NW Bicester

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

Environmental Statement Volume 3: Appendices

Hyder

P3Eco Ltd

a2dominion

Hyder Consulting (UK) Limited
2212959
5th Floor
The Pithay
All Saints Street
Bristol BS1 2NL
United Kingdom
Tel: +44 (0)117 372 1500
Fax: +44 (0)117 372 1508
www.hyderconsulting.com

P3 Eco (Bicester) Ltd and A2Dominion Group

Bicester Eco Development

Exemplar Environmental Statement

Volume 3: Appendices

Author	Various	
Checker	Caroline Soubry-Smith / Julia Faure Walker	
Approver	Andrew Saunders	

Report No	0505-UA001881-UP31R-01
Date	November 2010

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Hyder Consulting (UK) Limited
4th Floor
29 Bressenden Place
London
SW1E 5DZ
United Kingdom
Tel: +44 (0)203 014 9000
Fax: +44 (0)207 828 1794
www.hyderconsulting.com

Planning Department
Cherwell District Council
Bodicote House
Bodicote
Banbury
OX15 4AA

Our Ref 0504-UA001881-U31L-01

Direct Line +44 (0)20 3014 9157

2 August 2010

Dear Sir or Madam

Bicester Eco-town Exemplar Site: Environmental Impact Assessment (EIA) Request for Screening and Scoping Opinion

We are writing on behalf of our clients, P3 Eco and A2 Dominion, regarding the need for and scope of an Environmental Impact Assessment to accompany the outline planning application for the Bicester Eco-town Exemplar Site.

The proposed site is 33ha, and works will comprise of the following:

- approximately 400 residential units;
- a Care Home (Class C2);
- a primary school;
- B1(a) office accommodation;
- retail units (class A1 – A5);
- social and community facilities within class D with associated means of access;
- car parking;
- landscape;
- amenity space; and
- service infrastructure.

Further details of the proposals, including a location plan and site boundary are provided in the attached report.

This is a formal request for a screening opinion under Regulation 5(1) of the Town and Country Planning (Environmental Impact Assessment) Regulations 1999 (as amended). We note that a response to this formal request is required to be made within three weeks.

Given the nature and scale of the proposed development, we understand that it is likely that an EIA will be required, and we therefore also request a formal opinion on the scope of the assessment. We have prepared a Scoping Report for the Exemplar Site of the Eco-town development, which outlines the key constraints identified and our proposed approach to assessment for each topic. We kindly request that your formal scoping response be provided within the statutory period of five weeks.

However, in the meantime, we are proceeding with our assessment of the Exemplar Site, in line with the approach outlined in the attached Scoping Report, and would therefore welcome interim discussions and comments on our proposed approach.

If you have any queries, please do not hesitate to contact me on the direct dial provided above or by e-mail at caroline.soubry-smith@hyderconsulting.com.

Yours sincerely

Caroline Soubry-Smith
Principal Environmental Consultant

Enc Bicester Eco-town Exemplar Site Scoping Report

P3Eco Ltd

Hyder

a2dominion

Bicester Eco Town - Exemplar Site

Environmental Impact Assessment

Scoping Report

Hyder Consulting (UK) Limited
2212959
29 Bressenden Place
London SW1E 5DZ
United Kingdom
Tel: +44 (0)1483 240686
Fax: +44 (0)870 000 3905
www.hyderconsulting.com

Bicester Eco Town - Exemplar Site

Environmental Impact Assessment

Scoping Report

Author	Various, compiled by Julia Bentley	
Checker	Caroline Soubry-Smith	
Approver	Julian Galloway	

Report No 0501-UA001881-UA31R-01

Date 19 July 2010

This report has been prepared for P3 Eco Ltd and A2 Dominion in accordance with the terms and conditions of appointment for Bicester Ecotown. Hyder Consulting (UK) Limited (2212959) cannot accept any responsibility for any use of or reliance on the contents of this report by any third party.

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1 INTRODUCTION

1.1 Background

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

Within the PPS1 supplement, eco-towns are to provide as sustainable developments of at least 5,000 homes with other ancillary developments to include one job per household. Four 'first wave' locations were identified with the potential to have an Eco-town; including north-west Bicester.

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

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'*[1] *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 north-west Bicester Eco-town is being developed by P3 Eco and A2 Dominion, and lies within the jurisdiction of Cherwell District Council (Cherwell DC). Part of the eco-town development comprises the Exemplar Site development. This is being brought forward as the first phase of the project and is proposed for the north-eastern edge of the Eco-town development area. This Scoping Report has been prepared in relation to this Exemplar Site development, therefore it does not relate to the full extent of the Eco-town site.

[1] Active Design – www.sportengland.org/planning_active_design

1.2 Need for an Environmental Impact Assessment (EIA)

EIA is a procedure for ensuring that the likely environmental effects of a new development are properly understood by the public and relevant competent authorities before a decision is made to grant planning consent. Under The Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999 as amended) (hereafter, the EIA Regulations), the proposal is considered to be a “Schedule 2” development which will require a formal EIA due to its scale and proximity to sensitive areas. Each outline planning application will therefore be accompanied by an ES.

1.3 Purpose and Structure of this Document

While there is no statutory requirement to undertake or report on scoping of an EIA, it is considered that defining and agreeing the scope of the EIA is one of the most critical parts of the planning process in that it sets the context for the detailed assessment that follows and ensures that it conforms to the requirements of the EIA Regulations. Consequently, the objectives of the scoping process undertaken for the development and reported in this document are to:

- Identify the topics and issues that are proposed to be the focus of the EIA
- Eliminate any topics and issues not requiring further consideration and which would therefore not be taken further in the EIA
- Define the scope of the study for each of the topics and issues to be considered
- Identify the methodologies being followed for conducting baseline studies
- Identify the methodologies being followed for predicting environmental effects and for evaluating the significance and severity of environmental effects
- Identify the methods to be adopted for incorporation of mitigation and other environmentally driven modifications into the design, as it develops
- Identify consultees to be included in the data collection and the EIA process

Following this Introduction, the report is structured as follows:

- Chapter 2 briefly describes the site and its context, including project nature and purpose
- Chapter 3 outlines the main environmental topics to be considered, the key issues and the further data collection required. For each topic, a definition of the study area, summary of existing site description, potential impacts, potential mitigation measures, proposed methodologies and consultations have been included
- Chapter 4 provides a summary of the Scoping Report

Baseline information has been gathered through desk top studies, including websites and previous project reports. No primary data collection has currently been undertaken.

2 THE PROJECT

2.1 Site Description

The town of Bicester lies approximately 24km to the northeast 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-town site lies to the north west of Bicester, approximately 1.5km from the town centre, and comprises an area of approximately 413ha. The site, shown on Figure 2.1, currently comprises Grade 3 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.

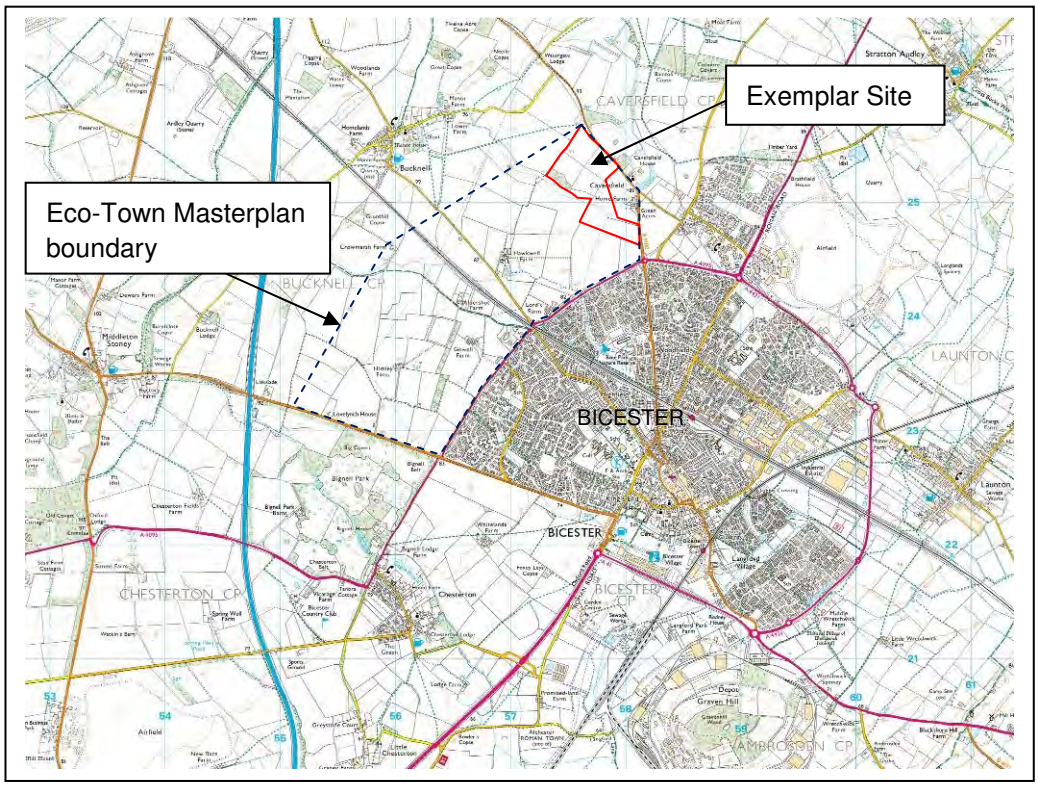

Figure 2.1: Site Location Plan

Figure 2.2 illustrates the site boundary for the Exemplar Site, comprising two main zones for development and a zone in between to allow a connection between the developments. This Site lies within the whole Eco-town site boundary, at its north-eastern edge, and lies due north of Bicester town. The Exemplar Site boundary runs alongside the B4100, and covers an area of approximately 33ha, of which 18.48ha lies within the two zones for development.

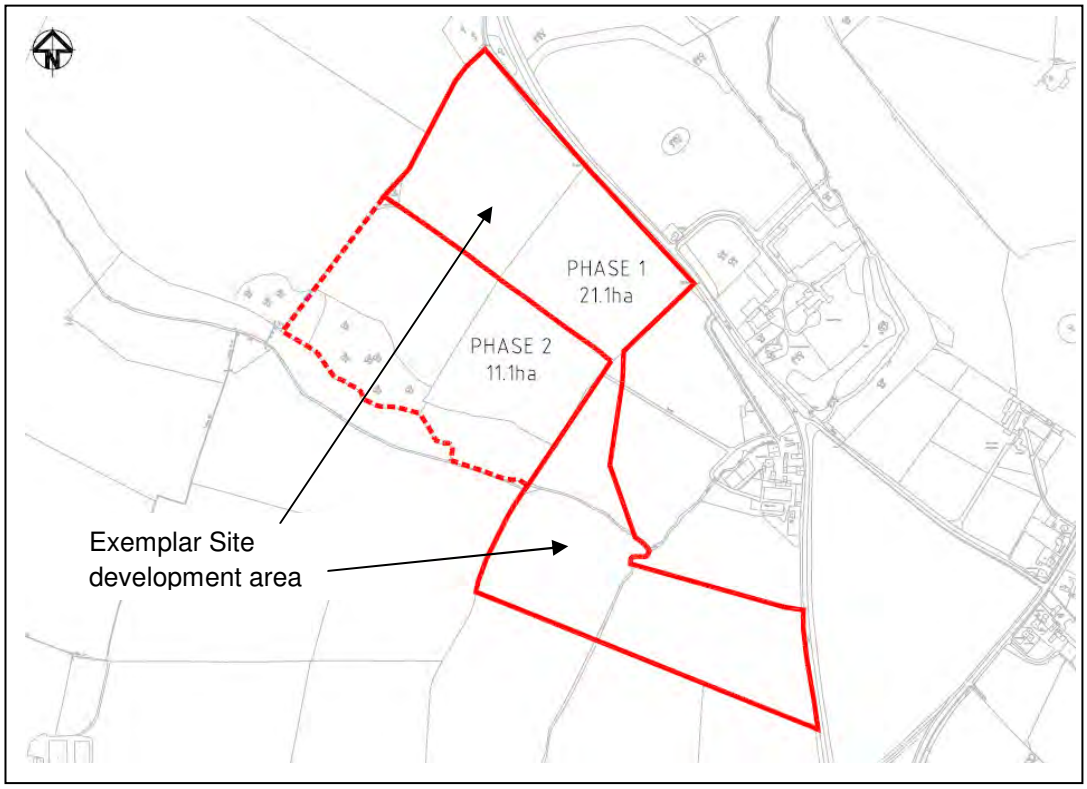

Figure 2.2: Exemplar Site Plan

2.2 Background to the Development

P3Eco Ltd, who have options to acquire land to the north west of Bicester, and have selected A2Dominion as its development partner for the promotion and implementation of the Exemplar Site scheme, and also as affordable housing partner in respect of the wider master plan proposals. The land at north west Bicester is identified in the Supplement to PPS1 entitled 'Eco-towns' (July 2009) as a location for a potential Eco-town.

P3Eco are promoting the overall site for a development comprising an Eco-town through the Cherwell Core Strategy DPD. Within the Core Strategy, Cherwell District Council have 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
- Homes that achieve at least Level 4 of the Code for Sustainable Homes

- Access to one employment opportunity for each new dwelling within easy reach by walking, cycling and / or public transport
- Encouraging trips originating from the development to be made by means other than the car with potential to rise to 50%
- 40% of the total gross site area will be provided as green space of which half will be public open space

It is the Council's intention to identify the land at north west 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 north west Bicester Eco-Development allocation is defined at Appendix "6" of the emerging Core Strategy.

The PPS1 supplement advises that it is for the local planning authority to decide whether it wishes to meet its strategic housing requirements by way of 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 Council's 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 paras. 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 draft Core Strategy (February 2010) 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-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 either through an Area Action Plan ('AAP') or a Supplementary Planning Document ('SPD').

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-town, 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 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.

The purpose of this brief is to set out the principles of the development of the Eco-town at north west Bicester, to help inform the preparation of the Core Strategy and related policy documents. The brief will inform the preparation of a masterplan for the site and related planning applications.

2.3 The Exemplar Site Proposals

The first phase of the Eco-town to be developed will be the Exemplar Site, which lies in the north-eastern area of the site. The Exemplar Site is shown on Figure 2.2, with two areas of key development, with a connection zone lying in between. The development proposals include provision for the following:

- Approximately 400 residential units
- A Care Home (Class C2)
- A primary school
- B1(a) office accommodation
- Retail units (class A1 – A5)
- Social and community facilities within class D with associated means of access
- Car parking
- Landscape
- Amenity space
- Service infrastructure

Currently, the Exemplar Site planning application is submitted in outline with all matters reserved, except for access. In addition, full planning permission will be sought for the residential development, means of access thereto, and associated car parking, landscape, amenity space and service infrastructure.

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

2.4 Development Programme

The key planning and development milestones associated with the Exemplar Site and the wider Eco-town development have been set out in Table1 below:

Table 1: Development Programme

Milestone	Planned Programme
Submission of Exemplar Planning Application	November 2010
Update of Project Masterplan	February 2011
Planning Committee (Exemplar Site)	March 2011
Completion of Masterplan Work	August 2011

3 PROPOSED EIA SCOPE

3.1 EIA Approach

The EIA will be carried out in accordance with the legal requirements of the EIA Regulations, which implement EC Directive 85/337/EEC and its amendment 97/11/EC.

Several guideline documents have been used in defining the scope of the EIA and the assessment methodology to be used. The scoping exercise has also been based on experience of EIA for similar projects. In addition to observing the formal requirements of the EIA directives, and the EIA Regulations further formal guidance will inform the assessment. Examples include Environmental Impact Assessment: A Guide to Procedures (DCLG, 2000 and amendment 2001); Planning Policy Guidance (PPG) Notes and Planning Policy Statements (PPS); and Guidelines for Environmental Impact Assessment (IEMA, 2004).

In accordance with relevant guidelines, the EIA will incorporate 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 will identify resources and receptors that will need to be taken into account during the assessment process.

Assessment Scenarios: For all topics, assessments are 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 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 will be used to assess these impacts.

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

Determining Significance: Determining the severity of an effect and deciding whether or not it is significant, are important steps in the formal EIA process, and are necessary in order to satisfy statutory reporting requirements. In general, the severity 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.

Cumulative Impacts: 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

Consultation: During the EIA process statutory and key non-statutory consultees have been, and will continue to be, engaged both as a part of the scoping process and during ES preparation. They will include: English Heritage, Natural England, the Environment Agency, and Cherwell District Council.

3.2 EIA Topics

With regard to the EIA guidelines, a number of EIA topics have been identified which are considered to warrant assessment. Our proposed approach to assessment for each of these topics is described in the Table 2 overleaf.

Table 2: EIA Topics and Scope

	Proposed Study Area	Existing Site Description	Further Data Collection Proposed	Potential Impacts	Mitigation and Opportunities for Enhancement	Proposed Assessment Methodology	Consultation
3.2.1 Air Quality	The air quality study area comprises the whole Exemplar Site; this has been selected because it will be necessary to establish whether any future sensitive receptors (e.g. residents, schools and hospitals) are predicted to experience concentrations of pollutants above the Air Quality Strategy (AQS) objectives. Roads in the vicinity of the site and receptors on these routes will be included within this assessment; these may include routes along the A4095, the B4100 and the M40.	Currently, Cherwell DC has not declared any Air Quality Management Areas (AQMAs) within their administrative boundary. The 2009 Updating and Screening Assessment did, however, identify monitored exceedances of the annual mean objective for NO_2 and has recommended a detailed assessment for three areas. This includes Queens Avenue within Bicester itself which is the only of the three areas in the vicinity of the development. The detailed assessment is not yet complete but contact will be maintained with Cherwell DC's Environmental Health Officer (EHO) to establish whether an AQMA will be established in Bicester. All other pollutants have been found not to exceed the relevant AQS objectives. Cherwell DC has one continuous automatic monitor but this is located in Banbury, a significant distance from Bicester. There are a number of NO_2 diffusion tube monitoring locations closer to the site. Further diffusion tubes have been commissioned in the vicinity of an exceedance at Queens Avenue in late 2009. It is expected that annual average results would be made available by late 2010. The monitoring data suggests that exceedances of the annual mean NO_2 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	In order to establish baseline conditions in the vicinity of the site, it is recommended that a three month diffusion tube survey is carried out for the whole site. This is the minimum length of time required by Local Air Quality Management Technical Guidance (LAQM.TG) (2009). This should be undertaken to establish background concentrations in the area and to identify a current baseline along roads where future development may take place, and along roads that are potentially affected by changes in traffic flow that trigger the DMRB criteria. This will require data from the Transport Assessment to inform the necessary monitoring locations.	The development has the potential to impact air quality in two ways, dust and emissions from the construction phase, and operational emissions from traffic movements and on-site energy production. Construction impacts will primarily be related to dust emissions that can result in enhanced dust soiling and may, without adequate mitigation, temporarily affect amenity use and, potentially, commercial operations.. Exhaust emissions from on-site plant and from vehicles accessing the works may also affect local air quality. 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_2 and PM_{10}.	The main effect on air quality will be from the increase in traffic associated with the development. It will be important in terms of air quality and the overall sustainability of the site to implement sustainable travel measures, ensure the site is designed with travel minimisation in mind and ensure access to local transport facilities is facilitated. For example, there are proposals for a new rail link between Bicester and Oxford allowing direct links to London. It will be essential to minimise car travel to Bicester Town station by ensuring that fast and efficient public transport links are established between the Eco-Town and the station. Soft mitigation measures like siting sensitive receptors away from pollution sources such as busy roads and the Energy Centre should be taken account of in the master plan.	It is recommended that construction dust and emissions are assessed following the Best Practice Guidance issued by the London Councils, 'Control of dust and emissions from construction and demolition.' Although Bicester Eco-Town 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 air quality impacts will be assessed utilising the guidance in the Design Manual for Roads and Bridges (DMRB) Volume 11 Environmental Assessment. Section 3 Environmental Assessment Techniques Part 1 HA 207/07 and LAQM.TG (2009). The criteria defined in the DMRB air quality chapter will be used to identify those roads which are likely to be affected by the development. It is proposed that the assessment is undertaken using the DMRB screening model. If there is the risk of potential exceedances of the AQS objectives at receptors, detailed modelling using ADMS Roads will be undertaken. Assessments of the baseline year and the opening year should be undertaken with the latter including the 'do minimum' and 'do something' scenarios. This assessment will utilise data provided from the transport assessment. The significance criteria used will be those outlined in the Environmental Protection UK 'Development Control:	The Environmental Protection Officer (EPO) at Cherwell DC has been contacted with respect to baseline data collection. It will be necessary to continue to consult with the EPO throughout the EIA process.

	Proposed Study Area	Existing Site Description	Further Data Collection Proposed	Potential Impacts	Mitigation and Opportunities for Enhancement	Proposed Assessment Methodology	Consultation
		Bicester. Tamarisk Gardens monitoring location is closest to the Exemplar Site; on the edge of Bicester with the diffusion tube located approximately 30 metres back from the A4095. This shows that at background locations away from roads, the concentrations are significantly below the annual mean objective for NO_2.				Planning for Air Quality (2010 update)'.	
3.2.2 Noise	To assess the operational impact due to road traffic noise of the Exemplar Site the study area will extend out 2km from the boundary of the site in accordance with The Design Manual for Roads and Bridges (DMRB), Volume 11, Section 3, Part 7. The effects upon traffic flows on every road within this study area will form the basis for the noise impact upon existing receptors from road traffic noise. In order to establish if the Exemplar Site would be suitable for residential use the extent of the study area would cover 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). The study area for construction noise will be defined by the nearest sensitive receptors to the boundary of the sites. It is usual to include all sensitive receptors within 100m of the boundary. The study area will however change as different phases of the development are constructed.	An aerial overview of the site indicates that road traffic noise from the A4095 and B4100 would be the dominant noise source across the site. There are no dominant sources of industrial noise in close proximity to the site.	A full noise survey will need to be undertaken at the Exemplar Site and at selected sensitive receptors within the study area. The $L_{Aeq,T}$; L_{A90}; L_{A10}; L_{Amin} and L_{Amax} will be measured at all locations. It anticipated that measurements will be carried out at 4 locations for a period of 4 days. This would allow for data to be collected on a typical weekday, a Friday and a weekend. This will need to be confirmed in consultation with the EHO for Cherwell District Council. The above monitoring scenario is based on the assumption that outdoor noise kits can be placed at secure locations. Should it be found that monitoring locations are not secure, short duration attended measurements will need to be agreed with Cherwell District Council.	Potential increase in local ambient noise levels due to increases in traffic flows on surrounding road network. Operational noise impacts can also be expected from plant and equipment related to the commercial component of the development. These impacts would be assessed in terms of BS 4142. Background noise measurements will be taken at nearby residential receptors to assess the plant noise. It will also be assumed that once the Bicester Eco Town is occupied, background noise levels will be similar to those measured in adjacent residential areas. These noise levels will be used to recommend design noise limits for plant to be installed on site. Potential for construction noise to cause a nuisance for sensitive receptors in the vicinity of the site. The type and extent of noise impact will be dependent upon the contractor's chosen methods of working. Examples of potential noise sources include traffic noise from haulage vehicles, piling and movement of materials. Vibration levels from any piling on site will be discussed in a qualitative nature. At this stage	Across the site mitigation measures will be recommended to ensure that all residential dwellings will fall into noise exposure category A or B as defined in PPG 24. A number of measures can be introduced to control the source of, or limit exposure to, noise. Such measures will be proportionate and reasonable and may include one or more of the following: ▪ Lay-out: If there are any proposed residential dwellings which will be close to existing roads, then site layout should be considered with non critical rooms (kitchens & bathrooms) designed to face the roads. The design of the site could also be utilised in order for buildings to act as noise screening for the development ▪ For the operational aspect of the development any increases of over 3dB due to road traffic noise which would occur 15 years after opening will be mitigated against if possible. Different forms of mitigation could include the use of noise barriers or the implementation of low noise surfacing on affected road links	The assessment of operational impacts from road traffic noise will be undertaken in accordance with DMRB Volume 11, Part 7, Section 3 – Noise and Vibration. The assessment of whether the proposed site would be suitable for residual use would be 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.	No consultations have been undertaken to date. Pending is a response from Local Environmental Health Officer regarding the selection of noise monitoring locations.

	Proposed Study Area	Existing Site Description	Further Data Collection Proposed	Potential Impacts	Mitigation and Opportunities for Enhancement	Proposed Assessment Methodology	Consultation
				in the planning process it is unlikely that sufficient information would be available to allow vibration levels to be predicted at identified receptors.	▪ Noise control measures consistent with good working practices would be implemented during the construction phase. The noise control measures would be developed within a Construction Environmental Management Plan (CEMP), which would be prepared prior to construction commencing		
3.2.3 Landscape and Visual Impact	The study area will be defined by the Zone of Visual Influence (ZVI) of the development, which is subject to detailed analysis. Given the relatively flat topography, vegetation cover and adjacent urban area, the ZVI is not anticipated to extend greater than approximately 1km beyond the site boundary.	The existing site is not covered by any landscape designations. Landscape Character is defined by the transition between Natural England National Character Areas 107 and 108, the 'Cotswolds' and 'Upper Thames Clay Vales', respectively. The site is largely made up of mixed farmland with landscape elements/features including copses, hedgerows and isolated properties/ farmsteads. There is an area of woodland located within the site boundary. Key visual receptors, within and adjacent to the site, potentially include local Public Rights of Way, residential properties at the northern edge of Bicester, and outlying small settlements/properties (such as Caversfield), including Listed Buildings (Home Farm and the Church of St. Lawrence at Caversfield - see 3.4 below).	Local Landscape Character and site landscape features/elements; Zone of Visual Influence, visual receptors, and representative viewpoints.	Potential loss of local landscape elements potentially resulting in impacts on landscape character. Potential disturbance to views resulting in impacts on visual amenity. Potential loss of woodland which would have an impact on landscape character and visual amenity.	Given the wooded character of the landscape, green infrastructure/structural planting proposals have the potential to offer mitigation (replacement for any vegetation removal, and response to settings of visual receptors), and positively contribute to local landscape character, potentially resulting in enhancement.	The assessment will be undertaken in accordance with 'Guidelines for Landscape and Visual Impact Assessment: 2nd Edition', produced by the Landscape Institute and Institute of Environmental Management and Assessment (2002).	No consultation has been undertaken to date. Cherwell DC will be contacted regarding the selection of viewpoints.
3.2.4 Archaeology & Cultural Heritage	The study area for archaeology and built heritage will be 500m from the site boundary. It is considered that this will be a sufficiently large area to allow for a determination of the archaeological potential of the site. The study area for historic landscape will be defined by the Zone of Visual Influence of	The existing site does not contain any statutory designated sites. There are two listed buildings adjacent to the site boundary, the Grade II* St Lawrence's Church and the grade II Home Farmhouse, Caversfield Manor House is also located adjacent to the eastern boundary of the site.	Relevant cartographic sources will be analysed including OS maps and Tithe maps if available. A visit will be made to the Records Office and the relevant local Studies Library to gather data from appropriate textual sources which could include directories and local	The proposed development has the potential to impact upon as yet unknown archaeological remains within the site, possibly related to the two areas of known archaeology to the east and west. There is also the potential to	The archaeological potential will need to be fully evaluated and archaeological remains present conserved in the most appropriate manner either through considerate design avoiding the most sensitive areas or archaeological excavation and recording.	The assessment will be undertaken in accordance with PPS5 Planning for the Historic Environment (2010). Initially a Desk-based Assessment will be undertaken. The Desk-based Assessment will follow the standards set out in the IFA	To date initial consultation has been undertaken with, the Planning Archaeologist at Oxfordshire County Council who has recommended that the archaeological potential of the site will need to be assessed by a Desk-based Assessment and confirmed by evaluation prior to the

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	the development. This is anticipated to be larger than the archaeology and built heritage study area and will allow for a range of landscape features to be considered in the assessment.	Whilst the manor house is not listed it is of historical significance. To the west of the site an enclosure has been identified on aerial photographs and to the east of the site the deserted medieval village of Caversfield has been recorded. The nearest Conservation Area and Scheduled Ancient Monuments are located approximately 2km away at RAF Bicester and are separated from the site by an area of settlement so are therefore unlikely to be affected.	history studies. A site walkover will be carried out to survey the site for evidence of archaeological assets and possible disturbance that may have affected any archaeological remains. Data will also be gathered on the historic landscape of the site and study area.	impact upon the setting of the two listed buildings and the building of historic value adjacent to the site boundary.	The impacts on the setting of the listed building can be minimised by preserving key lines of sight through considered design and planting. Sympathetic design of key structures within the new development could also help to complement the existing historic buildings. In order to determine the archaeological potential of the site, there could be geophysical survey and/or archaeological evaluation in line with the recommendations of the Planning Archaeologist at Oxfordshire County Council.	Standards and Guidance for Desk-based Assessment (2008) and will comprise a full archaeological and historic baseline, the results of the site walkover survey and will make recommendations for any further work required to fully determine the archaeological potential of the site. The Desk-based Assessment and the results of any further fieldwork will then inform the Cultural Heritage chapter of the Environmental Statement (ES). The ES will follow the methodology laid out in the Highways Agency Design Manual for Roads and Bridges (2007) and any archaeological fieldwork carried out will follow the relevant IFA Standards and Guidance.	determination of any application for the site. Ongoing consultation will be carried out with the Planning Archaeologist regarding the archaeological potential of the site and consultation will be undertaken with the relevant Conservation Officer regarding the Listed Buildings.
3.2.5 Human Health	The study area for the human health assessment is closely related to that used for other environmental topics as human health is a cross-cutting topic that influences and is influenced by a number of other environmental factors. To understand existing health status, a study area covering Cherwell DC will be used with a focus upon the ward in which the Exemplar Site is situated (Caversfield) and those within the immediate vicinity. This is to ensure that existing health patterns for the communities surrounding the site are characterised. Reference will also be made, where necessary, to trends reported for Oxfordshire to provide appropriate contextual information and comparative	The assessment of effects on human health will utilise baseline data collated for other environmental topics including: ▪ Details about the demographic profile and the provision of community and social infrastructure within the socio-economic assessment ▪ Location of Public Rights of Way in the vicinity of the site ▪ Details of existing and potential areas of land contamination presented within the geology and soils assessment ▪ Existing air quality and noise issues presented as part of the air quality and noise and vibration assessments	Further statistics about the health status of those communities that could be affected including incidence of mortality from key diseases such as cancer, coronary heart disease and respiratory disease, as well as health conditions linked to lifestyles, including incidence of obesity and type II diabetes. Accessibility indicators which demonstrate the current accessibility of the public to facilities including primary schools, secondary schools, GPs, hospitals, further education, and the means of access available, e.g. walking, cycling, public transport, will be collated. Further details will be obtained about the provision and capacity of local healthcare	The following impacts from the development could affect human health and will be considered during the assessment: ▪ Changes to noise and vibration ▪ Changes to air quality ▪ Generation of waste during construction and waste management techniques employed at the site ▪ Changes to the landscape and the built environment and the effects upon the ability to pursue healthy lifestyles ▪ Changes to the transport network ▪ Accessibility to community networks and facilities	Connections to nearby footpaths and bridleways should be provided as part of the scheme. There may be scope to provide a green connection/corridor to the Bure Park Nature Reserve in Bicester. Opportunities should be sought to maximise engagement and collaboration with local residents such that they feel engaged in the process and can actively contribute to the urban space that will be created. This could help contribute to a greater sense of belonging and place. Consultation events should consider the types of open space that are needed and the types of public art that could be incorporated into them to help create a sense of place and	A standalone Health Impact Assessment (HIA) is not being undertaken for this Scheme, 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 considered holistically. The methods proposed within the Merseyside Guidelines for HIA[3] will be used to guide the assessment of effects on human health although they will be adapted to reflect the integration of human health considerations into the ES. The assessment will use a broad definition of health which recognises that health is affected by more than simply the presence or absence of	No consultation has been undertaken to date. During the preparation of the assessment, consultation will be undertaken with the Decision Support Team of the Oxfordshire Primary Care Trust to obtain baseline data, to discuss the availability of healthcare facilities and to discuss potential opportunities for the design of the scheme. Consultation utilising focus groups and workshops specific to human health issues will not form a specific part of the EIA methodology. However, stakeholder events are to be held as part of the site design process and the information from these events will be used to inform the assessment where appropriate.

[3] Alex Scott-Samuel, Birley, Martin and Ardern, Kate (May 2001) The Merseyside Guidelines for Health Impact Assessment

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	statistics. The assessment will utilise the results of other topics. These topics may use different study areas to that defined above and this will be acknowledged in the ES. The study area, therefore, will vary depending upon the health determinants being considered as part of the assessment.	▪ Existing green space infrastructure presented in both the socio-economic and landscape assessments The health status of the population living in Cherwell district is generally good with life expectancy above the England average. Over the past ten years there have been health improvements with the rates of death from all causes combined and of early death from heart disease having improved. However, there are issues linked to rate of road injuries and death and rates of violent crime which are above the England average. Despite there being good levels of health overall, there are health inequalities with significant differences in health outcomes for those living in the most affluent wards to those residents who live in the more deprived communities.	facilities. Data will also be sourced from the South East Public Health Observatory and Cherwell DC as necessary.		ownership. The Exemplar Site needs to incorporate areas of open space that complement the requirements of the Cherwell Green Space Strategy. It also needs to provide opportunities for informal sport and recreation that could benefit health in the long-term and provide opportunities for meeting places amongst communities to promote social interaction. Issues including natural surveillance and perceptions of safety should also be integral to the design of areas of open space. The design of the Exemplar Site should ensure that cyclists and pedestrians are given priority over vehicular traffic. The design and facilities provided in the Eco-town need to meet the requirements of all sectors of society (the Public Health Strategy[2] cites a predicted 150% increase in the number of people aged over 85 between 2004 and 2029 in Cherwell).	disease and is influenced by a range of health determinants. The assessment will determine how the health determinants will be affected by the Exemplar Site which could result in a change in health outcomes. The following health determinants will be considered in the assessment: ▪ Noise ▪ Air quality ▪ Landscape and the built environment ▪ Waste management ▪ Exposure to contamination ▪ Accessibility to community and social networks including health services ▪ Physical activity ▪ Transport ▪ Community networks ▪ Safety and security ▪ Community engagement and empowerment The cross-cutting nature of the human health assessment will require the use of results presented in other environmental topics to determine the potential effects of the Exemplar Site on health outcomes.	
3.2.6 Agriculture & Land Use	The assessment will be based on the whole of the Exemplar Site. However, the potential impacts will need to be put into a regional and national context, in particular in relation to the loss of agricultural land.	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	Existing soil information has been collated through published soil maps and a Soils Site Report obtained from the National Soil Resources Institute. Agricultural Land Classification (ALC) maps have been obtained from the MAGIC website. Further soil and ALC information will be sought from	The site is approximately 33ha in area and therefore has the potential to affect a significant area of existing agricultural land, particularly if all or the majority of this is of Grade 3a land. This will, to some extent, depend on the availability of other BMV (Best and Most Versatile, i.e. land which falls into grades 1,2 and 3a) land.	There may be opportunities under the following headings: **Soil handling and re-use** The soil handling methodologies as set out in the Construction Code of Practice for the Sustainable Use of Soils on Construction Sites (DEFRA, 2009) should be followed. This should include the development of a Soil	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	Consultation with Natural England and the landowner(s) will be undertaken.

[2] Oxfordshire Partnership (December 2007) Public Health Strategy for Oxfordshire

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		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 appears to be predominantly under arable production with some grazing. The ground appears to have a low topography. The land is shown as being Grade 3 (under the Agricultural Land Classification Scheme). Whilst Grade 3a land falls within the 'Best and Most Versatile' category (BMV) this distinction is not shown on published plans. There are no farm buildings within the site, although it is not known if there are any services, such as water pipes feeding watering troughs, across the site. There appears to be an access route into fields to the north-west of the site through the central part of the site.	Natural England, along with information on whether any of the land is within a Stewardship Agreement. If it is not possible to ascertain the ALC Grade (i.e. 3a or 3b) from available information an ALC survey will be required. The landowner will also be contacted in order to assess the potential for impacts on farm viability.	The impact on farm viability will depend on the overall size of the land holding, and whether the development will result in changes to how the surrounding land was accessed (such as resulting in longer travel times to and from fields outside the boundary).	Resources Plan. This can have significant benefits in terms of reducing the environmental impacts of transporting and disposing of surplus materials. This should be tied in with the Site Waste Management Plan. **Use of Sustainable Drainage Systems (SUDS)** Within the SUDS opportunities will be taken to maximise the use of soils won from site to both attenuate and treat flows during both the construction and operational phases. **Local food production** Opportunities to promote local food production, and to maximise the ability of the soils to support this, should be taken. Advice should be provided to home and allotment growers on how best to handle and care for the soil resource. This may go some way to mitigating for the overall loss of agricultural productivity across the site. **Biodiversity** Within the Soil Resources Plan specific soils should be identified for use in habitat creation areas. These soils have the potential (depending on nutrient status in particular) to support species-rich grassland and woodland communities and inclusion of such habitats would enhance the biodiversity of the site.	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 Current best practice and professional judgement will be used to define significant criteria in relation to both agricultural land and farming businesses.	
3.2.7 Ecology	The assessment will be based on surveys that have been undertaken within the wider Ecotown site and targeted surveys within the exemplar site itself. Desk information will be obtained for land that is up to 5km from the Ecotown site boundary.	The Exemplar Site is comprised of arable land and semi-improved neutral grassland with boundary hedgerows. The majority of the hedgerows are species-rich, with some substantial features that appear to be ancient in origin. There is one	The MAGIC and NBN websites have been reviewed and further desk study information will be obtained from Thames Valley Environmental Records Centre, the Hawk and Owl Trust, and Butterfly Conservation. Surveys that have been	The following impacts from the development could affect ecology and will be considered during the assessment: ▪ Loss of arable land, thus the loss of habitat that is used by nesting farmland birds and foraging barn	A large part of the site would be retained as open space thus there is considerable scope to offset any impacts on terrestrial invertebrates, farmland birds, foraging barn owls and bats. Measures to protect and enhance the retained and newly created semi-natural	The 'Guidelines for Ecological Impact Assessment in the United Kingdom' (IEEM 2006) will be followed with respect to the assessment of impacts.	The consultees listed below have been consulted with respect to the scope of the Ecological Surveys and will continue to be consulted thorough out the assessment process: ▪ Cherwell DC Biodiversity/Countryside

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	The study area therefore comprises the Exemplar site and a wider area, as appropriate, for designated sites of nature conservation importance and for particular species and groups of conservation concern.	small block of semi-natural broad-leaved woodland within the site. Many of the canopy trees have been removed and the woodland is largely comprised of shrub species with a patchy ground flora. Game birds are reared in this woodland. There is a stream within the site and water quality within this watercourse appeared to be good. Ecological surveys are ongoing and thus the full survey results are not available. However, it is known that the site is used by farmland birds and may be of value to barn owls. It is likely that the site will support common species of reptiles (slow-worm, common lizard and grass snake). Surveys have revealed that great crested newts are present in the area, but not within or immediately adjacent to the Exemplar Site. The hedgerows, and potentially the grassland habitats, appear to be of value to terrestrial invertebrates, and butterflies in particular. The presence of white clawed crayfish has been confirmed within the watercourse close to the Exemplar Site, but survey work has yet to be undertaken within the site. There is a confirmed bat roost within the farm buildings close to the site and a large number of potential bat roost site in trees have also been identified. There are two large badger setts within the site. Both brown hare and hedgehog have been recorded on site. There is one Sites of Special Scientific Interest (SSSI) located within 2km of the Exemplar Site boundary. This	completed include: a Phase 1 Habitat Survey and surveys for great crested newts. Surveys that are in progress or will be undertaken include those for terrestrial invertebrates; white clawed crayfish; reptiles; breeding birds; dormice; bat emergence and activity surveys; water voles; otters, and botanical surveys of the hedgerows and grassland.	owls ▪ Loss of semi-improved grassland that may be of value to terrestrial invertebrates, foraging bats and foraging barn owls ▪ Loss of open watercourse and/or fragmentation of the stream corridor with potential impacts on crayfish, otters, water voles and foraging bats ▪ Hedgerow loss and/or fragmentation of the hedgerow network with potential impacts on terrestrial invertebrates, dormice and foraging bats. ▪ Loss of trees that may support roosting bats ▪ The main badger sett will be retained, but there is the potential for the loss of badger setts or disturbance to badgers occupying the other large sett ▪ Lighting has the potential to affect wildlife using retained habitats, in particular invertebrates and foraging bats ▪ Loss of habitat that is used by reptiles, brown hare and hedgehogs It is not envisaged that the development would have an effect on great crested newts. Dust, noise and visual disturbance during construction are unlikely to lead to significant effects on wildlife. However, this will be reassessed when the survey results are available. Once built, there is the potential that the residents and their pets could have adverse effects on wildlife present within the retained habitats.	habitats within the development would be secured through a biodiversity strategy. Opportunities will be sought within the development proposals to create habitats of value to wildlife within any green spaces or green networks. If further surveys reveal that the grassland habitat is of value consideration will be given to retaining the grassland habitat in situ or relocating species-rich turves to areas of open space. There may also be scope to enhance the plant species diversity of retained grassland habitats. Careful consideration will be given to the design of the bridge crossings to reduce the fragmentation effects of access roads. The fragmentation of the hedgerow network and loss of trees will be kept to a minimum to avoid/reduce impacts on protected species. Hedgerows and stream corridors would be retained with suitable buffer zones to maintain their value for wildlife. These features will be incorporated into green corridors that provide for the movement of wildlife across the site. Careful consideration will be given to the layout to avoid/reduce impacts on the large badger sett that could be affected by the proposal. Lighting will be designed with care to avoid impacts on invertebrates (if appropriates) and foraging bats. Measures to protect and enhance the retained and newly created semi-natural		Officer and Eco town Project Manager ▪ Berkshire, Buckinghamshire and Oxfordshire Wildlife Trust Conservation Officer ▪ Natural England's Lead Environmental Planning Officer ; Oxford County Council's Ecologist and Natural Environment Manager ▪ Environment Agency's Biodiversity and Planning Officers

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		is designated for its geological attributes and lies to the north of RAF Bicester: Stratton Audley Quarries SSSI.			habitats within development would be secured through a biodiversity strategy. Careful design will ensure that impacts associated with the new residents and their pets are reduced as far as possible. The implementation of standard mitigation techniques would prevent any negative effects on water quality during construction and thus avoid downstream impacts and in particular any impacts on the down stream riverine SSSI. The careful design of the SUDS would avoid any adverse effects on watercourses during the operational phase of the development.		
3.2.8 Socio-economics & Community	Consideration of socio-economic and community effects will be focused within two defined spatial areas, both 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 Cavershield within which the site is located. Potential impacts in this area will be more direct in nature and more significant in scale. The WIZ will consider the site in the wider region, focusing on the Local Authority area of Oxfordshire and 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	The Exemplar Site is located just north west of Bicester town, adjacent to the B4100. Bicester is a rapidly expanding historic market town and now has a population of approximately 30,000. This represents growth of 50% since 1981. The growth of the town has been influenced by its location on the strategic road network close to junction 9 of the M40, where the A34 meets the A41. Bicester's economy is focused on defence activities at the Ministry of Development Bicester, storage and distribution, food processing, engineering and publishing. Its proximity to and close relationship with Oxford helps the town by creating opportunities for economic development. The draft Core Strategy for Cherwell DC, however, acknowledges that it can also make it competitively difficult to draw investment into	The following data collection is proposed as part of the assessment: ▪ Further assessment of demographics and deprivation in this area focusing on the Index of Multiple Deprivation and ward level data for the five electoral wards that form the CIZ ▪ Further breakdown of employment and unemployment statistics including industry of employment ▪ Understanding the provision of existing community facilities and their capacity within the area ▪ Baseline data will be used from published sources including the Office of National Statistics, the Annual Business Inquiry, Annual Survey of House and Earning, and consideration for Cherwell	During the construction stage the following impacts have been identified: ▪ The potential to generate direct and indirect employment ▪ The potential impact on accessing key services and amenities such as health facilities, care services, schools and transportation hubs ▪ The potential to inhibit local leisure and recreation provision During the functional stage of the Exemplar Site the impacts are envisaged to include: ▪ The contribution to housing supply in terms of affordability and variety ▪ The contribution to the broader amenity and open space provision for the Bicester area ▪ The contribution to community facility and service provision including	Potential mitigation measures will include a local employment and training strategy and a communications and consultation strategy to ensure the community is informed in advance of planned works and disruption. For the functional phase of the Exemplar Site, mitigation measures are likely to also include ensuring adequate provision of social and community infrastructure, a local employment and training strategy, provision of access routes and communication routes between the new and existing community, and development of a community integration strategy.	The methodology for assessing temporary (construction) socio-economic effects will be based on the standard English Partnerships methodology, supplemented by a qualitative assessment of secondary disruption effects from traffic and other primary construction impacts. The methodology for assessing the 'functional' effects of the exemplar site mixes both quantitative and qualitative assessments as follows: ▪ Analysis of proposed land use and floor space provision to determine employment generation potential from the new development, coupled with an assessment of the likely effect on the employment availability for the existing economically active population ▪ Comparison of the provision of new social and community infrastructure	No consultation has been undertaken to date. During the preparation of the assessment, consultation will be undertaken with the following individuals or representatives of the socioeconomic themes: ▪ Tourism Officer, Cherwell District Council ▪ Public Rights of Way Officer, Oxfordshire County Council ▪ Healthcare Officer, Oxfordshire Primary Care Trust ▪ Town Centre Manager, Bicester Town Council ▪ Local Constabulary, Banbury Constabulary ▪ Education Services, Oxfordshire County Council ▪ Leisure and Recreation Officer, Cherwell District Council ▪ Social Services, Oxfordshire County Council

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	proposed development. The CIZ will be the focus for the consideration of impact to include an appreciation for community facility capacity and provision.	the town and results in high levels of out-commuting. A 2006 Employment Land Review also highlights the Chilterns, M25 corridor and London as market influences. In terms of planned future development of the settlement, it is important to note the following significant developments: ▪ 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 Sainsbury's 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^2 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	DC Annual Monitoring Reports. This will also be supplemented by consultations with representatives of key themes being considered ▪ Some of the socioeconomic datasets gathered will also provide the evidence base for the Health Impact Assessment ▪ In terms of social nuisances resulting from either the construction or functional stages of the Exemplar Site, this will draw on the research findings of other disciplines including 'air quality', 'noise' and 'landscape and visual' themes	health care facilities, potential community meeting venues and accommodation for possible outreach projects ▪ The impact on education facilities – primary, secondary and tertiary ▪ The potential impact on crime and anti-social behaviour. In this instance there is the potential to engage with a Police Crime Prevention Design Advisor ▪ The long-term contribution to local business capabilities and local economy ▪ The impact of the proposals on existing recreation sites and Public Rights of Way		with identified needs and existing under provision within the existing community ▪ Consideration of cumulative effects, for example development of the Exemplar Site alongside other developments in the locality ▪ Recommendation of mitigation measure, where appropriate ▪ Assessment of residual effects following implementation of mitigation measures	
3.2.9 Waste - Operation &	As Cherwell DC is the waste collection authority, the Study Area will comprise Cherwell District and any waste facilities	**Construction waste** The existing site is largely undeveloped land. It is anticipated that there will be	Further data collection is proposed for the following: ▪ Location of all treatment and disposal facilities for all	The following potential impacts have been identified: At a local level: ▪ waste storage – potential	**Construction waste** Against the context of the previously mentioned requirements of PPS1, the Eco	In order to assess the residual effects that the construction and operational waste produced by the new	Informal correspondence with the Head of Environmental Services at Cherwell District Council.

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Construction	that will receive waste arising from the Construction and Excavation, and Operational phases, of the development.	little or no demolition materials which would need to be considered for incorporation into the new-build phase of the project. It is anticipated that construction material waste likely to arise from the new-build phase will consist of hard and inert materials, soils and stones, plastics, packaging (wooden and plastic), insulation material, miscellaneous metals, canteen and office waste. PPS1 requires that Eco Towns 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** It is anticipated that types and quantities of waste generated during operation will be similar to those of Cherwell District and that recycling rates will be at least equivalent to Cherwell District. Cherwell DC recycling rates are already well above the UK average. According to WasteDataFlow approximately 59,000 tonnes of Municipal Waste was generated in Cherwell District in 2008/09 of which 29,000 tonnes was sent for recycling/composting/reuse. This equates to a recycling rate of 50%, compared to 42% in Oxfordshire and 38% in the country. PPS1 requires that Eco-towns are set targets for residual waste, recycling levels and landfill diversion which are more ambitious than those set	wastes generated during Construction and Excavation and Operational stages ▪ Waste targets for Cherwell DC in the 2010 Waste Strategy (currently under review) ▪ Details of Cherwell DC waste and recycling collection systems (materials collected, receptacles provided, frequency of collection etc) ▪ Details of any new preferred treatment/disposal option for the region and implications on collections from new build developments ▪ Details of any proposed Energy from Waste facility within the development and impacts and/or integration with waste management in the surrounding region	impacts are visual amenity, odour, restricted personal access ▪ collection vehicle access and manoeuvring – potential impacts are noise, odour and safety At regional level: potential impacts are ▪ not achieving recycling and waste avoidance targets ▪ the impacts of increased traffic movements through the region by the additional waste vehicles required to support the development. Environmental impacts of waste within treatment/ disposal facilities will not be included within this EIA.	Town has the opportunity to deliver Best Practice construction waste minimisation and management in accordance with the WRAP (Waste and Resources Action Programme) definition. **Operational waste** Against the context of the existing high recycling rates in the District and the requirements of PPS1, there is opportunity to design a showcase waste management system at the Eco Town. The waste management system (including waste storage and collection) will be designed to mitigate against potential local impacts and achieve maximum recycling and landfill diversion, thus mitigating against the potential impact of not meeting targets. It is assumed that any impacts of operational waste within treatment and disposal facilities will be addressed in the facility EIAs and covered by their license/permit conditions.	development two separate criteria will be used. Construction and operational waste will be assessed separately. These are detailed below: **Impact of waste destined for landfill**: This will be determined by the level of waste likely to be diverted from landfill by the development. For each level of impact (Very High to Negligible) a % diversion range will be applied which will be determined by the types of waste forecast to arise from the development. **Magnitude of potential effect**: This will be determined by the residual effect that the development will have on the existing and future local waste management strategy. Both criteria detailed above will assess the relevant waste baselines. The assessment of effects will be made taking into consideration the residual effects of the development based on the construction and operational waste production and the implementation of the mitigation measures to be delivered by the project.	Formal consultation required to: Discuss waste management aspirations for the Eco Town; Determine a formal position with regards to any future waste facilities in the region and implications on waste management at the development; Determine the implications of a potential Waste to Energy Facility on waste management at the development.

	Proposed Study Area	Existing Site Description	Further Data Collection Proposed	Potential Impacts	Mitigation and Opportunities for Enhancement	Proposed Assessment Methodology	Consultation
		out in the National Waste Strategy for 2007 which sets recycling/composting rates of at least 40% by 2010, 45% by 2015 and 50% by 2020.					
3.2.10 Flood risk & Hydrology	The study area for the water environment consists of the site, along with the catchment area of the two tributaries to the Bure and the extents of Bure from the A4095 (the downstream boundary of the site) to the confluence upstream of Caversfield House. The tributaries of the Bure included within the study area are: ▪ The stream flowing in a easterly direction from the north western boundary from its head to its confluence with the Bure at the A4095 ▪ 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 extends to the area immediately downstream of the A4095 to ensure that the flood risk posed to the site and elsewhere is not increased as a result of the development.	Surface water runoff across the site flows largely at greenfield rates to the Bure and its tributaries with the potential for localised ponding to occur in small low lying areas. The flood risk within the site is unconfirmed as the online EA flood maps are based upon coarse DTM and JFLOW modelling and are not considered suitable to delineate the flood plain to support a planning application. Therefore a hydraulic model will be constructed to confirm flood plain extents across the site. The EA maps cover the Bure (the onsite tributaries are too small to have previously been modelled) and indicate that the flood plain is constrained to the area immediately around the banks It is considered likely that the hydraulic model of the Bure and its tributaries will largely confirm this.	Topographical and channel surveys will be undertaken to inform the hydraulic model.	The development could lead to degradation in water quality in the receptor during construction and operational phases of the development. Surface water runoff rates could be increased leading to an increase in flood risk elsewhere. Flooding of the development could occur should buildings be placed within the flood plain.	At this stage the potential impacts and the proposed mitigation or opportunities of enhancement are considered to be: ▪ Flooding from increased surface water runoff: a conceptual drainage strategy utilising SUDS measures will be developed for the site to ensure that surface water runoff from the site is maintained at greenfield rates and water is not discharged to the surface water sewers where possible ▪ Flooding resulting from a reduction in floodplain: a hydraulic model will be constructed to delineate the floodplain, this will ensure that there is no loss of floodplain up to and including the 100 year event ▪ Biodiversity/Recreation: The water features within the site can be enhanced to provide increased values for biodiversity and recreation. This could be achieved through green corridors, channel maintenance, creation of a two stage channel ▪ The Ecotown will aspire to achieving water neutrality ▪ The development will aspire to meet the water consumption requirement of Level 5 of the code for sustainable homes ▪ No development will be located within Flood Zone 3	A standalone Flood Risk Assessment (FRA) will be undertaken for this Scheme, and will be appended to the ES. The ES will consider the impacts from the site upon the water quality and quantity regime both within the site and the receptor (River Bure) immediately downstream of the site.	Consultation has begun with the Environment Agency, and consultation will be undertaken with the drainage engineers at Cherwell DC.

	Proposed Study Area	Existing Site Description	Further Data Collection Proposed	Potential Impacts	Mitigation and Opportunities for Enhancement	Proposed Assessment Methodology	Consultation
					and where possible development will be avoided in Flood Zone 2.		
3.2.11 Contaminated Land	The Exemplar Site assessment will be undertaken as part of the wider Bicester Eco-Town assessment, which will focus on potential contaminants within, and in close proximity to the larger site boundary.	The Exemplar Site comprises arable land and semi-improved neutral grassland with boundary hedgerows. There are no buildings or other structures within the site area although it is not known whether there are any services present e.g. water pipes feeding watering troughs. There is no historical evidence of any past industrial or commercial activity on site that may have led to significant contamination of the soil. As such, if contaminants are present, these are expected to be related to agricultural land use i.e. herbicides, pesticides, and fertilisers, which would be expected to impact groundwater and surface water more severely than the soil. The geology of the area is such that the estimated probability of a property being above the Radon Action Level is 3 to 5%.	In order to prove or disprove the presence of contaminants within the soil and groundwater, it will be necessary to undertake an intrusive ground investigation comprising boreholes and machine-excavated trial pits. This will enable representative samples to be collected and sent for laboratory analysis.	The risks to the development through contaminants potentially contained within soil and/or water beneath the site are considered at this time to be low. During construction, there is a risk of localised pollution of the soil, groundwater and surface water through spills/leaks from construction plant and storage containers. However, the eventual impact on the ground from a mainly residential development is expected to be minimal.	During construction, correct site management procedures will be followed. Additionally, due to the geology of the area, it will be necessary to incorporate basic radon protection measures in the construction of new dwellings and extensions.	A human health and controlled waters risk assessment will be undertaken once contamination testing results are received following an intrusive ground investigation. This will determine whether the development will be affected by contaminants already present on site, and will also help determine whether any special measures will be necessary during construction.	No consultations have been undertaken to date. The contaminated land risk assessment will be based on factual data gathered through an intrusive ground investigation, with observations and recommendations made accordingly.

4 SUMMARY AND NEXT STEPS

4.1 Summary

Section 3 of this Scoping Report provides an outline of the existing site description and highlights potential impacts that may arise as a result of the Bicester Eco-Town Exemplar Site development. Following this initial desk-based review, it is proposed to consider the following environmental topics in the EIA for the eco-town:

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

Further data collection is required in order to inform the EIA. As part of this exercise, it is proposed to contact the following statutory and non-statutory organisations:

- Cherwell District Council
- Environment Agency
- English Heritage
- Natural England
- Oxfordshire County Council
- Local landfill operators
- Local waste management facilities
- Thames Valley Environmental Records Centre
- Parish Councils
- Oxfordshire Primary Care Trust
- Bicester Town Council
- Banbury Constabulary
- Three Valleys Water

4.2 Next Steps

This Scoping Report sets out our proposed approach to the Exemplar Site EIA, in terms of study areas, data collection, proposed methodologies and potential for mitigation and enhancement. The Report also sets out our proposed approach for consultation with Cherwell District Council

and relevant consultees. These consultees have been identified for each topic, and are summarised in Section 4.1 above.

Following receipt of comments regarding our proposals for the Exemplar Site, the EIA will be progressed, as agreed with Cherwell District Council. An Environmental Statement will be prepared and will be submitted with the Planning Application for the Site.

Hyder Consulting (UK) Limited
4th Floor
29 Bressenden Place
London
SW1E 5DZ
United Kingdom
Tel: +44 (0)203 014 9000
Fax: +44 (0)207 828 1794
www.hyderconsulting.com

Planning Department
Cherwell District Council
Bodicote House
Bodicote
Banbury
OX15 4AA

Our Ref: 0506-UA001881-U31L-01
Your Ref: 10/00004/SCOP
Direct Line +44 (0)20 3014 9157

27th August 2010

Dear Sir or Madam

Bicester Eco-town Exemplar Site: Environmental Impact Assessment (EIA) Request for Screening and Scoping Opinion

We refer to our letter requesting an EIA screening and scoping opinion under the Town and Country Planning (Environmental Impact Assessment) Regulations 1999 (as amended), dated 2nd August 2010, ref 0504-UA001881-U31L-01, which was submitted on behalf of our clients, P3 Eco and A2 Dominion, relating to the above development.

Since the submission of the scoping / screening opinion request, further negotiations have been held in relation to the red line boundary of the exemplar development and the scale and form of development to be undertaken within that. It has been resolved that the exemplar scheme will relate to the top two fields, the central core and the fields to the south of Home Farm. As such the other two fields in the northern corner of the development are not forming part of the exemplar scheme. In relation to the EIA screening and scoping request, we have provided details of the updated project description overleaf. The red line of the application site is smaller than that which was originally screened and there is no material change in the type of development, the principle of development or the location of development. As such we consider that the confirmation of the detailed area does not require a further and revised screening / scoping request to be submitted.

We note that your scoping opinion, in line with the statutory 5 week response period, is due on Monday 6th September. Given the timescales for our application (provided in the original report ref 0501-UA001881-UA31R-01), we would be happy to receive your initial scoping response based on the original submission in accordance with the stated timescales, followed by your comments on any changes as a result of this letter at a later date.

If you have any queries, please do not hesitate to contact me on the direct dial provided above or by e-mail at caroline.soubry-smith@hyderconsulting.com.

Yours sincerely

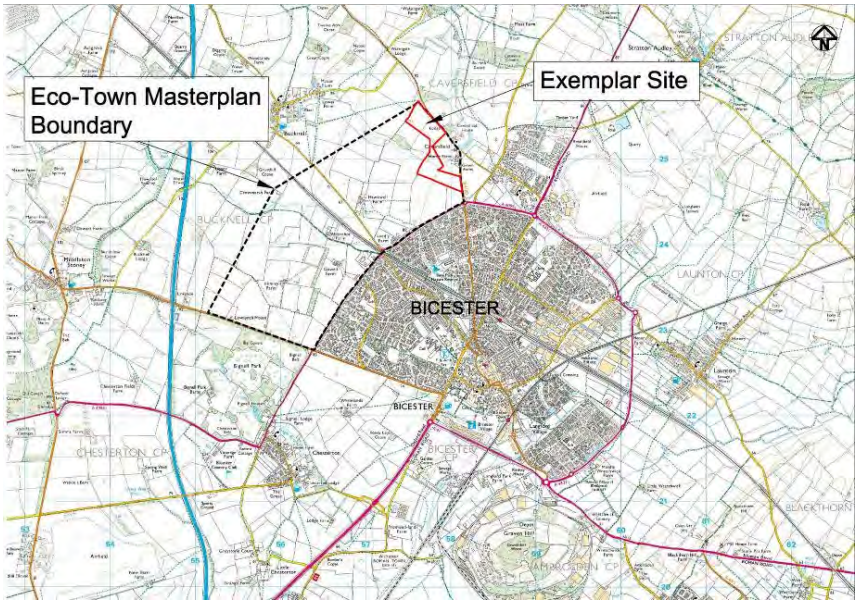
Caroline Soubry-Smith, Principal Environmental Consultant

INVESTOR IN PEOPLE

RoSPA 2008 GOLD MEDAL

Amended text for Section 2.1: Site Description

Note: Paragraphs 1-3 remain unchanged



Amended Figure 2.1: Site Location Plan

Figure 2.2 illustrates the site boundary for the Exemplar Site, comprising two main zones for development and a zone in between to allow a connection between the developments. This Site lies within the whole Eco-town site boundary, at its north-eastern edge, and lies due north of Bicester town. The Exemplar Site boundary runs alongside the B4100, and covers an area of approximately 21 ha.

Amended Figure 2.2: Exemplar Site Plan

Amended text for Section 2.3: The Exemplar Site Proposals

The Exemplar site will be the first development on the whole site and lies in the north eastern area of the site. The Exemplar site is shown in Figure 2.2 with two areas of key development with a connecting zone lying in between. Land will be available for some or all of the following:

- Approximately 400 residential units
- A Care Home (Class C2)
- A primary school
- B1(a) office accommodation
- Retail units (class A1 – A5)
- Social and community facilities within class D with associated means of access
- Car parking
- Landscape
- Amenity space
- Service infrastructure

The Exemplar Site planning application will be submitted as a hybrid application comprising:

- Full planning permission will be sought for the residential development, 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.

Amended text for Section 2.4: Development Programme

The key planning and development milestones associated with the Exemplar Site and the wider Eco-town development have been set out in Table 1 below:

Table 1: Development Programme

Milestone	**Planned Programme**
Submission of Exemplar Planning Application	5th November 2010
Update of Project Masterplan	February 2011
Planning Committee (Exemplar Site)	March 2011
Submission of Masterplan Work	August 2011

Planning, Housing & Economy
John Hoad Strategic Director Planning, Housing and Economy

Cherwell
DISTRICT COUNCIL
NORTH OXFORDSHIRE

Bodicote House • Bodicote
Banbury • Oxfordshire
OX15 4AA
*Telephone **01295 252535***
Textphone 01295 221572
DX 24224 (Banbury)
www.cherwell.gov.uk

Hyder Consulting (UK) Limited
4th Floor Bressenden Place
London
SW1E 5DZ

For the attention of Caroline Soubry-Smith

Please ask for ***Andrew Bowe*** *Our ref* ***10/00005/SCOP*** *Your ref* ***0504-UA001881-U31L-01***
Direct Dial ***01295 221842*** *Fax* ***01295 221856*** *Email* ***andrew.bowe@cherwell-dc.gov.uk***

21st September 2010

Dear Ms Soubry-Smith

TOWN AND COUNTRY PLANNING (ENVIRONMENTAL IMPACT ASSESSMENT) (ENGLAND & WALES) REGULATIONS 1999 (AS AMENDED)

REQUEST FOR SCOPING OPINION

Application No:	**10/00005/SCOP**
Applicant's Name:	**P3Eco and A2 Dominion**
Proposal:	**Scoping Opinion - Proposed Bicester Eco Development: Exemplar Site**
Location:	**Bicester Eco Town Exemplar site**
Parish:	**Caversfield**

Further to your letter dated 2nd August 2010 and the submitted attachments, I have consulted with relevant colleagues both in Cherwell District Council and Oxfordshire County Council, together with other statutory authorities and consultation bodies. Their responses are set out below, largely in full, and in some cases this may include matters that go beyond the site boundary. These responses constitute the Council's screening opinion.

The request for a scoping opinion relates to a proposed planning application for approximately 400 dwellings on 33 hectares of land adjacent to B4100. This is to be the first phase, as an Exemplar project, of the proposed North West Bicester Eco development identified in the Eco towns Planning Policy Statement.

<u>The Environment Agency:</u>

The Environment Agency (EA) welcomes the opportunity to comment on proposed content of the environmental statement set out in the scoping report. It is understood that an Environmental Impact Assessment (EIA) will be undertaken for the first phase of this development and will not cover the whole development site. Having reviewed the Scoping Report, the EA has provided comments on the following topics, not all of which are referred to in the scoping report:

- Ecology

- Waste, including sewage
- Flood Risk and Hydrology
- Contaminated Land
- Energy

Ecology

The outlined study proposals appear to be reasonable and the intention to identify any related information that is available up to five kilometres from the site boundary is supported. Only one watercourse has been identified under the site description but there are actually two and this should be amended. The EA agrees that the water quality of these rivers is generally good and can confirm this by providing the relevant data.

Given the sensitivities already identified within the exemplar site and wider area, the EA is pleased that additional surveys to those already undertaken will be carried out. It is essential however, that surveys are undertaken at the most appropriate time of year and therefore it may be necessary for some surveys to be updated at a later stage if necessary.

The EA generally agrees with the outlined potential impacts and mitigation options. The scoping report refers to the opportunity to enhance plant species which the EA supports. It is recommended that planting should incorporate local native species which are locally sourced. There should be an emphasis on providing rich habitat for mammals, reptiles and invertebrates which have been found on site or where there is potential to attract Biodiversity Action Plan (BAP) species into the area.

By way of mitigation and/or enhancement, the EA would like to see green corridors alongside the watercourses on site. The minimum buffer zone should be 15 metres measured from the top of the bank each side of the watercourses. This will offer good protection and an opportunity to enhance the habitat value. Maintaining a sizeable space between the riverbank and development is also important to manage risks of diffuse pollution which poses a risk of water quality deterioration. Under the Water Framework Directive (WFD), the UK must plan to ensure our surface, ground and coastal waters reach good ecological status by 2027. This development must not hinder that potential and where feasible take steps to ensure water quality is improved.

It is also essential that a proper and accountable regime is identified to ensure Green Infrastructure and other newly created habitat is managed and maintained in the long term. This includes land which is used for sustainable drainage features.

Waste

Again, the proposed scope of this chapter, in terms of construction and municipal waste, appears reasonable. The EA supports the proposal to limit the amount of construction waste to landfill and that a showcase waste management system is highlighted as an opportunity. The Waste, Water and Energy workstream group has recently met to discuss the waste strategy.

The existing recycling rate across Cherwell District is currently very good and is identified at 50%. This is likely to be nearer 58% which is above the 50% target of the 2007 Waste Strategy and the 55% 2020 target for Oxfordshire. However, it is generally agreed within the workstream that ambitious waste management and waste reduction targets should be set.

The report refers to "proposed energy from waste facility within the development" but later goes on to say that impacts of waste treatment and disposal and treatment will not be considered within the EIA. While the EA accepts that the operation of energy from waste facilities will be regulated under the Environmental Permitting Regulations 2010, a certain level of assessment of their environmental impact should be considered within the EIA if any facilities of this type are to be incorporated into the design of the scheme.

Flood risk and Hydrology

A relatively small proportion of land along both watercourses on site has been correctly identified as having flood risk associated with them. The Environment Agency's Flood Map currently shows the broad level of risk and the EA supports the intention to undertake a hydraulic model to more accurately determine the extent to which these watercourses may flood. The EA would need to have the opportunity to review this model and is already discussing the technicalities of this with you. The EA also supports the intention to extend the study area downstream of the site to ensure flood risk will not be increased as a result of this development.

The report proposes that a separate Flood Risk Assessment (FRA) will be produced and will be submitted as an appendix to the EIA. It also states that Sustainable Urban Drainage Systems (SUDS) will be incorporated into the scheme to maintain greenfield runoff rates. This is supported by the EA. However, the report only refers to producing a "conceptual" strategy. It is essential that sufficient detail is presented to ensure there is space for SUDS features and that this is not left for later consideration. This is particularly important for the housing element for which full planning approval is being sought. The EA is in the process of providing some more detailed guidance on the scope of the Flood Risk Assessment.

While this chapter may not be the most appropriate place to discuss and outline measures to address water resource and water consumption, the EA supports the presented opportunity to aspire to water neutrality. However, it stresses that the development will be required to meet the Code for Sustainable Homes (CSH) level 5 for water, which equates to water consumption of 80 litres per person per day. This is a requirement of the PPS1 supplement (EcoTown supplement paragraph ET 17.5 b) and has recently been clarified with you.

Water Resource is a topic area which the EA recommends is most appropriately considered within a Water Cycle Study.

Contaminated Land

The scope of this topic is acceptable. The EA supports the intention to carry out intrusive ground investigations to establish the presence, if any, of contaminated land and the proposed controlled waters risk assessment. If groundwater contamination is encountered the EA should be consulted on any proposed mitigation options prior to being finalised within the Environmental Statement (ES).

Energy Use and Sewage

Neither of these topics has been covered within the Scoping Report. Each application needs to demonstrate how it contributes to the overall achievement of Zero Carbon status as well as ensuring that all individual buildings are highly efficient through a combination of building fabric and the potential for renewable energy systems. This will have a significantly beneficial impact on the environment and should therefore be scoped into the EIA.

The planning application will also need to be supported by a Water Cycle Study (see above) that will ensure there is sufficient provision made for water infrastructure. This includes sewerage infrastructure. The Study will need to assess the options for how and where to treat the sewerage. It will need to take account of:

- The current infrastructure at Bicester Sewage Treatment Works (STW) and whether there is capacity to take additional flows from the site. Phosphorus loading is the biggest concern in this area.

- The study should work alongside the FRA to ensure the options reviewed would not cause flooding to sites downstream of any discharge.

- Timeframes and funding of options

- Point of discharge, if an on-site treatment option is pursued then it should seek to review the viability of discharging to Gagle Brook as well as Town Brook. Discharging to Gagle Brook is likely to remove any increased flood risk to Bicester from the increased flows due to treated effluent.

- Measures to ensure any required new infrastructure will be funded and delivered in line with the new development.

Highways Agency

The Highways Agency has confirmed that when a scoping report is submitted, the following information should be provided:

- Details of the development, such as location, access arrangements, use class, size or number of units, maximum number of parking spaces and any other relevant information.
- Proposed methodology for estimating the vehicular trip generation and distribution on the strategic road network, and resulting trip generation figures
- Proposed methodology for assessing the impact of trip generation on the strategic road network.

The Highways Agency's response refers to Guidance on Transport Assessments produced by the Department of Transport in 2007 and the initial appraisal consultation form published with the guidance. The Highways Agency has confirmed that it would be happy to assist in any data that it has pertaining to the junctions relevant to the proposed development.

Natural England

Case law[1] and guidance from the Office of the Deputy Prime Minister[2] has stressed the need for a full set of environmental information to be available for consideration prior to a decision being taken on whether or not to grant planning permission. Natural England therefore advises that the EIA should give full consideration to:

Sites of Special Scientific Interest (SSSIs).

The development site is close to the following designated nature conservation sites:

- Ardley Cutting and Quarry SSSI
- Ardley Trackways SSSI
- Stratton Audley Quarries SSSI
- Tingewick Meadows SSSI
- Long Herdon Meadow SSSI
- Arncott Bridge Meadows
- Wendlebury Meads and Mansmoor Closes SSSI
- Weston Fen SSSI
- Bestmoor SSSI
- Kirtlington Quarry SSSI

[1] Harrison, J in *R. v. Cornwall County Council ex parte Hardy* (2001)
[2] *Note on Environmental Impact Assessment Directive for Local Planning Authorities* (April 2004)

Further information on the SSSIs can be found at www.natureonthemap.org.uk or by request from Natural England. The Environmental Statement should include a full assessment of the direct and indirect effects of the development on the features of special interest within these sites and should identify such mitigation measures as may be required in order to avoid, minimise or reduce any adverse significant effects.

Within the scoping report it states that there is just one SSSI within two kilometres (Stratton Audley Quarries SSSI), however, Ardley Cutting and Quarry SSSI is also within two kilometres of the exemplar site.

Within Table 2, under 3.2.1 Air Quality, it states that potential impacts on air quality come from construction, traffic movements and on-site energy production. Where a development includes energy production Natural England requests that the impact on the air quality is assessed for SSSI's within 10 kilometres of the site. This would include the full list of sites provided above.

Where traffic movements will be increased as a result of the development, Natural England requests that impacts on air quality is assessed for SSSIs within 200 metres of the roads experiencing increased traffic. Further information on air pollution and its impacts on species and habitats can be found on www.apis.ac.uk

The exemplar site is also hydrologically linked to designated sites downstream of the site such as Wendlebury Meads and Mansmoor Closes SSSI. Natural England asks that the impact of this development on the hydrological conditions, including water quality, at these SSSI's is assessed.

Landscape Character and Designated Areas

To ensure that the proposed scheme does not adversely affect the character of the surrounding countryside, Natural England recommends that consideration should be given to the following aspects in the environmental impact assessment:

- The potential impact of the scheme on the landscape character and visual amenity of the surrounding area.
- The detailed design of the proposed development should seek to respect and enhance local character and distinctiveness, and use appropriate materials and designs in all new built features.

Landscape and visual impacts

Natural England wishes to see details regarding local landscape character areas mapped at a scale appropriate to the development site and any relevant management plans or strategies pertaining to the area. The EIA should include assessments of visual effects on the surrounding area and landscape together with any physical effects on the development, such as changes in topography.

The EIA should include a full assessment of the potential impacts of the development on local landscape character using landscape assessment methodologies. Natural England strongly advocates the use of Landscape Character Assessment (LCA), based on the good practice guidelines produced jointly by the Landscape Institute and Institute of Environmental Assessment in 2002. LCA provides a sound basis for guiding, informing and understanding the ability of any location to accommodate change and to make positive proposals for conserving, enhancing or regenerating character, as detailed proposals are developed. Guidance on LCA, published by the Countryside Agency and Scottish Natural Heritage, is available at:
http://www.countryside.gov.uk/LAR/Landscape/CC/landscape_character_assesment.asp

Table 2, section 3.2.3 Landscape and Visual Impact, proposes the use of the 'Guidelines for Landscape and Visual Impact Assessment: 2nd Edition' and this is supported by Natural England.

In order to foster high quality development that respects, maintains, or enhances, local landscape character and distinctiveness, Natural England encourages all new development to consider the character and distinctiveness of the area, with the design and outlay of all elements of a proposed development reflecting local design characteristics and wherever possible using local materials. The EIA process should detail the measures to be taken to ensure the building design will be of a high standard, as well as detail of layout alternatives together with justification of the selected option in terms of landscape impact and benefit.

Access and Recreation

Natural England encourages any proposal to incorporate measures to help encourage people to access the countryside for quiet enjoyment. Measures such as reinstating existing footpaths together with the creation of new footpaths and bridleways are to be encouraged. Links to other green networks or urban fringe areas should also be explored to help promote the creation of a wider green infrastructure.

Local Wildlife Sites

Natural England's records indicate that there are several Local Wildlife Sites in the area surrounding the proposed development site. Local Wildlife Sites are of county importance for wildlife. The Environmental Statement should therefore include an assessment of the likely impacts on the wildlife interests of the surrounding sites. The assessment should include proposals for mitigation of any impacts and if appropriate, compensation measures.

Species protected by the Wildlife and Countryside Act 1981 (as amended) and the Conservation of Habitats and Species Regulations 2010.

Natural England is pleased to see that surveys for protected species are either in progress or will be undertaken. If any protected species are found the Environmental Statement should include details of:

- The species concerned;
- The population level at the site affected by the proposal;
- The direct and indirect effects of the development upon that species;
- Full details of any mitigation or compensation that might be required and
- Whether the impact is acceptable and/or licensable.

In order to provide this information there may be a requirement for a survey at a particular time of year. Surveys should always be carried out by suitably qualified and where necessary, licensed, consultants.

The scoping report states in Table 3.2, Section 3.2.7 on Ecology, that surveys have been carried out and great crested newts are in the area but not within or immediately adjacent to the exemplar site. It also states the surveys that are in progress or will be undertaken. The great crested newt, dormouse and all species of bats are European protected species such that it is illegal to intentionally kill, injure or otherwise disturb them. If any of these species are found to be present you should also consult Natural England's Wildlife Management and Licensing Unit in Bristol (Tel. 0845 6014523) about licensing implications before any work can proceed.

Other features of nature conservation interest, for example, habitats and species identified within the UK and Oxfordshire Biodiversity Action Plans.

Natural England advises that habitat surveys are carried out on site to identify any important habitats present. In addition, ornithological, botanical and invertebrate surveys should be carried out at appropriate times in the year, to establish whether any scarce or priority species are present. The Environmental Statement should include details of:

- Any historical data for the site affected by the proposal (e.g. from previous surveys);
- Additional surveys carried out as part of this proposal;
- The habitats and species present;
- The status of these habitats and species (e.g. whether BAP priority habitat);
- The direct and indirect effects of the development upon those habitats and species;
- Full details of any mitigation or compensation that might be required.

The standards set out in the Eco Towns Planning Policy Statement (July 2009) state that eco towns should demonstrate a net gain in biodiversity and planning permission may not be granted for eco town proposals which have a significant effect on internationally designated nature conservation sites or Sites of Special Scientific Interest (paragraph ET16.1). The development should avoid adversely impacting the most important wildlife areas within the site, and should if possible provide opportunities for overall wildlife gain.

Cumulative and in-combination effects.

The EIA should include an impact assessment to identify, describe and evaluate the effects that are likely to result from the project in combination with other projects and activities that are being, have been or will be carried out. To carry out the assessment of cumulative and in-combination effects, the following types of projects should be included (subject to the availability of information):

a. Existing completed projects
b. Approved but uncompleted projects
c. Ongoing activities
d. Plans or projects for which an application has been made and which are under consideration by the consenting authorities
e. Plans and projects which are reasonably foreseeable, i.e. projects for which an application has not yet been submitted, but which are likely to progress before completion of the development and for which sufficient information is available to assess the likelihood of cumulative and in-combination effects.

Berkshire, Buckinghamshire and Oxfordshire Wildlife Trust

Berkshire, Buckinghamshire and Oxfordshire Wildlife Trust (BBOWT) welcomes the proposed assessment methodology for the ecology chapter which will be prepared following the IEEM 'Guidelines for Ecological Impact Assessment in the United Kingdom' (2006). Whilst some baseline data is presented in the scoping report, it is unclear whether a data search has been requested from the Thames Valley Environmental Records Centre. BBOWT suggest that this is included as part of the desktop study to inform the scope of the EIA.

In addition to considering protected species and designated sites, BBOWT recommend that the EIA should assess the presence of, and any impacts on, habitats and species of principal importance as listed under Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006. BBOWT also suggests that the EIA identifies opportunities to enhance biodiversity, in line with Eco towns PPS and the guidance in Planning Policy Statement 9 (PPS9); Biodiversity and Geological Conservation, which states: *'Plan policies and planning decisions should aim to maintain, and enhance, restore or add to biodiversity and geological conservation interests.'*

The proposed site lies near to the Upper Cherwell Conservation Target Area. Conservation Target Areas (CTAs) identify the most important areas for wildlife conservation in Oxfordshire, where targeted conservation action will have the greatest benefit. BBOWT recommends that opportunities should be taken to secure biodiversity enhancements that will help achieve the

aims of the Upper Cherwell CTA, which include lowland meadow management and restoration and wet grassland restoration to improve the area for waders and wildfowl.

Oxfordshire County Council

The relevant officers of the County Council have been consulted and have the following comments:

Transport

The Scoping Report does not appear to include any details about Transport or Highway related issues. A Transport Assessment will be required for the Exemplar planning application as well as Transport Assessment for the application site as a whole.

Rights of Way

Public Rights of Way (PROW) should be included under the Transport/Highways assessment. Section 3.2.5: Human Health includes public rights of way but this is limited to the line of PRoW in the vicinity of the site. The human health section should look at line of PRoW. In addition it should assess the condition and levels of use of current PRoW and green spaces. It should also assess how the development will make best use of PRoW/green space and provide for mitigation, by extra provision and improvements to existing, to meet the needs of Eco development residents' and the aims of the Rights of Way Improvement Plan.

Archaeology

The County Archaeologist broadly supports the provisions for the Archaeological and Cultural Heritage section of the EIA set out in section 3.2.4 of Table 2 of the EIA scoping report. It is recommended that the measures set out in the report document for identifying the potential impact on this development on archaeological deposits and other aspects of the cultural heritage should be undertaken and included in the Environmental Statement.

Green Infrastructure, Landscape and Visual Impact, Ecology

See detailed comments in Annex 1

Socio-economic impacts

Section 3.2.5 refers to Human Health. In terms of data collection, the EIA should refer to data in the Joint Strategic Needs Assessment (JSNA); this report identifies current and future health and wellbeing needs in light of existing services, and informs future service planning taking into account evidence of effectiveness. It is available on the Oxfordshire Data Observatory website, www.oxfordshireobservatory.info, under Data > Themes > JSNA 2009.

Accessibility to day resource centres for older people, children's centres, special educational needs (SEN) facilities, adult learning, NHS dentists should be looked at. The mitigation/ opportunities for enhancement should also include provision of community space where people can meet and where community health services, children's services and social services can be delivered to the new community. There will need to be consultation with the County Council (through the social and community infrastructure workstream) on the inclusion of space to deliver children's services and social services to older and disabled people as part of the scheme.

In Section 3.2.7: Ecology the Consultation column should refer to Oxfordshire (not Oxford) County Council.

In Section 3.2.8: Socio economics and community the study area should be based on the Bicester catchment area for local service delivery that is, including surrounding villages such as Upper Heyford. This will be important for considering the impacts of the proposal on provision of higher order services and facilities which cover a wide catchment area for example, secondary school and library provision. The existing site description should refer to Bicester Village as an important player in the local economy. The availability of employment space at Upper Heyford may have an impact.

The data collection column should refer to JSNA. In looking at the impacts of demands from the proposed exemplar development, it will be important to understand the timing of these new demands against the background of demands projected from already planned housing sites and the scale and timing of new community facilities, particularly schools which are planned as part of those housing sites.
In the functional stage of the exemplar, the potential impacts on services and facilities provided off-site should be considered, for example, library, secondary school, youth facility, fire and rescue. Mitigation measures should include improvements to off-site services and facilities provided off-site.

Consultation should take place with Oxfordshire County Council through the social and community infrastructure workstream. The impacts on County Council delivered services will not be limited to "education" and "social services". The County Council has statutory responsibility for a much wider range of services, the impacts of which will need to be considered.

In Section 3.2.9: Waste – operation and construction, consultation on issues related to energy and waste management should include the County Council through the Energy, Waste and Water workstream.

In Section 3.2.10: Flood Risk and hydrology, consultation relating to the development of SUDS should include Oxfordshire County Council in view of the County Council's new statutory responsibilities in relation to flooding.

The consultation list in Section 4.1 should refer to Thames Valley Police rather than Banbury Constabulary. Similarly, the reference to Three Valleys Water should be replaced with Thames Water.

Thames Water

Thames Water welcomes the opportunity to comment on the scoping document and its response is set out in the following paragraphs.

The provision of water and waste water infrastructure is essential to any development and Thames Water is aware of the potential for a Water Cycle Study to be undertaken for the Eco-development. While Thames Water accepts that work is ongoing to understand the water and waste water infrastructure needs, it makes the following observations in response to the scoping report:

- It is unclear at this stage what the net increase in demand on Thames Water infrastructure will be as a result of the proposed development.
- Thames Water is concerned that the network in this area may be unable to support the demand anticipated from this development.
- The developer needs to consider the net increase in water and waste water demand to serve the development and also any impact the development may have off site further down the network, if no/low water pressure and internal/external sewage flooding of property is to be avoided.

Thames Water has recommended that any EIA report should be expanded to consider the following.

- The proposed development's demand for water supply and network infrastructure both on and off site and can it be met
- The proposed development's demand for sewage treatment and network infrastructure both on and off site and can it be met
- The surface water drainage requirements and flood risk of the development both on and off site and can it be met

Please contact Thames Water's Developer Services department on 0845 850 2777 to obtain information on the above issues

English Heritage

English Heritage has been consulted and has the following comments. It is noted that Landscape and Visual Impact (3.2.3) and Archaeology and Cultural Heritage (3.2.4) are topics to be covered by the EIA. English Heritage is content that potential negative impacts upon the historic environment have been identified and mitigation/enhancement opportunities identified for the site and its immediate vicinity. Table 2 identifies the potential for impact upon the Grade II* listed St. Lawrence's Church and Grade II listed Home Farmhouse and the need for an assessment of archaeological potential.

Clearly, the Exemplar Site forms only a relatively small part of the proposed eco-town area. Nevertheless, it will contribute to the direct, indirect, secondary, cumulative, short, medium and long-term, permanent and temporary, positive and negative effects of the proposals as a whole. There may be potential for some beneficial reuse of buildings of historic significance associated with the former RAF Bicester a little way to the east of the site. Opportunities may arise associated with the construction phase of the eco-town and over the longer term, for example, as a source of premises suitable for employment and community uses. This warrants being scoped into the assessment.

Cherwell District Council- Planning Policy (including Design and Conservation Officer comments)

The proposed development is the first phase of a larger development and therefore it is inextricably linked to the wider proposal, as is made clear in the first six pages of the Scoping Report. There will inevitably be interactions between the different phases of the larger development. For example, public transport routes, drainage, open space, employment, retail, community and education facilities are not mutually exclusive in their provision or in their use. The interaction between the different phases is an important element of the whole development as a sustainable community.

It is 'reasonably foreseeable' that the adjoining land will be developed (because without it we would not be considering this proposal). Circular 2/99 and the EIA Regulations both make it clear that the cumulative effects of development should be assessed. The cumulative effects include the effects of the whole scheme. The increase in potentially adverse impacts should arguably be assessed as part of the requirement to forecast and predict direct indirect and cumulative impacts (Schedule 4).

The impact assessment might identify mitigating actions that are contingent with delivery of the later phases i.e. advance screen planting, green corridors providing biodiversity linkages through the whole development and beyond to the countryside; or sustainable travel or energy choices that may only become available through the other phases (cycle links, bus stops, or decentralised energy sources where viability requires the larger scale development).

If such elements are recognised as 'positive' mitigations, the adverse impacts associated with the development as a whole should also be assessed (rather than the wider development just being selectively acknowledged).

On large developments it is normal practice for an outline application to be submitted for the whole scheme and these impacts assessed, to be followed by Reserved Matters applications. Paragraph 1.2 of the Scoping Report states that "*each outline application will therefore be accompanied by an ES*". Such an approach would require the submission of a number of environmental statements and the Council would seek a comprehensive outline application following the submission of the exemplar application.

It is also unclear whether development of the area defined as "phase 2" in Fig 2.2 is to be assessed or not. It is included within the site boundary but there is no indication as to the proposals.

The reference at paragraph 3.23 to established landscape character as having a "wooded character" is rather simplistic and should refer to a range of documents, including the Cherwell District Council (CDC) Landscape Character Assessment and also our Countryside Design Summary, which give finer grain landscape types and identify the site as falling into the Oxfordshire Estate Farmlands. The Oxfordshire Wildlife and Landscape study should also be considered. It is important that the established landscape character is fully understood before appropriate mitigation techniques are considered.

Transport is not mentioned and so it is not clear whether a separate transport assessment is to be carried out. This is an aspect of the proposals that will be important to local people and must be fully addressed.

The reference to impact on heritage assets is rather heavy on archaeology. PPS 5 now refers to designated and undesignated heritage assets so impacts on undesignated assets should be included. Impacts on setting and curtilage will also need to be assessed.

The overfly zone for Windrushers' Gliding Club at RAF Bicester needs to be taken into account. Care will need to be taken not to develop in locations that would prevent continued aviation use of the former RAF Bicester.

The main alternatives are required to be assessed. These need to be clearly set out in the Environmental Statement.

On air quality, it would be appropriate in this Eco Town to assess the emissions from buildings. The TCPA worksheets recommend that these are monitored.

On a minor point, there are a few locations where references from other documents (for example, reference to a brief, to demonstrating deliverability of the site, to informing the preparation of the Core Strategy and to Three Rivers Water) do not seem to have been edited out and this should be corrected.

Cherwell District Council - Biodiversity and Countryside Officer

The above officer has nothing substantial to add to the responses of BBOWT and Natural England to this scoping report but emphasises the following points:

- Bearing in mind some of the ecological surveys for protected species, and habitats and species of principle importance, have not yet been completed, it is important that the EIA does take into account the findings of all surveys;
- The impact on important wildlife sites (SSSIs, Local Wildlife Sites, Local Nature Reserves and Conservation Target Areas) close to the site should be comprehensively assessed;

- The development of a Biodiversity Strategy to ensure that a net gain in biodiversity is achieved is crucial;
- The connectivity within the site, and between the site and the surrounding countryside, particularly in terms of hedgerows and water courses, is vitally important.

Cherwell District Council - Environmental Protection Officer

Air Quality

The above officer has previously spoken with Hyder and confirmed that the proposed approach is acceptable in principle. A detailed assessment at Queens Avenue / Kings End, Bicester is being undertaken for nitrogen dioxide. This will be reported by the end of February 2011 and a lag time of approximately six weeks should be allowed from sample collection to receiving monitoring results, The "soft mitigation" measures outlined when developing the master plan are a sensible approach as a general principle. It is noted that the baseline monitoring period is only three months which is the minimum length of monitoring time required in LAQM.TG, 2009. This document does state that all surveys should ideally be carried out for a minimum of six consecutive months (three in summer and three in winter) to ensure they are representative of the whole year. A longer period of monitoring (six months) would therefore be preferred. It is accepted that the proposed three months of monitoring is likely to provide useful information for informing the environmental statement when period mean corrected against long term background data sets, but it is recommended that a longer period of monitoring is undertaken. From previous correspondence it is understood that there may be various time constraints on this project and that submitting an addendum to the ES is not a favourable / practicable approach.

Land contamination

The approach outlined in the scoping report i.e. assessing the risk from land contamination through intrusive ground investigation and subsequent chemical analysis is acceptable.

The above sections set out the local planning authority's response to the request for a screening opinion. Some comments have taken a while to be received and I therefore apologise for the delay in responding. Any further comments received will be forwarded. In the meantime I trust this information is of assistance to you in the formulation of the Environmental Statement and should be treated as the Council's formal scoping opinion made under the EIA Regulations 1999, Circular 02/99 and the Town and Country Planning (General Development Procedure) Order 1995.

Yours sincerely

John Hoad
Strategic Director, Planning, Housing and Economy

Ref	Date	Consultee	Contact Details	Topic	Comment	Response
1	06/09/2010	Environment Agency	Sarah Green, Planning Liaison Officer, Environment Agency, Red Kite House, Howbery Park, Crowmarsh Gifford, Oxon, Wallingford, OX10 8BD	Ecology	The outlined study proposals appear to be reasonable and we support the intention to identify any related information that is available up to 5km from the site boundary.	Noted
2	06/09/2010	Environment Agency	Sarah Green DD: 01491 828485 sarah.green@environment-agency.gov.uk	Water/ Ecology	Only 1 watercourse has been identified under the site description but there are actually 2 and this should be amended.	This will be checked and inserted into the relevant EIA chapters.
3	06/09/2010	Environment Agency	Sarah Green DD: 01491 828485 sarah.green@environment-agency.gov.uk	Water/ Ecology	We agree that the water quality of these rivers is generally good. We can and will provide relevant data to confirm this.	HCL to contact Environment Agency to obtain water quality information.
4	06/09/2010	Environment Agency	Sarah Green DD: 01491 828485 sarah.green@environment-agency.gov.uk	Ecology	Given the sensitivities already identified within the first phase site, we are pleased that additional surveys to those already undertaken will be carried out. It is essential however, that surveys are undertaken at the most appropriate time of year and therefore it may be necessary for some surveys to be update at a later stage if necessary.	Surveys have been completed by Arup. All surveys were undertaken by qualified professionals and have been undertaken at the appropriate time of year. If any updates are required, HCL confirm they will be undertaken at the appropriate time of year in consultation with the relavent stakeholders.
5	06/09/2010	Environment Agency	Sarah Green DD: 01491 828485 sarah.green@environment-agency.gov.uk	Ecology	We generally agree with the outlined potential impacts and mitigation options. The report refers to the opportunity to enhance plant species which we support and wish to recommend that planting should incorporate local native species which are locally sourced. There should be an emphasis on providing rich habitat for mammals, reptiles and invertebrates which have been found on site or where there is potential to attract BAP species into the area.	Noted. Environment Agency's recommendation for local native species which are locally sourced has been passed on to the design team.
6	06/09/2010	Environment Agency	Sarah Green, Planning Liaison Officer, Environment Agency, Red Kite House, Howbery Park, Crowmarsh Gifford, Oxon, Wallingford, OX10 8BD	Ecology	The outlined study proposals appear to be reasonable and we support the intention to identify any related information that is available up to 5km from the site boundary.	Noted
7	06/09/2010	Environment Agency	Sarah Green, Planning Liaison Officer, Environment Agency, Red Kite House, Howbery Park, Crowmarsh Gifford, Oxon, Wallingford, OX10 8BD	Ecology	The outlined study proposals appear to be reasonable and we support the intention to identify any related information that is available up to 5km from the site boundary.	Noted
8	06/09/2010	Environment Agency	Sarah Green DD: 01491 828485 sarah.green@environment-agency.gov.uk	Ecology	It is also essential that a proper and accountable regime is identified to ensure Green Infrastructure and other newly created habitat is managed and maintained in the long term. This includes land which is used for sustainable drainage features.	Noted. Long term maintenance / management has been considered by the design team, when making recommendations.
9	06/09/2010	Environment Agency	Sarah Green DD: 01491 828485 sarah.green@environment-agency.gov.uk	Waste	The proposed scope of this chapter in terms of construction and municipal waste appears reasonable.	Noted.
10	06/09/2010	Environment Agency	Sarah Green DD: 01491 828485 sarah.green@environment-agency.gov.uk	Waste	We support the proposal to limit the amount of construction waste to landfill and that a showcase waste management system is highlighted as an opportunity. The Waste Water and Energy workstream have recently met to discuss the waste strategy. The existing recycling rate across Cherwell is currently very good and is identified at 50%. This is likely to be nearer 58% which is above the 50% target of the 2007 Waste Strategy and the 55% 2020 target for Oxfordshire. However, it is generally agreed within this workstream that we should still set ambitious waste management and waste reduction targets.	Noted. Under PPS1 all planning applications must be accompanied by a Sustainable Waste and Resources Plan (SWRP) which sets targets for operational waste. The SWRP for the Exemplar site sets an ambitious initial recycling/composting target of 70%, which was agreed by the Waste Water and Energy work stream.
11	06/09/2010	Environment Agency	Sarah Green DD: 01491 828485 sarah.green@environment-agency.gov.uk	Waste	The report refers to “proposed energy from waste facility within the development” but later goes on to say that impacts of waste treatment and disposal and treatment will not be considered within the EIA. While we accept that the operation of energy from waste facilities will be regulated under the Environmental Permitting Regulations 2010, a certain level of assessment of their environmental impact should be considered within the EIA if any facilities of this type be incorporated into the design of the scheme.	Should an Energy from Waste Facility (i.e. anaerobic digestion) be considered, this would certainly be the case. However an Energy SWOT analysis has been carried out which concluded that organic quantities generated at the site would be insufficient. With reference to the report saying 'impacts of waste treatment and disposal and treatment will not be considered within the EIA' , we refer here to the impacts of waste which is removed off site to a licensed operator (along with all Cherwell District's MSW) for treatment/disposal: we do not intend to include potential impacts of these facilities within this EIA.

Ref	Date	Consultee	Contact Details	Topic	Comment	Response
12	06/09/2010	Environment Agency	Sarah Green DD: 01491 828485 sarah.green@environment-agency.gov.uk	Flood Risk and Hydrology	A relatively small proportion of land along both watercourses on site has been correctly identified as having flood risk associated with them. Our Flood Map currently shows the broad level of risk and we support the intention to undertake a hydraulic model to more accurately determine the extent to which these watercourses may flood. We would need to have the opportunity to review this model and we are already discussing the technicalities of this with Hyder.	Noted. HCL to continue liaising with Environment Agency.
13	06/09/2010	Environment Agency	Sarah Green DD: 01491 828485 sarah.green@environment-agency.gov.uk	Flood Risk and Hydrology	We also support the intention to extend the study area downstream of the site to ensure flood risk will not be increased as a result of this development.	Noted.
14	06/09/2010	Environment Agency	Sarah Green DD: 01491 828485 sarah.green@environment-agency.gov.uk	Flood Risk and Hydrology	The report proposes that a separate Flood Risk Assessment will be produced and will be submitted as an appendix to the EIA. It also states that SUDs will be incorporated into the scheme to maintain Greenfield runoff rates. This we support.	Noted.
15	06/09/2010	Environment Agency	Sarah Green DD: 01491 828485 sarah.green@environment-agency.gov.uk	Flood Risk and Hydrology	The report only refers to producing a "conceptual" strategy. It is essential that sufficient detail is presented to ensure there is space for SUDs features and that this is not left for later consideration. This is particularly important for the housing element for which full planning approval is being sought. We are in the process of providing some more detailed guidance on the scope of the Flood Risk Assessment.	SuDS features have been included in the Drainage Strategy.
16	06/09/2010	Environment Agency	Sarah Green DD: 01491 828485 sarah.green@environment-agency.gov.uk	Flood Risk and Hydrology	While this chapter may not be the most appropriate place to discuss and outline measures to address water resource and water consumption, we support the presented opportunity to aspire to water neutrality. However, we must stress that the development will be required to meet CSH level 5 for water, which equates to water consumption of 80 litres per person per day. This is a requirement of the PPS1 supplement (EcoTown supplement paragraph ET 17.5 b). This has recently been clarified with Hyder.	Noted
17	06/09/2010	Environment Agency	Sarah Green DD: 01491 828485 sarah.green@environment-agency.gov.uk	Flood Risk and Hydrology	Water Resource is a topic area which we recommend is most appropriately considered within a Water Cycle Study.	Noted.
18	06/09/2010	Environment Agency	Sarah Green DD: 01491 828485 sarah.green@environment-agency.gov.uk	Contaminated Land	The scope of this topic is acceptable.	Noted.
19	06/09/2010	Environment Agency	Sarah Green DD: 01491 828485 sarah.green@environment-agency.gov.uk	Contaminated Land	We support the intention to carry out intrusive ground investigations to establish the presence, if any, of contaminated land and the proposed controlled waters risk assessment. If groundwater contamination is encountered we would like to be consulted on any proposed mitigation options prior to being finalised within the ES.	Noted.
20	06/09/2010	Environment Agency	Sarah Green DD: 01491 828485 sarah.green@environment-agency.gov.uk	Energy Use and Sewage	Neither of these topics has been covered within the Scoping Report.	Noted.
21	06/09/2010	Environment Agency	Sarah Green DD: 01491 828485 sarah.green@environment-agency.gov.uk	Energy Use and Sewage	Each application needs to demonstrate how it contributes to the overall achievement of Zero Carbon status as well as ensuring that all individual buildings are highly efficient through a combination of building fabric and the potential for renewable energy systems. This will have a significantly beneficial impact on the environment and should therefore be scoped in to the EIA.	These will be discussed in the Sustainability document accompanying the planning application.
22	06/09/2010	Environment Agency	Sarah Green DD: 01491 828485 sarah.green@environment-agency.gov.uk	Energy Use and Sewage	The planning application will also need to be supported by a Water Cycle Study that will ensure there is sufficient provision made for water infrastructure. This includes sewerage infrastructure.	Noted. A Water Cycle Study has been prepared.
23	06/09/2010	Environment Agency	Sarah Green DD: 01491 828485 sarah.green@environment-agency.gov.uk	Energy Use and Sewage	The study will need to assess the options for how and where to treat the sewerage. It will need to take account of: 1. the current infrastructure at Bicester STW and whether there is capacity to take additional flows from the site. Phosphorus loading is the biggest concern in this area; 2. The study should work alongside the FRA to ensure the options reviewed would not cause flooding to sites downstream of any discharge; 3. Timeframes and funding of options; 4. Point of discharge, if an on-site treatment option is pursued then it should seek to review the viability of discharging to Gagle Brook as well as Town Brook. Discharging to Gagle Brook is likely to remove any increased flood risk to Bicester from the increased flows due to treated effluent; 5. Measures to ensure any required new infrastructure will be funded and delivered in line with the new development.	Noted. A Water Cycle Study has been prepared. Consultation with Thames Water is ongoing.

Ref	Date	Consultee	Contact Details	Topic	Comment	Response
24	26/08/2010	Natural England	Mrs Charlotte Frizzell, Senior Environmental Planning Advisor, Western Area Government Team, South East Region, Natural England	Ecology	The development site is close to the following designated nature conservation sites: Ardley Cutting and Quarry SSSI Ardley Trackways SSSI Stratton Audley Quarries SSSI Tingewick Meadows SSSI Long Herdon Meadow SSSI Arncott Bridge Meadows SSSI Wendlebury Meads and Mansmoor Closes SSSI Weston Fen SSSI Bestmoor SSSI Kirtlington Quarry SSSI Further information on the SSSI's can be found at www.natureonthemap.org.uk or by request from this office. The Environmental Statement should include a full assessment of the direct and indirect effects of the development on the features of special interest within these sites and should identify such mitigation measures as may be required in order to avoid, minimise or reduce any adverse significant effects.	Noted. Information has been passed on to ecology team.
25	28/08/2010	Natural England	Mrs Charlotte Frizzell 0300 060 1925 charlotte.frizzell@naturalengland.org.uk	Ecology	Within the scoping report it states that there is just one SSSI within 2km (Stratton Audley Quarries SSSI), however Ardley Cutting and Quarry SSSI is also within 2km of the exemplar site.	Noted. This has been reviewed and amended within the ES chapter.
26	28/08/2010	Natural England	Mrs Charlotte Frizzell 0300 060 1925 charlotte.frizzell@naturalengland.org.uk	Ecology	Within Table 2, under 3.2.1 Air Quality, it states that potential impacts on air quality come from construction, traffic movements and on-site energy production. Where a development includes energy production Natural England requests that the impact on the air quality is assessed for SSSI's within 10km of the site. This would include the full list provided above.	Noted. These sites are included in the ES.
27	28/08/2010	Natural England	Mrs Charlotte Frizzell 0300 060 1925 charlotte.frizzell@naturalengland.org.uk	Ecology/ Air Quality	Where traffic movements will be increased as a result of the development Natural England requests that impacts on air quality is assessed for SSSIs within 200m of the roads experiencing increased traffic. Further information on air pollution and its impacts on species and habitats can be found on www.apis.ac.uk.	Noted.
28	28/08/2010	Natural England	Mrs Charlotte Frizzell 0300 060 1925 charlotte.frizzell@naturalengland.org.uk	Ecology/ Water Quality	The exemplar site is also hydrologically linked to designated sites downstream of the site such as Wendlebury Meads and Mansmoor Closes SSSI. Natural England asks that the impact of this development on the hydrological conditions, including water quality, at these SSSI's is assessed.	Noted.
29	28/08/2010	Natural England	Mrs Charlotte Frizzell 0300 060 1925 charlotte.frizzell@naturalengland.org.uk	Landscape Character	To ensure that the proposed scheme does not adversely affect the character of the surrounding countryside, we recommend that consideration should be given to the following aspects in the environmental impact assessment: The potential impact of the scheme on the landscape character and visual amenity of the surrounding area. The detailed design of the proposed improvements should seek to respect and enhance local character and distinctiveness, and use appropriate materials and designs in all new built features.	Noted.
30	28/08/2010	Natural England	Mrs Charlotte Frizzell 0300 060 1925 charlotte.frizzell@naturalengland.org.uk	Landscape and Visual Impacts	Natural England would wish to see details regarding local landscape character areas mapped at a scale appropriate to the development site and any relevant management plans or strategies pertaining to the area. The EIA should include assessments of visual effects on the surrounding area and landscape together with any physical effects on the development, such as changes in topography.	Noted. Local landscape character areas will be included as part of the ES. The EIA also includes assessments of visual effects on the surrounding area and landscape.
31	28/08/2010	Natural England	Mrs Charlotte Frizzell 0300 060 1925 charlotte.frizzell@naturalengland.org.uk	Landscape and Visual Impacts	The EIA should include a full assessment of the potential impacts of the development on local landscape character using landscape assessment methodologies. We strongly advocate the use of Landscape Character Assessment (LCA), based on the good practice guidelines produced jointly by the Landscape Institute and Institute of Environmental Assessment in 2002. LCA provides a sound basis for guiding, informing and understanding the ability of any location to accommodate change and to make positive proposals for conserving, enhancing or regenerating character, as detailed proposals are developed. Guidance on LCA, published by the Countryside Agency and Scottish Natural Heritage, is available at: http://www.countryside.gov.uk/LAR/Landscape/CC/landscape_character_assesment.asp	Noted. Good practice guidelines will be applied when undertaking the landscape assessment.
32	28/08/2010	Natural England	Mrs Charlotte Frizzell 0300 060 1925 charlotte.frizzell@naturalengland.org.uk	Landscape and Visual Impacts	Natural England notes that table 2, section 3.2.3 Landscape and Visual Impact proposes the use of the 'Guidelines for Landscape and Visual Impact Assessment: 2nd Edition' and we support this.	Noted.

Ref	Date	Consultee	Contact Details	Topic	Comment	Response
33	28/08/2010	Natural England	Mrs Charlotte Frizzell 0300 060 1925 charlotte.frizzell@naturalengland.org.uk	Landscape and Visual Impacts	In order to foster high quality development that respects, maintains, or enhances, local landscape character and distinctiveness, Natural England would encourage all new development to consider the character and distinctiveness of the area, with the design and outlay of all elements of a proposed development reflecting local design characteristics and wherever possible using local materials. The Environment Impact Assessment process should detail the measures to be taken to ensure the building design will be of a high standard, as well as detail of layout alternatives together with justification of the selected option in terms of landscape impact and benefit.	Noted. This has formed part of the Exemplar design and mitigation.
34	28/08/2010	Natural England	Mrs Charlotte Frizzell 0300 060 1925 charlotte.frizzell@naturalengland.org.uk	Access and Recreation	Natural England would encourage any proposal to incorporate measures to help encourage people to access the countryside for quiet enjoyment. Measures such as reinstating existing footpaths together with the creation of new footpaths and bridleways are to be encouraged. Links to other green networks or urban fringe areas should also be explored to help promote the creation of a wider green infrastructure.	Noted. This has been addressed through the design process, and assessed in the ES under the socioeconomics and health impact assessments.
35	28/08/2010	Natural England	Mrs Charlotte Frizzell 0300 060 1925 charlotte.frizzell@naturalengland.org.uk	Ecology	Our records indicate that there are several Local Wildlife Sites in the area surrounding the development site. Local Wildlife Sites are of county importance for wildlife. The Environmental Statement should therefore include an assessment of the likely impacts on the wildlife interests of the surrounding sites. The assessment should include proposals for mitigation of any impacts and if appropriate, compensation measures.	Noted.
36	28/08/2010	Natural England	Mrs Charlotte Frizzell 0300 060 1925 charlotte.frizzell@naturalengland.org.uk	Ecology	We are pleased to see that surveys for protected species are either in progress or will be undertaken. If any protected species are found the Environmental Statement should include details of: The species concerned; The population level at the site affected by the proposal; The direct and indirect effects of the development upon that species; Full details of any mitigation or compensation that might be required; Whether the impact is acceptable and/or licensable.	Noted.
37	28/08/2010	Natural England	Mrs Charlotte Frizzell 0300 060 1925 charlotte.frizzell@naturalengland.org.uk	Ecology	The scoping report states in Table 3.2, Section 3.2.7 on Ecology, that surveys have been carried out and great crested newts are in the area but not within or immediately adjacent to the exemplar site. It also states the surveys that are in progress or will be undertaken. In order to provide this information there may be a requirement for a survey at a particular time of year. Surveys should always be carried out by suitably qualified and where necessary, licensed, consultants. The great crested newt, dormouse and all species of bats are European protected species such that it is illegal to intentionally kill, injure or otherwise disturb them. If any of these species are found to be present you should also consult Natural England's Wildlife Management and Licensing Unit in Bristol (Tel. 0845 6014523) about licensing implications before any work can proceed.	Noted. Surveys have been undertaken by suitably qualified and licenced (if required) consultants. All surveys are undertaken at the appropriate time of year.
38	28/08/2010	Natural England	Mrs Charlotte Frizzell 0300 060 1925 charlotte.frizzell@naturalengland.org.uk	Ecology	Natural England advises that habitat surveys that are carried out on site identify any important habitats present. In addition, ornithological, botanical and invertebrate surveys should be carried out at appropriate times in the year, to establish whether any scarce or priority species are present. The Environmental Statement should include details of: Any historical data for the site affected by the proposal (e.g. from previous surveys); Additional surveys carried out as part of this proposal; The habitats and species present; The status of these habitats and species (e.g. whether BAP priority habitat); The direct and indirect effects of the development upon those habitats and species; Full details of any mitigation or compensation that might be required.	Noted. Ecology surveys have been undertaken by Arup. The ES includes the relevant information and assessment.
					The standards set out in the Eco Towns Planning Policy Statement (July 2009) state that eco towns should demonstrate a net gain in biodiversity and planning permission may not be granted for eco town proposals which have a significant effect on internationally designated nature conservation sites or Sites of Special Scientific Interest (paragraph ET16.1). The development should avoid adversely impacting the most important wildlife areas within the site, and should if possible provide opportunities for overall wildlife gain.	Noted.

Ref	Date	Consultee	Contact Details	Topic	Comment	Response
39	28/08/2010	Natural England	Mrs Charlotte Frizzell 0300 060 1925 charlotte.frizzell@naturalengland.org.uk	Cumulative and In-combination effects	The EIA should include an impact assessment to identify, describe and evaluate the effects that are likely to result from the project in combination with other projects and activities that are being, have been or will be carried out. To carry out the assessment of cumulative and in-combination effects, the following types of projects should be included. (Subject to the availability of information): a. Existing completed projects; b. Approved but uncompleted projects; c. Ongoing activities; d. Plans or projects for which an application has been made and which are under consideration by the consenting authorities; e. Plans and projects which are reasonably foreseeable, i.e. projects for which an application has not yet been submitted, but which are likely to progress before completion of the development and for which sufficient information is available to assess the likelihood of cumulative and in-combination effects.	Noted.
40	01/09/2010	Oxfordshire CC	Linda Currie, Team Leader, Strategic Planning Consultations, Oxfordshire County Council. 01865 810432 linda.currie@oxfordshire.gov.uk	Transport	The Scoping Report does not appear to include any details about Transport or Highway related issues. A Transport Assessment will be required for the Exemplar planning application as well as Transport Assessment for the application site as a whole.	Transport Assessment will be completed separately. A Traffic and Transport chapter has ben included in the ES.
41	01/09/2010	Oxfordshire CC	Linda Currie 01865 810432 linda.currie@oxfordshire.gov.uk	Public Rights of Way	Public Rights of Way (PROW) should be included under the Transport/Highways assessment.	Noted. It has been considered within the Socioeconomic and Human Health assessments within the ES.
42	01/09/2010	Oxfordshire CC	Linda Currie 01865 810432 linda.currie@oxfordshire.gov.uk	Human Health (PRoW)	Section 3.25 includes public rights of way but this is limited to the line of PRoW in the vicinity of the site. The EIA could go further with the 'human health' side of things and look at the line of PRoW, plus the condition and levels of use of current PRoW and greenspaces and then see how the development could make best use of these and provide for mitigation, by extra provision and improvements to existing, to meet the needs of Eco-town residents and the aims of the Rights of Way Improvement Plan.	The line of the PRoW has been considered as part of the socio-economic and human health assessment. Where data has been readily available from the County Council regarding the current use of PRoW and greenspaces then this information has been utilised. However, new primary data has not been collated for this assessment and is considered to be outside the scope of this assessment.
43	01/09/2010	Oxfordshire CC	Linda Currie 01865 810432 linda.currie@oxfordshire.gov.uk	Cultural Heritage	The County Archaeologist broadly supports the provisions for the Archaeological and Cultural Heritage section of the EIA set out in section 3.2.4 in Table 2 of the EIA scoping report. Should an Environmental Impact Assessment be required on this application then we would recommend that the measures set out in this document for identifying the potential impact on this development on archaeological deposits and other aspects of the cultural heritage should be undertaken and included in the ES.	Noted. Cultural heritage has been included as part of the ES. This includes assessing potential impacts on archaeology and built heritage assets.
44	01/09/2010	Oxfordshire CC	Linda Currie 01865 810432 linda.currie@oxfordshire.gov.uk	Socio-Economics	Section 3.2.5 Data collection – the EIA should refer to data in the Joint Strategic Needs Assessment (JSNA); this report identifies current and future health and wellbeing needs in light of existing services, and informs future service planning taking into account evidence of effectiveness. It is available on the Oxfordshire Data Observatory website, www.oxfordshireobservatory.info, under Data > Themes > JSNA 2009.	Noted.
45	01/09/2010	Oxfordshire CC	Linda Currie 01865 810432 linda.currie@oxfordshire.gov.uk	Socio-Economics	Accessibility to day resource centres for older people, childrens centres, SEN facilities, adult learning, NHS dentists should be looked at.	Oxfordshire CC has been contacted to determine the availability of this data. There is not the scope to undertake our own raw data collection on this issue. Liaison with Social and Community Infrastructure Workstream undertaken
46	01/09/2010	Oxfordshire CC	Linda Currie 01865 810432 linda.currie@oxfordshire.gov.uk	Socio-Economics	Mitigation /opportunities for enhancement – these should also include provision of community space where people can meet and where community health services, children's services and social services can be delivered to the new community.	The extent to which the EIA can refer to specific community infrastructure was dependent on the evidence base gathered by the Social and Community Infrastructure Workstream. Liaison with Social and Community Infrastructure Workstream undertaken.
47	01/09/2010	Oxfordshire CC	Linda Currie 01865 810432 linda.currie@oxfordshire.gov.uk	Socio-Economics	Consultation - there will need to be consultation with the County Council (through the social and community infrastructure work stream) on the inclusion of space to deliver childrens services and social services to older and disabled people as part of the scheme.	Consultation envisaged through the Social and Community Infrastructure Workstream. Liaison with Social and Community Infrastructure Workstream undertaken.
48	01/09/2010	Oxfordshire CC	Linda Currie 01865 810432 linda.currie@oxfordshire.gov.uk	Socio-Economics	Section 3.2.7: Consultation column should refer to Oxfordshire (not Oxford) County Council	Noted and amended.

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49	01/09/2010	Oxfordshire CC	Linda Currie 01865 810432 linda.currie@oxfordshire.gov.uk	Socio-Economics	Section 3.2.8: Study area – the local area should be based on the Bicester catchment area for local service delivery ie including surrounding villages such as Upper Heyford . This will be important for considering the impacts of the proposal on provision of higher order services and facilities which cover a wide catchment area eg secondary school, library provision	Our baseline data collection has focused around the electoral wards that form the Bicester settlement, plus Caversfield ward (within which the exemplar site/whole site is located) which has been defined as the 'Central Impact Zone'. Ref 49 refers to the need to extend the study area to incorporate some other outlying villages that are not within the Caversfield ward – Upper Heyford mentioned. For those included within the Caversfield ward site visits have been undertaken and these are accounted for within the baseline socio-economic datasets: Bucknall, Ardley, Caversfield, Bainton and Stoke Lyne. Broad reference has been made to the villages reliant on Bicester services but are outside the Central Impact Zone. This assessment stage will similarly refer to the potential impacts on these outlying villages.
50	01/09/2010	Oxfordshire CC	Linda Currie 01865 810432 linda.currie@oxfordshire.gov.uk	Socio-Economics	Site description – Bicester Village is an important player in the local economy. The availability of employment space at Upper heyford may have an impct	Noted. Bicester Village and wider employment demand/supply have been referred to in the socio-economic impact.
51	01/09/2010	Oxfordshire CC	Linda Currie 01865 810432 linda.currie@oxfordshire.gov.uk	Socio-Economics	Data collection – refer to JSNA. In looking at the impacts of demands from the exemplar development, it will be important to understand the timing of these new demands against the back ground of demands projected from already planned housing sites and the scale and timing of new community facilities, particularly schools which are planned as part of those housing sites	Consultation through the Social and Community Infrastructure Workstream and other pre-application discussions. The EIA will however reference other development considerations and the general interaction of the exemplar site with other schemes.
52	01/09/2010	Oxfordshire CC	Linda Currie 01865 810432 linda.currie@oxfordshire.gov.uk	Socio-Economics	Potential impacts: In the functional stage of the exemplar, the impacts on services and facilities provided off-site should be considered eg library, secondary school, youth facility, fire and rescue.	Consultation through the Social and Community Infrastructure Workstream. Liaison with Social and Community Infrastructure Workstream undertaken
53	01/09/2010	Oxfordshire CC	Linda Currie 01865 810432 linda.currie@oxfordshire.gov.uk	Socio-Economics	Mitigation measures: This should include improvements to off-site services and facilities provided off-site	Consultation on community infrastructure and services will have been undertaken as part of the Social and Community Infrastructure Workstream. Liaison with Social and Community Infrastructure Workstream undertaken. Off-site mitigation provision does not necesarily fall within the remit of this ES.
54	01/09/2010	Oxfordshire CC	Linda Currie 01865 810432 linda.currie@oxfordshire.gov.uk	Socio-Economics	Consultation: with Oxfordshire County Council through the social and community infrastructure workstream. The impacts on County delivered services will not be limited to "education" and "social services". The County Council has statutory responsibility for a much wider range of services, the impacts on which will need to be considered	Noted. A much broader assessment of impact has been undertaken, based on identified potential impact domains: local demographics, housing, employment, the local economy, community facilities and services, crime, tourism and its integration with other local development proposals.
55	01/09/2010	Oxfordshire CC	Linda Currie 01865 810432 linda.currie@oxfordshire.gov.uk	Socio-Economics	Section 3.2.9: Consultation on issues related to energy and waste management should include the County Council through the Energy, Waste and Water workstream.	Noted. Referenced as part of a range of secondary impacts in addition to impacts such as social nuisances such as poor air quality, noise etc.
56	01/09/2010	Oxfordshire CC	Linda Currie 01865 810432 linda.currie@oxfordshire.gov.uk	Water/ Flood Risk	Section 3.2.10: Consultation re development of SUDs should include the County Council in view of the Council's new statutory responsibilities re flooding.	Noted.
57	01/09/2010	Oxfordshire CC	Linda Currie 01865 810432 linda.currie@oxfordshire.gov.uk	Socio-Economics	Section 4.1 Consultation list should include Thames Valley Police rather than Banbury Constabulary ?	Noted. Using Thames Valley Crime statistics.
58	01/09/2010	Oxfordshire CC	Linda Currie 01865 810432 linda.currie@oxfordshire.gov.uk	Landscape and Visual Impacts	The EIA should consider the potential impacts of the exemplar site within the context of the entire eco town development and the existing town of Bicester. Green Infrastructure should be an over-arching theme for the development design and should incorporate landscape, ecology and hydrology elements. Outputs from the Green Infrastructure workstream should inform the EIA process. Over arching GI objectives should be used to inform the EIA process; See Annex 1 response from Oxfordshire CC.	Noted - forms part of Exemplar design, which has been described/summarised in ES mitigation sections.
59	01/09/2010	Oxfordshire CC	Linda Currie 01865 810432 linda.currie@oxfordshire.gov.uk	Landscape and Visual Impacts	This chapter should involve close liaison with the consultants writing the ecology and flood risk & hydrology chapters, as proposed mitigation strategies and compensation/ enhancement measures may affect the resulting development design. Outputs from the Green Infrastructure workstream should inform the Landscape and Visual Impact chapter.	Landscape, ecology, water/flood risk have liaised closely in formulation of green infrastructure proposals.

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60	01/09/2010	Oxfordshire CC	Linda Currie 01865 810432 linda.currie@oxfordshire.gov.uk	Landscape and Visual Impacts	This chapter should cover the following: Elements of the development and its construction relevant to landscape and visual impact; Planning context; Assessment methodology; Baseline conditions; Identification and evaluation of likely significant effects (inc cumulative); Mitigation and enhancement; and long-term management and monitoring.	Noted. Chapter complies with these requirements.
61	01/09/2010	Oxfordshire CC	Linda Currie 01865 810432 linda.currie@oxfordshire.gov.uk	Landscape and Visual Impacts	Oxfordshire County Council documents relevant to this chapter include the following:o Oxfordshire Wildlife and Landscape Study (Middleton Stoney Wooded Estatelands landscape type), available from http://owls.oxfordshire.gov.uk and see appendix I; o Conservation Target Areas Report (Tusmore and Shellswell Park CTA and Ray CTA), available from http://www.oxfordshire.gov.uk/naturalenvironment and see appendix II; o Rights of Way Improvement Plan, available from http://www.oxfordshire.gov.uk/countryside	Noted.
62	01/09/2010	Oxfordshire CC	Linda Currie 01865 810432 linda.currie@oxfordshire.gov.uk	Landscape and Visual Impacts	The Hyder Consulting scoping report makes no reference to the OWLS study or the 1995 Cherwell District Landscape Assessment so does not currently have a robust information base relating to landscape character.	Scoping report provided an overview only - further level of detail has been included in ES.
63	01/09/2010	Oxfordshire CC	Linda Currie 01865 810432 linda.currie@oxfordshire.gov.uk	Landscape and Visual Impacts	Landscape Character Assessment (LCA) should be carried out based on the good practice guidelines produced jointly by the Landscape Institute and Institute of Environmental Assessment in 2002.	Noted. Our landscape team have followed good practice guidance.
64	01/09/2010	Oxfordshire CC	Linda Currie 01865 810432 linda.currie@oxfordshire.gov.uk	Landscape and Visual Impacts	The LCA should be considered within the context of Cherwell District Landscape Assessment and the Oxfordshire Wildlife and Landscape Study (accessible from http://owls.oxfordshire.gov.uk/). In particular, the biodiversity, forces for change, and landscape strategy elements of OWLS should be used. The Bicester Eco town exemplar site is within the OWLS Wooded Estatelands landscape type and Middleton Stoney local character area; further details are included in appendix I.	Noted.
65	01/09/2010	Oxfordshire CC	Linda Currie 01865 810432 linda.currie@oxfordshire.gov.uk	Landscape and Visual Impacts	It is recognised that OWLS has been undertaken at a county level. For a development of this size we would therefore expect to see local studies which refine this broad-scale information, provide better detail on the local landscape, and landscape guidelines specifically for the development.	Noted. Local landscape character areas have been included as part of the ES. The EIA also includes assessments of visual effects on the surrounding area and landscape.
66	01/09/2010	Oxfordshire CC	Linda Currie 01865 810432 linda.currie@oxfordshire.gov.uk	Landscape and Visual Impacts	Mitigation and Enhancement: Landscape planting schemes for enhancement and mitigation should be agreed in discussion with the ecological and hydrological consultants and be in line with the outputs from the Green Infrastructure work-stream. Planting schemes should also follow guidance from the Oxfordshire Wildlife and Landscape Study (OWLS) to ensure they are appropriate to the area.	Noted. Landscape team have liaised with ecology and water teams.
67	01/09/2010	Oxfordshire CC	Linda Currie 01865 810432 linda.currie@oxfordshire.gov.uk	Landscape and Visual Impacts	Green Infrastructure and Masterplanning: Landscape is a key component of green infrastructure and the results of the landscape character assessment should be used to influence the green infrastructure principles and master-planning process for the site.	Noted. Landscape team has provided inputs into the wider Masterplan.
68	01/09/2010	Oxfordshire CC	Linda Currie 01865 810432 linda.currie@oxfordshire.gov.uk	Landscape and Visual Impacts	Provision should be made for the long term management of any public green space, particularly for areas for which mitigation or compensation/enhancement measures have been proposed.	Noted. Landscape/ecology teams have formulated heads of terms, which are summarised in ES mitigation / enhancement sections
69	01/09/2010	Oxfordshire CC	Linda Currie 01865 810432 linda.currie@oxfordshire.gov.uk	Landscape and Visual Impacts	The EIA should include head of terms for a management plan with the full management plan to be submitted prior to the completion of the development. The costs of implementing the plan may need to be secured through a S106 agreement. This sum should cover the costs of annual monitoring and an annual review of the management plan for the entire site, in addition to the management work itself.	Noted. Landscape/ecology teams have formulated heads of terms, which are summarised in ES mitigation / enhancement sections
70	01/09/2010	Oxfordshire CC	Linda Currie 01865 810432 linda.currie@oxfordshire.gov.uk	Landscape and Visual Impacts	Responsibility for carrying out the review of the management plan and the management work itself will need to be taken by an individual or group of individuals, as agreed by the developer and Cherwell District Council in discussion with the relevant nature conservation bodies.	Noted
71	01/09/2010	Oxfordshire CC	Linda Currie 01865 810432 linda.currie@oxfordshire.gov.uk	Ecology and Landscape	A single plan for management and monitoring of both biodiversity and landscape elements of the development would be sensible to minimise resource expenditure and ensure cohesion between landscape and biodiversity requirements. This could be achieved using a green infrastructure management and monitoring scheme.	A Green Infrastructure Plan has been prepared.
72	01/09/2010	Oxfordshire CC	Linda Currie 01865 810432 linda.currie@oxfordshire.gov.uk	Ecology	This chapter should involve close liaison with the consultants writing the landscape & visual impact and flood risk & hydrology chapters, as proposed mitigation strategies and compensation/ enhancement measures may affect the resulting development design. Outputs from the Green Infrastructure workstream should inform the Ecology chapter.	Noted.
73	01/09/2010	Oxfordshire CC	Linda Currie 01865 810432 linda.currie@oxfordshire.gov.uk	Ecology	See comment 60 (Landscape and visual impact) for list of elements ecology chapter should cover.	Noted. Ecology team reviewed this list.

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74	01/09/2010	Oxfordshire CC	Linda Currie 01865 810432 linda.currie@oxfordshire.gov.uk	Ecology	Planning policies, legislation and other documents relevant to this chapter include the following: Habitat Regs 2010; CROW Act 2000; WCA 1981; Badger Act 1992; PPS9; o Oxfordshire Biodiversity Action Plan, available from http://www.oncf.org.uk/biodiversity/biodiversity.html; o Oxfordshire Wildlife and Landscape Study (Middleton Stoney Wooded Estatelands landscape type), available from http://owls.oxfordshire.gov.uk and appendix I; o Local Wildlife Sites Project, project information available from http://www.bbowt.org.uk, information on location of sites and citations available from http://www.tverc.org/; o Biodiversity and Planning in Oxfordshire guidance available from http://www.oxfordshire.gov.uk/naturalenvironment; o Conservation Target Areas Report (Tusmore and Shellswell Park CTA and Ray CTA), available from http://www.oxfordshire.gov.uk/naturalenvironment and appendix II; o Rights of Way Improvement Plan, available from http://www.oxfordshire.gov.uk/countryside	Noted. Information was provided to ecology team.
75	01/09/2010	Oxfordshire CC	Linda Currie 01865 810432 linda.currie@oxfordshire.gov.uk	Ecology	The EIA should identify protected or priority species, designated sites, important habitats or other biodiversity features on or adjacent to the development site. Desk study information is available from the Thames Valley Environmental Records Centre (http://www.tverc.org/).	Noted. Ecology team identified these assets. Information on Records Centre was passed on to ecology team.
76	01/09/2010	Oxfordshire CC	Linda Currie 01865 810432 linda.currie@oxfordshire.gov.uk	Ecology	Desk study – In addition to obtaining records from TVERC, the Hawk and Owl Trust and Butterfly Conservation, Arup should also contact the local bat group, the local badger group and Banbury Ornithological Society for their records.	Noted.
77	01/09/2010	Oxfordshire CC	Linda Currie 01865 810432 linda.currie@oxfordshire.gov.uk	Ecology	Ardley Cutting & Quarry SSSI (unit 2) is located just outside of the development site boundary.	Noted. The SSSI has been included in the EIA chapter.
78	01/09/2010	Oxfordshire CC	Linda Currie 01865 810432 linda.currie@oxfordshire.gov.uk	Ecology	The site is close to the Tusmore and Shellswell Park Conservation Target Area and Ray Conservation Target Area and the development should help meet the targets of these CTAs. Further information is provided in appendix II.	Noted.
79	01/09/2010	Oxfordshire CC	Linda Currie 01865 810432 linda.currie@oxfordshire.gov.uk	Ecology	Surveys – In addition to the surveys mentioned in the scoping report, winter surveys for brown hairstreak eggs should be carried out. There are badger setts on the site and whether the development could have a significant impact or not will depend on the exact location of housing and whether the setts close to houses are main setts or outliers and whether the other setts on site are used by the same clan of badgers or not, and where the main setts are in relation to the foraging areas. Bait-marking would be needed to determine this.	Noted.
80	01/09/2010	Oxfordshire CC	Linda Currie 01865 810432 linda.currie@oxfordshire.gov.uk	Ecology	If any protected species are found, a mitigation strategy will need to be prepared and submitted in discussion with Natural England and Oxfordshire County Council and it may be necessary for the applicant to obtain a licence from Natural England. Mitigation strategies for any other protected species, species of conservation concern, rare and notable species or UK BAP species that could be potentially impacted by the development will be needed.	Noted.
81	01/09/2010	Oxfordshire CC	Linda Currie 01865 810432 linda.currie@oxfordshire.gov.uk	Ecology	Any impacts of the development which cannot be minimized to a negligible level through mitigation will need to be compensated for. This could be via on and/or off site enhancement of existing biodiversity resources and/or the creation of new habitat. The type of compensatory habitat should be appropriate to the surrounding habitat and species present in the area. The biodiversity strategy and guidelines outlined on the OWLS website and the CTA project can be used as guidance for the enhancement of ecological areas and their future management.	Noted.
82	01/09/2010	Oxfordshire CC	Linda Currie 01865 810432 linda.currie@oxfordshire.gov.uk	Ecology	The development should result in a net enhancement in biodiversity.	Noted.
83	01/09/2010	Oxfordshire CC	Linda Currie 01865 810432 linda.currie@oxfordshire.gov.uk	Ecology	Ecology is a key component of green infrastructure and the results of ecological surveys should be used to influence the green infrastructure principles and master-planning process for the site.	Noted. Ecology team have inputted into the masterplan development.
84	01/09/2010	Oxfordshire CC	Linda Currie 01865 810432 linda.currie@oxfordshire.gov.uk	Ecology	See Annex 1 of Oxfordshire CC comments for Green Infrastructure biodiversity principles	Ecology team reviewed Green Infrastructure biodiversity principles in Annex 1
85	01/09/2010	Oxfordshire CC	Linda Currie 01865 810432 linda.currie@oxfordshire.gov.uk	Ecology	Provision should be made for the long term management of any public green space, particularly for areas for which mitigation or compensation/enhancement measures have been proposed.	Noted. Ecology chapter includes mitigation and enhancement recommendations.
86	01/09/2010	Oxfordshire CC	Linda Currie 01865 810432 linda.currie@oxfordshire.gov.uk	Ecology	The EIA should include head of terms for a management plan with the full management plan to be submitted prior to the completion of the development. The costs of implementing the plan may need to be secured through a S106 agreement. This sum should cover the costs of annual monitoring and an annual review of the management plan for the entire site, in addition to the management work itself.	Noted.

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87	01/09/2010	Oxfordshire CC	Linda Currie 01865 810432 linda.currie@oxfordshire.gov.uk	Ecology	Responsibility for carrying out the review of the management plan and the management work itself will need to be taken by an individual or group of individuals, as agreed by the developer and Cherwell District Council in discussion with the relevant nature conservation bodies.	Noted.
88	01/09/2010	Oxfordshire CC	Linda Currie 01865 810432 linda.currie@oxfordshire.gov.uk	Ecology	Continuous monitoring will be needed to determine the actual impacts of the development on the biodiversity of the site. Monitoring should also provide information on the success of the mitigation strategies implemented for the protected species and feed into the management plan to allow it to be altered as necessary	Noted.
89	01/09/2010	Oxfordshire CC	Linda Currie 01865 810432 linda.currie@oxfordshire.gov.uk	Ecology	A single plan for management and monitoring of both biodiversity and landscape elements of the development would be sensible to minimise resource expenditure and ensure cohesion between landscape and biodiversity requirements. This could be achieved using a green infrastructure management and monitoring scheme.	Noted.
90	01/09/2010	Oxfordshire CC	Linda Currie 01865 810432 linda.currie@oxfordshire.gov.uk	Landscape/Ecology	See Annex 1 of Oxfordshire CC comments for Appendices containing additional Landscape and Ecology information.	Landscape and Ecology teams reviewed Annex 1 - additional comments
91	26/08/2010	Berkshire, Buckinghamshire and Oxfordshire Wildlife Trust	BBOWT, The Lodge, 1 Armstrong Road, Littlemore, Oxford, OX4 4XT	Ecology	Key points that will need to be included in the EIA are as follows: • Survey to identify protected species, and habitats and species of importance (as listed under Section 41 of the NERC Act 2006)principle; • Identification of any indirect impacts of development at this site on biodiversity in the wider area, including hydrological impacts, air pollution impacts and potential damage to sensitive sites through increased recreational pressure; • Identification of opportunities for biodiversity enhancements, to allow development of a Biodiversity Strategy that will achieve a net gain in biodiversity	Noted and reviewed/included.
92	26/08/2010	Berkshire, Buckinghamshire and Oxfordshire Wildlife Trust	Rebecca Micklem, Conservation Officer (Oxon); beccymicklem@bbowt.org.uk	Ecology	Data collection to inform the EIA should include a data search to identify designated sites, protected species, and species and habitats of principal importance (as listed under Section 41 of the NERC 2006). I note that reference is made (in the third column of the table provided on page 16 of the scoping report) to the presence of a single SSSI within 2km of the site, Stratton Audley Quarries. This site is in fact designated SSSI for it's geological interest but also receives Local Wildlife Site status for its ecological importance. I am concerned that other SSSIs in the area appear to have been overlooked. These include Ardley Cutting and Quarry SSSI which lies within 1.5 km, to the north west of the site. The EIA will also need to identify Local Wildlife Sites and Local Nature Reserves in the area and assess any likely impacts on these sites.	Noted. SSSIs reviewed and correctly included in the EIA chapter.
93	26/08/2010	Berkshire, Buckinghamshire and Oxfordshire Wildlife Trust	Rebecca Micklem, Conservation Officer (Oxon); beccymicklem@bbowt.org.uk	Ecology	In developing mitigation, we recommend that off-site mitigation for some impacts (e.g. farmland birds) is taken into consideration in the EIA. In developing proposals to retain ecological features, such as hedgerows, on site we recommend that consideration is given to the likely impact on these features during occupation of the development and the need for ongoing nature conservation management of such features.	Noted. Ecology team have taken this request into consideration when developing mitigation measures.
94	26/08/2010	Berkshire, Buckinghamshire and Oxfordshire Wildlife Trust	Rebecca Micklem, Conservation Officer (Oxon); beccymicklem@bbowt.org.uk	Ecology	The exemplar site will need to demonstrate a net gain in biodiversity in line with the guidance in eco-town PPS (ET 16.1). The EIA should identify areas with potential for delivery of biodiversity enhancements. We welcome recognition within the Agriculture and Landuse section of the report, that a Soil Resources Plan should be used to identify areas of soils suitable for habitat creation. In relation particularly to the exemplar site application, it is essential that habitat connectivity is achieved with existing and future habitats to be created within the wider site.	Noted.
95	26/08/2010	Berkshire, Buckinghamshire and Oxfordshire Wildlife Trust	Rebecca Micklem, Conservation Officer (Oxon); beccymicklem@bbowt.org.uk	Ecology	Whilst a separate process to the EIA, the Council should be aware that there is also a requirement within the Eco-town PPS that a strategy for conserving and enhancing local biodiversity is produced to accompany planning applications for eco-towns.	Noted.
96	26/08/2010	Berkshire, Buckinghamshire and Oxfordshire Wildlife Trust	Rebecca Micklem, Conservation Officer (Oxon); beccymicklem@bbowt.org.uk	Ecology	Additional comments made to Arup ecologists in May 2010	Ecology team reviewed additional comments made by BBO Wildlife Trust in May 2010.
97	20/09/2010	English Heritage	Steve Williams, Regional Planner; 01483 252052; steve.williams@english-heritage.org.uk	Cultural Heritage	English Heritage has been consulted and has the following comments. It is noted that Landscape and Visual Impact (3.2.3) and Archaeology and Cultural Heritage (3.2.4) are topics to be covered by the EIA. English Heritage is content that potential negative impacts upon the historic environment have been identified and mitigation/enhancement opportunities identified for the site and its immediate vicinity. Table 2 identifies the potential for impact upon the Grade II* listed St. Lawrence's Church and Grade II listed Home Farmhouse and the need for an assessment of archaeological potential.	Noted.

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98	20/09/2010	English Heritage	Steve Williams, Regional Planner; 01483 252052; steve.williams@english-heritage.org.uk	Cultural Heritage	Clearly, the Exemplar Site forms only a relatively small part of the proposed eco-town area. Nevertheless, it will contribute to the direct, indirect, secondary, cumulative, short, medium and long term, permanent and temporary, positive and negative effects of the proposals as a whole. There may be potential for some beneficial reuse of buildings of historic significance associated with the former RAF Bicester a little way to the east of the site. Opportunities may arise associated with the construction phase of the eco-town and over the longer term, for example, as a source of premises suitable for employment and community uses. This warrants being scoped into the assessment.	Noted, however the former RAF Bicester site is outside of the development area so it may be outside the scope of the assessment to recommend reuse of the historical buildings associated with it.
99	24/09/2010	Thames Water	Thames Water Developer Services 0845 850 2777	Water	The provision of water and waste water infrastructure is essential to any development and Thames Water is aware of the potential for a Water Cycle Study to be undertaken for the Eco-development.	A Water Cycle Study has been prepared.
100	24/09/2010	Thames Water	Thames Water Developer Services 0845 850 2777	Water	While Thames Water accepts that work is ongoing to understand the water and waste water infrastructure needs, it makes the following observations in response to the scoping report: • It is unclear at this stage what the net increase in demand on Thames Water infrastructure will be as a result of the proposed development. • Thames Water is concerned that the network in this area may be unable to support the demand anticipated from this development. • The developer needs to consider the net increase in water and waste water demand to serve the development and also any impact the development may have off site further down the network, if no/low water pressure and internal/external sewage flooding of property is to be avoided.	Noted. Liaison with Thames Water is ongoing.
101	24/09/2010	Thames Water	Thames Water Developer Services 0845 850 2777	Water	Thames Water has recommended that any EIA report should be expanded to consider the following. • The proposed development's demand for water supply and network infrastructure both on and off site and can it be met • The proposed development's demand for sewage treatment and network infrastructure both on and off site and can it be met • The surface water drainage requirements and flood risk of the development both on and off site and can it be met	Noted. Liaison with Thames Water is ongoing.
102	24/09/2010	Thames Water	Thames Water Developer Services 0845 850 2777	Water	Please contact Thames Water's Developer Services department on 0845 850 2777 to obtain information on the above issues	Noted. Liaison with Thames Water is ongoing.
103	24/09/2010	Highways Agency		Transport	The Highways Agency has confirmed that when a scoping report is submitted, the following information should be provided: • Details of the development, such as location, access arrangements, use class, size or number of units, maximum number of parking spaces and any other relevant information. • Proposed methodology for estimating the vehicular trip generation and distribution on the strategic road network, and resulting trip generation figures • Proposed methodology for assessing the impact of trip generation on the strategic road network.	Noted. Traffic and Transport chapter and Transport Assessment includes this information.
104	24/09/2010	Highways Agency		Transport	The Highways Agency's response refers to Guidance on Transport Assessments produced by the Department of Transport in 2007 and the initial appraisal consultation form published with the guidance. The Highways Agency has confirmed that it would be happy to assist in any data that it has pertaining to the junctions relevant to the proposed development	Noted.
105	24/09/2010	Cherwell District Council	Cherwell DC Planning Policy, Design & Conservation Officers	General	The proposed development is the first phase of a larger development and therefore it is inextricably linked to the wider proposal, as is made clear in the first six pages of the Scoping Report. There will inevitably be interactions between the different phases of the larger development. For example, public transport routes, drainage, open space, employment, retail, community and education facilities are not mutually exclusive in their provision or in their use. The interaction between the different phases is an important element of the whole development as a sustainable community.	Noted.
106	24/09/2010	Cherwell District Council	Cherwell DC Planning Policy, Design & Conservation Officers	Cumulative	It is 'reasonably foreseeable' that the adjoining land will be developed (because without it we would not be considering this proposal). Circular 2/99 and the EIA Regulations both make it clear that the cumulative effects of development should be assessed. The cumulative effects include the effects of the whole scheme. The increase in potentially adverse impacts should arguably be assessed as part of the requirement to forecast and predict direct indirect and cumulative impacts (Schedule 4).	Noted. Cumulative Effects chapter includes the effects of the NW Bicester eco-development with the Exemplar.

Ref	Date	Consultee	Contact Details	Topic	Comment	Response
107	24/09/2010	Cherwell District Council	Cherwell DC Planning Policy, Design & Conservation Officers	Ecology, landscape, sust	The impact assessment might identify mitigating actions that are contingent with delivery of the later phases i.e. advance screen planting, green corridors providing biodiversity linkages through the whole development and beyond to the countryside; or sustainable travel or energy choices that may only become available through the other phases (cycle links, bus stops, or decentralised energy sources where viability requires the larger scale development). If such elements are recognised as 'positive' mitigations, the adverse impacts associated with the development as a whole should also be assessed (rather than the wider development just being selectively acknowledged).	Noted by all topics.
108	24/09/2010	Cherwell District Council	Cherwell DC Planning Policy, Design & Conservation Officers	General	On large developments it is normal practice for an outline application to be submitted for the whole scheme and these impacts assessed, to be followed by Reserved Matters applications. Paragraph 1.2 of the Scoping Report states that "*each outline application will therefore be accompanied by an ES*". Such an approach would require the submission of a number of environmental statements and the Council would seek a comprehensive outline application following the submission of the exemplar application.	Noted.
109	24/09/2010	Cherwell District Council	Cherwell DC Planning Policy, Design & Conservation Officers	General	It is also unclear whether development of the area defined as "phase 2" in Fig 2.2 is to be assessed or not. It is included within the site boundary but there is no indication as to the proposals.	Noted. Site boundary updated.
110	24/09/2010	Cherwell District Council	Cherwell DC Planning Policy, Design & Conservation Officers	Landscape	The reference at paragraph 3.23 to established landscape character as having a "wooded character" is rather simplistic and should refer to a range of documents, including the Cherwell District Council (CDC) Landscape Character Assessment and also our Countryside Design Summary, which give finer grain landscape types and identify the site as falling into the Oxfordshire Estate Farmlands. The Oxfordshire Wildlife and Landscape study should also be considered. It is important that the established landscape character is fully understood before appropriate mitigation techniques are considered.	Scoping report provided overview only - further level of detail has been included in ES.
111	24/09/2010	Cherwell District Council	Cherwell DC Planning Policy, Design & Conservation Officers	Transport	Transport is not mentioned and so it is not clear whether a separate transport assessment is to be carried out. This is an aspect of the proposals that will be important to local people and must be fully addressed.	A separate Transport Assessment is being carried out for the development. A Traffic and Transport chapter summarises this assessment in the ES.
112	24/09/2010	Cherwell District Council	Cherwell DC Planning Policy, Design & Conservation Officers	Cultural Heritage	The reference to impact on heritage assets is rather heavy on archaeology. PPS 5 now refers to designated and undesignated heritage assets so impacts on undesignated assets should be included. Impacts on setting and curtilage will also need to be assessed.	Noted. Undesignated assets such as Caversfield House have been considered and setting of all assets has been included.
113	24/09/2010	Cherwell District Council	Cherwell DC Planning Policy, Design & Conservation Officers	Design	The overfly zone for Windrushers' Gliding Club at RAF Bicester needs to be taken into account. Care will need to be taken not to develop in locations that would prevent continued aviation use of the former RAF Bicester.	Comment has been passed on to the wider design team.
114	24/09/2010	Cherwell District Council	Cherwell DC Planning Policy, Design & Conservation Officers	General	The main alternatives are required to be assessed. These need to be clearly set out in the Environmental Statement.	Noted. Alternatives have been discussed in the ES.
115	24/09/2010	Cherwell District Council	Cherwell DC Planning Policy, Design & Conservation Officers	Air Quality	On air quality, it would be appropriate in this Eco Town to assess the emissions from buildings. The TCPA worksheets recommend that these are monitored.	The TCPA sheet for energy requires assessment from on site energy generation. The Energy Centre has been included as part of the ES.
116	24/09/2010	Cherwell District Council	Cherwell DC Planning Policy, Design & Conservation Officers	General	On a minor point, there are a few locations where references from other documents (for example, reference to a brief, to demonstrating deliverability of the site, to informing the preparation of the Core Strategy and to Three Rivers Water) do not seem to have been edited out and this should be corrected.	Noted. This will not be replicated in the ES.
117	24/09/2010	Cherwell District Council	Cherwell DC Biodiversity and Conservation Officer	Ecology	The above officer has nothing substantial to add to the responses of BBOWT and Natural England to this scoping report but emphasises the following points: • Bearing in mind some of the ecological surveys for protected species, and habitats and species of principle importance, have not yet been completed, it is important that the EIA does take into account the findings of all surveys; • The impact on important wildlife sites (SSSIs, Local Wildlife Sites, Local Nature Reserves and Conservation Target Areas) close to the site should be comprehensively assessed; • The development of a Biodiversity Strategy to ensure that a net gain in biodiversity is achieved is crucial; • The connectivity within the site, and between the site and the surrounding countryside, particularly in terms of hedgerows and water courses, is vitally important.	Noted and included.
118	24/09/2010	Cherwell District Council	Cherwell DC Environmental Protection Officer	Air Quality	The above officer has previously spoken with Hyder and confirmed that the proposed approach is acceptable in principle.	Noted.

Ref	Date	Consultee	Contact Details	Topic	Comment	Response
119	24/09/2010	Cherwell District Council	Cherwell DC Environmental Protection Officer	Air Quality	A detailed assessment at Queens Avenue / Kings End, Bicester is being undertaken for nitrogen dioxide. This will be reported by the end of February 2011 and a lag time of approximately six weeks should be allowed from sample collection to receiving monitoring results.	Noted.
120	24/09/2010	Cherwell District Council	Cherwell DC Environmental Protection Officer	Air Quality	The "soft mitigation" measures outlined when developing the master plan are a sensible approach as a general principle.	Noted.
121	24/09/2010	Cherwell District Council	Cherwell DC Environmental Protection Officer	Air Quality	It is noted that the baseline monitoring period is only three months which is the minimum length of monitoring time required in LAQM.TG, 2009. This document does state that all surveys should ideally be carried out for a minimum of six consecutive months (three in summer and three in winter) to ensure they are representative of the whole year. A longer period of monitoring (six months) would therefore be preferred. It is accepted that the proposed three months of monitoring is likely to provide useful information for informing the environmental statement when period mean corrected against long term background data sets, but it is recommended that a longer period of monitoring is undertaken.	Previously discussed this with the EPO at Cherwell DC. The programme for the project only allows 3 months monitoring to be considered for the Exemplar site. However, it was agreed that 6 months monitoring around the whole site would be carried out.
122	24/09/2010	Cherwell District Council	Cherwell DC Environmental Protection Officer	Air Quality	From previous correspondence it is understood that there may be various time constraints on this project and that submitting an addendum to the ES is not a favourable / practicable approach.	Three months monitoring results will not be available until late November. An addendum to the Exemplar ES will be needed in order to meet the requirements of the EPO as listed in their comment above. It's unavoidable unless the EPO changes their requirement.
123	24/09/2010	Cherwell District Council	Cherwell DC Environmental Protection Officer	Contaminated Land	The approach outlined in the scoping report i.e. assessing the risk from land contamination through intrusive ground investigation and subsequent chemical analysis is acceptable.	Noted.
124	24/09/2010	Cherwell District Council	John Hoad, Cherwell DC Strategic Director of Planning, Housing and Economy	General	The above sections set out the local planning authority's response to the request for a screening opinion. Some comments have taken a while to be received and I therefore apologise for the delay in responding. Any further comments received will be forwarded. In the meantime I trust this information is of assistance to you in the formulation of the Environmental Statement and should be treated as the Council's formal scoping opinion made under the EIA Regulations 1999, Circular 02/99 and the Town and Country Planning (General Development Procedure) Order 1995.	Noted.
ADDITIONAL BACKGROUND COMMENTS FROM CONSULTEES (BUT NOT INCLUDED IN FORMAL SCOPING OPINION)						
A1	*20/09/2010*	*English Heritage*	*Steve Williams, Regional Planner; 01483 252052; steve.williams@english-heritage.org.uk*	*Cultural Heritage*	*We welcome recognition that the north west Bicester eco-development, as distinct from an eco-town, will not be a standalone new settlement and that its success will very much depend upon symbiosis with the existing town and its communities.*	*Noted.*
A2	*20/09/2010*	*English Heritage*	*Steve Williams, Regional Planner; 01483 252052; steve.williams@english-heritage.org.uk*	*Cultural Heritage*	*Although the development area as a whole is relatively unconstrained by nationally significant heritage assets (two Grade II listed barns at Hinley Farm and the Grade II listed Home Farmhouse within the site; and the Grade II* Church of St. Lawrence, Caversfield just outside the boundary), it will be important to consider impacts (positive and negative), upon the wider area including the historic town centre and other significant heritage assets such as RAF Bicester.*	*Noted, however RAF Bicester and the town centre of Bicester lies outside the study area as defined in the Scoping report and therefore considering it in the assessment would constitute additional work outside of the original scope. We do not feel that from a heritage point of view there will be any impact on the town centre due to it being separated from the development by the large residential development of northern Bicester.*
A3	*20/09/2010*	*English Heritage*	*Steve Williams, Regional Planner; 01483 252052; steve.williams@english-heritage.org.uk*	*Cultural Heritage*	*Locally significant landscape features within and around the site such as hedgerows, tree lines and field patterns will have an important contribution to make to help in the creation of a sustainable and distinctive new community*	*Noted. The landscape, heritage and ecology teams are working closely with the design team to create a sustainable and distinctive community.*
A4	*20/09/2010*	*English Heritage*	*Steve Williams, Regional Planner; 01483 252052; steve.williams@english-heritage.org.uk*	*Cultural Heritage*	*The masterplanning framework introduces the concept of a 'collage of villages', with local centres/hubs based upon four existing farmsteads. The Exemplar site occupies a relatively small part of the eco-development area, but in terms of the historic environment, it has the potential to impact upon the setting of Home Farmhouse and the Church of St. Lawrence, although neither are actually within the Exemplar boundary. The Halcrow's Concept Study of February 2009 noted the need for sympathetic design in proximity to the listed buildings as a priority. This will clearly need to be picked up as more detailed design work is progressed. One of the difficulties in responding to this Exemplar consultation is that it represents such a small part of the whole proposal, while so much remains to be revealed about the remainder, not least areas actually abutting the site.*	*Noted. The landscape and heritage teams are working closely with the design team to develop sympathetic design in proximity to listed buildings.*

Ref	Date	Consultee	Contact Details	Topic	Comment	Response
A5	20/09/2010	English Heritage	Steve Williams, Regional Planner; 01483 252052; steve.williams@english-heritage.org.uk	Cultural Heritage	The latest Exemplar layout illustrates an extensive area of undeveloped land to the south and west of Home Farm. This would provide some spatial separation and relief to the two listed buildings mentioned, but the area is actually outside the Exemplar site boundary and may therefore give a false impression of openness in the vicinity of the farmstead, which after all, is trailed as one of the four foci of development around which a new community is planned to grow	Noted. The area of undeveloped land will remain in the ownership of Home Farm. It is a buffer zone providing spatial separation for the listed buildings and for the receptors.
A6	20/09/2010	English Heritage	Steve Williams, Regional Planner; 01483 252052; steve.williams@english-heritage.org.uk	Cultural Heritage	The Exemplar Project Vision refers to development being designed to respect the constraints of the site, but this is qualified in parenthesis by reference to ecological and technical. For the avoidance of doubt, and having regard to the potential for impact upon heritage assets referred to above, we suggest the reference should be to 'environmental' rather than just 'ecological', or 'ecological, heritage and technical'.	Noted. This will be acknowledged in the ES.
A7	20/09/2010	English Heritage	Steve Williams, Regional Planner; 01483 252052; steve.williams@english-heritage.org.uk	Cultural Heritage	The Vision also refers to 'respect' for adjoining countryside and 'the existing Bicester'. More could be made of this, along the lines that it is one of the positive attributes of the exercise that local character and distinctiveness should positively inform the outcomes	Noted.
A8	20/09/2010	English Heritage	Steve Williams, Regional Planner; 01483 252052; steve.williams@english-heritage.org.uk	Cultural Heritage	English Heritage advocates historic characterisation as an integrated understanding of place. It leads to an understanding of how places have evolved and are currently perceived which helps to manage this change. It is particularly effective when carried out as early on in the process as possible. Historic characterisation helps to establish sensitivities of a place and its capacity for development or change; helps to define opportunities for new development and informs its design; establishes the heritage values and significance of a place for different stakeholders and can assist coordination with community neighbourhood aspirations. It would assist us to know the extent to which specific characterisation work has been undertaken and is being used to inform further development of the masterplan.	As part of the ES the Heritage chapter will be considering the Historic landscape within the Exemplar site and the surroundign study area using available cartographic and written sources. However as English Heritage are probably aware no Historic Landscape Characterisation has been carried out for Oxfordshire. To carry out one as part of this project would be beyond our scope of work.

APPENDIX 7A

Arup (2010) Phase 1 Habitat Survey

A2 Dominion

Bicester Eco town

Phase 1 Habitat Survey

A2 Dominion

Bicester Eco Town

Phase 1 Habitat Survey

July 2010

This report takes into account the particular instructions and requirements of our client.
It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party

Ove Arup & Partners Ltd
13 Fitzroy Street, London W1T 4BQ
Tel +44 (0)20 7636 1531 Fax +44 (0)20 775 ____
www.arup.com

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ARUP

Document Verification

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1 Introduction

1.1 Background

Arup was commissioned by A2 Dominion to carry out an ecological appraisal of the proposed Bicester Eco Town development in Oxfordshire. The development site is located within a belt of mixed-use farmland which lies to the north west of Bicester, between the town and the nearby village of Bucknell (Central OS Grid Ref: SP 565 247)

This report details the findings of Phase 1 Habitat Surveys which were undertaken across the whole site during the spring of 2010.

The purpose of Phase 1 Habitat Surveys is to map key habitats and plant species assemblages, and identify the presence and/or potential for protected species. This report presents an initial assessment of the ecological significance of the features currently present on site, and the likelihood that the area supports species of conservation interest which may be affected by the proposed development.

As an initial assessment, the Phase 1 Habitat Survey provides recommendations for further surveys, if needed, and where relevant, possible mitigation and site enhancements that may be necessary under legislative and current policy parameters. It is intended that this information will be used to inform an Environmental Impact Assessment (EIA).

1.2 Aims and Objectives

The Phase 1 Habitat Surveys set out to:

- Provide information on the type, location, extent and distribution of habitats present on the site.
- Provide an evaluation of the likely ecological value of the site, and the presence of species protected by law or otherwise of nature conservation importance, or of habitats or features able to support such species.
- Assess the implications of the findings in relation to the proposed development and, where appropriate, suggest suitable mitigation and/or enhancement works to maintain legislative compliance.
- Advise on any further survey work that may be required to ensure legal compliance or to inform the detailed design process further.

1.3 Report Structure

Following this introduction, Chapter 2 describes UK policy, guidance and legislation with respect to ecology and biodiversity. Chapter 3 covers survey methodologies utilised to assess the ecological interest of the site. Chapter 4 presents the results and Chapter 5 an appraisal of the survey findings; Chapter 6 recommends further work and consideration of mitigation and enhancement measures where necessary.

2 Policies, Guidance and Legislation

2.1 General

The interpretations of the findings of this survey and the subsequent recommendations have been produced in accordance with relevant legislation and best practice guidance. They also take into account Planning Policy Statement 9 (PPS9) and other nature conservation policies within local and regional planning policy documents.

Legislation relating to ecological resources that are relevant to this report and the recommendations provided include the following:

- ***Wildlife and Countryside Act, 1981 (as amended)*.** This Legislation still comprises the primary means of protecting wildlife in the UK and provides the mechanism by which a number of international directives are implemented in the UK.

- ***Conservation (Natural Habitats &c.) Regulations, 1994*.** This Act provides protection for European protected species and their habitats, such as bats and great crested newts.

- ***Countryside and Rights of Way (CRoW) Act, 2000*.** The CRoW Act strengthened the details of The Wildlife and Countryside Act in relation to Sites of Special Scientific Interest (SSSI) and threatened species.

- ***Natural Environment and Rural Communities (NERC) Act, 2006*.** This Act puts an obligation on public authorities to have regard to the conservation of species and habitats of principal importance for the purpose of conserving biodiversity.

2.1.1 Planning Policy Statement 9 (PPS9)

This sets out the Government's planning policies on the protection of biodiversity and geological conservation through the planning system. The policies may also be material to decisions on individual planning applications for Eco-towns.

2.1.2 Planning Policy Statement on Eco-towns

The Planning Policy Statement (PPS) on Eco-towns is a supplement to PPS1 which sets out the governments overarching planning policies on the delivery of sustainable development through the planning system. It states that Eco-towns should demonstrate a net gain in local biodiversity and that planning permission may not be granted for eco town proposals which have a significant adverse effect on internationally designated nature conservation sites or Sites of Special Scientific Interest.

The PPS on Eco-towns also states that planning applications for these developments should also contain a strategy for conserving and enhancing local biodiversity. This should be based on up-to date information about the biodiversity of the area including proposals for the management of local ecosystems and, where appropriate, the restoration of degraded habitats or the creation of replacement habitats.

2.1.3 Biodiversity Positive: Eco-towns biodiversity worksheet

This worksheet highlights the aim to develop and promote eco-towns as Exemplars of sustainable development. It provides guidance in support of the Planning Policy Statement (PPS) on Eco-towns and sets out the requisite steps necessary to ensure the overall impact of these developments on biodiversity is both positive and sustained.

2.1.4 Biodiversity Action Plans (BAPs)

The UK Biodiversity Action Plan (UK BAP) was produced in accordance with the 1992 UN Convention on Biological Diversity. It describes the UK's biological resources and commits a detailed plan for the protection of these resources, focusing on key habitats and species considered to be of particular significance to nature conservation within a UK context. While local councils and planning officers must have due regard for species and habitats on the UK BAP, they must also have due regard for the specific targets of county or borough local BAPs (LBAP) where these have been produced.

3 Methodology

Field surveys of the proposal site were undertaken by experienced Arup ecologists during the spring of 2010. This report details the findings of these preliminary surveys; the interpretation draws on information relating to the surrounding area in to provide context for the survey findings and facilitate a more robust and informed assessment.

3.1 Desk Study

A desk study was conducted within a 5km radius of the central grid reference for the site. This utilised the on-line research tools Nature on the Map[1], and the Multi Agency Geographic Information for the Countryside website MAGIC[2]. The search focussed on statutory sites designated for nature conservation within the vicinity of the proposed development area. Additional data on distributions of notable and protected species and non-statutory local sites for nature conservation were sourced from Thames Valley Environmental Records Centre.

UK Biodiversity Action Plans (UK BAPs) and the Biodiversity in Oxfordshire website[3] (the local biodiversity action plans (LBAPs) were consulted for details of species of note that could be expected to occur in the area.

This contextual information can assist in determining which species are likely to be affected by the proposed development, and has helped to focus the field survey in identifying signs of notable species that could be expected to occur in the vicinity.

3.2 Field Survey

Surveys of the proposed development site were undertaken by experienced Arup ecologists in accordance with the standard methodology as defined by the Joint Nature Conservancy Council's Handbook for Phase 1 Habitat Survey (2003)[4]. The extent of each area of homogenous vegetation was mapped in the field, noting the dominant vegetation communities present, in order to produce a Phase 1 Habitat Map of the site.

Evidence of protected species, or the potential to support protected species, was also noted and presented within mapped target notes. The habitat mapping and target note locations are presented in Figure 1, and target note descriptions provided in Appendix A

Based on the habitats present at and around the site and on professional judgement informed by the findings of the desk study, the protected and notable species most likely to be present at the site were considered to be amphibians, reptiles, badger, brown hare, white-clawed crayfish, bat, dormice, water vole, otter and birds. Therefore searches for signs of these species, including footprints, scratch marks, feeding stations, burrows, setts, spraint, droppings, foraging signs, staining, nesting or roosting places (including old bird's nests) were searched for at the time of the survey. Any man-made or natural refugia were inspected and, where possible, lifted to search for sheltering wildlife such as reptiles and amphibians.

Further assessment was made based on our understanding of the habitat types present and with consideration to the site's position within the wider landscape. This allowed for determination of the site's potential to support protected species, species of high nature conservation value, and important habitats which the proposed development may impact upon.

3.3 Limitations

The Phase 1 habitat surveys were conducted during the Spring of 2010. This is generally outside of the recommended survey window for some species, particularly flowering plants. However, professional judgment allowed for an assessment of the likely value of the site,

[1] *www.natureonthemap.org.uk*
[2] *www.magic.gov.uk*
[3] *http://www.oxfordshire.gov.uk/*
[4] JNCC. 2003. *Handbook for Phase 1 Habitat Survey*. Joint Nature Conservation Committee, Peterborough.

and of the habitats present to support such species, and provides sufficiently robust conclusions for the purposes of this report.

The findings presented in this report represent those of the period within which the surveys were undertaken only. Variations in these conditions can be expected to occur as a result of seasonal factors, population dispersal and changes in habitats over time.

It should also be noted that fauna may travel over wide areas and can have large home ranges and so can be overlooked within surveys. Species which are absent at the time of survey may also return to or colonise a site anew at any time in the future.

4 Results and Appraisal

4.1 Desk Study

4.1.1 Statutory Designated Sites

Three statutory designated sites for nature conservation exist within the 5km search radius from the centre of the proposed development site (See Table 1). These are all Sites of Special Scientific Interest (SSSI) and are represented, courtesy of Thames Valley Environmental Records Centre, in Figure 1, below.

Table 1: Statutory Designated Sites within 5km of the Centre of the Proposed Development Site

Site name	Status	Condition	Location relative to the Proposal Site
Ardley Trackways	SSSI	Favourable	Approximately 1km south west of the proposal site
Ardley Cutting & Quarry	SSSI	Unfavourable recovering	Partially located within the proposal site
Straton Audley Quarries	SSSI	Destroyed	Approximately 3km north east of the proposal site

The Ardley Cutting & Quarry SSSI extends along the south facing embankment of the railway line into the proposed development site where it abuts the field boundaries of Crowmarsh Farm in Bucknell.

Ardley Trackways is the next closest designated site to the proposed development. It can be found approximately 1km away from the south-western extent of the site.

Straton Audley Quarries SSSI is found 1km to the north east of Bicester town (~3km form the proposed development). However, being disused, the quarries have flooded and the SSSI area itself is now submerged. Hence the area has now been classified by Natural England as ‘destroyed’.

4.1.2 Non-Statutory Designated Sites

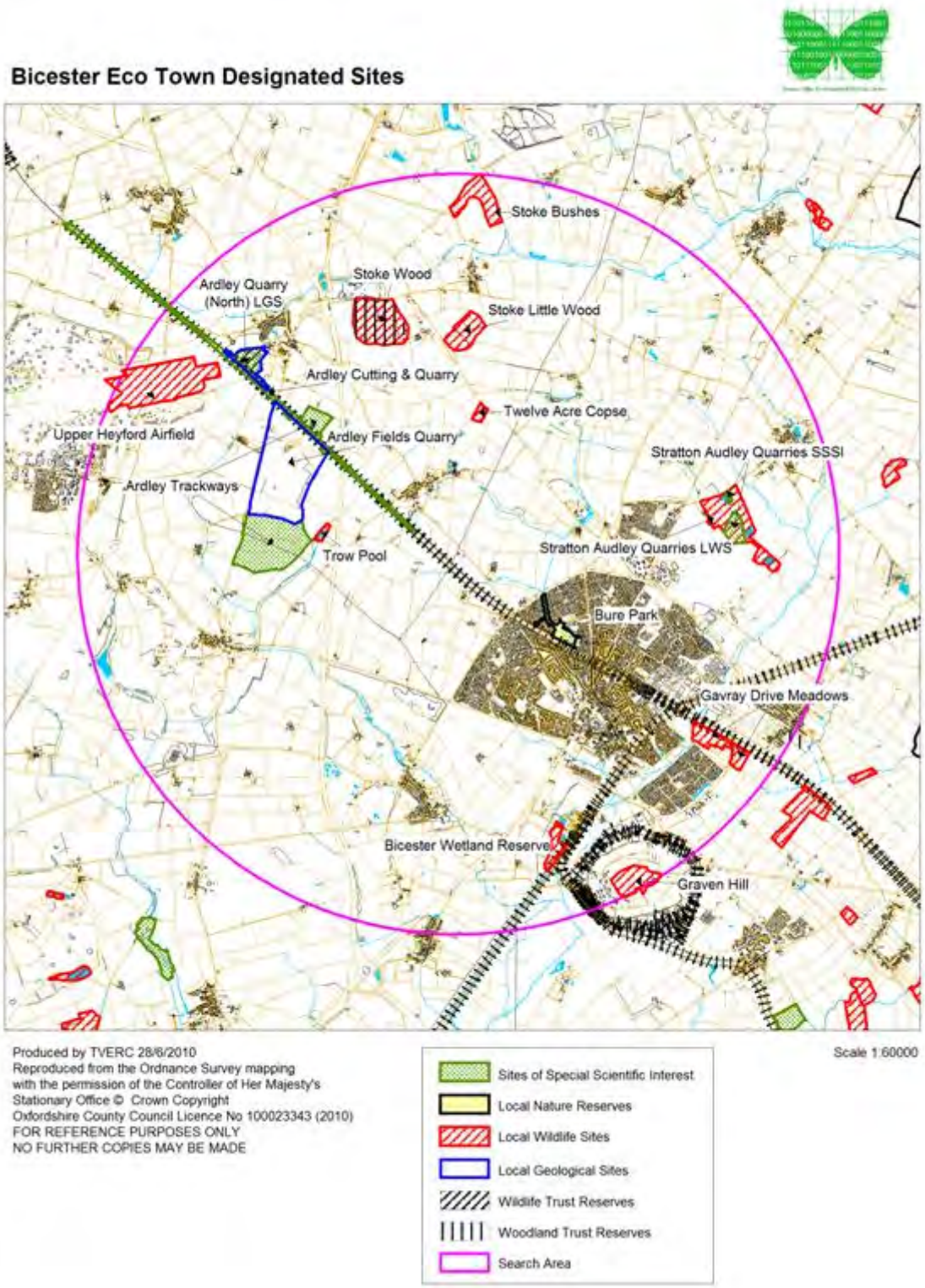
Information on non-statutory designated sites for nature conservation which lie within 5km of the proposal have been provided by Thames Valley Environmental Records Centre. These are represented along with the three designated sites detailed above, in Figure 1. Further details relating to these non-statutory designated sites are provided in Table 2.

Table 2: Non-statutory Designated Sites within 5km of the Centre of the Proposed Development Site

Site name	Status	Location relative to the Proposal Site
Stoke Bushes	Local Wildlife Site/ Woodland Trust Reserve	North
Stoke Little Wood	Local Wildlife Site	North
Twelve Acre Copse	Local Wildlife Site	North
Upper Heyford Airfield	Local Wildlife Site	North-West
Trow Pool	Local Wildlife Site	West
Sratton Audley Quarries	Local Wildlife Site	East
Gavray Drive Meadows	Local Wildlife Site	South-East
Bicester Wetland Reserve	Local Wildlife Site	South-East
Graven Hill	Local Wildlife Site	South-East
Bure Park	Local Nature Reserve	East

Ardley Fields Quarry	Local Geological Site	North-West
Ardley Fields Quarry (North)	Local Geological Site	North-West

Figure 1: Statutory and non-statutory designated sites within 5km of the proposed Bicester Eco-town development (Supplied by Thames Valley Environmental Records Centre).



4.1.3 Protected or Notable Species

There are records of some 38 species protected under EU or UK legislation, or both, and a further 51 UKBAP species from within 5km of the proposal site. These include great crested newt, otter, water vole, badger, white-clawed crayfish, common lizard, barn owl and 16 other bird species. The records suggest that the site, and those habitats immediately surrounding the proposed Eco-town development, support a broad and diverse assemblage of species which collectively provide an excellent representation of those one might expect to find within the wider landscape. The records of protected species are summarised below in Table 3. A more extensive list made available by Thames Valley Environmental Records Centre which details all species records, including priority UKBAP species, can be found in **Appendix C** of this document.

Table 3: Protected species recorded within 5km of the site

Common Name	Scientific Name	Number of Records	Date of Most Recent Record	Location Relative to Site	Protection or Notable Status
Rough marsh-mallow	*Althaea hirsuta*	1	19-Jul-90	SP547250 Trow Pool	Schedule 8 (W&C Act 1981)
Plymouth Pear	*Pyrus cordata*	1	15-May-07	SP55452776 Stoke Wood	Schedule 8 (W&C Act 1981)
Meadow Clary	*Salvia pratensis*	8	2005	2005 SP536250 Ardley Lay-by	Schedule 8 (W&C Act 1981)
Bluebell	*Hyacinthoides non-scripta*	19	15-May-07	SP55452776 Stoke Wood	Schedule 8 (W&C Act 1981) Section 13 Part 2
Wood White	*Leptidea sinapis*	1	04-Jun-91	SP585263 Cotmore Covert & Bainton Copse	Schedule 5, parts 5(a) and (b) (W&C Act 1981)
Brown Hairstreak	*Thecla betulae*	7	27-Oct-05	SP60132201 Gavray Drive Meadows	Schedule 5, parts 5(a) and (b) (W&C Act 1981)
Small Blue	*Cupido minimus*	27	20-Aug-02	SP599252 Stratton Audley Quarry	Schedule 5, parts 5(a) and (b) (W&C Act 1981)
Adonis Blue	*Lysandra bellargus*	1	1990	SP5226	Schedule 5, parts 5(a) and (b) (W&C Act 1981)
White clawed Crayfish	*Austropotamobius pallipes*	1	28-June-94	SP58712148 A41 Bicester (Langford Brook)	Schedule 5, parts 1, 5(a) and (b) (W&C Act 1981)

Great Crested Newt	*Triturus cristatus*	17	07-April-09	SP59872520 Stratton Audley Quarry	Schedule 5 - all parts (W&C Act 1981); H & S Dir (An 2)
Smooth Newt	*Lissotriton vulgaris*	14	07-April-09	SP59872520 Stratton Audley Quarry	Schedule 5, parts 5(a) and (b) (W&C Act 1981)
Common Toad	*Bufo bufo*	5	19-June-08	SP54722499 Trow Pool	Schedule 5, parts 5(a) and (b) (W&C Act 1981)
Common Frog	*Rana temporaria*	10	31/07/2008	SP605246 Stratton Audley Quarry	Schedule 5, parts 5(a) and (b) (W&C Act 1981)
Viviparous Lizard	*Lacerta vivipara*	1	2002	SP57652360 Bicester, 132 Barry Avenue	Schedule 5, parts 1, 5(a) and (b) (W&C Act 1981)
Grass Snake	*Natrix natrix*	9	21-Aug-03	SP559214 Orchard Rise, Chesterton	Schedule 5, parts 1, 5(a) and (b) (W&C Act 1981)
Bittern	*Botaurus stellaris*	2	2001	SP577209 Bicester Wetland Reserve	Schedule 1 (W&C Act 1981); Birds Dir (An 1)
Garganey	*Anas querquedula*	1	23-May-83	SP525230 Middleton Park (Ecological Area)	Schedule 1 (W&C Act 1981)
Red Kite	*Milvus milvus*	3	22-Feb-04	SP5720 22-Feb-04 SP5720	Schedule 1 (W&C Act 1981); Birds Dir (An 1)
Merlin	*Falco columbarius*	4	20-Apr-03	SP5720 Bicester	Schedule 1 (W&C Act 1981)
Hobby	*Falco subbuteo*	3	30-May-04	SP5620 Record Confidential	Schedule 1 (W&C Act 1981)
Peregrine	*Falco peregrinus*	1	2003	SP577209 Bicester Wetland Reserve	Schedule 1 (W&C Act 1981); Birds Dir (An 1)
Little Ringed Plover	*Charadrius dubius*	5	2004	SP577209 Bicester Wetland Reserve	Schedule 1 (W&C Act 1981)
Black-Tailed Godwit	*Limosa limosa*	2	2004	SP577209 Bicester Wetland Reserve	Schedule 1 (W&C Act 1981)
Greenshank	*Tringa nebularia*	2	2000	SP577209 Bicester Wetland	Schedule 1 (W&C Act

				Reserve	1981)
Green Sandpiper	*Tringa ochropus*	6	15-Feb-04	SP5720 Bicester Golf Club	Schedule 1 (W&C Act 1981)
Barn Owl	*Tyto alba*	10	19-Jun-05	SP588283 Hethe Brede	Schedule 1 (W&C Act 1981)
Kingfisher	*Alcedo atthis*	10	31-July-08	SP602250 Stratton Audley Quarry	Schedule 1 (W&C Act 1981); Birds Dir (An 1)
Hoopoe	*Upupa epops*	4	17-May-99	SP5327 Ardley Field Quarry	Schedule 1 (W&C Act 1981)
Fieldfare	*Turdus pilaris*	2	07-Mar-04	SP5929 Hethe	Schedule 1 (W&C Act 1981)
Redwing	*Turdus iliacus*	1	07-Mar-04	SP5929 Hethe	Schedule 1 (W&C Act 1981)
Firecrest	*Regulus ignicapillus*	1	23-Jan-98	SP5720 Confidential	Schedule 1 (W&C Act 1981)
Brambling	*Fringilla montifringilla*	1	07-Mar-04	SP5929 Hethe	Schedule 1 (W&C Act 1981)
Natterer's Bat	*Myotis nattereri*	1	09-Oct-93	SP595259 Bicester	Schedule 5 - all parts (W&C Act 1981); H & S Dir (An 4, 5)
Pipistrelle bat	*Pipistrellus pipistrellus*	4	29-Dec-99	SP609258 Bicester	Schedule 5 - all parts (W&C Act 1981); H & S Dir (An 4, 5)
Brown Long-eared bat	*Plecotus auritus*	3	05-June-96	SP535233 Middleton Stoney	Schedule 5 - all parts (W&C Act 1981); H & S Dir (An 4, 5)
Water Vole	*Arvicola terrestris*	8	30-June-03	SP580230 Bicester	Schedule 5, parts 4(a) and (b) (W&C Act 1981
Badger	*Meles meles*	17	31-July-08	SP602250 Stratton Audley Quarry	Badger Act 1992
Otter	*Lutra lutra*	1	19-June-08	SP546924 Trow Pool	Schedule 5 - all parts (W&C Act 1981); H & S Dir (An 2)

Key: WCA – Wildlife & Countryside Act 1981 (as amended); H &S Dir (An 2) - Species listed in Annex 2 of the EC Habitats Directive; H & S Dir (An 4, 5) – Species listed in Annexes 4/5 of the EC Habitats Directive

4.2 Field Survey

The Phase 1 Habitat Survey Map is provided in the **Figures** section at the end of the report and habitat descriptions, together with details of characteristic and/or constant species, are provided below.

Observations made over the course of the Phase 1 surveys were recorded as Target Notes. These are detailed in Figures 2a through to 2d which collectively represent the entire proposed development area and its immediate surrounds. **Appendix A** lists the Target Notes with associated detailed descriptions.

4.2.1 Habitats

Although the site directly abuts a large residential development which currently represents the north-western extent of Bicester town, it retains an entirely rural character and is used almost exclusively for common agricultural purposes. That said, the site is bisected by a major railway line (see **Figures**), though the railway embankments only add to the diversity of habitats present within the boundaries of the proposed development.

The majority of the southern half of the site is composed of arable fields demarcated by a network of mature and established hedgerows, some of which obscure dry ditches. A small proportion of these fields have narrow field margins which have been left un-ploughed to the benefit of invertebrates and ground nesting birds. Gowell Farm, in the south-eastern corner of the proposed development, is unoccupied. The old farm buildings and immediate surroundings effectively represent a brown field site, though this area should by no means be overlooked when considering features and habitats of ecological value. There are also some semi-improved pastures and occasional belts of over-mature, unmanaged orchard.

There are three ponds within the southern half of the proposed development (or south of the railway line). One can be found on Crowmarsh Farm, due south of Bucknell village. This pond is fed by one of two streams which flow through the site; one is located within the grounds of Gowell Farm; and, a third pond appears to have been recently created and can be found south-east of Himley Farm.

The stream which feeds into Crowmarsh Farm pond continues its path in an easterly direction toward the railway line. Much of this stretch of the stream is bordered by lush riparian vegetation.

The northern half of the site (north of the railway line) is more diverse in terms of the habitats represented therein. There is a greater extent of riparian habitat than is found within the southern half of the site. Much of this habitat borders the second stream which flows through the site from Bucknell Village towards Home Farm, in the north east corner of the proposed development area. Two pastures which lie adjacent to the northern bank of this stream are of notable interest; though semi-improved they still appear to retain reasonably diverse botanical communities which, in the past, may have represented British National Vegetation Classification community MG4 (Mesotrophic Grassland community No. 4).

As with the southern half of the site, the arable fields, and improved/semi-improved pastures north of the railway line, are delineated by a network of potentially species-rich hedgerows. Some of these are mature and well established whilst others have gaps and can be considered defunct. There are also several stretches of hedgerow which appear to have been planted out within the last ten to fifteen years.

A large number of mature and semi mature trees can be found which border the fields and associated ditch lines north of the railway line. The species represented include oak, horse chestnut, willow and ash. There are also occasional parcels of broadleaved woodland, the most significant of which can be found ~500m west of Caversfield in the north east of the site and is dominated by ash, elder and a large number of standing dead elms.

There is small network of ponds which loosely congregate around the north western boundary of the proposed development area, east of Bucknell village. Several more can be found amongst the pastures of Home Farm in the north west of the site.

4.2.2 Habitat Descriptions

4.2.2.1 Arable land

A large proportion of the land within the boundaries of the proposal site is currently in use for arable agriculture. A variety of crops were recorded during the surveys including legume, wheat and oil-seed rape. A number of these fields have areas of set-aside or field margins. The intensity of the planting and land-usage varied between landowners

The margins supported grasses and arable weeds including false-oat grass, (*Arrhenatherum elatius)*, couch grass (*Elytrigia repens)*, nettle (*Urtica dioica)*, pineappleweed (*Matricaria discoidea)*, scented mayweed (*Tripleurospermum odoratum)* and scarlet pimpernel, (*Anagallis arvensis)*.

4.2.2.2 Amenity Grassland

Areas of amenity grassland exist amongst the farms and private properties within the proposal site. These are less diverse, in terms of the species present, than other grasslands on site such as those recorded along the streams and ancient hedgerows. A number of these areas of amenity grasslands are connected to defunct orchards and structured landscaping.

Species recorded within this habitat included perennial rye-grass (*Lolium perenne)*, daisy, (*Bellis perennis)*, ribwort plantain (*Plantago lanceolata)* and germander speedwell (*Veronica chamaedrys*).

4.2.2.3 Buildings

The proposal site boundary incorporates a number of farms; this includes at least six farm houses and associated outbuildings. The buildings vary in structure, composition and condition and many have features suitable for bats and birds.

4.2.2.4 Broadleaved Plantation Woodland

Across the proposal site there are many areas of plantation woodland. These are almost entirely broadleaved with only occasional individual conifer species present. They vary in age and maturity and have generally been planted in association with other habitat creation schemes, such as the water bodies on Home Farm in the north of the site; or otherwise alongside field boundaries.

The species recorded within this habitat include hawthorn (*Crataegus monogyna)*, blackthorn (*Prunus spinosa)*, ash (*Fraxinus excelsior)*, silver birch (*Betula penula)*, and occasionally shrub species such as gorse (*Ulex europeaus)*.

Generally the shrub layer is either absent or undeveloped and largely consists of hawthorn or elder (*Sambucus nigra*).

Ground flora appears to be largely represented by species on which the woodland was planted – mostly improved grassland or arable field margin species such as false oat-grass (*Arrenatherum elatius)*, cock's-foot (*Dactylis glomerata)*, nettle and cleavers (*Galium urbanum)*.

4.2.2.5 Broadleaved Semi-natural Woodland

There are two main areas of semi-natural woodland remaining within the proposed development area. These are Grunthill Copse and a small area of partially felled woodland near Caversfield.

The woodland at Caversfield has had most of the canopy species felled. From the evidence of trunks laying on the woodland floor and the remaining stumps it is apparent that this woodland once had a canopy of ash (*Fraxinus excelsior)*. The canopy recorded during surveys appears to have developed from the shrub flora and consists predominantly of hawthorn, elm (*Ulmus* spp.)*,* elder (*Sambucus nigra)* and some remnant ash. The hawthorn re-growth provides a shrub layer along with some dense patches of bramble (*Rubus fruticosus).* The ground flora consists largely of dog's mercury (*Mercurialis perennis),* nettle and, occasionally, wood dock (*Rumex sanguineus).*

Grunthill Copse can be found in the west of the site, south of the railway line on the track to Crowmarsh Farm and pool. Historic replanting includes a number of poplar (*Populus* spp.) in

the south of the wooded area. The shrub layer consists largely of hawthorn and bramble; the ground flora included species such as ground ivy (*Glechoma hederacea)*, lords and ladies (*Arum maculatum)* and garlic mustard (*Alliaria petiolata)*.

Both woodlands are currently used by gamekeepers to provide cover for pheasants and consequently the grounds flora is occasionally sparse.

4.2.2.6 Defunct Species Poor Hedgerow

Across the site there are occasional sections of species poor hedgerow which are no longer stock-proof and now defunct. Generally these remnants of old hedgerows are little more than sporadic sections of linear scrub. Where the line of a hedgerow has become indistinct it has been classified and marked on the Phase 1 Map as scrub. However, where bramble, honeysuckle (*Lonicera periclymenum)*, and arable field margins remain represent the line between occasional stands of hawthorn and blackthorn (*Prunus spinosa)* the habitat has been recorded as defunct hedgerow.

The defunct hedgerows are generally dominated by hawthorn, blackthorn and, less frequently, field maple (*Acer campestre)*.

Ground flora within these hedgerows was generally of limited diversity and consisted largely of species including nettle, colt's-foot (*Tussilago farfara)*, cleavers and ground ivy (*Glechoma hederacea)*.

4.2.2.7 Defunct Species Rich Hedgerow

Generally the hedgerows on site recorded as representing this habitat type have become spindly through lack of management and no longer maintain a constant dense form. However, they still clearly demarcate a field boundaries.

Species recorded within this habitat type include field maple, hawthorn, elder, blackthorn, ash, wild privet (*Ligustrum ovalifolium)* and wych elm (*Ulmus glabra)*.

The ground floras recorded were limited in diversity and, as above, consisted largely of improved grassland species such as nettle, garlic mustard, hedge woundwort (*Stachys sylvatica)*, cleavers and ground ivy.

4.2.2.8 Dense Scrub

This habitat type is used within this Phase 1 Habitat Survey to describe the scrub recorded in overgrown areas of private garden. Typical species included apple (*Malus* spp.), hawthorn, buddleia (*Buddleia davidii)*, bramble, nettle, blackthorn, honeysuckle and traveller's-joy (*Clematis vitalba)*.

4.2.2.9 Improved Grassland

This habitat exists across areas which have been intensively grazed or otherwise re-sown to provide silage pasture. The botanical structure and diversity of these grasslands are limited. The dominant species include perennial rye-grass (*Lolium perenne)* and timothy (*Phleum pratense).* Forbs such as dandelion (*Taraxacum officinale*) are also present.

4.2.2.10 Intact Species Poor Hedgerow

There is only a limited occurrence of this habitat type across the site; it is confined mostly to areas where intensive land management and flailing has reduced the structure and diversity of the hedgerows. The dominant species is hawthorn. Blackthorn and elm are only occasionally present.

Ground flora was limited in diversity and consisted largely of improved grassland species including false oat-grass (*Arrhenatherum elatius)*, nettle, cock's-foot (*Dactylis glomerata*), cleavers and ground ivy.

4.2.2.11 Intact Species Rich Hedgerow

The majority of the hedgerows within the proposal site are both intact and species rich. Favourable management both historically and recently have ensured a well-developed structure with high species diversity. Generally these hedgerows are at least two to three metres thick, two to three metres tall and, where not demarcating grazed fields, have a one to two metre grass verge/arable field boundary. As a consequence, ancient woodland

indicator species, detailed below, are recorded regularly, as are grassland species indicative of historically diverse neutral grasslands.

Species recorded within the hedgerows include hawthorn, wych elm, apple, ash, oak (*Quercus* spp.), wild privet (*Ligustrum vulgare)*, sycamore (*Acer pseudoplatanus)*, midland hawthorn (*Crataegus laevigata)*, field rose (*Rosa arvensis)* and blackthorn. Several hedgerows support wayfaring-tree (*Viburnum lantana)*, dogwood (*Cornus sanguinea)* and elder. Climbing species such as honeysuckle, black bryony (*Tamus communis)*, white bryony (*Bryonia alba)* and ivy (*Hedera helix)* were also recorded in abundance.

Hedgerow trees within and across the site are predominantly ash and field maple, however a number of sycamore and oak were also recorded.

Ground flora within these well-structured hedgerows includes lords and ladies, dog's mercury, red campion (*Silene dioica)*, hedge woundwort (*Stachys sylvatica)*, creeping buttercup (*Ranunculus repens)*, garlic mustard and ground ivy.

4.2.2.12 Marshy Grassland

This habitat only represented within a single narrow belt of semi-improved grassland in the north east of the site. Anecdotal evidence suggests that it developed after a bore-hole was sunk in the field and a localised change in hydrology resulting from over-flow from the pump. The main feature of this area of grassland is the deeper, rank sward that supports brooklime (*Veronica beccabunga)*. At the time of survey the area was poached after an apparent period of cattle grazing.

4.2.2.13 Running Water

The site is bisected by two principal watercourses, both of which flow in an easterly direction before joining in a confluence along the eastern boundary of the site and then pass into Bicester. The upper reaches of these watercourses are winterbournes. Possibly as a consequence of this these sections appear to dry out in mid to late spring when the water table drops. The winterbournes have a series of online ponds, most of which also dry out during the summer.

The lower reaches of these watercourses, where water flows for most of the year, support large communities of aquatic, marginal and emergent plant species. Most prevalent of these are water parsnip (*Berula erecta)* and fool's watercress (*Apium nodiflorum)*. Marginal and emergent species include reed sweetgrass (*Glyceria maxima)*, common reed (*Phragmites australis)*, bittersweet (*Solanum dulcamara)*, meadowsweet (*Filipendula ulmaria)* and marsh marigold (*Caltha palustris)*.

At the time of the surveys the watercourses appeared clean and free of indicators of localised pollution. Banks of small bivalves were occasionally recorded within the watercourses.

4.2.2.14 Scattered Broadleaved Trees

This habitat type describes the mature broadleaved trees recorded standing within fields isolated from other vegetation structures across the site. Their isolated nature is likely to be a result the removal of hedgerows within which they would have originally stood.

These trees are generally mature ash or oak.

4.2.2.15 Scattered Scrub

There is only a limited representation of this habitat across the site. Where it has been recorded it consists predominantly of hawthorn and blackthorn.

4.2.2.16 Semi-improved Neutral Grassland

The remaining pasture within the site is predominantly recorded within the north-eastern area. There are two types of semi-improved grassland within this area; the first is represented by those fields that have been intensively grazed over the last twenty years or so. Although the sward diversity has been reduced within these fields, there are still species present suggestive of historically higher levels of diversity. The second form of semi-improved grassland is represented by those fields supporting a botanical assemblages indicative of hay meadow communities.

Species present within the swards of these grasslands are predominantly grasses such as annual meadow grass (*Poa annua)*, common bent (*Agrostis capillaris)*, red fescue (*Festuca rubra)*, yorkshire fog (*Holcus lanatus)*, sweet vernal-grass (*Anthoxanthum odoratum)* with more competitive species such as cock's-foot and false oat-grass (*Arrhenatherum elatius)*. Occasionally, and particularly within the narrow fields alongside the watercourses, the sward will include species such as crested dog's-tail (*Cynosurus cristatus)* and meadow foxtail (*Alopecurus pratensis)*.

Forbs recorded within these grasslands include lady's bedstaw (*Galium verum)*, creeping cinquefoil (*Potentilla reptans)*, ribwort plantain (*Plantago lanceolata)*, red clover (*Trifolium pratense)*, common mouse-ear (*Cerastium fontanum)*, meadow buttercup (*Ranunculus acris)*, commoon sorrel (*Rumex acetosa)*, sheep sorrel (*Rumex acetosella)* and yellow rattle (*Rhinanthus minor)*.

4.2.2.17 Standing Water

Across the site there are ten waterbodies, three of which are likely to regularly dry out during the summer months.

Two of the ponds that dry out are online ponds on the winterbourne that rises in the north-west of the site in Bucknell village. The third is also online of the same winterbourne and is further east towards Caversfield. Of the six remaining ponds, four are associated with private gardens and landscaped areas, one is a field pond near Hawkswell Farm, and the sixth lies immediately south of Crowmarsh Farm.

The field pond at Hawkeswell Farm is relatively small, but supports pond water-starwort (*Callitriche stagnalis)* and pond water-crowfoot (*Ranunculus peltatus)*.

The pond at Crowmarsh Farm appears to be fed by two means; by stream (although this is a winterbourne which is likely to dries out over the summer months) and by spring. The pond levels are artificially high, due to the presence of a retaining wall that supports a farm track along the eastern bank of the pond. The pond itself has a deep silt bottom and supports a diverse flora including fennel-leaved pondweed and opposite-leaved pondweed (*Groenlandia densa)*. The margins of the pond, particularly the northern banks, are heavily vegetated with water mint (*Mentha aquatic)*, common spike rush (*Eleocharis palustris)* and brooklime (*Veronica beccabunga)*.

4.2.2.18 Swamp

This habitat is extremely limited in extent within the proposed development site and is represented by small areas of developing, nascent reed-bed. One such area exists as a linear feature along the stream flowing east from Crowmarsh Pond. Another exists in a low-lying damp area adjacent to the bottom of the railway embankment at Rickett's Farm further along this same watercourse. There is also an area of swamp vegetation consisting mostly of planted bog plants within a landscaped pond in the north of the site, on the western bounds of Bucknell village.

4.2.2.19 Tall Ruderal

This vegetation has developed within fields predominantly around Gowell's Farm, along the eastern edge of the site. The fields now consist predominantly of nettle and hogweed (*Heracleum sphondylium)* with some patches of bramble. Other locations where areas of homogenous vegetation exist have also been recorded and mapped. Species recorded include field poppy (*Papver rhoeas)*, prickly lettuce (*Lactuca serriola)*, broadleaved dock (*Rumex obtusifolius)*, spear thistle (*Cirsium vulgare)* and great willowherb (*Epilobium hirsutum)*.

5 Discussion

The habitats recorded across the proposal site are valuable in terms of local and national biodiversity action plans, as ecological corridors and for the maintenance of protected species populations. The habitats are considered further in Section 5.1. Protected species likely to be present on site are considered in section 5.2.

5.1 Habitats

The habitats and features of significance found across the site include:

- Hedgerows
- Running Water
- Standing Water
- Swamp
- Broadleaved Semi-natural Woodland
- Semi-improved Grassland

Individually they are of merit and require further assessment. Together, they provide a locally unique and valuable mosaic of structured habitats and associations. The narrow fields and hedgerow patterns alongside the streams are indicative of early field enclosures and include many of the semi-improved grasslands and associated ponds on site. The intrinsic value of these habitats includes their important functions as ecological corridors, the support they provide to local biodiversity and their historic context with the landscape.

Several habitats recorded on site are either UK BAP or Local, Oxfordshire, BAP habitats; these are detailed in Table 4.

Table 4: Local and National status of habitats recorded at the proposal site

Habitat recorded during survey	UK BAP Priority Habitat	LBAP Priority Habitat
Broadleaved Semi-natural Woodland	Lowland Mixed Deciduous Woodland	Lowland Mixed Deciduous Woodland
Swamp	Reedbeds	Reedbed
Semi-improved Neutral Grassland	Lowland Meadows	Lowland Meadows
Intact Species-rich Hedgerow Intact Species-poor Hedgerow Defunct Species-rich Hedgerow Defunct Species-poor Hedgerow	Hedgerows	
Standing Water	Eutrophic Standing Waters	Eutrophic Standing Water
Standing Water	Ponds	
Running Water	Rivers	

In terms of ecological value the habitats collectively afford foraging, cover, roosting and nesting habitats as well as opportunities for sett building. Potential exists for a large number of UK and European protected species to be present on site. During the Phase 1 Surveys direct observations were made of badgers, common lizard and a large number of bird species including local BAP species such as skylark (*Alauda arvensis)* and yellowhammer (*Emberiza citronella)*.

5.2 Species

The site has potential for a number of protected species as well as UK and Local BAP species. These species or species groups are considered individually below. The habitats and features of potential suitability to them are identified in Figures 2a through to 2d and in the associated Target Notes detailed in **Appendix A**.

Detail on the various articles of legislation that afford protection to those species detailed below can be found in **Appendix B**.

5.2.1 Protected Species

Bats: The are numerous features including mature trees, trees with bat boxes, farm buildings and derelict farm structures which all have good potential for supporting bat roosts. Coupled with this the network of hedgerows, field margins and small patches of woodland on site offer ample opportunity for populations of invertebrates, including the prey species of bats, to exist and thrive. Hence, the presence of bat roosts on site is considered to be high.

Birds: The site offers a variety of habitats of potential suitability to an equally diverse assemblage of bird species. A large number of bird species were observed during the course of the Phase 1 surveys and it is considered likely that many more species frequent the site over the course of each year. Nesting opportunities for birds are similarly common across the site.

An appreciation of which species use the site and the habitats and locations of greatest value to their continued favourable population status with the area will be fundamental in assessing of the potential impacts of the proposed development on this species group.

Badgers: Two large badger setts were indentified within the site boundaries over the course of the Phase 1 surveys. It is not yet know whether these represent main or outlier setts, but the initial observations suggest that the number of individuals living within the proposed development area, at least to the east of the site, is relatively high. Much of the remainder of the site offers suitable foraging habitat, which benefits from low levels of human disturbance, and there are several locations where main, annex or outlier setts might be located.

Great crested newts: There are several ponds, ditch lines and waterbodies within the proposed development site, or otherwise within 500m of the proposed development boundaries, which offer suitable breeding habitat for great crested newts (See Figs 2a to 2d). Many of these are connected to or surrounded by terrestrial habitat which is also of high suitability to great crested newts. However, observations made over the course of the Phase 1 surveys suggest that some are ephemeral in nature, and only likely to hold water during the winter months.

Water voles: Habitats of medium to high suitability for water voles exist at various locations across the site. These include ponds, ditches and stone bed streams. The habitats which are likely to be of greatest value to water voles are the two small streams which flow across the site in a roughly west to east orientation. One of these streams originates at Crowmarsh Farm (see Fig 1), is culverted under the railway line which bisects the site, flows just south of Hawkwell farm and on into Bicester Town. The second stream appears to originate in Bucknell village, close to the north-west boundary of the proposed development. From here it flows through Lower Farm and on to Home Farm, which represents the north east extent of the site. At this point the stream joins an existing ditch line which flows in a southerly direction for approximately 800m before converging with the first stream a short way into the existing residential development in west Bicester. At many locations, though not all, the streams are well vegetated by plant species favoured by water voles and the flow of water appears to be both reasonable and consistent throughout the year.

Several ponds exist within the boundaries of the proposed development. However, over the course of the survey period it became apparent that to only a handful of these hold water throughout the year. Hence, it is only these ponds, identified in Figures 2a to 2d, which are considered suitable for water voles.

Various other ditch lines exist across the site but are considered to be less favourable to water voles. For example, there are several ditch lines which separate the arable fields of the southern portion of the site. However, many of these appear to be dry for the majority of the year and are shaded-out by dense hedgerows.

Otters: The ditches and watercourses that flow across the site are not considered to be significant enough to represent habitat of high potential value to otters. That said, the watercourses may contain crayfish, a prey species of otters, and hence may be used for occasional foraging or as corridors for dispersal. The site may therefore represent an important habitat affording otters opportunities to reach other more favourable sites and enhancing connectivity across the wider landscape. This suggestion should be considered further in light of detailed survey data.

Crayfish: The two streams which bisect the site in a west to east orientation (detailed above) offer habitat of medium to high potential value to crayfish. Attention with regard to this species should be focused on those stretches of the streams where the flow of water is consistent throughout the year and there isn't excessive over-shading or vegetative growth across the main water channel.

Reptiles: There are various habitats across the site with good potential for supporting breeding populations of three reptile species; slow worm, grass snake and common lizard. These include, but are in way limited to, the railway embankments, riparian habitats and a large pile of natural stone which has been left in the corner of one of the pastures on Home Farm.

Invertebrates: The north-west section of site is littered with log piles, some of which are quite considerable in size and constructed from substantial oak trunks. The site as a whole also has a large amount of standing dead timber; there are many young elm trees which appear to have been killed by Dutch Elms' disease. Log piles and standing dead trees are excellent habitats for a large number of invertebrate species and it is likely that together they support a diverse assemblage of invertebrates within the proposed development site.

The streams which flow through the site appear to have sedimentary limestone beds. Consequently, we would expect stretches of the streams which exhibit other optimal characteristics to support an abundance of aquatic insect larvae and crustaceans owing the nutrient rich nature of the waters. Further opportunities for invertebrates exist amongst the more botanically diverse of the pastures and meadows found in the north-west sector of the site. Though these all appear to have all improved to some extent, some are still likely to be of reasonable, if not significant, value to butterflies and certain species of day-flying moths.

Dormice: The site is criss-crossed with a network of hedgerows, some of which appear to have been planted out recent years. However, others are very well established and, owing to the apparent diversity of woody species present, offer potentially suitable habitat for dormice. Although some of the more mature hedges have become defunct in places, the network of hedgerows provides connectivity across the site and landscape as a whole. This would be expected to promote the dispersal of dormice and facilitate colonisation of new areas, thus elevating the likelihood of their presence of site.

The patches of woodland on site are likely to be less suitable for dormice due to a lack of typically suitable habitat; hazel, beech and sweet chestnut with associated thick undergrowth.

5.2.2 Biodiversity Action Plan Species

UK and LBAP species that are also potentially present on site are detailed in Table 5. Table 5 does not comprehensively list all BAP species potentially present on site as many of these have already been considered in this report. The LBAP does list many bird and invertebrate species; these are discussed in Section 5.2.1 above.

Table 5: Biodiversity Action Plan species potentially present on site

Common Name	Scientific Name	Status
Hedgehog	*Erinaceus europaeus*	UKBAP Species, LBAP Species
Brown Hare	*Lepus europaeus*	UKBAP Species, LBAP Species
Harvest Mouse	*Micromys minutus*	UKBAP Species, LBAP Species
Polecat	*Mustela putorius*	UKBAP Species, LBAP Species
Common Toad	*Bufo bufo*	UKBAP Species, LBAP Species

Biodiversity Action Plan species are afforded protection through the Natural Environment and Rural Communities Act 2006, whereby public authorities are to have regard to a duty to conserve species of importance to biodiversity.

PPS9 highlights the need for local authorities to give due regard to biodiversity. It suggests that "Development proposals provide many good opportunities for building-in beneficial biodiversity or geological features as part of good design. When considering proposals, local planning authorities should maximise such opportunities in and around developments, using planning obligations where necessary." A full appreciation of the protected species that are present on site, as will be provided by the extended surveys recommended above, will inform the design and implementation of a meaningful ecological mitigation and enhancement package. This is likely to have a positive influence on the determination of the planning application and will help in meeting relevant planning obligations set by the local authority.

More specifically, the Planning Policy Statement on Eco-towns states that such developments should demonstrate a net gain in local biodiversity and that associated planning applications for should contain a strategy for conserving and enhancing local biodiversity which is based upon up-to date information on biodiversity of the area. The protected species surveys recommended in this report will provide the necessary baseline information enabling these significant challenges to be met. They will also inform the requisite proposals for management of the local ecosystems and, where appropriate, restoration of degraded habitats or the creation of replacement habitats.

6 Recommendations

The Phase 1 surveys described in this report suggest that the site is of high ecological value; there is strong potential for a large number of protected species to exist within the proposed development area and the site itself is well connected to the wider landscape, promoting the persistence of local species at favourable population levels. To fully assess the ecological value of the site and to inform the planning process for the proposed Eco-town, it is recommended that a number of protected species and habitat surveys are undertaken. If the planning application is successful then the data gained from these surveys will reduce the risk of delays to the construction programme and will ensure legal and policy compliance.

The habitat surveys recommended are as follows:

1. Hedgerows: a targeted survey of the hedgerows across the site is recommended to ensure a comprehensive assessment is made of the diversity value of these corridors.
2. Ponds: several waterbodies on site appear to be worthy of further assessment in terms of invertebrates, amphibians and aquatic plant species.
3. Botanical Survey: targeted botanical surveys should be undertaken focussing upon those areas of grassland and woodland likely to support notable or locally scarce plant species.

The extended Phase 2 protected species surveys recommended are as follows (the habitats and features referred to below are detailed in Figures 2a to 2d with associated Target Notes listed and described in Appendix A:

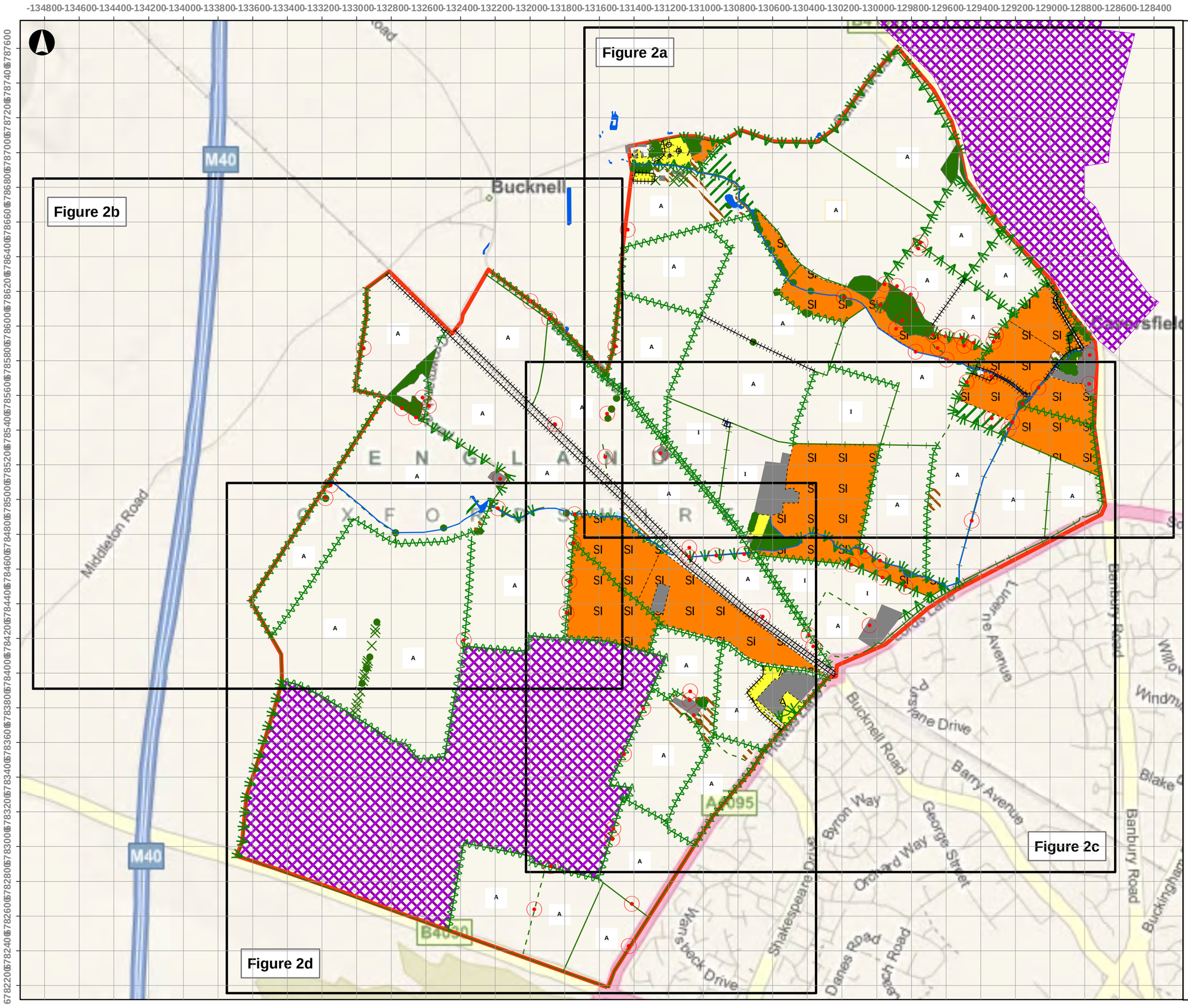
1. Bats: A series of bat emergence surveys should be carried out in line with standard guidance at each of the potential roosts identified (28 in total). An appropriate number of transect surveys should also be undertaken across the site focussing on linear features (e.g. mature hedgerows, woodland edges and corridors of riparian habitat) as well as likely commuting corridors and areas of potential foraging habitat. Together, these surveys will allow for the mapping of bat roosts within the boundaries of the proposed development and will provide us with an understanding of those other habitats and features of value to bats in the locality.
2. Nesting Birds: The site presents a wealth of opportunities for nesting and foraging birds in the form of hedgerows, mature trees, barns and derelict farm buildings scrub, pasture and numerous other features and habitats. Consequently, both wintering and breeding bird surveys should be commissioned to determine which species utilise the site and what value the site has to birds in terms of their long-term persistence in the area.
3. Badgers: This species is already known to occupy the site since two active setts were recorded during the course of the Phase 1 field surveys. However, further dedicated badger surveys will be necessary to map the locations and determine the status of all setts across the site, and to enable an understanding of the extent to which badger use different areas of the site.

   A badger bait marking study will also be necessary to determine how many badger clans there area within the proposed development boundaries and the extent of their respective territories.
4. Great crested newts: Several ponds have been identified within the proposed development site as having potential for supporting breeding populations of great crested newts (GCN) and other amphibian species. These and all other ponds and waterbodies within 500m of the proposed development boundaries should be Habitat Suitability Index (HIS) scored. Those with HIS scores indicative of potential for GCN will then need to be surveyed to inform the planning process. The resulting data will also allow for design of an appropriate mitigation package, should the planning application prove successful.

5. Otters and water voles; Surveys should be undertaken along those watercourses flowing through the site which have been identified as being of likely value to otters and water voles. With respect to otters, the surveys should also focus of features which might be used as holts and hovers.
6. Reptiles: There are numerous habitats and features across the site likely to support breeding populations of reptiles. A representative selection of the most suitable reptile habitats on site should be surveyed, in line with standard survey guidelines, to determine which species are present and to gauge their population sizes.
7. Invertebrates: Surveys for red data list and biodiversity action plan species should be undertaken within each of the habitats on site which afford good opportunities for invertebrates. Particular attention should be given to the considerable dead wood habitats on site as well as the belts of riparian vegetation, aquatic environments, and meadows.
8. Dormice: Many of the hedgerows across the site are potentially suitable for dormice. In general the hedgerow network is well connected and hence, if dormice are present in the wider area, it is likely the species will have colonised or sustained populations amongst those favourable habitats within the proposed development area. Consequently, a series of dormouse surveys should be undertaken, in line with standard practice, focussing on those hedgerows and woodland features of greatest suitability to the species.
9. White-clawed crayfish: Surveys will need to be carried out along the two stone-bed streams which flow through the site to determine the presence/absence of white-clawed crayfish and advise on mitigation measures which may be necessary prior to the construction phase.

FIGURES


N
Legend
Masterplan Boundary
Masterplan Boundary
0
500
1,000
2,000
Meters
Bucknell
Caversfield
Middleton Stoney
Bignell Park
Bicester
Bicester North
Bicester Town
Ardley Road
Bucknell Road
Middleton Road
Southwold Lane
M40
B4100
B4030
B430
A4095



A Arable

I Improved Grassland

Target Note

Fence

Running Water

Standing Water

Swamp

Scattered Scrub

Dense Scrub

Tall Ruderal

Broad-leaved Woodland

Broad-leaved Plantation Woodland

Broad-leaved Scattered Trees

Native Species-rich Intact Hedgerow

Native Species-rich Intact Hedgerow with Trees

Native Species-rich Defunct Hedgerow

Species-poor Intact Hedgerow

Species-poor Intact Hedgerow with Trees

Species-poor Defunct Hedgerow

Semi-improved Neutral Grassland

Marshy Grassland

Amenity Grassland

S Spoil Pile

Buildings

Site Boundary

No Access Permitted

Issue	Date	By	Chkd	Appd
P1	23-06-10	TS	OB	PJ

Metres 0 300 600 1,200

ARUP

The Arup Campus, Blythe Gate
Blythe Valley Park, Solihull, West Midlands, B90 8AE
Tel +44 (0)121 213 3000 Fax +44 (0)121 213 3001
www.arup.com

Client

A2 Dominion

Job Title

Bicester Eco-town

Drawing Title

Phase 1 Habitat Survey Map

Keyplan

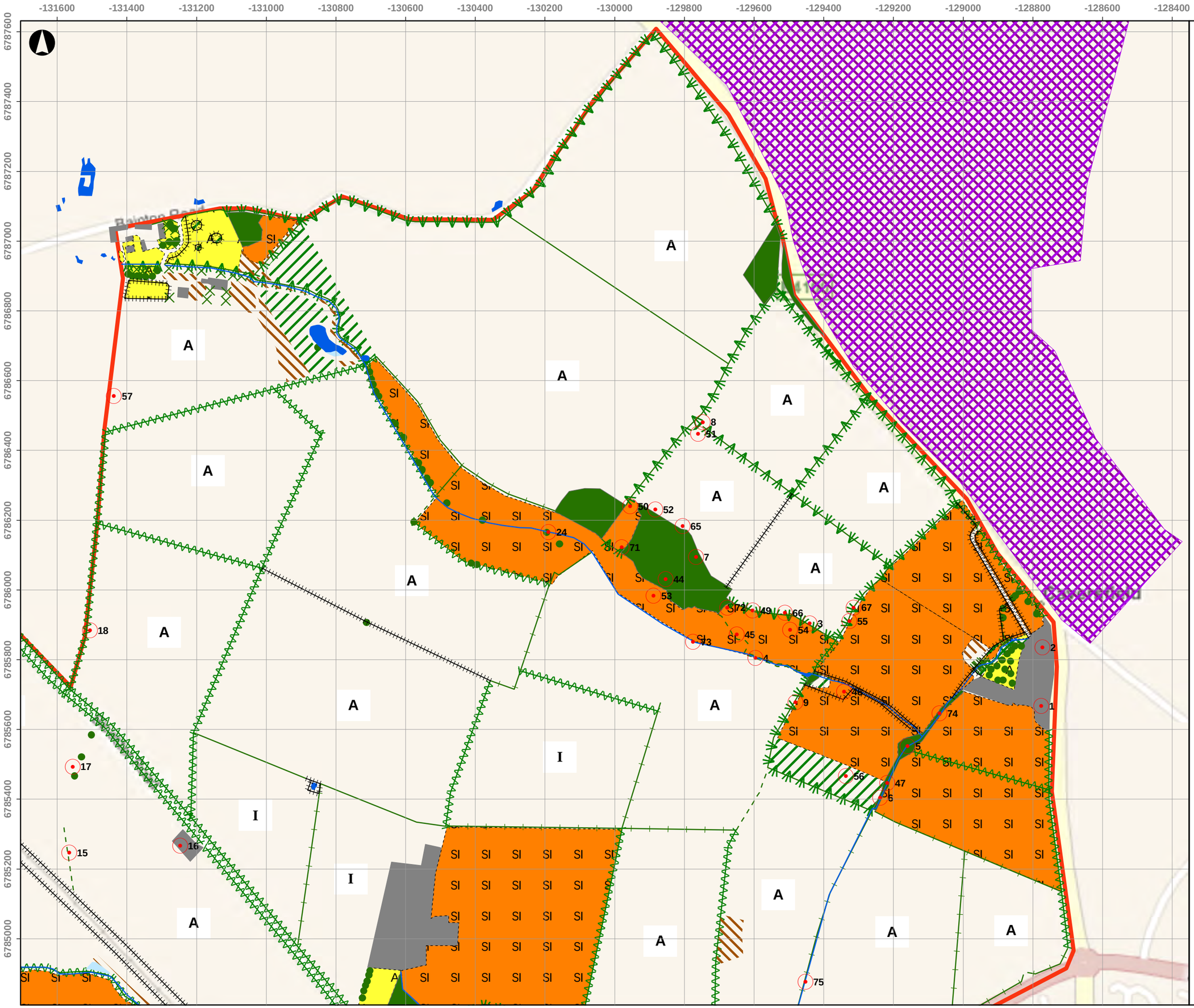
Scale at A3

1:20,000

Drawing Status

Issue

Job No	Drawing No	Issue
212606-00	Figure 2	P1



A Arable

I Improved Grassland

Target Note

Fence

Running Water

Standing Water

Swamp

Scattered Scrub

Dense Scrub

Tall Ruderal

Broad-leaved Woodland

Broad-leaved Plantation Woodland

Broad-leaved Scattered Trees

Native Species-rich Intact Hedgerow

Native Species-rich Intact Hedgerow with Trees

Native Species-rich Defunct Hedgerow

Species-poor Intact Hedgerow

Species-poor Intact Hedgerow with Trees

Species-poor Defunct Hedgerow

Semi-improved Neutral Grassland

Marshy Grassland

Amenity Grassland

Spoil Pile

Buildings

Site Boundary

No Access Permitted

Issue	Date	By	Chkd	Appd
P1	23-06-10	TS	OB	PJ

Metres 0 140 280 560

ARUP

The Arup Campus, Blythe Gate
Blythe Valley Park, Solihull, West Midlands, B90 8AE
Tel +44 (0)121 213 3000 Fax +44 (0)121 213 3001
www.arup.com

Client

A2 Dominion

Job Title

Bicester Eco-town

Drawing Title

Phase 1 Habitat Survey Map

Scale at A3

1:10,000

Drawing Status

Issue

Job No	Drawing No	Issue
212606-00	Figure 2a	P1

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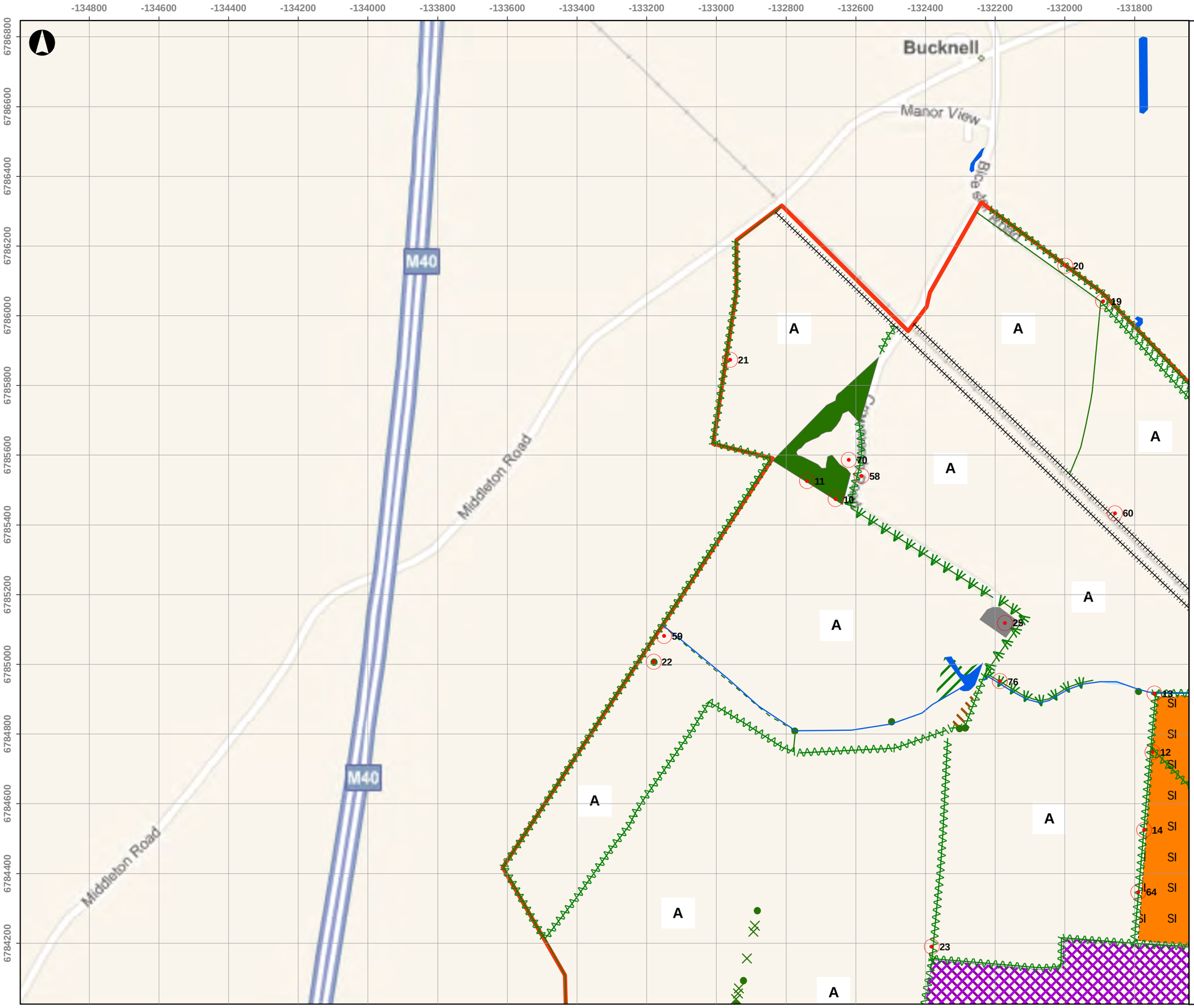

A Arable

I Improved Grassland

Target Note

Fence

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Standing Water

Swamp

Scattered Scrub

Dense Scrub

Tall Ruderal

Broad-leaved Woodland

Broad-leaved Plantation Woodland

Broad-leaved Scattered Trees

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Native Species-rich Intact Hedgerow with Trees

Native Species-rich Defunct Hedgerow

Species-poor Intact Hedgerow

Species-poor Intact Hedgerow with Trees

Species-poor Defunct Hedgerow

Semi-improved Neutral Grassland

Marshy Grassland

Amenity Grassland

S Spoil Pile

Buildings

Site Boundary

No Access Permitted

Issue	Date	By	Chkd	Appd
P1	23-06-10	TS	OB	PJ

Metres

0 140 280 560

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The Arup Campus, Blythe Gate
Blythe Valley Park, Solihull, West Midlands, B90 8AE
Tel +44 (0)121 213 3000 Fax +44 (0)121 213 3001
www.arup.com

Client

A2 Dominion

Job Title

Bicester Eco-town

Drawing Title

Phase 1 Habitat Survey Map

Scale at A3

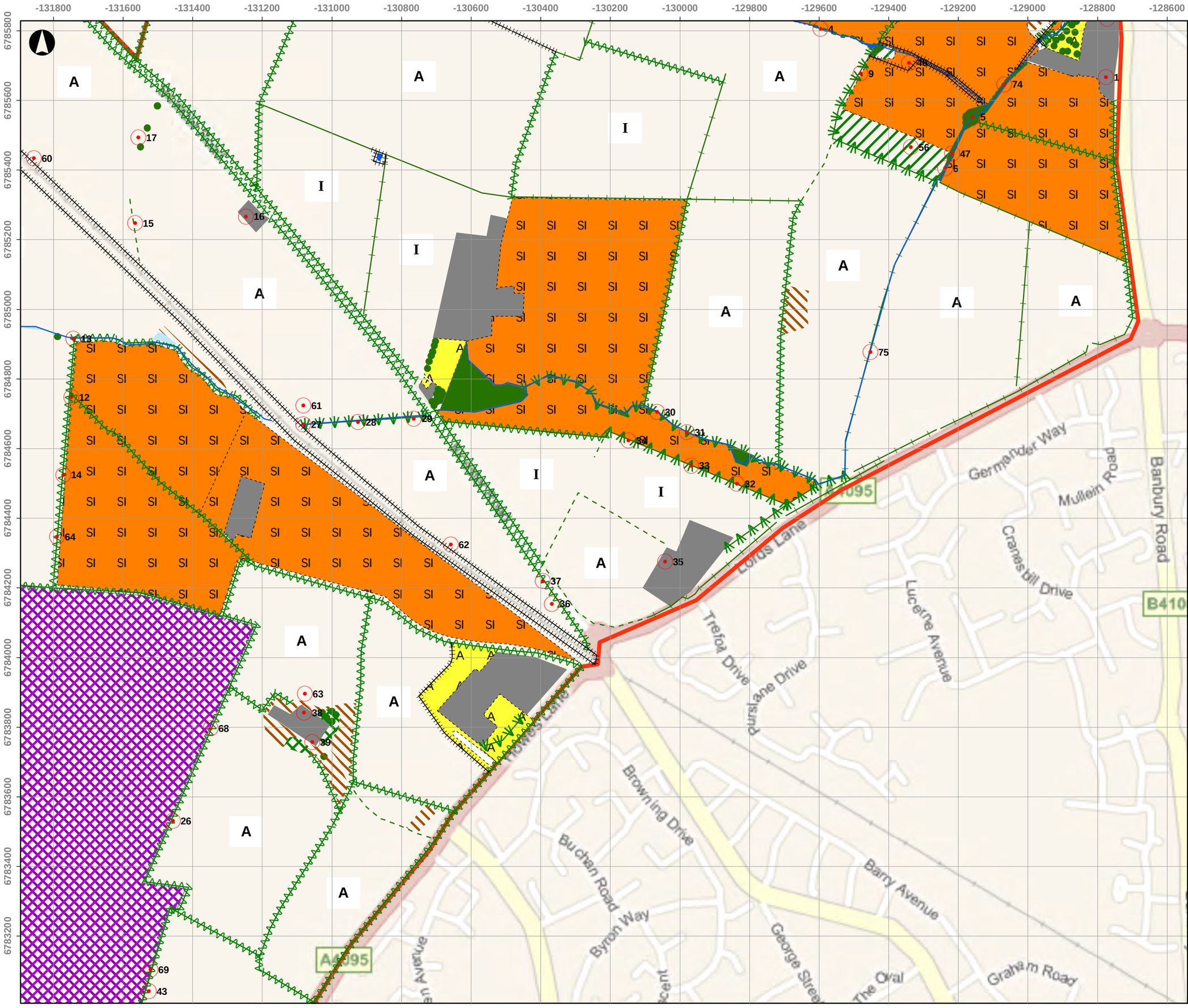
1:10,000

Drawing Status

Issue

Job No	Drawing No	Issue
212606-00	Figure 2b	P1

oFileLocation



A Arable

I Improved Grassland

Target Note

Fence

Running Water

Standing Water

Swamp

Scattered Scrub

Dense Scrub

Tall Ruderal

Broad-leaved Woodland

Broad-leaved Plantation Woodland

Broad-leaved Scattered Trees

Native Species-rich Intact Hedgerow

Native Species-rich Intact Hedgerow with Trees

Native Species-rich Defunct Hedgerow

Species-poor Intact Hedgerow

Species-poor Intact Hedgerow with Trees

Species-poor Defunct Hedgerow

Semi-improved Neutral Grassland

Marshy Grassland

Amenity Grassland

Spoil Pile

Buildings

Site Boundary

No Access Permitted

Issue	Date	By	Chkd	Appd
P1	23-06-10	TS	OB	PJ

Metres

0 140 280 560

ARUP

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Tel +44 (0)121 213 3000 Fax +44 (0)121 213 3001
www.arup.com

Client

A2 Dominion

Job Title

Bicester Eco-town

Drawing Title

Phase 1 Habitat Survey Map

Scale at A3

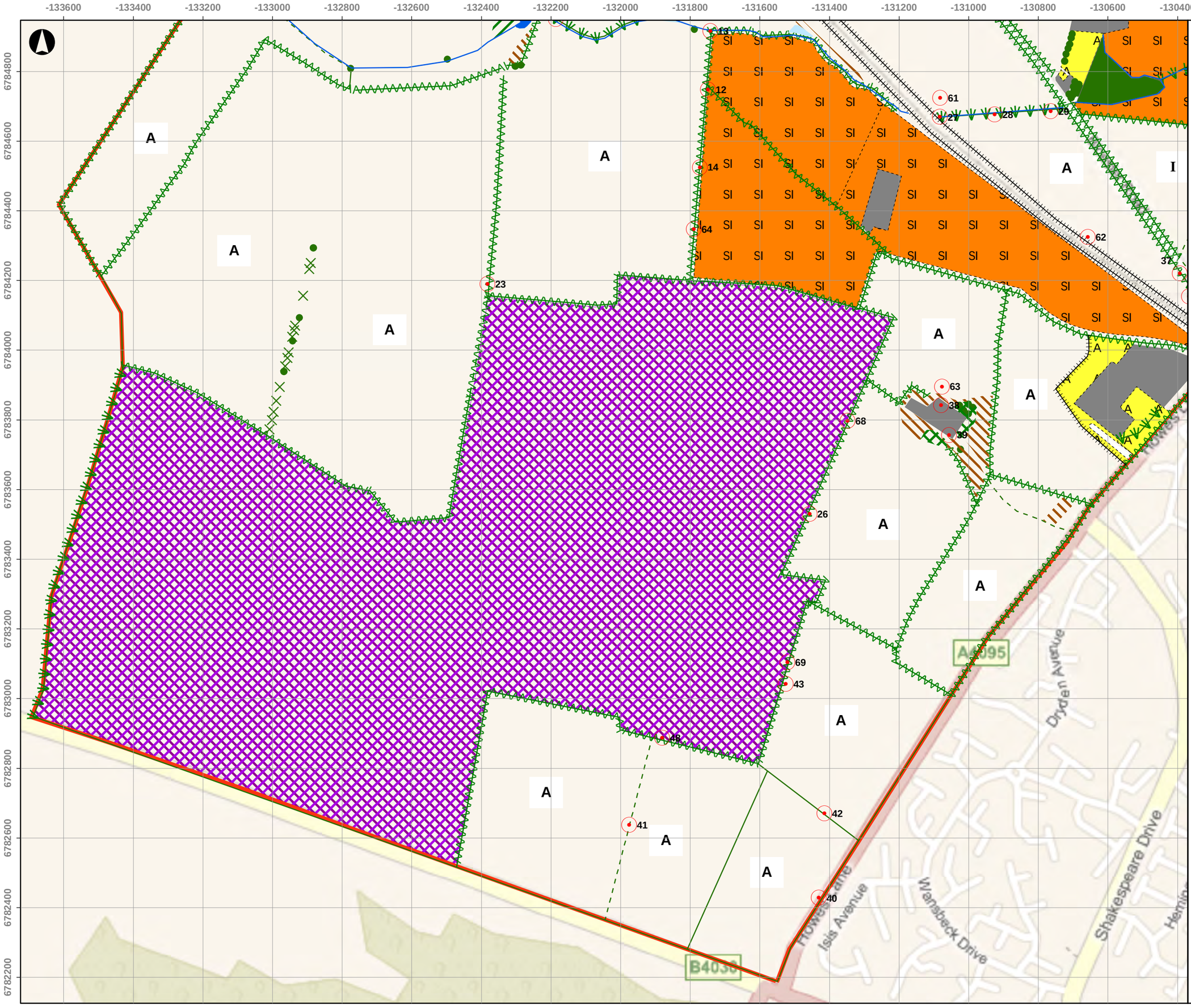
1:10,000

Drawing Status

Issue

Job No	Drawing No	Issue
212606-00	Figure 2c	P1

oFileLocation



A Arable

I Improved Grassland

Target Note

Fence

Running Water

Standing Water

Swamp

Scattered Scrub

Dense Scrub

Tall Ruderal

Broad-leaved Woodland

Broad-leaved Plantation Woodland

Broad-leaved Scattered Trees

Native Species-rich Intact Hedgerow

Native Species-rich Intact Hedgerow with Trees

Native Species-rich Defunct Hedgerow

Species-poor Intact Hedgerow

Species-poor Intact Hedgerow with Trees

Species-poor Defunct Hedgerow

Semi-improved Neutral Grassland

Marshy Grassland

Amenity Grassland

Spoil Pile

Buildings

Site Boundary

No Access Permitted

Issue	Date	By	Chkd	Appd
P1	23-06-10	TS	OB	PJ

Metres

0 140 280 560

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Tel +44 (0)121 213 3000 Fax +44 (0)121 213 3001
www.arup.com

Client

A2 Dominion

Job Title

Bicester Eco-town

Drawing Title

Phase 1 Habitat Survey Map

Scale at A3

1:10,000

Drawing Status

Issue

Job No	Drawing No	Issue
212606-00	Figure 2d	P1

oFileLocation

Appendix A

Target Notes

A1 Target Notes

Target Note Number (TN #)	Comment/Description
TN 1	Modern farm house and units (Home Farm) – bat roost potential
TN 2	Farm units and converted barns (Home Farm) - bat roost potential
TN 3	2 × mature horse chestnut trees with cracks/fissures (one tree has a hollow trunk) – bat roost potential
TN 4	Mature oak with owl box - bat roost potential
TN 5	Grey poplar with 2 × bat boxes and log pile at base of tree - bat roost potential
TN 6	Mature ash with owl box and mature willow with bird boxes - bat roost potential
TN 7	Mature oak with little owl box - bat roost potential
TN 8	Dead ash - bat roost potential
TN 9	Dead oak - bat roost potential
TN 10	Dead ash - bat roost potential
TN 11	Mature oak & dead ash - bat roost potential
TN 12	Mature ash - bat roost potential
TN 13	3 × mature ash with ivy cover - bat roost potential
TN 14	Mature ash - bat roost potential
TN 15	Mature ash - bat roost potential
TN 16	Mature ash with ivy cover and adjacent farm units - bat roost potential
TN 17	Mature ash - bat roost potential
TN 18	Mature oak - bat roost potential
TN 19	Mature oak - bat roost potential
TN 20	Mature oak - bat roost potential
TN 21	Rotten oak with hollow trunk - bat roost potential
TN 22	Large mature ash that is isolated - bat roost potential
TN 23	Mature ash - bat roost potential
TN 24	Mature ash with ivy cover - bat roost potential
TN 25	Farm units and buildings - bat roost potential
TN 26	Old mature ash - bat roost potential
TN 27	3 × mature ash with ivy cover - bat roost potential
TN 28	2 × mature ash with ivy cover - bat roost potential
TN 29	2 × mature ash with ivy cover and willow - bat roost potential
TN 30	Mature ash - bat roost potential
TN 31	Mature ash - bat roost potential
TN 32	Mature ash - bat roost potential
TN 33	Mature ash - bat roost potential
TN 34	Mature ash - bat roost potential

Target Note Number (TN #)	Comment/Description
TN 35	Bricked farm out buildings - bat roost potential
TN 36	Mature oak with ivy cover - bat roost potential
TN 37	Mature ash with ivy cover - bat roost potential
TN 38	Derelict farm house and barns - bat roost potential
TN 39	Mature oak - bat roost potential
TN 40	Mature oak - bat roost potential
TN 41	Mature oak with thick ivy cover - bat roost potential
TN 42	Mature oak - bat roost potential
TN 43	Ancient ash pollard - bat roost potential
TN 44	Badger sett in woodlands
TN 45	Badger sett in hedgerow
TN 46	Badger sett in grassland
TN 47	Badger sett in woodland along stream
TN 48	Badger sett in bank
TN 49	Suitable foraging and basking habitat for reptiles
TN 50	Log pile - suitable refugia and basking location for reptiles
TN 51	Suitable foraging and basking habitat for reptiles
TN 52	Suitable foraging and basking habitat for reptiles
TN 53	Suitable foraging and basking habitat for reptiles
TN 54	Suitable foraging and basking habitat for reptiles
TN 55	Suitable foraging and basking habitat for reptiles
TN 56	Suitable foraging and basking habitat for reptiles
TN 57	Suitable foraging and basking habitat for reptiles
TN 58	Suitable foraging and basking habitat for reptiles
TN 59	Suitable foraging and basking habitat for reptiles
TN 60	Suitable foraging and basking habitat for reptiles
TN 61	Suitable foraging and basking habitat for reptiles
TN 62	Suitable foraging and basking habitat for reptiles
TN 63	Suitable foraging and basking habitat for reptiles
TN 64	Suitable foraging and basking habitat for reptiles
TN 65	Woodland edge suitable for dormouse
TN 66	Hedgerow suitable for dormouse
TN 67	Hedgerow suitable for dormouse
TN 68	Hedgerow suitable for dormouse
TN 69	Hedgerow suitable for dormouse
TN 70	Brown hare sighting
TN 71	Log pile - invertebrate survey

Target Note Number (TN #)	Comment/Description
TN 72	Log pile - invertebrate survey
TN 73	Ditch suitable for water voles
TN 74	Watercourse suitable for crayfish and water voles
TN 75	Watercourse suitable for crayfish and water voles
TN 76	Watercourse suitable for crayfish, water voles and aquatic invertebrates

Appendix B

Protected Species Legislation

B1 Protected Species Legislation

The various items of legislation relevant to the species groups discussed within this report are described in the paragraphs below:

6.1.1 Bats

All species of British bat (*Vespertilionidae* and *Rhinolophidae*) are listed under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) and receive full protection under Section 9. Bats are also identified as European protected species on Schedule 2 of the Conservation (Natural Habitats, etc.) Regulations 1994, which confers full protection under Regulation 39. Protection was further extended by the CRoW Act 2000. Under the above legislation it is an offence to:

- kill, injure or take an individual bat;
- possess any part of an individual bat either alive or dead;
- intentionally or recklessly damage, destroy or obstruct access to any place or structure used by bats for shelter, rest, protection or breeding;
- intentionally or recklessly disturb bats when they are using any place of shelter or protection; or
- sell or attempt to sell any individual bat.

It is also an offence to set and use articles capable of catching, injuring or killing bats (for example a trap or poison), or knowingly cause or permit such an action.

Bats are listed as priority species in the UK Biodiversity Action Plan and as species of principal importance for the conservation of biological diversity in England under Section 74 of the CRoW Act 2000.

6.1.2 Great Crested Newts

The great crested newt (*Triturus cristatus*) is listed under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) and is afforded full protection under Section 9. The great crested newt is also listed as a European protected species on Schedule 2 of the Conservation (Natural habitats, etc.) Regulations 1994 which gives it full protection under Regulation 39. Protection was extended by the Countryside and Rights of Way Act 2000 (the CRoW Act). Under the above legislation it is an offence to:

- kill, injure or take an individual great crested newt;
- possess any part of an individual great crested newt either alive or dead;
- intentionally or recklessly damage, destroy or obstruct access to any place or structure used by great crested newts for shelter, rest, protection or breeding;
- intentionally or recklessly disturb great crested newts while they are using any place of shelter or protection; or
- sell or attempt to sell any individual great crested newt.

The great crested newt is listed as a priority species in the UK Biodiversity Action Plan and as species of principal importance for the conservation of biological diversity in England under Section 74 of the Countryside and Rights of Way (CRoW) Act 2000.

6.1.3 Reptiles

Common lizard (*Lacerta vivipara*), grass snake (*Natrix natrix*), slow-worm (*Anguis fragilis*), and adder (*Vipera berus*) are listed under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended), in respect of Section 9(5) and part of Section 9(1). This protection was extended by the Countryside and Rights of Way (CRoW) Act 2000. Under the legislation it is an offence to:

- intentionally or deliberately kill or injure any individual of these species; or
- sell or attempt to sell any part of these species either alive or dead.

6.1.4 Birds

All species of bird are protected under Section 1 of the Wildlife and Countryside Act 1981 (as amended). Protection was extended by the Countryside and Rights of Way (CRoW) Act 2000. Under the above legislation it is an offence to intentionally:

- kill, injure or take any wild bird;
- take, damage or destroy the nest of any wild bird while that nest is in use or being built; or
- take or destroy an egg of any wild bird.

Certain species are listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended) and receive protection under Sections 1(4) and 1(5). The protection was extended by the Countryside and Rights of Way (CRoW) Act 2000. There are special penalties where the offences listed above are committed for any Schedule 1 species and it is also an offence to intentionally or recklessly:

- disturb any such bird when it is building its nest or while it is in or near a nest containing dependant young; or
- disturb the dependant young of any such bird.

6.1.5 Otters

The otter is protected under a wide range of international legislation including Annex II and IV of the EC habitats directive EC/92/43; Appendix II of the Bern Convention; The Wild Mammals Protection Bill 1996 and Schedule 5 of the Wildlife and Countryside Act 1981. Consequently, it is an offence to either intentionally or recklessly kill, injure or knowingly disturb any otter, damage or destroy an otter holt, or take an otter from the wild.

The Countryside and Rights of Way Act 2000 (CRoW) places legal emphasis on developers to survey for otters prior to applying for planning permission.

As a protected species, the otter is covered in the UK by the ODPM Planning Policy Statement, PPS9. PPS9 requires that the presence of this species is given material consideration when determining planning applications.

6.1.6 Water Voles

The water vole, *Arvicola terrestris*, is a species of priority conservation concern because of its declining status in the UK. In 1998 it received legal protection under Schedule 5 of the Wildlife and Countryside Act 1981. This amendment (Section 9 (part 4)) afforded protection to the water voles' places of shelter, though the animals themselves received no protection.

However, on the 6th April 2008 the species received an increased level of protection, becoming fully covered by the provisions of section 9 of the Wildlife and Countryside Act 1981 (as amended). Consequently, it is now an offence to:

• Intentionally kill, injure or take water voles.

• Possess or control live or dead water voles or derivatives.

• Intentionally or recklessly damage, destroy or obstruct access to any structure or place used for shelter or protection.

• Intentionally or recklessly disturb water voles whilst occupying a structure or place used for that purpose.

• Sell water voles or offer or expose for sale or transport for sale.

• Publish or cause to be published any advertisement which conveys the buying or selling of water voles.

Where a proposed development requires planning permission it should be anticipated that the local planning authority will give regard to the need to conserve water voles before reaching their planning decision, as is required by section 40 of the Natural Environment and Rural Communities Act 2006. Due to their protected status water voles are a material planning consideration (as detailed in PPS9), so planning authorities should ensure

adequate information is available on water voles at the potential impacts on their long term population status before determining a planning application.

6.1.7 Badgers

The badger, *Meles meles*, is protected under the Protection of Badgers Act 1992. This makes it illegal to kill, injure, take, possess, or cruelly ill-treat a badger or attempt to do so, to damage or destroy a sett, to obstruct access to a badger sett (or any entrance), or to disturb a badger when it is occupying a sett (English Nature 1999). Licences can be obtained from Natural England in order for development works that would result in disturbance or destruction of a sett to be legally undertaken.

Badgers are additionally afforded protection under Section 11 (Schedule 6, paras 11 & 12) of the Wildlife and Countryside Act 19981 (as amended). This legislation relates to the methods used in capturing and killing badgers, prohibiting for example, the use of snares and traps.

6.1.8 Hazel Dormouse

The hazel dormouse is protected under the Wildlife & Countryside Act 1981 (as amended) and the Conservation (Natural Habitats &c.) Regulations 1994 (as amended). Together, these two pieces of legislation make it an offence to capture, disturb, injure or kill dormice, or otherwise damage or destroy their breeding sites and resting places.

If an activity is likely to result in an offence (such as destroying an area of known breeding habitat), there are several options to proceed lawfully:

- Avoid carrying it out.
- Follow good practice guidance on methods or timing to reduce the chance of committing an offence.
- Obtain a licence to allow otherwise unlawful activities.

A licence application would need to demonstrate the following:

- The authorised activities will be undertaken for a specified purpose (e.g. commonly over-riding public interest or conservation)
- No satisfactory alternative exists.
- The activities will not compromise the conservation status of the species. Some activities will require the design and implementation of an ecological mitigation package, such as a habitat creation scheme, to offset damage or destruction of suitable habitats and thus meet this final objective. Licensing is a common requirement associated with land-use change or development.

6.1.9 Crayfish

The white-clawed crayfish, *Austropotamobius pallipes*, is the only native crayfish species of UK inland waters. The species is suffering a dramatic decline both nationally and internationally and consequently receives protection through the Wildlife & Countryside Act 1981 (as amended).

The species is also listed on Annex II of the European Habitats Directive (92/43/EEC) and is scheduled as a Priority Species within the UK Biodiversity Action Plan.

Together, these pieces of legislation make it an offence to:

Sell, kill, injure, take from the wild, offer for sale, possess or transport for the purpose of sale any live or dead white clawed crayfish, or part thereof.
With regard to planning applications, authorities are legally required to consider the species and the conservation of its favoured habitats. Consequently, relevant ecological surveys are normally required before planning permission can be granted. Development activities likely to contravene the above detailed legislation will require the developer to obtain a licence from Natural England, as set out in Section 16(3) of the Wildlife & Countryside Act 1981. Licence applications are likely to require a comprehensive ecological mitigation package for the species.

Appendix C

Legally Protected & Notable/Rare Species Records

Common Name	Scientific Name	Abundance	Sex/ Stage	Date	Grid Ref	Grid Ref Qualifier	Master Site	Sub-Site/Locality	UK Legislation	European Legislation	Global Red List Species	UK Red List Species	UKBAP and NERC Act 2006 Species	Notable Inverts.	2009 BOCC Status	Nat. Rare/ Scarce Plants
a moss	Aloina rigida			01 NOV 1984 - 30 MAR 1985	SP538273		Ardley Quarry and Cuttings SSSI	Ardley Quarry and Cutting BBOWT Reserve								Scarce (Mo)
a moss	Brachythecium mildeanum			02-Dec-82	SP538273		Ardley Quarry and Cuttings SSSI	Quarry								Scarce (Mo)
a moss	Brachythecium mildeanum			01 NOV 1984 - 30 MAR 1985	SP538273		Ardley Quarry and Cuttings SSSI	Ardley Quarry and Cutting BBOWT Reserve								Scarce (Mo)
Good King Henry	Chenopodium bonus-henricus			-1987	SP568206		Bowler's Copse, North Meadow					post2001:VU				
Good King Henry	Chenopodium bonus-henricus			-1987	SP561218		Gagle Brook Flood Plain, Chesterton					post2001:VU				
Night-flowering Catchfly	Silene noctiflora			-1986	SP547250		Trow Pool					post2001:VU				
Night-flowering Catchfly	Silene noctiflora			Oct-78	SP547250		Trow Pool					post2001:VU				
Large-leaved Lime	Tilia platyphyllos			-1979	SP518231		Middleton Park (Ecological Area)	Gold Barn Wood, Middleton Park								Scarce (VP)
Rough Marsh-mallow	Althaea hirsuta			19-Jul-90	SP547250		Trow Pool		Schedule 8 (W&C Act 1981)							
Plymouth Pear	Pyrus cordata	Present		15-May-07	SP55452776		Stoke Wood		Schedule 8 (W&C Act 1981)			post2001:VU	Priority Sp.			Rare (VP)
Sainfoin	Onobrychis viciifolia			-1984	SP538273		Ardley Quarry and Cuttings SSSI					post2001:NT				
Sainfoin	Onobrychis viciifolia			05-May-78	SP538273		Ardley Quarry and Cuttings SSSI	Ardley Quarry and Cutting BBOWT Reserve				post2001:NT				
Sainfoin	Onobrychis viciifolia			22-Jun-83	SP534274		Ardley Quarry and Cuttings SSSI	Fritwell Railway Cuttings				post2001:NT				
Sainfoin	Onobrychis viciifolia			04-Jul-83	SP544263		Ardley Quarry and Cuttings SSSI	Fritwell Railway Cuttings				post2001:NT				
Sainfoin	Onobrychis viciifolia			04-Jul-83	SP554255		Ardley Quarry and Cuttings SSSI	Fritwell Railway Cuttings				post2001:NT				
Dwarf Spurge	Euphorbia exigua			-1984	SP538273		Ardley Quarry and Cuttings SSSI					post2001:NT				
Dwarf Spurge	Euphorbia exigua			19-Jun-85	SP534274		Ardley Quarry and Cuttings SSSI	Fritwell Railway Cuttings				post2001:NT				
Dwarf Spurge	Euphorbia exigua			-1986	SP571287		Stoke Lyne Marshy Grassland	Stoke Lyne Marshy Grassland				post2001:NT				
Dwarf Spurge	Euphorbia exigua			-1986	SP547250		Trow Pool					post2001:NT				
Dwarf Spurge	Euphorbia exigua			Oct-78	SP547250		Trow Pool					post2001:NT				
Dwarf Spurge	Euphorbia exigua			03/07/2000	SP525269		Upper Heyford Airfield					post2001:NT				
Allseed	Radiola linoides			-1984	SP538273		Ardley Quarry and Cuttings SSSI					post2001:NT				
Shepherd's-needle	Scandix pecten-veneris			1987	SP597234		Bicester					post2001:CR	Priority Sp.			
Shepherd's-needle	Scandix pecten-veneris			23-May-88	SP597234		Bicester					post2001:CR	Priority Sp.			
Shepherd's-needle	Scandix pecten-veneris			23-May-87	SP597234			Manor Cottages, oxon tetrad 5822				post2001:CR	Priority Sp.			
Field Gromwell	Lithospermum arvense			1983	SP565276		Stoke Little Wood					post2001:EN				
Field Gromwell	Lithospermum arvense			27-Jun-79	SP522255		The Gorse and Heath	THE HEATH (EAST)				post2001:EN				
Cat-mint	Nepeta cataria			-1984	SP538273		Ardley Quarry and Cuttings SSSI					post2001:VU				
Cat-mint	Nepeta cataria			05-May-78	SP538273		Ardley Quarry and Cuttings SSSI	Ardley Quarry and Cutting BBOWT Reserve				post2001:VU				
Basil Thyme	Clinopodium acinos			12-Jul-94	SP535249		Ardley Lay-by					post2001:VU	Priority Sp.			
Basil Thyme	Clinopodium acinos			-1984	SP538273		Ardley Quarry and Cuttings SSSI					post2001:VU	Priority Sp.			
Basil Thyme	Clinopodium acinos			05-May-78	SP538273		Ardley Quarry and Cuttings SSSI	Ardley Quarry and Cutting BBOWT Reserve				post2001:VU	Priority Sp.			
Basil Thyme	Clinopodium acinos			22-Jun-83	SP534274		Ardley Quarry and Cuttings SSSI	Fritwell Railway Cuttings				post2001:VU	Priority Sp.			
Basil Thyme	Clinopodium acinos			04-Jul-83	SP544263		Ardley Quarry and Cuttings SSSI	Fritwell Railway Cuttings				post2001:VU	Priority Sp.			
Basil Thyme	Clinopodium acinos			23-Jul-85	SP534274		Ardley Quarry and Cuttings SSSI	Fritwell Railway Cuttings				post2001:VU	Priority Sp.			
Basil Thyme	Clinopodium acinos			12-Jul-88	SP534274		Ardley Quarry and Cuttings SSSI	Fritwell Railway Cuttings				post2001:VU	Priority Sp.			
Basil Thyme	Clinopodium acinos			03/07/2000	SP525269		Upper Heyford Airfield					post2001:VU	Priority Sp.			
Round-leaved Mint	Mentha suaveolens			-1984	SP538273		Ardley Quarry and Cuttings SSSI					post2001:DD				Scarce (VP)
Meadow Clary	Salvia pratensis	2		1985	SP535250		Ardley Lay-by		Schedule 8 (W&C Act 1981)			post2001:NT				Scarce (VP)
Meadow Clary	Salvia pratensis			1985	SP536253		Ardley Lay-by		Schedule 8 (W&C Act 1981)			post2001:NT				Scarce (VP)
Meadow Clary	Salvia pratensis			1987	SP535249		Ardley Lay-by		Schedule 8 (W&C Act 1981)			post2001:NT				Scarce (VP)
Meadow Clary	Salvia pratensis	5	Species	2005	SP536250		Ardley Lay-by		Schedule 8 (W&C Act 1981)			post2001:NT				Scarce (VP)
Meadow Clary	Salvia pratensis	4		Jul-87	SP536251		Ardley Lay-by		Schedule 8 (W&C Act 1981)			post2001:NT				Scarce (VP)
Meadow Clary	Salvia pratensis			10-Jul-94	SP535249		Ardley Lay-by		Schedule 8 (W&C Act 1981)			post2001:NT				Scarce (VP)
Meadow Clary	Salvia pratensis	6		01-Jul-95	SP535249		Ardley Lay-by		Schedule 8 (W&C Act 1981)			post2001:NT				Scarce (VP)

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Meadow Clary	Salvia pratensis			-1984	SP537253		Verge of Middleton Stoney/Ardley Rd		Schedule 8 (W&C Act 1981)			post2001:NT				Scarce (VP)
Narrow-fruited Cornsalad	Valerianella dentata			05/09/2000	SP521252		The Gorse and Heath					post2001:EN				
Corn Chamomile	Anthemis arvensis			-1986	SP547250		Trow Pool					post2001:EN				
Corn Chamomile	Anthemis arvensis			Oct-78	SP547250		Trow Pool					post2001:EN				
Stinking Chamomile	Anthemis cotula			-1984	SP538273		Ardley Quarry and Cuttings SSSI					post2001:VU				
Stinking Chamomile	Anthemis cotula			05-May-78	SP538273		Ardley Quarry and Cuttings SSSI	Ardley Quarry and Cutting BBOWT Reserve				post2001:VU				
Stinking Chamomile	Anthemis cotula			1983	SP565276		Stoke Little Wood					post2001:VU				
Galingale	Cyperus longus	Present	Species	21/06/2006-09/07/2007	SP598253							post2001:NT				Scarce (VP)
Wood Barley	Hordelymus europaeus			-1984	SP538273		Ardley Quarry and Cuttings SSSI									Scarce (VP)
Bluebell	Hyacinthoides non-scripta			-1984	SP538273		Ardley Quarry and Cuttings SSSI		W&C Act 1981, Schedule 8, Section 13 Part 2							
Bluebell	Hyacinthoides non-scripta			05-May-78	SP538273		Ardley Quarry and Cuttings SSSI	Ardley Quarry and Cutting BBOWT Reserve	W&C Act 1981, Schedule 8, Section 13 Part 2							
Bluebell	Hyacinthoides non-scripta			1990	SP562213		Chesterton Churchyard		W&C Act 1981, Schedule 8, Section 13 Part 2							
Bluebell	Hyacinthoides non-scripta	locally abundant		28-Apr-87	SP588204		Graven Hill		W&C Act 1981, Schedule 8, Section 13 Part 2							
Bluebell	Hyacinthoides non-scripta			14/06/2002	SP588204		Graven Hill		W&C Act 1981, Schedule 8, Section 13 Part 2							
Bluebell	Hyacinthoides non-scripta			13-Apr-88	SP526274		Kennel Copse		W&C Act 1981, Schedule 8, Section 13 Part 2							
Bluebell	Hyacinthoides non-scripta			12/06/2001	SP526274		Kennel Copse	east of road	W&C Act 1981, Schedule 8, Section 13 Part 2							
Bluebell	Hyacinthoides non-scripta			12/06/2001	SP526274		Kennel Copse	west of road	W&C Act 1981, Schedule 8, Section 13 Part 2							
Bluebell	Hyacinthoides non-scripta			-1979	SP518231		Middleton Park (Ecological Area)	Gold Barn Wood, Middleton Park	W&C Act 1981, Schedule 8, Section 13 Part 2							
Bluebell	Hyacinthoides non-scripta			-1981	SP567295		Stoke Bushes		W&C Act 1981, Schedule 8, Section 13 Part 2							
Bluebell	Hyacinthoides non-scripta			14-Jun-00	SP567295		Stoke Bushes		W&C Act 1981, Schedule 8, Section 13 Part 2							
Bluebell	Hyacinthoides non-scripta			-1981	SP565276		Stoke Little Wood		W&C Act 1981, Schedule 8, Section 13 Part 2							
Bluebell	Hyacinthoides non-scripta			14/05/2003	SP565276		Stoke Little Wood		W&C Act 1981, Schedule 8, Section 13 Part 2							
Bluebell	Hyacinthoides non-scripta			14-May-03	SP565276		Stoke Little Wood		W&C Act 1981, Schedule 8, Section 13 Part 2							
Bluebell	Hyacinthoides non-scripta			-1986	SP555278		Stoke Wood		W&C Act 1981, Schedule 8, Section 13 Part 2							
Bluebell	Hyacinthoides non-scripta			27-Jun-90	SP553280		Stoke Wood		W&C Act 1981, Schedule 8, Section 13 Part 2							
Bluebell	Hyacinthoides non-scripta	Abundant		15-May-07	SP55452776		Stoke Wood		W&C Act 1981, Schedule 8, Section 13 Part 2							
Bluebell	Hyacinthoides non-scripta			-1986	SP548282		Sycamore Grove, Ardley		W&C Act 1981, Schedule 8, Section 13 Part 2							
Bluebell	Hyacinthoides non-scripta			-1986	SP568266		Twelve Acre Copse		W&C Act 1981, Schedule 8, Section 13 Part 2							
Greater Butterfly-orchid	Platanthera chlorantha			-1981	SP567295		Stoke Bushes					post2001:NT				
Greater Butterfly-orchid	Platanthera chlorantha			12/06/2001	SP567295		Stoke Bushes					post2001:NT				
Green-winged Orchid	Orchis morio			19-Jun-85	SP534274		Ardley Quarry and Cuttings SSSI	Fritwell Railway Cuttings				post2001:NT				

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a leafhopper	Macropsis mendax			08-Aug-86	SP603251		Stratton Audley Quarry							Nationally Notable B		
a leafhopper	Psammotettix nodosus			11-Sep-01	SP599278		Fringford Pingo					Pre94:Insu				
a ground beetle	Bembidion quadripustulatum			14-Jun-00	SP579210		Bicester Sewage Farm Reserve						Priority Sp.	Nationally Notable B		
a ground beetle	Bembidion gilvipes			01-Mar-00	SP538273		Ardley Quarry and Cuttings SSSI	Quarry						Nationally Notable B		
a ground beetle	Bembidion gilvipes			01-Mar-00	SP538273		Ardley Quarry and Cuttings SSSI	Quarry						Nationally Notable B		
a ground beetle	Bembidion gilvipes			01-Mar-00	SP538274		Ardley Quarry and Cuttings SSSI							Nationally Notable B		
a ground beetle	Bembidion gilvipes			16-Jan-03	SP5922		Gavray Drive complex	feld 12, Gavray Drive complex						Nationally Notable B		
a ground beetle	Bembidion gilvipes			16-Jan-03	SP598222		Gavray Drive complex	field 11, Gavray Drive complex						Nationally Notable B		
a ground beetle	Bembidion clarki			28-May-87	SP538273		Ardley Quarry and Cuttings SSSI	Ardley Quarry and Cutting BBOWT Reserve						Nationally Notable B		
a ground beetle	Bembidion clarki			03-Dec-88	SP538273		Ardley Quarry and Cuttings SSSI	Ardley Quarry and Cutting BBOWT Reserve						Nationally Notable B		
a ground beetle	Bembidion clarki			01-Mar-00	SP538273		Ardley Quarry and Cuttings SSSI	Quarry						Nationally Notable B		
a ground beetle	Bembidion clarki			01-Mar-00	SP538273		Ardley Quarry and Cuttings SSSI	Quarry						Nationally Notable B		
a ground beetle	Bembidion clarki			01-Mar-00	SP538274		Ardley Quarry and Cuttings SSSI							Nationally Notable B		
a ground beetle	Bembidion clarki			13-Mar-00	SP598251		Stratton Audley Quarry							Nationally Notable B		
a ground beetle	Bembidion clarki			14-Mar-00	SP598251		Stratton Audley Quarry							Nationally Notable B		
a ground beetle	Pterostichus anthracinus			12-Mar-93	SP538273		Ardley Quarry and Cuttings SSSI	Quarry						Nationally Notable B		
a ground beetle	Pterostichus anthracinus	2	male	13-Mar-93	SP538273		Ardley Quarry and Cuttings SSSI	Ardley Quarry and Cutting BBOWT Reserve						Nationally Notable B		
a ground beetle	Pterostichus anthracinus			27-Jul-88	SP603251		Stratton Audley Quarry							Nationally Notable B		
a ground beetle	Harpalus ardosiacus			12-Nov-99	SP548262		Ardley Fields Quarry	Ardley Fields Quarry North Quarry						Nationally Notable B		
a ground beetle	Harpalus azureus			27-Jul-88	SP603251		Stratton Audley Quarry							Nationally Notable B		
a ground beetle	Harpalus schaubergerianus			30-Nov-86	SP543264		Ardley Fields Quarry							Nationally Notable B		
a ground beetle	Harpalus schaubergerianus			28-Apr-87	SP543264		Ardley Fields Quarry							Nationally Notable B		
a ground beetle	Harpalus schaubergerianus			28-May-87	SP538273		Ardley Quarry and Cuttings SSSI	Ardley Quarry and Cutting BBOWT Reserve						Nationally Notable B		
a ground beetle	Acupalpus consputus			28-May-87	SP538273		Ardley Quarry and Cuttings SSSI	Ardley Quarry and Cutting BBOWT Reserve						Nationally Notable B		
a ground beetle	Acupalpus consputus			20-Jun-87	SP538273		Ardley Quarry and Cuttings SSSI	Ardley Quarry and Cutting BBOWT Reserve						Nationally Notable B		
a ground beetle	Lebia chlorocephala			01-Mar-00	SP538273		Ardley Quarry and Cuttings SSSI	Quarry						Nationally Notable B		
a ground beetle	Lebia chlorocephala			01-Mar-00	SP538273		Ardley Quarry and Cuttings SSSI	Quarry						Nationally Notable B		
a ground beetle	Lebia chlorocephala			26-Feb-91	SP599252		Stratton Audley Quarry							Nationally Notable B		
Bombardier Beetle	Brachinus crepitans	21-100	adult	27-Jul-88	SP603251		Stratton Audley Quarry							Nationally Notable B		
Bombardier Beetle	Brachinus crepitans			18-Aug-88	SP603251		Stratton Audley Quarry							Nationally Notable B		

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a crawling water beetle	Haliplus furcatus			1990 - 1999	SP599278		Fringford Pingo					Pre94:EN				
a water beetle	Scarodytes halensis			May-85	SP538273		Ardley Quarry and Cuttings SSSI	Ardley Quarry and Cutting BBOWT Reserve						Nationally Notable B		
a whirligig	Gyrinus natator			28-Apr-85	SP538273		Ardley Quarry and Cuttings SSSI	Quarry				Pre94:EN				
a whirligig	Gyrinus natator			May-85	SP538273		Ardley Quarry and Cuttings SSSI	Ardley Quarry and Cutting BBOWT Reserve				Pre94:EN				
a scavenger water beetle	Hydrochus angustatus			06-Oct-88	SP572258		Bucknell ram pond							Nationally Notable B		
a scavenger water beetle	Helophorus nanus			1990 - 1999	SP599278		Fringford Pingo							Nationally Notable B		
a scavenger water beetle	Berosus affinis			12-Nov-99	SP548262		Ardley Fields Quarry	Ardley Fields Quarry North Quarry						Nationally Notable B		
a rove beetle	Philonthus fumarius			16-Jan-03	SP5922		Gavray Drive complex	Field no number, Gavray Drive complex						Nationally Notable B		
a rove beetle	Sepedophilus pedicularius			16-Jan-03	SP598222		Gavray Drive complex	Field 11, Gavray Drive complex						Nationally Notable		
a rove beetle	Sepedophilus pedicularius			16-Jan-03	SP6022		Gavray Drive complex	Field 5, Gavray Drive complex						Nationally Notable		
a rove beetle	Haploglossa picipennis			14-Mar-00	SP602251		Stratton Audley Quarry							Nationally Notable		
a long-toed water beetle	Dryops similaris			13-Jan-02	SP599278		Fringford Pingo					Pre94:NR				
a jewel beetle	Agrilus laticornis			27-Jun-90	SP555277		Stoke Wood							Nationally Notable B		
a leaf beetle	Cryptocephalus aureolus			02-Jun-04	SP599252		Stratton Audley Quarry	Tetrad 5824						Nationally Notable B		
a leaf beetle	Cryptocephalus aureolus			02-Jun-04	SP599252		Stratton Audley Quarry	Tetrad 5824						Nationally Notable B		
a leaf beetle	Cryptocephalus aureolus			02-Jun-04	SP602251		Stratton Audley Quarry							Nationally Notable B		
Flax Flea Beetle	Longitarsus parvulus			01-Mar-00	SP538273		Ardley Quarry and Cuttings SSSI	Quarry						Nationally Notable A		
a leaf beetle	Psylliodes luteola			29-Aug-86	SP534274		Ardley Quarry and Cuttings SSSI	Fritwell Railway Cuttings				Pre94:Insu				
a weevil	Ceutorhynchus campestris			02-Jun-04	SP602251		Stratton Audley Quarry							Nationally Notable B		
a weevil	Ceutorhynchus campestris			02-Jun-04	SP602251		Stratton Audley Quarry							Nationally Notable B		
Ghost Moth	Hepialus humuli			06-Jun-04	SP6024		Bicester airfield	explosives dump area, Bicester airfield					Priority Sp.			
Dingy Skipper	Erynnis tages			1985	SP538273		Ardley Quarry and Cuttings SSSI	Quarry					Priority Sp.			
Dingy Skipper	Erynnis tages			1985	SP538273		Ardley Quarry and Cuttings SSSI	Quarry					Priority Sp.			
Dingy Skipper	Erynnis tages	1		1990	SP5226		Ardley Quarry and Cuttings SSSI	Ardley Quarry					Priority Sp.			
Dingy Skipper	Erynnis tages			22-Jun-83	SP534274		Ardley Quarry and Cuttings SSSI	Fritwell Railway Cuttings					Priority Sp.			
Dingy Skipper	Erynnis tages			May-85	SP538273		Ardley Quarry and Cuttings SSSI	Ardley Quarry and Cutting BBOWT Reserve					Priority Sp.			
Dingy Skipper	Erynnis tages			03-Jun-85	SP534274		Ardley Quarry and Cuttings SSSI	Fritwell Railway Cuttings					Priority Sp.			
Dingy Skipper	Erynnis tages	2-9		15-May-92	SP538274		Ardley Quarry and Cuttings SSSI	Ardley Quarry N R					Priority Sp.			
Dingy Skipper	Erynnis tages	1		16-May-92	SP5327		Ardley Quarry and Cuttings SSSI	Ardley Quarry Reserve					Priority Sp.			
Dingy Skipper	Erynnis tages			02-May-90	SP5226								Priority Sp.			
Dingy Skipper	Erynnis tages			02-May-90	SP5226								Priority Sp.			
Dingy Skipper	Erynnis tages			19-May-90	SP5226								Priority Sp.			
Dingy Skipper	Erynnis tages			19-May-90	SP5226								Priority Sp.			
Dingy Skipper	Erynnis tages			31-May-90	SP5226								Priority Sp.			
Dingy Skipper	Erynnis tages			31-May-90	SP5226								Priority Sp.			
Grizzled Skipper	Pyrgus malvae	6	Adult	25-Apr-02	SP53762725		Ardley Quarry						Priority Sp.			
Grizzled Skipper	Pyrgus malvae			1978	SP538273		Ardley Quarry and Cuttings SSSI	Ardley Quarry and Cutting BBOWT Reserve					Priority Sp.			
Grizzled Skipper	Pyrgus malvae			1985	SP538273		Ardley Quarry and Cuttings SSSI	Quarry					Priority Sp.			

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Grizzled Skipper	Pyrgus malvae			1985	SP538273		Ardley Quarry and Cuttings SSSI	Quarry					Priority Sp.			
Grizzled Skipper	Pyrgus malvae	1		1990	SP5226		Ardley Quarry and Cuttings SSSI	Ardley Quarry					Priority Sp.			
Grizzled Skipper	Pyrgus malvae			May-85	SP538273		Ardley Quarry and Cuttings SSSI	Ardley Quarry and Cutting BBOWT Reserve					Priority Sp.			
Grizzled Skipper	Pyrgus malvae			03-Jun-85	SP534274		Ardley Quarry and Cuttings SSSI	Fritwell Railway Cuttings					Priority Sp.			
Grizzled Skipper	Pyrgus malvae			19-Jun-85	SP534274		Ardley Quarry and Cuttings SSSI	Fritwell Railway Cuttings					Priority Sp.			
Grizzled Skipper	Pyrgus malvae	1		28-Apr-91	SP536274		Ardley Quarry and Cuttings SSSI	Ardley Quarry					Priority Sp.			
Grizzled Skipper	Pyrgus malvae			08-Jul-91	SP538273		Ardley Quarry and Cuttings SSSI	Ardley Quarry and Cutting BBOWT Reserve					Priority Sp.			
Grizzled Skipper	Pyrgus malvae	2-9		15-May-92	SP538274		Ardley Quarry and Cuttings SSSI	Ardley Quarry N R					Priority Sp.			
Grizzled Skipper	Pyrgus malvae	1		16-May-92	SP5327		Ardley Quarry and Cuttings SSSI	Ardley Quarry Reserve					Priority Sp.			
Grizzled Skipper	Pyrgus malvae	Present	Adult	14/06/2002	SP588204		Graven Hill						Priority Sp.			
Grizzled Skipper	Pyrgus malvae			02-May-90	SP5226								Priority Sp.			
Grizzled Skipper	Pyrgus malvae			02-May-90	SP5226								Priority Sp.			
Grizzled Skipper	Pyrgus malvae			25-May-90	SP5226								Priority Sp.			
Grizzled Skipper	Pyrgus malvae			25-May-90	SP5226								Priority Sp.			
Grizzled Skipper	Pyrgus malvae			31-May-90	SP5226								Priority Sp.			
Grizzled Skipper	Pyrgus malvae			31-May-90	SP5226								Priority Sp.			
Grizzled Skipper	Pyrgus malvae	1		05-Jul-91	SP5226			Bicester; Railway Path					Priority Sp.			
Grizzled Skipper	Pyrgus malvae			17-May-98	SP5327			Ardley Wood					Priority Sp.			
Grizzled Skipper	Pyrgus malvae			28-May-90	SP5622								Priority Sp.			
Grizzled Skipper	Pyrgus malvae			28-May-90	SP5622								Priority Sp.			
Grizzled Skipper	Pyrgus malvae	1		18-May-97	SP5723			Bicester N W					Priority Sp.			
Wood White	Leptidea sinapis	1		04-Jun-91	SP585263		Cotmore Covert & Bainton Copse +Ext	Cotmore Cover, Cotmore Covert & Bainton Copse +Ext	Schedule 5, parts 5(a) and (b) (W&C Act 1981)				Priority Sp.			
Brown Hairstreak	Thecla betulae	2	Egg	27-Oct-05	SP59942226		Gavray Drive Meadows	Middle of northern boundary of Field 7	Schedule 5, parts 5(a) and (b) (W&C Act 1981)				Priority Sp.			
Brown Hairstreak	Thecla betulae	1	Egg	27-Oct-05	SP59992199		Gavray Drive Meadows	Middle of northern boundary of Field 1	Schedule 5, parts 5(a) and (b) (W&C Act 1981)				Priority Sp.			
Brown Hairstreak	Thecla betulae	1	Egg	27-Oct-05	SP60002204		Gavray Drive Meadows	Northern boundary of Field 2	Schedule 5, parts 5(a) and (b) (W&C Act 1981)				Priority Sp.			
Brown Hairstreak	Thecla betulae	1	Egg	27-Oct-05	SP60052216		Gavray Drive Meadows	Middle of northern boundary of Field 3	Schedule 5, parts 5(a) and (b) (W&C Act 1981)				Priority Sp.			
Brown Hairstreak	Thecla betulae	4	Egg	27-Oct-05	SP60092222		Gavray Drive Meadows	NE corner of Field 5	Schedule 5, parts 5(a) and (b) (W&C Act 1981)				Priority Sp.			
Brown Hairstreak	Thecla betulae	1	Egg	27-Oct-05	SP60132201		Gavray Drive Meadows	Middle of western boundary of Field 17	Schedule 5, parts 5(a) and (b) (W&C Act 1981)				Priority Sp.			
Brown Hairstreak	Thecla betulae	1	Egg	27-Oct-05	SP60242206		Gavray Drive Meadows	Middle of northern boundary of Field 17	Schedule 5, parts 5(a) and (b) (W&C Act 1981)				Priority Sp.			
White Letter Hairstreak	Satyrium w-album	2-9		27-Jul-97	SP5622			Whitelands Farm					Priority Sp.			
Small Blue	Cupido minimus			1985	SP538273		Ardley Quarry and Cuttings SSSI	Quarry	Schedule 5, parts 5(a) and (b) (W&C Act 1981)				Priority Sp.			
Small Blue	Cupido minimus			1985	SP538273		Ardley Quarry and Cuttings SSSI	Quarry	Schedule 5, parts 5(a) and (b) (W&C Act 1981)				Priority Sp.			
Small Blue	Cupido minimus	10-29		1990	SP5226		Ardley Quarry and Cuttings SSSI	Ardley Quarry	Schedule 5, parts 5(a) and (b) (W&C Act 1981)				Priority Sp.			
Small Blue	Cupido minimus			22-Jun-83	SP534274		Ardley Quarry and Cuttings SSSI	Fritwell Railway Cuttings	Schedule 5, parts 5(a) and (b) (W&C Act 1981)				Priority Sp.			
Small Blue	Cupido minimus			04-Jul-83	SP544263		Ardley Quarry and Cuttings SSSI	Fritwell Railway Cuttings	Schedule 5, parts 5(a) and (b) (W&C Act 1981)				Priority Sp.			
Small Blue	Cupido minimus			04-Jul-83	SP554255		Ardley Quarry and Cuttings SSSI	Fritwell Railway Cuttings	Schedule 5, parts 5(a) and (b) (W&C Act 1981)				Priority Sp.			
Small Blue	Cupido minimus			26-Jul-84	SP534274		Ardley Quarry and Cuttings SSSI	Fritwell Railway Cuttings	Schedule 5, parts 5(a) and (b) (W&C Act 1981)				Priority Sp.			
Small Blue	Cupido minimus			30-Jun-86	SP534274		Ardley Quarry and Cuttings SSSI	Fritwell Railway Cuttings	Schedule 5, parts 5(a) and (b) (W&C Act 1981)				Priority Sp.			
Small Blue	Cupido minimus			12-Jul-88	SP534274		Ardley Quarry and Cuttings SSSI	Fritwell Railway Cuttings	Schedule 5, parts 5(a) and (b) (W&C Act 1981)				Priority Sp.			

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Small Blue	Cupido minimus			29-Jun-90	SP5226				Schedule 5, parts 5(a) and (b) (W&C Act 1981)				Priority Sp.			
Small Blue	Cupido minimus			29-Jun-90	SP5226				Schedule 5, parts 5(a) and (b) (W&C Act 1981)				Priority Sp.			
Small Blue	Cupido minimus			26-Jul-90	SP5226				Schedule 5, parts 5(a) and (b) (W&C Act 1981)				Priority Sp.			
Small Blue	Cupido minimus			30-Aug-90	SP5226				Schedule 5, parts 5(a) and (b) (W&C Act 1981)				Priority Sp.			
Small Blue	Cupido minimus			06-Sep-90	SP5226				Schedule 5, parts 5(a) and (b) (W&C Act 1981)				Priority Sp.			
Small Blue	Cupido minimus	2-9		16-Aug-91	SP5226			Bicester Railway Path	Schedule 5, parts 5(a) and (b) (W&C Act 1981)				Priority Sp.			
Small Blue	Cupido minimus	10-29		28-May-90	SP5622				Schedule 5, parts 5(a) and (b) (W&C Act 1981)				Priority Sp.			
Small Blue	Cupido minimus	10-29		28-May-90	SP5622				Schedule 5, parts 5(a) and (b) (W&C Act 1981)				Priority Sp.			
Small Blue	Cupido minimus			01-Jun-90	SP5622				Schedule 5, parts 5(a) and (b) (W&C Act 1981)				Priority Sp.			
Small Blue	Cupido minimus			01-Jun-90	SP5622				Schedule 5, parts 5(a) and (b) (W&C Act 1981)				Priority Sp.			
Small Blue	Cupido minimus			24-Jul-90	SP5622				Schedule 5, parts 5(a) and (b) (W&C Act 1981)				Priority Sp.			
Small Blue	Cupido minimus			27-Jul-90	SP5622				Schedule 5, parts 5(a) and (b) (W&C Act 1981)				Priority Sp.			
Small Blue	Cupido minimus			01-Aug-90	SP5622				Schedule 5, parts 5(a) and (b) (W&C Act 1981)				Priority Sp.			
Small Blue	Cupido minimus			13-Aug-90	SP5622				Schedule 5, parts 5(a) and (b) (W&C Act 1981)				Priority Sp.			
Small Blue	Cupido minimus	Present	Adult	20/08/2002	SP599252		Stratton Audley Quarry	Tetrad 5824	Schedule 5, parts 5(a) and (b) (W&C Act 1981)				Priority Sp.			
Small Blue	Cupido minimus	Present	Adult	20/08/2002	SP602251		Stratton Audley Quarry		Schedule 5, parts 5(a) and (b) (W&C Act 1981)				Priority Sp.			
Small Blue	Cupido minimus	Present	Adult	20/08/2002	SP602251		Stratton Audley Quarry	north west, Stratton Audley Quarry	Schedule 5, parts 5(a) and (b) (W&C Act 1981)				Priority Sp.			
Small Blue	Cupido minimus	Present	Adult	20/08/2002	SP602251		Stratton Audley Quarry	South	Schedule 5, parts 5(a) and (b) (W&C Act 1981)				Priority Sp.			
Adonis Blue	Lysandra bellargus			1990	SP5226				Schedule 5, parts 5(a) and (b) (W&C Act 1981)							
White Admiral	Limenitis camilla	1		31-Jul-07	SP55452776		Stoke Wood						Priority Sp.			
Wall	Lasiommata megera			1985	SP538273		Ardley Quarry and Cuttings SSSI	Quarry					Priority Sp.			
Wall	Lasiommata megera			1985	SP538273		Ardley Quarry and Cuttings SSSI	Quarry					Priority Sp.			
Wall	Lasiommata megera	10-29		1990	SP5226		Ardley Quarry and Cuttings SSSI	Ardley Quarry					Priority Sp.			
Wall	Lasiommata megera			22-Jun-83	SP534274		Ardley Quarry and Cuttings SSSI	Fritwell Railway Cuttings					Priority Sp.			
Wall	Lasiommata megera			Jun-85	SP538273		Ardley Quarry and Cuttings SSSI	Ardley Quarry and Cutting BBOWT Reserve					Priority Sp.			
Wall	Lasiommata megera			03-Jun-85	SP534274		Ardley Quarry and Cuttings SSSI	Fritwell Railway Cuttings					Priority Sp.			
Wall	Lasiommata megera			02-May-90	SP5226								Priority Sp.			
Wall	Lasiommata megera			02-May-90	SP5226								Priority Sp.			
Wall	Lasiommata megera	1		07-Aug-91	SP5226			Bicester Railway Path					Priority Sp.			
Wall	Lasiommata megera	2-9		16-Aug-91	SP5226			Bicester Railway Path					Priority Sp.			
Wall	Lasiommata megera			01-Aug-90	SP5622								Priority Sp.			
Wall	Lasiommata megera			13-Aug-90	SP5622								Priority Sp.			
Wall	Lasiommata megera			22-Aug-90	SP580212								Priority Sp.			
Wall	Lasiommata megera			01-Jun-85	SP565276		Stoke Little Wood						Priority Sp.			
Wall	Lasiommata megera			10-Aug-83	SP599252		Stratton Audley Quarry						Priority Sp.			
Wall	Lasiommata megera			10-Aug-83	SP603251		Stratton Audley Quarry						Priority Sp.			
Wall	Lasiommata megera		adult	02-Jun-04	SP602251		Stratton Audley Quarry	SW detatched part					Priority Sp.			
Wall	Lasiommata megera			19-Jul-90	SP547250		Trow Pool						Priority Sp.			
Wall	Lasiommata megera	1		1994	SP601245		Whitecross Green Wood						Priority Sp.			

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Small Heath	Coenonympha pamphilus			04-Jul-83	SP543264		Ardley Fields Quarry						Priority Sp.			
Small Heath	Coenonympha pamphilus			03-Jun-85	SP543264		Ardley Fields Quarry						Priority Sp.			
Small Heath	Coenonympha pamphilus			07-Jul-86	SP543264		Ardley Fields Quarry						Priority Sp.			
Small Heath	Coenonympha pamphilus			1985	SP538273		Ardley Quarry and Cuttings SSSI	Quarry					Priority Sp.			
Small Heath	Coenonympha pamphilus			1985	SP538273		Ardley Quarry and Cuttings SSSI	Quarry					Priority Sp.			
Small Heath	Coenonympha pamphilus	10-29		1990	SP5226		Ardley Quarry and Cuttings SSSI	Ardley Quarry					Priority Sp.			
Small Heath	Coenonympha pamphilus			22-Jun-83	SP534274		Ardley Quarry and Cuttings SSSI	Fritwell Railway Cuttings					Priority Sp.			
Small Heath	Coenonympha pamphilus			04-Jul-83	SP544263		Ardley Quarry and Cuttings SSSI	Fritwell Railway Cuttings					Priority Sp.			
Small Heath	Coenonympha pamphilus			04-Jul-83	SP554255		Ardley Quarry and Cuttings SSSI	Fritwell Railway Cuttings					Priority Sp.			
Small Heath	Coenonympha pamphilus			26-Jul-84	SP534274		Ardley Quarry and Cuttings SSSI	Fritwell Railway Cuttings					Priority Sp.			
Small Heath	Coenonympha pamphilus			Jun-85	SP538273		Ardley Quarry and Cuttings SSSI	Ardley Quarry and Cutting BBOWT Reserve					Priority Sp.			
Small Heath	Coenonympha pamphilus			03-Jun-85	SP534274		Ardley Quarry and Cuttings SSSI	Fritwell Railway Cuttings					Priority Sp.			
Small Heath	Coenonympha pamphilus			19-Jun-85	SP534274		Ardley Quarry and Cuttings SSSI	Fritwell Railway Cuttings					Priority Sp.			
Small Heath	Coenonympha pamphilus			23-Jul-85	SP534274		Ardley Quarry and Cuttings SSSI	Fritwell Railway Cuttings					Priority Sp.			
Small Heath	Coenonympha pamphilus			30-Jun-86	SP534274		Ardley Quarry and Cuttings SSSI	Fritwell Railway Cuttings					Priority Sp.			
Small Heath	Coenonympha pamphilus			07-Jul-86	SP538273		Ardley Quarry and Cuttings SSSI	Quarry					Priority Sp.			
Small Heath	Coenonympha pamphilus			12-Jul-88	SP534274		Ardley Quarry and Cuttings SSSI	Fritwell Railway Cuttings					Priority Sp.			
Small Heath	Coenonympha pamphilus			08-Jul-91	SP538273		Ardley Quarry and Cuttings SSSI	Ardley Quarry and Cutting BBOWT Reserve					Priority Sp.			
Small Heath	Coenonympha pamphilus	Present	Adult	26/06/2002	SP598222		Gavray Drive Meadows	Gavray Drive western fields					Priority Sp.			
Small Heath	Coenonympha pamphilus			08-Jul-91	SP526274		Kennel Copse						Priority Sp.			
Small Heath	Coenonympha pamphilus	2-9		1997	SP603228		Launton Churchyard						Priority Sp.			
Small Heath	Coenonympha pamphilus			19-May-90	SP5226								Priority Sp.			
Small Heath	Coenonympha pamphilus			19-May-90	SP5226								Priority Sp.			
Small Heath	Coenonympha pamphilus	10-29		25-May-90	SP5226								Priority Sp.			
Small Heath	Coenonympha pamphilus	10-29		25-May-90	SP5226								Priority Sp.			
Small Heath	Coenonympha pamphilus	10-29		07-Jun-90	SP5226								Priority Sp.			
Small Heath	Coenonympha pamphilus	10-29		07-Jun-90	SP5226								Priority Sp.			
Small Heath	Coenonympha pamphilus			13-Jun-90	SP5226								Priority Sp.			
Small Heath	Coenonympha pamphilus			13-Jun-90	SP5226								Priority Sp.			
Small Heath	Coenonympha pamphilus			14-Jun-90	SP5226								Priority Sp.			
Small Heath	Coenonympha pamphilus			14-Jun-90	SP5226								Priority Sp.			
Small Heath	Coenonympha pamphilus	10-29		29-Jun-90	SP5226								Priority Sp.			
Small Heath	Coenonympha pamphilus	10-29		29-Jun-90	SP5226								Priority Sp.			
Small Heath	Coenonympha pamphilus	10-29		03-Jul-90	SP5226								Priority Sp.			
Small Heath	Coenonympha pamphilus	10-29		03-Jul-90	SP5226								Priority Sp.			
Small Heath	Coenonympha pamphilus			12-Jul-90	SP5226								Priority Sp.			
Small Heath	Coenonympha pamphilus			12-Jul-90	SP5226								Priority Sp.			
Small Heath	Coenonympha pamphilus			23-Jul-90	SP5226								Priority Sp.			
Small Heath	Coenonympha pamphilus			26-Jul-90	SP5226								Priority Sp.			
Small Heath	Coenonympha pamphilus	10-29		15-Aug-90	SP5226								Priority Sp.			
Small Heath	Coenonympha pamphilus	10-29		30-Aug-90	SP5226								Priority Sp.			
Small Heath	Coenonympha pamphilus			06-Sep-90	SP5226								Priority Sp.			
Small Heath	Coenonympha pamphilus	2-9		06-Apr-91	SP5226			Bicester; Railway Path					Priority Sp.			
Small Heath	Coenonympha pamphilus	10-29		04-Jun-91	SP5226			Bicester; Railway Path					Priority Sp.			
Small Heath	Coenonympha pamphilus	30-99		21-Jun-91	SP5226			Bicester; Railway Path					Priority Sp.			
Small Heath	Coenonympha pamphilus	10-29		28-Jun-91	SP5226			Bicester; Railway Path					Priority Sp.			
Small Heath	Coenonympha pamphilus	1		05-Jul-91	SP5226			Bicester; Railway Path					Priority Sp.			
Small Heath	Coenonympha pamphilus	2-9		19-Jul-91	SP5226			Bicester Railway Path					Priority Sp.			
Small Heath	Coenonympha pamphilus	2-9		26-Jul-91	SP5226			Bicester Railway Path					Priority Sp.			
Small Heath	Coenonympha pamphilus	2-9		02-Aug-91	SP5226			Bicester Railway Path					Priority Sp.			
Small Heath	Coenonympha pamphilus	1		20-Jul-92	SP5226			Ardley					Priority Sp.			
Small Heath	Coenonympha pamphilus			24-Jul-98	SP5226			Chilgrove Drive - N					Priority Sp.			
Small Heath	Coenonympha pamphilus	10-29		22-May-92	SP5422			Near M40					Priority Sp.			
Small Heath	Coenonympha pamphilus	2-9		03-Jun-92	SP5422			Chesterton & Bucknell Parish					Priority Sp.			
Small Heath	Coenonympha pamphilus	2-9		10-Aug-92	SP547233			Bucknell					Priority Sp.			
Small Heath	Coenonympha pamphilus	2-9		19-Aug-93	SP547233			B4030					Priority Sp.			
Small Heath	Coenonympha pamphilus	2-9		26-Aug-93	SP548220			A4098					Priority Sp.			
Small Heath	Coenonympha pamphilus	1		28-May-90	SP5622								Priority Sp.			

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Small Heath	Coenonympha pamphilus	1		28-May-90	SP5622								Priority Sp.			
Small Heath	Coenonympha pamphilus	10-29		01-Jun-90	SP5622								Priority Sp.			
Small Heath	Coenonympha pamphilus	10-29		01-Jun-90	SP5622								Priority Sp.			
Small Heath	Coenonympha pamphilus			15-Jun-90	SP5622								Priority Sp.			
Small Heath	Coenonympha pamphilus			15-Jun-90	SP5622								Priority Sp.			
Small Heath	Coenonympha pamphilus			28-Jun-90	SP5622								Priority Sp.			
Small Heath	Coenonympha pamphilus			28-Jun-90	SP5622								Priority Sp.			
Small Heath	Coenonympha pamphilus			30-Jun-90	SP5622								Priority Sp.			
Small Heath	Coenonympha pamphilus			30-Jun-90	SP5622								Priority Sp.			
Small Heath	Coenonympha pamphilus			24-Jul-90	SP5622								Priority Sp.			
Small Heath	Coenonympha pamphilus			27-Jul-90	SP5622								Priority Sp.			
Small Heath	Coenonympha pamphilus			01-Aug-90	SP5622								Priority Sp.			
Small Heath	Coenonympha pamphilus	10-29		13-Aug-90	SP5622								Priority Sp.			
Small Heath	Coenonympha pamphilus			07-Sep-90	SP5622								Priority Sp.			
Small Heath	Coenonympha pamphilus	2-9		18-May-97	SP5723			Bicester N W, oxon tetrad 5622					Priority Sp.			
Small Heath	Coenonympha pamphilus	1		10-Aug-97	SP5722			Bicester - S W, oxon tetrad 5622					Priority Sp.			
Small Heath	Coenonympha pamphilus			21-Jun-98	SP5629			Stoke Bushes, oxon tetrad 5628					Priority Sp.			
Small Heath	Coenonympha pamphilus	1		06-Jul-97	SP5823			Bicester N, oxon tetrad 5822					Priority Sp.			
Small Heath	Coenonympha pamphilus	2-9		1991	SP5826			Fringford, oxon tetrad 5826					Priority Sp.			
Small Heath	Coenonympha pamphilus	2-9		05-Jul-91	SP601219			Oxon tetrad 6020					Priority Sp.			
Small Heath	Coenonympha pamphilus	2-9		05-Jul-91	SP601221			Oxon tetrad 6020					Priority Sp.			
Small Heath	Coenonympha pamphilus			08-Jul-81	SP603251		Stratton Audley Quarry						Priority Sp.			
Small Heath	Coenonympha pamphilus			08-Jul-91	SP599252		Stratton Audley Quarry						Priority Sp.			
Small Heath	Coenonympha pamphilus	Present	Adult	20/08/2002	SP602251		Stratton Audley Quarry	north west, Stratton Audley Quarry					Priority Sp.			
Small Heath	Coenonympha pamphilus	Present	Adult	20/08/2002	SP599252		Stratton Audley Quarry	Tetrad 5824					Priority Sp.			
Small Heath	Coenonympha pamphilus		adult	20-Aug-02	SP602251		Stratton Audley Quarry	north west, Stratton Audley Quarry					Priority Sp.			
Small Heath	Coenonympha pamphilus	present; 9	Adult; Species	29/05/2003	SP602251		Stratton Audley Quarry						Priority Sp.			
Small Heath	Coenonympha pamphilus	present	Species	11/06/2003	SP602250		Stratton Audley Quarry						Priority Sp.			
Small Heath	Coenonympha pamphilus	present	Adult	13/06/2003	SP602251		Stratton Audley Quarry	south quarry					Priority Sp.			
Small Heath	Coenonympha pamphilus	present; 30	Adult; Species	17/06/2003	SP602251		Stratton Audley Quarry						Priority Sp.			
Small Heath	Coenonympha pamphilus	present	Species	20/06/2003	SP602250		Stratton Audley Quarry						Priority Sp.			
Small Heath	Coenonympha pamphilus			07-Jul-03	SP602251		Stratton Audley Quarry	west quarry, Stratton Audley Quarry					Priority Sp.			
Small Heath	Coenonympha pamphilus	present; 3	Adult; Species	16/07/2003	SP602251		Stratton Audley Quarry						Priority Sp.			
Small Heath	Coenonympha pamphilus	2	Species	05/08/2003	SP602250		Stratton Audley Quarry						Priority Sp.			
Small Heath	Coenonympha pamphilus	present; 34	Adult; Species	06/08/2003	SP602251		Stratton Audley Quarry						Priority Sp.			
Small Heath	Coenonympha pamphilus	present; 57	Adult; Species	27/08/2003	SP602251		Stratton Audley Quarry						Priority Sp.			
Small Heath	Coenonympha pamphilus	present; 12	Adult; Species	15/09/2003	SP602251		Stratton Audley Quarry						Priority Sp.			
Small Heath	Coenonympha pamphilus		adult	02-Jun-04	SP599252		Stratton Audley Quarry	Tetrad 5824					Priority Sp.			
Small Heath	Coenonympha pamphilus		adult	02-Jun-04	SP602251		Stratton Audley Quarry						Priority Sp.			
Small Heath	Coenonympha pamphilus		adult	02-Jun-04	SP602251		Stratton Audley Quarry	SW detatched part, Stratton Audley Quarry					Priority Sp.			
Small Heath	Coenonympha pamphilus	1	Species	31/07/2008	SP605246		Stratton Audley Quarry	Southern section					Priority Sp.			
Small Heath	Coenonympha pamphilus	present	Species	27-Sep-06	SP59902537		Stratton Audley Quarry (NW corner)						Priority Sp.			
Small Heath	Coenonympha pamphilus			30-Jun-86	SP547250		Trow Pool						Priority Sp.			
Lackey	Malacosoma neustria		larva	28-Apr-85	SP538273		Ardley Quarry and Cuttings SSSI	Quarry					Priority Sp.			
Lackey	Malacosoma neustria			May-85	SP538273		Ardley Quarry and Cuttings SSSI	Ardley Quarry and Cutting BBOWT Reserve					Priority Sp.			
Shaded Broad-Bar	Scotopteryx chenopodiata	1	Adult	16/07/02-17/07/02	SP53762725		Ardley Quarry						Priority Sp.			
Shaded Broad-bar	Scotopteryx chenopodiata			26-Jul-84	SP534274		Ardley Quarry and Cuttings SSSI	Fritwell Railway Cuttings					Priority Sp.			

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Shaded Broad-bar	Scotopteryx chenopodiata			23-Jul-85	SP534274		Ardley Quarry and Cuttings SSSI	Fritwell Railway Cuttings					Priority Sp.			
Shaded Broad-bar	Scotopteryx chenopodiata			29-Aug-86	SP534274		Ardley Quarry and Cuttings SSSI	Fritwell Railway Cuttings					Priority Sp.			
Small Phoenix	Ecliptopera silaceata			06-Jun-04	SP6024		Bicester airfield	explosives dump area, Bicester airfield					Priority Sp.			
White Ermine	Spilosoma lubricipeda			06-Jun-04	SP6024		Bicester airfield	explosives dump area, Bicester airfield					Priority Sp.			
White Ermine	Spilosoma lubricipeda			30-Jun-86	SP547250		Trow Pool						Priority Sp.			
Buff Ermine	Spilosoma luteum			06-Jun-04	SP6024		Bicester airfield	explosives dump area, Bicester airfield					Priority Sp.			
Cinnabar	Tyria jacobaeae		adult	02-Jun-04	SP534221		A4095/A43 Junction near Oxford Lodge						Priority Sp.			
Cinnabar	Tyria jacobaeae			1978	SP538273		Ardley Quarry and Cuttings SSSI	Ardley Quarry and Cutting BBOWT Reserve					Priority Sp.			
Cinnabar	Tyria jacobaeae			May-85	SP538273		Ardley Quarry and Cuttings SSSI	Ardley Quarry and Cutting BBOWT Reserve					Priority Sp.			
Cinnabar	Tyria jacobaeae		larva	23-Jul-85	SP534274		Ardley Quarry and Cuttings SSSI	Fritwell Railway Cuttings					Priority Sp.			
Cinnabar	Tyria jacobaeae		larva	12-Jul-88	SP534274		Ardley Quarry and Cuttings SSSI	Fritwell Railway Cuttings					Priority Sp.			
Cinnabar	Tyria jacobaeae		immature male	20-Jul-83	SP516242		Aves Ditch	Tetrad 5024 section					Priority Sp.			
Cinnabar	Tyria jacobaeae			06-Jun-04	SP6024		Bicester airfield	explosives dump area, Bicester airfield					Priority Sp.			
Cinnabar	Tyria jacobaeae	Present	Adult	24/06/2002	SP602220		Gavray Drive Meadows	Gavray Drive field 22 (renamed field 17)					Priority Sp.			
Cinnabar	Tyria jacobaeae		adult	02-Jun-04	SP599252		Stratton Audley Quarry	Tetrad 5824					Priority Sp.			
Cinnabar	Tyria jacobaeae	present	Species	31/07/2008	SP605246		Stratton Audley Quarry	Southern section					Priority Sp.			
Cinnabar	Tyria jacobaeae			30-Jun-86	SP547250		Trow Pool						Priority Sp.			
Small Square-Spot	Diarsia rubi	1	Individual	16/07/02-17/07/02	SP53762725		Ardley Quarry						Priority Sp.			
Small Square-spot	Diarsia rubi			06-Jun-04	SP6024		Bicester airfield	explosives dump area, Bicester airfield					Priority Sp.			
Shoulder-striped Wainscot	Mythimna comma			06-Jun-04	SP6024		Bicester airfield	explosives dump area, Bicester airfield					Priority Sp.			
Grey Dagger	Acronicta psi			03-Jun-85	SP534274		Ardley Quarry and Cuttings SSSI	Fritwell Railway Cuttings					Priority Sp.			
Knotgrass	Acronicta rumicis			06-Jun-04	SP6024		Bicester airfield	explosives dump area, Bicester airfield					Priority Sp.			
Dusky Brocade	Apamea remissa			06-Jun-04	SP6024		Bicester airfield	explosives dump area, Bicester airfield					Priority Sp.			
Large Nutmeg	Apamea anceps			06-Jun-04	SP6024		Bicester airfield	explosives dump area, Bicester airfield					Priority Sp.			
Rosy Rustic	Hydraecia micacea	1	Individual	29/08/02-30/08/02	SP53762725		Ardley Quarry						Priority Sp.			
Mottled Rustic	Caradrina morpheus			06-Jun-04	SP6024		Bicester airfield	explosives dump area, Bicester airfield					Priority Sp.			
Four-spotted	Tyta luctuosa			22-Jun-83	SP534274		Ardley Quarry and Cuttings SSSI	Fritwell Railway Cuttings				Pre94:VU	Priority Sp.			
Four-spotted	Tyta luctuosa			04-Jul-83	SP544263		Ardley Quarry and Cuttings SSSI	Fritwell Railway Cuttings				Pre94:VU	Priority Sp.			
Four-spotted	Tyta luctuosa			04-Jul-83	SP554255		Ardley Quarry and Cuttings SSSI	Fritwell Railway Cuttings				Pre94:VU	Priority Sp.			
Four-spotted	Tyta luctuosa			26-Jul-84	SP534274		Ardley Quarry and Cuttings SSSI	Fritwell Railway Cuttings				Pre94:VU	Priority Sp.			
Four-spotted	Tyta luctuosa			03-Jun-85	SP534274		Ardley Quarry and Cuttings SSSI	Fritwell Railway Cuttings				Pre94:VU	Priority Sp.			
Four-spotted	Tyta luctuosa			19-Jun-85	SP534274		Ardley Quarry and Cuttings SSSI	Fritwell Railway Cuttings				Pre94:VU	Priority Sp.			
Volucella inanis	Volucella inanis	1	Species	04/08/2008	SP54722499		Trow Pool							Nationally Notable		
Volucella inanis	Volucella inanis	3	Species	22/08/2008	SP54722499		Trow Pool							Nationally Notable		
The Small Tiphia	Tiphia minuta			2003	SP602251		Stratton Audley Quarry							Nationally Notable B		
The Small Tiphia	Tiphia minuta			07-Jul-03	SP602251		Stratton Audley Quarry							Nationally Notable B		

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The Small Tiphia	Tiphia minuta			07/07/2003	SP602251		Stratton Audley Quarry							Nationally Notable B		
a solitary bee	Andrena varians			2003	SP602251		Stratton Audley Quarry							Nationally Notable B		
a solitary bee	Andrena varians			20-Apr-03	SP602251		Stratton Audley Quarry							Nationally Notable B		
a solitary bee	Andrena varians			20/04/2003	SP602251		Stratton Audley Quarry							Nationally Notable B		
a solitary bee	Halictus confusus			2003	SP602251		Stratton Audley Quarry					Pre94:NR				
a solitary bee	Halictus confusus			2003	SP602251		Stratton Audley Quarry					Pre94:NR				
Yellow Footed Mining Bee	Lasioglossum xanthopum			2003	SP602251		Stratton Audley Quarry							Nationally Notable B		
Yellow Footed Mining Bee	Lasioglossum xanthopum			13-Jun-03	SP602251		Stratton Audley Quarry							Nationally Notable B		
a solitary bee	Lasioglossum malachurus			2003	SP602251		Stratton Audley Quarry							Nationally Notable B		
a solitary bee	Lasioglossum malachurus			07-Jul-03	SP602251		Stratton Audley Quarry							Nationally Notable B		
a solitary bee	Lasioglossum pauxillum			2003	SP602251		Stratton Audley Quarry							Nationally Notable A		
a solitary bee	Lasioglossum pauxillum			16-May-03	SP602251		Stratton Audley Quarry							Nationally Notable A		
a solitary bee	Lasioglossum pauxillum			16/05/2003	SP602251		Stratton Audley Quarry							Nationally Notable A		
a solitary bee	Lasioglossum leucopum			2003	SP602251		Stratton Audley Quarry					Pre94:NR				
a solitary bee	Lasioglossum leucopum			16-May-03	SP602251		Stratton Audley Quarry					Pre94:NR				
a solitary bee	Sphecodes crassus			2003	SP602251		Stratton Audley Quarry							Nationally Notable B		
a solitary bee	Sphecodes crassus			13-Jun-03	SP602251		Stratton Audley Quarry							Nationally Notable B		
Sphecodes crassus	Sphecodes crassus			13/06/2003	SP602251		Stratton Audley Quarry							Nationally Notable B		
Two Coloured Mason Bee	Osmia bicolor			2003	SP602251		Stratton Audley Quarry							Nationally Notable B		
Two Coloured Mason Bee	Osmia bicolor			13-Jun-03	SP602251		Stratton Audley Quarry							Nationally Notable B		
Two Coloured Mason Bee	Osmia bicolor			13/06/2003	SP602251		Stratton Audley Quarry							Nationally Notable B		
Freshwater Crayfish	Austropotamobius pallipes	Present	Species	28/06/1994	SP58712148			A41 BICESTER (LANGFORD BROOK)	Schedule 5, parts 1, 5(a) and (b) (W&C Act 1981)		post94:VU		Priority Sp.			
Eel	Anguilla anguilla			23-May-83	SP525230		Middleton Park (Ecological Area)						Priority Sp.			
Great Crested Newt	Triturus cristatus			04-Jul-83	SP543264		Ardley Fields Quarry		Schedule 5 - all parts (W&C Act 1981)	H & S Dir (An 2)			Priority Sp.			
Great Crested Newt	Triturus cristatus	2	Egg	20-Apr-04	SP53762725		Ardley Quarry		Schedule 5 - all parts (W&C Act 1981)	H & S Dir (An 2)			Priority Sp.			
Great Crested Newt	Triturus cristatus			2001	SP538273		Ardley Quarry and Cuttings SSSI	Quarry	Schedule 5 - all parts (W&C Act 1981)	H & S Dir (An 2)			Priority Sp.			
Great Crested Newt	Triturus cristatus	21	male	11-Apr-03	SP601223			Bicester	Schedule 5 - all parts (W&C Act 1981)	H & S Dir (An 2)			Priority Sp.			
Great Crested Newt	Triturus cristatus	14	female	11-Apr-03	SP601223			Bicester	Schedule 5 - all parts (W&C Act 1981)	H & S Dir (An 2)			Priority Sp.			
Great Crested Newt	Triturus cristatus	69	male	28-Apr-03	SP601223			Bicester	Schedule 5 - all parts (W&C Act 1981)	H & S Dir (An 2)			Priority Sp.			
Great Crested Newt	Triturus cristatus	29	female	28-Apr-03	SP601223			Bicester	Schedule 5 - all parts (W&C Act 1981)	H & S Dir (An 2)			Priority Sp.			
Great Crested Newt	Triturus cristatus	26	female	04-May-03	SP601223			Bicester	Schedule 5 - all parts (W&C Act 1981)	H & S Dir (An 2)			Priority Sp.			
Great Crested Newt	Triturus cristatus	51	male	04-May-03	SP601223			Bicester	Schedule 5 - all parts (W&C Act 1981)	H & S Dir (An 2)			Priority Sp.			

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Great Crested Newt	Triturus cristatus	15	female	21-May-03	SP601223			Bicester	Schedule 5 - all parts (W&C Act 1981)	H & S Dir (An 2)			Priority Sp.			
Great Crested Newt	Triturus cristatus	26	male	21-May-03	SP601223			Bicester	Schedule 5 - all parts (W&C Act 1981)	H & S Dir (An 2)			Priority Sp.			
Great Crested Newt	Triturus cristatus			20-Mar-88	SP599252		Stratton Audley Quarry		Schedule 5 - all parts (W&C Act 1981)	H & S Dir (An 2)			Priority Sp.			
Great Crested Newt	Triturus cristatus			20-Mar-88	SP603251		Stratton Audley Quarry		Schedule 5 - all parts (W&C Act 1981)	H & S Dir (An 2)			Priority Sp.			
Great Crested Newt	Triturus cristatus		immature	19-Jun-92	SP599252		Stratton Audley Quarry		Schedule 5 - all parts (W&C Act 1981)	H & S Dir (An 2)			Priority Sp.			
Great Crested Newt	Triturus cristatus	1	Female	07/04/2009	SP59912525		Stratton Audley Quarry		Schedule 5 - all parts (W&C Act 1981)	H & S Dir (An 2)			Priority Sp.			
Great Crested Newt	Triturus cristatus	1	Male	07/04/2009	SP59872520		Stratton Audley Quarry		Schedule 5 - all parts (W&C Act 1981)	H & S Dir (An 2)			Priority Sp.			
Great Crested Newt	Triturus cristatus			1996	SP59972220			Unipart Development Site	Schedule 5 - all parts (W&C Act 1981)	H & S Dir (An 2)			Priority Sp.			
Smooth Newt	Triturus vulgaris			2001	SP538273		Ardley Quarry and Cuttings SSSI	Quarry	Schedule 5, parts 5(a) and (b) (W&C Act 1981)							
Smooth Newt	Triturus vulgaris			May-85	SP538273		Ardley Quarry and Cuttings SSSI	Ardley Quarry and Cutting BBOWT Reserve	Schedule 5, parts 5(a) and (b) (W&C Act 1981)							
Smooth Newt	Triturus vulgaris			May-85	SP538273		Ardley Quarry and Cuttings SSSI	Quarry	Schedule 5, parts 5(a) and (b) (W&C Act 1981)							
Smooth Newt	Triturus vulgaris			08-Jul-91	SP538273		Ardley Quarry and Cuttings SSSI	Ardley Quarry and Cutting BBOWT Reserve	Schedule 5, parts 5(a) and (b) (W&C Act 1981)							
Common newt	Triturus vulgaris	Minimum of	Adult	01-Apr-02	SP60692255		Ditch, Sherwood Close, Launton		Schedule 5, parts 5(a) and (b) (W&C Act 1981)							
Smooth Newt	Triturus vulgaris			May-04	SP534235		Middleton Park (Ecological Area)		Schedule 5, parts 5(a) and (b) (W&C Act 1981)							
Smooth Newt	Triturus vulgaris	6	adult	11-Apr-03	SP601223			Bicester, Oxon tetrad 6022	Schedule 5, parts 5(a) and (b) (W&C Act 1981)							
Smooth Newt	Triturus vulgaris	4	adult	28-Apr-03	SP601223			Bicester, Oxon tetrad 6022	Schedule 5, parts 5(a) and (b) (W&C Act 1981)							
Smooth Newt	Triturus vulgaris	16	adult	04-May-03	SP601223			Bicester, Oxon tetrad 6022	Schedule 5, parts 5(a) and (b) (W&C Act 1981)							
Smooth Newt	Triturus vulgaris	25	adult	21-May-03	SP601223			Bicester, Oxon tetrad 6022	Schedule 5, parts 5(a) and (b) (W&C Act 1981)							
Smooth Newt	Triturus vulgaris			26-Feb-91	SP603251		Stratton Audley Quarry		Schedule 5, parts 5(a) and (b) (W&C Act 1981)							
Smooth Newt	Triturus vulgaris	2	Female	07/04/2009	SP59912525		Stratton Audley Quarry		Schedule 5, parts 5(a) and (b) (W&C Act 1981)							
Smooth Newt	Triturus vulgaris	1	Male	07/04/2009	SP59872520		Stratton Audley Quarry		Schedule 5, parts 5(a) and (b) (W&C Act 1981)							
Smooth Newt	Triturus vulgaris	2	Female	07/04/2009	SP59872520		Stratton Audley Quarry		Schedule 5, parts 5(a) and (b) (W&C Act 1981)							
Common Toad	Bufo bufo	9	adult	11-Apr-03	SP601223			Bicester, Oxon tetrad 6022	Schedule 5, parts 5(a) and (b) (W&C Act 1981)				Priority Sp.			
Common Toad	Bufo bufo	15	adult	28-Apr-03	SP601223			Bicester, Oxon tetrad 6022	Schedule 5, parts 5(a) and (b) (W&C Act 1981)				Priority Sp.			
Common Toad	Bufo bufo	11	adult	04-May-03	SP601223			Bicester, Oxon tetrad 6022	Schedule 5, parts 5(a) and (b) (W&C Act 1981)				Priority Sp.			
Common Toad	Bufo bufo	6	adult	21-May-03	SP601223			Bicester, Oxon tetrad 6022	Schedule 5, parts 5(a) and (b) (W&C Act 1981)				Priority Sp.			
Common Toad	Bufo bufo	Present	Juvenile	19/06/2008	SP54722499		Trow Pool		Schedule 5, parts 5(a) and (b) (W&C Act 1981)				Priority Sp.			
Common Frog	Rana temporaria			2001	SP538273		Ardley Quarry and Cuttings SSSI	Quarry	Schedule 5, parts 5(a) and (b) (W&C Act 1981)							
Common Frog	Rana temporaria	1 adult	Adult	01-Apr-02	SP60692255		Ditch and pond, Sherwood Close, Launton		Schedule 5, parts 5(a) and (b) (W&C Act 1981)							
Common Frog	Rana temporaria			23-May-83	SP525230		Middleton Park (Ecological Area)		Schedule 5, parts 5(a) and (b) (W&C Act 1981)							

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Common Frog	Rana temporaria	6	adult	11-Apr-03	SP601223			Bicester, Oxon tetrad 6022	Schedule 5, parts 5(a) and (b) (W&C Act 1981)							
Common Frog	Rana temporaria	11	adult	28-Apr-03	SP601223			Bicester, Oxon tetrad 6022	Schedule 5, parts 5(a) and (b) (W&C Act 1981)							
Common Frog	Rana temporaria	18	adult	04-May-03	SP601223			Bicester, Oxon tetrad 6022	Schedule 5, parts 5(a) and (b) (W&C Act 1981)							
Common Frog	Rana temporaria	22	adult	21-May-03	SP601223			Bicester, Oxon tetrad 6022	Schedule 5, parts 5(a) and (b) (W&C Act 1981)							
Common Frog	Rana temporaria	2	Species	31/07/2008	SP605246		Stratton Audley Quarry	Southern section	Schedule 5, parts 5(a) and (b) (W&C Act 1981)							
Common Frog	Rana temporaria	1	Species	31/07/2008	SP605246		Stratton Audley Quarry	Southern section: fishing lake and surrounds	Schedule 5, parts 5(a) and (b) (W&C Act 1981)							
Common Frog	Rana temporaria	1	Presence	19/06/2008	SP54722499		Trow Pool		Schedule 5, parts 5(a) and (b) (W&C Act 1981)							
Viviparous Lizard	Lacerta vivipara	c. 20		2002	SP57652360		Bicester, 132, Barry Avenue		Schedule 5, parts 1, 5(a) and (b) (W&C Act 1981)				Priority Sp.			
Grass Snake	Natrix natrix			1978	SP538273		Ardley Quarry and Cuttings SSSI	Quarry	Schedule 5, parts 1, 5(a) and (b) (W&C Act 1981)				Priority Sp.			
Grass Snake	Natrix natrix	1		Summer 1994	SP561215		Barnside, Alchester Rd, Chesterton		Schedule 5, parts 1, 5(a) and (b) (W&C Act 1981)				Priority Sp.			
Grass Snake	Natrix natrix	1		Summer 2000	SP561222		Bignell Park, Chesterton		Schedule 5, parts 1, 5(a) and (b) (W&C Act 1981)				Priority Sp.			
Grass Snake	Natrix natrix	1	Juvenile	Summer 1995	SP562232		Himley Farm, Bicester		Schedule 5, parts 1, 5(a) and (b) (W&C Act 1981)				Priority Sp.			
Grass Snake	Natrix natrix	1	Adult	Summer 2003	SP561237		Himley Farm, Bicester		Schedule 5, parts 1, 5(a) and (b) (W&C Act 1981)				Priority Sp.			
Grass Snake	Natrix natrix	2		21-Aug-03	SP559214		Orchard Rise, Chesterton?		Schedule 5, parts 1, 5(a) and (b) (W&C Act 1981)				Priority Sp.			
Grass Snake	Natrix natrix			28-Jul-87	SP572210		Roman Road by Hayfield		Schedule 5, parts 1, 5(a) and (b) (W&C Act 1981)				Priority Sp.			
Grass Snake	Natrix natrix		adult	08-Jul-81	SP603251		Stratton Audley Quarry		Schedule 5, parts 1, 5(a) and (b) (W&C Act 1981)				Priority Sp.			
Grass Snake	Natrix natrix			08-Jul-91	SP602251		Stratton Audley Quarry		Schedule 5, parts 1, 5(a) and (b) (W&C Act 1981)				Priority Sp.			
Little Grebe	Tachybaptus ruficollis		in bud	03-Jun-85	SP543264		Ardley Fields Quarry								Amber List	
Little Grebe	Tachybaptus ruficollis	29	Species	2000	SP577209		Bicester Wetland Reserve								Amber List	
Little Grebe	Tachybaptus ruficollis	4	Species	2001	SP577209		Bicester Wetland Reserve								Amber List	
Little Grebe	Tachybaptus ruficollis	30	Species	2002	SP577209		Bicester Wetland Reserve								Amber List	
Little Grebe	Tachybaptus ruficollis	39	Species	2003	SP577209		Bicester Wetland Reserve								Amber List	
Little Grebe	Tachybaptus ruficollis	42	Species	2004	SP577209		Bicester Wetland Reserve								Amber List	
Little Grebe*	Tachybaptus ruficollis	1		26-May-04	SP5720	Record	Bicester: Bicester Golf Club								Amber List	
Little Grebe*	Tachybaptus ruficollis	1	Pair	15-Mar-00	SP5721	Record	Bicester: Bicester Wetland Reserve								Amber List	
Little Grebe	Tachybaptus ruficollis		proved breeding	20-Jul-83	SP519230		Middleton Park (Ecological Area)								Amber List	
Little Grebe	Tachybaptus ruficollis			15-Sep-82	SP603251		Stratton Audley Quarry								Amber List	
Little Grebe	Tachybaptus ruficollis			23-Sep-87	SP603251		Stratton Audley Quarry								Amber List	
Little Grebe	Tachybaptus ruficollis			26/06/2003	SP547250		Trow Pool								Amber List	
Little Grebe	Tachybaptus ruficollis	Present	Species	17-Jul-04	SP547249		Trow Pool								Amber List	
Little Grebe	Tachybaptus ruficollis	1	Species	04/07/2008	SP54722499		Trow Pool								Amber List	
Little Grebe	Tachybaptus ruficollis	4	Species	13/06/2008-18/07/2008	SP54722499		Trow Pool								Amber List	
Bittern	Botaurus stellaris	1	Species	2000	SP577209		Bicester Wetland Reserve		Schedule 1 (W&C Act 1981)	Birds Dir (An 1)			Priority Sp.		Red List	
Bittern	Botaurus stellaris	1	Species	2001	SP577209		Bicester Wetland Reserve		Schedule 1 (W&C Act 1981)	Birds Dir (An 1)			Priority Sp.		Red List	
Little Egret	Egretta garzetta	4	Species	2002	SP577209		Bicester Wetland Reserve								Amber List	
Little Egret	Egretta garzetta	3	Species	2003	SP577209		Bicester Wetland Reserve								Amber List	
Greylag Goose	Anser anser	1	Species	2003	SP577209		Bicester Wetland Reserve								Amber List	
Greylag Goose	Anser anser			23-May-83	SP525230		Middleton Park (Ecological Area)								Amber List	

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Wigeon	Anas penelope	5	Species	2001	SP577209		Bicester Wetland Reserve								Amber List	
Wigeon	Anas penelope	11	Species	2002	SP577209		Bicester Wetland Reserve								Amber List	
Wigeon	Anas penelope	5	Species	2003	SP577209		Bicester Wetland Reserve								Amber List	
Wigeon	Anas penelope	8	Species	2004	SP577209		Bicester Wetland Reserve								Amber List	
Gadwall	Anas strepera	11	Species	2000	SP577209		Bicester Wetland Reserve								Amber List	
Gadwall	Anas strepera	17	Species	2001	SP577209		Bicester Wetland Reserve								Amber List	
Gadwall	Anas strepera	21	Species	2002	SP577209		Bicester Wetland Reserve								Amber List	
Gadwall	Anas strepera	36	Species	2003	SP577209		Bicester Wetland Reserve								Amber List	
Gadwall	Anas strepera	36	Species	2004	SP577209		Bicester Wetland Reserve								Amber List	
Teal	Anas crecca	30	Species	2000	SP577209		Bicester Wetland Reserve								Amber List	
Teal	Anas crecca	27	Species	2001	SP577209		Bicester Wetland Reserve								Amber List	
Teal	Anas crecca	41	Species	2002	SP577209		Bicester Wetland Reserve								Amber List	
Teal	Anas crecca	41	Species	2003	SP577209		Bicester Wetland Reserve								Amber List	
Teal	Anas crecca	1	Species	2004	SP577209		Bicester Wetland Reserve								Amber List	
Mallard	Anas platyrhynchos	3	Species	2000	SP577209		Bicester Wetland Reserve								Amber List	
Mallard	Anas platyrhynchos	1	Species	2001	SP577209		Bicester Wetland Reserve								Amber List	
Mallard	Anas platyrhynchos	2	Species	2002	SP577209		Bicester Wetland Reserve								Amber List	
Mallard	Anas platyrhynchos	5	Species	2003	SP577209		Bicester Wetland Reserve								Amber List	
Mallard	Anas platyrhynchos	4	Species	2004	SP577209		Bicester Wetland Reserve								Amber List	
Mallard	Anas platyrhynchos		proved breeding	14-Jun-01	SP599278		Fringford Pingo								Amber List	
Mallard	Anas platyrhynchos		Breeding confirmed	30-Apr-02	SP599278		Fringford Pingo								Amber List	
Mallard	Anas platyrhynchos			-1987	SP561218		Gagle Brook Flood Plain, Chesterton								Amber List	
Mallard	Anas platyrhynchos			01-Dec-78	SP518232		Middleton Park (Ecological Area)	Middleton Park Lake							Amber List	
Mallard	Anas platyrhynchos			23-May-83	SP525230		Middleton Park (Ecological Area)								Amber List	
Mallard	Anas platyrhynchos		proved breeding	20-Jul-83	SP519230		Middleton Park (Ecological Area)								Amber List	
Mallard*	Anas platyrhynchos	200		05-May-03	SP5728	Record	Stoke Lyne								Amber List	
Mallard	Anas platyrhynchos	present	Species	11/06/2003	SP602250		Stratton Audley Quarry								Amber List	
Mallard	Anas platyrhynchos	5; 1	Juvenile; Female	20/06/2003	SP602250		Stratton Audley Quarry								Amber List	
Mallard	Anas platyrhynchos	present	Species	05/08/2003	SP602250		Stratton Audley Quarry								Amber List	
Mallard	Anas platyrhynchos		proved breeding	02-Jun-04	SP602251		Stratton Audley Quarry	SW detatched part, Stratton Audley Quarry							Amber List	
Mallard	Anas platyrhynchos	Present	Species	31/07/2008	SP602250		Stratton Audley Quarry								Amber List	
Mallard	Anas platyrhynchos	Present	Species	17-Jul-04	SP547249		Trow Pool								Amber List	
Mallard	Anas platyrhynchos	2; 1	Juvenile; Female	17/06/2008	SP54662494		Trow Pool	southern pool and surrounding habitat							Amber List	
Mallard	Anas platyrhynchos	2; >1	Juvenile; Species	04/07/2008	SP54722499		Trow Pool								Amber List	
Mallard	Anas platyrhynchos	present	Species	04/08/2008	SP54722499		Trow Pool								Amber List	
Mallard	Anas platyrhynchos	present	Species	22/08/2008	SP54722499		Trow Pool								Amber List	
Mallard	Anas platyrhynchos	3	Species	13/06/2008-18/07/2008	SP54722499		Trow Pool								Amber List	
Pintail	Anas acuta	1	Species	2000	SP577209		Bicester Wetland Reserve								Amber List	
Pintail	Anas acuta	3	Species	2002	SP577209		Bicester Wetland Reserve								Amber List	
Pintail	Anas acuta	1	Species	2004	SP577209		Bicester Wetland Reserve								Amber List	
Garganey	Anas querquedula			23-May-83	SP525230		Middleton Park (Ecological Area)		Schedule 1 (W&C Act 1981)						Amber List	
Shoveler	Anas clypeata	7	Species	2000	SP577209		Bicester Wetland Reserve								Amber List	
Shoveler	Anas clypeata	10	Species	2001	SP577209		Bicester Wetland Reserve								Amber List	
Shoveler	Anas clypeata	24	Species	2002	SP577209		Bicester Wetland Reserve								Amber List	
Shoveler	Anas clypeata	16	Species	2003	SP577209		Bicester Wetland Reserve								Amber List	
Shoveler	Anas clypeata	27	Species	2004	SP577209		Bicester Wetland Reserve								Amber List	
Pochard	Aythya ferina	2	Species	2004	SP577209		Bicester Wetland Reserve								Amber List	
Tufted Duck	Aythya fuligula	6	Species	2000	SP577209		Bicester Wetland Reserve								Amber List	
Tufted Duck	Aythya fuligula	3	Species	2001	SP577209		Bicester Wetland Reserve								Amber List	
Tufted Duck	Aythya fuligula	4	Species	2003	SP577209		Bicester Wetland Reserve								Amber List	

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Tufted Duck	Aythya fuligula	14	Species	2004	SP577209		Bicester Wetland Reserve								Amber List	
Tufted Duck*	Aythya fuligula	1		15-Jun-04	SP5720	Record	Bicester: Bicester Golf Club								Amber List	
Tufted Duck	Aythya fuligula		proved breeding	20-Jul-83	SP519230		Middleton Park (Ecological Area)								Amber List	
Tufted Duck	Aythya fuligula			15-Sep-82	SP603251		Stratton Audley Quarry								Amber List	
Red Kite*	Milvus milvus	1		22-Feb-04	SP5720	1km Square Record	Bicester: Bicester Golf Club		Schedule 1 (W&C Act 1981)	Birds Dir (An 1)					Amber List	
Red Kite*	Milvus milvus	1		26-May-03	SP5527	1km Square Record	Stoke Lyne		Schedule 1 (W&C Act 1981)	Birds Dir (An 1)					Amber List	
Red Kite	Milvus milvus	1	Species	04/08/2008	SP54722499		Trow Pool		Schedule 1 (W&C Act 1981)	Birds Dir (An 1)					Amber List	
Kestrel	Falco tinnunculus	3	Juvenile	27-Jun-04	SP579263		Bainton								Amber List	
Kestrel*	Falco tinnunculus	1		15-Nov-03	SP5720	Record	Bicester								Amber List	
Kestrel	Falco tinnunculus	3	Juvenile	20-Jun-04	SP552269		Bucknell								Amber List	
Kestrel	Falco tinnunculus	2	Juvenile	29-May-05	SP552269		Bucknell								Amber List	
Kestrel	Falco tinnunculus	4	Juvenile	20-Jun-04	SP568272		Caversfield								Amber List	
Kestrel	Falco tinnunculus	4	Juvenile	20-Jun-04	SP587260		Caversfield								Amber List	
Kestrel	Falco tinnunculus	5	Juvenile	05-Jun-05	SP585287		Caversfield								Amber List	
Kestrel	Falco tinnunculus	5	Species	12-Jun-05	SP568272		Caversfield								Amber List	
Kestrel	Falco tinnunculus	5	Juvenile	26-Jun-05	SP578250		Caversfield								Amber List	
Kestrel	Falco tinnunculus	4	Juvenile	06-Jun-04	SP547208		Chesterton								Amber List	
Kestrel	Falco tinnunculus	5	Juvenile	06-Jun-04	SP551266		Chesterton								Amber List	
Kestrel	Falco tinnunculus	4	Juvenile	29-May-05	SP537213		Chesterton								Amber List	
Kestrel	Falco tinnunculus	4	Juvenile	29-May-05	SP547208		Chesterton								Amber List	
Kestrel	Falco tinnunculus	4	Juvenile	19-Jun-05	SP551266		Chesterton								Amber List	
Kestrel	Falco tinnunculus	2	Species	19/08/2002	SP59702225		Gavray Drive Meadows	field 9 (renamed field 11)							Amber List	
Kestrel	Falco tinnunculus	4	Juvenile	19-Jun-05	SP585286		Hethe Brede								Amber List	
Kestrel	Falco tinnunculus			-1986	SP561267		Manor Farm Scrub								Amber List	
Kestrel	Falco tinnunculus		proved breeding	20-Jul-83	SP519230		Middleton Park (Ecological Area)								Amber List	
Kestrel	Falco tinnunculus	4	Juvenile	20-Jun-04	SP547226		Middleton Stoney								Amber List	
Kestrel	Falco tinnunculus	4	Juvenile	04-Jul-04	SP535226		Middleton Stoney								Amber List	
Kestrel	Falco tinnunculus	6	Juvenile	29-May-05	SP547226		Middleton Stoney								Amber List	
Kestrel	Falco tinnunculus	4	Juvenile	19-Jun-05	SP535226		Middleton Stoney								Amber List	
Kestrel	Falco tinnunculus			15-Sep-82	SP603251		Stratton Audley Quarry								Amber List	
Kestrel	Falco tinnunculus			23-Sep-87	SP603251		Stratton Audley Quarry								Amber List	
Kestrel	Falco tinnunculus	1	Species	11/06/2003	SP602250		Stratton Audley Quarry								Amber List	
Kestrel	Falco tinnunculus	1	Species	20/06/2003	SP602250		Stratton Audley Quarry								Amber List	
Kestrel	Falco tinnunculus	1	Species	31/07/2008	SP601250		Stratton Audley Quarry	Northern section							Amber List	
Kestrel	Falco tinnunculus	1	Species	31/07/2008	SP602250		Stratton Audley Quarry								Amber List	
Kestrel	Falco tinnunculus	1	Species	04/08/2008	SP54722499		Trow Pool								Amber List	
Merlin*	Falco columbarius	1		09-Mar-00	SP5720	Record	Bicester		Schedule 1 (W&C Act 1981)						Amber List	
Merlin*	Falco columbarius	1		20-Apr-03	SP5720	Record	Bicester		Schedule 1 (W&C Act 1981)						Amber List	
Merlin	Falco columbarius	1	Species	2003	SP577209		Bicester Wetland Reserve		Schedule 1 (W&C Act 1981)						Amber List	
Merlin*	Falco columbarius	1		08-Dec-00	SP5527	Record	Stoke Lyne		Schedule 1 (W&C Act 1981)						Amber List	
Hobby	Falco subbuteo	1	Species	2001	SP577209		Bicester Wetland Reserve		Schedule 1 (W&C Act 1981)							
Hobby*	Falco subbuteo	1		30-May-04	SP5620	Record	Confidential		Schedule 1 (W&C Act 1981)							
Hobby	Falco subbuteo			23-May-83	SP525230		Middleton Park (Ecological Area)		Schedule 1 (W&C Act 1981)							
Peregrine	Falco peregrinus	4	Species	2003	SP577209		Bicester Wetland Reserve		Schedule 1 (W&C Act 1981)	Birds Dir (An 1)						
Grey Partridge	Perdix perdix		proved breeding	04-Jul-83	SP554255		Ardley Quarry and Cuttings SSSI	Fritwell Railway Cuttings					Priority Sp.		Red List	
Grey Partridge*	Perdix perdix	1		05-May-03	SP5828	Record	Hethe						Priority Sp.		Red List	
Grey Partridge*	Perdix perdix	1		26-May-03	SP5929	Record	Hethe						Priority Sp.		Red List	
Grey Partridge*	Perdix perdix	1		26-May-03	SP5929	Record	Hethe						Priority Sp.		Red List	
Grey Partridge	Perdix perdix	2	Species	11/06/2003	SP602250		Stratton Audley Quarry						Priority Sp.		Red List	
Grey Partridge	Perdix perdix	Present	Species	31/07/2008	SP602250		Stratton Audley Quarry						Priority Sp.		Red List	

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Little Ringed Plover	Charadrius dubius	1	Species	2003	SP577209		Bicester Wetland Reserve		Schedule 1 (W&C Act 1981)							
Little Ringed Plover	Charadrius dubius	3	Species	2004	SP577209		Bicester Wetland Reserve		Schedule 1 (W&C Act 1981)							
Little Ringed Plover	Charadrius dubius	3		15-May-96	SP602251		Stratton Audley Quarry		Schedule 1 (W&C Act 1981)							
Little Ringed Plover	Charadrius dubius	2	Species	11/06/2003	SP602250		Stratton Audley Quarry		Schedule 1 (W&C Act 1981)							
Little Ringed Plover	Charadrius dubius	1	Species	31/07/2008	SP602250		Stratton Audley Quarry		Schedule 1 (W&C Act 1981)							
Golden Plover	Pluvialis apricaria	1	Species	2001	SP577209		Bicester Wetland Reserve								Amber List	
Golden Plover	Pluvialis apricaria	1	Species	2002	SP577209		Bicester Wetland Reserve								Amber List	
Golden Plover	Pluvialis apricaria	3	Species	2004	SP577209		Bicester Wetland Reserve								Amber List	
Golden Plover*	Pluvialis apricaria	63		10-Oct-03	SP600268		Stratton Audley								Amber List	
Lapwing*	Vanellus vanellus	300		23-Feb-01	SP578217		Bicester						Priority Sp.		Red List	
Lapwing	Vanellus vanellus	1	Species	2000	SP577209		Bicester Wetland Reserve						Priority Sp.		Red List	
Lapwing	Vanellus vanellus	6	Species	2001	SP577209		Bicester Wetland Reserve						Priority Sp.		Red List	
Lapwing	Vanellus vanellus	1	Species	2002	SP577209		Bicester Wetland Reserve						Priority Sp.		Red List	
Lapwing	Vanellus vanellus	2	Species	2003	SP577209		Bicester Wetland Reserve						Priority Sp.		Red List	
Lapwing	Vanellus vanellus	8	Species	2004	SP577209		Bicester Wetland Reserve						Priority Sp.		Red List	
Lapwing*	Vanellus vanellus	4		05-May-03	SP5828	Record	Hethe						Priority Sp.		Red List	
Lapwing*	Vanellus vanellus	2		14-May-04	SP5929	Record	Hethe						Priority Sp.		Red List	
Lapwing*	Vanellus vanellus	6		05-May-03	SP5728	Record	Stoke Lyne						Priority Sp.		Red List	
Lapwing*	Vanellus vanellus	6		26-May-03	SP5527	Record	Stoke Lyne						Priority Sp.		Red List	
Lapwing	Vanellus vanellus	2	Species	04/08/2008	SP54722499		Trow Pool						Priority Sp.		Red List	
Lapwing	Vanellus vanellus	Present	Species	09/07/2007	SP598253								Priority Sp.		Red List	
Jack Snipe	Lymnocryptes minimus	1	Species	2000	SP577209		Bicester Wetland Reserve								Amber List	
Jack Snipe	Lymnocryptes minimus	2	Species	2002	SP577209		Bicester Wetland Reserve								Amber List	
Jack Snipe	Lymnocryptes minimus	3	Species	2003	SP577209		Bicester Wetland Reserve								Amber List	
Jack Snipe	Lymnocryptes minimus	5	Species	2004	SP577209		Bicester Wetland Reserve								Amber List	
Snipe	Gallinago gallinago	1		12-Nov-99	SP548262		Ardley Fields Quarry	Ardley Fields Quarry North Quarry							Amber List	
Snipe	Gallinago gallinago	40	Species	2000	SP577209		Bicester Wetland Reserve								Amber List	
Snipe	Gallinago gallinago	21	Species	2001	SP577209		Bicester Wetland Reserve								Amber List	
Snipe	Gallinago gallinago	26	Species	2002	SP577209		Bicester Wetland Reserve								Amber List	
Snipe	Gallinago gallinago	1	Species	2003	SP577209		Bicester Wetland Reserve								Amber List	
Snipe	Gallinago gallinago	44	Species	2004	SP577209		Bicester Wetland Reserve								Amber List	
Snipe	Gallinago gallinago			23-May-83	SP525230		Middleton Park (Ecological Area)								Amber List	
Snipe	Gallinago gallinago			15-Sep-82	SP603251		Stratton Audley Quarry								Amber List	
Snipe	Gallinago gallinago	1	Species	31/07/2008	SP601250		Stratton Audley Quarry	Northern section							Amber List	
Woodcock	Scolopax rusticola			23-May-83	SP525230		Middleton Park (Ecological Area)								Amber List	
Woodcock*	Scolopax rusticola	1		18-Mar-99	SP522253		Middleton Stoney: The Heath								Amber List	
Black-Tailed Godwit	Limosa limosa	1	Species	2004	SP577209		Bicester Wetland Reserve		Schedule 1 (W&C Act 1981)						Red List	
Black-tailed Godwit	Limosa limosa			23-May-83	SP525230		Middleton Park (Ecological Area)		Schedule 1 (W&C Act 1981)						Red List	
Curlew	Numenius arquata	1	Species	2004	SP577209		Bicester Wetland Reserve						Priority Sp.		Amber List	
Curlew*	Numenius arquata	1		16-May-04	SP5720	Record	Bicester: Bicester Golf Club						Priority Sp.		Amber List	
Redshank	Tringa totanus	1	Species	2000	SP577209		Bicester Wetland Reserve								Amber List	
Redshank	Tringa totanus	1	Species	2004	SP577209		Bicester Wetland Reserve								Amber List	
Greenshank	Tringa nebularia	1	Species	2000	SP577209		Bicester Wetland Reserve		Schedule 1 (W&C Act 1981)							
Greenshank*	Tringa nebularia	2		02-Oct-98	SP5721	Record	Bicester: Bicester Sewage Farm		Schedule 1 (W&C Act 1981)							
Green Sandpiper	Tringa ochropus	13	Species	2000	SP577209		Bicester Wetland Reserve		Schedule 1 (W&C Act 1981)						Amber List	
Green Sandpiper	Tringa ochropus	6	Species	2001	SP577209		Bicester Wetland Reserve		Schedule 1 (W&C Act 1981)						Amber List	
Green Sandpiper	Tringa ochropus	5	Species	2002	SP577209		Bicester Wetland Reserve		Schedule 1 (W&C Act 1981)						Amber List	
Green Sandpiper	Tringa ochropus	13	Species	2003	SP577209		Bicester Wetland Reserve		Schedule 1 (W&C Act 1981)						Amber List	
Green Sandpiper	Tringa ochropus	39	Species	2004	SP577209		Bicester Wetland Reserve		Schedule 1 (W&C Act 1981)						Amber List	
Green Sandpiper*	Tringa ochropus	1		15-Feb-04	SP5720	Record	Bicester: Bicester Golf Club		Schedule 1 (W&C Act 1981)						Amber List	
Common Sandpiper	Actitis hypoleucos	1	Species	2000	SP577209		Bicester Wetland Reserve								Amber List	

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Common Sandpiper	Actitis hypoleucos	2	Species	2001	SP577209		Bicester Wetland Reserve								Amber List	
Common Sandpiper	Actitis hypoleucos	3	Species	2002	SP577209		Bicester Wetland Reserve								Amber List	
Common Sandpiper	Actitis hypoleucos	2	Species	2003	SP577209		Bicester Wetland Reserve								Amber List	
Common Sandpiper	Actitis hypoleucos	5	Species	2004	SP577209		Bicester Wetland Reserve								Amber List	
Common Sandpiper	Actitis hypoleucos	1	Species	31/07/2008	SP602250		Stratton Audley Quarry								Amber List	
Black-Headed Gull	Larus ridibundus	Present	Species	17-Jul-04	SP547249		Trow Pool								Amber List	
Lesser Black-Backed Gull	Larus fuscus	present	Species	05/08/2003	SP602250		Stratton Audley Quarry								Amber List	
Lesser Black-Backed Gull	Larus fuscus	Present	Species	17-Jul-04	SP547249		Trow Pool								Amber List	
Lesser Black-Backed Gull	Larus fuscus	present	Species	22/08/2008	SP54722499		Trow Pool								Amber List	
Herring Gull	Larus argentatus			23-May-83	SP525230		Middleton Park (Ecological Area)								Red List	
Common Tern	Sterna hirundo	1	Species	2000	SP577209		Bicester Wetland Reserve								Amber List	
Common Tern*	Sterna hirundo	1		10-Jul-04	SP5720	Record	Bicester: Bicester Golf Club								Amber List	
Common Tern	Sterna hirundo	Present	Breeding	09/07/2007	SP598253										Amber List	
Black Tern	Chlidonias niger	3		15-May-96	SP602251		Stratton Audley Quarry								Amber List	
Stock Dove*	Columba oenas	6		26-May-03	SP5929	Record	Hethe								Amber List	
Stock Dove	Columba oenas	8	Species	11/06/2003	SP602250		Stratton Audley Quarry								Amber List	
Stock Dove	Columba oenas	1	Species	20/06/2003	SP602250		Stratton Audley Quarry								Amber List	
Stock Dove	Columba oenas	Present	Species	31/07/2008	SP602250		Stratton Audley Quarry								Amber List	
Stock Dove	Columba oenas	Present	Species	17-Jul-04	SP547249		Trow Pool								Amber List	
Turtle Dove*	Streptopelia turtur			01-Jun-98	SP5925	Record	Bicester: Bicester Quarry						Priority Sp.		Red List	
Turtle Dove*	Streptopelia turtur	1		15-Mar-00	SP5525	Record	Bucknell						Priority Sp.		Red List	
Turtle Dove*	Streptopelia turtur			08-Jun-98	SP5424	Record	Bucknell: Trow Pool						Priority Sp.		Red List	
Turtle Dove	Streptopelia turtur			30-Jun-86	SP547250		Trow Pool						Priority Sp.		Red List	
Turtle Dove	Streptopelia turtur			19-Jul-90	SP547250		Trow Pool						Priority Sp.		Red List	
Cuckoo*	Cuculus canorus	1		30-May-03	SP5720	Record	Bicester						Priority Sp.		Red List	
Cuckoo*	Cuculus canorus	1		18-May-04	SP5720	Record	Bicester						Priority Sp.		Red List	
Cuckoo	Cuculus canorus	1	Species	2004	SP577209		Bicester Wetland Reserve						Priority Sp.		Red List	
Barn Owl	Tyto alba	1	Species	2003	SP577209		Bicester Wetland Reserve		Schedule 1 (W&C Act 1981)						Amber List	
Barn Owl	Tyto alba	3	Juvenile	20-Jun-04	SP568272		Caversfield		Schedule 1 (W&C Act 1981)						Amber List	
Barn Owl	Tyto alba	3	Juvenile	12-Jun-05	SP568272		Caversfield		Schedule 1 (W&C Act 1981)						Amber List	
Barn Owl	Tyto alba	3	Juvenile	29-May-05	SP537212		Chesterton		Schedule 1 (W&C Act 1981)						Amber List	
Barn Owl*	Tyto alba	1		13-Jun-98	SP5622	Record	Confidential		Schedule 1 (W&C Act 1981)						Amber List	
Barn Owl*	Tyto alba	1		22-Nov-99	SP5521	Record	Confidential		Schedule 1 (W&C Act 1981)						Amber List	
Barn Owl*	Tyto alba	1		08-Feb-00	SP5423	Record	Confidential		Schedule 1 (W&C Act 1981)						Amber List	
Barn Owl*	Tyto alba	1		26-May-03	SP5828	Record	Confidential		Schedule 1 (W&C Act 1981)						Amber List	
Barn Owl*	Tyto alba	1		24-Jan-04	SP5428	Record	Confidential		Schedule 1 (W&C Act 1981)						Amber List	
Barn Owl	Tyto alba	4	Juvenile	19-Jun-05	SP588283		Hethe Brede		Schedule 1 (W&C Act 1981)						Amber List	
Swift	Apus apus	1	Species	2001	SP577209		Bicester Wetland Reserve								Amber List	
Swift	Apus apus	3	Species	2004	SP577209		Bicester Wetland Reserve								Amber List	
Swift*	Apus apus	6		14-May-04	SP5929	Record	Hethe								Amber List	
Swift	Apus apus			23-May-83	SP525230		Middleton Park (Ecological Area)								Amber List	
Swift	Apus apus	present	Species	11/06/2003	SP602250		Stratton Audley Quarry								Amber List	
Swift	Apus apus	1	Species	20/06/2003	SP602250		Stratton Audley Quarry								Amber List	
Swift	Apus apus	Present	Species	17-Jul-04	SP547249		Trow Pool								Amber List	
Swift	Apus apus	1	Species	13/06/2008-18/07/2008	SP54722499		Trow Pool								Amber List	
Swift	Apus apus	Present	Nest	01/05/2008-31/08/2008	SP55782162			17 Bignell View, Chesterton							Amber List	
Swift	Apus apus	Present	Nest	01/05/2008-31/08/2008	SP58202231			7 Cemetery Road, Bicester							Amber List	
Swift	Apus apus	Present	Nest	01/05/2008-31/08/2008	SP565258			Farmhouse at east end of Bucknell							Amber List	

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Swift	Apus apus	Present	Nest	01/05/2008-31/08/2008	SP584223			Henley House, Causeway, Bicester							Amber List	
Swift	Apus apus	Present	Nest	01/05/2008-31/08/2008	SP580225			Kings End, Bicester							Amber List	
Kingfisher	Alcedo atthis			14/08/2003	SP60202345		Bicester Airfield	area 17 Stream	Schedule 1 (W&C Act 1981)	Birds Dir (An 1)					Amber List	
Kingfisher	Alcedo atthis			14-Aug-03	SP601235		Bicester airfield	area 17, Bicester airfield	Schedule 1 (W&C Act 1981)	Birds Dir (An 1)					Amber List	
Kingfisher	Alcedo atthis	5	Species	2000	SP577209		Bicester Wetland Reserve		Schedule 1 (W&C Act 1981)	Birds Dir (An 1)					Amber List	
Kingfisher	Alcedo atthis	5	Species	2001	SP577209		Bicester Wetland Reserve		Schedule 1 (W&C Act 1981)	Birds Dir (An 1)					Amber List	
Kingfisher	Alcedo atthis	4	Species	2002	SP577209		Bicester Wetland Reserve		Schedule 1 (W&C Act 1981)	Birds Dir (An 1)					Amber List	
Kingfisher	Alcedo atthis	6	Species	2003	SP577209		Bicester Wetland Reserve		Schedule 1 (W&C Act 1981)	Birds Dir (An 1)					Amber List	
Kingfisher	Alcedo atthis	10	Species	2004	SP577209		Bicester Wetland Reserve		Schedule 1 (W&C Act 1981)	Birds Dir (An 1)					Amber List	
Kingfisher	Alcedo atthis			03-Sep-81	SP60402215			Launton station pond, oxon tetrad 6022	Schedule 1 (W&C Act 1981)	Birds Dir (An 1)					Amber List	
Kingfisher	Alcedo atthis			-1986	SP571287		Stoke Lyne Marshy Grassland	Stoke Lyne Marshy Grassland	Schedule 1 (W&C Act 1981)	Birds Dir (An 1)					Amber List	
Kingfisher	Alcedo atthis	1	Species	31/07/2008	SP602250		Stratton Audley Quarry		Schedule 1 (W&C Act 1981)	Birds Dir (An 1)					Amber List	
Hoopoe*	Upupa epops	1		11-May-99	SP5327	Record	Ardley: Ardley Field Quarry		Schedule 1 (W&C Act 1981)							
Hoopoe*	Upupa epops	1		17-May-99	SP5327	Record	Ardley: Ardley Field Quarry		Schedule 1 (W&C Act 1981)							
Hoopoe	Upupa epops			20-Nov-80	SP588204		Graven Hill	Royal ordnance base, Graven Hill	Schedule 1 (W&C Act 1981)							
Hoopoe*	Upupa epops	1		04-May-99	SP5529	Record	Hethe		Schedule 1 (W&C Act 1981)							
Green Woodpecker	Picus viridis	6	Species	2000	SP577209		Bicester Wetland Reserve								Amber List	
Green Woodpecker	Picus viridis	8	Species	2001	SP577209		Bicester Wetland Reserve								Amber List	
Green Woodpecker	Picus viridis	15	Species	2002	SP577209		Bicester Wetland Reserve								Amber List	
Green Woodpecker	Picus viridis	18	Species	2003	SP577209		Bicester Wetland Reserve								Amber List	
Green Woodpecker	Picus viridis	10	Species	2004	SP577209		Bicester Wetland Reserve								Amber List	
Green Woodpecker	Picus viridis			16-Jan-03	SP5922		Gavray Drive complex	feld 6, Gavray Drive complex							Amber List	
Green Woodpecker	Picus viridis			28-Apr-87	SP588204		Graven Hill								Amber List	
Green Woodpecker	Picus viridis			-1981	SP567295		Stoke Bushes								Amber List	
Green Woodpecker	Picus viridis			20/08/2002	SP602251		Stratton Audley Quarry	South							Amber List	
Green Woodpecker	Picus viridis			20/08/2002	SP602251		Stratton Audley Quarry								Amber List	
Green Woodpecker	Picus viridis			20-Aug-02	SP602251		Stratton Audley Quarry	south, Stratton Audley Quarry							Amber List	
Green Woodpecker	Picus viridis			20-Aug-02	SP602251		Stratton Audley Quarry								Amber List	
Green Woodpecker	Picus viridis	1	Species	05/08/2003	SP602250		Stratton Audley Quarry								Amber List	
Green Woodpecker	Picus viridis			02-Jun-04	SP602251		Stratton Audley Quarry	SW detatched part, Stratton Audley Quarry							Amber List	
Green Woodpecker	Picus viridis			31/07/2008	SP601250		Stratton Audley Quarry	Northern section							Amber List	
Green Woodpecker	Picus viridis	Present; Present	Male; Female	31/07/2008	SP602250		Stratton Audley Quarry								Amber List	

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Green Woodpecker	Picus viridis			-1986	SP548282		Sycamore Grove, Ardley								Amber List	
Lesser Spotted Woodpecker	Dendrocopos minor			-1986	SP548282		Sycamore Grove, Ardley						Priority Sp.		Red List	
Skylark*	Alauda arvensis	3		05-May-03	SP5828	Record	Hethe						Priority Sp.		Red List	
Skylark	Alauda arvensis			20/08/2002	SP602251		Stratton Audley Quarry	north west, Stratton Audley Quarry					Priority Sp.		Red List	
Skylark	Alauda arvensis			20/08/2002	SP599252		Stratton Audley Quarry	Tetrad 5824					Priority Sp.		Red List	
Skylark	Alauda arvensis			20-Aug-02	SP599252		Stratton Audley Quarry	Tetrad 5824					Priority Sp.		Red List	
Skylark	Alauda arvensis			20-Aug-02	SP602251		Stratton Audley Quarry	north west, Stratton Audley Quarry					Priority Sp.		Red List	
Skylark	Alauda arvensis	2	Species	11/06/2003	SP602250		Stratton Audley Quarry						Priority Sp.		Red List	
Skylark	Alauda arvensis	4	Species	20/06/2003	SP602250		Stratton Audley Quarry						Priority Sp.		Red List	
Skylark	Alauda arvensis	5	Species	31/07/2008	SP601250		Stratton Audley Quarry	Northern section					Priority Sp.		Red List	
Skylark	Alauda arvensis	1	Species	13/06/2008-18/07/2008	SP54722499		Trow Pool						Priority Sp.		Red List	
Sand Martin	Riparia riparia	1	Species	2000	SP577209		Bicester Wetland Reserve								Amber List	
Sand Martin	Riparia riparia	1	Species	2001	SP577209		Bicester Wetland Reserve								Amber List	
Sand Martin	Riparia riparia	1	Species	2002	SP577209		Bicester Wetland Reserve								Amber List	
Sand Martin	Riparia riparia	2	Species	2003	SP577209		Bicester Wetland Reserve								Amber List	
Sand Martin	Riparia riparia	3	Species	2004	SP577209		Bicester Wetland Reserve								Amber List	
Sand Martin*	Riparia riparia	2		03-Jul-04	SP5720	Record	Bicester: Bicester Golf Club								Amber List	
Sand Martin	Riparia riparia	1	Species	20/06/2003	SP602250		Stratton Audley Quarry								Amber List	
Swallow*	Hirundo rustica	1		28-Mar-01	SP5720	Record	Bicester								Amber List	
Swallow*	Hirundo rustica	2	Adult	10-Jul-04	SP5720	Record	Bicester: Bicester Golf Club								Amber List	
Swallow*	Hirundo rustica	4	Juvenile	10-Jul-04	SP5720	Record	Bicester: Bicester Golf Club								Amber List	
Swallow	Hirundo rustica	present	Species	11/06/2003	SP602250		Stratton Audley Quarry								Amber List	
Swallow	Hirundo rustica	Present	Species	31/07/2008	SP602250		Stratton Audley Quarry								Amber List	
House Martin	Delichon urbica	1	Species	2003	SP577209		Bicester Wetland Reserve								Amber List	
House Martin	Delichon urbica	4	Species	2004	SP577209		Bicester Wetland Reserve								Amber List	
House Martin*	Delichon urbica	60		15-May-04	SP5720	Record	Bicester: Bicester Golf Club								Amber List	
House Martin	Delichon urbica		proved breeding	20-Jul-83	SP519241		Middleton Park (Ecological Area)								Amber List	
Yellow Wagtail	Motacilla flava		in bud	03-Jun-85	SP543264		Ardley Fields Quarry						Priority Sp.		Red List	
Yellow Wagtail	Motacilla flava	2	Species	2000	SP577209		Bicester Wetland Reserve						Priority Sp.		Red List	
Yellow Wagtail	Motacilla flava	2	Species	2001	SP577209		Bicester Wetland Reserve						Priority Sp.		Red List	
Yellow Wagtail	Motacilla flava	1	Species	2002	SP577209		Bicester Wetland Reserve						Priority Sp.		Red List	
Yellow Wagtail	Motacilla flava	3	Species	2003	SP577209		Bicester Wetland Reserve						Priority Sp.		Red List	
Yellow Wagtail	Motacilla flava	1	Species	2004	SP577209		Bicester Wetland Reserve						Priority Sp.		Red List	
Grey Wagtail	Motacilla cinerea	10	Species	2000	SP577209		Bicester Wetland Reserve								Amber List	
Grey Wagtail	Motacilla cinerea	17	Species	2001	SP577209		Bicester Wetland Reserve								Amber List	
Grey Wagtail	Motacilla cinerea	9	Species	2002	SP577209		Bicester Wetland Reserve								Amber List	
Grey Wagtail	Motacilla cinerea	18	Species	2003	SP577209		Bicester Wetland Reserve								Amber List	
Grey Wagtail	Motacilla cinerea	14	Species	2004	SP577209		Bicester Wetland Reserve								Amber List	
Grey Wagtail	Motacilla cinerea	1	Species	13/06/2008-18/07/2008	SP54722499		Trow Pool								Amber List	
Dunnock	Prunella modularis			26/06/2002	SP598222		Gavray Drive Meadows	Gavray Drive western fields					Priority Sp.		Amber List	
Dunnock	Prunella modularis	present	Species	11/06/2003	SP602250		Stratton Audley Quarry						Priority Sp.		Amber List	
Dunnock	Prunella modularis	present	Species	20/06/2003	SP602250		Stratton Audley Quarry						Priority Sp.		Amber List	
Dunnock	Prunella modularis	Present	Species	31/07/2008	SP602250		Stratton Audley Quarry						Priority Sp.		Amber List	
Dunnock	Prunella modularis	1	Species	04/08/2008	SP54722499		Trow Pool						Priority Sp.		Amber List	
Dunnock	Prunella modularis	3	Species	13/06/2008-18/07/2008	SP54722499		Trow Pool						Priority Sp.		Amber List	
Wheatear*	Oenanthe oenanthe	1		26-May-03	SP5929	Record	Hethe								Amber List	
Fieldfare*	Turdus pilaris	c.50		04-Apr-99	SP558221		Chesterton: Bignell House		Schedule 1 (W&C Act 1981)						Red List	
Fieldfare*	Turdus pilaris	50		07-Mar-04	SP5929	Record	Hethe		Schedule 1 (W&C Act 1981)						Red List	
Song Thrush	Turdus philomelos			26/06/2002	SP598222		Gavray Drive Meadows	Gavray Drive western fields					Priority Sp.		Red List	
Song Thrush	Turdus philomelos	3	Species	13/06/2008-18/07/2008	SP54722499		Trow Pool						Priority Sp.		Red List	
Redwing*	Turdus iliacus	50		07-Mar-04	SP5929	Record	Hethe		Schedule 1 (W&C Act 1981)						Red List	
Mistle Thrush	Turdus viscivorus			-1987	SP561218		Gagle Brook Flood Plain, Chesterton								Amber List	

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Grasshopper Warbler	Locustella naevia			28-Apr-87	SP588204		Graven Hill						Priority Sp.		Red List	
Whitethroat	Sylvia communis	1	Species	2000	SP577209		Bicester Wetland Reserve								Amber List	
Whitethroat	Sylvia communis	1	Species	2001	SP577209		Bicester Wetland Reserve								Amber List	
Whitethroat	Sylvia communis	1	Species	2002	SP577209		Bicester Wetland Reserve								Amber List	
Whitethroat	Sylvia communis			26/06/2002	SP598222		Gavray Drive Meadows	Gavray Drive western fields							Amber List	
Whitethroat	Sylvia communis	3	Species	11/06/2003	SP602250		Stratton Audley Quarry								Amber List	
Whitethroat	Sylvia communis	present	Species	20/06/2003	SP602250		Stratton Audley Quarry								Amber List	
Willow Warbler	Phylloscopus trochilus	2	Species	2002	SP577209		Bicester Wetland Reserve								Amber List	
Willow Warbler	Phylloscopus trochilus	1	Species	2003	SP577209		Bicester Wetland Reserve								Amber List	
Willow Warbler	Phylloscopus trochilus			28-Apr-87	SP588204		Graven Hill								Amber List	
Willow Warbler	Phylloscopus trochilus	20	Species	11/06/2003	SP602250		Stratton Audley Quarry								Amber List	
Willow Warbler	Phylloscopus trochilus	present	Species	20/06/2003	SP602250		Stratton Audley Quarry								Amber List	
Willow Warbler	Phylloscopus trochilus	1	Species	05/08/2003	SP602250		Stratton Audley Quarry								Amber List	
Willow Warbler	Phylloscopus trochilus	present	Singing/Calling	17/06/2008	SP54662494		Trow Pool	southern pool and surrounding habitat							Amber List	
Firecrest*	Regulus ignicapillus	1		23-Jan-98	SP5720	Record	Confidential		Schedule 1 (W&C Act 1981)						Amber List	
Spotted Flycatcher*	Muscicapa striata	2		26-May-03	SP5929	1km Square Record	Hethe						Priority Sp.		Red List	
Marsh Tit	Parus palustris	1	Species	2003	SP577209		Bicester Wetland Reserve						Priority Sp.		Red List	
Marsh Tit	Parus palustris			-1981	SP567295		Stoke Bushes						Priority Sp.		Red List	
Marsh Tit	Parus palustris	present	Species	05/08/2003	SP602250		Stratton Audley Quarry						Priority Sp.		Red List	
Willow Tit	Parus montanus	2	Species	2001	SP577209		Bicester Wetland Reserve						Priority Sp.		Red List	
Willow Tit	Parus montanus	1	Species	2002	SP577209		Bicester Wetland Reserve						Priority Sp.		Red List	
Willow Tit	Parus montanus	1	Species	2003	SP577209		Bicester Wetland Reserve						Priority Sp.		Red List	
Starling*	Sturnus vulgaris	500		13-Sep-04	SP5720	Record	Bicester						Priority Sp.		Red List	
Starling	Sturnus vulgaris	50	Species	27-Sep-06	SP59902537		Stratton Audley Quarry (NW corner)						Priority Sp.		Red List	
House Sparrow*	Passer domesticus	30		13-Sep-04	SP5720	Record	Bicester						Priority Sp.		Red List	
Tree Sparrow*	Passer montanus	4		05-May-03	SP5828	Record	Hethe						Priority Sp.		Red List	
Tree Sparrow*	Passer montanus	3		26-May-03	SP5828	Record	Hethe						Priority Sp.		Red List	
Tree Sparrow*	Passer montanus	1		26-May-03	SP5929	Record	Hethe						Priority Sp.		Red List	
Tree Sparrow*	Passer montanus	1		26-May-03	SP5929	Record	Hethe						Priority Sp.		Red List	
Tree Sparrow*	Passer montanus	3		07-Mar-04	SP5929	Record	Hethe						Priority Sp.		Red List	
Brambling*	Fringilla montifringilla	3		07-Mar-04	SP5929	Record	Hethe		Schedule 1 (W&C Act 1981)							
Linnet	Carduelis cannabina	1	Species	2002	SP577209		Bicester Wetland Reserve						Priority Sp.		Red List	
Linnet	Carduelis cannabina			-1987	SP562220		Bignell Lodge Farm Meadow						Priority Sp.		Red List	
Linnet	Carduelis cannabina			-1987	SP561218		Gagle Brook Flood Plain, Chesterton						Priority Sp.		Red List	
Linnet*	Carduelis cannabina	4		05-May-03	SP5828	Record	Hethe						Priority Sp.		Red List	
Linnet*	Carduelis cannabina	6		14-May-04	SP5929	Record	Hethe						Priority Sp.		Red List	
Linnet	Carduelis cannabina			23-May-83	SP525230		Middleton Park (Ecological Area)						Priority Sp.		Red List	
Linnet*	Carduelis cannabina	2		05-May-03	SP5728	Record	Stoke Lyne						Priority Sp.		Red List	
Linnet	Carduelis cannabina	present	Species	11/06/2003	SP602250		Stratton Audley Quarry						Priority Sp.		Red List	
Linnet	Carduelis cannabina	present	Species	20/06/2003	SP602250		Stratton Audley Quarry						Priority Sp.		Red List	
Linnet	Carduelis cannabina	present	Species	05/08/2003	SP602250		Stratton Audley Quarry						Priority Sp.		Red List	
Linnet	Carduelis cannabina	present	Species	31/07/2008	SP605246		Stratton Audley Quarry	Southern section					Priority Sp.		Red List	
Linnet	Carduelis cannabina	Present	Species	31/07/2008	SP602250		Stratton Audley Quarry						Priority Sp.		Red List	
Twite	Carduelis flavirostris	1	Species	2000	SP577209		Bicester Wetland Reserve						Priority Sp.		Red List	
Bullfinch	Pyrrhula pyrrhula	1	Species	11/06/2003	SP602250		Stratton Audley Quarry						Priority Sp.		Amber List	
Bullfinch	Pyrrhula pyrrhula			02-Jun-04	SP602251		Stratton Audley Quarry						Priority Sp.		Amber List	
Bullfinch	Pyrrhula pyrrhula	present	Species	31/07/2008	SP605246		Stratton Audley Quarry	Southern section: fishing lake and surrounds					Priority Sp.		Amber List	
Bullfinch	Pyrrhula pyrrhula	Present	Species	31/07/2008	SP602250		Stratton Audley Quarry						Priority Sp.		Amber List	
Bullfinch	Pyrrhula pyrrhula	2	Species	13/06/2008-18/07/2008	SP54722499		Trow Pool						Priority Sp.		Amber List	
Yellowhammer	Emberiza citrinella			23-May-83	SP525230		Middleton Park (Ecological Area)						Priority Sp.		Red List	
Yellowhammer	Emberiza citrinella			02-Jun-04	SP527280			Fritwell minor road					Priority Sp.		Red List	
Yellowhammer	Emberiza citrinella			28-Jul-87	SP572210		Roman Road by Hayfield						Priority Sp.		Red List	
Yellowhammer	Emberiza citrinella			-1981	SP567295		Stoke Bushes						Priority Sp.		Red List	
Yellowhammer*	Emberiza citrinella	10		05-May-03	SP5728	Record	Stoke Lyne						Priority Sp.		Red List	

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Yellowhammer*	Emberiza citrinella	3		26-May-03	SP5527	Record	Stoke Lyne						Priority Sp.		Red List	
Yellowhammer	Emberiza citrinella			-1986	SP571287		Stoke Lyne Marshy Grassland	Stoke Lyne Marshy Grassland					Priority Sp.		Red List	
Yellowhammer	Emberiza citrinella	8	Species	11/06/2003	SP602250		Stratton Audley Quarry						Priority Sp.		Red List	
Yellowhammer	Emberiza citrinella	Present	Species	17-Jul-04	SP547249		Trow Pool						Priority Sp.		Red List	
Yellowhammer	Emberiza citrinella	present	Singing/Calling	17/06/2008	SP54662494		Trow Pool	southern pool and surrounding habitat					Priority Sp.		Red List	
Yellowhammer	Emberiza citrinella	1	Species	04/07/2008	SP54722499		Trow Pool						Priority Sp.		Red List	
Yellowhammer	Emberiza citrinella	2	Species	13/06/2008-18/07/2008	SP54722499		Trow Pool						Priority Sp.		Red List	
Yellowhammer	Emberiza citrinella	Present	Species	09/07/2007	SP537275								Priority Sp.		Red List	
Reed Bunting	Emberiza schoeniclus	13	Species	2000	SP577209		Bicester Wetland Reserve						Priority Sp.		Amber List	
Reed Bunting	Emberiza schoeniclus	10	Species	2001	SP577209		Bicester Wetland Reserve						Priority Sp.		Amber List	
Reed Bunting	Emberiza schoeniclus	13	Species	2002	SP577209		Bicester Wetland Reserve						Priority Sp.		Amber List	
Reed Bunting	Emberiza schoeniclus	14	Species	2003	SP577209		Bicester Wetland Reserve						Priority Sp.		Amber List	
Reed Bunting	Emberiza schoeniclus	10	Species	2004	SP577209		Bicester Wetland Reserve						Priority Sp.		Amber List	
Reed Bunting*	Emberiza schoeniclus	1		03-Jan-04	SP5720	Record	Bicester: Bicester Golf Club						Priority Sp.		Amber List	
Reed Bunting*	Emberiza schoeniclus	2		07-Mar-04	SP5929	Record	Hethe						Priority Sp.		Amber List	
Reed Bunting*	Emberiza schoeniclus	4		14-May-04	SP5929	Record	Hethe						Priority Sp.		Amber List	
Reed Bunting*	Emberiza schoeniclus	2		26-May-03	SP5527	Record	Stoke Lyne						Priority Sp.		Amber List	
Reed Bunting	Emberiza schoeniclus	8	Species	11/06/2003	SP602250		Stratton Audley Quarry						Priority Sp.		Amber List	
Reed Bunting	Emberiza schoeniclus			02-Jun-04	SP602251		Stratton Audley Quarry	SW detatched part, Stratton Audley Quarry					Priority Sp.		Amber List	
Reed Bunting	Emberiza schoeniclus	Present	Species	31/07/2008	SP602250		Stratton Audley Quarry						Priority Sp.		Amber List	
Corn Bunting*	Miliaria calandra	1		05-May-03	SP5929	Record	Hethe						Priority Sp.		Red List	
Corn Bunting*	Miliaria calandra	1	Male	05-May-03	SP5929	Record	Hethe						Priority Sp.		Red List	
Corn Bunting*	Miliaria calandra	4		26-May-03	SP5929	Record	Hethe						Priority Sp.		Red List	
Corn Bunting*	Miliaria calandra	4		26-May-03	SP5929	Record	Hethe						Priority Sp.		Red List	
Corn Bunting*	Miliaria calandra	1		14-May-04	SP5929	Record	Hethe						Priority Sp.		Red List	
Corn Bunting	Miliaria calandra			02-Jun-04	SP527280			Fritwell minor road					Priority Sp.		Red List	
Hedgehog	Erinaceus europaeus			03-Jun-85	SP543264		Ardley Fields Quarry						Priority Sp.			
Hedgehog	Erinaceus europaeus	1		14-May-06	SP592226			100m SW of bridge over Bicester Ring Rd, between Gavray Drive & Railway					Priority Sp.			
Chiroptera	Chiroptera	Present	Flying	19/06/2008	SP54662494		Trow Pool	Southern pool	Schedule 5 - all parts (W&C Act 1981)	H & S Dir						
Natterer's Bat	Myotis nattereri			09-Oct-93	SP595259			Bicester, oxon tetrad 5824	Schedule 5 - all parts (W&C Act 1981)	H & S Dir (An 4,5)						
Pipistrelle	Pipistrellus pipistrellus			08-Aug-95	SP560216			Chesterton	Schedule 5 - all parts (W&C Act 1981)	H & S Dir (An 4,5)						
Pipistrelle	Pipistrellus pipistrellus			13-Jan-93	SP604228			Launton, Oxon tetrad 6022	Schedule 5 - all parts (W&C Act 1981)	H & S Dir (An 4,5)						
Pipistrelle	Pipistrellus pipistrellus			29-Dec-99	SP609258				Schedule 5 - all parts (W&C Act 1981)	H & S Dir (An 4,5)						
Pipistrelle	Pipistrellus pipistrellus			25-Jul-96	SP607261			Stratton Audley, Oxon tetrad 6026	Schedule 5 - all parts (W&C Act 1981)	H & S Dir (An 4,5)						
Brown Long-eared Bat	Plecotus auritus			05-Aug-87	SP561257		Bucknell Churchyard		Schedule 5 - all parts (W&C Act 1981)	H & S Dir (An 4,5)			Priority Sp.			
Brown Long-eared Bat	Plecotus auritus			05-Aug-87	SP561257		Bucknell Churchyard		Schedule 5 - all parts (W&C Act 1981)	H & S Dir (An 4,5)			Priority Sp.			
Brown Long-eared Bat	Plecotus auritus			05-Jun-96	SP535233			Middleton Stoney	Schedule 5 - all parts (W&C Act 1981)	H & S Dir (An 4,5)			Priority Sp.			
Brown Hare	Lepus capensis			04-Jul-83	SP554255		Ardley Quarry and Cuttings SSSI	Fritwell Railway Cuttings					Priority Sp.			
Brown Hare	Lepus capensis			-1986	SP554262		Digging Copse & the Plantation						Priority Sp.			
Brown Hare	Lepus capensis			14-Jun-01	SP599278		Fringford Pingo						Priority Sp.			
Brown Hare	Lepus capensis			23-May-83	SP525230		Middleton Park (Ecological Area)						Priority Sp.			
Brown Hare	Lepus capensis			20-Jul-83	SP519230		Middleton Park (Ecological Area)						Priority Sp.			
Brown Hare	Lepus capensis			13-Mar-00	SP544221								Priority Sp.			
Brown Hare	Lepus europaeus	present	Species	11/06/2003	SP602250		Stratton Audley Quarry						Priority Sp.			
Brown Hare	Lepus capensis	2	adult	02-Jun-04	SP602251		Stratton Audley Quarry						Priority Sp.			

Common Name	Scientific Name	Abundance	Sex/ Stage	Date	Grid Ref	Grid Ref Qualifier	Master Site	Sub-Site/Locality	UK Legislation	European Legislation	Global Red List Species	UK Red List Species	UKBAP and NERC Act 2006 Species	Notable Inverts.	2009 BOCC Status	Nat. Rare/ Scarce Plants
Water Vole	Arvicola terrestris			Aug-78	SP538273		Ardley Quarry and Cuttings SSSI	Ardley Quarry and Cutting BBOWT Reserve	Schedule 5, parts 4(a) and (b) (W&C Act 1981)				Priority Sp.			
Water Vole	Arvicola terrestris			01 Jun 2003 - 30 Jun 2003	SP580230		Bicester		Schedule 5, parts 4(a) and (b) (W&C Act 1981)				Priority Sp.			
Water Vole	Arvicola terrestris			23-May-83	SP525230		Middleton Park (Ecological Area)		Schedule 5, parts 4(a) and (b) (W&C Act 1981)				Priority Sp.			
Water Vole	Arvicola terrestris			08-Apr-99	SP580236		Ray Catchment		Schedule 5, parts 4(a) and (b) (W&C Act 1981)				Priority Sp.			
Water Vole	Arvicola terrestris			29-Sep-99	SP579236		Ray Catchment		Schedule 5, parts 4(a) and (b) (W&C Act 1981)				Priority Sp.			
Water Vole	Arvicola terrestris			01 Feb 2000 - 29 Feb 2000	SP595226		Ray Catchment		Schedule 5, parts 4(a) and (b) (W&C Act 1981)				Priority Sp.			
Water Vole	Arvicola terrestris			01 Jun 1995 - 30 Jun 1995	SP576239		Ray Catchment		Schedule 5, parts 4(a) and (b) (W&C Act 1981)				Priority Sp.			
Water Vole	Arvicola terrestris			01 Sep 2003 - 30 Sep 2003	SP581228		River Bure, Bicester		Schedule 5, parts 4(a) and (b) (W&C Act 1981)				Priority Sp.			
Polecat	Mustela putorius		dead on road	May-00	SP533228			A43T					Priority Sp.			
Polecat	Mustela putorius		dead on road	14-Apr-03	SP543275			Ardley					Priority Sp.			
Polecat	Mustela putorius		dead on road	27-Aug-01	SP604273			A421, Oxon tetrad 6026					Priority Sp.			
Badger	Meles meles		Sett	Apr-85	SP538273		Ardley Quarry and Cuttings SSSI	Quarry	Badger Act 1992							
Badger	Meles meles			May-85	SP538273		Ardley Quarry and Cuttings SSSI	Ardley Quarry and Cutting BBOWT Reserve	Badger Act 1992							
Badger	Meles meles			May-85	SP538273		Ardley Quarry and Cuttings SSSI	Quarry	Badger Act 1992							
Badger	Meles meles	Present		24-May-05	SP564274		B4100, by Stoke Little Wood		Badger Act 1992							
Badger	Meles meles	Present		04-Jul-05	SP564274		B4100, by Stoke Little Wood		Badger Act 1992							
Badger	Meles meles	Present		02-Mar-05	SP564273		B4100, Nr. Swift's House Fm		Badger Act 1992							
Badger	Meles meles		dead on road	06-Mar-01	SP537249			north of Middleton Stoney	Badger Act 1992							
Badger	Meles meles		Badger Sett	01-Jan-83	SP520260			Ardley Old Quarry	Badger Act 1992							
Badger	Meles meles		dead on road	14-Apr-04	SP558198			A34	Badger Act 1992							
Badger	Meles meles		dead on road	06-Feb-97	SP549232				Badger Act 1992							
Badger	Meles meles		dead on road	31-Mar-04	SP575215			A41	Badger Act 1992							
Badger	Meles meles		dead on road	09-Nov-06	SP598259			A421, oxon tetrad 5824	Badger Act 1992							
Badger	Meles meles		Badger Sett	02-Oct-94	SP605275			near Waterloo Farm, Oxon tetrad 6026	Badger Act 1992							
Badger	Meles meles		dead on road	23-Jun-01	SP605273			A421, oxon tetrad 6026	Badger Act 1992							
Badger	Meles meles		dead on road	05-Sep-02	SP606273				Badger Act 1992							
Badger	Meles meles		dead on road	05-Sep-02	SP607274				Badger Act 1992							
Badger	Meles meles	Present		13-Aug-05	SP594241		Skimmingdish Lane, Bicester		Badger Act 1992							
Badger	Meles meles	Present	Signs	31/07/2008	SP602250		Stratton Audley Quarry		Badger Act 1992							
Otter	Lutra lutra	1	spraints	19/06/2008	SP5463924900		Trow Pool	Southern pool	Schedule 5 - all parts (W&C Act 1981)	H & S Dir (An 2)			Priority Sp.			
Lasioglossum (Dialictus) leucopus	Lasioglossum leucopus			16/05/2003	SP602251		Stratton Audley Quarry					Pre94:NR				
Lasioglossum (Evylaeus) malachurum	Lasioglossum (Evylaeus) malachurum			07/07/2003	SP602251		Stratton Audley Quarry							Nationally Notable B		

Statement concerning Oxfordshire Bird Records

The majority of bird records , except those in the north of the county, have been provided by the Oxford Ornithological Society. Such records are denoted by an asterix next to their common name. Please note that:

a. Not all species are subject to the same degree of recording; the absence of records of a species in a given geographical area does not necessarily indicate absence of that species.

b. Not all parts of the county are subject to the same degree of recording; the absence of records for a given area does not necessarily indicate the absence of bird species.

c. Records of species regarded as sensitive have been provided with reduced information about location. Any requests for more precise information about the location of such "confidential" sites should be addressed directly to OOS.

Prepared by TVERC 29/06/2010

Statement about Grid References

The following types of grid references are provided:

Six figure grid references. Many of these will an assigned relatively central grid reference for a site though with small sites the assigned grid reference for a site could be close to the edge. The record may have come from anywhere within the site. Where additional location information is provided the reference may be more accurate or central to a subsite within the larger site. Where the location is not site based the grid reference should be within 100 metres of the location.

Four figure grid references. Generally these are 1km records often with some location information to give an idea of which part of the 1km square the record was found. Sometime this information can be quite accurate. Where a large site is referred to the location should be in that part of the 1km square that is within the site. In some case these may be tetrad records with grid reference referring to a 2km x 2km square. This includes some confidential records from Oxford Ornithological Society. Other tetrad data is rarely included.

Eight and ten figure grid references: These are generally accurately worked out to the location where the species was found. However for small and thin sites eight figure grid references may be used as a central grid reference for a site

TVERC intends to start tagging data to qualify these grid references but at present only a limited amount of qualification is provided.

APPENDIX 7B

Arup (2010) Hedgerow Survey

A2 Dominion
Bicester Eco-Town
Hedgerow Survey

ISSUE | October 2010

This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number 213225-00

Ove Arup & Partners Ltd
13 Fitzroy Street
London W1T 4BQ
www.arup.com

ARUP

Document Verification

ARUP

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Contents

1 Introduction

1.1 Background

Arup have been commissioned by A2 Dominion to carry out a suite of protected species and habitat surveys for the proposed Bicester Exemplar Eco-Town development in Oxfordshire. The aim of this study is to obtain information on the condition of the Hedgerows that may be affected by the proposed works through survey, to identify which, if any, are important under the Hedgerow Regulations 1997 and to identify any implications that the redevelopment may have on these features.

The proposed development is located within a belt of predominantly grazing farmland which lies to the north west of Bicester (centred on National Grid Reference: SP 577 251); the boundary of the exemplar site is shown in Appendix A. At present the proposed development area consists of a matrix of farmland with up to 10 grazed fields separated by many high quality species rich hedgerows. A distinct lowland area with an ephemeral stream runs east to west through the south and central areas of the site, and midway flows into a second ephemeral stream running north to south through the site.

At present the farmland within the development area is being managed in a relatively sensitive manner with regards to biodiversity. This includes areas set aside for badger setts, numerous bird boxes, including barn owl (*Tyto alba*) and kestrel (*Falco tinnunculus*) and the provision of bat boxes. Hedgerows have been maintained to produce a wide, continuous and mostly species rich structure and are playing an important part for biodiversity on the site.

This report details the findings of the study and provides relevant recommendations to ensure legal compliance during the works.

1.2 Ecology and Legislation

1.2.1 Generic Legislation

This report and its recommendations have been produced in accordance with relevant legislation and best practice guidance. They also take into account Planning Policy Statement 9 (PPS9) and other nature conservation policies within local and regional planning policy documents.

Legislation relating to ecological resources that are relevant to this appraisal includes the following:

- ***Wildlife and Countryside Act, 1981 (as amended).*** This Legislation still comprises the primary means of protecting wildlife in the UK and provides the mechanism by which a number of international directives are implemented in the UK.

- ***Conservation (Natural Habitats &c.) Regulations, 1994.*** This Act provides protection for European protected species such as bats and great crested newts.

- ***Countryside and Rights of Way (CROW) Act, 2000.*** The CROW Act strengthened the details of The Wildlife and Countryside Act in relation to Sites of Special Scientific Interest (SSSI) and threatened species.
- ***Natural Environment and Rural Communities (NERC) Act, 2006.*** This Act puts an obligation on public bodies and statutory undertakers to ensure due regard to the conservation of biodiversity.
- ***Planning Policy Statement 9 (PPS9).*** This sets out the Government's planning policies on the protection of biodiversity and geological conservation through the planning system. The policies set out in PPS9 may also be material to decisions on individual planning applications.

The key principles of the PPS9 are stated as:

"Regional planning bodies and local planning authorities should adhere to the following key principles to ensure that the potential impacts of planning decisions on biodiversity and geological conservation are fully considered…….

(vi) the aim of planning decisions should be to prevent harm to biodiversity and geological conservation interests. Where granting planning permission would result in significant harm to those interests, local planning authorities will need to be satisfied that the development cannot reasonably be located on any alternative sites that would result in less or no harm. In the absence of any such alternatives, local planning authorities should ensure that, before planning permission is granted, adequate mitigation measures are put in place. Where a planning decision would result in significant harm to biodiversity and geological interests which cannot be prevented or adequately mitigated against, appropriate compensation measures should be sought. If that significant harm cannot be prevented, adequately mitigated against, or compensated for, then planning permission should be refused."

In addition, PPS9 states:

"Development proposals provide many good opportunities for building-in beneficial biodiversity or geological features as part of good design. When considering proposals, local planning authorities should maximise such opportunities in and around developments, using planning obligations where necessary."

In respect of species protection, PPS9 states:

"*……planning authorities should ensure that these species are protected from the adverse effects of development, where appropriate, by using planning conditions or obligations. Planning authorities should refuse permission where harm to the species or their habitats would result unless the need for, and benefits of, the development clearly outweigh that harm*".

1.2.2 Specific Legislation

The Countryside and Rights of Way Act 2000 (CRoW) and the Natural Environments and Rural Communities Act (2006) places a duty the Highways Agency to have regard to the purposes of conserving biological diversity as defined by the Convention on Biological Diversity 1992; this includes promoting the conservation, enhancement and restoration of priority habitats such as species-

rich ancient hedgerows. Article 10 of the 1992 Habitats Directive (carried forward in Regulation 37 of the Conservation (Natural Habitats, &c.) Regulations 1994) encourages the management of linear features, such as hedgerows to aid the 'migration, dispersal and genetic exchange of wild species'.

The Hedgerows Regulations 1997 outlines the criteria for determining "important" hedgerows. A hedgerow must have existed for 30 years or more and should satisfy at least one of the criteria listed below.

- Includes at least 7 woody species, on average, in a 30m length;
- At least 6 woody species, on average, in a 30m length and has at least 3 associated features (listed separately within the Regulations);
- At least 6 woody species, on average, in a 30m length, including a Black-poplar tree, or Large-leaved Lime, or Small-leaved Lime, or Wild Service-tree; or
- At least 5 woody species, on average, in a 30m length and has at least 4 associated features (listed separately within the Regulations).

Associated features include parallel hedges (within 15m), ditches and supporting walls/banks.

Further criteria to be considered in the identification of important hedgerows include archaeological and historical criteria as well as ecological criteria.

1.2.3 Eco-Town guidance

In addition to a range of legislation described above in section 1.2.1, a wealth of policy and other guidance is available to govern and direct development proposals in their responsibilities with regard to ecology and biodiversity. These include the recently-published governmental guidance that specifically sets out how to deal with eco-town proposals (Biodiversity Positive: Eco-towns Biodiversity Worksheet, TCPA, 2009). The key points of this (referred to as the principal objectives for an Eco-town Biodiversity Strategy) are as follows:

- **Protecting and enhancing the best of biodiversity**: key habitat areas supporting characteristic and uncommon species should be sustained, where conservation is the main priority.
- **Mitigating the impact of development and securing net biodiversity gain**: the inclusion of supplementary habitat areas that fulfil other green infrastructure functions and support more widespread and common species.
- **Integrating biodiversity within the built environment:** the incorporation of a high degree of permeability for wildlife within built areas and structures.
- **Increasing biodiversity's resilience and ability to adapt to climate change**: ensuring a robust connectivity of habitats that facilitates the wider movement and migration of species.

This provides a clear steer for the design of an eco-town proposal, such that the avoidance of key habitat areas must be the priority, followed by the retention and creation of a matrix of secondary habitats both within and outside of the built area, and that all of the above are robustly connected to facilitate future wildlife

movements and dispersals. Other key elements of the approach include making provisions for management, funding and accountability, to ensure success.

All eco-town proposals should include an Eco-Town Biodiversity Strategy (ETBS) to be developed in tandem with the masterplan for the site. This will provide the framework for delivering net biodiversity gain, setting out what is to be achieved and the steps that are needed to achieve it and, most importantly, how biodiversity will be increased and enhanced in advance of and alongside development, rather than at the end of the development process. It should include specific measurable targets for net biodiversity gain, reflecting local priorities for biodiversity (and contributing to national and regional targets as appropriate) and it should take account of the challenges posed by climate change.

1.2.4 Biodiversity Targets

The UK Biodiversity Action Plan (UK BAP) was produced in accordance with the 1992 UN Convention on Biological Diversity. It describes the UK's biological resources and commits a detailed plan for the protection of these resources, focusing on key habitats and species considered to be of particular significance to nature conservation within a UK context.

The conservation priorities that will be most appropriate to the Bicester eco-town proposal are those listed within the UK and (at the lower tier) Oxfordshire Biodiversity Action Plans (BAPs). These list a number of key habitats and species that form the priorities for conservation in those areas and serve as an existing framework within which the Eco-town can work and provide positive contributions to nature conservation at both local and national scales.

Hedgerows are a national biodiversity action plan priority habitat.

1.3 Aims and Objectives

The aim of this study is to obtain information on the condition of the Hedgerows that may be affected by the proposed works through survey, to identify which, if any, are important under the Hedgerow Regulations 1997.

1.4 Report Content and Layout

The methodology of the survey undertaken is detailed in Section 2; the results of the survey are summarised in Section 3 and Section 4 contains the discussion and recommendations. Appendix A contains the survey drawing and Appendices B & C examples of the survey recording sheets.

2 Methodology

2.1 Selection Criteria for Hedgerow Survey

The Phase 1 Habitat survey report for the Proposed Development site (Arup, 2010[1]) identified a network of diverse and relatively species rich hedgerows across the site. The criteria for selection for further assessment were decided considering any potential impacts to the area on a landscape scale. The impacts to connectivity and the value of hedgerows in terms of linkages throughout the Proposed Development site were considered paramount over any possible impacts to individual species rich hedgerows, the value of all of such hedgerows in terms of record of diversity was identified within the Phase 1 Habitat Report.

Given the limited extent of the exemplar site and the relatively high diversity of all the hedgerows present, all the hedgerows across the site were surveyed.

The hedgerows surveyed are represented in the Hedgerow Survey Drawing in Appendix A.

2.2 Field Survey

The survey methodology followed the local hedgerow survey (a standardised procedure) as detailed in the Hedgerow Survey Handbook (Bickmore, 2002) and a second assessment was made on site to permit the categorization of each hedgerow using the Hedgerow Evaluation and Grading System (HEGS). The completed Local Hedgerow Survey and Hedgerow Evaluation and Grading System (HEGS) sheets can be found in Appendix B & C. The former collects data to inform the determination of hedgerow importance as detailed in the Environment Act 1995 and the Hedgerow Regulations 1997; the latter allows a hedgerow to be categorised according to its significance to wildlife. The two methodologies and details of interpretation are outlined below:

2.2.1 Local Hedgerow Survey

The Hedgerows Regulations 1997 outlines the criteria for determining "important" hedgerows. These criteria include archaeological and historical criteria as well as ecological criteria. The supplementary form from the Hedgerow Survey Handbook (Bickmore 2002) ensures the survey conforms to the plant species criteria in the 1997 Regulations; the aim of the survey being to assess a hedgerow according to its plant species diversity and ecological importance.

- the length of each hedgerow was calculated prior to the survey from Ordnance Survey 1:2,500 maps;
- for every 100m of hedge the central 30m section was surveyed, with a maximum of three 30m sections per hedgerow;

[1] Bicester Eco-town

- in each 30m section, the presence of woody (tree and shrub) species and woodland[2] (herbaceous) species within one metre, in any direction, of the outermost edges of the hedgerow was recorded;
- for the whole hedgerow, the number of standard (mature) trees was recorded; and,
- other data gathered for the whole hedgerow included hedge height, width, structure, management, information on ditches and banks associated with the hedge, whether gaps formed less than 10% of the hedge and adjacent land use and connections.

2.2.2 HEGS Assessment

Hedgerows can also be categorised as to their ecological importance using the Hedgerow Evaluation and Grading System (HEGS; Clements & Tofts 1992). This allows a hedgerow to be categorised according to their significance for wildlife. Hedgerows are graded on a scale of 1-4 (high value to low value) to reflect their ecological value based on the hedgerow structure, connectivity, species diversity and associated features. To grade a hedgerow:

- the height, width, length and structure of the average cross-section of each hedgerow was assessed;
- the number, age and species of standard trees was recorded per 100m;
- percentage gaps and the number of end connections (a value of 1 per hedgerow or other linear feature; 2 for woodland) was determined;
- a full species list was compiled of the hedge canopy and whether the hedge is native species dominant;
- associated features such as the presence of a hedge-bank, lynchet, ditch and or grass verge were noted; and,
- a species list prepared of ground flora and notes of any notable species.

2.2.3 Notable Plant Species

Notable plant species (species of nature conservation importance) were identified during the survey if they were:

- UK and Local Biodiversity Action Plan (BAP) species;
- afforded legal protection by being listed on Schedule 8 of the Wildlife and Countryside Act 1981 (as amended); and/or,
- listed as Critically Endangered, Endangered, Vulnerable or Near Threatened in The Vascular Plant Red Data List for Great Britain (Cheffings *et al* 2005).

[2] Including ancient woodland indicator species.

3 Results and Discussion

3.1 Results

The survey site mainly comprises grazing land with a small area of broadleaved plantation woodland. A total of 19 hedgerows were surveyed; an evaluation of all hedgerows is provided in Table 3.1. Table 3.2 has a summary of species and features. The location of the survey site and the hedgerows surveyed are shown in Appendix A.

Table 3.1 Hedgerow evaluation according to the modified HEGS system and the ecological criteria of the Hedgerow Regulations 1997

Hedgerow	HEGS Grade	HEGS Value	Important Hedgerow (Hedgerow Regulations)
1	1	Very High	**Important**
2	-1	High – Very High	**Important**
3	1	Very High	**Important**
4	-1	High – Very High	**Important**
5	-2	Moderate – High	**Important**
6	-1	High – Very High	**Important**
7	2	High	-
8	1	Very High	**Important**
9	-2	Moderate – High	-
10	+1	Very High	**Important**
11	1	Very High	**Important**
12	-2	Moderate – High	-
13	2	High	-
14	-1	High – Very High	**Important**
15	-1	High – Very High	**Important**
16	1	Very High	**Important**
17	+2	High – Very High	-
18	1	Very High	**Important**
19	-1	High – Very High	-

No notable plant species were recorded during the hedgerow survey within the exemplar site.

Table 3.2 Hedgerow species and structure summary

Hedgerow	Woody Species in 30 metre Sample	Ground/Climbing Flora	Gaps	Associated Features
1	Hawthorn *Crataegus monogyna*, Blackthorn *Prunus spinosa*, Elm *Ulmus* sp., Elder *Sambucus nigra*, Ash *Fraxinus excelsior*, Dogwood *Cornus sanguinea*, Hazel *Corylus avellana*, Wayfaring Tree *Viburnum lantana*, Wild Privet *Ligustrum vulgare*, Rose *Rosa* sp., Apple *Malus* sp.	Dog's Mercury *Mercurialis perennis*, Cleavers *Galium urbanum*, Black Bryony *Tamus communis*, Bramble *Rubus fruticosa*, White Dead Nettle *Lamium album*, Garlic Mustard *Alliaria petiolata*, Ground Ivy *Glechoma hederacea*	0%	Historic Parish Boundary
2	Hawthorn *Crataegus monogyna*, Blackthorn *Prunus spinosa*, Elm *Ulmus* sp., Field Maple *Acer campestre*, Horse Chestnut *Aesculus hippocastanum*, Wild Privet *Ligustrum vulgare*, Rose *Rosa* sp., Apple *Malus* sp.	Dog's Mercury *Mercurialis perennis*, Cleavers *Galium urbanum*, White Dead Nettle *Lamium album*, Garlic Mustard *Alliaria petiolata*, Ground Ivy *Glechoma hederacea*	0%	-
3	Hawthorn *Crataegus monogyna*, Blackthorn *Prunus spinosa*, Elm *Ulmus* sp., Field Maple *Acer campestre*, Elder *Sambucus nigra*, Hazel *Corylus avellana*, Wayfaring Tree *Viburnum lantana*, Wild Privet *Ligustrum vulgare*, Rose *Rosa* sp., Apple *Malus* sp.	Cleavers *Galium urbanum*, Bramble *Rubus fruticosus*, White Dead Nettle *Lamium album*, Garlic Mustard *Alliaria petiolata*, Ground Ivy *Glechoma hederacea*, Ivy *Hedera helix*	0%	-
4	Hawthorn *Crataegus monogyna*, Blackthorn *Prunus spinosa*, Elder *Sambucus nigra*, Wild Privet *Ligustrum vulgare*, Rose *Rosa* sp., Field Maple *Acer campestre*, Apple *Malus* sp.	Ground Ivy *Glechoma hederacea*, Honeysuckle *Lonicera periclymenum*, White Campion *Silene latifolia*, Garlic Mustard *Alliaria petiolata*, Dog's Mercury *Mercurialis perennis*, Bramble *Rubus fruticosa*, Ivy *Hedera helix*	0%	-
5	Hawthorn *Crataegus monogyna*, Blackthorn *Prunus spinosa*, Elm *Ulmus* sp., Elder *Sambucus nigra*. Guelder Rose *Viburnum opulus*, Field Maple *Acer campestre*. Dog Rose *Rosa canina*	Ground Ivy *Glechoma hederacea*, Dog's Mercury *Mercurialis perennis*, Bramble *Rubus fruticosus*, White Dead Nettle *Lamium album*	0%	-
6	Hawthorn *Crataegus monogyna*, Blackthorn *Prunus spinosa*, Elm *Ulmus* sp., Midland Hawthorn *Crataegus laevigata*, Elder *Sambucus nigra*, Wild Privet *Ligustrum vulgare*, Apple *Malus* sp., Rose *Rosa* sp.	Lesser Celandine *Ranunculus ficaria*, Cleavers *Galium aparine*, Ivy *Hedera helix*, White Dead Nettle *Lamium album*, Ground Ivy *Glechoma hederacea*, Bramble *Rubus fruticosus*, Lords and Ladies *Arum maculatum*, Garlic Mustard *Alliaria petiolata*	0%	-

Hedgerow	Woody Species in 30 metre Sample	Ground/Climbing Flora	Gaps	Associated Features
7	Hawthorn *Crataegus monogyna*, Blackthorn *Prunus spinosa*, Elder *Sambucus nigra*, Field Maple *Acer campestre*, Elm *Ulmus* sp., Apple *Malus* sp.	Cleavers *Galium aparine*, White Dead Nettle *Lamium album*	0%	-
8	Wild Privet *Ligustrum vulgare*, Blackthorn *Prunus spinosa*, Field Maple *Acer campestre*, Dogwood *Cornus sanguinea*, Hawthorn *Crataegus monogyna*, Ash *Fraxinus excelsior*, Elder *Sambucus nigra*, Wayfaring Tree *Viburnum lantana*, Apple *Malus* sp., Elm *Ulmus* sp., Rose *Rosa* sp.	Dog's Mercury *Mercurialis perennis*, Cleavers *Galium aparine*, Garlic Mustard *Alliaria petiolata*, Ground Ivy *Glechoma hederacea*, Bramble *Rubus fruticosus*, Lords and Ladies *Arum maculatum*, White Dead Nettle *Lamium album*	0%	Historic Parish Boundary
9	Elm *Ulmus* sp., Hawthorn *Crataegus monogyna*, Elder *Sambucus nigra*, Wild Privet *Ligustrum ovalifolium*	Cleavers *Galium aparine*, Lesser Celandine *Ranunculus ficaria*, Bittersweet *Solanum dulcamara*, Ivy *Hedera helix*, Lords and Ladies *Arum maculatum*, Bramble *Rubus fruticosus*, Great Willowherb *Epilobium hirsutum*	0%	-
10	Wild Privet *Ligustrum vulgare*, Elm *Ulmus* sp., Elder *Sambucus nigra*, Blackthorn *Prunus spinosa*, Wayfaring Tree *Viburnum lantana*, Field Maple *Acer campestre*, Hawthorn *Crataegus monogyna*, Beech *Fagus sylvatica*, Rose *Rosa* sp., Apple *Malus* sp.	Garlic Mustard *Alliaria petiolata*, Cleavers *Galium aparine*, Bramble *Rubus fruticosa*	0%	-
11	Elder *Sambucus nigra*, Rose *Rosa* sp., Hawthorn *Crataegus monogyna*, Blackthorn *Prunus spinosa*, Elm *Ulmus* sp., Apple *Malus* sp., Field Maple *Acer campestre*, Wayfaring Tree *Viburnum lantana*	Cleavers *Galium aparine*, Ground Ivy *Glechoma hederacea*, Lords and Ladies *Arum maculatum*, White Dead Nettle *Lamium album*, Ivy *Hedera helix*, Garlic Mustard *Alliaria petiolata*, Dog's Mercury *Mercurialis perennis*, Black Bryony *Tamus communis*, Bramble *Rubus fruticosus*, Lady's Bedstraw *Galium verum*, Yarrow *Achillea millefolium*	0%	Mediaeval Field Boundary
12	Elder *Sambucus nigra*, Blackthorn *Prunus spinosa*, Hawthorn *Crataegus monogyna*, Midland Hawthorn *Crataegus laevigata*, Rose *Rosa* sp.	Dog's Mercury *Mercurialis perennis*, Cleavers *Galium aparine*, Ground Ivy *Glechoma hederacea*, Lords and Ladies *Arum maculatum*, Garlic Mustard *Alliaria petiolata*, Wood Sage *Teucrium scorodonia*	≤10%	-

Hedgerow	Woody Species in 30 metre Sample	Ground/Climbing Flora	Gaps	Associated Features
13	Blackthorn *Prunus spinosa*, Hawthorn *Crataegus monogyna*, Field Maple *Acer campestre*, Elder *Sambucus nigra*, Rose *Rosa* sp., Elm *Ulmus* sp.	Ground Ivy *Glechoma hederacea*, Nettle *Urtica dioica*	0%	-
14	Elm *Ulmus* sp., Elder *Sambucus nigra*, Hawthorn *Crataegus monogyna*, Ash *Fraxinus excelsior*, Rose *Rosa* sp., Blackthorn *Prunus spinosa*, Field Maple *Acer campestre*	Cleavers *Galium aparine*, White Dead Nettle *Lamium album*, Bramble *Rubus fruticosa*, Garlic Mustard *Alliaria petiolata*, Ivy *Hedera helix*, Lords and Ladies *Arum maculatum*, Ground Ivy *Glechoma hederacea*, Dog Violet *Viola rivinia*	0%	-
15	Elm *Ulmus* sp., Elder *Sambucus nigra*, Rose *Rosa* sp., Hawthorn *Crataegus monogyna*, Blackthorn *Prunus spinosa*, Field Maple *Acer campestre*	Cleavers *Galium aparine*, Ground Ivy *Glechoma hederacea*, Bramble *Rubus fruticosus*, White Dead Nettle *Lamium album*, Black Bryony *Tamus communis*, Ivy *Hedera helix*, Lords and Ladies *Arum maculatum*	0%	-
16	Blackthorn *Prunus spinosa*, Elder *Sambucus nigra*, Willow *Salix* sp., Hawthorn *Crataegus monogyna*, Field Maple *Acer campestre*, Rose *Rosa* sp., Elm *Ulmus* sp., Wayfaring Tree *Viburnum lantana*, Apple *Malus* sp.	Ivy *Hedera helix*, Cleavers *Galium aparine*, Bramble *Rubus fruticosus*, Lords and Ladies *Arum maculatum*, Garlic Mustard *Alliaria petiolata*, Ground Ivy *Glechoma hederacea* , Wood Avens *Geum urbanum*, Black Bryony *Tamus communis*, White Dead Nettle *Lamium album*	0%	-
17	Blackthorn *Prunus spinosa*, Hawthorn *Crataegus monogyna*, Elder *Sambucus nigra*, Ash *Fraxinus excelsior*	Bramble *Rubus fruticosus*, Black Bryony *Tamus communis*, Ground Ivy *Glechoma hederacea*	0%	-
18	Snowberry *Symphoriocarpus alba*, Elm *Ulmus* sp., Elder *Sambucus nigra*, Hawthorn *Crataegus monogyna*, Wayfaring Tree *Viburnum lantana*, Field Maple *Acer campestre*, Blackthorn *Prunus spinosa*, Rose *Rosa* sp., Ash *Fraxinus excelsior*, Wild Privet *Ligustrum vulgare*	Ivy *Hedera helix*, Cleavers *Galium aparine*, Ox-eye Daisy *Leucanthemum vulgare*, Lords and Ladies *Arum maculatum*, Bramble *Rubus fruticosus*, White Dead Nettle *Lamium album*	0%	-
19	Hawthorn *Crataegus monogyna*, Elder *Sambucus nigra*, Elm *Ulmus* sp., Apple *Malus* sp., Blackthorn *Prunus spinosa*, Rose *Rosa* sp.	Cleavers *Galium aparine*, Broad-leaved Dock *Rumex obtusifolius*, White Dead Nettle *Lamium album*, Ground Ivy *Glechoma hederacea*, Lords and Ladies *Arum maculatum*	≤10%	-

3.2 Discussion

The two different methods of grading a hedgerow (The Hedgerow Regulations 1997 and HEGS) differ in the emphasis they place on species-richness. The Hedgerow Regulations 1997 will identify species-richness, but in contrast, the HEGS method places more emphasis on the structural and connective features of a hedgerow and the intrinsic importance to wildlife as a whole, whether as a species-rich hedgerow or by providing good nesting habitat for birds or cover and corridors of movement for other animals. The use of both of these two evaluation methods allows for a better appreciation of a hedgerow's overall ecological importance.

The hedgerows around the boundary as well as many of the sub-dividing hedgerows within the western section of the exemplar site are species rich (7 woody species or more). The hedgerows along the western boundary lie on an historic parish boundary; hedgerows 11 and 12 are probably on mediaeval field boundaries and are therefore likely to be important in a historical context as well as being valuable ecologically. Thirteen of the 19 hedgerows surveyed are classifiably Important Hedgerows (Hedgerow Regulations, 1997).

All of the hedgerows present within the exemplar site are of high or very high ecological value. The hedgerows have been managed sensitively, are generally between 2 – 4 metres wide and 2 – 4 metres tall, and are botanically diverse.

The hedgerows within the site provide cover, hibernation and foraging habitat for a variety of protected terrestrial mammals, reptiles and amphibians as well as providing nesting habitat for locally and nationally important bird species. The following protected, UKBAP and LBAP species that utilise hedgerows as a landscape feature and intrinsically as breeding/foraging habitat, have been recorded on site:

- Common Pipistrelle *Pipistrellus pipistrellus*, Soprano Pipistrelle *Pipistrellus pygmaeus*, Noctule *Nyctalus noctula*, Leisler's Bat *Nyctalus leisleri*, Brown Long-eared *Plecotus auritus*, a Myotid species *Myotis* sp.;
- Common Lizard *Zootoca vivipara*, Grass Snake *Natrix natrix*;
- Badger *Meles meles*, Hedgehog *Erinaceous europeaus* and;
- Dunnock *Prunella modularis*, Yellowhammer *Emberiza citronella*, Song Thrush *Turdus philomelos*.

The hedgerows are the main landscape features that provide for these species and any impacts to hedgerows will be detrimental to the conservation status of these species which is directly contrary to Eco-Town policy, local and national planning policy and UK and EU law.

Within the grazed land context present at this site, hedgerows such as these are key features within the landscape, ecologically and historically.

4 Conclusions and Recommendations

The hedgerows within the exemplar site are considered to be of high ecological value:

- 70% of the hedgerows are Important under the classification of the Hedgerow Regulations (1997);
- all hedgerows present are of high or very high value (HEGS); and,
- all hedgerows present within the exemplar site are UKBAP priority habitat.

To ensure that the tenets of the Eco-Town development policies (protection, enhancement and net-gain of biodiversity) are considered, the following recommendations are made:

- All hedgerows will be avoided by proposals and works. A buffer of at least 10 metres will be retained either side of these hedgerows, that can be managed sensitively for biodiversity and not for amenity, to ensure that the roles and functions of the hedgerow network within the site are retained. Given the intrinsic and fundamental value of these hedgerows, as well as the importance of these features to local and national BAP priority species, it is an imperative that every consideration is made with regards their retention and sensitive incorporation into the design.
- A management plan should be drawn up to ensure that appropriate maintenance will retain the value of the hedgerows throughout the site. The plan should include planting up gaps in hedgerows, hedge-laying sections where appropriate, sensitive management regimes of the grassland margins around the hedgerows.
- If the design proposals do not consider the ecological features of the site and it is not possible to avoid impacts to the hedgerows, then it is imperative that they are translocated and enhanced as essential mitigation. To ensure that mitigation proposals provide for protection, enhancement and overall a net biodiversity gain, it is recommended that any sections of hedgerow should be extended once translocated and associated habitats, woodland and grassland, developed to provide appropriate offsetting for the removal of corridors throughout the site. Consideration should also be given to how to replace the lost corridor within the design for the exemplar site taking into account the populations of UKBAP and LBAP species present on site that will be using the corridor.

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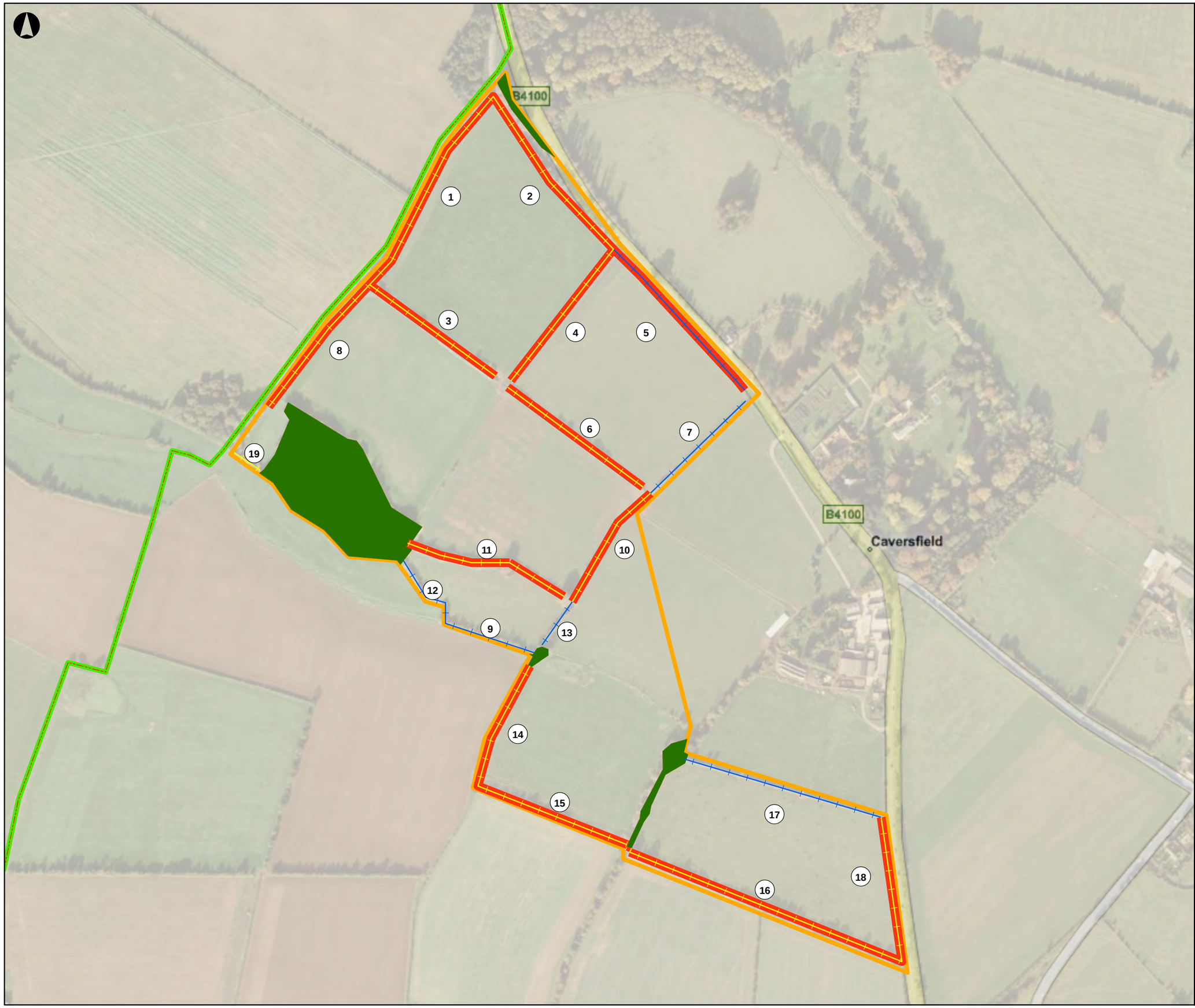
Appendix A

Hedgerow Survey Drawing



Legend

- Very High HEGS Value
- High HEGS Value
- Important Hedgerows
- Semi-natural Broadleaved Woodland
- Historic Civic Boundary
- Exemplar Boundary

Issue	Date	By	Chkd	Appd
P1	22-07-10	JB	AB	MB

Metres
0 105 210 420

ARUP

The Arup Campus, Blythe Gate
Blythe Valley Park, Solihull, West Midlands, B90 8AE
Tel +44 (0)121 213 3000 Fax +44 (0)121 213 3001
www.arup.com

Client
A2 Dominion

Job Title
Bicester Eco-town (Exemplar Site)

Drawing Title
Hedgerow Survey Important and Valuable Hedgerows

Scale at A3
1:7,000

Drawing Status
Issue

Job No	Drawing No	Issue
213225-00	Appendix A	P1

oFileLocation

Appendix B

HEGS Survey Recording Sheets

HEDGE RECORD AND EVALUATION SHEET

HEDGE NO. :

1 Recently laid or coppiced | YES | NO | (if yes, score 7 and ignore criteria 2 to 4 below)

	SCORE ->	1	2	3	4
2	Height (exclude bank)	0-1m	1-2m	2-4m	4m+
3	Width	0-1m	1-2m	2-3m	3m+
4	Average Cross-Section				

5 STANDARD TREES
Species present:

No. of trees present

6 Length: m

7 Standards/100m | nil | ≤1 | 1≤3 | 3≤5 | >5 |

STRUCTURAL SCORE

8 Percentage Gaps | 10%+ | 10-0% |

9 No. of End Connections | nil | 1 | 2 | 3 | 4+ |

CONNECTIVITY SCORE

10 HEDGE CANOPY SPECIES
Species present:

Combined total of tree and shrub species:

11 Native Species Dominant | nil | 1-2 spp | mixed |
Exotic spp dominant - score nil

12 Total No. of Tree & Shrub Spp. | 1-4 | 5-7 | 8-9 | 10+ |

DIVERSITY SCORE

13 Hedgebank/Lynchet | nil | 0-½m | ½-1m | 1m+ |

14 Ditch | No ditch | Ditch |

15 Grass Verge (2m+ wide) | nil | on 1 side | on 2 sides |

ASSOCIATED FEATURES SCORE

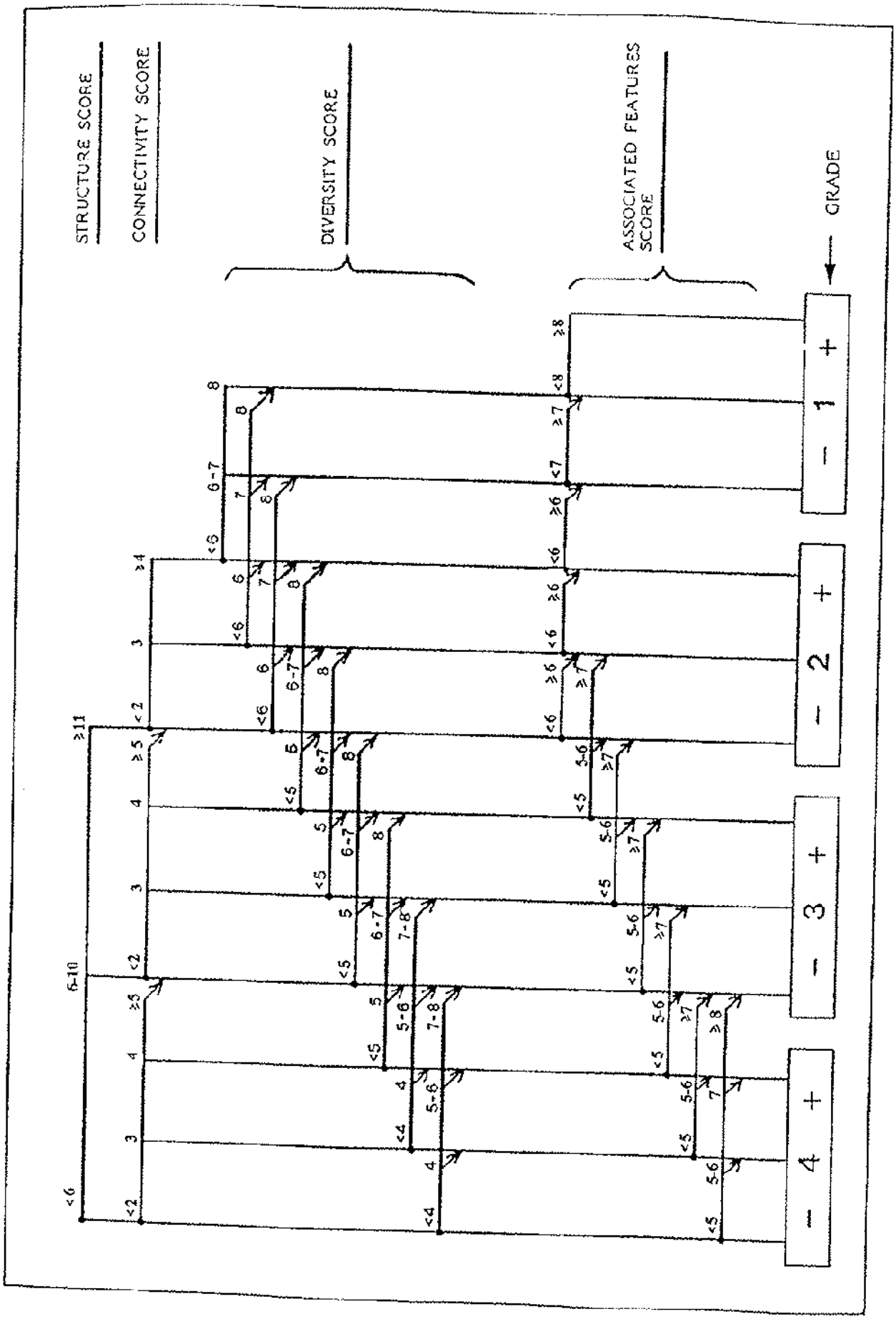
16 NOTES
Ground flora & Climbers:

17 Notable Species present | Pop nig | Til cor | Pyr cor | Sor tor | Til pla | other | ----------> Yes (NS) No

GRADE

new hedge | old laid | unmanaged | cut/trimmed
track/roadside | fence/wall | parish boundary | garden boundary

Site: Date: Surveyor:


STRUCTURE SCORE
CONNECTIVITY SCORE
DIVERSITY SCORE
ASSOCIATED FEATURES SCORE
GRADE
- 1 +
- 2 +
- 3 +
- 4 +

Appendix C

Local Hedgerow Survey
Recording Sheets

LOCAL HEDGEROW SURVEY: FIELD SURVEY FORM

DATE: __ __/__ __/__ __ GRID REF: __ __/__ __ __/__ __ __ HEDGE No: _____/_____/_____

SURVEYOR(S) ..... SIDE SURVEYED: N / E / S / W

1. HEDGE CONTEXT (length between end points)

TYPE		ADJACENT LAND USE						CONNECTIONS					
		Side A			Side B *			End C			End D		
Arable	Cereal / Root / Other	C	R	O	C	R	O	C	R	O	C	R	O
Grassland	Improved / Semi-improved / Unimproved	I	S	U	I	S	U	I	S	U	I	S	U
	livestock (Cattle / Sheep / Other)	C	S	O	C	S	O	C	S	O	C	S	O
Woodland	broadleaved (Mature / Immature)	M	I		M	I		M	I		M	I	
	conifer (Mature / Immature)	M	I		M	I		M	I		M	I	
	mixed (Mature / Immature)	M	I		M	I		M	I		M	I	
Route	rail / road – please state (M / A / B / C / U)												
	Track – please state (BR / Boat / Other)												
	public footpath												
Water	River / Stream	R	S		R	S		R	S		R	S	
	Lake / Pond	L	P		L	P		L	P		L	P	
Built-up / Garden	Built-up / Garden	B	G		B	G		B	G		B	G	
Heathland	heathland												
Other (state)													
Hedge	Established / New							E	N		E	N	
	Trimmed / Overgrown							T	O		T	O	
	hedgebank												
Fence	Wire / Netting							W	N		W	N	
	Post & Rail							P	R		P	R	
	Wall												
	Other												

HEDGEROW TREES (total number)	0	1 – 5	over 5

* Where visible

N.B. More than 1 category can apply for each column

2. ASSOCIATED FEATURES per 30m

Typical cross section of hedge banks where present (please circle one)

a) Half bank

b) Lynchett

c) Hedge bank

d) Other (sketch)

Bank height	under 0.5m	0.5 - 1m	1.1 - 1.5m	1.6m +
Bank type	earth		stonefaced	
Bank management	none	fenced off	grazed	mown / cut

OTHER FEATURES		Side A			Side B*		
Ditch / stream	width at base	under 0.5m	0.5 - 1m	over 1m	under 0.5m	0.5 - 1m	over 1m
		internal		external	internal		external
		wet		dry	wet		dry
Verge / headland	width	under 1m	1 - 2m	over 2m	under 1m	1 - 2m	over 2m
	management	grazed	cut	uncut	grazed	cut	uncut
Fence	height	under 0.6m	0.6 - 1.2m	over 1.2m	under 0.6m	0.6 - 1.2m	over 1.2m
	type	post & rail	netting	wire strand	post & rail	netting	wire strand
	other fence (state)						
Other (state)							

* Where visible

3. HEDGE STRUCTURE / MANAGEMENT per 30m

Average height (excluding bank)	0.1 - 1m		1.1 - 2m		2.1 - 4m		4.1m +
Average width at base (excluding bank)	0.1 - 1m		1.1 - 2m		2.1 - 4m		4.1m +
Intergrity (**S**ignificant or **M**inor)	stock-proof		leggy		gaps		wind shaped
			S	**M**	**S**	**M**	**S**	**M**
Signs of recent management	none				recent (under 2yrs)		old (2 - 10yrs)
Type of recent management	flailed/trimmed		coppiced		laid		weed control
Older management features (over 10yrs)	coppice stools		pollarded trees		laid		

Typical cross section of type of hedge

a) Clipped and dense

b) Mechanically cut

c) Unclipped

d) Overgrown and leggy

e) Overgrown plus outgrowth

f) Other (sketch)

LOCAL HEDGEROW SURVEY: SUPPLEMENT – Hedgerow Regulations (1997)

DATE: __ __ /__ __ /__ __ **GRID REF:** __ __ /__ __ __ /__ __ __ **HEDGE No:** _____ /_____ /_____

SHRUB LAYER (WOODY SPECIES) per 30m							
Species	Section of hedge			Species	Section of hedge		
	Up to 100m	100 - 200m	Over 200m		Up to 100m	100 - 200m	Over 200m
Alder *(A. glutinosa)*				Hawthorn, midland *(C. laevigata)*			
Apple, crab *(M. sylvestris)*				Hazel *(C. avellana)*			
Ash *(F. excelsior)*				Holly *(I. aquilfolium)*			
Aspen *(P. tremula)*				Hornbeam *(C. betulas)*			
Beech *(F. sylvatica)*				Juniper *(J. communis)*			
Birch, downy *(B.pubescens)*				Lime, large-leaved *(T. platyphyllos)*			
Birch, silver *(B. pendula)*				Lime, small-leaved *(T. cordata)*			
Black-poplar *(P. nigra-ssp betuifolia)*				Maple, field *(A. campestre)*			
Blackthorn *(P. spinosa)*				Mezereon *(D. mezereum)*			
Box *(B. sempervirens)*				Oak, pendunculate *(Q.robur)*			
Broom *(C. scoparius)*				Oak, sessile *(Q. petraea)*			
Buckthorn *(R. cathartica)*				Pear, Plymouth *(P. cordata)*			
Buckthorn, alder *(F. alnus)*				Pear, wild *(P. pyraster)*			
Butcher's-broom *(R. aculeatus)*				Poplar, grey *(Populus x canescens)*			
Cherry, bird *(P. padus)*				Poplar, white *(P. alba)*			
Cherry, wild *(P. avium)*				Privet, wild *(L. vulgare)*			
Cotoneaster, wild *(C. integer)*				Rose *(Rosa spp.)*			
Currant, downy *(R. spicatum)*				Rowan *(S. aucuparia)*			
Currant, mountain *(R. alpinum)*				Sea-buckthorn *(H. rhamoides)*			
Dogwood *(C. sanguinea)*				Service tree, wild *(S. torminalis)*			
Elder *(S. nigra)*				Spindle *(E. europaeus)*			
Elm *(Ulmus spp.)*				Spurge-laurel *(D. laureola)*			
Gooseberry *(R. uva-crispa)*				Walnut *(J. regia)*			
Gorse *(U. europaeus)*				Wayfaring-tree *(V. lantana)*			
Gorse, dwarf *(U. minor)*				Whitebeam *(Sorbus spp.)*			
Gorse, western *(U. gallii)*				Willow *(Salix spp.)*			
Guelder rose *(V. opulus)*				Yew *(T. baccata)*			
Hawthorn *(C. monogyna)*							

GROUND FLORA (WOODLAND SPECIES)
Any 3 spp occurring within 1m of each other on outer most edge of hedgerow

Species		Species	
Barren strawberry *(P. sterilis)*		Narrow buckler fern *(D. carthusiana)*	
Bluebell *(H. non-scriptus)*		Nettle-leaved bell-flower *(C. trachelium)*	
Broad buckler fern *(D. dilatata)*		Oxlip *(P. elatior)*	
Broad-leaved helleborine *(E. helleborine)*		Pignut *(C. majus)*	
Bugle *(A. reptans)*		Primrose *(P. vulguris)*	
Common cow-wheat *(M. pratense)*		Ramsons *(A. ursinum)*	
Common dog violet *(V. riviniana)*		Sanicle *(S. europaea)*	
Common polypody *(P. vulgare)*		Scaly male-fern *(D. affinis)*	
Dog's mercury *(M. perennis)*		Small cow-wheat *(M. sylvaticum)*	
Early dog violet *(V. reichenbachiana)*		Soft shield fern *(P. setiferum)*	
Early purple orchid *(O. mascula)*		Sweet violet *(V. odorata)*	
Enchanter's nightshade *(C. lutetiana)*		Toothwort *(L. squamaria)*	
Giant fescue *(F. gigantea)*		Tormentil *(P. erecta)*	
Goldilocks buttercup *(R. auricomus)*		Wild strawberry *(F. vesca)*	
Great bell-flower *(C. latifolia)*		Wood anemone *(A. nemorosa)*	
Greater wood-rush *(L. sylvatica)*		Wood avens/Herb bennet *(G. urbanum)*	
Hairy brome *(B. ramosus)*		Wood false-brome *(B. sylvaticum)*	
Hairy wood-rush *(L. pilosa)*		Wood horsetail *(E. sylvaticum)*	
Hard fern *(B. spicant)*		Wood meadow-grass *(P. nemoralis)*	
Hard shield fern *(P. aculeatum)*		Wood melick *(M. uniflora)*	
Harebell *(C. rotundifolia)*		Wood millet *(M. effusum)*	
Hart's tongue *(A. scolopendrium)*		Wood sage *(T. scorodonia)*	
Heath bedstraw *(G. saxatile)*		Wood sedge *(C. sylvatica)*	
Herb-Paris *(P. quadrifolia)*		Wood sorrel *(O. acetosella)*	
Herb-Robert *(G. robertianum)*		Wood speedwell *(V. montana)*	
Lady fern *(A. filix-femina)*		Wood spurge *(E. amygdaloides)*	
Lords-and-ladies *(A. maculatum)*		Woodruff *(G. odoratum)*	
Male fern *(D. filix-mas)*		Yellow archangel *(L. galeobdolon)*	
Moschatel *(A. moshatellina)*		Yellow pimpernel *(L. nemorum)*	

For whole hedge:

Actual number of standard trees (multi stemmed trees with diameter of >15cm at 1.3m, single stemmed trees diameter of >20cm at 1.3m) . . . . . .Trees

Does ditch extend over half the length? . . . . . .Yes / No

Does bank or wall extend over half the length? . . . . . .Yes / No

Do gaps form less than 10% of the length? . . . . . .Yes / No

APPENDIX 7C

Arup (2010) Vegetation Survey

A2 Dominion
Bicester Eco-town Exemplar Site
Vegetation Survey

J/213000/213225-00

Issue | September 2010

This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number 213225-00

Ove Arup & Partners Ltd
13 Fitzroy Street
London W1T 4BQ
www.arup.com

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Document Verification

ARUP

Job title		Bicester Eco-town Exemplar Site			**Job number** 213225-00
Document title		Vegetation Survey			**File reference**
Document ref		J/213000/213225-00			
Revision	**Date**	**Filename**	Vegetation Report.docx		
Draft 1	14/09/10	**Description**	First draft		
			Prepared by	Checked by	Approved by
		Name	Stephen Carter	Austin Brown	Michael Bull
		Signature			
Draft 2	24/09/10	**Filename**	Vegetation Report Draft 2.docx		
		Description	Including checkers comments		
			Prepared by	Checked by	Approved by
		Name	Stephen Carter	Austin Brown	Michael Bull
		Signature			
Issue	28/09/10	**Filename**	Vegetation Report Issue.docx		
		Description	Including checkers comments		
			Prepared by	Checked by	Approved by
		Name			
		Signature			
		Filename			
		Description			
			Prepared by	Checked by	Approved by
		Name			
		Signature			
				Issue Document Verification with Document	✓

Contents

Photographs

Attachments

Appendices

Appendix A

Sample Site Data

1 Introduction

1.1 Background

Arup has been commissioned by A2 Dominion to carry out a suite of protected species and habitat surveys for the proposed Bicester eco-town development in Oxfordshire. This report describes the findings of a vegetation survey and the implications for development at the Exemplar Site (hereinafter referred to as the site).

The site is located within a belt of predominantly grazing farmland, with associated activities such as hay making west of Home Farm and to the north west of Bicester (SP 577 251); the red line area is shown in **Figure 1**.

At present the farmland within the development area is being managed in a relatively sensitive manner with regards to biodiversity. This includes areas set aside for badger setts, numerous bird boxes, including barn owl (*Tyto alba*) and kestrel (*Falco tinnunculus*), and the provision of bat boxes. Hedgerows have been maintained to produce a wide, continuous and mostly species rich structure and are playing an important part for biodiversity on the site.

1.2 Ecology and Legislation

The recommendations provided in this report take into account government guidance associated with eco-town development, biodiversity targets, legislation and planning policies that relate to nature conservation.

1.2.1 Generic Legislation

This report and its recommendations have been produced in accordance with relevant legislation and best practice guidance. They also take into account Planning Policy Statement 9 (PPS9) and other nature conservation policies within local and regional planning policy documents.

Legislation relating to ecological resources that are relevant to this appraisal includes the following:

- ***Wildlife and Countryside Act, 1981 (as amended).*** This Legislation still comprises the primary means of protecting wildlife in the UK and provides the mechanism by which a number of international directives are implemented in the UK.

- ***Conservation (Natural Habitats &c.) Regulations, 1994.*** This Act provides protection for European protected species such as bats, great crested newts and the hazel dormouse.

- ***Countryside and Rights of Way (CROW) Act, 2000.*** The CROW Act strengthened the details of The Wildlife and Countryside Act in relation to Sites of Special Scientific Interest (SSSI) and threatened species.

- ***Natural Environment and Rural Communities (NERC) Act, 2006.*** This Act puts an obligation on public bodies and statutory undertakers to ensure due regard to the conservation of biodiversity.

- ***Planning Policy Statement 9 (PPS9).*** This sets out the Government's planning policies on the protection of biodiversity and geological conservation through the planning system. The policies set out in PPS9 may also be material to decisions on individual planning applications.

The key principles of the PPS9 are stated as:

"Regional planning bodies and local planning authorities should adhere to the following key principles to ensure that the potential impacts of planning decisions on biodiversity and geological conservation are fully considered…….

(vi) the aim of planning decisions should be to prevent harm to biodiversity and geological conservation interests. Where granting planning permission would result in significant harm to those interests, local planning authorities will need to be satisfied that the development cannot reasonably be located on any alternative sites that would result in less or no harm. In the absence of any such alternatives, local planning authorities should ensure that, before planning permission is granted, adequate mitigation measures are put in place. Where a planning decision would result in significant harm to biodiversity and geological interests which cannot be prevented or adequately mitigated against, appropriate compensation measures should be sought. If that significant harm cannot be prevented, adequately mitigated against, or compensated for, then planning permission should be refused."

In addition, PPS9 states:

"Development proposals provide many good opportunities for building-in beneficial biodiversity or geological features as part of good design. When considering proposals, local planning authorities should maximise such opportunities in and around developments, using planning obligations where necessary."

In respect of species protection, PPS9 states:

"*……planning authorities should ensure that these species are protected from the adverse effects of development, where appropriate, by using planning conditions or obligations. Planning authorities should refuse permission where harm to the species or their habitats would result unless the need for, and benefits of, the development clearly outweigh that harm*".

1.2.2 Species Legislation

In the UK, all wild plants are subject to protection from intentional uprooting without the landowners permission, through the provisions of the Wildlife and Countryside Act 1981 (as amended). Some rare plant species are afforded protection from picking, uprooting, destruction or sale because they are listed on Schedule 8 of the Wildlife & Countryside Act 1981 (as amended) and or Schedule 4 of The Conservation of Habitats and Species Regulations 2010.

1.2.3 Eco-town Guidance

In addition to a range of legislation described above in section 1.2.1, a wealth of policy and other guidance is available to govern and direct development proposals in their responsibilities with regard to ecology and biodiversity. These include the recently-published governmental guidance that specifically sets out how to deal with eco-town proposals (Biodiversity Positive: Eco-towns Biodiversity Worksheet, TCPA, 2009). The key points of this (referred to as the principal objectives for an Eco-town Biodiversity Strategy) are as follows:

- **Protecting and enhancing the best of biodiversity**: key habitat areas supporting characteristic and uncommon species should be sustained, where conservation is the main priority.
- **Mitigating the impact of development and securing net biodiversity gain**: the inclusion of supplementary habitat areas that fulfil other green infrastructure functions and support more widespread and common species.
- **Integrating biodiversity within the built environment**: the incorporation of a high degree of permeability for wildlife within built areas and structures.
- **Increasing biodiversity's resilience and ability to adapt to climate change**: ensuring a robust connectivity of habitats that facilitates the wider movement and migration of species.

This provides a clear steer for the design of an eco-town proposal, such that the avoidance of key habitat areas must be the priority, followed by the retention and creation of a matrix of secondary habitats both within and outside of the built area, and that all of the above are robustly connected to facilitate future wildlife movements and dispersals. Other key elements of the approach include making provisions for management, funding and accountability, to ensure success.

All eco-town proposals should include an ETBS to be developed in tandem with the masterplan for the site. This will provide the framework for delivering net biodiversity gain, setting out what is to be achieved and the steps that are needed to achieve it and, most importantly, how biodiversity will be increased and enhanced in advance of and alongside development, rather than at the end of the development process. It should include specific measurable targets for net biodiversity gain, reflecting local priorities for biodiversity (and contributing to national and regional targets as appropriate) and it should take account of the challenges posed by climate change.

1.2.4 Biodiversity Action Plans

The UK Biodiversity Action Plan (UK BAP) was produced in accordance with the 1992 UN Convention on Biological Diversity. It describes the UK's biological resources and commits a detailed plan for the protection of these resources, focusing on key habitats and species considered to be of particular significance to nature conservation within a UK context.

The conservation priorities that will be most appropriate to the Bicester eco-town proposal are those listed within the UK BAP and (at the lower tier) Oxfordshire Local Biodiversity Action Plan (LBAP). These list a number of key habitats and species that form the priorities for conservation in those areas and serve as an

existing framework within which the eco-town can function and provide positive contributions to nature conservation at both local and national scales.

1.3 Aim and Objectives

The Phase 1 Habitat Survey (Arup, 2010) reported that semi-improved neutral grassland and broad-leaved semi-natural woodland to be of most ecological value because they are UK BAP priority listed habitats to occur within the more extensive Masterplan Area.

The aim of the vegetation survey was to survey in more detail the grassland and woodland habitats at the site.

The objectives of this report are to:

- describe the plant communities present at the site;
- evaluate plant communities present at the site;
- report any protected or otherwise notable plants present at the site; and,
- recommend appropriate mitigation and compensation measures to balance the requirements of the proposed development.

1.4 Report Content and Layout

Following this introduction, Chapter 2 describes the methodology utilised to describe and evaluate vegetation present at the site. Chapter 3 describes and discusses the vegetation survey findings. The conclusions and recommendations are provided in Chapter 4. A list of references is provided in Chapter 5.

2 Methodology

2.1 Desk Study

Records of protected and otherwise notable plants were requested from the Thames Valley Environmental Records Centre (TVERC) within a 5km radius of the site.

Aerial photographs and the Phase 1 Habitat Survey report were reviewed to determine the location of grassland and woodland habitats to survey in more detail.

2.2 Field Survey

An ecologist experienced in identifying plants and sampling vegetation in accordance with the National Vegetation Classification (NVC) methodology (Rodwell, 1991 and 1992) undertook a walkover survey of grassland and woodland habitats at the site on 28th July 2010.

The woodland at the site was considered to be of more ecological value than the grassland habitats which have mainly been improved for agriculture. Therefore, the woodland was subject to a more detailed NVC survey.

Five quadrats were used to sample an area of homogeneous vegetation within the woodland. Each quadrat comprised a selected canopy area, within which understorey, field layer and ground layer area was located to record plant using the following standard areas:

- 50m × 50m for the canopy;
- 10m × 10m for the understorey;
- 4m × 4m for the field layer; and,
- 1m × 1m for the ground layer.

Within each quadrat the relative plant cover of each species was assessed by eye of all the live and above-ground parts of the plant and then assigned a score according to the DOMIN scale as indicated in **Table 1**.

Plant species names follow standard nomenclature (Stace, 2010 and Atherton *et al*, 2010).

Other details of the sampled vegetation were also recorded: stand area, sample area, vegetation layer cover and mean height, slope, aspect, altitude and soil description (see **Appendix A**).

Table 1. DOMIN scale used for assessing plant cover-abundance

DOMIN Scale	Plant Cover (%)
10	91 to 100
9	76 to 90
8	51 to 75
7	34 to 50
6	26 to 33
5	11 to 25
4	4 to 10
3	Many individuals
2	Several individuals
1	Few individuals

2.3 Data Analysis

The computer programme MATCH was used to analyse the sample data. MATCH mathematically compares the sample data with the constancy profiles for all the NVC plant communities/sub-communities and produces a list of similarity coefficients which outputs a list of possible plant communities/sub-communities.

2.4 Assumptions and Limitations

No account can be made of the absence of protected or otherwise notable vernal flowering species because they were not evident and therefore not recorded. However, this risk was minimised because the experienced ecologist who undertook the survey used professional judgement to determine whether any unrecorded protected and otherwise notable plant species are likely to naturally occur at the site.

The determination of conservation status is based on policy as published at the time of the assessment. No allowance has been made for unforeseen policy changes that may occur in the future.

3 Results and Discussion

3.1 Desk Study

No protected or otherwise notable plant species have been recorded at or adjacent to the site from records supplied by TVERC.

3.2 Field Survey

3.2.1 Grassland

There are several moderately nutrient enriched grassland habitat types at the site, which can be categorised as follows:

- unmanged rough grassland;
- re-seeded arable leys; and,
- semi-improved grassland.

The location of the aforementioned grassland habitats is highlighted on **Figure 1**.

3.2.1.1 Unmanaged Rough Grassland

A belt of unmanaged rough grassland occurs adjacent to the stream that flows west to east across the central part of the site. Barbed wire fencing excludes cattle from grazing the vegetation and consequently a sward approximately 1m tall of low floristic diversity has established.

The dominant plant species is false oat-grass *Arrhenatherum elatius* and the vegetation is most characteristic of the NVC plant community MG1 *Arrenatherum elatius* grassland.

At the site, the MG1 vegetation is of low intrinsic ecological value, but it does support a range of invertebrates and vertebrates. No protected or otherwise notable plant species were recorded or expected to be present within this plant community type.

3.2.1.2 Re-seeded Arable Leys

Within the northern part of the site re-seeded arable leys have recently been established. The leys have low floristic diversity and are grazed by cattle.

The dominant plant species are perennial ryegrass *Lolium perenne* and clovers *Trifolium* spp. and the vegetation is most characteristic of the NVC plant community MG7 *Lolium perenne* leys and related grasslands.

At the site, the MG7 vegetation is of low intrinsic ecological value and no protected or otherwise notable plant species were recorded or expected to be present within this plant community type.

3.2.1.3 Species-poor Semi-improved grassland

The grasslands within the southern part of the site have lower floristic diversity than compared to other parts of the more extensive Masterplan Area. Low floristic diversity is related to the extent to which the grasslands have been improved for cattle grazing.

The vegetation shows some resemblance between NVC plant communities MG5 *Cynosurus cristatus* - *Centaurea nigra* and MG6 *Lolium perenne* - *Cynosurus cristatus* grasslands.

At the site, the MG5/MG6 grassland is, as a consequence of management, of low floristic diversity and hence of lower ecological value than if managed to enhance its biodiversity potential. No protected or otherwise notable plant species were recorded or expected to be present within this plant community type.

3.2.2 Woodland

3.2.2.1 Broad-leaved Semi-natural Woodland

Broad-leaved woodland is located in the western corner of the site and to the west of Home Farm (see **Figure 1**). The woodland has had most of the former canopy trees removed. There are a few remaining canopy trees, stumps and felled trunks which indicate that the wood was originally dominated by ash *Fraxinus excelsior*. Subsequently, the woodland has been re-planted mainly with native broad-leaved species, but also with Norway maple *Acer platanoides* and Scots pine *Pinus sylvestris* which are not naturally characteristic of ash woodland.

The quadrat locations are highlighted in **Figure 2**. Analysis of the sample data indicates that the vegetation is most similar to W8d *Fraxinus excelsior – Acer campestre – Mercurialis perennis* woodland *Hedera helix* sub-commnunity. The MATCH co-efficient for W8d is 44.5.

The woodland is characteristic of the W8d plant sub-community because the canopy appears to be dominated by ash and less diverse than the other associated W8 sub-communities. Also, where the field layer has not recently been disturbed there is a continuous carpet of ivy *Hedera helix* agg.

W8 woodlands are widespread over damp base-rich soils in typically warm and dry areas of southern lowland Britain, becoming progressively sparser towards the north-west because of smaller exposures of calcareous rocks/superficials and the cooler and wetter prevailing climate.

The W8 woodland at the site is of moderate intrinsic ecological value and supports a wide range of invertebrates and vertebrates. No protected or otherwise notable plant species were recorded or expected to be present within this plant community type.

4 Conclusions and Recommendations

The W8 woodland at the site, which is a UK BAP priority habitat, is of moderate ecological value and therefore in accordance with policy and best practice, impacts to it should be avoided. If this is not possible, appropriate mitigation and/or compensation measures proportionate to the ecological impact would need to be implemented. In addition, measures to enhance the woodland to ensure biodiversity gain and compliance with government policy regarding eco-town development would need to be implemented.

It is recommended that a buffer zone is created around the woodland to minimise impacts from development and to enhance its' biodiversity potential. The woodland could be enhanced by maximising the amount of edge habitat along tracks and clearings in order to attract a wider range of wildlife. Tree species that are not naturally characteristic of W8 woodland, such as Norway maple and Scots pine, could be removed to facilitate the growth of ash standards and their future expansion within the canopy.

It is also recommended that hedgerows are planted with native species characteristic to the local area to connect with the woodland in order to facilitate wildlife dispersal across the site.

Implementation of the aforementioned recommendations would help ensure that the proposed development complies with eco-town guidance and also contribute to the UK BAP and Oxfordshire LBAP objectives.

5 References

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Malloch, A.J.C. (1999). *Match 2.14 for Windows NT/98/95*. Unit of Vegetation Science, University of Lancaster.

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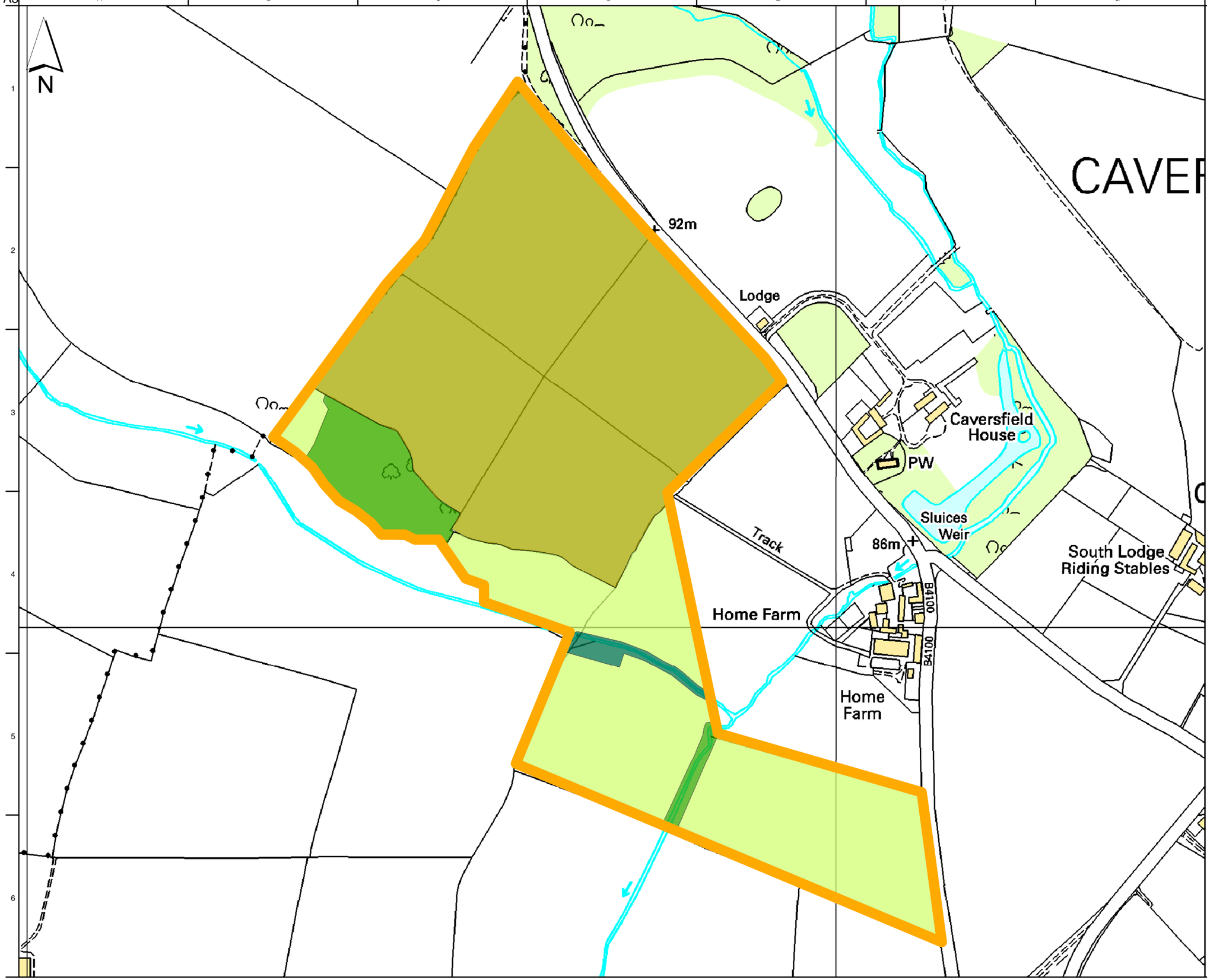
United Kingdom Biodiversity Action Plan (2010). *United Kingdom Biodiversity Action Plan.* http://www.ukbap.org.uk [09.10].

Figures

Figure 1 Habitat Location Map

A3



Legend

- Exemplar Site Boundary
- Broad-leaved Semi-natural Woodland
- Re-seeded Arable Leys
- Species-poor Semi-improved Grassland
- Unmanaged Rough Grassland

Issue	Date	By	Chkd	Appd
-	21-09-2010	DMc	SC	AB

ARUP

13 Fitzroy Street
London W1T 4BQ
Tel +44 (0)20 7636 1531 Fax +44 (0)20 7580 3924
www.arup.com

Client
A2 Dominion

Job Title
Bicester Eco-town Exemplar Site Vegetation Survey

Drawing Title
Habitat Location Map

Scale at A3
1:4,500

Discipline
Ecology

Drawing Status
Draft

Job No	Drawing No	Issue
213225-00	Figure 1	-

Do not scale

Figure 2 Sample Site Location Map

A3

N

92m

Lodge

Caversfield House

PW

Sluices Weir

86m

South Lodge Riding Stables

Track

Home Farm

Home Farm

B4100

B4100

Q1

Q2

Q3

Q4

Q5

Legend

- Exemplar Site Boundary
- Woodland Sample Site
- Q1 Quadrat Number

Issue	Date	By	Chkd	Appd
-	21-09-2010	DMc	SC	AB

ARUP

13 Fitzroy Street
London W1T 4BQ
Tel +44 (0)20 7636 1531 Fax +44 (0)20 7580 3924
www.arup.com

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Job Title

Bicester Eco-town Exemplar Site Vegetation Survey

Drawing Title

Sample SIte Location Map

Scale at A3

1:4,500

Discipline

Ecology

Drawing Status

Draft

Job No	Drawing No	Issue
213225-00	Figure 2	-

Do not scale

A1 Sample Site Data

Survey Date: 28th July 2010	**Description of Sample Site:** Replanted wood with some remaining ash in the canopy, stumps and felled trunks. Sparse leaf litter and few areas of bare ground due to extensive moss cover
Altitude: 90m	**Slope:** Level
Aspect: None	**Soil:** Silty-clay
Stand Area: 300m × 80m	**Sample Area:** Canopy 50 x 50m, understorey 10 x 10m, field layer 4m x 4m and ground layer 1m x 1m
Layers (Mean Height) Canopy 20m Understorey 8m Field 1m Ground 50mm	**Layers (Cover)** Canopy 40% Understorey 70% Field 50% Ground 80%

Plant Species	**Quadrat Number**					**Plant Species**	**Quadrat Number**				
	1	**2**	**3**	**4**	**5**		**1**	**2**	**3**	**4**	**5**
Canopy						*Viola riviniana/reichenbachiana*			2		
Acer campestre			3	6		**Ground Layer**					
Fraxinus excelsior	5	5	5	4	5	*Hypnum cupressiforme*	2	2		1	
Understorey						*Thamnobryum alopecurum*	6	8	4	6	2
Acer campestre				2	4						
Corylus avellana		2									
Crategus monogyna	5	8			5						
Sambucus nigra	7	3	7	4	3						
Ulmus procera		2									
Field Layer											
Alliara petiolata					2						
Anthriscus sylvestris		5	6	6	7						
Arctium lappa	1										
Arum maculatum	2	2	2	2	2						
Bromopsis ramosa				2	3						
Dryopteris dilitata			1								
Fraxinus excelsior	2	4	2								
Geum urbanum	2										
Glechoma hederacea	3		3		2						
Hedera helix			4	7	8						
Mercurialis perennis	7	5	5	3	4						
Rosa canina					1						
Rubus fruticosus agg.	2										
Sambucus nigra			2								
Stachys sylvatica					2						
Tamus communis					1						
Urtica dioica	5	4	5	2	3						

APPENDIX 7D

Arup (2010) Crayfish Survey

A2 Dominion
Bicester Eco-Town
Crayfish Survey

ISSUE | September 2010

This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number 213225-00

Ove Arup & Partners Ltd
13 Fitzroy Street
London W1T 4BQ
www.arup.com

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Document Verification

ARUP

Job title		Bicester Eco-Town		**Job number** 213225-00
Document title		Crayfish Survey		**File reference**
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Revision	**Date**	**Filename**	Crayfish Survey Report Draft 1.docx	
Draft 1	20/09/10	**Description**	First draft	
			Prepared by	Checked by	Approved by
		Name	Megan Hooper	Austin Brown	Michael Bull
		Signature			
Issue	30/09/10	**Filename**	Crayfish_Survey_Report_Exemplar_Issue.docx	
		Description		
			Prepared by	Checked by	Approved by
		Name	Megan Hooper	Austin Brown	Michael Bull
		Signature			
		Filename		
		Description		
			Prepared by	Checked by	Approved by
		Name			
		Signature			
		Filename		
		Description		
			Prepared by	Checked by	Approved by
		Name			
		Signature			
			Issue Document Verification with Document		✓

Contents

1 Introduction

1.1 Background

Arup has been commissioned by A2 Dominion to carry out a suite of protected species and habitat surveys for the proposed Bicester Exemplar Eco-Town development in Oxfordshire. This specific report is in respect of crayfish.

The proposed development is located within a belt of predominantly grazing farmland which lies to the north west of Bicester. (SP 577 251); the red line area is shown in Figure 1. At present the proposed development area consists of a matrix of farmland with up to 10 grazed fields separated by many high quality species rich hedgerows. A distinct lowland area with an ephemeral stream runs east to west through the south and central areas of the site, and midway flows into a second ephemeral stream running north to south throughout the site.

At present the farmland within the development area is being managed in a relatively sensitive manner with regards to biodiversity. This includes areas set aside for badger setts, numerous bird boxes, including barn owl (*Tyto alba*) and kestrel (*Falco tinnunculus*) and the provision of bat boxes. Hedgerows have been maintained to produce a wide, continuous and mostly species rich structure and are playing an important part for biodiversity on the site.

1.2 Ecology and Legislation

1.2.1 Generic Legislation

This report and its recommendations have been produced in accordance with relevant legislation and best practice guidance. They also take into account Planning Policy Statement 9 (PPS9) and other nature conservation policies within local and regional planning policy documents.

Legislation relating to ecological resources that are relevant to this appraisal includes the following:

- ***Wildlife and Countryside Act, 1981 (as amended).*** This Legislation still comprises the primary means of protecting wildlife in the UK and provides the mechanism by which a number of international directives are implemented in the UK.

- ***Conservation (Natural Habitats &c.) Regulations, 1994.*** This Act provides protection for European protected species such as bats and great crested newts.

- ***Countryside and Rights of Way (CROW) Act, 2000.*** The CROW Act strengthened the details of The Wildlife and Countryside Act in relation to Sites of Special Scientific Interest (SSSI) and threatened species.

- ***Natural Environment and Rural Communities (NERC) Act, 2006.*** This Act puts an obligation on public bodies and statutory undertakers to ensure due regard to the conservation of biodiversity.

- ***Planning Policy Statement 9 (PPS9).*** This sets out the Government's planning policies on the protection of biodiversity and geological conservation through the planning system. The policies set out in PPS9 may also be material to decisions on individual planning applications.

The key principles of the PPS9 are stated as:

"Regional planning bodies and local planning authorities should adhere to the following key principles to ensure that the potential impacts of planning decisions on biodiversity and geological conservation are fully considered…….

(vi) the aim of planning decisions should be to prevent harm to biodiversity and geological conservation interests. Where granting planning permission would result in significant harm to those interests, local planning authorities will need to be satisfied that the development cannot reasonably be located on any alternative sites that would result in less or no harm. In the absence of any such alternatives, local planning authorities should ensure that, before planning permission is granted, adequate mitigation measures are put in place. Where a planning decision would result in significant harm to biodiversity and geological interests which cannot be prevented or adequately mitigated against, appropriate compensation measures should be sought. If that significant harm cannot be prevented, adequately mitigated against, or compensated for, then planning permission should be refused."

In addition, PPS9 states:

"Development proposals provide many good opportunities for building-in beneficial biodiversity or geological features as part of good design. When considering proposals, local planning authorities should maximise such opportunities in and around developments, using planning obligations where necessary."

In respect of species protection, PPS9 states:

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1.2.2 Species Legislation

- ***Wildlife and Countryside Act 1981*** **-** It is an offence to take or sell white-clawed crayfish *Austropotamobius pallipes*. Natural England issues licences to take white-clawed crayfish for the purpose of crayfish surveys where white-clawed crayfish may be present. These are issued to suitably qualified individuals.

Under Section 16(3) of the WCA 1981, Natural England may issue a Conservation Licence to allow works that may affect white-clawed crayfish, such as works to a river bank and bed. This is subject to those works contributing to the conservation of the population.

It is an offence under Schedule 9 of the WCA 1981 to release non-native crayfish such as the American signal crayfish *Pacifastacus leniusculus* to any watercourse

or waterbody. Individuals caught during engineering works or survey cannot be returned to the wild. Measures to control the spread of crayfish plague are also required during works where present.

- ***Water Resources Act 1991 and National Crayfish Byelaws 2005***

To undertake crayfish trapping on a watercourse, consent is required from the Environment Agency. The consent is to use fishing instruments (other than rod and line) and/or remove crayfish from inland waters under the National Crayfish Byelaws 2005 (England) and Section 210, Schedule 25 of the Water Resources Act 1991. The Environment Agency provides tags that must be attached to each trap during the survey.

- ***EC Directive Conservation of Natural Habitats & Flora (92/43/EEC)***

The Conservation of Natural Habitats and Flora Directive (92/43/EEC), also known as the Habitats Directive, has been translated into UK law through The Conservation of Habitats and Species Regulations 2010, also known as The Habitats and Species Regulations 2010. They offer protection to a number of plant and animal species throughout Europe via the designation of Special Areas of Conservation (SACs).

The white-clawed crayfish is listed under Annex II and Annex V of The Habitats and Species Regulations 2010. This requires that sites are designated as SACs to protect white-clawed crayfish where they are present. In this case the site has not be designated an SAC.

- ***UK Biodiversity Action Plan (UKBAP)***

The white-clawed crayfish is listed on the UK BAP due its decline in the UK. The existence of the UK Biodiversity Action Plan (UKBAP), published in 1994, arises from the UK Government's commitment to biodiversity made at the 1992 Earth Summit in direct response to the resulting Convention on Biological Diversity. To implement the UKBAP, the UK Biodiversity Group has produced a list of Habitat Action Plans and Species Action Plans (HAPs and SAPs).

1.2.3 Eco-Town guidance

In addition to a range of legislation described above in section 1.2.1, a wealth of policy and other guidance is available to govern and direct development proposals in their responsibilities with regard to ecology and biodiversity. These include the recently-published governmental guidance that specifically sets out how to deal with eco-town proposals (Biodiversity Positive: Eco-towns Biodiversity Worksheet, TCPA, 2009). The key points of this (referred to as the principal objectives for an Eco-town Biodiversity Strategy) are as follows:

- **Protecting and enhancing the best of biodiversity**: key habitat areas supporting characteristic and uncommon species should be sustained, where conservation is the main priority.
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- **Increasing biodiversity's resilience and ability to adapt to climate change**: ensuring a robust connectivity of habitats that facilitates the wider movement and migration of species.

This provides a clear steer for the design of an eco-town proposal, such that the avoidance of key habitat areas must be the priority, followed by the retention and creation of a matrix of secondary habitats both within and outside of the built area, and that all of the above are robustly connected to facilitate future wildlife movements and dispersals. Other key elements of the approach include making provisions for management, funding and accountability, to ensure success.

All eco-town proposals should include an Eco-Town Biodiversity Strategy (ETBS) to be developed in tandem with the masterplan for the site. This will provide the framework for delivering net biodiversity gain, setting out what is to be achieved and the steps that are needed to achieve it and, most importantly, how biodiversity will be increased and enhanced in advance of and alongside development, rather than at the end of the development process. It should include specific measurable targets for net biodiversity gain, reflecting local priorities for biodiversity (and contributing to national and regional targets as appropriate) and it should take account of the challenges posed by climate change.

1.2.4 Biodiversity Targets

The UK Biodiversity Action Plan (UK BAP) was produced in accordance with the 1992 UN Convention on Biological Diversity. It describes the UK's biological resources and commits a detailed plan for the protection of these resources, focusing on key habitats and species considered to be of particular significance to nature conservation within a UK context.

The conservation priorities that will be most appropriate to the Bicester eco-town proposal are those listed within the UK and (at the lower tier) Oxfordshire Biodiversity Action Plans (BAPs). These list a number of key habitats and species that form the priorities for conservation in those areas and serve as an existing framework within which the Eco-town can work and provide positive contributions to nature conservation at both local and national scales.

1.3 Aims and Objectives

The aims and objective of the crayfish survey are to:

- assess the suitability of the watercourses and waterbodies within the development areas for crayfish;
- determine the presence/likely absence of crayfish within suitable watercourses and waterbodies within the proposed development areas; and
- outline mitigation measures during works in the event that crayfish are present on the site.

1.4 Report Content and Layout

Firstly, the desk based and field survey methodology is presented in Section 2 followed by the results and discussion in Section 3. The final conclusions and recommendations in Section 4 provide recommendations for the type of

mitigation that will be required during works to these watercourses to protect biodiversity.

2 Methodology

2.1 Desk Study

Existing data for white-clawed crayfish and American signal crayfish was obtained from the NBN Gateway.

2.2 Field Survey

The crayfish survey season is considered to be between May to October inclusive with the optimal time for survey between July and September inclusive (Peay, 2003). The season is dependent on suitable habitat conditions for survey and the avoidance of the crayfish breeding season. The watercourses that were surveyed are shown on Figure 2.

The habitat was assessed for its suitability to support white-clawed crayfish based on the habitat descriptions in Holdich (2003) and Peay (2003). The survey was undertaken on 5th August. The following information was recorded:

- Water clarity.
- Bed substrate and materials suitable for refuge.
- Potential food supply.
- Siltation.
- Observed presence of crayfish and fish.
- Any negative indicators e.g. pollution inputs.

These details were also recorded during the trapping survey and torchlight survey visits to ensure that any changes in conditions had been monitored.

2.2.1 Survey Limitations

The findings presented in this report represent those at the time of survey and reporting. Variations in these conditions will take place as a result of seasonal factors, and with the general passage of time.

It should also be noted that fauna may travel over wide areas and can have large home ranges and so can be overlooked within surveys. Species which are absent at the time of survey may also return to or colonise a site anew at any future time.

3 Results and Discussion

3.1 Desk Study

White-clawed crayfish have been observed within Langford Brook to the south of Bicester in 1994 and 1997. However, American signal crayfish have been recorded in Langford Brook in 2009 (NBN Gateway).

American signal crayfish have also been found in the ponds in Bucknell. The data for this record was not certain but it could have been before 1978 (NBN Gateway). More recent records for American signal crayfish for the River Cherwell have been recorded near Bucknell in 2000 and 2002.

A dead American signal crayfish was found on the bank next to Crowmarsh Pond (to the west of the survey area) during a survey for riparian mammals in July 2010 (Arup, 2010).

3.2 Field Survey

The results of the habitat suitability assessment are shown in Figure 2. No historic crayfish burrows were observed along this section. The watercourse is dry within the Exemplar site. As a result, the watercourses are not considered to be suitable to support a breeding population of crayfish.

Connecting watercourses and waterbodies to this section had some suitability to support crayfish.

3.3 Discussion

The watercourses within the Exemplar site were dry at the time of the survey and would not allow a breeding population of crayfish to establish at this location. However, when flows return over winter and into spring the source of the water may pass through waterbodies and watercourses that have suitability for crayfish. It is known that American signal crayfish are present in the wider area although they have not been confirmed to be present within connecting waterbodies and watercourses. Therefore, it is possible that individual American signal crayfish if present may be washed downstream into this section from time to time. Due to the presence of American signal crayfish in the area it is highly unlikely that white-clawed crayfish are present in connecting watercourses and waterbodies.

4 Conclusions and Recommendations

The watercourses within the Exemplar site are considered to be unsuitable to support a breeding population of crayfish. However, it is possible that individual American signal crayfish, if present upstream of these dry sections, may be washed downstream into these sections from time to time. Due to the presence of American signal crayfish in the area it is highly unlikely that white-clawed crayfish are present in connecting watercourses and waterbodies. Therefore, the risk of the protected white-clawed crayfish being present is very low.

American signal crayfish are not protected rather they are an undesirable alien invasive species that carry crayfish plague and predate on our native white-clawed crayfish. As a precaution it should be assumed that there is a risk of American signal crayfish and crayfish plague being transferred between watercourses and sites while the watercourses are wet within the Exemplar site.

A method statement for the works should be prepared in advance of works to prevent the spread of American signal crayfish and crayfish plague. All contractors should be informed of their responsibilities in relation to this species to include the following:

- Requirements for disinfection of site vehicles, equipment and personal clothing where contact has been made with any mud, vegetation and water in or near to watercourses within the development site when damp or wet.
- Instructions on the euthanasia and disposal of American signal crayfish that may be removed from the watercourse and/or waterbody during works.
- A protocol for briefing staff on the presence of American signal crayfish and their responsibility to prevent the spread of this species and the crayfish plague.
- Emergency contact details for a licenced crayfish surveyor to be used in the event that crayfish are found during works and there is a lack of certainty as to the identification of this species.

5 References

Holdich, D. (2003). Ecology of the White-clawed Crayfish. *Conserving Natura 2000 Rivers Ecology Series No. 1*. English Nature, Peterborough.

Peay, S. (2003). Monitoring the White-clawed Crayfish *Austropotamobius pallipes*. *Conserving Natura 2000 Rivers Monitoring Series No. 1*, English Nature, Peterborough.

Peay, S. (2000). *Guidance on works affecting white-clawed crayfish. Report FIN/CON/139.* English Nature, Peterborough.

A1 Figures

A1.1 Figure 1: Site Area

A3

N

92m

Lodge

CAVER

Caversfield House

PW

Sluices Weir

86m

Track

South Lodge Riding Stables

B4100

Home Farm

Home Farm

Legend

Exemplar Site Boundary

Issue	Date	By	Chkd	Appd
-	22-09-2010	AE	SC	AB

ARUP

13 Fitzroy Street
London W1T 4BQ
Tel +44 (0)20 7636 1531 Fax +44 (0)20 7580 3924
www.arup.com

Client
A2 Dominion

Job Title
Bicester Eco-town

Drawing Title
Site Overview

Scale at A3
1:4,500

Discipline
Ecology

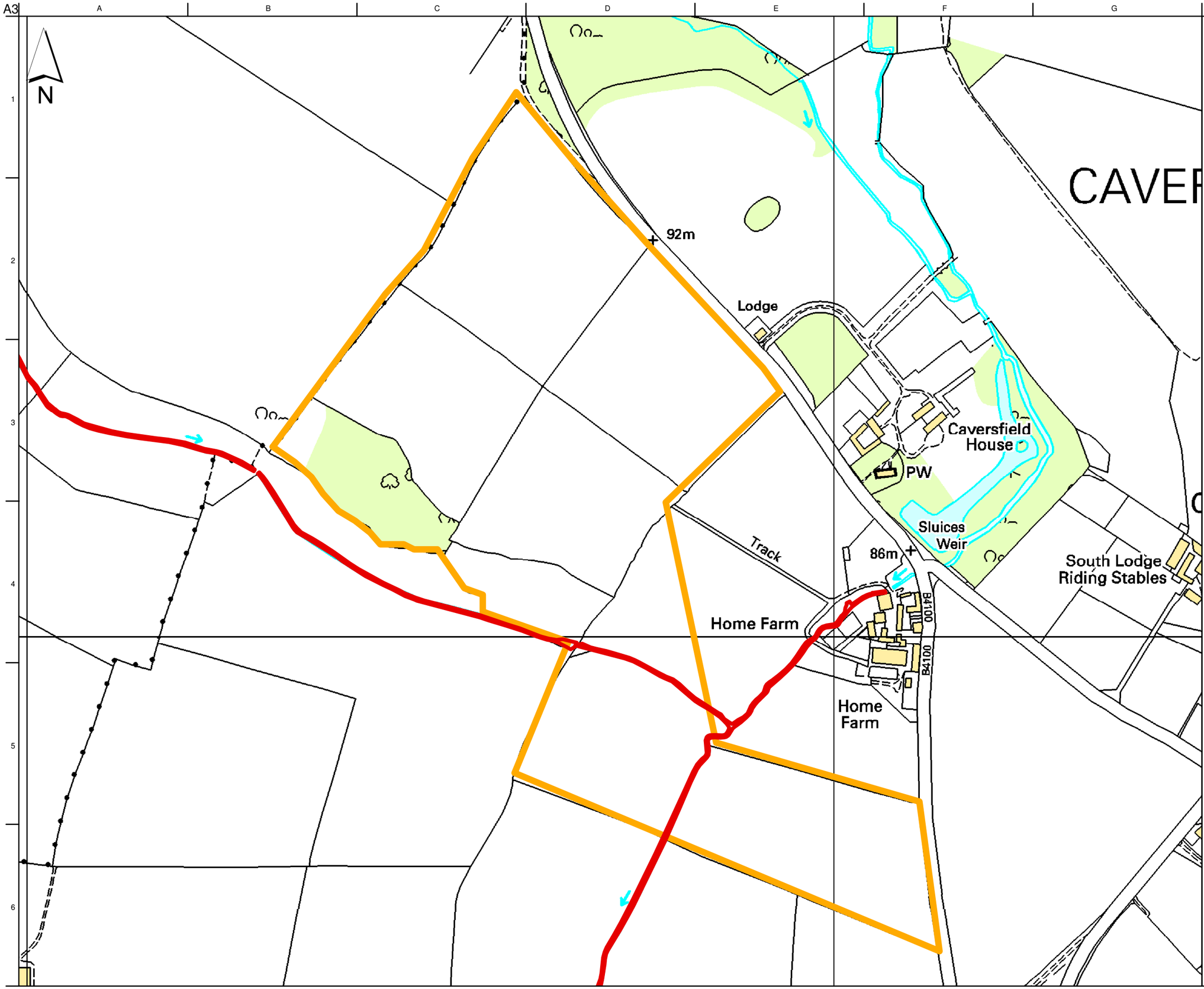
Drawing Status
Draft

Job No	Drawing No	Issue
213225-00	Figure 1	-

Do not scale

A1.2 Figure 2: Crayfish Survey Areas

A3



Legend

- Damp/Dry watercourse
- Wet watercourse
- Exemplar Site Boundary

Issue	Date	By	Chkd	Appd
-	24-09-2010	AE	SC	AB

ARUP

13 Fitzroy Street
London W1T 4BQ
Tel +44 (0)20 7636 1531 Fax +44 (0)20 7580 3924
www.arup.com

Client
A2 Dominion

Job Title
Bicester Eco-town

Drawing Title
Crayfish Survey Areas

Scale at A3
1:4,500

Discipline
Ecology

Drawing Status
Draft

Job No	Drawing No	Issue
213225-00	Figure 2	-

Do not scale

APPENDIX 7E

Arup (2010) Great Crested Newt Survey

A2 Dominion
Bicester Eco-Town
Great Crested Newt Survey

Issue | November 2010

This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number 213225-00

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13 Fitzroy Street
London W1T 4BQ
www.arup.com

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Document Verification

ARUP

Job title		Bicester Eco-Town			**Job number** 213225-00
Document title		Great Crested Newt Survey			**File reference**
Document ref		J/213000/213225-00			
Revision	**Date**	**Filename**	Bicester Exemplar Great Crested Newt Survey Report Draft 1.docx		
Draft 1	31/08/10	**Description**	First draft		
			Prepared by	Checked by	Approved by
		Name	James Brock	Austin Brown	Michael Bull
		Signature			
Draft 2	29/09/10	**Filename**	Bicester Exemplar Great Crested Newt Survey Report Draft 2.docx		
		Description	Incorporating checkers comments		
			Prepared by	Checked by	Approved by
		Name	James Brock	Austin Brown	Michael Bull
		Signature			
Issue	04/11/10	**Filename**	Bicester Exemplar Great Crested Newt Survey Report		
		Description	Incorporating reviewers comments		
			Prepared by	Checked by	Approved by
		Name	James Brock	Austin Brown	Michael Bull
		Signature			
		Filename			
		Description			
			Prepared by	Checked by	Approved by
		Name			
		Signature			
				Issue Document Verification with Document	✓

Contents

1 Introduction

1.1 Background

Arup have been commissioned by A2 Dominion to carry out a suite of protected species and habitat surveys for the proposed Bicester Exemplar Eco-Town development in Oxfordshire. This study was undertaken to obtain information on the presence/absence of populations of Great Crested Newts that may be affected by the proposed works.

The proposed development is located within a belt of predominantly grazing farmland which lies to the north west of Bicester. (SP 577 251); the boundary of the exemplar site is shown in Appendix A. At present the proposed development area consists of a matrix of farmland with up to 10 grazed fields separated by many high quality species rich hedgerows. A distinct lowland area with an ephemeral stream runs east to west through the south and central areas of the site, and midway flows into a second ephemeral stream running north to south through the site.

At present the farmland within the development area is being managed in a relatively sensitive manner with regards to biodiversity. This includes areas set aside for badger setts, numerous bird boxes, including barn owl (*Tyto alba*) and kestrel (*Falco tinnunculus*) and the provision of bat boxes. Hedgerows have been maintained to produce a wide, continuous and mostly species rich structure and are playing an important part for biodiversity on the site.

This report details the findings of the study and provides relevant recommendations to ensure legal compliance during the works.

1.2 Ecology and Legislation

1.2.1 Generic Legislation

This report and its recommendations have been produced in accordance with relevant legislation and best practice guidance. They also take into account Planning Policy Statement 9 (PPS9) and other nature conservation policies within local and regional planning policy documents.

Legislation relating to ecological resources that are relevant to this appraisal includes the following:

- ***Wildlife and Countryside Act, 1981 (as amended).*** This Legislation still comprises the primary means of protecting wildlife in the UK and provides the mechanism by which a number of international directives are implemented in the UK.
- ***Conservation (Natural Habitats &c.) Regulations, 1994.*** This Act provides protection for European protected species such as bats and great crested newts.
- ***Countryside and Rights of Way (CROW) Act, 2000.*** The CROW Act strengthened the details of The Wildlife and Countryside Act in relation to Sites of Special Scientific Interest (SSSI) and threatened species.
- ***Natural Environment and Rural Communities (NERC) Act, 2006.*** This Act puts an obligation on public bodies and statutory undertakers to ensure due regard to the conservation of biodiversity.

- ***Planning Policy Statement 9 (PPS9).*** This sets out the Government's planning policies on the protection of biodiversity and geological conservation through the planning system. The policies set out in PPS9 may also be material to decisions on individual planning applications.

The key principles of the PPS9 are stated as:

"Regional planning bodies and local planning authorities should adhere to the following key principles to ensure that the potential impacts of planning decisions on biodiversity and geological conservation are fully considered…….

(vi) the aim of planning decisions should be to prevent harm to biodiversity and geological conservation interests. Where granting planning permission would result in significant harm to those interests, local planning authorities will need to be satisfied that the development cannot reasonably be located on any alternative sites that would result in less or no harm. In the absence of any such alternatives, local planning authorities should ensure that, before planning permission is granted, adequate mitigation measures are put in place. Where a planning decision would result in significant harm to biodiversity and geological interests which cannot be prevented or adequately mitigated against, appropriate compensation measures should be sought. If that significant harm cannot be prevented, adequately mitigated against, or compensated for, then planning permission should be refused."

In addition, PPS9 states:

"Development proposals provide many good opportunities for building-in beneficial biodiversity or geological features as part of good design. When considering proposals, local planning authorities should maximise such opportunities in and around developments, using planning obligations where necessary."

In respect of species protection, PPS9 states:

"*……planning authorities should ensure that these species are protected from the adverse effects of development, where appropriate, by using planning conditions or obligations. Planning authorities should refuse permission where harm to the species or their habitats would result unless the need for, and benefits of, the development clearly outweigh that harm*".

1.2.2 Specific Legislation

Great Crested Newt is afforded legal protection by the provisions of The Wildlife & Countryside Act 1981 (as amended) and The Conservation (Natural Habitats etc) Regulations 1994. As such, without a licence from Natural England, it would constitute an offence to intentionally, deliberately or recklessly:

- kill, injure or capture a Great Crested Newt;
- damage, destroy or obstruct access to any breeding site or resting place of a Great Crested Newt;
- disturb a Great Crested Newt while it is occupying a structure or place that it uses for shelter or protection.

1.2.3 Eco-Town guidance

In addition to a range of legislation described above in section 1.2.1, a wealth of policy and other guidance is available to govern and direct development proposals in their

responsibilities with regard to ecology and biodiversity. These include the recently-published governmental guidance that specifically sets out how to deal with eco-town proposals (Biodiversity Positive: Eco-towns Biodiversity Worksheet, TCPA, 2009). The key points of this (referred to as the principal objectives for an Eco-town Biodiversity Strategy) are as follows:

- **Protecting and enhancing the best of biodiversity**: key habitat areas supporting characteristic and uncommon species should be sustained, where conservation is the main priority.
- **Mitigating the impact of development and securing net biodiversity gain**: the inclusion of supplementary habitat areas that fulfil other green infrastructure functions and support more widespread and common species.
- **Integrating biodiversity within the built environment:** the incorporation of a high degree of permeability for wildlife within built areas and structures.
- **Increasing biodiversity's resilience and ability to adapt to climate change**: ensuring a robust connectivity of habitats that facilitates the wider movement and migration of species.

This provides a clear steer for the design of an eco-town proposal, such that the avoidance of key habitat areas must be the priority, followed by the retention and creation of a matrix of secondary habitats both within and outside of the built area, and that all of the above are robustly connected to facilitate future wildlife movements and dispersals. Other key elements of the approach include making provisions for management, funding and accountability, to ensure success.

All eco-town proposals should include an Eco-Town Biodiversity Strategy (ETBS) to be developed in tandem with the masterplan for the site. This will provide the framework for delivering net biodiversity gain, setting out what is to be achieved and the steps that are needed to achieve it and, most importantly, how biodiversity will be increased and enhanced in advance of and alongside development, rather than at the end of the development process. It should include specific measurable targets for net biodiversity gain, reflecting local priorities for biodiversity (and contributing to national and regional targets as appropriate) and it should take account of the challenges posed by climate change.

1.2.4 Biodiversity Targets

The UK Biodiversity Action Plan (UK BAP) was produced in accordance with the 1992 UN Convention on Biological Diversity. It describes the UK's biological resources and commits a detailed plan for the protection of these resources, focusing on key habitats and species considered to be of particular significance to nature conservation within a UK context.

The conservation priorities that will be most appropriate to the Bicester eco-town proposal are those listed within the UK and (at the lower tier) Oxfordshire Biodiversity Action Plans (BAPs). These list a number of key habitats and species that form the priorities for conservation in those areas and serve as an existing framework within which the Eco-town can work and provide positive contributions to nature conservation at both local and national scales.

The Great Crested Newt is also listed as a Priority Species on the UK Biodiversity Action Plan (UKBAP). The Great Crested Newt is also included on the Biodiversity in Oxfordshire Local Biodiversity Action Plan (LBAP). The LBAP objectives and targets for the Great Crested Newt include the creation and enhancement of ponds and surrounding terrestrial habitat.

1.3 Aims and Objectives

The aim of this study is to obtain information on the presence/absence of populations of Great Crested Newts that may be affected by the proposed works, and to identify any implications that the development may have on this species.

1.4 Report Content and Layout

The methodology of the survey undertaken is detailed in Section 2; the results of the survey are summarised in Section 3 and Section 4 contains the discussion and recommendations. Appendix A contains the survey drawing. Appendix A contains the survey drawing and Appendices B & C an example of the survey recording sheets and the weather data.

2 Methodology

2.1 Desk Study

Thames Valley Environmental Records Centre, the biological recording centre for the Oxfordshire area, were contacted for past records of amphibians within 500 m of the boundary of the proposal site.

2.2 Field Survey

2.2.1 Survey Area

Where access was permitted, all ponds within 500 metres of the boundary of the proposed development were subject to assessment and survey. Four ponds were assessed for their suitability for Great Crested Newts, of which 3 were subject to full surveys as described below.

Surveys were carried out by five experienced ecologists who possess Great Crested Newt survey licences. A Survey Map showing the locations of all ponds is provided in Appendix A.

2.2.2 Survey Methodology

Surveys were conducted between 10th and 25th of May 2010.

The ponds were surveyed using four of the following techniques, where deemed suitable:

- bottle trapping;
- sweep netting;
- egg searching;
- torching; and,
- refugia search.

These techniques were used in combination to maximise the chances of detecting amphibians (particularly Great Crested Newts). Each survey visit comprised four of the five survey techniques, where a particular method was deemed suitable for certain water bodies, in accordance with standard guidance (English Nature, 2001).

2.2.3 Bottle Trapping

This method is considered to be the most effective technique for determining presence and assisting with making adult population assessments. It involves setting bottle traps, made from 2 litre plastic drinks bottles, along the pond/ditch margins. A total of 15 traps were set at the 3 waterbodies, just before dusk, and were left overnight with an air bubble in them, and retrieved soon after sunrise the following morning.

2.2.4 Sweep Netting

A net with a 2mm × 4mm mesh was used during the day to survey waterbodies at a rate of approximately 15 minutes netting per 50m of shoreline. Netting allows the detection of both adults and juveniles (all amphibians) although it is the least effective of all the methods, due in part to the disturbance it can cause. It is best used to determine presence/absence rather than population size and can be more effective for larvae in late summer, although care must be taken not to damage the gills.

2.2.5 Egg Searching

Margins of the waterbodies were searched for amphibian eggs in order to confirm the presence of breeding adults. Adult female newts lay their eggs on submerged vegetation and sometimes debris. The distinctive eggs are often laid on the leaves of aquatic plants, which are then folded over eggs and held in place with an adhesive substance. It is believed that by covering the eggs, this confers some degree of protection from predation and damage. The search for eggs was undertaken with care, trying not to damage or disturb the pond and surrounding vegetation unnecessarily.

2.2.6 Torching

After dusk, torches were used to shine light into the waterbodies during darkness to see what amphibians were present. If the water is clear, this method can be used for detecting presence, and for assessing adult population estimates. The perimeter of the pond/ditch was walked (as far as safe access permitted), and all adults observed were counted.

2.2.7 Refuge Search

Where present, natural and artificial refugia surrounding the waterbodies were also checked for the presence of newts. Artificial refugia include pieces of corrugated iron, wooden boards and roofing felt. Natural refugia include logs, debris, bark, moss, stones/rocks etc. Juveniles and adults can be detected using this method; however it is usually most effective as an additional method, to supplement other surveys such as bottle trapping. All refugia were replaced in the same position once checked, and artificial refugia were removed once the survey is completed.

2.3 Limitations

Not all waterbodies were accessible due to access restrictions placed on the survey by land owners who were unhappy with either the project or the communications that they had received from the client.

The findings presented in this report represent those at the time of survey and reporting. Variations in these conditions will take place as a result of seasonal factors, and with the general passage of time.

It should also be noted that fauna may travel over wide areas and can have large home ranges and so can be overlooked within surveys. Species which are absent at the time of survey may also return to or colonise a site anew at any future time.

3 Results and Discussion

3.1 Desk Study

Thames Valley Environmental Records Centre provided past records of Great Crested Newts from within 500 metres of the site; no records exist for this area.

3.2 Field Survey

3.2.1 Pond Suitability

Four ponds were identified through desk-study review of aerial photographs, the Phase 1 Habitat Survey (Arup, 2010), Ordnance Survey maps, and from speaking with land-owners, all ponds within 500 metres of the exemplar site were considered. All water bodies identified from OS maps and aerial photographs that lay east of the B4100 were de-selected due to a lack of willingness on the part of the land-owners to provide access to surveyors.

Each waterbody was visited to assess the suitability of the ponds for Great Crested Newts; each pond was assessed using the pond HSI scoring system (Oldham *et al*, 2000*)*. Only 3 ponds were considered suitable for surveying. Table 2 details the reasons for deselecting ponds; the Pond numbers correlate to those shown in Fig 1 contained in Appendix A.

Table 2: Details of all ponds within 500 metres of the Proposed Development site and, where necessary, the reasons for de-selection from the Great Crested Newt survey

Pond Number	Location (NGR)	Description	HSI Scores	Survey Required?
1	SP580250	Small pond, immediately offline from the small brook to the rear (north-west) of Home Farm. Deep, open water with marginal vegetation, surrounded by scrub, trees and a small section of lawn.	0.51 (below average)	Yes
2	SP580250	Small pond, online the small brook to the rear (north-west) of Home Farm. Shallow water with dense emergent vegetation, surrounded by scrub, trees and a small section of lawn.	0.59 (below average)	Yes
3	SP576249	Small pond, online the winterbourne from Bucknell. Marginal and emergent vegetation and bound to the south by a defunct hedgerow and to the north by grazing pasture.	0.54 (below average)	This pond was entirely dried out by the 10th May 2010 - **Unsuitable**
4	SP571258	Spring-fed pond within woodland adjacent to Bainton Road, east of Bucknell. Open water with marginal and emergent vegetation.	0.47 (poor)	Yes

3.2.2 Habitat Characteristics

All the waterbodies surveyed lie outside the exemplar site boundary; Pond 4 lies 500 metres north of the north-western boundary and 1 and 2 within 200 metres of the boundary adjacent to Home Farm.

Ponds 1 and 2 lie adjacent to the small winterbourne that flows from Caversfield south towards Bicester around Home Farm. Pond 1 is separated from the water course by a

wooded bank and is set in a deep depression within an area of lawn and ruderal vegetation; it has some marginal vegetation including reed sweet grass *Glyceria maxima* and lesser reedmace *Typha latifolia*. Pond 2 is immediately to the south of Pond 1 and is online the water course. It is densely vegetated with reed sweet grass with occasional water forget-me-not *Myosotis scorpioides* and water mint *Mentha aquatica*.

EP4 lies immediately north of Bainton Road, behind the hedgerow lining the lane, within an area of woodland. The pond is relatively shallow and is dominated by wavy bitter-cress *Cardamine flexuosa* with some water mint and water forget-me-not. The invasive, non-native aquatic plant New Zealand pygmy weed *Crassula helmsii* was recorded at this pond.

3.2.3 Weather Conditions

Suitable weather conditions for recording amphibians prevailed during the surveys and the weather on each of the survey visits is detailed in Appendix C.

3.2.4 Amphibian Field Records

No amphibian species were recorded from the 3 waterbodies that were surveyed within 500 metres of the exemplar site.

3.3 Discussion

The water-bodies surveyed were small, averaging 40 metres squared. All ponds have areas of open water and support a range of marginal plant species that provide egg-laying habitat. However, whilst ponds 1 and 2 lie alongside each other, pond 4 is 1.9 kilometres away; ponds are therefore considered too infrequent within the landscape to provide optimal breeding habitat for GCN. Pond 4 dried out early on in the summer therefore this pond is not suitable breeding habitat.

A large fish pond is present within the grounds of Caversfield House, and in discussions with various landowners it was ascertained that there are further ponds to the north of Caversfield House, however the current owners of this property did not agree to surveys being undertaken on their land. The fish pond is unsuitable for GCN as the fish would feed on the eggs and immature newt life stages (efts); the other ponds potentially present are at least 700 metres from ponds 1 and 2, and up to 1.8 kilometres from 4. Should there be populations of GCN within the ponds north of Caversfield then these are at such a distance from the waterbodies around the exemplar site that any population expansion at that locality would not result in the utilisation of the ponds around the exemplar site by any hypothetical population.

Several ponds are located within and around the village of Bucknell at a frequency that provides a greater suitability for GCN and therefore it is considered possible that this species would be present in this area; it is possible that, should this species be recorded present in Bucknell that a large population may create a source of GCN that could utilise the ponds around the exemplar site, however it is considered unlikely that any small population would remain viable with the limited breeding habitat available.

4 Conclusions and Recommendations

The survey results are limited due to the restrictions on accessing all water-bodies within 500 metres of the exemplar site. Whilst the survey results suggest that there are currently no breeding populations of Great Crested Newt within 500 metres of the exemplar site, this is not a complete picture of the potential amphibian populations around the site.

Of the ponds surveyed, number 3 and 4 both dried out before the end of the breeding season and are therefore unsuitable for Great Crested Newt. With only two, small potential breeding ponds within 500 metres of this site the site is considered sub-optimal for Great Crested Newts.

Given the condition and types of ponds present on site, it is considered unlikely that should a possible population adjacent to the site expand in size and range that the ponds within the exemplar site (taking into consideration fluctuating water levels of water bodies and water courses throughout the area, and habitat linkages) could support an viable population of Great Crested Newt, however they would likely support other amphibian species.

The intent of the policies with regards the design of Eco-Towns focus on the enhancement of biodiversity within the development and the net increase of biodiversity value within the site. Therefore, to increase the value of the site for amphibians, the following landscaping and habitat management options are recommended:

- a number of ponds are created within the development of varying types to provide for different amphibian species;
- all extant ponds to be protected along with at least a 10m margin of habitat that is not managed for amenity purposes;
- all ponds are to be linked by structured vegetation such as hedgerows and associated grassland margins, the latter not managed for amenity purposes;
- the hedgerows, ditches and winterbournes present throughout the site should be protected along with a suitable margin to ensure the continuity of presence of ecological corridors to permit fluctuating amphibian populations within the locality move into the site; and,
- management of the habitats within development should be sensitive to the likely presence of amphibian species within grasslands, hedgerows and woodland.

It is also recommended that further amphibian survey works are undertaken to ensure that the waterbodies within the land to the east of the B4100 are correctly and appropriately assessed for the presence of protected amphibian species.

References

[1] Arnold, N. & Ovenden, D. (2002). A Field Guide to the Reptiles and Amphibians of Britain and Europe. Collins, London.

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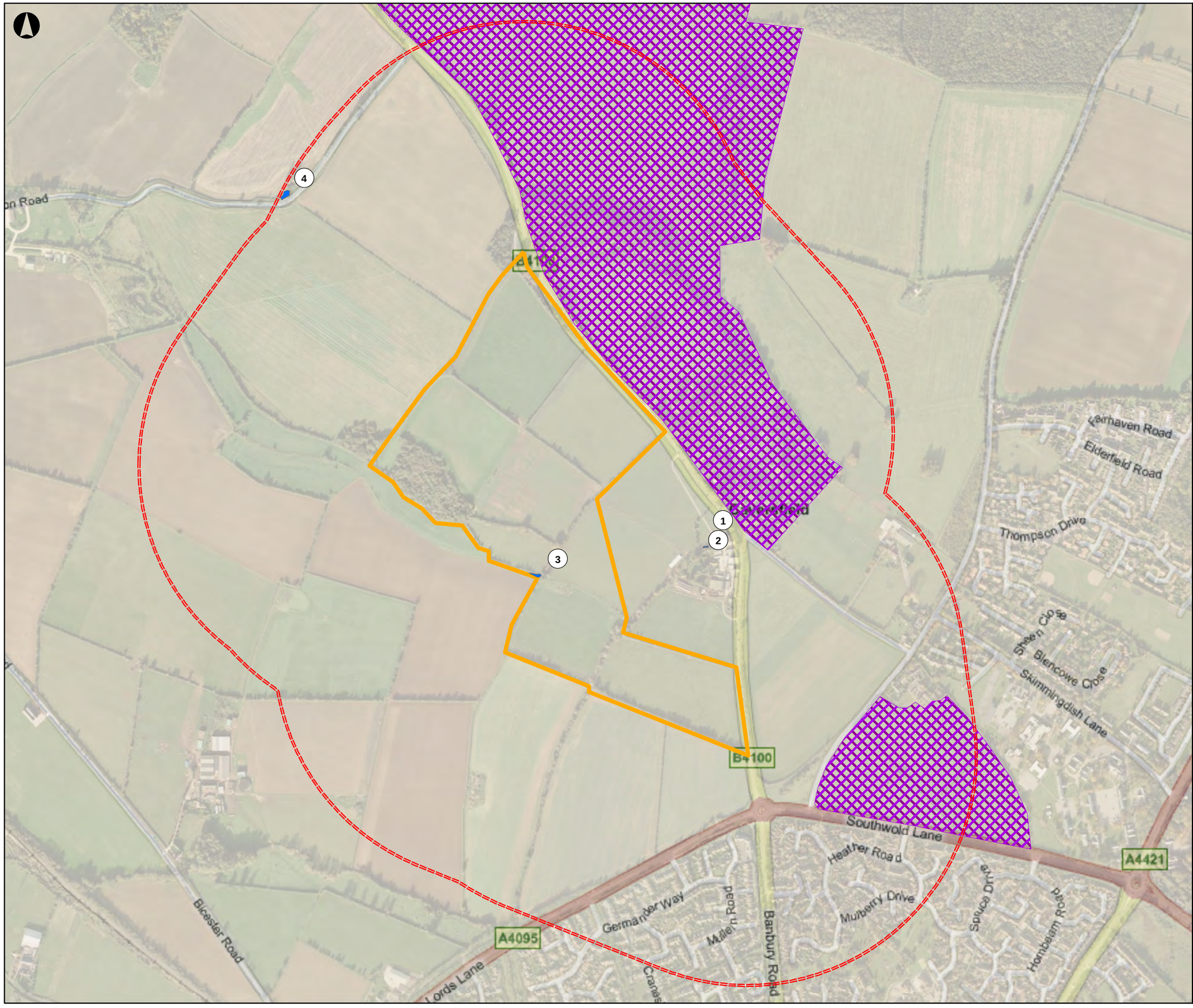
[3] Oldham, R. S.; Keeble, J.; Swan, M. J. S. & Jeffcote, M. (2000). *Evaluating the suitability of habitat for the great crested newt* (Triturus cristatus). The Herpetological Journal, Volume 10, Number 4.

[4] JNCC (1998). Herpetofauna Workers' Manual. Joint Nature Conservation Committee, Peterborough.

Appendix A

Great Crested Newt Survey Drawing



Legend

- Ponds Surveyed
- 500m Buffer around Exemplar Site
- No Access Permitted
- Exemplar Boundary

Issue	Date	By	Chkd	Appd
P1	22-07-10	JB	NW	PJ

Metres
0 180 360 720

ARUP

The Arup Campus, Blythe Gate
Blythe Valley Park, Solihull, West Midlands, B90 8AE
Tel +44 (0)121 213 3000 Fax +44 (0)121 213 3001
www.arup.com

Client
A2 Dominion

Job Title
Bicester Eco-town (Exemplar Site)

Drawing Title
Great Crested Newt Survey Surveyed Ponds

Scale at A3
1:12,500

Drawing Status
Issue

Job No	Drawing No	Issue
213225-00	Appendix A	P1

oFileLocation

Appendix B

Great Crested Newt Survey
Recording Sheet

Pond No:	Location:	NGR:	Recorders:	Dates:	Visit No:

Species	Netting	Egg /Spawn Search ✓/×	Refuge	Torching	Bottle Trapping No. Set: Time in: Time Out:	Visual Day	Visual Night
Date of Survey Method:							
Survey Method Used or Feasibility (Yes/No/Reason)							
Positive Result (✓) Negative Result (×)							
GCN MAD							
GCN FAD							
GCN Ind AD							
GCN Juv							
GCN Eft							
GCN Egg							
SN MAD							
SN FAD							
SN Ind AD							
SN Juv							
SN/PN Eft							
SN/PN Egg							
PN MAD							
PN FAD							
PN Ind AD							
AN							
CF MAD							
CF FAD							
CF Ind AD							
CF Pair (m+f)							
CF Juv							
CF Tad							
*CF Spawn		*					
CT MAD							
CT FAD							
CT Ind AD							
CT Pair (m+f)							
CT Juv							
CT Tad							
CT Spawn							
GF							

Weather

Morning – Date:

Air Temp Max:		Air Temp Min:		Water Temp:	
Sun (Circle)	None	Hazy	Rare	Occasional	Bright
	Very Hot	Hot	Warm	Mild	None
Wet Weather (circle)	None	Drizzle	Light	Moderate	Heavy
	Short Showers	Long Showers	Persistent	Hail	Snow
Wind (circle)	None	Light	Moderate	Strong	Beau/Speed:
	Rare Gusts	Occasional Gusts	Frequent Gusts	Persistent	Wind Dir:
Cloud	Type:	Cloud Cover %:		Oktas:	
		None	Low	Mid Cloud	High Cloud
Other Weather Conditions:	Frost	Icy	Fog	Lightning	Thunder

Afternoon – Date:

Air Temp Max:		Air Temp Min:		Water Temp:	
Sun (Circle)	None	Hazy	Rare	Occasional	Bright
	Very Hot	Hot	Warm	Mild	None
Wet Weather (circle)	None	Drizzle	Light	Moderate	Heavy
	Short Showers	Long Showers	Persistent	Hail	Snow
Wind (circle)	None	Light	Moderate	Strong	Beau/Speed:
	Rare Gusts	Occasional Gusts	Frequent Gusts	Persistent	Wind Dir:
Cloud	Type:	Cloud Cover %:		Oktas:	
		None	Low	Mid Cloud	High Cloud
Other Weather Conditions:	Frost	Icy	Fog	Lightning	Thunder

Night time – Date:

Air Temp Max:		Air Temp Min:		Water Temp:	
Moonlight	None	Occasional	Bright	Waxing/Waning	Full
Wet Weather (circle)	None	Drizzle	Light	Moderate	Heavy
	Short Showers	Long Showers	Persistent	Hail	Snow
Wind (circle)	None	Light	Moderate	Strong	Beau/Speed:
	Rare Gusts	Occasional Gusts	Frequent Gusts	Persistent	Wind Dir:
Cloud	Type:	Cloud Cover %:		Oktas:	
		None	Low	Mid Cloud	High Cloud
Other Weather Conditions:	Frost	Icy	Fog	Lightning	Thunder

Other Notes:

Appendix C

Great Crested Newt Survey
Weather Data

C1 Weather Data

Date	**10th – 11th May 2010**		
Air Temp Max	6	Wind	Light
Air Temp Min	4	Cloud	8/8
Precipitation	None	Other	-

Date	**11th – 12th May 2010**		
Air Temp Max	6	Wind	Light
Air Temp Min	4	Cloud	4/8
Precipitation	None	Other	-

Date	**17th – 18th May 2010**		
Air Temp Max	14	Wind	Light
Air Temp Min	12	Cloud	2/8
Precipitation	None	Other	-

Date	**24th – 25th May 2010**		
Air Temp Max	20	Wind	-
Air Temp Min	18	Cloud	0/8
Precipitation	None	Other	-

APPENDIX 7F

Arup (2010) Reptile Survey

A2 Dominion
Bicester Eco-Town
Reptile Survey

ISSUE | September 2010

This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number 213225-00

Ove Arup & Partners Ltd
13 Fitzroy Street
London W1T 4BQ
www.arup.com

ARUP

Document Verification

ARUP

Job title		Bicester Eco-Town		**Job number** 213225-00
Document title		Reptile Survey		**File reference**
Document ref		J/213000/213225-00		
Revision	**Date**	**Filename**		
Draft 1	31/08/10	**Description**	First draft	
			Prepared by	Checked by	Approved by
		Name	Austin Brown	Andrew Barron	Michael Bull
		Signature			
Issue	28/09/10	**Filename**	Protected species - Reptile report - issue.docx	
		Description	Minor changes	
			Prepared by	Checked by	Approved by
		Name	Austin Brown	Andrew Barron	Michael Bull
		Signature			
		Filename		
		Description		
			Prepared by	Checked by	Approved by
		Name			
		Signature			
		Filename		
		Description		
			Prepared by	Checked by	Approved by
		Name			
		Signature			
			Issue Document Verification with Document		✓

Contents

1 Introduction

1.1 Background

Arup has been commissioned by A2 Dominion to carry out a suite of protected species and habitat surveys for the proposed Bicester Exemplar Eco-Town development in Oxfordshire. This report is in respect of reptiles.

The proposed development is located within a belt of predominantly grazing farmland, with associated activities such as hay making, which lies to the north west of Bicester. (SP 577 251); The red line area is shown in Figure 1. At present the proposed development area consists of a matrix of farmland with up to 10 grazed fields separated by many high quality species rich hedgerows. A distinct lowland area with an ephemeral stream runs east to west through the south and central areas of the site, and midway flows into a second ephemeral stream running north to south through the site.

At present the farmland within the development area is being managed in a relatively sensitive manner with regards to biodiversity. This includes areas set aside for badger setts, numerous bird boxes, including barn owl (*Tyto alba*) and kestrel (*Falco tinnunculus*), and the provision of bat boxes. Hedgerows have been maintained to produce a wide, continuous and mostly species rich structure and are playing an important part for biodiversity on the site.

1.2 Ecology and Legislation

1.2.1 Generic Legislation

This report and its recommendations have been produced in accordance with relevant legislation and best practice guidance. It also takes into account Planning Policy Statement 9 (PPS9) and other nature conservation policies within local and regional planning policy documents.

Legislation relating to ecological resources that are relevant to this appraisal includes the following:

- ***Wildlife and Countryside Act, 1981 (as amended).*** This Legislation still forms the primary means of protecting wildlife in the UK and provides the mechanism by which a number of international directives are implemented in the UK.

- ***Conservation (Natural Habitats &c.) Regulations, 1994.*** This Act provides protection for European protected species such as bats, great crested newts and the hazel dormouse.

- ***Countryside and Rights of Way (CROW) Act, 2000.*** The CROW Act strengthened the details of The Wildlife and Countryside Act in relation to Sites of Special Scientific Interest (SSSI) and threatened species.

- ***Natural Environment and Rural Communities (NERC) Act, 2006.*** This Act puts an obligation on public bodies and statutory undertakers to ensure due regard to the conservation of biodiversity.

- ***Planning Policy Statement 9 (PPS9).*** This sets out the Government's planning policies on the protection of biodiversity and geological conservation through the planning system. The policies set out in PPS9 may also be material to decisions on individual planning applications.

The key principles of the PPS9 are stated as:

"Regional planning bodies and local planning authorities should adhere to the following key principles to ensure that the potential impacts of planning decisions on biodiversity and geological conservation are fully considered…….

(vi) the aim of planning decisions should be to prevent harm to biodiversity and geological conservation interests. Where granting planning permission would result in significant harm to those interests, local planning authorities will need to be satisfied that the development cannot reasonably be located on any alternative sites that would result in less or no harm. In the absence of any such alternatives, local planning authorities should ensure that, before planning permission is granted, adequate mitigation measures are put in place. Where a planning decision would result in significant harm to biodiversity and geological interests which cannot be prevented or adequately mitigated against, appropriate compensation measures should be sought. If that significant harm cannot be prevented, adequately mitigated against, or compensated for, then planning permission should be refused."

In addition, PPS9 states:

"Development proposals provide many good opportunities for building-in beneficial biodiversity or geological features as part of good design. When considering proposals, local planning authorities should maximise such opportunities in and around developments, using planning obligations where necessary."

In respect of species protection, PPS9 states:

"*……planning authorities should ensure that these species are protected from the adverse effects of development, where appropriate, by using planning conditions or obligations. Planning authorities should refuse permission where harm to the species or their habitats would result unless the need for, and benefits of, the development clearly outweigh that harm*".

1.2.2 Species Legislation

Common lizard (*Zootoca vivipara*), grass snake (*Natrix natrix*), slow-worm (*Anguis fragilis*), and adder (*Vipera berus*) are listed under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended), in respect of Section 9(5) and part of Section 9(1). This protection was extended by the Countryside and Rights of Way (CRoW) Act 2000. Under the legislation it is an offence to:

- Intentionally or deliberately kill or injure any individual of these species; or

- Sell or attempt to sell any part of these species either alive or dead.

1.2.3 Eco-Town guidance

In addition to a range of legislation described above in section 1.2.1, a wealth of policy and other guidance is available to govern and direct development proposals in their responsibilities with regard to ecology and biodiversity. These include the recently-published governmental guidance that specifically sets out how to deal with Eco-Town proposals (Biodiversity Positive: Eco-towns Biodiversity Worksheet, TCPA, 2009). The key points of this guidance (referred to as the principal objectives for an Eco-Town Biodiversity Strategy) are as follows:

- **Protecting and enhancing the best of biodiversity**: key habitat areas supporting characteristic and uncommon species should be sustained, where conservation is the main priority.
- **Mitigating the impact of development and securing net biodiversity gain**: the inclusion of supplementary habitat areas that fulfil other green infrastructure functions and support more widespread and common species.
- **Integrating biodiversity within the built environment:** the incorporation of a high degree of permeability for wildlife within built areas and structures.
- **Increasing biodiversity's resilience and ability to adapt to climate change**: ensuring a robust connectivity of habitats that facilitates the wider movement and migration of species.

This provides a clear steer for the design of an Eco-Town proposal, such that the avoidance of key habitat areas must be the priority, followed by the retention and creation of a matrix of secondary habitats both within and outside of the built area, and that all of the above are robustly connected to facilitate future wildlife movements and dispersals. Other key elements of the approach include making provisions for management, funding and accountability, to ensure success.

All Eco-Town proposals should include an Eco-Town Biodiversity Strategy (ETBS) to be developed in tandem with the masterplan for the site. This will provide the framework for delivering net biodiversity gain, setting out what is to be achieved and the steps that are needed to achieve it and, most importantly, how biodiversity will be increased and enhanced in advance of and alongside development, rather than at the end of the development process. It should include specific measurable targets for net biodiversity gain, reflecting local priorities for biodiversity (and contributing to national and regional targets as appropriate) and it should take account of the challenges posed by climate change.

1.2.4 Biodiversity Targets

The UK Biodiversity Action Plan (UK BAP) was produced in accordance with the 1992 UN Convention on Biological Diversity. It describes the UK's biological resources and commits a detailed plan for the protection of these resources, focusing on key habitats and species considered to be of particular significance to nature conservation within a UK context.

The conservation priorities that will be most appropriate to the Bicester Eco-Town proposal are those listed within the UK and (at the lower tier) Oxfordshire Biodiversity Action Plans (BAPs). These list a number of key habitats and

species that form the priorities for conservation in those areas and serve as an existing framework within which the Eco-Town can work and provide positive contributions to nature conservation at both local and national scales.

1.3 Aims and Objectives

These surveys aim to establish the likely presence or absence of reptiles at the Exemplar site and the suitability of the site for these species regardless of presence. The report will offer mitigation and enhancements for these species where needed.

1.4 Limitations

The findings presented in this report represent those at the time of survey and reporting. Variations in these conditions will take place as a result of seasonal factors, and with the general passage of time.

It should also be noted that fauna may travel over wide areas and can have large home ranges and so can be overlooked within surveys. Species which are absent at the time of survey may also return to or colonise a site anew at any future time.

1.5 Report Content and Layout

Following this introduction, Chapter 2 covers survey methodologies, chapter 3 presents the results and discussion and chapter 4 covers conclusions and recommendations.

2 Methodology

2.1 Desk Study

A desk study was conducted within a 5km radius of the site. This used on-line research tools including Nature on the Map (www.natureonthemap.org.uk) and the National Biodiversity Network Gateway (www.nbn.org.uk). The search looked for local occurrences of reptiles. Additional data were sourced from Thames Valley Environmental Records Centre.

UK Biodiversity Action Plans (UK BAPs) and Local Biodiversity Action Plans (LBAPs) were reviewed for relevant information. These plans list priority species and habitats for the country and its regions, and are the UK government's response to fulfilling its obligations to the Convention of Biological Diversity (CBD).

2.2 Field Survey

The accepted survey method for all species of British reptile (Gent and Gibson 2000)[1] involves the use of artificial refugia, such as corrugated metal and roofing felt sheets. These sheets tend to warm up faster than the surrounding habitat and provide a relatively warm, damp and secure habitat away from many predators, thus allowing the safe assimilation of heat that these species require. Reptiles will therefore use refugia in preference to the surrounding habitat (except during high temperatures), making refugia an excellent survey tool in helping to determine the density and distribution of reptiles in an area. The effectiveness of a refugia survey is dependent on the time of year; April, May, and September being the three key months, and the weather; with overcast days with sunny spells and temperatures not higher than 19°C being ideal.

Such refugia are recommended to be checked on at least seven separate visits for presence /absence surveys (Froglife 1999)[2]; however, not all survey visits should be on consecutive days, as too similar weather conditions may skew survey data. Each survey visit should consist of up to three rounds; however, this is highly dependent upon the size of the site and changing weather conditions on the day. For a rough population estimate, a minimum of ten survey visits should be used.

Ten survey visits[3] were made at the Exemplar site during suitable weather conditions. A total of 52 refugia were set over distinct areas on the site (Figure 2). Survey dates are shown in Table 1.

---

[1] Gent, A.H., & Gibson, S.D., eds. 1998. Herpetofauna workers' manual. Joint Nature Conservation Committee, Peterborough.
[2] FROGLIFE. 1999. Reptile Survey: An introduction to planning, conducting and interpreting surveys for snake and lizard conservation. Froglife Advice Sheet 10.
[3] Please note that whilst ten dedicated survey visits were made, many of the reptile mats were also checked on an ad hoc basis during the course of other protected species surveys.

3 Results and Discussion

3.1 Desk Study

Results from the local biological records centre and NBN show numerous historical grass snake (*Natrix natrix*) records within 5 km of the site, and one of common lizard (*Zootoca vivipara*) within 1km of the site. Grass snakes have been reported at Home Farm (Pers comm. farm owners).

3.2 Field Survey

Field surveys recorded two instances of common lizard within the north-east of the site and a single grass snake on the northern perimeter of the site's main wooded copse (see Figure 2 for locations). Table 1 below shows survey results. Please see Appendix 1for full results and weather

Table 1 Reptile survey results

Reptile survey number	date undertaken	Results
Tin Set up	07 May	NA
1	17 May	No reptiles seen
2	18 May	No reptiles seen
3	20 May	No reptiles seen
4	25 May	No reptiles seen
5	26 May	2 common lizards on NE boundary of site
6	28 May	No reptiles seen
7	03 June	No reptiles seen
8	02 Sept	No reptiles seen
9	06 Sept	1 grass snake on northern boundary of main copse.
10	07 Sept	No reptiles seen

3.3 Discussion

Due to the landscape nature of the Exemplar site, that of grazing lands, there are few areas of suitable reptile habitat and hence there is only a limited potential for these species. Surveys found common lizards and a grass snake along boundary features, which is in line with what would be expected. It is likely that reptiles will use any of the hedgerow or woodland boundary features on site, particularly those receiving full sun.

4 Conclusions and Recommendations

Due to the limited areas of reptile habitat that the boundary features provide (i.e. the hedgerows, woodland edges and stream banks) they become a focus for reptiles and hence become a crucial feature for them. For the reptile population on site to be maintained at a positive conservation status these boundary features should be preserved and should be enhanced with a buffer zone.

To recognise the targets and aspirations set by Eco-Town legislation, and associated governmental and borough targets, the following recommendations are made:

1. Maintain on-site connectivity as is afforded at present by the boundary features[4].
2. All boundary features should incorporate a buffer zone at least 10 meters wide and preferably more.
3. New reptile habitat should be created, as at present the low population, due to the lack of suitable habitats, is more vulnerable to external perturbations and hence local extinctions. Any new habitats should always be connected to existing habitats so as to create a larger interconnected habitat.
4. Increase the connectivity of reptile habitats to the wider landscape; this could be achieved by planting more hedgerows and incorporating rough grassland buffer areas.

[4] These will include hedgerows, woodland edges and stream banks.

Figures

A3

N

92m

Lodge

CAVER

Caversfield House

PW

Sluices Weir

86m

Track

South Lodge Riding Stables

B4100

Home Farm

Home Farm

Legend

Exemplar Site Boundary

Issue	Date	By	Chkd	Appd
-	22-09-2010	AE	SC	AB

ARUP

13 Fitzroy Street
London W1T 4BQ
Tel +44 (0)20 7636 1531 Fax +44 (0)20 7580 3924
www.arup.com

Client
A2 Dominion

Job Title
Bicester Eco-town

Drawing Title
Site Overview

Scale at A3
1:4,500

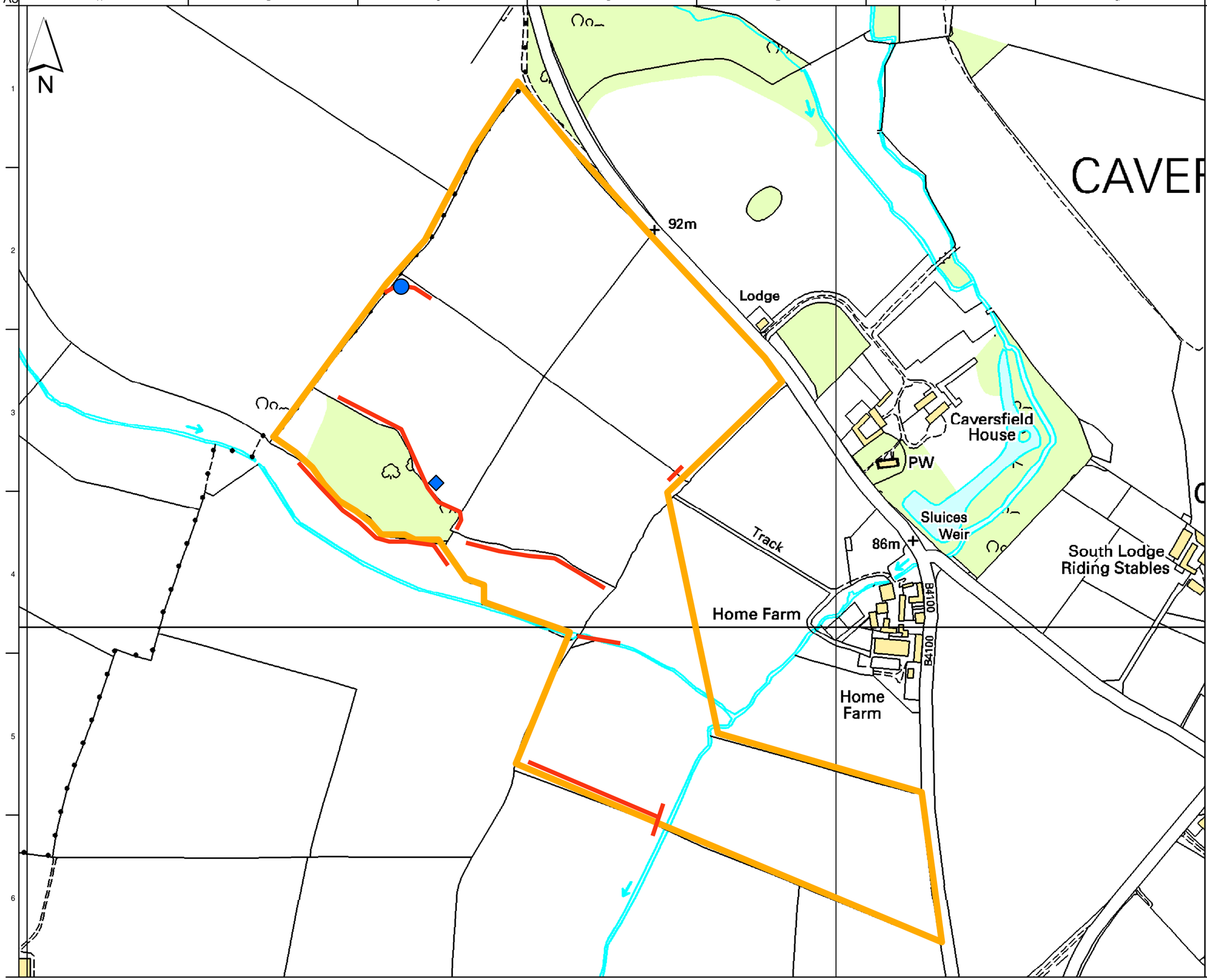
Discipline
Ecology

Drawing Status
Draft

Job No	Drawing No	Issue
213225-00	Figure 1	-

Do not scale

A3



Legend

- Common Lizard Sightings
- Grass Snake Sightings
- Reptile_Survey_Areas
- Exemplar Site Boundary

Issue	Date	By	Chkd	Appd
-	22-09-2010	AE	SC	AB

ARUP

13 Fitzroy Street
London W1T 4BQ
Tel +44 (0)20 7636 1531 Fax +44 (0)20 7580 3924
www.arup.com

Client
A2 Dominion

Job Title
Bicester Eco-town

Drawing Title
Reptile Survey Locations and Sightings

Scale at A3
1:4,500

Discipline
Ecology

Drawing Status
Draft

Job No	Drawing No	Issue
213225-00	Figure 2	-

Do not scale

A2 Survey Data

Date	Visit #		Results		Weather		
		Round #		Temp	Precipitation	Cloud	Wind
17/05/10	1	1	No reptiles observed.	12°C	None	3 oct	Light
		2	No reptiles observed	15°C	None	5 oct	Light
18/05/10	2	1	No reptiles observed	15°C	None	1oct	Light
		2	No reptiles observed	17°C	None	1oct	Light
20/05/10	3	1	No reptiles observed	16°C	None	4 oct	Moderate
		2	No reptiles observed	17°C	None	5 oct	Moderate
25/05/10	4	1	No reptiles observed	18°C	None	3 oct	Light
26/05/10	5	1	2 adult common lizards, NE site boundary	13°C	None	5 oct	Light
		2	No reptiles observed	15°C	None	5 oct	Light
28/05/10	6	1	No reptiles observed	16°C	None	4 oct	Light
		2	No reptiles observed	18°C	None	3 oct	Light
03/06/10	7	1	No reptiles observed	15°C	None	4 oct	Moderate

		2	No reptiles observed	16°C	None	5 oct	Moderate
02/09/10	8	1	No reptiles observed	17°C	None	4 oct	Still
		2	No reptiles observed	18°C	None	4 oct	Still
06/09/10	9	1	One adult grass snake (female) by main copse northern boundary	15°C	None	2 oct	Light
07/09/10	10	1	No reptiles observed	14°C	None	5 oct	Light
		2	No reptiles observed	18°C	None	3 oct	Light

APPENDIX 7G

Arup (2010) Breeding Bird Survey

A2 Dominion
Bicester Eco-town
Exemplar Site
Breeding Bird Survey

J/213000/213225-00

Issue | September 2010

This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number 213225-00

Ove Arup & Partners Ltd
13 Fitzroy Street
London W1T 4BQ
www.arup.com

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Document Verification

ARUP

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Document title		Breeding Bird Survey			**File reference**
Document ref		J/213000/213225-00			
Revision	**Date**	**Filename**	Breeding Bird Report.docx		
Draft 1	14/09/10	**Description**	First draft		
			Prepared by	Checked by	Approved by
		Name	Stephen Carter	Austin Brown	Michael Bull
		Signature			
Draft 2	28/09/10	**Filename**	Breeding Bird Report Draft 2.docx		
		Description	Including checkers comments		
			Prepared by	Checked by	Approved by
		Name			
		Signature			
Issue	28/09/10	**Filename**	Breeding Bird Report Issue.docx		
		Description	Including approvers comments		
			Prepared by	Checked by	Approved by
		Name	S.H.Carter		
		Signature			
		Filename			
		Description			
			Prepared by	Checked by	Approved by
		Name			
		Signature			
				Issue Document Verification with Document	✓

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1 Introduction

1.1 Background

Arup has been commissioned by A2 Dominion to carry out a suite of protected species and habitat surveys for the proposed Bicester eco-town development in Oxfordshire. This report describes the findings of a breeding bird survey (including barn owls) and the implications for development at the Exemplar Site (hereinafter referred to as the site).

The site is located within a belt predominantly grazing farmland, with associated activities such as hay making west of Home Farm and to the north west of Bicester (SP 577 251); the red line area is shown in **Figure 1**.

The main habitat types at the site comprise re-seeded arable leys, semi-improved neutral grassland (of varying floristic diversity that relates to the extent of improvement for cattle grazing), species-rich hedgerows and re-planted broad-leaved woodland. A shelterbelt of native broad-leaved trees has recently been planted along the southern site boundary. An ephemeral stream flows west to east across the central part of the site and midway flows into a second ephemeral stream that drains north to south. A belt of marginal vegetation and tall grasses occur adjacent to the streams.

1.2 Ecology and Legislation

The recommendations provided in this report take into account government guidance associated with eco-town development, biodiversity targets, legislation and planning policies that relate to nature conservation.

1.2.1 Generic Legislation

This report and its recommendations have been produced in accordance with relevant legislation and best practice guidance. They also take into account Planning Policy Statement 9 (PPS9) and other nature conservation policies within local and regional planning policy documents.

Legislation relating to ecological resources that are relevant to this appraisal includes the following:

- ***Wildlife and Countryside Act, 1981 (as amended).*** This Legislation still comprises the primary means of protecting wildlife in the UK and provides the mechanism by which a number of international directives are implemented in the UK.

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- ***Planning Policy Statement 9 (PPS9).*** This sets out the Government's planning policies on the protection of biodiversity and geological conservation through the planning system. The policies set out in PPS9 may also be material to decisions on individual planning applications.

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"Regional planning bodies and local planning authorities should adhere to the following key principles to ensure that the potential impacts of planning decisions on biodiversity and geological conservation are fully considered…….

(vi) the aim of planning decisions should be to prevent harm to biodiversity and geological conservation interests. Where granting planning permission would result in significant harm to those interests, local planning authorities will need to be satisfied that the development cannot reasonably be located on any alternative sites that would result in less or no harm. In the absence of any such alternatives, local planning authorities should ensure that, before planning permission is granted, adequate mitigation measures are put in place. Where a planning decision would result in significant harm to biodiversity and geological interests which cannot be prevented or adequately mitigated against, appropriate compensation measures should be sought. If that significant harm cannot be prevented, adequately mitigated against, or compensated for, then planning permission should be refused."

In addition, PPS9 states:

"Development proposals provide many good opportunities for building-in beneficial biodiversity or geological features as part of good design. When considering proposals, local planning authorities should maximise such opportunities in and around developments, using planning obligations where necessary."

In respect of species protection, PPS9 states:

"*……planning authorities should ensure that these species are protected from the adverse effects of development, where appropriate, by using planning conditions or obligations. Planning authorities should refuse permission where harm to the species or their habitats would result unless the need for, and benefits of, the development clearly outweigh that harm*".

1.2.2 Species Legislation

All wild birds (defined as species which are resident or are visitors to United Kingdom, but generally not game birds) are afforded legal protection by the Wildlife and Countryside Act 1981 (as amended). As far as planning and development is concerned, it is an offence to intentionally:

- kill;
- injure or take any wild bird or to take; or,
- damage or to destroy its nest, young or eggs.

Some species, such as barn owl, are listed on Schedule 1 of the Act and protected by additional penalties because of their rarity.

The protection afforded to wild birds through the provisions of Wildlife and Countryside 1981 (as amended) was extended by the Countryside and Rights of Way (CRoW) Act 2000 and it is also an offence to recklessly:

- disturb any such bird when it is building its nest or while it is in or near a nest containing dependant young; or,
- disturb the dependant young of any such bird.

1.2.3 Eco-town Guidance

In addition to a range of legislation described above in section 1.2.1, a wealth of policy and other guidance is available to govern and direct development proposals in their responsibilities with regard to ecology and biodiversity. These include the recently-published governmental guidance that specifically sets out how to deal with eco-town proposals (Biodiversity Positive: Eco-towns Biodiversity Worksheet, TCPA, 2009). The key points of this (referred to as the principal objectives for an Eco-town Biodiversity Strategy) are as follows:

- **Protecting and enhancing the best of biodiversity**: key habitat areas supporting characteristic and uncommon species should be sustained, where conservation is the main priority.
- **Mitigating the impact of development and securing net biodiversity gain**: the inclusion of supplementary habitat areas that fulfil other green infrastructure functions and support more widespread and common species.
- **Integrating biodiversity within the built environment**: the incorporation of a high degree of permeability for wildlife within built areas and structures.
- **Increasing biodiversity's resilience and ability to adapt to climate change**: ensuring a robust connectivity of habitats that facilitates the wider movement and migration of species.

This provides a clear steer for the design of an eco-town proposal, such that the avoidance of key habitat areas must be the priority, followed by the retention and creation of a matrix of secondary habitats both within and outside of the built area, and that all of the above are robustly connected to facilitate future wildlife movements and dispersals. Other key elements of the approach include making provisions for management, funding and accountability, to ensure success.

All eco-town proposals should include an ETBS to be developed in tandem with the masterplan for the site. This will provide the framework for delivering net biodiversity gain, setting out what is to be achieved and the steps that are needed to achieve it and, most importantly, how biodiversity will be increased and enhanced in advance of and alongside development, rather than at the end of the development process. It should include specific measurable targets for net biodiversity gain, reflecting local priorities for biodiversity (and contributing to national and regional targets as appropriate) and it should take account of the challenges posed by climate change.

1.2.4 Biodiversity Action Plans

The UK Biodiversity Action Plan (UK BAP) was produced in accordance with the 1992 UN Convention on Biological Diversity. It describes the UK's biological resources and commits a detailed plan for the protection of these resources, focusing on key habitats and species considered to be of particular significance to nature conservation within a UK context.

The conservation priorities that will be most appropriate to the Bicester eco-town proposal are those listed within the UK BAP and (at the lower tier) Oxfordshire Local Biodiversity Action Plan (LBAP). These list a number of key habitats and species that form the priorities for conservation in those areas and serve as an existing framework within which the eco-town can function and provide positive contributions to nature conservation at both local and national scales.

1.3 Aim and Objectives

The Phase 1 Habitat Survey (Arup, 2010) identified the need for a breeding bird survey to be undertaken at the site.

The aim of the breeding bird survey was to determine the ornithological value of the site when most species would be expected to nest.

The objectives of this study are to:

- determine the species and number of breeding territories at the site;
- evaluate the survey findings and to state whether any legally protected or otherwise notable species nest at the site;
- describe habitat features which support notable breeding bird species; and,
- recommend appropriate mitigation and compensation measures to balance the requirements of the proposed development.

1.4 Report Content and Layout

Following this introduction, Chapter 2 describes the methodology utilised to determine the presence of breeding bird territories at the site. Chapter 3 describes and discusses the breeding bird survey findings. The conclusions and recommendations are provided in Chapter 4. A list of references is provided in Chapter 5.

2 Methodology

2.1 Desk Study

Records of protected or otherwise notable birds were requested from the Thames Valley Environmental Records Centre (TVERC) within a 5km radius of the site.

Records of protected and otherwise notable bird records were also obtained from:

- Trevor Easterbrook of the Banbury Ornithological Society (BOS);
- Vince Cartwright of the Oxfordshire branch of the Barn Owl Conservation Network (BOCN); and the,
- Oxford Ornithological Society (OOS).

Reference is made to the general status of bird species recorded in Oxfordshire and listed on the OOS website (http://www.oos.org.uk/oxonlist.php[09/10]).

2.2 Field Survey

An ecologist experienced in recording breeding bird activity undertook three survey visits between 25th May and 21st July 2010. The survey period allowed for the detection of summer migrant arrivals to be recorded, as well as those species present year-round.

All survey work was carried out in conditions suitable for surveying breeding birds (avoiding heavy rain, fog or strong wind) and at the optimal time for recording activity (between 4 hours after sunrise and 4 hours before sunset).

The survey broadly followed standard methodology for recording breeding birds (Marchant, 1983). During each visit the surveyor slowly walked around field boundaries and habitat features within the proposal site boundary. A pair of 10x42 binoculars was used to observe signs of breeding activity. The identity and location of all birds seen or heard were recorded onto large scale maps using standard British Trust for Ornithology species codes.

The following signs of bird breeding activity were also recorded:

Possible Breeding

- observed in suitable nesting habitat
- singing male

Probable Breeding

- pair in suitable nesting habitat
- courtship and display
- visiting a probable nest site
- agitated behaviour

Confirmed Breeding

- used nest or eggshells
- recently fledged young
- adults entering or leaving an occupied nest
- adults carrying faecal sac of food for young
- nest containing eggs
- nest with young

Upon completion of the survey visits, all data was transferred to a master map, to highlight the location of an occupied nest site or centre of breeding territory. When the same species was recorded in the same vicinity on two or more visits this was taken to constitute a breeding territory.

2.3 Evaluation

The species recorded at the site were evaluated according to their nature conservation status. In this study, bird species with British breeding populations of <10,000 pairs or ≥10,000 pairs (Baker *et al*, 2006) that are included on either the UK Biodiversity Action Plan Priority Species List or the Birds of Conservation Concern (RSPB, 2009) Red or Amber List are considered notable:

- <1,000 pairs - national value;
- 1,000 to 9,999 pairs - regional value;
- 10,000 to 99,999 pairs - county value;
- 100,000 to 499,999 pairs - district value; and,
- ≥500,000 pairs - parish value.

2.4 Assumptions and Limitations

No account can be taken for the presence or absence of a bird species on any particular survey visit, since they may travel extensively throughout their breeding territory. However, professional judgement allows for the likely presence of these species to be predicted with sufficient certainty so as to not significantly limit the validity of these findings.

3 Results and Discussion

3.1 Desk Study

Data on protected or otherwise notable bird species that have been reported by TVERC, OOS or BOS within 1km of the site a boundary are summarised in **Table 1**.

Table 1: Protected or otherwise notable species nest locations recorded within 1km of the site boundary.

Species Name	Scientific Name	Most Recent Date	Location and Approximate Distance from the Site
Grey Partridge	*Perdix perdix*	2009	1km west
Kestrel	*Falco tinnunculus*	2009	On the south-western site boundary (occupied during 2010)
Kestrel	*Falco tinnunculus*	2008	500m north-west
Hobby	*Falco subbuteo*	2009	300m north-east (occupied during 2010)
Barn Owl	*Tyto alba*	2009	On the western site boundary (occupied during 2010)
Barn Owl	*Tyto alba*	2009	200m north-east (occupied during 2010)
Barn Owl	*Tyto alba*	2009	250m west
Barn Owl	*Tyto alba*	2009	700m north-west
Corn Bunting	*Miliaria calandra*	2007	1km west

3.2 Field Survey

A total of 19 bird species occupied a breeding territory and probably nested at the site. Details of the estimated number of breeding bird territories are provided in **Table 2** and their locations highlighted on **Figure 1**.

Table 2. Breeding bird territories recorded at the site.

Species Name	Scientific Name	Conservation Designation	Estimated Number of Breeding Territories	Breeding Status
Blackbird	*Turdus merula*	None	10	Confirmed
Barn Owl	*Tyto alba*	Schedule 1 and Amber List species	1	Confirmed
Blue Tit	*Parus caeruleus*	None	4	Probable
Chaffinch	*Fringilla coelebs*	None	8	Confirmed
Dunnock	*Prunella modularis*	UK BAP Priority and Amber List species	3	Probable
Goldfinch	*Carduelis carduelis*	None	1	Confirmed
Greenfinch	*Carduelis chloris*	None	2	Confirmed
Great Tit	*Parus major*	None	5	Confirmed
Jay	*Garralus glandarius*	None	1	Probable
Kestrel	*Falco tinnunculus*	Amber List species	1	Confirmed
Long-tailed Tit	*Aegithalos caudatus*	None	1	Confirmed
Lesser Whitethroat	*Sylvia curruca*	None	1	Possible
Robin	*Erithacus rubecula*	None	9	Probable
Sparrowhawk	*Accipter nisus*	None	1	Confirmed
Song Thrush	*Turdus philomelos*	UK BAP Priority and Red List species	1	Probable
Whitethroat	*Sylvia communis*	None	1	Probable
Wood Pigeon	*Columba palumbus*	None	16	Confirmed
Wren	*Troglodytes troglodytes*	None	6	Confirmed
Yellowhammer	*Emberiza citrinella*	UK BAP Priority and Red List species	4	Confirmed

Other bird species recorded flying over and/or not nesting at the site were: red kite, buzzard, hobby, swift, swallow, house martin, pied wagtail, magpie, jackdaw, rook, carrion crow and starling.

3.2.1 Birds of County Value

The barn owl population in Britain is estimated to be 4,000 breeding pairs and is regarded as an uncommon resident and breeding species in Oxfordshire (OOS, 2010). Barn owl is afforded special protection because it is listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended). Barn owl is also an

Amber List species. A pair of barn owls nested in a pole box in the central part of the site. Barn owls were recorded foraging over the grasslands within and adjacent the site. The barn owl breeding territory at the site is of county value. If the site supported more than one breeding pair, then the barn owl population would be of regional value.

3.2.2 Birds of District Value

The kestrel population in Britain is estimated to be 35,400 breeding pairs. Kestrel is an Amber List species. A pair of kestrels nested in a pole box along the southern site boundary. Kestrels were recorded foraging over the grasslands/field margins within and adjacent the site. The kestrel breeding territory at the site is of county value. If the site supported more than one breeding pair, then the kestrel population would be of county value.

3.2.3 Birds of Parish Value

The yellowhammer population in Britain is estimated to be 792,000 breeding pairs. Yellowhammer is a UK BAP Priority, Oxfordshire LBAP and Red List species. Four yellowhammer breeding territory is centred on mature hedgerows near arable land. The four yellowhammer breeding territories are of parish value.

The song thrush population in Britain is estimated to be 1,030,000 breeding pairs. Song thrush is a UK BAP Priority, Oxfordshire LBAP and Red List species. A song thrush breeding territory is centred on the mature hedgerow and trees at the northern corner of the site. The song thrush breeding territory is of parish value.

The dunnock population in Britain is estimated to be 2,060,000 breeding pairs. Dunnock is a UK BAP Priority, Oxfordshire LBAP and Amber List species. Three dunnock breeding territories were located in dense hedgerow scrub. The three dunnock breeding territories are of parish value.

4 Conclusions and Recommendations

Of the 19 bird species which established breeding territories at the site, five species are of nature conservation importance: barn owl, kestrel, yellowhammer, song thrush and dunnock. Of these, barn owl is the only species listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended) and hence subject to the provisions of special protection.

In order for the proposed eco-town to be compliant with legislation, policy and best practice, impacts (such as the loss of bird nest sites, places of shelter, foraging habitat etc) to the aforementioned species should be avoided. If this is not possible, appropriate mitigation and/or compensation measures to ensure a favourable local population status of affected bird species would need to be implemented. In addition, measures to create and/or enhance bird breeding habitat to ensure biodiversity gain would also need to be implemented.

It is recommended that the following measures are implemented:

- installation of a nest box and creation of rough grassland to provide foraging habitat for barn owl;
- installation of a nest box and creation of rough grassland to provide foraging habitat for kestrels;
- creation of hedgerows with native species characteristic to the local area, such as hawthorn and blackthorn, to provide nest sites for yellowhammer, song thrush, dunnock and other birds;
- creation of rough grassland adjacent to hedgerows in order to provide suitable foraging habitat for yellowhammer and other buntings and ficnhes;
- supplementary planting of native trees and shrubs such as ash, field maple, goat willow, blackthorn and hawthorn, to provide breeding and foraging habitat for range of bird species;
- enhancement of the watercourses and creation of shallow ponds to attract a more diverse range of bird species to the site; and,
- installation of house martin, swift, spotted flycatcher and house sparrow in suitable locations on proposed buildings.

Site clearance is best undertaken during the winter when most bird species are less sensitive to disturbance, rather than during their breeding season (which for most species is typically between March and July inclusive), where legislation exists to protect occupied nests, eggs and young.

If the site works need to occur during the bird breeding season, then it is recommended that a watching brief is carried out by a suitably experienced ecologist to ensure that bird nests are not damaged or destroyed, and therefore to confirm that the works are legally compliant. If a bird nest were found to be in use, all work will need to stop whilst measures to be taken to minimise disturbance to nesting birds and hence avoid a possible legal infringement, which also has potential to be a programme risk.

Implementation of the aforementioned recommendations would help ensure that the proposed development complies with eco-town guidance and also contribute to the UK BAP and Oxfordshire LBAP objectives.

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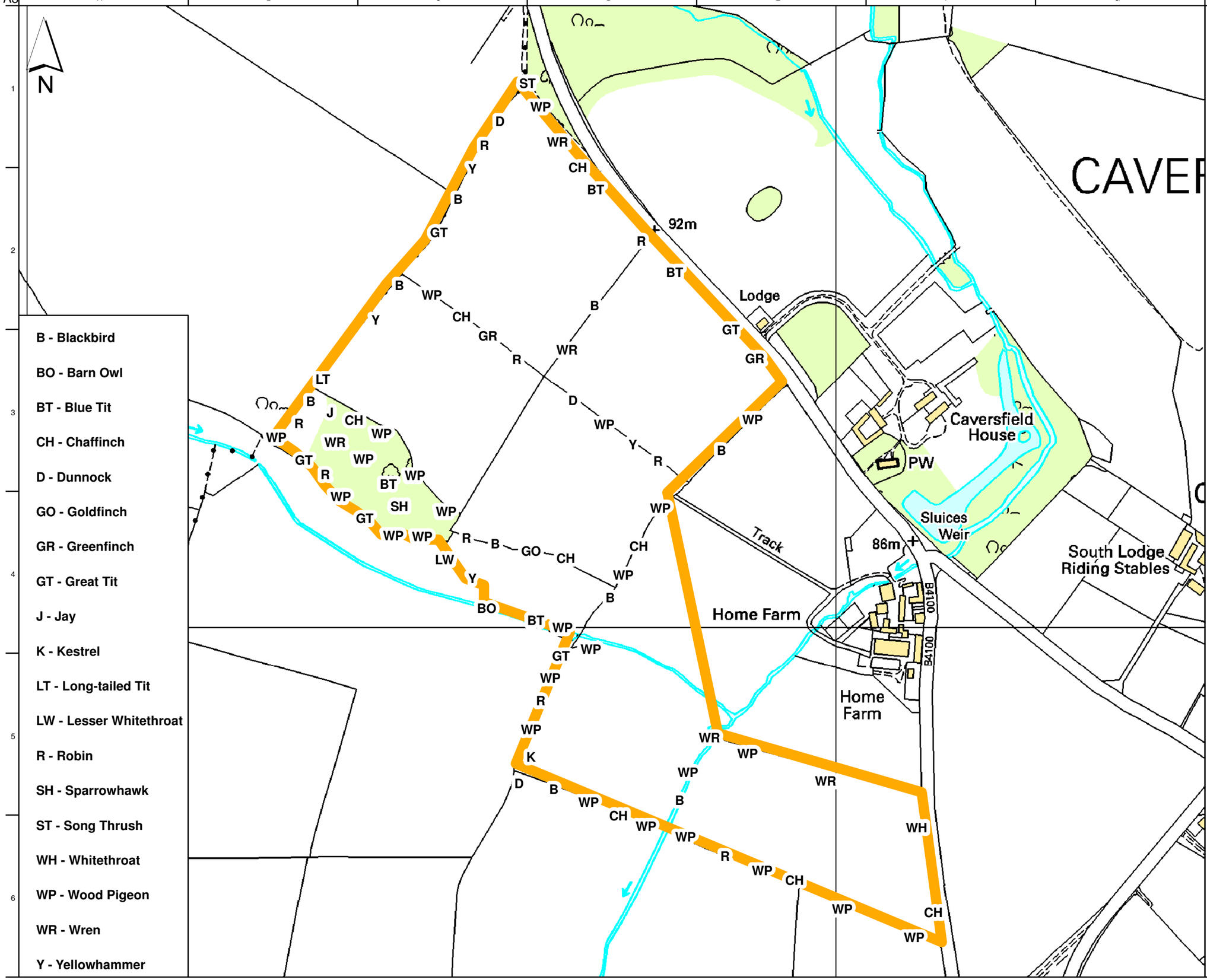
Figures

Figure 1 Breeding Bird Territory Location Map

A3



Legend

Exemplar Site Boundary

B - Blackbird
BO - Barn Owl
BT - Blue Tit
CH - Chaffinch
D - Dunnock
GO - Goldfinch
GR - Greenfinch
GT - Great Tit
J - Jay
K - Kestrel
LT - Long-tailed Tit
LW - Lesser Whitethroat
R - Robin
SH - Sparrowhawk
ST - Song Thrush
WH - Whitethroat
WP - Wood Pigeon
WR - Wren
Y - Yellowhammer

Issue	Date	By	Chkd	Appd
-	21-09-2010	DMc	SC	AB

ARUP

13 Fitzroy Street
London W1T 4BQ
Tel +44 (0)20 7636 1531 Fax +44 (0)20 7580 3924
www.arup.com

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Bicester Eco-town Exemplar Site
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Location Map

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APPENDIX 7H

Arup (2010) Exemplar Site Bat Survey

A2 Dominion
Bicester Eco-Town
Exemplar Site Bat Survey

J/213000/213225-00

Issue | September 2010

This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number 213225-00

Ove Arup & Partners Ltd
13 Fitzroy Street
London W1T 4BQ
www.arup.com

ARUP

Document Verification

ARUP

Job title		Bicester Eco-Town			**Job number** 213225-00
Document title		Exemplar Site Bat Survey			**File reference**
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			Prepared by	Checked by	Approved by
		Name	Neil Harwood		
		Signature			
Draft 2	27/09/10	**Filename**	Bat_Report_NH1 (AB rev 1)		
		Description	Second draft incorporating review comments		
			Prepared by	Checked by	Approved by
		Name	Neil Harwood	Austin Brown	
		Signature			
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		Description	Issue Version incorporating comments for approval		
			Prepared by	Checked by	Approved by
		Name	Neil Harwood	Austin Brown	Michael Bull
		Signature			
		Filename			
		Description			
			Prepared by	Checked by	Approved by
		Name			
		Signature			
				Issue Document Verification with Document	✓

Contents

1 Introduction

1.1 Background

Arup has been commissioned by A2 Dominion to carry out a suite of protected species and habitat surveys for the proposed Bicester Exemplar Eco-Town development in Oxfordshire. This specific report details the surveys undertaken for bats.

The proposed development is located within a belt of (predominantly) grazing land that lies to the north west of Bicester (SP 577 251); the red line boundary area is shown in Figure 1. At present, the proposed development area consists of a matrix of farmland, with up to 10 grazed fields separated by species-rich hedgerows. A distinct lowland area with an ephemeral stream runs east to west through the south and central areas of the site and, midway along its course, this stream flows into a second ephemeral stream running north to south through the site alongside a small wooded copse.

1.2 Ecology and Legislation

1.2.1 Generic Legislation

This report and its recommendations have been produced in accordance with relevant legislation and best practice guidance. It also takes into account Planning Policy Statement 9 (PPS9) and other nature conservation policies within local and regional planning policy documents.

Legislation relating to ecological resources that are relevant to this appraisal includes the following:

- ***Wildlife and Countryside Act, 1981 (as amended).*** This Legislation still forms the primary means of protecting wildlife in the UK and provides the mechanism by which a number of international directives are implemented in the UK.

- ***Conservation (Natural Habitats &c.) Regulations, 1994.*** This Act provides protection for European protected species such as bats, great crested newts and the hazel dormouse.

- ***Countryside and Rights of Way (CROW) Act, 2000.*** The CROW Act strengthened the details of The Wildlife and Countryside Act in relation to Sites of Special Scientific Interest (SSSI) and threatened species.

- ***Natural Environment and Rural Communities (NERC) Act, 2006.*** This Act puts an obligation on public bodies and statutory undertakers to ensure due regard to the conservation of biodiversity.

- ***Planning Policy Statement 9 (PPS9).*** This sets out the Government's planning policies on the protection of biodiversity and geological conservation through the planning system. The policies set out in PPS9 may also be material to decisions on individual planning applications.

The key principles of the PPS9 are stated as:

"Regional planning bodies and local planning authorities should adhere to the following key principles to ensure that the potential impacts of planning decisions on biodiversity and geological conservation are fully considered…….

(vi) the aim of planning decisions should be to prevent harm to biodiversity and geological conservation interests. Where granting planning permission would result in significant harm to those interests, local planning authorities will need to be satisfied that the development cannot reasonably be located on any alternative sites that would result in less or no harm. In the absence of any such alternatives, local planning authorities should ensure that, before planning permission is granted, adequate mitigation measures are put in place. Where a planning decision would result in significant harm to biodiversity and geological interests which cannot be prevented or adequately mitigated against, appropriate compensation measures should be sought. If that significant harm cannot be prevented, adequately mitigated against, or compensated for, then planning permission should be refused."

In addition, PPS9 states:

"Development proposals provide many good opportunities for building-in beneficial biodiversity or geological features as part of good design. When considering proposals, local planning authorities should maximise such opportunities in and around developments, using planning obligations where necessary."

In respect of species protection, PPS9 states:

"*……planning authorities should ensure that these species are protected from the adverse effects of development, where appropriate, by using planning conditions or obligations. Planning authorities should refuse permission where harm to the species or their habitats would result unless the need for, and benefits of, the development clearly outweigh that harm*".

1.2.2 Species Legislation

Bats may roost within buildings, other structures (such as bridges and caves) and mature trees, where there are suitable voids, crevices and other such cavities, allowing some protection from the elements and from disturbance. Within trees, for example, they may occupy crevices, splits or woodpecker-hole cavities within the main trunk, broken limbs or behind loose bark, as well as behind significant areas of ivy growth.

Most bat species prefer to forage within and across areas of wooded countryside, comprising hedgerows, rough grassland and scrub, and over open water where this is available. Those sites that offer a mosaic of these habitat types are therefore often those most favoured by bats.

Bats and places that function as their roost sites are afforded protection through the provisions of the Wildlife and Countryside Act 1981 (as amended), and the Conservation (Natural Habitats, &c.) Regulations 2010. It would constitute an offence to:

- kill, injure or capture a bat;

- damage, destroy or obstruct access to any bat breeding site or resting place; or,
- disturb a bat if it is likely to:
  1. impair its ability to -
  - survive, breed or reproduce or rear/nurture young; or,
  - hibernate or migrate; or,
  2. significantly affect the local distribution or abundance of the species to which they belong.

Should a roost site be confirmed within an area to be affected by development proposals, it is necessary to apply for a licence from Natural England, before any works which might potentially disturb the bats can be carried out. If the disturbance or destruction of that site is inevitable, mitigation and compensation measures would have to be put in place to ensure that the conservation status of the bats in question is not threatened or compromised.

Bats and other protected species are a material consideration of the planning process and the Natural Environment and Rural Communities (NERC) Act 2006 places a duty upon local authorities to have regard to biodiversity conservation in carrying out their duties.

1.2.3 Eco-Town Guidance

In addition to a range of legislation described above in section 1.2.1, a wealth of policy and other guidance is available to govern and direct development proposals in their responsibilities with regard to ecology and biodiversity. These include the recently-published governmental guidance that specifically sets out how to deal with Eco-Town proposals (Biodiversity Positive: Eco-towns Biodiversity Worksheet, TCPA, 2009). The key points of this guidance (referred to as the principal objectives for an Eco-Town Biodiversity Strategy) are as follows:

- **Protecting and enhancing the best of biodiversity**: key habitat areas supporting characteristic and uncommon species should be sustained, where conservation is the main priority.
- **Mitigating the impact of development and securing net biodiversity gain**: the inclusion of supplementary habitat areas that fulfil other green infrastructure functions and support more widespread and common species.
- **Integrating biodiversity within the built environment:** the incorporation of a high degree of permeability for wildlife within built areas and structures.
- **Increasing biodiversity's resilience and ability to adapt to climate change**: ensuring a robust connectivity of habitats that facilitates the wider movement and migration of species.

This provides a clear steer for the design of an Eco-Town proposal, such that the avoidance of key habitat areas must be the priority, followed by the retention and creation of a matrix of secondary habitats both within and outside of the built area, and that all of the above are robustly connected to facilitate future wildlife movements and dispersals. Other key elements of the approach include making provisions for management, funding and accountability, to ensure success.

All Eco-Town proposals should include an Eco-Town Biodiversity Strategy (ETBS) to be developed in tandem with the masterplan for the site. This will provide the framework for delivering net biodiversity gain, setting out what is to be achieved and the steps that are needed to achieve it and, most importantly, how biodiversity will be increased and enhanced in advance of and alongside development, rather than at the end of the development process. It should include specific measurable targets for net biodiversity gain, reflecting local priorities for biodiversity (and contributing to national and regional targets as appropriate) and it should take account of the challenges posed by climate change.

Specifically with respect to bats, the biodiversity guidance encourages:

- The retention of existing wooded areas and well-established standard trees;
- The installation of roost boxes for bats with domestic garden and wooded areas;
- The inclusion of bespoke bat roost features within new buildings, including the numbers of such features that is considered to be appropriate;
- Ensuring that artificial lighting is not a barrier to the nocturnal movements of bats; and
- The use of bats as a species indicator (of overall biodiversity value) during post-construction monitoring of new sites.

1.2.4 Biodiversity Targets

The UK Biodiversity Action Plan (UK BAP) was produced in accordance with the 1992 UN Convention on Biological Diversity. It describes the UK's biological resources and commits a detailed plan for the protection of these resources, focusing on key habitats and species considered to be of particular significance to nature conservation within a UK context.

The conservation priorities that will be most appropriate to the Bicester Eco-Town proposal are those listed within the UK and (at the lower tier) Oxfordshire Biodiversity Action Plans (BAPs). These list a number of key habitats and species that form the priorities for conservation in those areas and serve as an existing framework within which the Eco-Town can work and provide positive contributions to nature conservation at both local and national scales.

1.3 Aims and Objectives

The aims and objectives of this study were to:

- Identify the type, level and extent of bat activity within the Exemplar site;
- Appraise this level of interest in terms of the significance of the site for bats;
- Provide recommendations to ensure that potentially adverse impacts to bats are avoided within the masterplan and that appropriate enhancement measures are put in place; and

- Prescribe any further work necessary to ensure legal compliance at the time of future works on site.

1.4 Report Content and Layout

Following this introduction, Section 2 describes the methodology followed in carrying out this study. Section 3 summarises the results of the study and discusses the implications of these findings. Section 4 draws conclusions from the work and provides appropriate recommendations for moving forward.

At the end of the report, Figure 1 shows the locations of potential roost sites surveyed and transect routes followed, with Figure 2 illustrating the key areas of bat activity recorded during the surveys. Appendix 1 contains the full data sets pertaining to the bat surveys.

2 Methodology

2.1 Desk Study

A desk study was conducted within a 5km radius of the central grid reference for the site as part of the Phase 1 Habitat Survey (Arup, June 2010). Data on distributions of notable and protected species, including bats, were sourced primarily from the Thames Valley Environmental Records Centre. The Oxfordshire Bat Group was also consulted with respect to bat species that might be expected to occur within the vicinity of the site.

The UK and Oxfordshire Biodiversity Action Plans (BAPs) were reviewed for details of bat species that are targeted for conservation action either locally or nationally.

This contextual information can assist in determining those species likely to be affected by the proposed development, and has helped to focus the field surveys in searching for signs of bat species on site.

2.2 Field Survey

The field survey work was divided into three separate exercises: an initial scoping survey of the site, followed by a series of surveys to search for evidence of roost sites and a wider set of transect surveys to record bat activity across the site.

2.2.1 Scoping Survey

A scoping survey of the site was carried out by two experienced bat surveyors to identify those features of most likely to support bat roosts, which would then be subject to further survey work.

In addition, those features of most likely value to commuting and foraging bats (generally linear habitat features such as hedgerows and woodland edge) were also identified as the key routes for subsequent transect surveys.

Potential roost sites were identified following standard guidance, such as that provided by the Bat Workers Manual and Bat Survey Guidelines. Trees that offer roost opportunities for bats are generally mature, moribund or dead, with significant cracks, fissures or cavities (such as woodpecker holes) and/or significant areas of peeling bark or ivy cover within which bats can shelter. Buildings supporting potential for roost sites are generally older structures (but not exclusively so, pipistrelles will often use modern housing), with access to roof voids, cavity walls, and/or areas behind and around slipped tiles, lead flashing, window frames, soffit boxes and so on.

The setting of potential roost sites is also key in determining their likely use and value and most will have direct connectivity to semi-natural, linear features such as hedgerows, tree lines, woodland or field edges, to assist bats in navigating from and back to their roosts. Thus any well-connected linear feature comprising this sort of habitat was identified (and subsequently surveyed) as part of a transect route.

2.2.2 Roost Emergence Surveys

Each potential roost site identified was subject to three independent surveys, two at dusk and one at dawn (potential roost sites are shown in Figure 1). Where possible, these surveys were spread across a number of weeks or months, such that seasonal changes in bat activity could be taken into account.

Surveys at dusk, to identify bats emerging from roost features, are used to confirm roost sites and commuting routes away from these features, but surveys at dawn are often useful in pinpointing precise roost locations (within structures, for example), as light conditions are often better at this time of the day.

Dusk surveys were timed to occur between 30 minutes prior to sunset until 90 minutes after sunset. Dawn surveys were timed to occur between 120 minutes prior to sunrise and sunrise itself. These are the periods during which the vast majority of bat species would be expected to leave or return to their roost sites.

All were carried out during weather conditions known to be appropriate for bat activity. These were minimum temperatures of 7C, but preferably 10C, calm or very light winds only, and predominantly dry with no heavy rain.

Equipment used included heterodyne (Batbox III, Pettersson D200) and time expansion (Pettersson D240X) detectors, as well as Anabat SD1 remote-detecting units on some survey occasions. Where recorded, data was analysed using programmes such as Analook to confirm bat registrations and species identification.

Where seen or heard, observations such as bat characteristics, species, numbers, flight directions, heights and other behaviour, such as feeding buzzes, were noted to allow for the further interpretation of bat activity at that time.

2.2.3 Transect Activity Surveys

Each transect route was walked on two separate occasions (transect routes are shown in Figure 1), following a roost emergence survey. Methodologies followed were similar to those above, in terms of personnel, survey conditions, equipment and recording techniques; the transect routes were walked directly after a nearby roost emergence survey had been carried out, so the timing of these surveys were necessarily later (generally 90 minutes after dark, for a further 90 minutes).

This type of survey information is used to identify key features within the landscape used by bats for commuting along (to/from roost sites or between disparate foraging areas) or for foraging around. Bats will often use multiple foraging areas during the course of one night and so the survey of these features can reveal pertinent information on bat activity at any time during nightfall.

2.3 Assumptions and Limitations

No account can be made of the presence or absence of bats on any single survey occasion, as bat behaviour changes across the season, with bats moving between different foraging areas and roost sites with regularity. However, the level of survey effort and the spread of surveys across a number of months mean that it is very likely that no significant areas of bat activity have been overlooked.

3 Results and Discussion

3.1 Desk Study

There are records of three species of bat within 5km of the site, namely common pipistrelle (several), brown long-eared (several) and natterer's bat (one).

The Oxfordshire Bat Group (Dave Endacott (Oxfordshire Bat Group Recorder), *pers.com.*) would expect common and soprano pipistrelle, brown long-eared bat and noctule to be present across the study area, with roosts of common pipistrelle and brown long-eared bat known from houses in Chesterton, some 1.5km south of the site. Other species, such as serotine and/or leisler's bat, would be notable if found (the closest known leisler's roost is more than 10km from the study area, for example).

UK and Oxfordshire BAP priority species include soprano pipistrelle, brown long-eared bat and noctule, as well as other rare or restricted-range bat species not anticipated to be present on the site.

3.2 Field Survey

The below is a summary of the results obtained during the scoping, roost emergence and transect activity surveys. Full sets of results are provided in Appendix 2.

3.2.1 Scoping Survey

A total of nine potential roost locations were identified. These are shown in Table 1, below:

Table 1: Potential roost locations

Roost	Description
1	Home Farm: a modern detached house with adjacent outbuildings
2	Home Farm: farm units and converted barn buildings
3	Two adjacent mature horse chestnut trees, with substantial cracks/fissures
4	Mature oak tree (with owl box)
5	Mature grey poplar with two Schwegler bat boxes and log pile at base
6	Mature ash tree (with owl box) and adjacent mature willow (bird boxes)
7	Mature oak (with little owl box) with multiple holes and crevices
8	Dead mature oak (with bird boxes) with cracks and fissures
9	Dead mature horse chestnut, with woodpecker holes and hollow trunk

A total of three corridors of habitat likely to support the greatest levels of bat activity (both commuting and foraging activity) were identified during the scoping survey. These are shown in Table 2, below:

Table 2: Transect routes

Transect	Description
1	South: Route S of wooded copse adjacent to ditch line and hedgerow
2	Central: Route N of wooded copse adjacent to ditch line and hedgerow
3	North: Route along hedgerows to B4100 and adjacent to Home Farm

Furthermore, the church (St Lawrence's) at Caversfield, immediately east of the Exemplar site boundary, was identified as of potential and subsequently found to contain droppings believed to be those of brown long-eared bat (and possibly natterer's bat), during inspections of the church interior in July and September 2010. Therefore, this building formed the first confirmed roost site of the study and was surveyed further in September.

3.2.2 Roost Emergence Surveys

Surveys at the nine potential roost sites were carried out between mid May and early September 2010; these are shown in Table 3, below:

Table 3: Survey visit dates

Roost	Description	Visit 1	Visit 2	Visit 3
1	Modern farm house	17th May	18th May	21st Sept
2	Farm units and barns	17th May	18th May	6th July
3	Mature horse chestnuts	24th June	29th June	13th July
4	Mature oak	24th June	29th June	21st Sept
5	Mature grey poplars	30th June	5th July	3rd Sept
6	Mature ash and willow	30th June	5th July	3rd Sept
7	Mature oak	6th July	8th July	25th August
8	Dead ash	6th July	8th July	25th August
9	Dead horse chestnut	12th July	2nd Sept	21st Sept

Six species were recorded during the roost emergence surveys, as follows: common pipistrelle, soprano pipistrelle, brown long-eared bat, noctule and

leisler's bat. There were occasional records of unidentified bats believed to be from the *myotis* group; of these, natterer's bat is probably the most likely to be encountered within this area.

The greatest levels of bat activity were recorded along the tree and stream line between Home Farm (potential roosts 1 and 2) and potential roosts 5 and 6.

Roost sites that were confirmed as occupied during the surveys were as follows; these are shown in Figure 2:

- 1) St Lawrence's Church - brown long-eared bat (unknown use; other species also possibly present, such as natterer's bat*)
- 2) Modern farm house - common pipistrelle (likely small maternity roost)
- 3) Mature willow tree - common pipistrelle (likely small numbers or individuals only)

*Data collected from the church, using an Anabat left just outside the building overnight, provided records of common pipistrelle (3), noctule (1) and brown long-eared bat (1).

3.2.3 Transect Activity Surveys

Surveys along the three transect routes were carried out between early June and early July; dates are shown in Table 4, below:

Table 4: Transect visit dates

Transect	Description	Visit 1	Visit 2
1	Southern boundary	11th June	18th June
2	Central tree/hedge line	18th June	5th July
3	Northern boundary	11th June	24th June

Four species were recorded during the transect surveys, as follows: common pipistrelle, nathusius' pipistrelle, noctule and an unidentified *myotis* species of bat, with the majority of registrations being those of common pipistrelle.

The single nathusius' pipistrelle was recorded during a survey along transect 2, in the very centre of the site (see Figure 2) and its identification determined by a combination of field observations and analysed Anabat recordings, where the peak frequency was recorded at 40kHz, typical of this species.

The only activity identified along Transect 1 was at the very top end of this route, in the vicinity of the wooded copse and then towards the end of this route, in the vicinity of roost 6 and the hedgerow down to the B4100 from this area. No activity was recorded in the central sections of this route.

Bat activity was recorded along much of the length of Transect 2, alongside the wooded copse, in the vicinity of roost 3, and following the central stream down to roost 5. Only the final hedgerow between roost 5 and the B4100 lacked bat activity during the surveys.

Very little or no bat activity was recorded along the first half of Transect 3, between the start point in the north of the site (adjacent to roost 8) and along the B4100. Conversely, there was considerable activity alongside Home Farm and following the tree and stream line south west past roosts 5 and 6. This line is well used by foraging and commuting bats.

3.3 Discussion

A total of seven species of bat have been recorded on the Exemplar site: common pipistrelle, soprano pipistrelle, nathusius' pipistrelle, brown long-eared bat, leisler's, noctule and an unidentified species of *myotis* bat. This latter species is most likely to have been natterer's bat, present on occasion, and most likely in association with the wooded areas of the site.

These species are relatively abundant within the wider district and county areas, with the exception of nathusius' pipistrelle and leisler's bat, which, although likely to be under-recorded, are still notable records for the site. The closest known roost of leisler's bat is 12 km to the west of the Exemplar site within the area of Charlbury; there are no known records of nathusius 'pipistrelle within close proximity of the site, but they are known from the wider region (particularly in association with open water habitats).

Three roost sites have been confirmed within the Exemplar site area; St Lawrence's Church, Caversfield (immediately east of the site boundary), the modern farmhouse at Home Farm and a mature tree to the south-west of the farm. Although St Lawrence's falls beyond the direct area of impact of the proposals, it is very likely that bats from the church will commute or forage across the site (as is suggested by the other survey results). These roost sites support common pipistrelle and brown long-eared bats.

The level and extent of bat activity recorded (during the roost emergence and transect surveys) would suggest that large parts of the site are of local significance to a number of bat species. The key features, where significant levels of bat activity were encountered, appear to be as follows:

- The buildings and associated features – tree lines, hedgerows, gardens, stream around Home Farm
- The continuation of this tree and stream line SW to the end point of transect 3 (and beyond the site boundary)
- The dogleg stream line up NW through the centre of the site
- The tree line up to the wooded copse past roost 3
- The edge of the wooded copse (in the west of the site) to the start point of transect 2

All of the above are illustrated as key activity corridors for bats in Figure 2, at the end of this report.

Overall, the number of species and levels of activity noted during the surveys are in line with wider records of bat presence and the quality and condition of the habitats present. A total of seven species within an area of this size could be considered to be notable on a local scale. It is clear that the area supports some

valuable features of significance for local populations of bats and bats form an important component of the cumulative biodiversity value of the Exemplar site.

4 Conclusions and Recommendations

4.1 Summary

Arup was commissioned to carry out a bat survey of the Exemplar site, as part of the Bicester Eco-Town proposals. The information revealed by the survey will be used to inform the design of the masterplan in order to minimise adverse impacts to bats (and other protected species), create opportunities for biodiversity gain, and ensure legal compliance with respect to bats and their roosts during works.

A total of seven species of bat were encountered during the suite of surveys undertaken. These were all relatively abundant species in the context of the site, its surrounds and their recorded presence at county and regional levels. Of the seven species, nathusius' pipistrelle and leisler's bat were the most notable (with relatively few existing records in the area), although both species are probably under-recorded. Two roost sites were located within the site boundary (a farmhouse and a mature tree), with an additional roost just off site (a church).

4.2 Recommendations

As a result of these findings, a number of recommendations have been made, as follows. Many of these are based upon those contained within the Eco-Towns biodiversity worksheet (TCPA, 2009) and, for further information, this document should be consulted in tandem with this report. The detailed design of all mitigation measures should be carried out with the guidance of an experienced ecologist.

4.2.1 Impact Minimisation and Habitat Retention

- The two confirmed roost sites within the Exemplar site boundary (and the adjacent roost site very close by) should be left undisturbed, through their retention as a linked and uninterrupted green corridor, by the Eco-Town proposals. These are identified as confirmed roost sites on Figure 2.
- The features identified as of particular value to bats, specifically for commuting and for foraging, as well as those trees and buildings with roost potential (even where no bats were found during these surveys), should be retained in full. These are identified as the potential roost sites and key activity corridors on Figures 1 and 2 respectively. The wooded copse in the west of the site should be retained in full as a key element of this overall resource.
- Where any of the above is not possible, inspections of such features will be required prior to any potentially disturbing act to ensure that bats are not present, Where bats may later be affected, this may require an application for an EPS licence, which may in turn necessitate works to be carried out at certain times of year (where least direct disturbance to bats is likely), using low-impact techniques (such as the soft-felling of trees) and/or under the supervision of an ecologist.
- All artificial night lighting should be avoided or its use minimised in areas identified as of value to bats, as above. All lighting should be low-intensity, directional, hooded, and triggered by use, wherever possible, to

benefit bats and other nocturnal wildlife and minimise wider light spill and light pollution issues.

4.2.2 Habitat Enhancement

- Bespoke roost units should be created and installed throughout the built structures of the new Eco-Town area, including buildings and bridges. The Bat Conservation Trust suggests that an appropriate level of provision for bats in buildings would be 1 in 5 public buildings and 1 in 20 other structures (including private residencies). In the case of the public buildings in particular, this would involve the provision of free access (via tiles, for example) to roof spaces, for species such as brown long-eared bat, which require internal space for flight.
- Roost boxes should be provided on all trees identified as of roost potential during this survey, where these are not already present, assuming that these trees are retained within a corridor of habitat that is suitable for bat use. Additional boxes should be provided within the wooded copse within the north-west of the Exemplar site. Boxes should be provided in pairs, with varying orientations, and should comprise those box types known to be used by the three pipistrelle species, brown long-eared and noctule bats in particular (in total, this will equate to approximately 20 new roost boxes across the Exemplar site).
- Further enhancements could be made through wider landscaping measures (to include woodland planting and waterbodies of value to foraging bats) and the positive management of retained corridors of vegetation (to allow for the development of long grasses and shrubs that will offer insect prey).

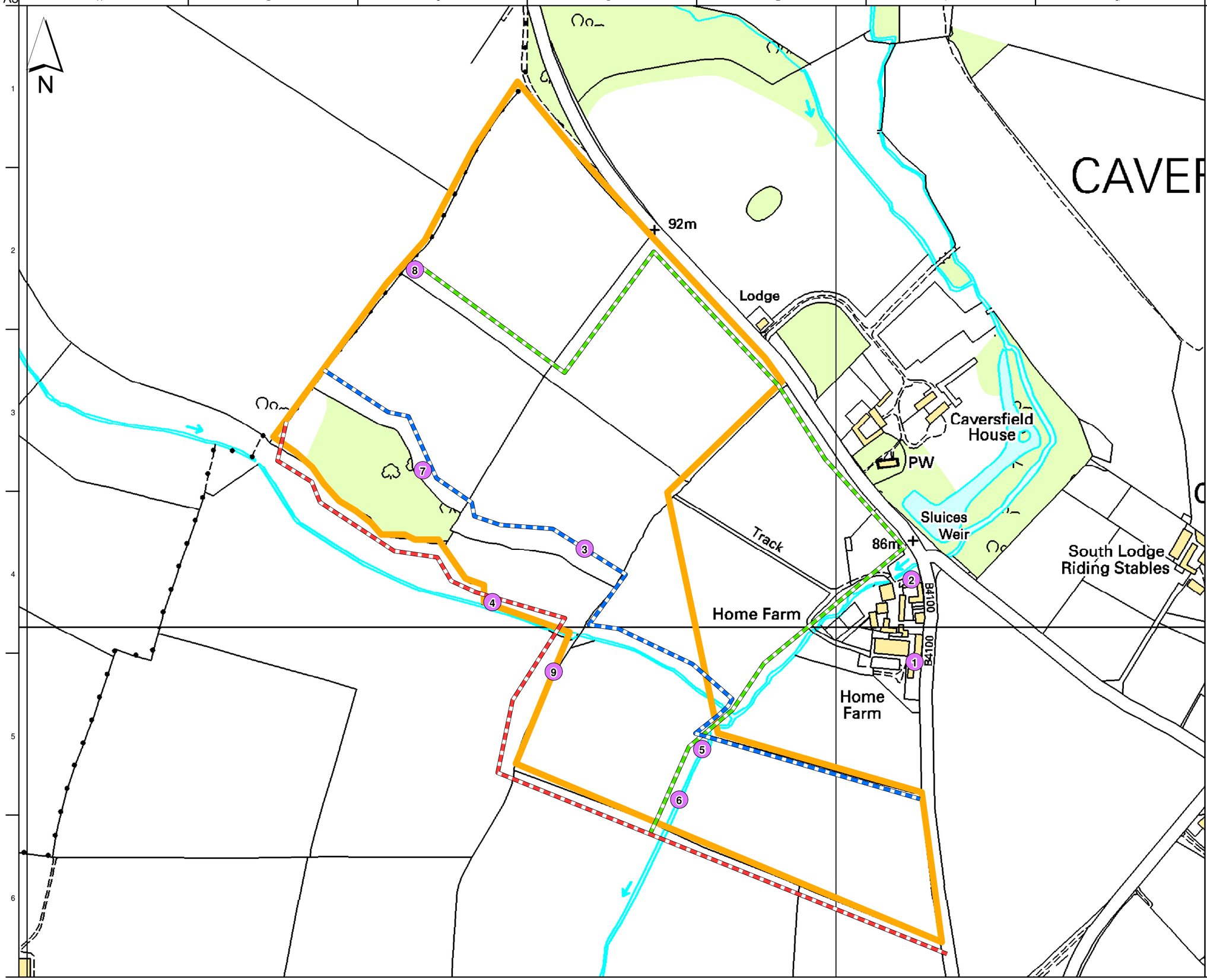
4.2.3 Maintenance and Monitoring

- A site-wide Eco-Town biodiversity strategy should be created to include measures to ensure that all installed structures (e.g. roost boxes) and retained and created habitats are appropriately managed and maintained into the future.
- Bat activity should be monitored following the construction of the proposals to determine whether i) the roost sites remain active and ii) the pre-development patterns of (commuting and foraging) bat activity continue. Furthermore, new roost installations (units within buildings and boxes on trees) should be monitored to reveal the level of uptake of these features.

A1 Figures

A1.1 Figure 1: Potential Roost and Transect Locations

A3



Legend

Potential Bat Roosts

Bat Survey Transects

Transect 1

Transect 2

Transect 3

Exemplar Site Boundary

Issue	Date	By	Chkd	Appd
-	27-09-2010	AE	SC	AB

ARUP

13 Fitzroy Street
London W1T 4BQ
Tel +44 (0)20 7636 1531 Fax +44 (0)20 7580 3924
www.arup.com

Client
A2 Dominion

Job Title
Bicester Eco-town

Drawing Title
Potential Roost sites and Transect Routes

Scale at A3
1:4,500

Discipline
Ecology

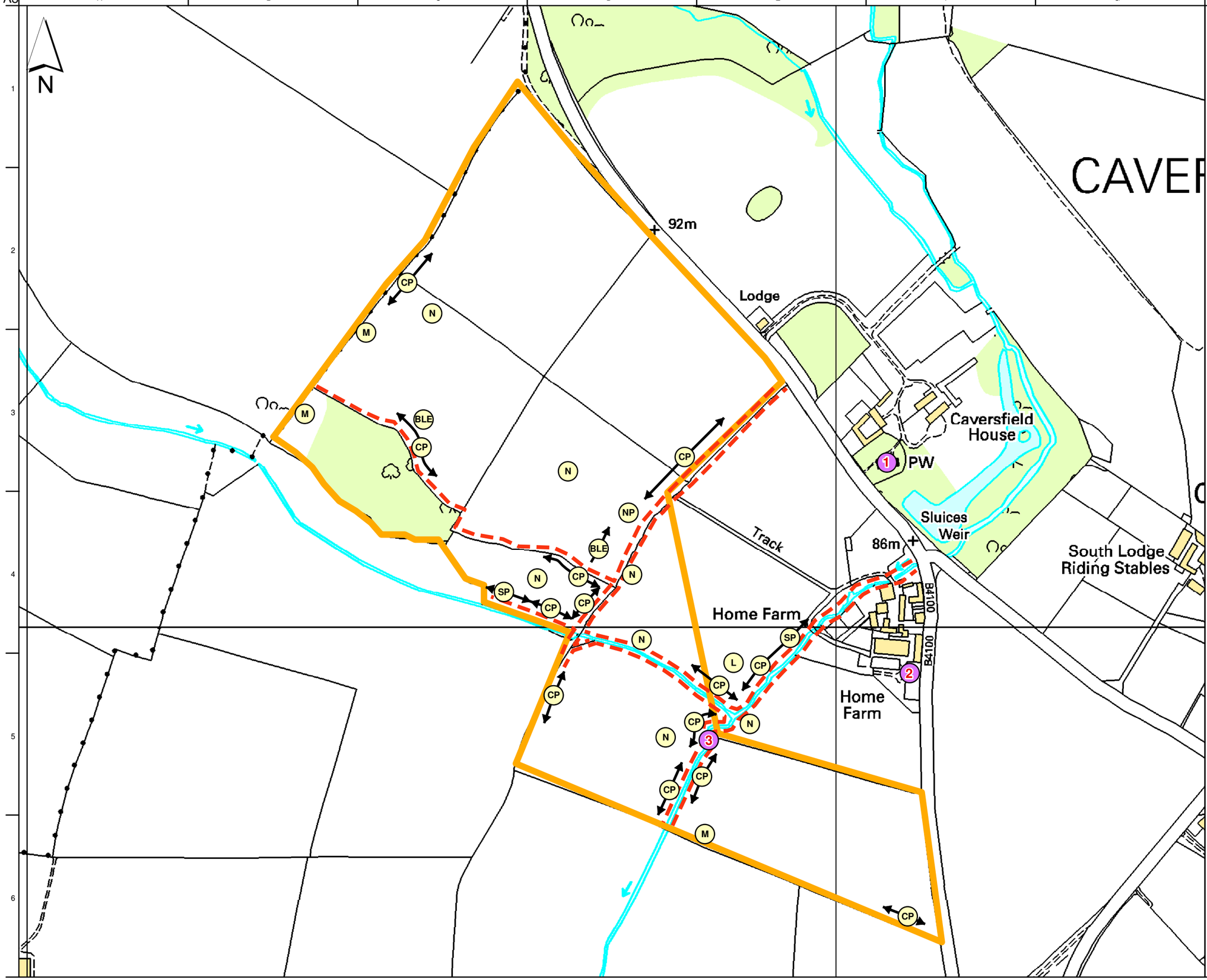
Drawing Status
Draft

Job No	Drawing No	Issue
213225-00	Figure 1	-

Do not scale

A1.2 Figure 2: Bat Activity Recorded

A3



Legend

- BLE Brown Long-eared Bat
- CP Common Pipistrelle
- L Leisler's
- M Myotis Species
- N Noctule
- SP Soprano Pipistrelle
- NP Nathusius' Pipistrelle
- 1 Confirmed Roost Site
- Key Activity Corridor
- Exemplar Site Boundary

Issue	Date	By	Chkd	Appd
-	24-09-2010	AE	SC	AB

ARUP

13 Fitzroy Street
London W1T 4BQ
Tel +44 (0)20 7636 1531 Fax +44 (0)20 7580 3924
www.arup.com

Client
A2 Dominion

Job Title
Bicester Eco-town

Drawing Title
Key Areas of Bat Activity

Scale at A3
1:4,500

Discipline
Ecology

Drawing Status
Draft

Job No	Drawing No	Issue
213225-00	Figure 2	-

Do not scale

A2 Survey Data

A2.1 Raw Survey Data

The data is divided into that obtained during potential roost surveys and during later transect (general bat activity surveys), below.

A2.1.1 Roost Emergence Surveys

Numbers of bat passes are highlighted where considered to be significant (>20 in single survey).

St Lawrence's Church, Caversfield

Anabat Data: *16th September (Overnight)*

- 20:16 – Common Pipistrelle
- 20:38 – Common Pipistrelle
- 20:39 – Common Pipistrelle
- 21:05 – Noctule
- 00:28 – Brown Long-eared Bat

Roost 1: Modern farm house

Visit 1: *17th May (Dusk) – AB (A) – Dry, clear, light wind, 11C dropping, dusk at 21:15*

- 21:19 – Common Pipistrelle
- 21:24 – Common Pipistrelle
- 21:32 – Common Pipistrelle
- 21:33 – Common Pipistrelle (2)
- 21:37 – Common Pipistrelle
- 21:39 – Common Pipistrelle
- 21:40 – Common Pipistrelle (4)
- 21:44 – Common Pipistrelle
- 21:45 – Soprano Pipistrelle
- 21:45 – Common Pipistrelle (3)
- 21:46 – Common Pipistrelle (2)
- 21:54 – Soprano Pipistrelle
- 21:55 – Common Pipistrelle (2) and Noctule
- 22:18 – Common Pipistrelle

Total bat passes: 23

Visit 2: *18th May (Dusk) – HKL – Dry, clear, light wind, mild 13C dropping, dusk at 21:18*

- 21:15 – Common Pipistrelle – 1 emerged from house (where tiles meet brickwork)
- 21:23 – Common Pipistrelle – brief forage outside barn
- 21:25 – Common Pipistrelle – brief forage between house and barn
- 21:40 – Common Pipistrelle – brief forage between house and barn
- 21:57 – Noctule – 1 commute through overhead

Visit 3: *21st September (Dawn) – AB – Dry, calm, lingering fog, 9C, dusk at 06:20*

- No registrations

Roost 2: Farm units and barns

Visit 1:*17th May (Dusk) – OB – Dry, clear, light wind, cool 11C dropping, dusk at 21:15*

- 21:35 – Common Pipistrelle – brief forage from direction of house
- Not recorded – Common Pipistrelle – brief forage around outbuildings

Visit 2:*18th May (Dusk) – OB – Dry, clear, light wind, mild 13C dropping, dusk at 21:18*

- No registrations

Visit 3: *6th July (Dawn) - AB (A) - Dry, clear, light wind, 10C; dawn at 04:40*

- 03:21 – Common Pipistrelle – western end of farmyard, brief pass
- 03:34 – Common Pipistrelle – brief pass
- 03:38 - Common Pipistrelle – brief pass
- 03:47 - Common Pipistrelle – brief pass
- 03:51 - Common Pipistrelle – brief pass
- 03:53 - Common Pipistrelle – brief pass
- 03.54 – Common Pipistrelle and Noctule – two passing together
- 03:54 – Common Pipistrelle – two passes
- 03:55 – Common Pipistrelle – brief pass
- 03:57 – Common Pipistrelle – brief pass
- 03:58 – Common Pipistrelle – four passes
- 04:06 –Common Pipistrelle – four passes as above, commuting south to north

Total bat passes: 20

Roost 3: Mature horse chestnuts

Visit 1: *24th June (Dusk) – NW – Calm, warm, humid, high cloud cover, light W breeze, 20C; dusk at 21:37*

- 22:21 – Unidentified bat, commuting overhead

Visit 2: *29th June (Dusk) – TS – Very warm, overcast, light southerly breeze, 22C; dusk at 21:27*

- 22:00 – Common Pipistrelle (2) – Foraging alongside trees until 22:15
- 22:25 – Noctule – 1 foraging overhead across fields between roosts 3 and 4
- 22:38 – Common Pipistrelle – Foraging alongside hedgerow, central site
- 22:38 – Noctule – Foraging over central field N of roost 3

Visit 3: *13th July (Dawn) – TS – Overcast, light rain at times, calm, mild 15C; dawn at 05:00*

- 03:45 – Common Pipistrelle – NW past front of tree
- 03:52 – Common Pipistrelle – S along perpendicular hedgerow
- 03:59 – Common Pipistrelle – passes until 04:05 between two trees
- 04:10 – Brown Long-eared Bat – NE past southernmost tree
- 04:15 – Common Pipistrelle (2) – in front of southernmost tree until 04:20
- 04:22 – Common Pipistrelle
- 04:27 – Common Pipistrelle (2) – regular circuits between trees until 04:35

Visit 4: *20th September (Dusk) – TS – Dry, overcast, moderate breeze, 12C; dusk at 19:05*

- 19:36 – Common Pipistrelle – unseen
- 19:40 - Common Pipistrelle – unseen
- 19:44 - Common Pipistrelle – unseen
- 19:48 - Common Pipistrelle – flying south-east along hedgerow
- 19: 49 - Common Pipistrelle – unseen, but foraging close by

Roost 4: Mature oak

Visit 1: *24th June (Dusk) – MS – Calm, warm, humid, high cloud cover, light W breeze, 20C; dusk at 21:37*

- 22:26 - Common Pipistrelle – foraging
- 22:27 - Common Pipistrelle – foraging
- 22:30 - Soprano Pipistrelle – foraging
- 22:31 - Common Pipistrelle – seen flying low along hedge line

Visit 2: *29th June (Dusk) – JB – Very warm, overcast, light southerly breeze, 22C; dusk at 21:27*

- 22:17 – Common Pipistrelle – foraging along adjacent hedge line until 22:25
- 22:28 – Common Pipistrelle – along winterbourne adjacent to potential roost

Visit 3: *20th September (Dusk) — JB – Dry, overcast, moderate breeze, 12C; dusk at 19:05*

- 19:35 – Common Pipistrelle – commuting unseen
- 19:45 – Common Pipistrelle – foraging unseen
- 19:47 – Common Pipistrelle – commuting along hedgerow
- 19:50 – Common Pipistrelle – commuting along hedgerow

Visit 4: *21st September (Dawn) – JB – Dry, calm, lingering fog, 9C; dusk at 06:20*

- No registrations

Roost 5: Mature grey poplars

Visit 1: *30th June (Dusk) – NH (A) – Calm, moderate cloud cover, warm, 20C; dusk at 21:25*

- 22:02 – Common Pipistrelle – Commute S towards roost 6 in front of tree line
- 22:05 – Common Pipistrelle (2) – Rapid commute S in quick succession
- 22:07 – Noctule – overhead field edge, c.10m from tree line
- 22:08 – Common Pipistrelle (2) – Rapid forage back N along tree line
- 22:09 – Common Pipistrelle (2) - Rapid forage back N
- 22:10-19 – Common Pipistrelle – Continuous foraging (30 passes) up and down tree line until 22.19
- 22:10-20 – Soprano Pipistrelle – In with Common Pipistrelle activity (4 passes)
- 22:20-30 – Common Pipistrelle – Intensive patch of feeding (4-5 individuals) at meeting point of hedgerow and ditch line (32 passes)
- 22:30-31 – **Leisler's** (suspected) – 3 circuit passes over field edge
- 22:30-36 – Common Pipistrelle - again foraging up and down tree line adjacent to roost 5 (13 passes)
- 22:34-36 – **Leisler's** (confirmed) – seen well twice against backlit sky; noticeably smaller than noctule, several short foraging circuits about 5m up, 10m from tree line.
- 22:37 – Common Pipistrelle – brief unseen pass
- 22:38 – Common Pipistrelle – brief unseen pass
- 22:39 – Common Pipistrelle – brief unseen pass
- 22:42 – Common Pipistrelle – brief unseen pass

Total bat passes: 98

Visit 2: *5th July (Dusk) – NH (A) – Mild 16C (but rapid drop to 12C), part overcast, calm to light breeze; dusk at 21:20*

- 22:04 – Common Pipistrelle – unseen overhead
- 22:07 – Common Pipistrelle – rapid commute S along tree line (from farm)
- 22:08 – Common Pipistrelle – unseen overhead
- 22:09 – Common Pipistrelle – unseen overhead
- 22:12 – Common Pipistrelle – circuit back and forth (2 passes) along tree line
- 22:15 – Common Pipistrelle – rapid commute N (back towards farm)
- 22:16-18 – Common Pipistrelle – constant foraging activity where hedge and ditch line meet including foraging up towards badger setts (10 passes)
- 22:19-22 – Common Pipistrelle – continuous foraging up and down tree line in front of roost 5 (12 passes)

- 22:23-26 – Common Pipistrelle – constant foraging activity in corner (10 passes)
- 22:28-31 – Common Pipistrelle – as above (9 passes)

Total bat passes: 48

Visit 3: *3rd September (Dawn) – OB – Calm, clear, damp, very cool, down to 7C; dawn at 05:45*

- 05:34 – Common Pipistrelle – commute north along tree line and return to roost within mature willow immediately north of poplar
- 05:39 – Common Pipistrelle – as above

Roost 6: Mature ash and willow

Visit 1: *30th June (Dusk) – AB – Calm, moderate cloud cover, warm, 20C; dusk at 21:25*

- 22:04 – Common Pipistrelle – Brief forage past (came from west?)
- 22:05 – Common Pipistrelle – Brief forage past
- 22:08 – Unidentified pass
- 22:09-15 – Common Pipistrelle - Constant passes and feeding in front of tree line
- 22:25 – Probable Noctule overhead

Visit 2: *5th July (Dusk) – AB – Mild 16C (but rapid drop to 12C), part overcast, calm to light breeze; dusk at 21:20*

- 22:07 – Common Pipistrelle – commuting pass south to north along hedge
- 22:10 – Common Pipistrelle (2) – commuting pass north to south
- 22:11 – Common Pipistrelle (2) – foraging close to water trough
- 22:12 – Common Pipistrelle (2) – foraging close to water trough
- 22:14 – Common Pipistrelle (2) – foraging close to water trough
- 22:16 – Common Pipistrelle (3) – foraging close to water trough
- 22:22 – Common Pipistrelle (3) and Soprano Pipistrelle (1) – foraging around water trough, north to the gate

Visit 3: *3rd September (Dawn) – CH – Calm, clear, damp, very cool, down to 7C; dawn at 05:45*

- 05:33 – Common Pipistrelle – rapid commute north in direction of farm

Roost 7: Mature oak

Visit 1: *6th July – ML – Dry, clear, warm 18C; dusk at 21:24*

- 21:41 – Unidentified – very faint registration
- 22:20 – Common Pipistrelle – passed along far side of hedgerow
- 22:23 – Unidentified – very faint registration
- 22:24 – Common Pipistrelle – passed along hedgerow
- 22:34 – Unidentified – possible distant Noctule
- 22:38 – Common Pipistrelle – circled overhead
- 22:40 – Unidentified – low frequency call
- 22:40 – Common Pipistrelle - passed along far side of hedgerow
- 22:43 – Unidentified – low frequency call
- 22:47 – Common Pipistrelle - passed along far side of hedgerow
- 22:50 – Brown Long-eared Bat (peak frequency 48) - unseen

Visit 2: *8th July (Dusk) – JB2 – Dry (light shower earlier), overcast, light breeze, warm 18C falling to 16C; dusk at 21:24*

- No registrations

Visit 3: *25th August (Dawn) – NW – Mild to cool, 12C down to 10C, clear with little high cloud cover; dawn at 06:04*

- 04:15 – Common Pipistrelle – commuting above path through woodland
- 04:43 – Pipistrelle sp – very faint registration at 45kHz
- 04:55 – Common Pipistrelle (2) – flying back and forth around area of gate and southern edge of woodland, until 05:06
- 05:14 – Unidentified (Brown Long-eared or Natterer's likely) – very faint feather-like registration at 45kHz, unseen

Roost 8: Dead ash

Visit 1: *6th July (Dusk) – TS – Calm, clear, warm, 18C; dusk at 21:30*

- 22:15 – Common Pipistrelle – commuting NE past tree, along hedgerow
- 22:25 – Common Pipistrelle – commuting NE past tree, along hedgerow
- 22:30 – Noctule – commuting overhead
- 22:32 – Unidentified (peak frequency 48) – commuting past
- 22:35 – Noctule – commuting overhead
- 22:38 – Noctule/Serotine – commuting and foraging overhead

Visit 2: *8th July (Dusk) – OB – Dry (light shower earlier), overcast, light breeze, warm 18C falling to 16C; dusk at 21:24*

- No registrations

Visit 3: *25th August (Dawn) - ML - Mild to cool, 12C down to 10C, clear with little high cloud cover; dawn at 06:04*

- 04:43 – Common Pipistrelle – flew overhead along hedgerow
- 04:47 – Common Pipistrelle – as above
- 05:02 – Common Pipistrelle – as above
- 05:08 – Common Pipistrelle – as above
- 05:17 – Common Pipistrelle – as above

Roost 9: Dead horse chestnut

Visit 1: *12th August (Dusk) – TS – Calm, part overcast, warm, 18C; dusk at 21:30*

- 22:03 – Common Pipistrelle – foraging pass in front of ash and horse cht
- 22:05 – Common Pipistrelle – as above
- 22:15 – Common Pipistrelle – as above
- 22:22 – Common Pipistrelle – as above
- 22:27 – Common Pipistrelle – as above
- 22:35 – Common Pipistrelle – foraging circuit around and behind ash

Visit 2: *2nd September (Dawn) – OB – Calm, clear but misty, damp, cool, down to 7C; dawn at 05:43*

- No registrations

Visit 3: *21st September (Dusk) – TS – Dry, calm, moderate overcast, 20C; dusk at 19:03*

- No registrations

A2.1.2 Transect Activity Surveys

Transect 1: South

Visit 1: *18th May – OB/HKL – Mild, calm, little cloud, 11C*

- 23:07 – Myotis sp – circuit at top end of transect (NW corner of site)
- 23:37 – Common Pipistrelle – circuit adjacent to W bank of stream, S of Home Farm
- 23:40 – Myotis sp – circuit adjacent to E bank of stream, S of Home Farm
- 23:49 – Common Pipistrelle – adjacent to hedge line to B4100
- 00:00 – Common Pipistrelle - adjacent to hedge line to B4100

Visit 2: *10th June – OB/JB – Mild, 13 down to 11C, heavy overcast, moderate breeze*

- 22: 08 – Common Pipistrelle – circuit at bottom end of transect, along hedgerow to B4100
- 22:10 – Common Pipistrelle – as above

Transect 2: Central

Visit 1: *18th May – OB/HKL– Mild, calm, little cloud, 11C*

- 22:49 – Common Pipistrelle – adjacent to roost 3 chestnuts
- 22:51 – Common Pipistrelle – along adjacent N-S hedgerow
- 23:22 – Noctule – other side of N-S hedgerow
- 23:31 – Common Pipistrelle – circuit close to roost 5
- 00:42 – Common Pipistrelle – Moving along central hedgerow from Caversfield House across to stream/wooded copse
- 00:50 – Common Pipistrelle – as above
- 01:39 – Common Pipistrelle – as above
- 01:43 – Common Pipistrelle – as above

Visit 2: *5th July – AB/NH (A) – Dry, clear, light wind, 13C; dusk at 21:20*

- 22:32 – Common Pipistrelle unseen
- 22:33 – Noctule – unseen overhead at corner of field
- 22:34 – Common Pipistrelle - unseen
- 22:36 – Noctule –unseen, along ditch line towards badger setts
- 22:46 – **Nathusius' Pipistrelle** - unseen, irregular, 'slappy' call, over central hedgerow in general proximity of woodland copse
- 22:53-54 – As above (3 passes)

Transect 3: North

Visit 1: *10th June – OB/JB - – Mild, 13 down to 11C, heavy overcast, moderate breeze*

- 22:15 – Common Pipistrelle – 2-3 individuals along tree and stream line adjacent to roost 6
- 22:21 – Common Pipistrelle – 3-4 individuals along tree and stream line adjacent to roost 5

Visit 2: *24th June – NW/MS - Calm, warm, humid, high cloud cover, light W breeze, temp; dusk at?*

- 23:02 - Common Pipistrelle – Top end of route near roost 8
- 23:05 - Common Pipistrelle – Top end of route near roost 8
- 23:25 – Common Pipistrelle – adjacent to Home Farm, near ditch line
- 23:28 – Common Pipistrelle – adjacent to Home Farm, near ditch line
- 23:38 – Common Pipistrelle – at least 4 bats, at wooded corner near roost 5

APPENDIX 7I

Arup (2010) Water Vole and Otter Survey

A2 Dominion
Bicester Eco-Town
Water Vole and Otter Survey

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Ove Arup & Partners Ltd
13 Fitzroy Street
London W1T 4BQ
www.arup.com

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Document Verification

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Job title		Bicester Eco-Town			**Job number** 213225-00
Document title		Water Vole and Otter Survey			**File reference**
Document ref		J/213000/213225-00			
Revision	**Date**	**Filename**	Water Vole and Otter Report Draft 1.docx		
Draft 1	20/09/10	**Description**	First draft		
			Prepared by	Checked by	Approved by
		Name	Megan Hooper	Austin Brown	Michael Bull
		Signature			
Issue	28/09/10	**Filename**	Otter_and_Water_Vole_ Report_Exemplar_ Final (ABrev).docx		
		Description			
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		Name	Megan Hooper	Austin Brown	Michael Bull
		Signature			
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			Prepared by	Checked by	Approved by
		Name			
		Signature			
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			Prepared by	Checked by	Approved by
		Name			
		Signature			
				Issue Document Verification with Document	✓

Contents

1 Introduction

1.1 Background

Arup have been commissioned by A2 Dominion to carry out a suite of protected species and habitat surveys for the proposed Bicester Exemplar Eco-Town development in Oxfordshire. This specific report is in respect of the riparian mammals, otter *Lutra lutra* and water vole *Arvicola terrestris*.

The proposed development is located within a belt of predominantly grazing farmland which lies to the north west of Bicester. (SP 577 251); the red line area is shown in Figure 1. At present the proposed development area consists of a matrix of farmland with up to 10 grazed fields separated by many high quality species rich hedgerows. A distinct lowland area with an ephemeral stream runs east to west through the south and central areas of the site, and midway flows into a second ephemeral stream running north to south throughout the site.

At present the farmland within the development area is being managed in a relatively sensitive manner with regards to biodiversity. This includes areas set aside for badger setts, numerous bird boxes, including barn owl (Latin) and kestrel (Latin) and the provision of bat boxes. Hedgerows have been maintained to produce a wide, continuous and mostly species rich structure and are playing an important part for biodiversity on the site.

1.2 Ecology and Legislation

1.2.1 Generic Legislation

This report and its recommendations have been produced in accordance with relevant legislation and best practice guidance. They also take into account Planning Policy Statement 9 (PPS9) and other nature conservation policies within local and regional planning policy documents.

Legislation relating to ecological resources that are relevant to this appraisal includes the following:

- ***Wildlife and Countryside Act, 1981 (as amended).*** This Legislation still comprises the primary means of protecting wildlife in the UK and provides the mechanism by which a number of international directives are implemented in the UK.

- ***Conservation (Natural Habitats &c.) Regulations, 1994.*** This Act provides protection for European protected species such as bats and great crested newts.

- ***Countryside and Rights of Way (CROW) Act, 2000.*** The CROW Act strengthened the details of The Wildlife and Countryside Act in relation to Sites of Special Scientific Interest (SSSI) and threatened species.

- ***Natural Environment and Rural Communities (NERC) Act, 2006.*** This Act puts an obligation on public bodies and statutory undertakers to ensure due regard to the conservation of biodiversity.

- ***Planning Policy Statement 9 (PPS9).*** This sets out the Government's planning policies on the protection of biodiversity and geological conservation through the planning system. The policies set out in PPS9 may also be material to decisions on individual planning applications.

The key principles of the PPS9 are stated as:

"Regional planning bodies and local planning authorities should adhere to the following key principles to ensure that the potential impacts of planning decisions on biodiversity and geological conservation are fully considered…….

(vi) the aim of planning decisions should be to prevent harm to biodiversity and geological conservation interests. Where granting planning permission would result in significant harm to those interests, local planning authorities will need to be satisfied that the development cannot reasonably be located on any alternative sites that would result in less or no harm. In the absence of any such alternatives, local planning authorities should ensure that, before planning permission is granted, adequate mitigation measures are put in place. Where a planning decision would result in significant harm to biodiversity and geological interests which cannot be prevented or adequately mitigated against, appropriate compensation measures should be sought. If that significant harm cannot be prevented, adequately mitigated against, or compensated for, then planning permission should be refused."

In addition, PPS9 states:

"Development proposals provide many good opportunities for building-in beneficial biodiversity or geological features as part of good design. When considering proposals, local planning authorities should maximise such opportunities in and around developments, using planning obligations where necessary."

In respect of species protection, PPS9 states:

"*……planning authorities should ensure that these species are protected from the adverse effects of development, where appropriate, by using planning conditions or obligations. Planning authorities should refuse permission where harm to the species or their habitats would result unless the need for, and benefits of, the development clearly outweigh that harm*".

1.2.2 Species Legislation

Water vole

Since April 2008, water voles have been fully protected through their inclusion in Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) with respect to Section 9. It is an offence to:

- Intentionally kill, injure or take (capture) a water vole;
- Possess or control a live or dead water vole, or any part of a water vole;

- Intentionally or recklessly damage, destroy or obstruct access to their breeding or resting places;
- Disturb water voles while they are in their breeding or resting places.
- Sell, offer for sale or advertise for live or dead water voles.

Offences under Section 9 carry a maximum penalty of a fine not exceeding Level 5 on the standard scale (currently £5,000), imprisonment for up to six months, or both.

There is no provision for licensing of actions that would otherwise be offences if the actions are for development, maintenance or land management. Works must fulfil the defence in the Act that permits otherwise illegal actions if they are *'the incidental result of a lawful operation and could not reasonably be avoided*'. Therefore avoidance and mitigation measures are required where water voles are present, to prevent an offence being committed.

If, after avoidance and mitigation measures, there is a risk that water voles are still present in their burrows within the working area then it may be necessary to trap them and relocate them to outside the working area. Natural England do not consider trapping and relocation to be incidental and therefore may issue a Conservation Licence for the works, assuming that there is no reasonable alternative to the work, there are no practical solutions to retaining the water voles at the location and there is some overall benefit to the conservation of the species (Natural England, 2008).

Otter

Otters are fully protected through their inclusion in Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) and in Schedule 2 of The Conservation (Natural Habitats, etc.) Regulations 2010 as a European protected species. Under the legislation, it is an offence to intentionally kill, injure or take an otter as well as intentionally or recklessly damage, destroy or obstruct access to any structure or place used for shelter or protection by an otter or disturbing an animal while it is occupying a structure or place which it uses for that purpose.

Where works could result in an offence under the above legislation, Natural England may issue a licence for the works. To obtain this licence avoidance and mitigation measures will be required and there may be time constraints to the works. The licence application process can take up to 60 working days.

1.2.3 Eco-Town guidance

In addition to a range of legislation described above in section 1.2.1, a wealth of policy and other guidance is available to govern and direct development proposals in their responsibilities with regard to ecology and biodiversity. These include the recently-published governmental guidance that specifically sets out how to deal with eco-town proposals (Biodiversity Positive: Eco-towns Biodiversity Worksheet, TCPA, 2009). The key points of this (referred to as the principal objectives for an Eco-town Biodiversity Strategy) are as follows:

- **Protecting and enhancing the best of biodiversity**: key habitat areas supporting characteristic and uncommon species should be sustained, where conservation is the main priority.

- **Mitigating the impact of development and securing net biodiversity gain**: the inclusion of supplementary habitat areas that fulfil other green infrastructure functions and support more widespread and common species.
- **Integrating biodiversity within the built environment:** the incorporation of a high degree of permeability for wildlife within built areas and structures.
- **Increasing biodiversity's resilience and ability to adapt to climate change**: ensuring a robust connectivity of habitats that facilitates the wider movement and migration of species.

This provides a clear steer for the design of an eco-town proposal, such that the avoidance of key habitat areas must be the priority, followed by the retention and creation of a matrix of secondary habitats both within and outside of the built area, and that all of the above are robustly connected to facilitate future wildlife movements and dispersals. Other key elements of the approach include making provisions for management, funding and accountability, to ensure success.

All eco-town proposals should include an Eco-Town Biodiversity Strategy (ETBS) to be developed in tandem with the masterplan for the site. This will provide the framework for delivering net biodiversity gain, setting out what is to be achieved and the steps that are needed to achieve it and, most importantly, how biodiversity will be increased and enhanced in advance of and alongside development, rather than at the end of the development process. It should include specific measurable targets for net biodiversity gain, reflecting local priorities for biodiversity (and contributing to national and regional targets as appropriate) and it should take account of the challenges posed by climate change.

1.2.4 Biodiversity Targets

The UK Biodiversity Action Plan (UK BAP) was produced in accordance with the 1992 UN Convention on Biological Diversity. It describes the UK's biological resources and commits a detailed plan for the protection of these resources, focusing on key habitats and species considered to be of particular significance to nature conservation within a UK context.

The conservation priorities that will be most appropriate to the Bicester eco-town proposal are those listed within the UK and (at the lower tier) Oxfordshire Biodiversity Action Plans (BAPs). These list a number of key habitats and species that form the priorities for conservation in those areas and serve as an existing framework within which the Eco-town can work and provide positive contributions to nature conservation at both local and national scales.

The water vole and otter are both Priority Species in the UKBAP. Water vole is also listed on the Oxfordshire BAP.

1.3 Aims and Objectives

The aims and objective of the water vole and Otter surveys are to:

- assess the habitat suitability within the proposed development area for water vole and otter;
- determine the presence/likely absence of otter and water vole within suitable habitat within the proposed development areas; and

- outline mitigation measures that are required and should be considered during works in the event that water vole and/or otter are present on the site.

1.4 Report Content and Layout

Firstly, the desk based and field survey methodology is presented in Section 2 followed by the results and discussion in Section 3. The final conclusions and recommendations in Section 4 provide recommendations for the type of mitigation that will be required during works to protect water vole and otter.

2 Methodology

2.1 Desk Study

Records were obtained from Thames Valley Ecological Records Centre for otter and water vole with 5km of the proposed development area. Records were also obtained using the online source, the NBN Gateway.

2.2 Field Survey

The proposed development site was surveyed according to standard survey methodologies. The survey area is shown on Figure 2. The otter and water vole surveys were undertaken at the same time as the location of field signs are similar for both species. The survey was undertaken on the 7th June and 28th August 2010.

2.2.1 Water Vole Survey

Initial habitat suitability assessment was undertaken to determine the likely locations for water voles to be present within the proposed development area. This involved recording flow conditions, availability of food and cover, water quality and the indications that water vole will not be present such as signs of Mink.

The standard water vole survey methodology involves a detailed survey along both banks of a watercourse to record field signs including (Strachan and Moorhouse, 2006) the following:

- Faeces/latrines – droppings deposited in piles near to burrows and tracks.
- Feeding stations – food (grasses, sedges etc) collected and stored in piles on the bank and along the waters edge.
- Burrows – typically a series of holes along the waters edge, or below the water level.
- Nests – where burrows have been flooded and in areas with dense vegetation, large nests (rugby ball size) of grasses, sedges and rushes woven around the base of bank side plants can sometimes be found.
- Footprints – these can often been seen in wet mud and silt at the margins. The first and fifth toes of the water vole hind foot are at right angles to the three central toes and may be differentiated from rat prints in this way.

The optimal survey period for water vole is between mid-April and September (early October) when they are most active (Strachan and Moorhouse 2006). Surveys can also be undertaken in February, March, October and November although they are less active and therefore it is a suboptimal time for survey.

2.2.2 Otter Survey

The habitat was assessed for the suitability to support otter by identifying suitable watercourses and waterbodies that could be used by otters, and potential vegetated areas that could support otter holts and couches (temporary resting places).

Suitable areas were then surveyed for signs of otter including the following:

- Spraints (droppings) left on exposed rocks along the watercourse, protrusions from the bank such as tree roots, on frequently used paths (particularly exit points from the watercourse) and in close proximity to otter holts.
- Footprints in the mud or silt along the margins of the watercourse.
- Feeding remains such as the skins of amphibians.
- Otter paths indicated by parted vegetation or bare ground where otters frequently use the same path.
- Otter holts within holes in the river bank or within root systems of trees within adjacent habitat.
- Otter couches (resting places) indicated by flattened areas of vegetation with paths leading to the watercourse.

2.2.3 Survey Limitations

Vegetation growth was high. This can sometimes limit the visibility of field signs. However, the narrow watercourses were easily accessible and it was not considered to be a significant limitation to the survey.

The findings presented in this report represent those at the time of survey and reporting. Variations in these conditions will take place as a result of seasonal factors, and with the general passage of time.

It should also be noted that fauna may travel over wide areas and can have large home ranges and so can be overlooked within surveys. Species which are absent at the time of survey may also return to or colonise a site anew at any future time.

3 Results and Discussion

3.1 Desk Study

Water vole has been recorded on the River Bure in Bicester (TVERC, 2010) and within the wider area although there were no records specific to the proposed development area.

An otter spraint was recorded in 2008 at Trow Pool near Bucknell. This is a coarse and carp fishery (TVERC, 2010). Records of otter within the development area were not found on the NBN Gateway.

Potential water vole burrows were observed adjacent to the site along the watercourse at Home Farm during the Phase 1 Habitat Survey undertaken in April 2010 as shown on Figure 2. At this time there was a flow of water within the watercourse. However, no associated field signs were observed to confirm the presence of water vole at this time.

3.2 Field Survey

3.2.1 Habitat Suitability

The watercourses within the Exemplar site had started to dry significantly by the June survey and were dry in August 2010, as shown on Figure 2. While the dense vegetation on the banks and within the channel provide suitable cover and foraging resources, the lack of water for a significant part of the year renders this length of watercourse unsuitable for a permanent water vole population . However, the watercourse may be suitable at other times of year while the water is flowing. Potentially suitable connecting watercourses and waterbodies for water voles are present upstream and downstream of the site.

The vegetation along the banks of the watercourses and waterbodies are potential suitable for otters. Occasional areas of nearby woodland and scrub provide potential otter holt sites. However, food sources are lacking due to low or absent water levels within the waterbodies and watercourses within the surrounding area. The area may be suitable for otter during winter when water flow is higher.

3.2.2 Otter and Water Vole Survey

No field signs of otter or water vole were observed during the survey.

3.3 Discussion

It is considered unlikely that otter or water vole were present at the time of the survey. There are a few records of otter and water vole in the surrounding area. However, both species are, in general, expanding their range in the UK.

Water vole and particularly otter are mobile mammals that may move from adjacent areas into these waterbodies and watercourses while water levels are high.

4 Conclusions and Recommendations

It is considered unlikely that water vole and otter are present within the proposed development area at this time. However, they may populate the suitable sections of watercourses and waterbodies during periods of high flow.

As a precaution a pre-start check for water vole and otter within watercourses and waterbodies to be affected by works should be undertaken prior to works. This check should be programmed to allow enough time to obtain Natural England licences and to undertake appropriate avoidance and mitigation measures prior to works.

If otter or water vole are found within the proprosed development site then consultation should be undertaken with Natural England and it may be necessary to obtain a Natural England licence for the works.

Damage to the watercourses and waterbodies within the proposed development area should be avoided as they provide a future potential resource for otter and water vole.

A1 Figures

A1.1 Figure 1: Site area

A3

N

92m

Lodge

CAVER

Caversfield House

PW

Sluices Weir

86m

Track

South Lodge Riding Stables

B4100

Home Farm

Home Farm

Legend

Exemplar Site Boundary

Issue	Date	By	Chkd	Appd
-	22-09-2010	AE	SC	AB

ARUP

13 Fitzroy Street
London W1T 4BQ
Tel +44 (0)20 7636 1531 Fax +44 (0)20 7580 3924
www.arup.com

Client
A2 Dominion

Job Title
Bicester Eco-town

Drawing Title
Site Overview

Scale at A3
1:4,500

Discipline
Ecology

Drawing Status
Draft

Job No	Drawing No	Issue
213225-00	Figure 1	-

Do not scale

A1.2 Figure 2: Otter and water vole survey areas

A3

N

92m

Lodge

Caversfield House

PW

Sluices Weir

86m

Track

Home Farm

Home Farm

B4100

B4100

South Lodge Riding Stables

CAVER

Legend

- Possible Water Vole Borrows - April 2010
- Damp/Dry watercourse
- Wet watercourse
- Exemplar Site Boundary

Issue	Date	By	Chkd	Appd
-	24-09-2010	AE	SC	AB

ARUP

13 Fitzroy Street
London W1T 4BQ
Tel +44 (0)20 7636 1531 Fax +44 (0)20 7580 3924
www.arup.com

Client
A2 Dominion

Job Title
Bicester Eco-town

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Ecology

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Job No	Drawing No	Issue
213225-00	Figure 2	-

Do not scale

APPENDIX 7J

Arup (2010) Dormouse Survey

A2 Dominion
Bicester Eco-Town
Dormouse Survey

ISSUE | September 2010

Ove Arup & Partners Ltd
13 Fitzroy Street
London W1T 4BQ
www.arup.com

Job number 213225-00

ARUP

Document Verification

ARUP

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			Prepared by	Checked by	Approved by
		Name	Austin Brown	Andrew Barron	Michael Bull
		Signature			
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			Prepared by	Checked by	Approved by
		Name	Austin Brown	Andrew Barron	Michael Bull
		Signature			
		Filename		
		Description		
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		Name			
		Signature			
		Filename		
		Description		
			Prepared by	Checked by	Approved by
		Name			
		Signature			
			Issue Document Verification with Document		✓

Contents

1 Introduction

1.1 Background

Arup has been commissioned by A2 Dominion to carry out a suite of protected species and habitat surveys for the proposed Bicester Exemplar Eco-Town development in Oxfordshire. This report is in respect of the hazel dormice (*Muscardinus avellanarius*).

The proposed development is located within a belt of predominantly grazing farmland which lies to the north west of Bicester. (SP 577 251); The red line area is shown in Figure 1. At present the proposed development area consists of a matrix of farmland with up to 10 grazed fields separated by many high quality species rich hedgerows. A distinct lowland area with an ephemeral stream runs east to west through the south and central areas of the site, and midway flows into a second ephemeral stream running north to south through the site.

At present the farmland within the development area is being managed in a relatively sensitive manner with regards to biodiversity. This includes areas set aside for badger setts, numerous bird boxes, including barn owl (*Tyto alba*) and kestrel (*Falco tinnunculus*), and the provision of bat boxes. Hedgerows have been maintained to produce a wide, continuous and mostly species rich structure and are playing an important part for biodiversity on the site.

1.2 Ecology and Legislation

1.2.1 Generic Legislation

This report and its recommendations have been produced in accordance with relevant legislation and best practice guidance. It also takes into account Planning Policy Statement 9 (PPS9) and other nature conservation policies within local and regional planning policy documents.

Legislation relating to ecological resources that are relevant to this appraisal includes the following:

- ***Wildlife and Countryside Act, 1981 (as amended).*** This Legislation still forms the primary means of protecting wildlife in the UK and provides the mechanism by which a number of international directives are implemented in the UK.

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- ***Planning Policy Statement 9 (PPS9).*** This sets out the Government's planning policies on the protection of biodiversity and geological conservation through the planning system. The policies set out in PPS9 may also be material to decisions on individual planning applications.

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In addition, PPS9 states:

"Development proposals provide many good opportunities for building-in beneficial biodiversity or geological features as part of good design. When considering proposals, local planning authorities should maximise such opportunities in and around developments, using planning obligations where necessary."

In respect of species protection, PPS9 states:

"*……planning authorities should ensure that these species are protected from the adverse effects of development, where appropriate, by using planning conditions or obligations. Planning authorities should refuse permission where harm to the species or their habitats would result unless the need for, and benefits of, the development clearly outweigh that harm*".

1.2.2 Species Legislation

Dormouse numbers have fallen significantly in the UK over the last 100 years both in terms of geographical distribution and numbers[1]. Dormice are afforded the following legal protection:

- Full protection under the *Wildlife and Countryside Act, 1981 (as amended)*.

[1] Bright, P., Morris, P., Mitchell-Jones, T 2006. *The Dormouse Conservation Handbook*. English Nature, Peterborough

- European Protected Species, under the *Conservation (Natural Habitats & c.) Regulations 1994*.

Under these legislative instruments it is illegal to undertake the following activities:

- Intentionally or deliberately kill, injure or capture dormice;
- Deliberately disturb dormice whether in a place of rest or not; and/or
- Damage or destroy dormouse breeding sites or resting places.

Any activity that would result in a contravention of the above legislation would require a Natural England licence to avoid committing an offence.

1.2.3 Eco-Town guidance

In addition to a range of legislation described above in section 1.2.1, a wealth of policy and other guidance is available to govern and direct development proposals in their responsibilities with regard to ecology and biodiversity. These include the recently-published governmental guidance that specifically sets out how to deal with Eco-Town proposals (Biodiversity Positive: Eco-towns Biodiversity Worksheet, TCPA, 2009). The key points of this guidance (referred to as the principal objectives for an Eco-Town Biodiversity Strategy) are as follows:

- **Protecting and enhancing the best of biodiversity**: key habitat areas supporting characteristic and uncommon species should be sustained, where conservation is the main priority.
- **Mitigating the impact of development and securing net biodiversity gain**: the inclusion of supplementary habitat areas that fulfil other green infrastructure functions and support more widespread and common species.
- **Integrating biodiversity within the built environment:** the incorporation of a high degree of permeability for wildlife within built areas and structures.
- **Increasing biodiversity's resilience and ability to adapt to climate change**: ensuring a robust connectivity of habitats that facilitates the wider movement and migration of species.

This provides a clear steer for the design of an Eco-Town proposal, such that the avoidance of key habitat areas must be the priority, followed by the retention and creation of a matrix of secondary habitats both within and outside of the built area, and that all of the above are robustly connected to facilitate future wildlife movements and dispersals. Other key elements of the approach include making provisions for management, funding and accountability, to ensure success.

All Eco-Town proposals should include an Eco-Town Biodiversity Strategy (ETBS) to be developed in tandem with the masterplan for the site. This will provide the framework for delivering net biodiversity gain, setting out what is to be achieved and the steps that are needed to achieve it and, most importantly, how biodiversity will be increased and enhanced in advance of and alongside development, rather than at the end of the development process. It should include specific measurable targets for net biodiversity gain, reflecting local priorities for biodiversity (and contributing to national and regional targets as appropriate) and it should take account of the challenges posed by climate change.

1.2.4 Biodiversity Targets

The UK Biodiversity Action Plan (UK BAP) was produced in accordance with the 1992 UN Convention on Biological Diversity. It describes the UK's biological resources and commits a detailed plan for the protection of these resources, focusing on key habitats and species considered to be of particular significance to nature conservation within a UK context.

The conservation priorities that will be most appropriate to the Bicester Eco-Town proposal are those listed within the UK and (at the lower tier) Oxfordshire Biodiversity Action Plans (BAPs). These list a number of key habitats and species that form the priorities for conservation in those areas and serve as an existing framework within which the Eco-Town can work and provide positive contributions to nature conservation at both local and national scales.

1.3 Aims and Objectives

These surveys aim to establish the likely presence or absence of dormice at the exemplar site and the suitability of the site for this species regardless of presence. The report will offer mitigation and enhancements for this species where needed.

1.4 Limitations

The findings presented in this report represent those at the time of survey and reporting. Variations in these conditions will take place as a result of seasonal factors, and with the general passage of time.

It should also be noted that fauna may travel over wide areas and can have large home ranges and so can be overlooked within surveys. Species which are absent at the time of survey may also return to or colonise a site anew at any future time.

1.5 Report Content and Layout

Following this introduction, Chapter 2 covers survey methodologies, chapter 3 presents the results and discussion and chapter 4 covers conclusions and recommendations.

2 Methodology

2.1 Desk Study

A desk study was conducted within a 5km radius of the site. This utilised on-line research tools including Nature on the Map (www.natureonthemap.org.uk) and the National Biodiversity Network Gateway (www.nbn.org.uk). The search looked for local occurrences of dormice. Additional data were sourced from Thames Valley Environmental Records Centre.

UK Biodiversity Action Plans (UK BAPs) and Local Biodiversity Action Plans (LBAPs) were reviewed for relevant information. These plans list priority species and habitats for the country and its regions, and are the UK government's response to fulfilling its obligations to the Convention of Biological Diversity (CBD).

2.2 Field Survey

Field surveys followed the general methodology as set out in 'Dormouse Conservation Handbook'[1]. In summary, with respect to the exemplar site, these were as follows:

1. Dormouse nest tubes were set out in suitable locations (informed from phase 1 habitat surveys and detailed hedgerow surveys).Tubes were set at a density of 1 per 20m of hedgerow and woodland edge habitat, where suitable. Figure 2 shows survey areas.
2. Tubes were checked for dormouse activity on a monthly basis (see Table 1), which totalled 5 surveys.
3. Hazel nut searches were undertaken in late September (dormice eat these in a diagnostic style).

Survey dates are shown in Table 1.

3 Results and Discussion

3.1 Desk Study

Results from the local biological records centre and NBN show no historical records of dormice within 5 km of the site.

Dormice are listed on the UK BAP due to their falling numbers and continued fragmentation of populations. At present they are not listed on the Local BAP for Oxfordshire.

3.2 Field Survey

Field surveys (nest tubes and nut searches) found no sign of dormouse activity. Table 1 below shows survey results.

Table 1 Dormouse survey results

Dormouse survey number	date undertaken	Results
Tube Set up	05-May	NA
1	27-May	All empty
2	21-Jun	All empty
3	19-Jul	All empty
4	02-Aug	All empty
5	13-Sep	All empty
Hazelnut search	15-Sept	Negative

3.3 Discussion

Although no signs of dormice were found during the survey works, the nature of the site would be suitable for a breeding population of dormice. This is due to the highly interconnected nature of suitable dormouse habitats on the site, mainly in the form of numerous high quality hedgerows.

4 Conclusions and Recommendations

The main reason for the decline in dormouse populations throughout their range in the UK is the fragmentation of their habitats often caused by changes in farming practices, large scale conurbations and reduced coppice woodland management. Although the exemplar site has a good system of ecologically high value hedges, it is however limited in terms of wooded areas, particularly coppice. This is further compounded by a lack of connectivity to suitable habitat within the wider landscape.

Dormice are highly vulnerable to local extinctions and as such are known to be valuable bio-indicators of the ecological health of an area. An area that can maintain a viable dormouse population or be suitable for recolonisation is an indicator of a significantly well managed ecological area.

To recognise the targets and aspirations set by Eco-Town legislation, and associated governmental and borough targets, the following recommendations are made:

1. Maintain on-site connectivity as is presently afforded by the high quality hedgerows.
2. Plant broadleaved woodland patches to create a mosaic of linked habitats.
3. Consider employing a coppice management regime to some areas of existing woodland and any newly planted woodland.
4. Increase the connectivity of dormouse habitats to the wider landscape; this could be achieved by planting more hedgerows and woodland areas.

Figures

A1.1 Figure 1: Site Area

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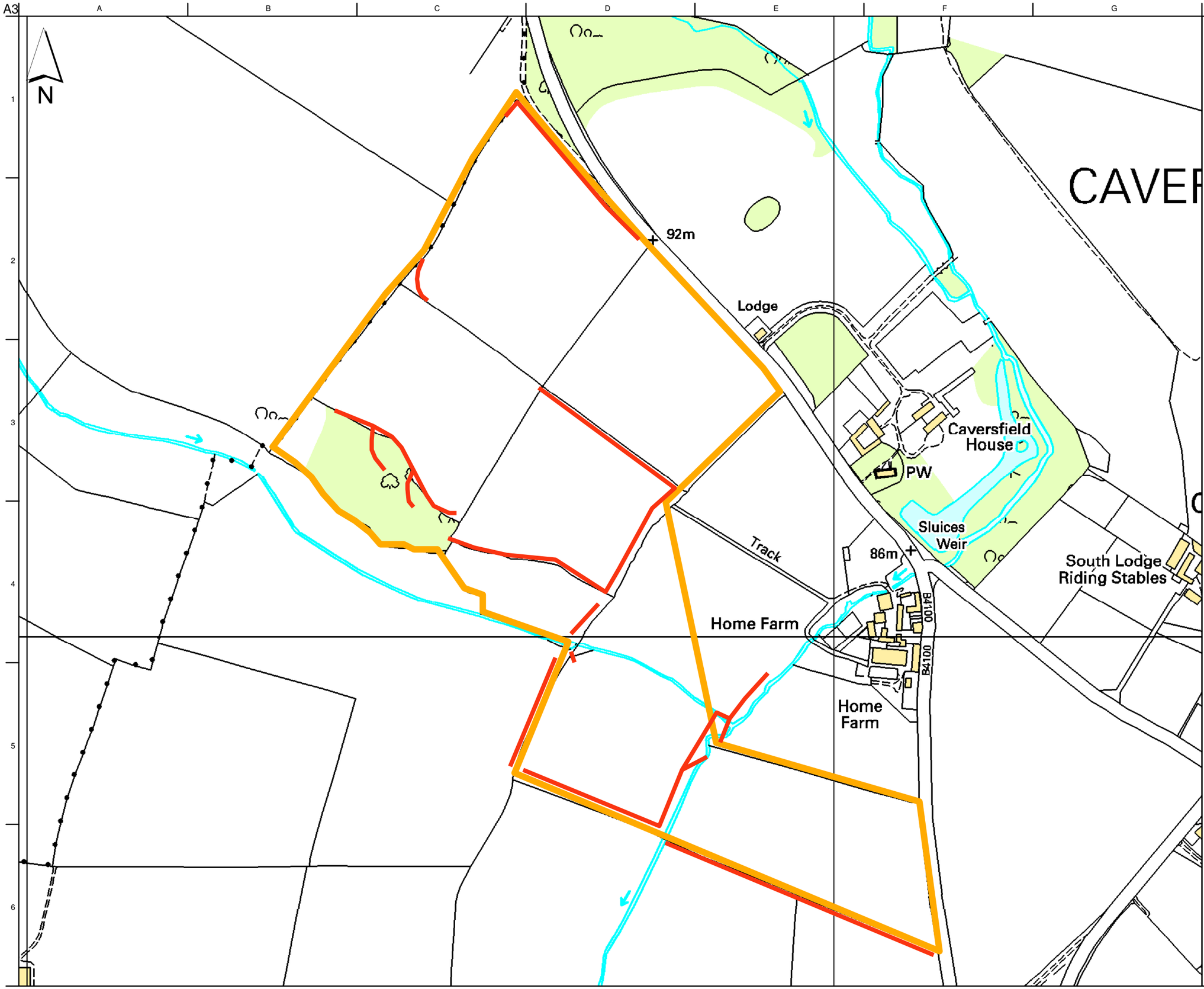
Draft

Job No	Drawing No	Issue
213225-00	Figure 1	-

Do not scale

A1.2 Figure 2: Survey Areas

A3



Legend

- Dormouse Survey Areas
- Exemplar Site Boundary

Issue	Date	By	Chkd	Appd
-	22-09-2010	AE	SC	AB

ARUP

13 Fitzroy Street
London W1T 4BQ
Tel +44 (0)20 7636 1531 Fax +44 (0)20 7580 3924
www.arup.com

Client
A2 Dominion

Job Title
Bicester Eco-town

Drawing Title
Dormouse Survey Areas

Scale at A3
1:4,500

Discipline
Ecology

Drawing Status
Draft

Job No	Drawing No	Issue
213225-00	Figure 2	-

Do not scale

APPENDIX 7K

Arup (2010) Badger Survey

A2 Dominion
Bicester Eco-Town
Badger Survey

ISSUE | September 2010

This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number 213225-00

Ove Arup & Partners Ltd
13 Fitzroy Street
London W1T 4BQ
www.arup.com

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Document Verification

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		Name	Oliver Barnett	Megan Hooper	Michael Bull
		Signature			
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		Name			
		Signature			
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Contents

1 Introduction

1.1 Background

Arup has been commissioned by A2 Dominion to carry out a suite of protected species and habitat surveys for the proposed Bicester Exemplar Eco-Town development in Oxfordshire. This specific report is in respect of badgers (*Meles meles*) and include both badger field surveys and badger bait marking surveys

The proposed development is located within a belt of predominantly grazing farmland which lies to the north west of Bicester. (SP 577 251); the orange line area is shown in Figure 1. At present the proposed development area consists of a matrix of farmland with up to 10 grazed fields separated by many high quality species rich hedgerows. A distinct lowland area with an ephemeral stream runs east to west through the south and central areas of the site, and midway flows into a second ephemeral stream running north to south through the site.

At present the farmland within the development area is being managed in a relatively sensitive manner with regards to biodiversity. This includes areas set aside for badger setts, numerous bird boxes, including barn owl, *Tyto alba*, and kestrel, *Falco tinnunculus*, and the provision of bat boxes. Hedgerows have been maintained to produce a wide, continuous and mostly species rich structure and are playing an important part for biodiversity on the site.

1.2 Ecology and Legislation

1.2.1 Generic Legislation

This report and its recommendations have been produced in accordance with relevant legislation and best practice guidance. They also take into account Planning Policy Statement 9 (PPS9) and other nature conservation policies within local and regional planning policy documents.

Legislation relating to ecological resources that are relevant to this appraisal includes the following:

- ***Wildlife and Countryside Act, 1981 (as amended)*.** This Legislation still comprises the primary means of protecting wildlife in the UK and provides the mechanism by which a number of international directives are implemented in the UK.

- ***Conservation (Natural Habitats &c.) Regulations, 1994*.** This Act provides protection for European protected species such as bats and great crested newts.

- ***Countryside and Rights of Way (CROW) Act, 2000*.** The CROW Act strengthened the details of The Wildlife and Countryside Act in relation to Sites of Special Scientific Interest (SSSI) and threatened species.

- ***Natural Environment and Rural Communities (NERC) Act, 2006.*** This Act puts an obligation on public bodies and statutory undertakers to ensure due regard to the conservation of biodiversity.

- ***Planning Policy Statement 9 (PPS9).*** This sets out the Government's planning policies on the protection of biodiversity and geological conservation through the planning system. The policies set out in PPS9 may also be material to decisions on individual planning applications.

The key principles of the PPS9 are stated as:

"Regional planning bodies and local planning authorities should adhere to the following key principles to ensure that the potential impacts of planning decisions on biodiversity and geological conservation are fully considered……..

(vi) the aim of planning decisions should be to prevent harm to biodiversity and geological conservation interests. Where granting planning permission would result in significant harm to those interests, local planning authorities will need to be satisfied that the development cannot reasonably be located on any alternative sites that would result in less or no harm. In the absence of any such alternatives, local planning authorities should ensure that, before planning permission is granted, adequate mitigation measures are put in place. Where a planning decision would result in significant harm to biodiversity and geological interests which cannot be prevented or adequately mitigated against, appropriate compensation measures should be sought. If that significant harm cannot be prevented, adequately mitigated against, or compensated for, then planning permission should be refused."

In addition, PPS9 states:

"Development proposals provide many good opportunities for building-in beneficial biodiversity or geological features as part of good design. When considering proposals, local planning authorities should maximise such opportunities in and around developments, using planning obligations where necessary."

In respect of species protection, PPS9 states:

"*……planning authorities should ensure that these species are protected from the adverse effects of development, where appropriate, by using planning conditions or obligations. Planning authorities should refuse permission where harm to the species or their habitats would result unless the need for, and benefits of, the development clearly outweigh that harm*".

1.2.2 Species Legislation

Badgers are protected under the Protection of Badgers Act 1992. This makes it illegal to:

- kill, injure, take, possess, or cruelly ill-treat a badger or attempt to do so;
- to damage or destroy a sett:
- to obstruct access to a badger sett (or any entrance); or,
- to disturb a badger when it is occupying a sett (English Nature 1999).

Licences can be obtained from Natural England in order for development works that would result in disturbance or destruction of a sett to be legally undertaken.

Badgers are additionally afforded protection under Section 11 (Schedule 6, paragraphs 11 & 12) of the Wildlife and Countryside Act 1991 (as amended). This legislation relates to the methods used in capturing and killing badgers, prohibiting for example, the use of snares and traps.

1.2.3 Eco-Town guidance

In addition to a range of legislation described above in section 1.2.1, a wealth of policy and other guidance is available to govern and direct development proposals in their responsibilities with regard to ecology and biodiversity. These include the recently-published governmental guidance that specifically sets out how to deal with eco-town proposals (Biodiversity Positive: Eco-towns Biodiversity Worksheet, TCPA, 2009). The key points of this (referred to as the principal objectives for an Eco-town Biodiversity Strategy) are as follows:

- **Protecting and enhancing the best of biodiversity**: key habitat areas supporting characteristic and uncommon species should be sustained, where conservation is the main priority.
- **Mitigating the impact of development and securing net biodiversity gain**: the inclusion of supplementary habitat areas that fulfil other green infrastructure functions and support more widespread and common species.
- **Integrating biodiversity within the built environment:** the incorporation of a high degree of permeability for wildlife within built areas and structures.
- **Increasing biodiversity's resilience and ability to adapt to climate change**: ensuring a robust connectivity of habitats that facilitates the wider movement and migration of species.

This provides a clear steer for the design of an eco-town proposal, such that the avoidance of key habitat areas must be the priority, followed by the retention and creation of a matrix of secondary habitats both within and outside of the built area, and that all of the above are robustly connected to facilitate future wildlife movements and dispersals. Other key elements of the approach include making provisions for management, funding and accountability, to ensure success.

All eco-town proposals should include an Eco-Town Biodiversity Strategy (ETBS) to be developed in tandem with the masterplan for the site. This will provide the framework for delivering net biodiversity gain, setting out what is to be achieved and the steps that are needed to achieve it and, most importantly, how biodiversity will be increased and enhanced in advance of and alongside development, rather than at the end of the development process. It should include specific measurable targets for net biodiversity gain, reflecting local priorities for biodiversity (and contributing to national and regional targets as appropriate) and it should take account of the challenges posed by climate change.

1.2.4 Biodiversity Targets

The UK Biodiversity Action Plan (UK BAP) was produced in accordance with the 1992 UN Convention on Biological Diversity. It describes the UK's biological resources and commits a detailed plan for the protection of these resources,

focusing on key habitats and species considered to be of particular significance to nature conservation within a UK context.

The conservation priorities that will be most appropriate to the Bicester eco-town proposal are those listed within the UK and (at the lower tier) Oxfordshire Biodiversity Action Plans (BAPs). These list a number of key habitats and species that form the priorities for conservation in those areas and serve as an existing framework within which the Eco-town can work and provide positive contributions to nature conservation at both local and national scales.

1.3 Aims and Objectives

The aims and objectives of this study were as follows:

- Establish locations of badger activity both within the Bicester Eco-Town Exemplar site and the immediate surrounding area.
- Determine the number of badger clans currently utilising the site and its immediate surrounds.
- Determine the extent of badger clan territories within and in the immediate vicinity of the Eco-Town Exemplar site.
- Provide recommendations for measures to mitigate for adverse effects of the proposals.
- Provide recommendations for habitat retention and enhancement on site with regard to badgers.

1.4 Report Content and Layout

Following this section of the report, Section 2 will detail the methodology of the badger field surveys as well as the associated bait marking and desk studies. The results of the surveys and studies are presented in Section 3 along with a discussion on the potential implications of the reports' findings on the proposed development. Section 4 sets out the conclusions of the report along with recommendations aimed at minimising the potential impacts of the development on badgers and making use of opportunities for habitat enhancement on site with regard to this species.

2 Methodology

2.1 Desk Study

A desk study was conducted within a 3km radius of the central grid reference for the site. This utilised the on-line research tools Nature on the Map[1], and the Multi Agency Geographic Information for the Countryside website MAGIC[2]. The search focussed on statutory sites designated for nature conservation within the vicinity of the proposed development area. Additional data on distributions of notable and protected species and non-statutory local sites for nature conservation were sourced from Thames Valley Environmental Records Centre.

UK Biodiversity Action Plans (UK BAPs) and the Biodiversity in Oxfordshire website[3] (the local biodiversity action plans (LBAPs) were consulted for details of species of note that could be expected to occur in the area.

2.2 Field Survey

The survey for badger activity was undertaken by two experienced Arup ecologists on the 10th of May 2010, and comprised walkover surveys and visual examinations of the site and the immediate surrounds. This involved searching the site and surrounding areas whilst focusing on suitable habitats and features, including all linear features, areas of scrub, woodland and amenity grassland.

Surveys aimed at recording the occurrence of the following indicators of badger presence:

- Badger setts.
- Badger paths.
- The presence of dung pits. Dung pits may occur singulary or in groups when they are classified as a latrine. The presence of badger footprints or hairs along the lines of paths, near sett entrances, or on vegetation or fencing close to areas of activity.

Any of the above indicators found during surveys were recorded and have been subsequently used to develop an understanding of badger activity across the Eco-Town Exemplar site.

2.3 Bait Marking Study

A badger bait marking study was also undertaken to determine whether one or more badger clans are currently utilising the site. This followed recognised methodologies described in the RSPCA's 'The Problems with Badgers' publication (Harris *et al.* 1991).; A Phase 1 Ecological Survey of the site, undertaken in April 2010, made preliminary identification of two badger setts, both of which have multiple entrances.

[1] www.natureonthemap.org.uk
[2] www.magic.gov.uk
[3] http://www.oxfordshire.gov.uk

The bait marking study was undertaken by first using a bait mix consisting of peanuts, syrup and small, coloured plastic beads, which were then left outside the various sett entrances at the two sett locations. Bait mixed with green and white beads was left at the entrances to the multi holed sett, which lies within the an area fenced off with post and rail fencing that is found at a location almost central to the various grazing pastures of Home Farm (see Figure 2, below).

A second bait mix, made using red and orange beads, was left outside various entrances to the sett which runs along the boundary of the small parcel of immature woodland found at the western extent of Home Farm.

The bait marking study was undertaken over a two week period which commenced on the 11th of May, 2010. During this time bait mixes, as detailed above, were put out at the various entrances to the two badger setts every second or third day. Field surveys of the Eco-Town Exemplar site and its immediate surrounds were undertaken at similar intervals to check for badger latrines and dung pits containing coloured beads from either of the two bait mixes. In this way it was hoped to determine whether the two setts are inhabited by individuals of the same or different clans.

2.4 Limitations

It is possible that some evidence of the presence of badgers could have been overlooked because of the density of vegetation in certain places, where physical access was not possible. In these areas, however, careful inspection of the peripheral vegetation was made to identify possible entrances, paths or other indicators of badger access into these areas.

Additionally, badgers can cover wide areas, hold large territories and colonise or leave a site at any time. Therefore, survey results detailed here reflect the situation at the time of survey. No account can be made for changes to badger activity, such as new sett digging, since the time of the Arup surveys.

Results and Discussion

2.5 Desk Study

The results of the desk study show that records of badgers in the area date back some 27 years to January 2003. A total of 17 records exist which detail badger sightings from a variety of locations including Ardley Quarry & Cutting SSSI, the stretch of the B4100 road adjacent to Stoke Little Wood, and Stratton Audley Quarry.

2.6 Field Survey

The Phase 1 habitat survey undertaken in Spring 2010 indentified two large badger setts within the boundaries of the Eco-Town Exemplar site. The field surveys which were subsequently undertaken revealed that both of these are active and are clearly occupied by a large number of individuals. This is borne out by the number of active entrances at each sett, the number of latrines and dung pits in the immediate vicinity, and the number of entrances with fresh bedding outside.

Figure 2 details the locations of the two setts. One is located almost centrally to the various grazing pastures of Home Farm and has been identified as a main sett. The main sett has in excess of 25 entrances, 10 to 12 of which showed signs of recent use over the course of the field surveys and associated bait marking study.

The second has been identified as an Annex sett and is located along the boundary of the small woodland copse found at the western extent of Home Farm. This sett is represented on Figure 2.

At the time of the survey there were in excess of 25 entrances to the Annex sett, though only six to eight of these showed signs of recent use.

Other outlier setts (both used and disused) exist within the boundaries of the Eco-Town Exemplar site, as identified on Figure 2. At the time of the surveys the outlier setts all had between one and two entrances.

The main, annex and outlier setts are connected by a network of paths which the badgers appear to regularly use for accessing suitable foraging areas. The most notable foraging area is the corridor of semi-improved pasture, which lies immediately adjacent to the ephemeral stone-bed stream that flows through the site in a south-easterly direction. This foraging area has been identified by the large number of foraging scrapes recorded during the field survey.

Over the months subsequent to the initial badger surveys, a number of incidental observations of badger foraging activity were made during bat emergence and dawn swarming surveys that were carried out on site. The vast majority of these occurred with this belt of semi-improved pasture, three of which involved several badgers.

During the course of the field survey it was recorded that the network of badger paths extend beyond the pastures of the Eco-Town Exemplar site and into the more arable landscape to the south. Foraging opportunities exist here in the form of hedgerows and associated field boundaries, though no scrapes, latrines or dung

pits were recorded in this area. Hence, it is likely the badgers are accessing other, more appropriate foraging habitat beyond the extent of the survey area.

2.7 Bait Marking Study

Despite concerted efforts over a two week period, the bait marking study failed to provide a definitive picture as to the extent of badger clan territories on site, or as to whether the site is occupied by more than one clan.

Latrines containing the red and orange beads from bait placed outside entrances to the large woodland outlier sett were found at various locations (see Figure 2), both to the west and east of the main sett. This would suggest that the badgers occupying the woodland copse annex and are of the same clan as those occupying the main sett, since the territory of the woodland outlier sett badgers appears to encompass and extend beyond the location of the main sett.

Individuals from the main sett clearly appear to be travelling and creating latrines and dung pits beyond the extent of the Eco-Town Exemplar site and the surrounding survey area. Only two latrines containing green and white beads were located during the course of the bait marking study despite significant quantities of bait being placed at the sett entrances over the survey period.

However, whilst one latrine containing green and white beads was found in the immediate vicinity of the main sett, the other was found to the west of the Eco-Town Exemplar site. Again, this would suggest that the individuals occupying these two setts represent the same clan and share foraging territories.

2.8 Discussion

The field survey and bait marking study detailed in this report reveal the Eco-Town Exemplar site to be an important location for badgers. The site currently supports a healthy and viable badger population.

The main sett is of considerable size and was recorded has having between 10 and 12 active entrances at the time of the survey.

The woodland copse annex and associated outlier setts are similarly extensive, with between six and eight active entrances recorded. When considering the number of currently inactive entrances which are also associated with both these setts, it would appear that badgers have occupied this area for many generations. Personal communication with the farm owner has suggested that badgers have be active on the site for at least 90 years and possibly longer

The findings of the survey highlight the dependence of foraging badgers on the semi-improved pastures of the site. The pastures beyond the south western site boundary are also of significant importance for foraging badgers.

Construction and development works in these pastures are likely to impose significant long-term disturbance effects on badgers. These negative impacts could be alleviated to a degree by the implementation of a series of mitigation and enhancement measures. These should include the retention of several important habitats which are currently present, including key areas of pasture, the small woodland copse in the south west corner of the site, all hedgerows, and the belt of

riparian habitat which runs adjacent to the south western site boundary and through the south east section of the site.

To maintain viability of the local badger population it will also be necessary to ensure their continued access to foraging areas across the wider landscape as well as within the boundaries of the Eco-Town Exemplar site development. This will require the retention and maintenance of movement corridors and, potentially, the provision of new on-site foraging areas through the implementation of appropriate and considered planting schemes.

These recommendations are discussed in more detail below.

3 Conclusions and Recommendations

3.1 Habitat Retention & Enhancement

The Bicester Eco-Town Exemplar site development has the potential to significantly impact upon the badgers which currently occupy the site. These impacts will almost inevitably include:

- loss of foraging habitat;
- restrictions on badger dispersal and movement across the site and amongst the wider landscape as a whole;
- the severance of existing badger territories; and,
- a long-term increase in perceived disturbance to badgers, both during and post-construction.

The following measures will help to reduce these negative impacts, though it is likely it will not be possible to either fully or significantly mitigate for the adverse effects of the development on badgers.

- Retain habitat areas currently on site which are of key importance to badgers. These include: the small parcel of woodland in the south west corner of the site; the semi improved pastures; all hedgerows within the site boundaries; and the belt of riparian habitat which runs adjacent to the south western site boundary and through the south east section of the site.
- Design and implement a site planting scheme aimed at broadly replicating those habitats already present in the wider area such that areas of badger foraging habitat to be lost to development can be replaced in other locations on site as and where appropriate and feasible.
- Retain and enhance existing habitat corridors to facilitate the continued dispersal of badgers amongst foraging areas within the wider landscape.

3.2 Construction Phase Mitigation for Badgers

During the construction phase, badgers should be able to access appropriate foraging habitat both within the boundaries of the exemplar site development and beyond into the wider landscape. Badgers should be excluded from areas of active construction, and site personnel excluded from areas where there are badger setts or from retained areas of badger foraging habitat, via installation of 1.2m high stock-proof fencing. Any works that have the potential to disturb badgers or impact their foraging areas are likely to require an appropriate badger licence from Natural England before works could commence.

3.3 Post Construction Monitoring

So as to ensure that the implemented mitigation measures have been effective and to demonstrate that activity of badgers and their favourable population status have been maintained following completion of the works, it is recommended that a suite of monitoring visits are carried out.

Figures

Figure 1: Site area

A3

N

92m

Lodge

CAVER

Caversfield House

PW

Sluices Weir

86m

Track

South Lodge Riding Stables

B4100

Home Farm

Home Farm

Legend

Exemplar Site Boundary

Issue	Date	By	Chkd	Appd
-	22-09-2010	AE	SC	AB

ARUP

13 Fitzroy Street
London W1T 4BQ
Tel +44 (0)20 7636 1531 Fax +44 (0)20 7580 3924
www.arup.com

Client
A2 Dominion

Job Title
Bicester Eco-town

Drawing Title
Site Overview

Scale at A3
1:4,500

Discipline
Ecology

Drawing Status
Draft

Job No	Drawing No	Issue
213225-00	Figure 1	-

Do not scale

Figure 2: Badger survey results

A3

N

92m

Lodge

Caversfield House

PW

Sluices Weir

86m

Track

South Lodge Riding Stables

Home Farm

B4100

Home Farm

Red & Orange bait stations

Green & White bait stations

Legend

- Latrine (not bait marked)
- Green/White bait latrine
- Red/Orange bait latrine
- Active outlier sett
- Disused outlier sett
- Disused outlier sett currently used by foxes
- Foraging scrape
- BadgerPaths
- Badger Main Sett
- Badger Annex Sett
- Exemplar Site Boundary

Issue	Date	By	Chkd	Appd
-	27-09-2010	DMc	OB	AB

ARUP

13 Fitzroy Street
London W1T 4BQ
Tel +44 (0)20 7636 1531 Fax +44 (0)20 7580 3924
www.arup.com

Client
A2 Dominion

Job Title
Bicester Eco-town

Drawing Title
Badger Field Survey and Bait Marking Study

Scale at A3
1:4,500

Discipline
Ecology

Drawing Status
Issue

Job No	Drawing No	Issue
213225-00	Figure 2	-

Do not scale

APPENDIX 7L

Arup (2010) Colin Plant Associates (2010) Bicester Eco-town Masterplan and Exemplar Site: Invertebrate Survey Report

Commissioned by
ARUP
13 Fitzroy St
London
W1T 4BQ

BICESTER ECO-TOWN
MASTERPLAN & EXEMPLAR SITE
INVERTEBRATE SURVEY REPORT

Report number BS/2541/10

October 2010

Prepared by

Colin Plant Associates (UK)
Consultant Entomologists
14 West Road
Bishops Stortford
Hertfordshire
CM23 3QP

01279-507697
cpauk1@ntlworld.com

1 INTRODUCTION AND METHODOLOGY

1.1 **Colin Plant Associates (UK)** were commissioned during June 2010 by **Arup** to undertake an investigation of invertebrates on an area of land to the north-west of Bicester in Oxfordshire upon which it is proposed to develop new housing.

1.2 An initial site visit was made on 29th June 2010, when a walk-over survey of the entire site was undertaken in order to determine the nature and extent of detailed survey work required. Subsequent visits were undertaken on

Date	Session	Activity
3 – 4 July	overnight	moth recording
4 July	day	terrestrial sampling;
16 – 17 July	overnight	moth recording
17 July	day	terrestrial sampling;
1 – 2 August	overnight	moth recording
2 August	day	terrestrial sampling;
22 – 23 August	overnight	moth recording
23 August	day	terrestrial sampling;
26 – 27 September	overnight	moth recording
27 September	day	terrestrial sampling;
7 – 8 October	overnight	moth recording
8 October	day	terrestrial sampling; aquatic sampling
21 October	day	terrestrial sampling; aquatic sampling

1.3 On all visits, terrestrial invertebrates were recorded by direct observations of both species and their signs (such as leaf mines and plant galls). In addition active sampling was also undertaken as follows:

Sweep-netting. A stout hand-held net is moved vigorously through vegetation to dislodge resting insects. The technique may be used semi-quantitatively by timing the number of sweeps through vegetation of a similar type and counting selected groups of species. This technique is effective for many invertebrates, including several beetle families, most plant bug groups and large number of other insects that live in vegetation of this type.

Beating trees and bushes. A cloth tray, held on a folding frame, is positioned below branches of trees or bushes and these are sharply tapped with a stick to dislodge insects. The same technique can be applied to tall perennial herbs and other plants that tower over a sward. Black or white trays are used depending upon which group of invertebrates has been targetted for search. Insects are collected from the tray using a pooter. This technique is effective in obtaining records of most arboreal species, including many beetle groups, bugs, caterpillars of Lepidoptera, spiders and others. It can be undertaken at any site where there are trees or bushes present although is rendered ineffective if the vegetation is wet or if the weather is windy.

Suction Sampling consists of using a converted leaf blower to collect samples from grass and other longer ground vegetation. The sample is then everted into a net bag and the invertebrates removed with a pooter. The advantage of suction sampling is that it catches species which do not fly readily or which live in deep vegetation. It is particularly productive for Coleoptera, some Diptera and Arachnida.

1.4 We also undertook passive sampling. This is effective because it does not depend upon the physical presence of the surveyor and it records species throughout the entire trap period.

Pitfall trapping. Vending-machine cups or similar are placed in the ground with the rim flush with, or slightly below, the surface. A fluid is added, containing ethylene glycol, sodium chloride and formalin with a little detergent to reduce surface tension. Holes made in the sides of the cups a couple of centimetres below the rim permit flood or rain water to drain without the traps over-flowing and the catch becoming lost. Invertebrates simply fall into the traps.

Pitfall traps were established in compartment T1 (Gowell Farm area). This area was selected as being representative, in part because it was the least likely zone to be disturbed by harvest, ploughing or other activities that would destroy the traps.

1.5 A**ctinic light trapping**. Normally, nocturnal recording of moths would involve operating 125-watt mercury vapour lamps from a portable generator. However, in order to trap a large number of separate sites on the same night, such a technique would have been difficult because of both the need to refuel generators and the potential security issues relating to the use of the very obvious lights. We therefore used small size actinic traps, operated from 12 volt burglar-alarm batteries, and left these running from early evening to the following morning. These units are discrete because, whilst still having an output in the safe zone of the UV range, their light output in the visible part of the spectrum is reduced; thus, they can be tucked away in undergrowth at the side of a track without passers-by noticing them. For the same reasons of light emission, they attract moths and other insects from a much shorter distance and so the resultant catch is usually more representative of the habitat selected, in comparison with that in mercury vapour traps which attract flying species from a much wider area of the countryside.

1.6 A formal search was undertaken for existing data was not specifically requested. After we had made an initial visual inspection of the habitats present on site we determined that this was likely to be unproductive. Nevertheless, during the course of the project we approached a number of key colleagues informally; as a result of this we are satisfied that no important invertebrate data has been overlooked.

2 OVERVIEW OF INVERTEBRATE HABITATS ON THE SITE

2.1 Preamble

2.1.1 The site is extensive, extending approximately three kilometres across at its widest points, although it is of an irregular shape. It occupies an area of level and slightly undulating lowland in the central part of England where it is separated from any maritime influence.

2.1.2 The lowest point of the site is marked by the 80 metre contour immediately north-east of Lord's Farm in the south, whilst the 100 metre contour runs through the churchyard at Bucknell village in the highest point to the north.

2.1.3 The soil appears to be based upon a clay component and does not seem to drain particularly rapidly after rainfall. The soil is evidently nutrient-rich and much of the site is given over to arable crop production.

2.1.4 Wildlife habitats here will be governed by these over-riding ecological parameters. They are now examined, specifically as they affect invertebrate ecology.

2.2 Terrestrial invertebrate habitats

2.2.1 Terrestrial habitats within the surveyed area are dominated by the overwhelmingly arable landscape. Most fields are ploughed annually and sown with a crop; those few which are not so treated are mostly pasture for cattle or sheep and so are often closely-grazed.

2.2.2 Hedges, rather than fences, define the field boundaries in most places. However, most of these hedges are likely to be of low value as invertebrate habitats – at least on a permanent basis. This is because almost all hedges are either trimmed or flailed, thus removing both invertebrates and their sources of food.

2.2.3 Recent research by personnel at Oxford University has shown that hedges, even poorly-structured monocultural ones, support a greater numerical abundance (though not necessarily a greater species diversity) of insects if there are standard trees retained within their lengths. A few of the hedges on the site do contain standard trees, mostly ash or oak and some of these appear to be mature and contain amounts of aerial dead timber (an important micro-habitat for invertebrates).

2.2.4 Marginal areas of fields are, in general, narrow or absent and when they are present they appear to be dominated by rank grasses. In general, most field margins appear to provide rather poor quality invertebrate habitats.

2.2.5 For similar reasons, transitional edge habitats, where there is a gradual physical change in height from low grassland to tall woodland, are very poorly represented and in most areas appear absent.

2.2.6 Woodland is represented by a number of small units. Most of these appear on the 1945 aerial photographs and so may be of some age, though the bulk of trees are young in comparison. Ash is the dominant tree in the landscape and is the main feature of these woodland units, usually joined by oaks and occasionally other trees.

2.2.7 These woodland units are widely spaced within the arable landscape and are joined only by relatively poor-quality hedges or else are quite isolated. Continuous woodland does not feature on the site and so true woodland invertebrates are probably absent.

2.2.8 Consequent upon this, and perhaps also upon the use of the small woodland units for pheasant rearing, the dead wood resource is minimal and other saproxylic habitats are also very poorly represented.

2.2.9 Other micro-habitat features are generally scarce. In the derelict yard of Gowell Farm, the remnants of a long-disused muck pile generated a healthy list of common rove beetles showing there to be a reservoir of such species in the area, but suitable habitat elsewhere on the site could not be found.

2.3 Aquatic invertebrate habitats

2.3.1 Both running water and static ponds are represented on the site and are now briefly discussed.

2.3.2 Most of the streams on the site were dry in the summer months and are generally regarded as being winterbournes. As such, their invertebrate complement will be minimal (although permanent winterbournes may develop a small but specialist fauna of water beetles in particular).

2.3.3 In summer months, searching for aquatic invertebrates in the dried or near dry courses will, quite obviously, be unproductive. Searching in the winter, though before the frosts, would probably reveal the greatest number of species.

2.3.4 During 2010, the return of water to the bulk of water courses started in September. Examinations undertaken in early October up to and including the final visit on 21st October 2010, showed that some of the watercourses remained dry, others were damp but lacked flowing water. Only the main stream, that flowing from near Crowmarsh Farm to pass under the railway embankment in the vicinity of Aldershot Farm before passing woodland south of Hawkwell Farm and so beyond the site boundary beneath Lord's Lane, contained a flow of water.

2.3.5 Two ponds were indicated to us in maps of the site. One is in the vicinity of Crowmarsh Farm (compartment A2 in the list below); the other is in the vicinity of Lower Farm, to the north (compartment A6).

3 SELECTION OF HABITAT AREAS FOR DETAILED EXAMINATION

3.1 It has been indicated above that largest part of the site is evidently unsuitable for invertebrates; this requires no sampling. However, the several small and localised habitat units across the site are of potential invertebrate interest and sampling of these was undertaken.

3.2 These terrestrial sample areas are defined in Map 1 where they are given recording compartment numbers that repeat in the species inventory at Appendices 1 and 2. These areas are now introduced in greater detail.

Terrestrial habitat compartment T1: Gowell Farm area

Gowell Farm is abandoned and the buildings are derelict. The concrete farmyard has been invaded by ruderal vegetation and scrub to provide a mosaic of young habitat that is poorly-represented elsewhere in the surveyed area.

Tree species here seem rather more varied than in the ash-dominated woodland units and include Elder, hawthorn, Sycamore, Turkey Oak, Damson, Sweet Chestnut, Birch and others.

Hedges here are overgrown and provide a stark, but ecologically welcome, contrast with the manicured hedges elsewhere on the site. The twigs of the hedgerow plants have become colonised with various lichens. A long-abandoned muck pile is still evident in a few places.

A mature oak tree, containing a reasonable quantity of aerial dead timber, guards the entrance to the farmyard on the southern side of the access track.

Actinic moth traps were operated by us in this compartment on selected dates.

Terrestrial habitat compartment T2

This appears to be a section of the former road. It is now isolated on the north side of the existing road and the marginal trees and bushes have become overgrown to provide something approaching a structured edge habitat – a feature that is very poorly represented on the site overall.

Trees here include Elm, Ash, Field Maple, birches, hawthorns, willows and poplars and are adorned with Ivy and occasional Hop plants. Non-natives such as cherry and Snowberry are also evident in a few places, but do not detract from the likely raised ecological value of this compartment.

Brambles dominate the under-storey in most places but there are also tall perennial herbs such as Great Willow-herb and other species that will inevitably add to the invertebrate biodiversity of this small area.

Actinic moth traps were operated by us in this compartment on selected dates.

Terrestrial habitat compartment T3

This is a small woodland unit typical of the many others on the site. It is dominated by Ash but other trees are also present. In general, the lower layers of flora beneath the canopy are restricted but at the edges in particular there is greater diversity of plant life and so potentially raised invertebrate interest.

Terrestrial habitat compartment T4

This is a zone of unmown vegetation with between a hedge and an arable field. As an invertebrate habitat it is likely to be poor, but it is a habitat type that is rare on the site and so was sampled.

Terrestrial habitat compartment T5

This is another Ash-dominated woodland, not dissimilar to compartment T3. Other ttrees here included elm and Elder and as always there is a dominance of brambles on the ground beneath the trees. However, unlike in T3, we were able to operate actinic moth traps in this unit on some visits.

Terrestrial habitat compartment T6: Grunthill Copse

This small woodland unit has a better mix of trees incorporated with the Ash that forms its basis. Deciduous oaks, elm, hawthorn, Field Maple and Beech all feature. These are joined by bramble and wild rose and there were also patches covered by White Bryony.

Actinic moth traps were operated by us in this compartment on selected dates.

Terrestrial habitat compartment T7

This is the small, Ash-dominated woodland behind the pond at Crowmarsh Farm. It is relatively small and uninteresting from an invertebrate viewpoint but it provides screening and micro-climate control for the adjacent pond.

Actinic moth traps were operated by us in this compartment on selected dates.

Terrestrial habitat compartment T8

This compartment does not feature in Map 1. It is a catch-all category for records of invertebrates made casually along hedgerows within the surveyed area.

3.3 The aquatic sample areas are also indicated in Map 1 where they are given recording compartment numbers that repeat in the species inventory at Appendices 2 and 3. These areas are now introduced in greater detail.

Aquatic habitat compartment A1

This section of the stream, near its source at a spring, flows across arable fields in a shallow channel that is bordered on each side by a strip of rank grassland vegetation extending about one metre. Te channel is largely dominated by grasses and other invading terrestrial vegetation and no aquatic macrophytes were evident during sampling sessions.

Aquatic habitat compartment A2

This is the pond that separates Compartments A1 and A3. It was created artificially by mechanical excavation of the stream and is up to 4 metres deep in places (unconfirmed third party information). There is a zone of marginal vegetation that may be of value to invertebrates.

Aquatic habitat compartment A3

This is a section of the main stream as it runs under the cover of a hedge. It is largely shaded and there are no aquatic macrophytes evident.

Aquatic habitat compartment A4

This section of the main stream flows beneath the cover of another overgrown hedge and is equally shaded and devoid of aquatic plants.

Aquatic habitat compartment A5

This downstream section of the watercourse is also heavily shaded but as it emerges into young woodland light penetrates from the side. In this area it flows fairly rapidly over a gravel substrate but is sufficiently shallow that young pheasants released into the wood in the autumn simply walk across it when the surveyor approaches!

Aquatic habitat compartment A6

This ornamental pond does not feature on 1945 aerial photographs and so is evidently a more recent artificial construction.

4 RESULTS OF TERRESTRIAL INVERTEBRATE SAMPLING

4.1 Summary

4.1.1 Appendix 1 reports the complete list of insect taxa encountered during the survey. The list is annotated with formal National Status codes where these are better than "nationally common" and these status codes are explained in Appendix 2.

4.1.2 A total of 560 invertebrate species was recorded. This is an acceptable total for the effort input and indicates that the level of sampling achieved is adequate to permit an assessment of the site. The more noteworthy amongst these are now briefly discussed.

4.2 Species of conservation interest

4.2.1 Several categories of invertebrates are of raised significance in an ecological assessment. These categories are explained in Appendix 2 and the corresponding species are now examined.

Legally Protected Species

4.2.2 No invertebrate species that are afforded direct legal protection under any UK or European legislation were encountered during the survey.

UK Biodiversity Action Plan Priority Species

4.2.3 One UK BAP species was recorded during the survey.

The Small Heath Butterfly *Coenonympha pamphilus* is a grassland species that has declined in recent years. It was added to the UK BAP list at the end of 2007 though there are disagreements over the need for this action. It remains widespread, though it has declined numerically so that whereas twenty years ago it was usual to see dozens if an afternoon it is now more likely that less than twenty or so will be seen.

At Bicester, we saw only very few examples in the area around Gowell Farm (Compartment T1).

4.2.4 The list of UK Biodiversity Action Plan Priority Species *of moths* is divided into two sections. In the first, a total of 81 species are afforded the status of UK BAP Priority Species; none of these is recorded in the surveyed area nor is any likely to be present.

4.2.5 The second section is a list of 69 species that have declined in population by a significant amount in the past 25 years. These are not yet rare and are flagged as UK BAP species "**for research only**". They were inadvertently included in the overall BAP list by non-specialists.

4.2.6 This has resulted a confusing situation; these species were not intended to be affected by the requirements of *Planning Policy Statement 9: Biodiversity and Geological Conservation*, published by the Office of the Deputy Prime Minister during 2005, which requires Local Authorities to take measures to protect the habitats of UK BAP species from further decline through policies in local development documents. They were merely flagged for special attention.

4.2.7 At Bicester, we have recorded 9 such "Research Only" moth species; several others are confidently predicted to be present.

Species	English name	Caterpillar feeds on	In terrestrial habitat area							
			1	2	3	4	5	6	7	8
Agrochola lychnidis	Beaded Chestnut	deciduous trees and shrubs and herbaceous plants (requires both)	+	+						
Allophyes oxyacanthae	Green Brindled Crescent	rosaceous trees and shrubs		+						
Atethmia centrago	Centre-barred Sallow	ash - buds then flowers	+	+			+	+	+	
Ecliptopera silaceata	Small Phoenix	willow herbs, enchanter's nightshade		+						
Hepialus humuli	Ghost Moth	roots of grasses and herbaceous plants	+							
Hydraecia micacea	Rosy Rustic	herbaceous plants, especially docks, feeding in the rootstock	+							
Melanchra persicariae	Dot Moth	herbaceous plants	+							
Tyria jacobaeae	Cinnabar Moth	Ragwort	+							
Xanthia icteritia	Sallow	sallow/willow catkins - then on herbaceous plants		+						

Red Data Book Species

4.2.8 One species listed in the British Red Data Books (Shirt, 1987; Bratton, 1991) or which has been elevated to the status of Critically Endangered, Endangered, Nationally Vulnerable or Near Threatened (formerly Nationally Rare) by subsequent formal reviews is recorded in the present survey.

Stigmella samiatella is a minute micro-moth whose caterpillars feed internally in the leaves of Sweet Chestnut trees, leaving a whitish galley – or "mine". It was provisionally placed in Red Data Book category 3, but has since proved to be widespread and common in the south of England wherever Sweet Chestnut grows. This may reflect a genuine range expansion, rather than it having been overlooked, but either way the status is not at all warranted.

Mines were found on a tree at Gowell Farm (compartment T1).

Nationally Scarce Species

4.2.9 No species recorded feature in the Nationally Scarce (formerly Nationally Notable - Na) category (see Appendix 2).

4.2.10 Five species recorded feature in the Nationally Scarce (formerly Nationally Notable - Nb) category (see Appendix 2).

The Shaded Pug moth (*Eupithecia subumbrata*) feeds as a caterpillar on a wide range of herbaceous plants. It is widespread across south-eastern England, though less frequent elsewhere, but it is only locally distributed and some apparently suitable sites do not seem to support it. On the basis that it might be declining, the Nationally Scarce status may be warranted.

Two adults were caught in an actinic trap at compartment T4.

The bark beetle *Kissophagus hederae* feds as a grub in the dead wood of mature ivy, and is usually only found in larger branches of the plant. This implies that established ivy, of some age is required so that this is in some way an indicator of habitat stability. Like many other species it is probably overlooked, but it appears to be genuinely absent from a great many sites examined.

We recorded adults in compartment T2.

Roesel's Bush-cricket *Metrioptera roeselii* has, recent years, undergone a very large expansion of range that is almost certainly climate-driven. In most years the insects develop without the ability to fly, but in favourable (hot) summers the females develop winged forms that are able to disperse after mating and establish populations in new areas. In the south-east of England, this cricket is present in considerable abundance in grassland habitats, including set-a-side, field margins, road verges and lightly grazed pastures where there is plenty of vegetation cover. The Nationally Notable status is no longer warranted and an unpublished document on the Internet has indeed reduced its status to Nationally Local.

We recorded adults at compartments T2 and T4 and also one in the rank grass that flanks aquatic compartment A1.

Phyllonorycter platanoidella is a leaf-mining micro moth that is very much under-recorded. In the south of Britain, it is widespread and expected wherever Norway Maple is established and its status is not warranted. There is debate over whether this is a separate species from some other *Acer*-feeding *Phyllonorycter* species.

We found abundant mines of this moth on fallen leaves at Gowell Farm (compartment T1).

The blue and red leaf beetle *Podagrica fuscicornis* feeds as a grub in the flowers and seeds of mallow (*Malva* species). The plant has become a common feature of verges, hedgerows and other sites and the distinctive beetle has become quite frequent in the past few years.

We found examples at Gowell Farm (compartment T1); the host plant does not appear to be widespread across the survey area. .

Nationally Local Species

4.2.11 Twenty-one species are listed formally as Nationally Local (see Appendix 2). These are:

Species	English name	Habitat associations	In terrestrial compartment							
			1	2	3	4	5	6	7	8
Amara lunicollis	a ground beetle	grasslands, open woodland, gardens etc	+							
Andrena flavipes	a solitary bee	nests colonially, usually tunnelling into a vertical face								+
Anomoia purmunda	a picture-winged fly	Larva feeds in the flesh of hawthorn berries	+	+				+		+
Aphodius granarius	a beetle	dung, rotting vegetation (compost heaps) and carcasses	+							
Aphthona euphorbiae	a leaf beetle	widely polyphagous	+	+	+	+	+	+	+	+
Ceratapion carduorum	a seed weevil	Thistles	+							
Cordylepherus (Malachius) viridis	a beetle	a common grassland species	+			+				+
Crepidodera plutus	a leaf beetle	Willows, especially Crack Willow - rarely on poplars		+						
Curculio glandium	a weevil	Oak trees	+							+
Curculio pyrrhoceras	a weevil	oak - causing leaf galls								+
Dorytomus tortrix	a weevil	in catkins of aspen and sallow		+						
Hylaeus annularis	a yellow-faced bee	nests in hollow plant stems, such as docks, etc	+							
Lasioglossum leucopus	a solitary bee	excavates nest burrow in level ground – preferring ruderal sites	+			+				+
Ledra aurita	Hippopotamus froghopper	Oak trees					+			
Nicrophorus vespilloides	a beetle	carrion	+							
Oplodontha viridula	a soldier fly	marshes and pond margins						+		
Phyllobius maculicornis	a weevil	polyphagous on leaves of deciduous trees and shrubs		+				+		+
Psylliodes chrysocephala	a weevil	various Cruciferae		+						
Pterostichus (Poecilus) cupreus	a ground beetle	open grassy habitats - usually where damp	+						+	
Rhamphus oxyacanthae	a beetle	larva mines in leaves of hawthorn		+						
Sicus ferrugineus	a parasitic fly	parasitic fly on bumble bees			+	+	+			+

4.3 Other species of interest

4.3.1 A third party report from a source regarded as reliable indicates the presence of the **White-letter Hairstreak butterfly (*Satyrium w-album*)** in association with a hedge containing elm re-growth in the extreme south-east corner of the site opposite Bignell Park. This butterfly declined drastically across Britain in the aftermath of the Dutch Elm Disease outbreak in the late 1970s and became extremely rare for several years. More recently it has apparently adapted to feeding (as a caterpillar) on elm suckers rather than requiring mature, flowering trees and has made a reasonable recovery. At 2010 it is widespread but rather local across southern and central England and is extending northwards, though it is absent from many apparently suitable sites and is nowhere numerically common.

5 RESULTS OF AQUATIC INVERTEBRATE SAMPLING

5.1 The species obtained by sampling representative aquatic habitats are presented in Appendix 3.

5.2 A rather low number of generally widespread and common species is recorded. This reflects the low quality of aquatic habitat on the site and is discussed below.

6 DISCUSSION

6.1 The initial impression of the whole site is that it is unlikely to be an invertebrate "hot-spot". Arable fields dominate the entire landscape which is punctuated only by small and rather isolated tree groups, not really woodlands, and rarely other by features. A reasonable network of hedges provides for movement of animals across the land, but most are regularly trimmed so that their intrinsic value to invertebrates is regularly curtailed. Most water courses are dry in the summer and in any event are mostly lost beneath hedges.

6.2 Invertebrate data obtained by us during the survey have done more to support this visual impression than they have to alter it. The number of recorded invertebrate species is relatively high, and this certainly reflects an adequate recording effort within the available time window, but the composition of the species assemblage reveals a startling lack of species of conservation interest.

6.3 By definition, such more interesting species are less frequently found than the others in the list and the reason for their rarity, in a great many cases, is vested in their specialist ecologies. A phytophagous (vegetarian) insect that can feed on a wide range of plants is clearly more likely to be widespread in distribution and numerically abundant than one which is restricted to either a single family of plants or perhaps to a single species.

6.4 Finding these species on a site is key to assessing its overall ecological value, but proving an absence is rather more tricky than demonstrating a presence. It is frequently said that an experienced entomologist should be able to find at least one noteworthy species on almost any site in southern Britain, and this is probably true, and so the number of such rare species within the recorded assemblage, as well as an examination of their ecological associations, is also important.

6.5 Several noteworthy species have, in fact, been found in the present survey. However, only two of these truly warrant their status – The Shaded Pug moth and the beetle *Kissophagus hederae*, which is associated with mature ivy. This is a very low total and it is, of course, inevitable that further survey will not only generate a longer species list but also that this might contain further interesting species. However, we are not of the opinion that the conclusions based on the present results would alter if extensive and detailed species listing was indeed undertaken.

6.6 Overall, therefore, we are of the opinion that the survey area supports a bare minimum of invertebrate interest. There are small areas of slightly better invertebrate habitat in the form of tree groups, water bodies and some other habitats and it is these that support the entire of the recorded invertebrate assemblage. These are now briefly discussed.

6.7 Tree groups are few, far between (isolated) and with the exception of compartment T2, apparently of low floral diversity. All appear to be dominated by Ash. The trees, generally, grow close together restricting the ground flora by reducing light penetration. Their boundaries with adjacent fields are mostly abrupt and transitional zones (edge habitats) are generally absent.

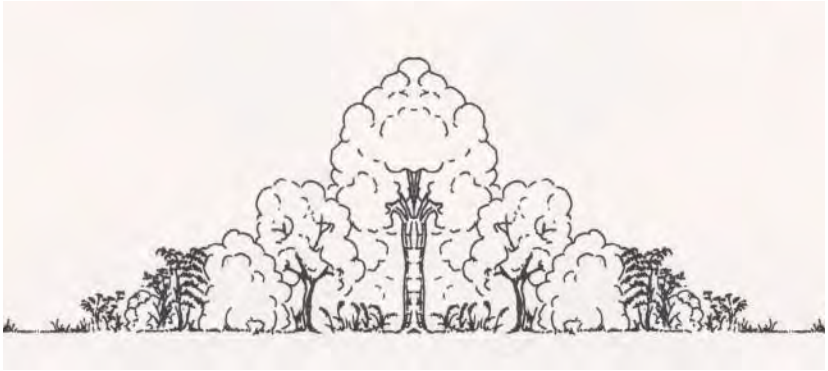
6.8 The single exception to this generalisation is the developing woodland in compartment T2. This is a section of the former main road that has now become isolated and is no longer subjected to management. Trees are growing to maturity, hedges have become overgrown and scrub is marching out from the edges across the former roadside verges where there is a greater diversity of herbs than can be found in most other parts of the site.

6.9 It is unsurprising to discover that this compartment has the highest species total of all the recorded compartments, with precisely 300 listed in Appendix 1. What this shows, quite clearly, is that areas of the site that are neglected – no longer managed – will develop a raised invertebrate value in a relatively short period of time. As if to prove this theorem, another abandoned area of the site, that around Gowell Farm (compartment T1), records the second highest invertebrate species diversity, with 294 taxa listed during 2010. Other areas of the site record significantly reduced species lists.

6.10 The network of hedges on the site is variable in quality. Almost all are either flailed or clipped on an annual basis. However, where hedges have grown very tall, this management is, in some sections, limited to the lower two or three metres; in these situations the uncut tops of the hedges present a better prospect for invertebrates.

6.11 Cutting hedges reduces intrinsic invertebrate interest for several reasons. Clearly, it directly removes the insects themselves. In the summer, this might be the actively feeding adults, whilst in the winter eggs, larvae, pupae and hibernating adults are lost. Since there is no evidence of the arisings being retained on this site, then there is no opportunity for mobile forms to return to the hedge. Additionally, it drastically reduces the food resource of many insects, notably nectar and pollen, by direct removal of flowering potential. As well as this it eliminates the transitional "edge habitat" zone that is of immense importance to invertebrates and other animal groups.

6.12 The best edges are those that are gradual, with the vertical component rising gradually through long grass, tall herbs and larger bushes to mature trees. This is illustrated in the following diagram:



6.13 Such edge habitats provide physical support for migration of invertebrates around the landscape; where the floral component is comprised of native rather than non-native species these edge habitats will also support a raised intrinsic invertebrate interest.

6.14 Most of the hedges on site appear to be poorly structured in this way and, in general, fields seem to be ploughed to within a metre or less of the base of their boundary hedges. They do nevertheless connect otherwise isolated areas of potential interest and their continued presence will be essential in the facilitation of movement of invertebrates around the landscape at Bicester. They ought to be retained and enhanced, or else replaced, in any proposed development.

6.15 Water-bodies on the site are few. Most ponds probably vanished a long time ago; no additional examples can be seen on 1945 aerial photographs. The largest pond currently extant (compartment A6) is entirely artificial, of recent creation and low in aquatic invertebrate interest.

6.16 Of potentially higher invertebrate ecology interest are the flowing water-courses. That which arises more or less on the boundary line of the survey area to the west of Crowmarsh Farm is spring-fed and so flows for most of the year, albeit rather slowly in the summer.

6.17 Most of the others were dry in the summer of 2010 and these may be seasonal features. Seasonal watercourses can develop a small but specialist invertebrate interest; unfortunately this could not be examined within the seasonal window available to us.

7 CONCLUSIONS

7.1 Overall, we are not able, on the basis of available data, to raise any specific invertebrate ecology-based objection to the proposed development of the Bicester site other than to comment that the overall reduction of open greenspace is inevitably detrimental to invertebrate ecology at the landscape level.

7.2 Nevertheless, the example of recording compartments T1 and T2 that withdrawal of management from this heavily manicured landscape will permit recolonisation by communities of invertebrates can be drawn upon to increase the value of any ecological mitigation package embarked upon for non-invertebrate reasons.

7.3 In particular, attention to the network of hedges would be valuable. Ideally, the network would be retained within the proposed development and wherever possible a more favourable hedgerow management regime should be installed. Not cutting one side of the hedge is desirable in some places; elsewhere a rotational cutting of hedges such that no section is cut more frequently than once every five years might be appropriate.

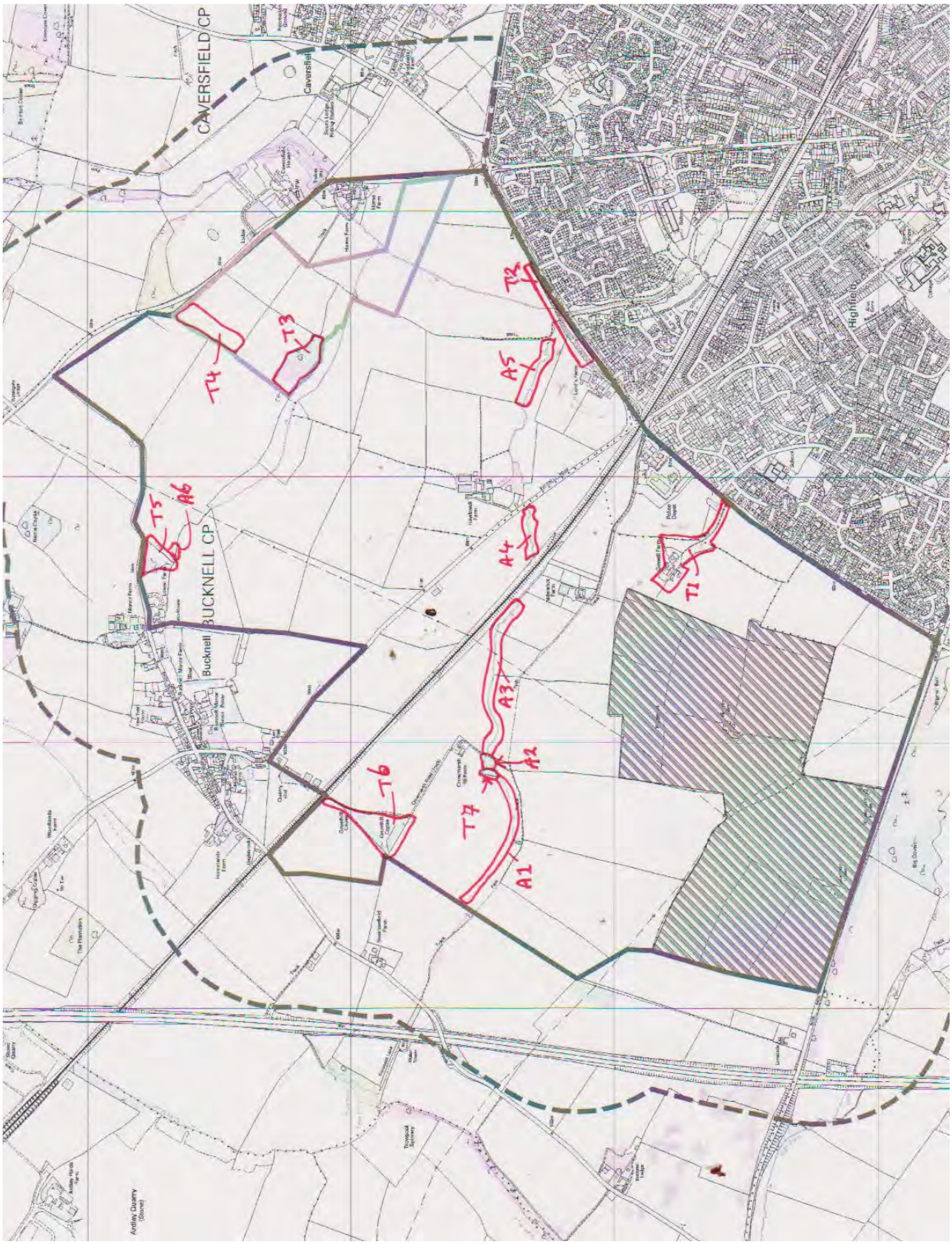
7.4 Retained tree groups could usefully be allowed to expand to occupy larger areas and to develop less well-defined boundaries. Incorporating these into amenity areas might allow for the development of better-structured edge habitats.

8 REFERENCES QUOTED IN THIS REPORT AND ITS APPENDICES

Bratton, J. H.	1991	*British Red Data Books: 3. Invertebrates other than insects*. NCC
Shirt, D. B. (ed.)	1987	*British Red Data Books: 2. Insects*. NCC
UK Biodiversity Group	1999	*Tranche 2 action plans. Volume iv - invertebrates*. English Nature.

APPENDICES

MAP 1: THE SURVEYED AREA, SHOWING THE POSITIONS OF THE RECORDING COMPARTMENTS AND THEIR NUMBERS



APPENDIX 1: TERRESTRIAL INVERTEBRATE SPECIES RECORDED

National status codes are explained in Appendix 2.

Group / species	English name if available	National status	Ecological associations	Where found (see text section 3)							
				1	2	3	4	5	6	7	8
ARACHNIDA: ARANEA	**SPIDERS**										
Araneidae											
Araneus diadematus	the garden spider		ubiquitous								+
Linyphiidae											
Lepthyphantes tenuis	a spider		ubiquitous - often in grassland, but also a pioneer species	+			+				
Linyphia triangularis	a money spider		almost ubiquitous	+			+				
Pisauridae				+							
Pisaura mirabilis	a spider		more or less ubiquitous, but likes tall vegetation								
ARACHNIDA: ACARI	**GALL MITES**										
Eriophyidae											
Aceria crataegi			causes galls on leaves of hawthorn	+	+				+		+
Aceria macrorhynchus			makes galls on Sycamore leaves	+							
Aceria pseudoplatani			causes galls on leaves of sycamore								+
Phyllocoptes goniothorax			causes galls on leaves of hawthorn	+	+				+		
ARACHNIDA: OPILIONES	**HARVESTMEN**										
Leiobunidae											
Leiobunum rotundum			Ubiquitous - under stones, logs etc		+						
Phalangiidae					+						
Oligolophus tridens			ubiquitous species								
COLEOPTERA	**BEETLES**										
Anobiidae											
Anobium punctatum			larvae feed in dead timber	+	+						+
Ptilinus pectinicornis			larvae feed in dead tree branches and other dead timber		+						+
Anthicidae											
Anthicus antherinus			larvae in decaying grass litter - adults at flowers							+	
Apionidae	**Seed weevils**										
Apion frumentarium			broad-leaved docks	+							

Group / species	English name if available	National status	Ecological associations	Where found (see text section 3)							
				1	2	3	4	5	6	7	8
Ceratapion carduorum		Local	Thistles	+							
Ceratapion gibbirostre			thistles - in the stems		+					+	
Malvapion malvae			Malvaceae - especially Malva sylvestris		+						
Perapion violaceum			dock plants, the larvae mining the stems; widespread and common	+							
Protapion apricans			bird's-foot Trefoil and perhaps other legumes; widespread and common	+	+						+
Protapion assimile			clover, especially red clover; widespread and common								+
Protapion dichroum			Trifolium - widespread and almost ubiquitous								+
Protapion trifolii			various clovers; widespread and common								
Trichapion simile			Associated with birch foliage		+						
Byturidae											
Byturus tomentosus	the raspberry beetle		Brambles and raspberries	+	+	+		+	+	+	+
Cantharidae	**Soldier beetles**										
Cantharis cryptica			tall vegetation, especially at the woodland/grassland interface	+	+	+	+	+	+	+	+
Malthinus seriepuncatatus			broad-leaved woodland species		+						+
Malthodes minimus			woodland and scrub								+
Rhagonycha fulva			tall, rank vegetation in lowland areas	+	+	+	+	+	+	+	+
Rhagonycha lignosa			an arboreal species	+	+	+		+	+	+	+
Rhagonycha limbata			dry grasslands (formerly called Rhagonycha femoralis)	+	+		+				
Carabidae	**Ground beetles**										
Amara (Curtonotus) aulica			dry, well-vegetated sites, the adults climbing stems of Compositae at night to feed on the seed heads	+							
Amara communis			phytophagous species of open sites, hiding under leaf rosettes, stones, etc	+							
Amara familiaris			Phytophagous species of gardens and other open, dry and sunny habitats	+							
Amara lunicollis		Local	grasslands, open woodland, gardens etc	+							
Amara similata			phytophagous on ruderal vegetation, especially on waste ground	+							
Bradycellus verbasci			prefers light soils in open situations, including arable	+							
Carabus violaceus			fairly widespread in most habitats	+							
Demetrias atricapillus			amongst leaf litter and in grasslands	+							
Dromius quadrimaculatus			arboreal species of deciduous trees and occasionally on conifers	+	+				+		

Group / species	English name if available	National status	Ecological associations	Where found (see text section 3)							
				1	2	3	4	5	6	7	8
Harpalus (Ophonus) puncticeps			phytophagous species of open, ruderal habitat	+							
Harpalus (Pseudophonus) rufipes			ubiquitous	+							
Loricera pilicornis			ubiquitous, but especially near water and in damp grassland; feeds on springtails					+		+	
Nebria brevicollis			ubiquitous late summer and autumn species	+						+	
Notiophilus biguttatus			most open ground habitats	+						+	
Pterostichus (Poecilus) cupreus		Local	open grassy habitats - usually where damp	+						+	
Pterostichus madidus			ubiquitous	+						+	
Pterostichus melanarius			ubiquitous	+							
Pterostichus nigrita s. str.			wet, well-vegetated habitats, river banks and damp woodland	+						+	
Pterostichus strenuus			most habitats that are not too dry	+							
Trechus quadristriatus			ubiquitous in most open habitats during autumn	+	+						
Cerambycidae	**longhorn beetles**										
Clytus arietis			in dead wood - usually birch or willow, adults at flowers		+						
Grammoptera ruficornis			larvae in twigs and small branches; adults at flowers		+						
Rhagium mordax			larvae feed internally in well-rotten stumps and other timber, especially oak	+							
Tetrops praeustus			feed on a wide variety of deciduous trees						+		+
Chrysomelidae	**leaf beetles**										
Altica lythri			Associated with various willow-herbs (Onagraceae)		+						
Aphthona euphorbiae		Local	widely polyphagous	+	+	+	+	+	+	+	+
Cassida rubiginosa			various thistles, burdock and other Asteraceae	+							
Chaetocnema hortensis			feeds on various grasses		+						
Crepidodera aurata			willows - rarely on poplars		+						
Crepidodera aurea			poplars - occasionally on willows		+						
Crepidodera fulvicornis			Salix species		+						
Crepidodera plutus		Local	Willows, especially Crack Willow - rarely on poplars		+						
Galerucella lineola			Alder, Hazel and willows		+						
Gastrophysa viridula			larvae feed on dock leaves in damp meadows and elsewhere							+	
Lochmaea crataegi			Hawthorn - larvae mine the berries. Occasionally on Blackthorn or Rowan		+				+		+
Longitarsus flavicornis			ragworts								+
Longitarsus luridus			widely polyphagous								+
Longitarsus parvulus			feeds on many plant species								+

Group / species	English name if available	National status	Ecological associations	Where found (see text section 3)							
				1	2	3	4	5	6	7	8
Oulema melanopa s. str.			feeds on grasses - very common	+							+
Phaedon tumidulus			on various Apiaceae, especially cow parsley, angelica, hogweed etc								+
Phyllodecta (Phratora) vulgatissima			willows and perhaps poplars and Aspen		+						
Phyllodecta (Phratora) vitellinae			willows and poplars, including Aspen		+						
Phyllotreta atra			various Brassicaceae	+	+		+				
Phyllotreta diademata			various Brassicaceae				+				
Phyllotreta nigripes			various Brassicaceae		+		+				
Phyllotreta undulata			various Brassicaceae	+	+		+				
Plagiodera versicolora			Crack willow and other willows, occasionally Black Poplar		+						
Podagrica fuscicornis		NS(Nb)	mallow (Malva species)		+						
Psylliodes chrysocephala		Local	various Cruciferae		+						
Psylliodes dulcamarae			Woody nightshade (Solanum dulcamara)								+
Psylliodes napi			various Cruciferae	+							
Sphaeroderma rubidum			feeds on thistles and other Asteraceae	+							
Sphaeroderma testaceum			mainly on thistles	+							
Ciidae											
Cis boleti			fungi - in both brackets and caps		+						+
Coccinellidae											
Adalia 10-punctata	10-spot ladybird		predatory on other insects	+	+		+	+	+		+
Adalia 2-punctata	2-spot ladybird		predatory on other insects	+	+	+	+	+	+	+	+
Anisostica 19-punctata	19-spot ladybird		wetland habitats							+	
Chilocoris renipustulatus	kidney-spot ladybird		trees, especially on willows in wet areas		+						
Coccinella 7-punctata	7-spot ladybird		predatory on other insects	+	+	+	+	+	+	+	+
Halyzia 16-guttata	Orange ladybird		predatory on other insects	+	+	+	+	+	+	+	+
Harmonia axyridis	Harlequin ladybird		a recent colonist in Britain	+	+	+	+	+	+	+	+
Propylea 14-punctata	14-spot ladybird		predatory on other insects	+	+	+	+	+	+	+	+
Rhyzobius litura	a spotless ladybird		predatory on other insects				+				+
Subcoccinella 24 - punctata	24-spot ladybird		predatory on other insects	+	+	+		+	+	+	+
Thea 22-punctata	22-spot ladybird		feeds on mildews								
Curculionidae	**Weevils**										
Anthonomus pedicularis			larvae develop in hawthorn berries		+				+		+
Barypeithes araneiformis			ubiquitous amongst moss, litter, etc.		+						

Group / species	English name if available	National status	Ecological associations	Where found (see text section 3)							
				1	2	3	4	5	6	7	8
Ceutorhynchus obstrictus			various Cruciferae		+						
Ceutorhynchus pallidactylus			ecology unclear		+						
Ceutorhynchus pollinarius			Nettles		+						
Cionus scrophulariae			Figworts (Scrophularia species)		+						
Curculio glandium		Local	Oak trees	+							+
Curculio pyrrhoceras		Local	oak - causing leaf galls								+
Curculio salicivorus			birch, willow and other trees								+
Dorytomus taeniatus			the larvae feeds inside the female catkins of willow trees		+						
Dorytomus tortrix		Local	in catkins of aspen and sallow		+						
Euophryum confine			dead timber		+						
Gymnetron pascuorum			feeds on flowers of Plantago lanceolata - Ribwort Plantain								+
Hypera nigrirostris			Trifolium pratense - on the foliage								+
Hypera postica			Medicago, Melilotus and Trifolium - on the foliage								+
Hypera rumicis			Rumex species (docks) - on the foliage								+
Nedyus quadrimaculatus			nettles - feeding on the flowers								+
Otiorhynchus singularis			feeds on a variety of plant roots	+							
Phyllobius maculicornis		Local	polyphagous on leaves of deciduous trees and shrubs		+				+	+	
Phyllobius oblongus			polyphagous on broad-leaved trees and bushes								
Phyllobius pomaceus			Nettles		+				+		
Phyllobius roboretanus			nettle - feeding on the leaves and flowers		+						
Phyllobius viridiaeris			typically in hedges and other edge habitats								
Polydrusus cervinus			trees and shrubs - feeding on the leaves								+
Polydrusus pterygomalus			polyphagous on broad-leaved trees, especially oak	+							
Rhamphus oxyacanthae		Local	larva mines in leaves of hawthorn		+						
Rhinoncus castor			Dock plants								
Rhynchaenus querci			larvae mine the leaves of oak trees	+	+				+		+
Sitona lineatus			various legumes	+	+	+	+	+	+	+	+
Trichosirocalus troglodytes			Plantains, usually in grassy places				+				+
Dermestidae											
Anthrenus verbasci			feeds on dead animal and plant matter, including dry carcasses		+						
Elateridae											
Agriotes lineatus			larvae feed on grass roots				+				
Athous (Hemicrepidus) hirtus			grassland, woodland rides, etc. The larvae feed in decaying wood and in soil								

Group / species	English name if available	National status	Ecological associations	Where found (see text section 3)							
				1	2	3	4	5	6	7	8
Athous haemorrhoidalis			the larva feeds on the roots of grasses		+						
Kibunea (Cidnopus) minuta			a species of dry grasslands				+				
Histeridae											
Saprinus semistriatus	a carrion beetle		feeds in carrion	+							
Kateretidae											
Brachypterus glaber			Nettles	+	+		+				+
Brachypterus urticae			Nettles	+	+	+	+				+
Latridiidae											
Aridius bifasciatus			litter, compost, tussocks etc - more or less ubiquitous								+
Aridius nodifer			litter, compost, tussocks etc - more or less ubiquitous								+
Leiodidae											
Catops nigricans			carrion	+							
Melyridae											
Cordylepherus (Malachius) viridis		Local	a common grassland species	+			+				+
Malachius bipustulatus	a malachite beetle		grasslands	+			+				+
Nitidulidae											
Glischrochilus hortensis			unknown association; adults usually in woodland		+						
Meligethes aeneus	a pollen beetle		various flowers	+	+	+	+	+	+	+	+
Scarabaeidae											
Aphodius granarius		Local	dung, rotting vegetation (compost heaps) and carcasses	+							
Scolytidae											
Kisophagus hederae	a bark beetle	NS(Nb)	larva feeds in dead ivy wood		+						
Scolytus scolytus	elm bark beetle		under elm bark			+		+	+		
Scraptiidae											
Anaspis fasciata (= humeralis)			larvae in twigs of oak and other trees; adults at hawthorn blossom		+						
Anaspis frontalis			larvae in twigs of oak and other trees; adults at hawthorn blossom		+						
Anaspis regimbarti			larvae feed in large girth oak branches and decaying oak trunks		+						
Silphidae	**Sexton Beetles**										
Necrodes littoralis			carrion	+							
Nicrophorus humator			carrion	+							
Nicrophorus vespilloides		Local	carrion	+							
Staphylinidae	**Rove beetles**										

Group / species	English name if available	National status	Ecological associations	Where found (see text section 3)							
				1	2	3	4	5	6	7	8
Aleochara curtula			leaf litter, decaying vegetation etc	+							
Aloconota gregaria			plant litter - ubiquitous	+							
Anotylus inustus			leaf litter, carrion, dung and similar	+							
Anotylus rugosus			a detritus-feeding rove beetle	+							
Anotylus sculpturatus			grass tussocks, litter, dung etc	+							
Atheta (Dimetrota) atramentaria			larvae feed in animal dung - very common	+							
Autalia rivularis			associated with herbivore dung	+							
Lathrobium brunnipes			grass tussocks, litter, dung etc	+							
Ocypus (Tasgius) ater			carrion, dung, etc	+							
Philonthus varius			ubiquitous - in moss, litter, carrion, dung etc	+							
Quedius curtipennis			leaf litter, carrion, dung and similar	+							
Quedius levicollis (= tristis)			ecology unclear	+							
Staphylinus brunnipes			leaf litter, carrion, dung and similar	+							
Tachyporus dispar			a detritus-feeding rove beetle	+							
Tachyporus hypnorum			leaf litter, grass tussocks and similar micro-habitats	+							
Tachyporus solutus			leaf litter, carrion, dung and similar	+							
Xantholinus linearis			leaf litter, grass tussocks and similar micro-habitats	+							
CRUSTACEA: ISOPODA	**WOODLICE**										
Oniscidae											
Oniscus asellus			damp, but not wet, habitats everywhere	+	+	+	+	+	+	+	+
Philosciidae											
Philoscia muscorum			under stones etc	+	+	+	+	+	+	+	+
Porcellionidae											
Porcellio scaber			under stones etc								
Trichoniscidae				+	+	+	+	+	+	+	+
Trichoniscus pusillus			under stones, bark, etc		+						
DERMAPTERA											
Forficulidae											
Forficula auricularia	common earwig		generalist species	+	+	+	+	+	+	+	+
DIPTERA											
Agromyzidae											
Agromyza alnibetulae			larva mines the leaves of birch trees	+							
Agromyza dipsaci			larva mines leaves of teasel	+							
Agromyza potentillae			mines leaves of Potentilla reptans and other rosaceous plants		+						+

Group / species	English name if available	National status	Ecological associations	Where found (see text section 3)							
				1	2	3	4	5	6	7	8
Amauromyza labiatarum			mines leaves of Lamium album and other labiates		+						
Liriomyza amoena			mines leaves of elder	+		+		+			+
Phytomyza heracleana			mines leaves of Heracleum spondylium		+						
Asilidae	**Robber flies**										
Dioctria baumhaueri			predatory -mainly in edge habitats	+	+						
Dioctria rufipes			predatory -mainly in edge habitats	+	+						
Leptogaster cylindrica			grassland predator	+	+	+	+	+	+	+	+
Cecidomyiidae				+	+				+		+
Dasineura crataegi			forms galls on hawthorn		+						
Dasineura marginemtorquens			forms rosette gall on sallows and willows		+						
Iteomyia caprea			larva galls the leaves of sallows		+						
Macrodiplosis volvens			larva feeds on oak leaves causing a gall to form a gall	+					+		
Conopidae											
Sicus ferrugineus		Local	parasitic fly on bumble bees			+	+	+			+
Dolichopodidae											
Chrysotus gramineus			very common grassland species	+						+	
Poecilobothrus nobilitatus			aquatic larvae								
Empididae											
Empis (Kritempis) livida			predatory on other flies	+	+	+	+	+	+	+	+
Empis (Xanthempis) trigramma			predatory on other flies	+	+	+	+	+	+	+	+
Lauxaniidae											
Sapromyzosoma 4-punctata			saprophagous species usually in woodland		+						
Tricholauxania praeusta			larvae feed amongst decaying vegetation in damp, shady places		+						
Limoniidae											
Austrolimnophila ochracea			woodland - even small ones- the larvae feeding in dead wood							+	
Cheilotrichia cinerascens			damp places		+					+	
Limonia nubeculosa	a cranefly		woodland - the larvae feeding in leaf litter		+						
Limonia tripunctata			lowland deciduous woodland, the larvae developing in the soil/litter		+						
Molophilus griseus			damp hedgerows, ditches and woodland		+						
Rhipidia (Limonia) duplicata			various habitats, including woodland and grassland, the larvae feeding in animal dung	+							+
Lonchopteridae											
Lonchoptera furcata			a more or less ubiquitous species in edge habitats		+						

Group / species	English name if available	National status	Ecological associations	Where found (see text section 3)							
				1	2	3	4	5	6	7	8
Lonchoptera lutea			ubiquitous species in edge habitats, saprophagous larvae		+					+	+
Platystomatidae											
Platystoma seminationis			larvae develop in decaying vegetable matter	+							
Ptychopteridae											
Ptychoptera albimana			damp habitats, including seepages								
Rhagionidae											
Rhagio lineola			woodland and scrub - especially at the edges							+	
Rhagio scolopaceus			woodland edge and other wooded areas - in clearings and at edges		+						+
Rhagio tringarius			damp habitats							+	
Sepsidae											
Nemopoda nitidula			shade-loving species, larvae in dung and carrion	+							
Sepsis fulgens			the most ubiquitous member of this group, feeding in mammal dung	+							
Stratiomyidae	**Soldier flies**										
Beris chalybata			associated with the scrub/grassland interface	+	+	+	+	+	+	+	+
Beris vallata			larvae require decomposing organic matter	+	+	+	+	+	+	+	+
Chloromyia formosa			ubiquitous	+	+	+	+	+	+	+	+
Chorisops tibialis			larvae require decomposing organic matter		+					+	+
Microchrysa polita			larvae require decomposing organic matter		+						+
Oplodontha viridula		Local	marshes and pond margins							+	
Pachygaster atra			woodland edge & scrubland species - larvae under dead bark of trees		+	+		+	+		
Pachygaster leachii			woodland edge & scrubland species - larvae under dead bark of trees		+						+
Sargus iridatus			larvae feed in rotting vegetation and similar material								
Syrphidae	**Hoverflies**										
Baccha elongata			shaded woodland		+						
Cheilosia albitarsis/ranunculi female				+							
Cheilosia pagana			larvae are thought to feed in the roots of Anthriscus sylvestris		+						
Chrysotoxum bicinctum			grassland species -associated with ants' nests	+			+				+
Dasysyrphus albostriatus			aphid predator at woodland edge habitats		+						
Dasysyrphus tricinctus			aphid predator at woodland edge habitats		+						
Epistrophe eligans			mainly at edge habitats	+	+	+	+	+	+	+	+

Group / species	English name if available	National status	Ecological associations	Where found (see text section 3)							
				1	2	3	4	5	6	7	8
Episyrphus balteatus			ubiquitous species, partly immigrant, and a predator of aphids	+	+	+	+	+	+	+	+
Eristalis arbustorum			Larvae require damp habitats but adults are more or less ubiquitous	+	+	+	+	+	+	+	+
Eristalis nemorum			Larvae require damp habitats but adults are more or less ubiquitous		+						
Eristalis pertinax			Larvae require damp habitats but adults are more or less ubiquitous	+	+	+	+	+		+	+
Eristalis tenax			Larvae require damp habitats but adults are more or less ubiquitous	+	+	+		+	+	+	+
Eupeodes corollae			Grassland	+	+	+	+	+	+	+	+
Eupeodes luniger			Grassland	+	+	+	+	+	+	+	+
Helophilus pendulus			Larvae require damp habitats but adults are more or less ubiquitous	+	+	+	+	+	+	+	+
Melanostoma mellinum			Grassland	+	+	+	+	+	+	+	+
Melanostoma scalare			Grassland	+			+				
Myathropa florea			larvae are semi-aquatic							+	
Neoascia podagrica			edge-habitat species	+	+		+		+	+	+
Pipizella viduata			Larvae feed on root aphids on Umbelliferae								+
Platycheirus albimanus			ubiquitous - larvae prey on aphids	+	+	+	+	+	+	+	+
Platycheirus clypeatus s. str.			Damp habitats							+	
Platycheirus scutatus s. str.			an edge-habitat species		+						
Rhingia campestris			Cow dung	+							
Sphaerophoria scripta			Grassland	+	+	+	+	+	+	+	+
Syritta pipiens			larvae in decaying vegetation; adults at flowers	+	+	+	+	+	+	+	+
Syrphus ribesii			larvae are aphid predators on trees and bushes	+	+	+	+	+	+	+	+
Syrphus vitripennis			larvae are aphid predators on trees and bushes	+	+	+	+	+	+	+	+
Volucella bombylans			inquiline in nests of bumble bees		+						
Volucella pellucens			inquiline in nests of social wasps/hornet		+						
Xylota segnis			Damp, dead wood		+						
Tabanidae											
Haematopota pluvialis			damp habitats - adult females are blood sucking horseflies	+					+	+	
Tachinidae											
Eriothrix rufomaculata			larva parasitises moth larvae	+	+	+	+	+	+	+	+
Tephritidae											
Anomoia purmunda		Local	Larva feeds in the flesh of hawthorn berries	+	+				+		+

Group / species	English name if available	National status	Ecological associations	Where found (see text section 3)							
				1	2	3	4	5	6	7	8
Euleia heraclei			white-flowering Umbelliferae	+							
Terellia ruficauda			larvae gall the flowers of thistles	+							
Urophora cardui			larvae gall the flowers of thistles	+							
Xyphosia miliaria			larvae gall the flowers of thistles - ubiquitous	+							
Tipulidae	**craneflies**										
Savtshenkia pagana			more or less ubiquitous		+						
Tipula oleracea			ubiquitous, larvae feeding on roots of grasses	+	+	+	+	+	+	+	+
Tipula paludosa			ubiquitous, larvae feeding on roots of grasses	+	+	+	+	+	+	+	+
HETEROPTERA											
Acanthosomatidae											
Acanthosoma haemorrhoidale	hawthorn shield bug		hawthorn		+				+		+
Elasmucha grisea			birch, occasionally alder	+							
Anthocoridae											
Anthocoris confusus			trees and shrubs	+	+						
Anthocoris nemoralis			trees and shrubs	+	+	+		+	+	+	+
Anthocoris nemorum			low vegetation	+	+	+	+	+	+	+	+
Cimicidae											
Orius niger			low vegetation on a variety of dry sites				+				
Coreidae											
Coriomeris denticulatus			various legumes	+			+				
Cydnidae											
Legnotus limbosus			Bedstraws		+						
Lygaeidae											
Chilacis typhae			Reedmace - in the flower heads							+	
Drymus brunneus	a plant bug		amongst litter or moss in damp or shaded places		+						
Heterogaster urticae			Nettles	+	+	+	+	+	+	+	+
Kleidocerys resedae			trees and shrubs generally	+	+			+			
Scolopostethus affinis			usually on nettles	+							
Miridae											
Adelphocoris lineolatus			leguminous plants	+							
Blepharidopterus angulatus			a wide range of broad-leaved trees		+						
Capsus ater			Grassland	+			+				
Cyllecoris histrionicus			associated with oak	+					+		
Deraeocoris lutescens			predatory amongst trees and bushes	+	+	+		+	+	+	

Group / species	English name if available	National status	Ecological associations	Where found (see text section 3)							
				1	2	3	4	5	6	7	8
Deraeocoris ruber			nettles, brambles as similar rough vegetation	+	+	+		+	+	+	
Dicyphus epilobii			Epilobium hirsutum		+						
Dryophilocoris flavo-4-maculatus			associated with oak	+			+				
Harpocera thoracica			Oaks -solitary and in woods	+			+				
Heterotoma meriopterum			edge habitats - especially in association with nettles	+							
Leptoterna dolabrata			found in a wide range of grassland habitats	+	+		+				+
Liocoris tripustulatus			stinging nettle	+	+		+				
Megalocoleus molliculus			a common plant bug associated with Yarrow	+							
Miris striatus			associated with oak	+				+			
Notostira elongata			grasslands								
Orthotylus marginalis			willow trees, occasionally alder and apple trees		+						
Pantilus tunicatus			alder and birch - on the catkins	+							
Phylus melanocephalus			restricted to oak trees					+			
Phytocoris varipes			dry, open grasslands are preferred. Partly vegetarian and partly a predator				+				
Plagiognathus arbustorum			polyphagous, but usually associated with stinging nettles	+							
Stenodema laevigatum			grasslands	+			+				+
Stenotus binotatus			grasslands	+			+				+
Nabidae											
Himacerus apterus	a damsel bug		a tree-dwelling species		+						
Nabis ferus			dry sites, especially ruderal grassland				+				
Pentatomidae											
Aelia acuminata			Thistles				+				
Dolycoris baccarum			polyphagous species of dry habitats				+				
Eysarcoris fabricii			probably polyphagous		+						
Palomena prasina			trees and shrubs	+	+			+	+	+	+
Pentatoma rufipes	The Forest Bug		tree-dwelling predator that often flies far from woodland	+	+						
Troilus luridus	a plant bug		a predator on broad leaved trees and occasionally on pines		+						
Tingidae											
Physatocheila dumetorum	a lacebug		hawthorn		+				+		+
Tingis ampliata			creeping thistle								+
Tingis cardui			spear thistle - Cirsium vulgare								+
HOMOPTERA: AUCHENORHYNCHA	**FROGHOPPERS**										

Group / species	English name if available	National status	Ecological associations	Where found (see text section 3)							
				1	2	3	4	5	6	7	8
Cercopidae											
Aphrophora alni	a froghopper		larvae feed under froth on a wide range of trees and shrubs		+						
Neophilaenus campestris			dry, open grassland				+				+
Philaenus spumarius	spittle-bug/Cuckoo-spit bug		larvae feed under froth on a wide range of herbaceous plants	+	+	+	+	+	+	+	+
Cicadellidae											
Cicadella viridis			grasses and rushes in marshy places							+	
Iassus lanio			usually on oak, occasionally on other trees	+							
Oncopsis tristis			birch trees	+							
Cixiidae											
Tachycixius pilosus			grasses		+		+				
Delphacidae											
Stenocranus minutus			grasses in a range of habitats							+	
Issidae											
Issus coleoptratus			various tree species		+						
Ledridae											
Ledra aurita	Hippopotamus froghopper	Local	Oak trees					+			
HOMOPTERA: STENORHYNCHA	**HOPPERS AND APHIDS**										
Aphididae											
Dysaphis crataegi agg.			forms galls on hawthorn	+	+				+		
HYMENOPTERA: ACULEATA	**BEES, WASPS AND ANTS**										
Apidae											
Andrena bicolor			open woodland and grassland - nests in the ground								+
Andrena flavipes	a solitary bee	Local	nests colonially, usually tunnelling into in a vertical face, in dry sandy sites								+
Bombus lapidarius	red-tailed bumble bee		ubiquitous	+	+	+	+	+	+	+	+
Bombus lucorum	white-tailed bumble bee		ubiquitous	+	+	+	+	+	+	+	+
Bombus pascuorum	common carder bee		ubiquitous	+	+	+	+	+	+	+	+
Bombus pratorum	a bumble bee		ubiquitous		+						
Bombus terrestris	buff-tailed bumble bee		ubiquitous	+	+	+	+	+	+	+	+
Halictus rubicundus			ground nesting solitary bee		+						
Halictus tumulorum			ground-nesting solitary bee in a range of habitats		+						

Group / species	English name if available	National status	Ecological associations	Where found (see text section 3)							
				1	2	3	4	5	6	7	8
Hylaeus annularis	a yellow-faced bee	Local	nests in hollow plant stems, such as docks, etc		+						
Lasioglossum leucopus		Local	excavates nest burrow in level ground - preferring ruderal sites		+		+				+
Lasioglossum morio			excavates nest burrows in level ground	+	+						
Lasioglossum smeathmanellum			excavates nest burrows in level ground		+						+
Osmia rufa			a red mason bee - nests in holes in trees or hard vertical cliffs	+							
Chrysididae											
Chrysis ignita	Ruby-tailed wasp		cleptoparasitic on eumenid wasps, especially *Ancistrocerus* species		+						
Eumenidae											
Ancistrocerus trifasciatus			nests in dead plant stems	+							
Formicidae											
Lasius niger s. str.	common black ant.		generalist species	+	+		+				+
Myrmica rubra	a red ant		ubiquitous	+	+						+
Sphecidae											
Trypoxylon attenuatum			preys on spiders. Nests in plant stems, beetle tunnel or other cavities		+						
Vespidae											
Vespula germanica	a common social wasp		ubiquitous		+						+
Vespula vulgaris	a common social wasp		ubiquitous							+	+
HYMENOPTERA: PARASITICA	**GALL WASPS**										
Cynipidae											
Andricus curvator			forms a gall on an oak leaf	+					+		
Andricus kollari			forms the oak marble gall	+					+		
Andricus ostreus			forms a gall on an oak leaf	+					+		
Biorhiza pallida			forms the oak apple gall	+					+		
Cynips divisa			forms a gall on oak	+					+		
Neuroterus numismalis			forms the button spangle gall on oak leaves						+		
Neuroterus quercusbaccarum			forms the hairy spangle gall on oak leaves	+					+		
Neuroterus tricolor			causes galls on oak leaves						+		
HYMENOPTERA: SYMPHYTA	**SAWFLIES**										
Argidae											
Arge ochropus			larvae feed on wild rose						+		

Group / species	English name if available	National status	Ecological associations	Where found (see text section 3)							
				1	2	3	4	5	6	7	8
Arge ustulata			sallow, birch and hawthorn are all recorded as foodplants		+						
Cephidae											
Calameuta pallipes			a grassland sawfly	+							
Cephus cultratus			larvae mine the stems of grasses				+				
Cephus pygmaeus			larvae mine the stems of grasses	+			+				
Tenthredinidae											
Aglaostigma aucupariae			larvae feed on bedstraws								
Athalia cordata			ubiquitous sawfly species	+							
Athalia liberta			ubiquitous sawfly species		+						
Dolerus niger			ubiquitous sawfly species		+						
Nematus ribesii			ubiquitous sawfly species		+						
Pontania bridgmannii			larva causes galls on sallow leaves		+						
Profenusa pygmaea			larva mines the leaves of oak trees		+				+		
Tenthredo livida			ubiquitous sawfly species		+						
LEPIDOPTERA:	**BUTTERFLIES**										
Hesperiidae											
Thymelicus sylvestris	Small skipper		grassland	+							
Lycaenidae											
Celastrina argiolus	Holly blue		both holly and ivy are required - as there are two generations per year		+						
Polyommatus icarus	Common blue		various legumes, especially Bird's-foot Trefoil	+							
Quercusia quercus	Purple Hairstreak		oak trees - including isolated examples	+							
Satyrium w-album	White-letter Hairstreak		Elm – feeding on suckers as well as mature trees								+
Nymphalidae											
Aglais urticae	Small tortoiseshell		larvae feed on Stinging Nettle								+
Coenonympha pamphilus	Small Heath	BAP	grassland	+							
Cynthia cardui	Painted lady		immigrant species	+							+
Inachis io	Peacock		nettles		+						
Maniola jurtina	Meadow brown		grassland species		+		+				
Pararge aegeria	Speckled wood		grasses in light woodland or scrub		+						
Polygonia c-album	Comma		nettles	+							
Pieridae											
Pieris napi	Green-veined white		ubiquitous	+							
Pieris rapae	Small white		ubiquitous	+							

Group / species	English name if available	National status	Ecological associations	Where found (see text section 3)							
				1	2	3	4	5	6	7	8
LEPIDOPTERA:	**MOTHS**										
Agonoxenidae											
Blastodacna hellerella			hawthorn - in the berries						+		
Arctiidae											
Eilema complana	Scarce Footman		lichens - especially on trunks, fences etc		+						
Tyria jacobaeae	Cinnabar	BAP(R)	Ragwort	+							
Bucculatricidae											
Bucculatrix ulmella			oak	+							
Choreutidae											
Anthophila fabriciana	Nettle-tap		nettles		+						
Coleophoridae											
Coleophora flavipennella			oak	+							
Coleophora lutipennella			oak	+							
Drepanidae											
Cilix glaucata	Chinese Character		blackthorn, hawthorn and other rosaceous bushes		+						
Gelechiidae											
Teleiodes luculella			oak	+							
Geometridae											
Biston betularia	Peppered Moth		deciduous trees and herbaceous plants		+						
Cabera exanthemata	Common Wave		Salix species and aspen		+						
Colostygia pectinataria	Green Carpet		bedstraws	+	+			+	+	+	
Cosmorhoe ocellata	Purple Bar		bedstraws	+							
Crocallis elinguaria	Scalloped Oak		deciduous trees		+						
Ecliptopera silaceata	Small Phoenix	BAP(R)	willow herbs, enchanter's nightshade		+						
Epirrhoe alternata	Common Carpet		bedstraws	+	+			+	+	+	
Eupithecia centaureata	Lime-speck Pug		various flowers	+	+			+	+	+	
Eupithecia subumbrata	Shaded Pug	NS(Nb)	herbaceous plants				+				
Eupithecia vulgata	Common Pug		herbaceous plants	+	+				+		
Hydriomena furcata	July Highflier		Salix species	+	+			+	+	+	
Idaea aversata	Riband wave		herbaceous plants - especially bedstraws	+	+			+	+	+	
Idaea biselata	Small Fan-footed Wave		dandelion, plantain, Polygonum etc		+						
Lomaspilis marginata	Clouded Border		sallow, willow, poplar - rarely hazel		+						
Opisthograptis luteolata	Brimstone Moth		deciduous trees		+						
Peribatodes rhomboidaria	Willow Beauty		deciduous trees	+	+					+	

Group / species	English name if available	National status	Ecological associations	Where found (see text section 3)							
				1	2	3	4	5	6	7	8
Xanthorhoe montanata	Silver-ground Carpet		herbaceous plants - especially bedstraws	+	+						
Xanthorhoe spadicearia	Red Twin-spot Carpet		herbaceous plants - especially bedstraws	+							
Gracillariidae											
Acrocercops brongniardella			mines leaves of oak	+					+		
Aspilapteryx tringipennella			Ribwort plantain		+						
Caloptilia robustella			oak	+	+						
Caloptilia stigmatella			sallow and poplar		+						
Caloptilia syringella			caterpillar mines leaves of ash, hawthorn or lilac		+	+		+	+	+	
Cameraria ohridella			larva mines the leaves of Horse Chestnut - a recent colonist in Britain, from Europe								+
Parornix anglicella			mines leaves of hawthorn	+	+			+	+		
Parornix finitimella			Blackthorn	+							
Phyllonorycter acerifoliella	= sylvella		mines leaves of field maple		+				+		
Phyllonorycter blancardella			mines leaves of apple	+							
Phyllonorycter cerasicolella			mines leaves of cherry		+						
Phyllonorycter corylifoliella			mines leaves of hawthorn and other rosaceous shrubs, rarely on birch	+	+				+		+
Phyllonorycter geniculella			mines leaves of sycamore	+							+
Phyllonorycter harrisella			mines leaves of oak	+					+		+
Phyllonorycter maestingella			mines leaves of beech						+		
Phyllonorycter messaniella			mines leaves of oak, beech, hornbeam and sweet chestnut	+					+		
Phyllonorycter oxyacanthae			mines leaves of hawthorn and other rosaceous shrubs		+				+		
Phyllonorycter platanoidella		NS(Nb)	mines leaves of Norway Maple	+							
Phyllonorycter quercifoliella			mines leaves of oak	+					+		
Phyllonorycter salicicolella			mines leaves of willows		+						
Phyllonorycter spinicolella			mines leaves of blackthorn	+							
Phyllonorycter trifasciella			mines leaves of honeysuckle and snowberry		+						
Phyllonorycter tristrigella			mines leaves of elm			+		+	+		
Phyllonorycter ulmifoliella			mines leaves of birch	+							
Hepialidae											
Hepialus humuli	Ghost Moth	BAP(R)	roots of grasses and herbaceous plants	+							
Lyonetiidae											
Lyonetia clerkella			mines leaves of rosaceous bushes and trees, birch etc	+	+						
Momphidae											

Group / species	English name if available	National status	Ecological associations	Where found (see text section 3)							
				1	2	3	4	5	6	7	8
Mompha ochraceella			willow-herbs, mining the leaves		+						
Mompha raschkiella			Rosebay Willow-herb - mining the leaves		+						
Nepticulidae											
Ectoedemia atricollis			rosaceous trees, especially hawthorn, mining the leaves	+	+				+		+
Ectoedemia subbimaculella			larva mines leaves of oak						+		
Stigmella anomalella			mines leaves of rose						+		
Stigmella atricapitella			mines leaves of oak	+					+		
Stigmella aurella agg.			mines leaves of bramble	+	+	+		+	+	+	+
Stigmella basiguttella			mines leaves of oak	+							
Stigmella crataegella			mines leaves of hawthorn	+	+						+
Stigmella hybnerella			mines leaves of hawthorn	+					+		+
Stigmella oxyacanthella			mines leaves of hawthorn	+	+				+		+
Stigmella plagicolella			mines leaves of blackthorn	+							
Stigmella roborella			mines leaves of oak						+		
Stigmella ruficapitella			mines leaves of oak and perhaps Sweet Chestnut	+					+		
Stigmella salicis			mines leaves of willow and sallow		+						
Stigmella samiatella		pRDB3	mines leaves of Sweet Chestnut	+							
Stigmella speciosa			mines leaves of sycamore	+							
Stigmella tityrella			mines leaves of beech						+		
Noctuidae											
Abrostola tripartita	Spectacle		nettles	+	+					+	
Acronicta aceris	Sycamore		Horse Chestnut, Sycamore and other deciduous trees	+							
Agrochola lychnidis	Beaded Chestnut	BAP(R)	deciduous trees and shrubs and herbaceous plants (requires both)	+	+						
Agrotis exclamationis	Heart and Dart		herbaceous plants	+	+			+	+	+	
Agrotis puta	Shuttle-shaped Dart		herbaceous plants	+	+			+			
Allophyes oxyacanthae	Green Brindled Crescent	BAP(R)	rosaceous trees and shrubs		+						
Amphipyra pyramidea	Copper Underwing		deciduous trees and bushes		+						
Apamea lithoxylaea	Light Arches		grasses	+							
Apamea monoglypha	Dark Arches		grasses	+	+			+	+	+	
Atethmia centrago	Centre-barred Sallow	BAP(R)	ash - buds then flowers	+	+			+	+	+	
Autographa gamma	Silver Y		nettles and other herbaceous plants - rarely surviving winter. Immigrants from Europe are regular	+							+
Axylia putris	Flame		herbaceous plants	+							

Group / species	English name if available	National status	Ecological associations	Where found (see text section 3)							
				1	2	3	4	5	6	7	8
Cosmia pyralina	Lunar-spotted Pinion		deciduous trees and bushes			+					
Cosmia trapezina	Dun-bar		deciduous trees	+	+			+			
Diachrysia chrysitis	Burnished Brass		nettles and other herbaceous plants	+	+						
Discestra trifolii	Nutmeg		Atriplex and Chenopodium	+							
Gortyna flavago	Frosted Orange		in the stems of thistle, burdock and similar plants	+							
Hoplodrina alsines	Uncertain		herbaceous plants	+	+			+	+	+	
Hoplodrina ambigua	Vines Rustic		herbaceous plants - especially dandelions	+	+			+	+	+	
Hydraecia micacea	Rosy Rustic	BAP(R)	herbaceous plants, especially docks, feeding in the rootstock	+							
Hypena proboscidalis	Snout		nettles	+							+
Lacanobia oleracea	Bright-line Brown-eye		herbaceous plants					+			
Melanchra persicariae	Dot Moth	BAP(R)	herbaceous plants	+							
Mesapamea didyma	Lesser Common Rustic		grasses						+	+	
Mesapamea secalis	Common Rustic		grasses	+	+				+		
Mesoligia furuncula	Cloaked Minor		grasses	+							
Mythimna impura	Smoky Wainscot		grasses	+							+
Mythimna pallens	Common Wainscot		grasses	+							
Noctua comes	Lesser Yellow Underwing		herbaceous plants	+	+			+	+	+	
Noctua janthe	Lesser Broad-bordered Yellow U		herbaceous plants	+	+			+	+	+	
Noctua pronuba	Large Yellow Underwing		herbaceous plants	+	+			+	+	+	
Nycteola revayana	Oak Nycteoline		oak leaves	+							
Ochropleura plecta	Flame Shoulder		herbaceous plants		+				+		
Oligia latruncula	Tawny Marbled Minor		grasses	+	+						
Omphaloscelis lunosa	Lunar Underwing		grasses	+							
Phlogophora meticulosa	Angle Shades		herbaceous plants	+							
Rivula sericealis	Straw Dot		grasses - especially Brachypodium species	+	+					+	
Xanthia icteritia	Sallow	BAP(R)	sallow/willow catkins - then on herbaceous plants		+						
Xanthia togata	Pink-barred Sallow		catkins of willow and poplar - then on herbaceous plants		+						
Xestia c-nigrum	Setaceous Hebrew Character		herbaceous plants	+	+			+	+	+	
Xestia triangulum	Double Square-spot		deciduous trees and shrubs		+						
Nolidae											
Nola cucullatella	Short-cloaked Moth		blackthorn and hawthorn					+			
Notodontidae											

Group / species	English name if available	National status	Ecological associations	Where found (see text section 3)							
				1	2	3	4	5	6	7	8
Notodonta ziczac	Pebble Prominent		poplars and sallows/willows		+						
Phalera bucephala	Buff-tip		deciduous trees		+						
Ptilodon capucina	Coxcomb Prominent		deciduous trees		+						
Oecophoridae											
Agonopterix heracliana			umbellifers, especially cow parsley, hogweed and Angelica	+							
Batia unitella			under loose dead bark, feeding on fungi	+				+			
Carcina quercana	The Flat Cooper		deciduous trees and bushes		+						
Pyralidae											
Acentria ephemerella			submerged aquatic plants							+	
Agriphila straminella			grasses	+	+			+	+	+	
Agriphila tristella			grasses	+	+			+	+	+	
Catoptria pinella			grasses	+	+			+	+	+	
Chrysoteuchia culmella			grasses	+	+			+	+	+	
Conobathra repandana			oak - usually feeding high in the canopy		+						
Crambus perlella			grasses	+							
Endotricha flammealis			trees and herbaceous plants - then on leaf litter					+	+		
Eudonia mercurella			mosses on trunks, walls etc		+						
Eurrhypara hortulata			nettles		+						
Phlyctaenia coronata			elder, Viburnum, lilac, privet		+						
Phycita roborella			oak					+			
Pleuroptya ruralis			nettles	+	+					+	
Scoparia ambigualis			thought to feed amongst mosses	+							
Sphingidae											
Deilephila elpenor	Elephant Hawk-moth		rosebay willow-herb		+						
Laothoe populi	Poplar Hawk-moth		poplars and sallows/willows	+	+						
Tischeriidae											
Tischeria ekebladella			mines leaves of oak	+					+		
Tortricidae											
Acleris ferrugana			oak						+		
Acleris forsskaleana			maple, sycamore		+				+		
Agapeta hamana			thistles - in the roots	+			+				
Aleimma loeflingiana			oak, occasionally hornbeam and maple/sycamore		+						
Apotomis betuletana			birch	+							
Cydia pomonella			fruits of rosaceous trees, especially apple	+							

Group / species	English name if available	National status	Ecological associations	Where found (see text section 3)							
				1	2	3	4	5	6	7	8
Cydia splendana			oak		+						
Endothenia gentianaeana			teasels - in the seed heads	+							
Epiblema scutulana			thistles - in the root and lower stem								+
Epiblema uddmanniana			Rubus spp., mainly brambles	+	+			+	+	+	+
Epiphyas postvittana			deciduous trees	+	+			+	+	+	
Eucosma cana			thistles and Centaurea nigra - in the flower head	+							
Eudemis profundana			oak	+							
Hedya salicella			Salix alba and other Salix species		+						
Pandemis corylana			deciduous trees and shrubs	+	+			+	+	+	
Pandemis heparana			deciduous trees and shrubs	+	+			+	+	+	
Pseudargyrotoza conwagana			ash and privet in the fruits and seeds	+	+			+	+	+	
Rhopobota naevana			trees and shrubs - especially ivy and blackthorn		+					+	
Spilonota ocellana			trees, shrubs and herbaceous plants	+	+			+	+		
Tortrix viridana	Green Oak Tortrix		oak	+					+		
Zeiraphera isertana			oak						+		
Yponomeutidae											
Acrolepia autumnitella			woody nightshade (bittersweet) and deadly nightshade		+						
Argyresthia bonnetella			caterpillar feeds in the shoots of hawthorn						+		
Argyresthia brockeella			birch and alder	+							
Argyresthia goedartella			birch and alder	+							
Plutella xylostella			primary immigrant from overseas; temporary resident on Cruciferae	+	+	+	+	+	+	+	+
Prays fraxinella			feeds in buds, shoots and leaves of ash trees	+	+	+		+	+	+	+
Scythropia crataegella			hawthorn - sometimes blackthorn						+		
Swammerdamia caesiella			birch	+							
Swammerdamia pyrella			hawthorn, apple and pear are recorded		+						
Ypsolopha parenthesella			oak, hornbeam, birch, hazel and other trees						+		
Ypsolopha scabrella			apple and hawthorn	+							
Ypsolopha sequella			maple and sycamore		+						
MECOPTERA	**SCORPIONFLIES**										
Panorpidae											
Panorpa germanica			edge habitats		+		+				+
MYRIAPODA: CHILOPODA	**CENTIPEDES**										
Cryptopidae											

Group / species	English name if available	National status	Ecological associations	Where found (see text section 3)							
				1	2	3	4	5	6	7	8
Cryptops hortensis			amongst litter - often synanthropic	+							
Lithobiidae											
Lithobius forficatus			many habitats	+							
Lithobius microps			detritivorous	+							
MYRIAPODA: DIPLOPODA	**MILLIPEDES**										
Julidae											
Tachypodoiulus niger	a snake millipede		many habitats and often found climbing trees		+						
NEUROPTERA	**LACEWINGS**										
Chrysopidae	**Green lacewings**										
Chrysopa perla			aphid predator amongst herbage	+	+		+				+
Chrysoperla carnea s.str.			aphid predator of trees and bushes	+	+	+	+	+	+	+	+
Cunctochrysa albolineata			predatory on aphids in tree foliage		+					+	
Nineta flava			thought to be associated with oak, feeding on aphids on the leaves						+		
Coniopterygidae	**Wax flies**										
Conwentzia psociformis			arboreal on deciduous trees		+						
Hemerobiidae	**brown lacewinhs**										
Hemerobius humulinus			trees and bushes, hedges, etc		+						
Hemerobius lutescens			trees and bushes, hedges, etc	+	+						
Hemerobius micans			oak		+				+		
Micromus paganus			ubiquitous, but usually in association with wood or scrub		+						+
Wesmaelius subnebulosus			larvae are aphid predators on trees and bushes		+	+					+
ORTHOPTERA											
Acrididae											
Chorthippus brunneus	Field grasshopper		grassland	+			+				
Tettigoniidae											
Leptophyes punctatissima	Speckled Bush-cricket		rough herbage and scrub		+						
Meconema thalassinum	Oak Bush-cricket		oak trees, especially when at the woodland edge		+						
Metrioptera roeselii	Roesel's Bush-cricket	NS(Nb)	long grassland		+		+				
Pholidoptera griseoaptera	Dark Bush-cricket		scrub and edge habitats		+						
PSOCOPTERA	**BARK LICE**										
Ectopsocidae											
Ectopsocus petersi			associated with trees and bushes		+						
Stenopsocidae											

Group / species	English name if available	National status	Ecological associations	Where found (see text section 3)							
				1	2	3	4	5	6	7	8
Graphopsocus cruciatus			associated with broad-leaved trees		+						

APPENDIX 2: INVERTEBRATE STATUS CODES

Earlier published reviews of scarce and threatened invertebrates employed the Red Data Book criteria used in the British Insect Red Data Book (Shirt 1987) with the addition of the category RDBK (Insufficiently Known) after in 1983. In addition, the status category Nationally Notable (now termed Nationally Scarce) was used from 1991. The original criteria of the International Union for the Conservation of Nature (IUCN – now called the World Conservation Union) for assigning threat status used in these publications had the categories *Endangered, Vulnerable,* and *Rare,* which were defined rather loosely and without quantitative parameters. The application of these categories was largely a matter of subjective judgment, and it was not easy to apply them consistently within a taxonomic group or to make comparisons between groups of different organisms. The deficiencies of the old system were recognised internationally, and in the mid-1980s proposals were made to replace it with a new approach which could be more objectively and consistently applied. In 1989, the lUCN's Species Survival Commission Steering Committee requested that a new set of criteria be developed to provide an objective framework for the classification of species according to their extinction risk. The first, provisional, outline of the new system was published in 1991. This was followed by a series of revisions, and the final version adopted as the global standard by the IUCN Council in December 1994. The guidelines were recommended for use also at the national level. In 1995, the Joint Nature Conservation Committee (JNCC) endorsed their use as the new national standard for Great Britain, and subsequent British Red Data Books have used these revised IUCN criteria. These criteria are used in this present report and are as follows:

EXTINCT (EX) A species is *Extinct* when there is no reasonable doubt that the last individual has died.

EXTINCT IN THE WILD A species is *Extinct* in the wild when it is known to survive only in cultivation, in captivity or as a naturalised population (or populations) well outside the past range.

CRITICALLY ENDANGERED
A species is *Critically Endangered* when it is facing an extremely high risk of extinction in the wild in the immediate future, as defined by any of the following criteria:

A. Population reduction in the form of either of the following:

1. An observed, estimated, inferred or suspected reduction of at least 80% over the last 10 years or three generations, whichever is the longer, based on direct observation, an index of abundance appropriate for the species, a decline in area of occupancy, extent of occurrence and/or quality of habitat, actual or potential levels of exploitation or the effects of introduced species, hybridisation, pathogens, pollutants, competitors or parasites.
2. A reduction of at least 80%, projected or suspected to be met within the 10 years or three generations, whichever is the longer, based any of these parameters.

B. Extent of occurrence estimated to be less than 100 Km^2 or areas of occupancy estimated to be less than 10 Km^2 and estimates indicating any <u>two</u> of the following:

1. Severely fragmented or known to exist at only a single location.
2. Continuing decline, observed, inferred or projected, in any of the following: a. extent of occurrence b. area of occupancy c. area, extent and/or quality of habitat d. number of locations or sub-populations e. number of mature individuals
3. Extreme fluctuations in extent of occurrence, area of occupancy, number of locations or sub-populations or number of mature individuals.

C. Population estimated to number less than 250 mature individuals and either:

1. An estimated continuing decline of at least 25% within 3 years or one generation, whichever is longer or
2. A continuing decline, observed, projected, or inferred, in numbers of mature individuals and population structure in the form of either severely fragmented *(i.e.* no sub-population estimated to contain more than 50 mature individuals) or all individuals are in a single sub-population

D. British population estimated to number less than 50 mature individuals.

E. Quantitative analysis showing the probability of extinction in the wild of at least 50% within 10 years or 3 generations, whichever is the longer.

ENDANGERED (Formerly RDB category 1)

A species is Endangered when it is not *Critically Endangered* but is facing a very high risk of extinction in the wild in the near future, as defined by any of the following criteria:

A. Population reduction in the form of either of the following:

1. An observed, estimated, inferred or suspected reduction of at least 50% over the last 10 years or three generations, whichever is the longer, based on direct observation, an index of abundance appropriate for the species, a decline in area of occupancy, extent of occurrence and/or quality of habitat, actual or potential levels of exploitation or the effects of introduced species, hybridisation, pathogens, pollutants, competitors or parasites.
2. A reduction of at least 50%, projected or suspected to be met within the 10 years or three generations, whichever is the longer, based any of these parameters.

B. Extent of occurrence estimated to be less than 5,000 Km^2 or areas of occupancy estimated to be less than 10 Km^2 and estimates indicating any <u>two</u> of the following:

1. Severely fragmented or known to exist at no more than five locations.
2. Continuing decline, observed, inferred or projected, in extent of occurrence, area of occupancy, area, extent and/or quality of habitat, number of locations or sub-populations or the number of mature individuals.

C. Population estimated to number less than 2500 mature individuals and either:

1. An estimated continuing decline of at least 20% within 5 years or 2 generations, whichever is longer or
2. A continuing decline, observed, projected, or inferred, in numbers of mature individuals and population structure in the form of either severely fragmented *(i.e.* no sub-population estimated to contain more than 250 mature individuals) or all individuals are in a single sub-population

D. British population estimated to number less than 250 mature individuals.

E. Quantitative analysis showing the probability of extinction in the wild of at least 20% within 20 years or 5 generations, whichever is the longer..

VULNERABLE (Formerly RDB category 2)

A species is *Vulnerable* when it is not *Critically Endangered or Endangered but* is facing a high risk of extinction in the wild in the medium-term future, as defined by any of the following criteria (A to E):

A. Population reduction in the form of either of the following:

1. An observed, estimated, inferred or suspected reduction of at least 20% over the last 10 years or three generations, whichever is the longer, based on direct observation, an index of abundance appropriate for the species, a decline in area of occupancy, extent of occurrence and/or quality of habitat, actual or potential levels of exploitation or the effects of introduced species, hybridisation, pathogens, pollutants, competitors or parasites.
2. A reduction of at least 20%, projected or suspected to be met within the 10 years or three generations, whichever is the longer, based any of these parameters.

B. Extent of occurrence estimated to be less than 20,000 Km^2 or areas of occupancy estimated to be less than 20,000 Km^2 and estimates indicating any <u>two</u> of the following:

1. Severely fragmented or known to exist at no more than ten locations. Continuing decline, observed, inferred or projected, in extent of occurrence, area of occupancy, area, extent and/or quality of habitat, number of locations or sub-populations or the number of mature individuals.
2. Extreme fluctuations in extent of occurrence, area of occupancy, number of locations or sub-populations or number of mature individuals.

C. Population estimated to number less than 10,000 mature individuals and either:

1. An estimated continuing decline of at least 10% within 10 years or 3 generations, whichever is longer or
2. A continuing decline, observed, projected, or inferred, in numbers of mature individuals and population structure in the form of either severely fragmented *(i.e.* no sub-population estimated to contain more than 1000 mature individuals) or all individuals are in a single sub-population

D. Population very small or restricted in the form of either of the following:

1. Population estimated to number less than 1,000 mature individuals.
2. Population is characterised by an acute restriction in its area of occupancy (typically less than 100 km) or in the number of locations (typically less than 5). Such a species would thus be prone to the effects of human activities (or stochastic events whose impact is increased by human activities) within a very short period of time in an unforeseeable future, and is thus capable of becoming *Critically Endangered* or even *Extinct* in a very short period.

E. Quantitative analysis showing the probability of extinction in the wild of at least 10% within 100 years.

LOWER RISK (Formerly RDB category 3)
A species is Lower Risk when it has been evaluated but does not satisfy the criteria for any of the categories *Critically Endangered, Endangered* or *Vulnerable.* Species included in the Lower Risk category can be separated into three sub-categories:

• **Conservation Dependent** species which are the focus of a continuing species -specific or habitat-specific conservation program targeted towards the species in question, the cessation of which would result in the species qualifying for one of the threatened categories above within a period of five years.

• **Near Threatened** Species which do not qualify for *Lower Risk (Conservation Dependent),* but which are close to qualifying for *Vulnerable.*

• **Least Concern**
Species which do not qualify for *Lower Risk (Conservation Dependent)* or *Lower Risk (Near Threatened).*

DATA DEFICIENT A species is *Data Deficient* when there is inadequate information to make a direct or indirect assessment of its risk of extinction based on its distribution and/or population status. A species in this category may be well studied, and its biology well known, but appropriate data on abundance and/or distribution are lacking. *Data Deficient* is therefore not a category of threat or Lower Risk.

LOWER RISK (NATIONALLY SCARCE – FORMERLY NATIONALLY NOTABLE)
Species which are not included within the IUCN threat categories and are estimated to occur less than 100 hectads of the Ordnance Survey national grid in Great Britain. It should be noted that Lower Risk (Nationally Scarce) is not a threat category, but rather an estimate of the extent of distribution of these species. Lower Risk species are subdivided as follows:

Na species estimated to occur within the range of 16 to 30 10-kilometre squares of the National Grid System.

Nb species estimated to occur within the range 31 to 100 10-kilometre squares of the National Grid System.

N Diptera (flies) not separated, falling into either category Na or Nb.

NATIONALLY LOCAL (L)
Species which, whilst fairly common, are evidently less widespread than truly common species, but also not qualifying as Nationally Notable having been recorded from over one hundred, but less than three hundred, ten-kilometre squares of the UK National Grid.

ASSOCIATED DEFINITIONS
Extent of occurrence
Extent of occurrence is defined as the area contained within the shortest continuous imaginary boundary which can be drawn to encompass all the known, inferred or projected sites of present occurrence of a species, excluding cases of vagrancy. This measure may exclude discontinuities or disjunctions within the overall distributions of species (e.g. large areas of obviously unsuitable habitat) (but see 'area of occupancy'). Extent of occurrence can often be measured by a minimum convex polygon (the smallest polygon in which no internal angle exceeds 180 degrees and which contains all the sites of occurrence).

Area of occupancy
Area of occupancy is defined as the area within its 'extent of occurrence' (see definition) which is occupied by a species, excluding cases of vagrancy. The measure reflects the fact that a species will not usually occur throughout the area of its extent of occurrence, which may, for example, contain unsuitable habitats. The area of occupancy is the smallest area essential at any stage to the survival of existing populations of a species *(e.g.* colonial nesting sites, feeding sites for migratory species). The size of the area of occupancy will be a function of the scale at which it is measured, and should be at a scale appropriate to relevant biological aspects of the species. The criteria include values in km^2, and thus to avoid errors in classification, the area of occupancy should be measured on grid squares (or equivalents) which are sufficiently small.

APPENDIX 3: AQUATIC INVERTEBRATE SPECIES RECORDED

Group / species	English name	Ecological associations and comments	In aquatic area					
			1	2	3	4	5	6
ANNELIDA	**LEECHES**							
Erpobdellidae								
Erpobdella testacea		eutrophic water bodies where it feeds on insect larvae		+				
COLEOPTERA	**WATER BEETLES**							
Dytiscidae								
Agabus bipustulatus		freshwater ponds etc		+				
Hydroporus palustris		freshwater ponds etc		+				
Hydroporus planus		most water bodies will support this common species		+			+	
Hydroporus pubescens		freshwater ponds etc		+				
Elmidae								
Limnius volkmari		aquatic species	+				+	
Haliplidae								
Haliplus ruficollis s. str.		ponds ditches and similar static water bodies		+			+	
Hydrophilidae								
Helophorus minutus				+				
CRUSTACEA: AMPHIPODA								
Gammaridae								
Gammarus pulex		most freshwater habitats		+	+	+	+	
CRUSTACEA: ISOPODA								
Asellidae								
Asellus aquaticus	freshwater hog louse	most freshwater habitats		+	+	+	+	
DIPTERA	**TRUE FLIES**							
Chironomidae	**midges**							
unidentified larvae				+	+	+	+	
Culicidae	**mosquitoes**							
unidentified larvae				+				
Tipulidae	**craneflies**							
unidentified larvae						+	+	
EPHEMEROPTERA	**MAYFLIES**							
Baetidae								
Baetis rhodani		Usually in running water - especially riffles	+					
HETEROPTERA	**WATER BUGS**							
Corixidae								
Callicorixa praeusta		Aquatic species. Most still or slow-flowing water bodies.		+			+	
Sigara lateralis		freshwater ponds etc thriving in those polluted by animal dung		+				
Sigara stagnalis		Aquatic species.		+				
Gerridae								
Gerris lacustris		Aquatic species. Ponds, lakes and canals with abundant submerged vegetation.		+				
Naucoridae								
Ilyocoris cimicoides		Aquatic species - weedy ponds, canals etc		+		+		
Notonectidae								
Notonecta glauca		Aquatic species - weedy ponds, canals etc		+				
MOLLUSCA	**WATER SNAILS**							
Lymnaeidae								
Lymnaea peregra	the wandering snail	ponds, streams and marshes		+	+	+	+	
Planorbis planorbis		freshwater habitat with pondweeds		+				
ODONATA								
Coenagriidae								
Enallagma cyathigerum	Common blue	static, open water bodies with emergent vegetation,		+				

	damselfly	flying mid May to early October						
Ischnura elegans	Blue-tailed damselfly	found in most permanent water bodies, the adults flying from May to August		+				
PLECOPTERA	**STONEFLIES**							
Nemouridae								
Nemoura cinerea		aquatic larvae are associated with still and very slow water		+				
TRICHOPTERA	**CADDIS FLIES**							
Limnephilidae								
Limnephilus auricula		common species of grassy pools and ditches including temporary waters	+					

APPENDIX 7M

Hyder Consulting (2010) North-West Bicester Eco-town Exemplar Site Biodiversity Strategy

A2Dominion Group and P3 Eco (Bicester) Ltd

NW Bicester eco development Exemplar

Appendix 7M: NW Bicester eco development Exemplar Eco-Town Biodiversity Strategy

Hyder Consulting (UK) Limited
2212959
The Mill
Brimscombe Port
Stroud
Glos GL5 2QG
United Kingdom
Tel: +44 (0)1453 731 231
Fax: +44 (0)1453 887 979
www.hyderconsulting.com

A2Dominion Group and P3 Eco (Bicester) Ltd

NW Bicester eco development Exemplar

Appendix 7M: NW Bicester eco development Exemplar Eco-Town Biodiversity Strategy

Author	Mark Lang	
Checker	Marie Evans	M.Evans
Approver	Samantha Walters	SKWalters

Report No	0510-UA001881-UE21R-01-ETBS
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CONTENTS

1 Introduction

This document forms an Eco-Town Biodiversity Strategy (ETBS) for the proposed Exemplar development. This has been created as a standalone ETBS document for the proposed Exemplar development. A separate ETBS will be produced for the remainder of the proposed NW Bicester eco development, which will incorporate the findings and proposals of the Exemplar ETBS.

This document sets out the key elements of the ETBS in relation to the proposed Exemplar development and details the mechanism by which a positive benefit for biodiversity will be achieved.

2 Siting, location and context

The proposed Exemplar development is located on the north-western edge of Bicester in Oxfordshire. The proposed development is approximately 21.1 hectares (ha) and is agricultural land that largely comprises arable and grassland fields used for silage production and cattle grazing.

A full ecological assessment was undertaken of the proposed development and wider area, including a comprehensive desk-based assessment and suite of ecological surveys, to provide up-to-date information regarding biodiversity within the area. This information has been used to assess potential impacts on ecological receptors and to identify measures to ensure a net gain in biodiversity.

The ecological assessment compiled information with respect to the habitats and species likely to be present within or in close proximity to the proposed development. It also identified opportunities for net biodiversity gain, including areas for habitat enhancement, habitat creation and ecological benefits by design. Important green infrastructure and wildlife corridors were also identified during the ecological assessment process. Full details of the ecological assessment can be found within Chapter 7 of the Exemplar Environmental Statement.

2.1 Biodiversity baseline and ‘Key habitat’

The proposed development is not located within or in close proximity to any statutory or non-statutory designated sites of nature conservation importance.

The proposed Exemplar development currently comprises arable farmland intensively managed as grassland leys for silage production, and cattle-grazed improved grassland of little intrinsic nature conservation value. A small number of trees and shrubs had been planted in one of the grazed pastures approximately five years previously. The grass surrounding these trees and shrubs is tall and unmanaged. The invertebrate surveys revealed that the site is of limited value to invertebrates. Two uncommon invertebrate species were recorded within an area of longer grassland habitat on the north-western edge of the site. The fields are enclosed by a network of species-rich hedgerows. These hedgerows support breeding birds, including low numbers of yellowhammer, song thrush, dunnock and whitethroat, all of which are species of conservation concern. One pair of barn owls was also confirmed to be breeding in a nest box 125m west of the proposed development. A pair of kestrels were also recorded nesting in a barn owl box in the south-west corner of the site. The hedgerows were considered to be suitable habitat for common reptile species. Whilst no reptile species were recorded within the proposed development, low numbers of common lizard and grass snake were found along adjacent hedgerows and close to the proposed development boundary. The hedgerows were also

considered suitable for use by hedgehogs. The hedgerows also function as linear corridors allowing movement of species across the proposed Exemplar development.

The River Bure and a tributary cross the proposed development area. One confirmed common pipistrelle bat roost was located within a mature tree on the bank of the River Bure. The watercourses and several hedgerows were found to be key areas of activity for foraging and commuting bats. Two further bat roosts were found in buildings outside of the proposed development in St Lawrence's Church, Caversfield, and at Home Farm. A 'main' badger sett is located within the proposed development adjacent to the tributary of the River Bure, and a single hole 'outlying' sett was found within the banks of the River Bure.

The hedgerows and the River Bure and its tributary were considered to be the most important habitat features within the proposed Exemplar development and are therefore considered to be 'Key habitat' features that will be maintained, managed and enhanced for their biodiversity interest. This will ensure that these habitats are able to support viable populations of species of conservation concern, including species currently recorded within the proposed development (for example breeding birds and bats), and species currently absent which would benefit from enhancement measures (such as valuable invertebrate species and assemblages).

Mechanisms for the long-term protection and management are discussed under Section 3 Management (below).

2.2 Masterplanning and design

This section considers how the masterplanning process has considered the conservation of existing habitats, the creation of new habitats and how these will be designed and programmed in alongside development. Regular meetings and discussions between the project team have ensured the creation of a proposed development masterplan which features biodiversity as a key element of the design. This design has also incorporated knowledge of local ecology and UK and Local Biodiversity Action Plan (BAP) targets, including consideration of the nearby Conservation Target Areas (CTAs). With these in mind, the masterplan design seeks to deliver the following principal objectives of an eco-town development:

- Protecting and enhancing the existing 'Key habitat';
- Mitigating the impact of development and securing net biodiversity gain;
- Integrating biodiversity with the built environment; and
- Increasing biodiversity's resilience and ability to adapt to climate change.

The measures provided to achieve these principals within the proposed Exemplar development are described in detail within the following paragraphs. The landscape proposals and a drawing illustrating biodiversity losses and gains are presented at the end of this report.

2.2.1 Protecting and enhancing the existing 'Key habitat'

The masterplan design has ensured the protection of the 'Key habitats' identified within the proposed development, including the hedgerows and the River Bure and its tributary. The design also protects and enhances these 'Key habitats' for the valuable species they are known to support, for example: bats, breeding birds, and badgers, and also species they have the potential to support, such as reptiles, hedgehogs and invertebrates. These habitats will be managed in the long-term under a Landscape and Ecology Conservation Management Plan (see Section 3, below).

Hedgerows

All hedgerows within the proposed development will be retained as far as possible; however, it will be necessary to breach these features to provide access, or to create visibility splays. Where this will occur, the affected sections of hedgerow and their associated ground flora will be translocated and replanted nearby within the proposed development. This will ensure that the hedgerow network is retained and that there is no net loss of hedgerows (see Section 2.3, below).

The majority of hedgerows within the proposed Exemplar development will also have a buffer comprising at least 3m of tall, less-intensively managed diverse grassland. This long grass habitat will complement the species-rich hedgerows and provide additional habitat for wild flowers and invertebrate species, thus increasing the foraging resource for bats, birds and other fauna. Adjacent to these hedgerow buffers there will also be areas of supplementary and transitional green habitats, including allotments, native tree and shrub planting, and SuDS features. Thus, all of the hedgerows will be retained within or adjacent to semi-natural habitats. The retention of hedgerows and the creation of diverse 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. New native tree and shrub planting alongside existing hedgerows areas will also reinforce and enhance the hedgerow habitat already present. This will include the provision of fruit and nut bearing trees and shrubs to provide increased foraging for invertebrates, bats and birds. Neither the watercourses nor the retained hedgerows and associated habitats will be lit so that they maintain their value for nocturnal fauna, including light-sensitive bat species.

During construction the hedgerows will be protected through sensitive construction methods, see Section 2.3 below for further details.

2.2.2 River Bure and tributary

The River Bure and its tributary together with the adjacent riparian and wooded corridor will be retained as part of the proposed development design. A wide belt of semi-natural habitat will be maintained alongside the River Bure and its tributary to protect both the channels and their flood zones. New mixed broadleaved woodland and orchard planting will be created alongside the River Bure to provide a wooded corridor which will also provide a link between the retained hedgerows and the riparian habitat. This woodland planting will also widen the tree-lined riparian corridor and enhance the ecological value of the River Bure. 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. The wind-fallen fruit will also provide additional foraging habitat for badgers. It is also proposed to plant orchard trees alongside the tributary of the Bure, which will also be of benefit to badgers, and diverse grasslands which will be of particular benefit to invertebrates.

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, protecting the use of these areas for nocturnal species such as bats and badgers. During the operational phase of the proposed development, the bridges will need to be lit for safety reasons. However, the lighting will be designed to be highly directional and shielded to ensure that the watercourses and adjacent supplementary habitats will be maintained as ‘dark corridors’ to allow bats continued foraging and commuting routes across the proposed Exemplar development.

Sustainable Drainage Systems (SuDS) that form part of the proposal will ensure water quality within the watercourses is protected once the site is developed. The design of the SuDS also includes features such as grassy swales, water-filled ditches, permanently wet and ephemeral

attenuation ponds, which provide additional wetland habitat that will be of conservation value to flora and fauna species. These features will be planted with appropriate mixes of native plants to maximise their benefit to wildlife. Areas of diverse grassland will also be created within the river corridors. Where conditions are dry and nutrient-poor subsoil can be uncovered, calcareous grassland species will be sown. Damp areas or areas with a more neutral soil will be sown with a more appropriate native wildflower seed mix.

2.2.3 Protected species

In addition to the protection and enhancement of the 'Key habitats' above, the design of the proposed Exemplar 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. The 'main' badger sett and a single outlying sett within the proposed development will be retained, and disturbance avoided as much as possible. The setts will also be retained within the dark unlit corridors along the River Bure and tributary and screened from development using scrub planting.

2.3 Mitigating the impact of development and securing net biodiversity gain

2.3.1 Mitigation measures

The following mitigation measures will be included within the proposed development to ensure there are no residual impacts on habitats and species. Drawings illustrating the landscape proposals and the biodiversity losses and gains are provided at the end of this report.

Hedgerows

All translocation operations will take place under close ecological and arboricultural supervision and will preferably be undertaken in the autumn/winter period when plants are dormant. This will also avoid conflicts with nesting birds. Should this timing not be possible, further after-care such as watering, may be required to ensure their continued survival. Appropriate measures will be determined in consultation with an arboricultural consultant. Any section of translocated hedgerow will be coppiced at height prior to moving and nest boxes will also be provided in suitable habitat on site to maintain nest sites for breeding birds. In addition, there will be measures to enhance and bolster the existing hedgerows, such as tree and shrub planting, and the provision of supplementary, transitional and buffer habitats adjacent to hedgerows. Together these measures will ensure there is not net less of hedgerows and provide a biodiversity gain. If it is not possible to translocate a hedgerow or the translocation fails new native tree and shrub planting will be provided to compensate for the habitat lost. These measures are discussed in more detail in Section 2.3.2, below.

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 in compliance with British Standards BS5837, to ensure that they are not subject to accidental damage during construction. This protective fencing together with a suitable buffer will ensure that the roots of the hedgerow trees and shrubs are not undermined during any excavation works. In addition, the buffer and adjacent supplementary habitats 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.

River Bure and tributary

Current best practice guidance will be followed to control site run-off, and standard mitigation techniques will ensure water quality within these watercourses is protected during all phases of the proposed development. Night-time lighting is not proposed during the construction of the proposed Exemplar development, but should it be necessary it will be kept away from the watercourses.

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 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.

Barn owls

Given the close proximity of the nest site to the proposed Exemplar development, the nest boxes (including that which was used in 2010), will be moved to a location on the edge of the woodland to the west of the proposed development or other areas of suitable habitat, thus ensuring they remain within suitable foraging habitat but in an area that will not be developed as part of the NW Bicester eco development in the future. Nest boxes would only be moved once it has been confirmed that no owls are currently using them by an experienced, licensed ecologist. This will ensure that there is no net loss in nesting opportunities for barn owls within the local area. In the event that the nest boxes are in poor condition new boxes will be installed instead. These boxes will also provide suitable nesting opportunities for the kestrels that were nesting on the proposed development.

Bats

Street lighting close to the watercourses and hedgerows will be designed to be directional and shielded to ensure that they are maintained as ‘dark corridors’ to allow bats continued foraging and commuting routes across the Exemplar development. It is therefore considered that there will be no net loss of suitable foraging and commuting habitat for bats.

Badgers

During the installation of the bridge structure over the River Bure, 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 badgers. Should disturbance prove likely, the closure of this sett may need to proceed under licence to Natural England, depending on activity levels at the sett at the time of construction works. Protective fencing will be installed around the ‘main’ badger sett to ensure that it is protected from accidental damage throughout construction. Protective fencing will also be installed around the ‘outlying’ badger sett prior to its closure (should this be necessary), and throughout construction works if it is to be retained. 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. 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. The protection and retention of the ‘main’ sett, the provision of dark corridors to areas of suitable foraging areas and the creation of habitats of value to foraging badgers will ensure that there is no net loss of habitat for badgers.

2.3.2 Securing net biodiversity gains

Habitat creation

In addition to protecting and enhancing existing 'Key habitats', new habitat creation will also be delivered as part of the proposed Exemplar development. The choice of which type of habitats to create on site has been driven by three broad objectives:

- Habitats which will complement the 'Key habitats' being retained;
- Habitats for which creation will make a positive contribution to local and national biodiversity objectives; and
- Habitats which are visually attractive and will enhance the quality of life for the residents of the Exemplar.

It is therefore proposed to create areas of the following:

- Flower-rich calcareous grassland;
- Flower-rich neutral/damp grassland;
- Mixed broad-leaved woodland;
- An area of orchard;
- Belts of tree and shrub planting to create links across the site where none currently exist;
- Permanently wet ponds;
- Temporarily wet features including ponds, ditches and swales;
- Lines of street trees, and blocks of tree and shrub planting as part of traffic controlling measures within home zones;
- Green walls and allotments; and
- Boxes will be provided for bat, bird and invertebrate species.

Areas of diverse grassland, including damp grassland and dry calcareous grassland, will be provided in areas of open space within the proposed development, and alongside hedgerows. These areas will be of potential value to invertebrates (such as the Shaded Pug moth), 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 BAP 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.

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 elsewhere within the proposed development. This woodland planting will also widen the tree-lined riparian corridor and enhance the ecological value of the River Bure and its tributary. Planting of woodland will increase the value of the proposed development for species such as invertebrates, birds, bats, and hedgehogs. Badgers will also benefit from the wind-fall fruit arising from the proposed orchard planting.

Providing woodlands will contribute to UKBAP targets for Lowland Mixed Broadleaved Woodland habitat, the Oxfordshire LBAP for Woodlands, and the Cherwell BAP habitat for Woodlands. It will also be in keeping the closest Conservation Target Area (CTA), the Tusmore and Shelswell Parks with Stoke Lyne Woodlands CTA, which comprises mixed broad-leaved woodland, and with 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 has been 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. The allotment areas will also be bordered with low hedgerows and shrub planting which will increase their value for fauna, such as nesting birds. Overall, the areas of tree planting will ensure that in the long-term, new links are created within the proposed development.

Surface water drainage within the proposed development will be managed using SuDS features. These will include permanent and ephemeral ponds, ditches, and swales. This combination of features will be seeded with native species, appropriate to the ground conditions, with native wetland species planted in wet features and species-rich grassland within dry locations. These features will provide diverse habitats of value for invertebrate species, amphibians and reptiles, such as grass snakes which have been recorded in close proximity to the proposed development. Together the SuDS features create a network of wet and dry habitats across the site.

Boxes will be provided in a range of habitats across the proposed development for use by invertebrates, nesting birds and roosting/hibernating bat. More detail on these boxes is provided within Section 2.4, below.

By increasing the overall diversity of habitat types present on site, and managing these habitats for their biodiversity interest, it will be possible to increase the opportunities for a wider range of species to exist on site than were present prior to development. The contribution that the habitat creation measures will make to local biodiversity could be recorded using the Biodiversity Action Recording System (BARS)) which is available to all BAP practitioners.

Table 1. Summary of biodiversity losses and gains

The areas of semi-natural habitats together with the artificial nest and roost features that would be retained and/or created as part of the proposed development would be managed to benefit wildlife in accordance with the Landscape and Ecology Management Plan. Habitats and species would be monitored in accordance with this management plan to ensure that the benefits to biodiversity are recorded and that management is altered, as necessary, to ensure that a net gain in biodiversity is achieved. Habitats and species that could be monitored include the hedgerows, areas of grassland, the SuDS features, orchards, butterflies, bats and birds. More details will be provided within the management plan.

Habitat/species	Value	Impact and effect	Mitigation/enhancement	Overall effect	Loss/Gain
Arable Land	Negligible value to wildlife. Regularly cut for silage. Small area of less intensively managed grassland on northern-western boundary; however, considered too small to be of value to wildlife.	Total loss of habitat. Little impact on the nature conservation resources in the local area.	Dependent on the time of year that works take place in this area pre-construction surveys may be required for brown hares and nesting birds.	Loss of habitat of negligible value to wildlife.	Loss of habitat of negligible nature conservation value
Grassland	Negligible value. Closely grazed by cattle. Species-poor flora.	Total loss of existing habitat. 13499m^2 of diverse grassland comprising native species will be created within areas of green space and alongside the hedgerows.	New areas of grassland will be managed to benefit wildlife. The grasslands will include species associated with dry calcareous soils and wetland habitats. The species mix chosen will be appropriate to the location.	Loss of habitat of negligible value to wildlife. Gain in diverse grassland of potential value to wildlife as it develops. Fauna that will benefit include invertebrates, reptiles, bats and hedgehogs. Positive effect.	Gain Diverse grassland created
Recent plantation	Recently planted area of trees and shrubs less than 1m high. Supports unmanaged, species-poor grassland too small and recent in origin to be of value to invertebrates, foraging bats or birds.	Total loss of existing habitat. 9058m^2 of new woodland and orchard planting.	Where possible trees and shrubs will be relocated elsewhere within the proposed development to areas of woodland planting to accelerate the development of this habitat. Loss of long grass habitat from this location will be compensated for by the creation of more diverse grassland that is managed to benefit wildlife.	Grassland loss will be more than compensated for through new grassland planting. New woodland and orchard planting will compensate for the loss of the plantation area. Positive effect.	Gain

Habitat/species	Value	Impact and effect	Mitigation/enhancement	Overall effect	Loss/Gain
Woodland planting and orchards	Orchards (an Oxfordshire BAP habitat) created as part of the proposed development in line with BAP targets. Not present prior to development. New woodland planting comprising native trees and shrubs comprising native species of value to wildlife will be created.	9058m^2 created (605m^2 orchard and 8453m^2 of woodland planting).	New plantings will be of benefit to fauna in particular invertebrates, birds, bats, hedgehogs and badgers.	Positive effect. (Gain already considered elsewhere in table.)	
Hedgerows	Species-rich hedgerows, the majority of which would be considered 'important' under the Hedgerows Regulations (1997). Valuable wildlife corridors for species such as invertebrates, reptiles, and bats. Nesting habitats for breeding birds. Species-poor ground floras. UKBAP, Cherwell BAP and Oxfordshire LBAP habitat.	Network fragmented by access roads. 465 linear metres translocated.	Sections of hedgerow that will be removed as part of the proposed development will be replanted t to maintain hedgerow links across the site. Fencing will be installed to protect retained hedgerows during construction. New planting will bolster hedgerows. Creating semi-natural habitats including allotments alongside these features will create additional habitat niches and transitional habitats of value to a range of wildlife, enhancing the value of the retained hedgerows. Nest boxes will be provided to compensate for temporary loss of habitat, as hedgerows will be coppiced at height prior to translocation.	In line with BAP targets for both the Cherwell and Oxfordshire BAPs there will be no net loss of hedgerows. Species associated with hedgerows, in particular invertebrates, will benefit from improved management of the hedgerow network in accordance with the Landscape and Ecology Conservation Management Plan. Positive effects as the hedgerows recover and benefit from management.	Gain in the longer term

Habitat/species	Value	Impact and effect	Mitigation/enhancement	Overall effect	Loss/Gain
Watercourses	Seasonally wet or wet during periods of high rainfall. Valuable corridors for bats. Limited value to aquatic species due to the lack of water for most of the year. UKBAP, Cherwell BAP and Oxfordshire LBAP habitat.	Corridors breached by access roads.	Width of bankside habitat removed to accommodate the bridges will be minimised as far as possible. Tree planting will compensate for trees removed. Watercourses and associated riparian habitat retained in wide corridors of semi-natural habitat. New habitats of value to wildlife will be created within river corridors, such as diverse grassland and woodland planting. Sensitive lighting design to ensure dark corridors retained. SuDS features will ensure water entering these features is balanced and treated. New wetland habitats created as part of SuDS supporting native plant species will lead to an increase in wetland habitats across the site.	New habitats of value to wildlife created within stream corridor, including SuDS features, diverse grassland and woodland planting. Water quality protected. Overall positive effect on these features in line with BAP targets.	Gain - improved water management, new habitats created.
School grounds	Although predominantly comprising amenity grassland habitats of value to wildlife will be created. These include an orchard, a nature trail supporting wildflower species, and areas of native tree and shrub planting.	New habitat created within the 10197m^2 allocated to the school grounds.	Habitats of value to wildlife will be managed sympathetically to benefit wildlife, It is likely that this would occur since the school is likely to need to meet the requirements of a BREEAM assessment.	Likely to be beneficial but this is dependent on sympathetic management of these green spaces.	Gain (dependent on habitat management)

Habitat/species	Value	Impact and effect	Mitigation/enhancement	Overall effect	Loss/Gain
Allotments and gardens	Although it is not their primary function, the habitats within these areas will be of value to a range of wildlife, including: invertebrates, reptiles, amphibians (particularly if garden ponds are created), nesting birds, badgers and bats.	3764m^2 of allotments and 19700m^2 of gardens will be created.	Once the dwellings are occupied it is likely that the residents will be involved in the management of the areas of open space. This is likely to have a beneficial effect on the way that they manage their gardens and allotments. At the very least it is likely that compost heaps will be created that will be of benefit to invertebrates and reptiles. Some of the nest boxes, bat roost boxes and invertebrate boxes provided as part of the propose development will be located in these areas.	Likely to be positive particularly in the longer-term as these areas develop and mature. Gain in the longer-term as habitats develop (already considered elsewhere in table with respect to species).	
SuDS features	Ephemeral and permanently wet features will be created as part of the proposed development. Of potential value to invertebrates, amphibians, bats and badgers.	A range of habitats created that would be of benefit to wildlife (covering 1366m^2).	A range of features will be created including: wet ditches, swales, perched ponds and wet ponds. These will be planted with native plants that are appropriate to the conditions, thus wetland plants will be used in features that will be wet or damp, whereas, plants associated with dry conditions will be planted elsewhere.	Positive effect. Gain already considered elsewhere in table.	

Habitat/species	Value	Impact and effect	Mitigation/enhancement	Overall effect	Loss/Gain
Invertebrates	Two uncommon species recorded: Shaded Pug moth and Roesel's Bush-cricket. Overall, site is of limited value to invertebrates.	Loss of existing habitat. It is likely that the uncommon invertebrates would persist on the site since suitable habitats for them would be retained alongside the hedgerow where they were recorded previously.	New habitats of greater value to invertebrates will be created as part of the development proposals. These include: areas of long grass habitat, hedgerows managed to benefit invertebrates, new tree and shrub planting, orchard planting, areas of diverse grassland, permanent wetlands, ephemeral wetlands, allotments, street trees and new habitats within the school grounds. Gardens and allotments also likely to be of benefit to invertebrate species diversity, particularly areas that are less regularly managed.	Loss of habitat of limited value to invertebrates. Creation of habitat that could potentially be of value to invertebrates. Overall a positive effect on these features.	Gain. New habitats created.
Amphibians	No features suitable for breeding amphibians on site. Habitat of limited value to foraging amphibians.	Not likely to be affected.	Temporary and permanently wet habitats created as part of the development proposal could provide conditions suitable for breeding amphibians. The areas of diverse grassland, other SuDS features and areas of tree and shrub planting could also be used by foraging amphibians. Habitats would be managed to benefit amphibians. Garden ponds and other wetland features likely to be created in private gardens which will also be of benefit to amphibians, in particular common frogs.	Overall, positive effects on amphibians as the newly created habitats develop.	Gain. New habitats created.

Habitat/species	Value	Impact and effect	Mitigation/enhancement	Overall effect	Loss/Gain
Reptiles	Common lizard and grass snake recorded in close proximity to development and are likely to be present within the proposed development in small numbers.	Reptiles were found to be associated with grassland adjacent to field boundaries and watercourse. These habitats will be retained or enhanced.	Reptiles will benefit from the habitat creation and enhancement measures, including: retention and enhancement of hedgerows and river corridors, together with adjacent buffer habitats such as diverse grasslands and woodland planting; provision of allotments. Compost heaps and less well managed areas within the allotments and private gardens will also provide habitats for reptiles.	Overall, positive effects on reptiles as the newly created habitats develop.	Gain. New habitats created.
Breeding birds	Site supports small numbers of breeding bird species of conservation concern including: four pairs of yellowhammer; one pair of whitethroat (probable breeding); three pairs of dunnock and one pair of song thrush (probable breeding). One pair of kestrels were confirmed to be breeding within a barn owl box.	Loss of hedgerow habitat used by breeding birds. Disturbance birds nesting in hedgerows, trees and nest boxes. Barn owl boxes to be moved and/or replaced to location where any birds occupying them will not be disturbed by construction work.	Works timed to avoid nesting birds. Where this is not possible, measures will be implemented to avoid disturbance. New nest boxes will be provided to compensate for the temporary loss of nesting sites, as sections of hedgerow are coppiced at height prior to translocation (100 boxes suitable for hole-nesting species and open fronted boxes will be provided). Nest boxes will also be provided on dwellings and public buildings to encourage swifts, house martins, swallows, house sparrow and starlings to nest on the site (54 boxes). Birds will benefit from improved management of the hedgerows. Insectivorous birds will benefit from the creation of habitats of value to invertebrates. Birds	Habitat that supports yellowhammers and whitethroats will be removed; thus, these species are unlikely to persist post-development. Song thrush and dunnock are likely to remain on site and will benefit from the proposed habitat creation. Kestrel may use the nest boxes provided for barn owls and return to forage over the site when the new habitats on the site mature, but they are likely to be displaced for a number of years (several kestrel generations). Birds associated with gardens are likely to benefit from the landscape proposals within the new development as the planting matures. In the longer-term the proposed development could support a	Nest boxes compensate for loss of nesting sites in the short-term. Gain in the longer-term as habitats mature.

Habitat/species	Value	Impact and effect	Mitigation/enhancement	Overall effect	Loss/Gain
			that eat nectar, fruit, nuts and seeds will benefit from the new tree and shrub planting. The creation of wetland habitats and the use of native wetland plants will also be of benefit to birds. Birds will also benefit from habitats created within the private gardens and allotments A proportion of the house holders also likely to feed wild garden birds and may install further nest boxes.	greater diversity of bird species than were present in 2010, including species of conservation concern which have not previously been recorded due to limited suitable nesting sites and foraging habitat.	
Barn owls	Confirmed to be occupying a nest box offsite but may occasionally forage over site; however, the proposed development area is considered to be of limited value to foraging barn owls.	Potential for disturbance to barn owls using nest box during construction.	Nest boxes will be moved to locations that would not be disturbed by current or future development proposals, this will be adjacent to the development but within suitable foraging habitat. Sufficient foraging habitat will be retained outwith the development proposals to ensure that barn owls would persist on the locality. Loss of small areas of habitat within the development site would not be expected to have any effect on their breeding success.	Barn owl may forage within suitable habitat created along the river corridor. Irrespective of this the development proposal would not have a positive or negative effect on barn owls, given the small areas of suitable habitat loss and the low numbers of prey species (voles) that the newly created habitats are likely to generate.	Neutral
Bats	Confirmed bat roost within a bat box installed on a mature tree along the River Bure within the proposed development. Bats forage and commute along watercourses and hedgerows. Limited natural roosting opportunities exist within the site (several of the trees that have the	Roost retained within watercourse buffer. Foraging corridors and commuting routes retained.	Foraging and commuting routes will be maintained as dark corridors. Links to habitats that are suitable for foraging bats outwith the proposal boundary will be retained. Confirmed tree roost retained and other potential roost sites identified during the surveys will also be retained. The creation of	Increase in potential roost sites. Previously the site contained limited roosting opportunities. The development will include the creation of habitats of potential value to foraging bats. Bat commuting routes will be retained.	Gain. New roosting opportunities and new foraging habitats.

Habitat/species	Value	Impact and effect	Mitigation/enhancement	Overall effect	Loss/Gain
	potential to support roosting bats do so because they support roost boxes).		habitats of benefit to invertebrates (see invertebrates above) would be expected to be of benefit to bats. The proposal would lead to an increase in features suitable for use by roosting bats (at least 20 bat roost boxes will be installed on dwellings and on trees, and a further 20 features (bat bricks or similar) will be installed on buildings, which will be suitable for crevice dwelling bats).	Overall there will be a positive effect on the bats that use the proposed development.	
Brown hares	Not recorded on site. Likely to be present in arable fields in the locality, but the proposed development area is not considered likely to be of value to brown hares.	Loss of foraging habitat unlikely to effect local population.	No mitigation or enhancement measures proposed. A pre-construction walkover of arable fields prior to vegetation removal will be undertaken to confirm the continued absence (or otherwise) of brown hares prior to works if works are to be undertaken when brown hares with dependent young may be present.	The effect on brown hares is expected to be neutral.	Neutral
Otters and water voles	Not present within site. Otters may occasionally travel across the watercourses within the proposed development when accessing other parts of their territory.	No effect.	No mitigation or enhancement measures proposed. A pre-construction walkover will be undertaken to confirm the continued absence (or otherwise) of otters and water voles prior to works.	The effect on otters and water voles is expected to be neutral.	Neutral
Dormice	Not present on site.	No effect	No mitigation or enhancement measures proposed	The effect on dormice is expected to be neutral.	Neutral

Habitat/species	Value	Impact and effect	Mitigation/enhancement	Overall effect	Loss/Gain
Badgers	A 'main' sett and an 'outlying' sett badger sett are located within the proposed development. The proposed development is also part of this social group's foraging habitat.	The 'main' sett will be retained within area of open space. The 'outlying' sett will be retained if possible, but may need to be excluded or lost to prevent disturbance during the construction of the proposed bridge across the River Bure. Potential for disturbance to badgers during construction.	Grassland habitat that is used by foraging badgers will be lost; however, this is not considered to be significant in terms of this social group of badgers' territory size. This will be compensated for in part by the creation of woodland, orchard and grassland habitats that would be of value to foraging badgers, particularly as the planting matures and bears fruit. Badgers are also likely to forage within the school playing fields, the allotments and the gardens unless measures are taken to prevent this from occurring. Badgers will be able to forage along the stream corridors beneath the bridges, it is considered unlikely that they would be at risk of mortality on the site roads given the low speeds that vehicles would be travelling. The 'main' sett will be screened from the development and any lighting associated with it through the planting of screening vegetation.	The effect on badgers is expected to be neutral.	Neutral

Encouraging local ownership and community involvement

Once the site is developed there are considerable opportunities to involve local residents more directly in their local environment to increase local ownership and appreciation of an eco-town ethos. Initiatives could include:

- Encouraging local residents to become involved in national recording schemes such as 'I spot' developed by the Open University or the 'Garden Birdwatch' scheme administered by the British Trust for Ornithology (BTO);
- Liaison with the Thames Valley Environmental Records Centre (TVERC) to develop a local wildlife recording scheme specifically focused on the proposed Exemplar development;
- The involvement of local residents in practical habitat management such as the British Trust for Ornithology's (BTCV) 'Green Gym' Initiative; and
- Encouraging the proposed Exemplar development residents to adopt and manage areas of local green space. For example Cumbria County Councils 'Green Space Project' aims to celebrate and enhance the heritage, cultural, environmental and community value of green spaces in Cumbria for all to enjoy and actively promotes local community engagement. Such an initiative could be set-up for the wider NW Bicester eco development.

Further details of these initiatives are presented in Appendix B.

2.4 Integrating biodiversity into the built environment

The following measures will be incorporated into the built environment and as part of hard landscaping to further benefit biodiversity, including areas where biodiversity is not the prime function. Such measures will include:

- Provision of allotments as supplementary, transitional and buffer habitats adjacent to retained hedges, new tree and shrub planting, and areas of green space to increase the overall area of habitat available to fauna. The 'scruffy' habitats created within the allotments, such as fallow areas, compost heaps 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 allotments will also contribute to the function of adjacent wildlife corridors;
- SuDS comprising a combination of permanently and seasonal wet features will provide habitat conditions for a range of wetland plant species, and enhance the value of these areas for a diverse range of fauna, such as invertebrates, amphibians and reptiles. These features will form a network of wetland features across the site;
- Bird boxes will be provided on dwellings and public buildings, and also on mature trees in suitable locations throughout the proposed development, thus incorporating wildlife into the built environment and increasing nesting opportunities for species that are frequently limited by suitable sites. Nest boxes will be installed in strategic places within dwellings and public buildings and will be targeted towards species that have undergone a decline in numbers in recent years, but are still characteristic of the urban fringe environments. Twenty swift boxes, 10 house martin boxes, 10 house sparrow boxes, four starling boxes, and 10 swallow boxes will be installed on dwellings and public buildings, in line with TCPA's Biodiversity Positive: Eco-towns Biodiversity Worksheet guidance (TCPA, 2009).

These boxes will be installed in locations 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. Approximately 100 nest boxes, comprising boxes suitable for hole nesting species and species that use open fronted boxes, will also be installed within retained vegetation and on the buildings. Together with the planting of new native tree and shrubs within the proposed development, this will provide enhancement measures. Nesting opportunities will therefore be provided for both birds that have been recorded on the site and species which are not currently present on the site due to the lack of natural nest sites. These boxes will ensure there is no net loss in available nesting habitat and provide biodiversity gain within the proposed development by accommodating species of conservation concern not previously recorded. 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. At least 20 bat bricks will be installed singly in dwellings and/or public buildings, in suitable unlit locations and at a variety of aspects, ideally facing suitable foraging habitat. A minimum of 20 bat boxes will also be installed on retained trees and dwellings and public buildings. These will be installed in groups of three on trees, 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. The provision of bat roosting sites incorporates wildlife features within the built environment and increases roosting opportunities for species that are frequently limited by suitable sites, particularly where energy-efficient housing is created. Prior to development there were few natural roost sites;

- At least 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;

- There will be the provision of a green wall associated with the northern central bus stop and also on the Energy Centre Silo. These features will support plants of value to wildlife and provide habitat suitable for invertebrates and potentially nesting birds;

- Tree and shrub planting will be included as part of the home zones and also to line streets. These will increase the areas of vegetation and green links within the proposed development, softening hard landscaping areas. The planting will comprise native species of benefit to fauna, such as invertebrates, and will also provide nesting opportunities for bird species;

- Habitat areas will be included within school grounds to increase pupils' daily contact with the natural environment, including a nature trail, native tree and shrub planting orchard planting, wetland planting, and other habitat creation measures.

2.5 Increasing biodiversity's resilience to and ability to adapt to climate change

In order to increase the resilience of biodiversity to climate change and ensure it can adapt in the long term the following elements have been incorporated into the masterplan design:

- Maintaining the ecological diversity of habitats already present on site;

- Increasing habitat diversity and the availability of ecological niches by creating new habitat types within the proposed development, such as woodland, ponds and diverse grassland;
- Ensuring that existing watercourses are given sufficient space to adapt by allowing for natural processes of erosion and deposition;
- The provision of ponds and the SuDS treatment system will ensure water resources within the site are controlled and maintained within the proposed development and for the future. It is anticipated that future rainfall events will be more erratic and SuDS features have been designed to cope with such events;
- Ensuring that retained habitats and newly created habitats form linear corridors allowing migration of species across the proposed development and into the wider countryside;
- Measures to control the micro-climate of the proposed development include the provision of interconnected green spaces and corridors which will help to provide evaporative cooling effects;
- The retention and improvement of the riparian corridor, the hedgerows, woodland planting and green spaces such as the Village green and school, and the interconnecting green corridors will help to reduce temperatures across the proposed development;
- Increased quantity of tree and shrub planting across the proposed development as a whole will also provide green networks and retain moisture in the most developed areas;
- The landscape proposals include large numbers of native species that are adapted to the current climate. Many of these native species will cope with the stressed environments that may be created by climate change. Careful consideration has been given to the grassland mixes; those for the SuDS features; and the tree and shrub species.

3 Management

In order to safeguard the future management of the retained and new habitats, a suitable mechanism for ensuring the funded long-term management of the site will be developed and adopted. This will include the production of a Landscape and Ecology Conservation Management Plan which will identify how habitat features are to be managed to maintain their biodiversity interest (see Section 3 and Appendix A). The management plan will include and allow for an ecological review of management activities on a regular basis, particularly regarding the implementation of the management plan prescriptions, and would monitor the success of the mitigation. This monitoring would identify the need to amend the management practices should they not be delivering the required biodiversity gain. The management plan will also aim to involve the local community in the monitoring and management planning process, and to encourage local ownership and involvement in their natural environment through activities such as practical hands on management and biodiversity recording initiatives.

Heads of terms for a Landscape and Ecology Conservation Management Plan are presented in Appendix A.

4 Funding

In order to safeguard the future management of features of benefit to biodiversity, an appropriate mechanism and funding package will be required to ensure that the measures outlined in the Landscape and Ecology Conservation Management Plan can be delivered in perpetuity.

The exact mechanism by which this will be achieved is yet to be agreed and it is likely that a variety of mechanisms will be selected for the different areas of open space and semi-natural habitats. A number of options that could be considered are presented below, but this list is by no means exhaustive and additional measures may be included within the final Landscape and Ecology Conservation Management Plan. There should also be an element of ecological review of management activities, particularly the implementation of the management plan prescriptions, and monitoring the success of the mitigation. This monitoring would enable alterations to management practices if they are not delivering the required ecological gain.

- The local community could undertake some of the management in the Landscape and Ecology Conservation Management Plan through an initiative similar to BTCV's 'Green Gym', or residents could as a group adopt and management portions of the green infrastructure. Funding could be provided by a community charge on the proposed development's new residents. This would encourage local participation and engender a sense of ownership in their local environment;

- A dedicated management company could be appointed with sufficient funds to implement and manage particular habitat enhancement measures, for example the SuDS features. Funding would be provided by a commuted sum (or similar) from the developer secured through a Section 106 Agreement with the Local Planning Authority. The management company, who ideally would have experience in managing ecologically sensitive areas, would be responsible for undertaking the management of the retained habitats and features in accordance with the Landscape and Ecology Management Plan;

- The Local Planning Authority could oversee the implementation of the Landscape and Ecology Conservation Management Plan. Funding being provided by a commuted sum (or similar) from the developer secured through a Section 106 Agreement with the Local Authority; or

- A third party such as the local wildlife trust, with appropriate funding, would undertake the management and implementation of the Landscape and Ecology Conservation Management Plan.

5 Governance and accountability

PPS 1 supplementary guidance on Eco-towns identifies a clear requirement for appropriate governance structures to ensure that there is:

- Continued community engagement;

- Sustainability metrics are monitored; and

- Future development continues to meet Eco-town standards.

The long-term governance structure adopted for the proposed Exemplar development will ensure that biodiversity is a key consideration in all these aspects of governance and accountability. In addition, it is envisaged that a steering group will be set up to ensure that the

measures identified within the Landscape and Ecology Conservation Management Plan to protect and enhance biodiversity continue throughout the life of the proposed development.

6 Conclusions

The key aims and objectives of the proposed Exemplar development ETBS are highlighted below:

- Retain, protect and enhance the 'Key habitats' as identified from the field surveys and assessment process that are present within the proposed development. This has included the protection and enhancement of the hedgerows and River Bure and its tributary within the proposed development;

- Identify opportunities to create additional habitat types to make a positive contribution to local biodiversity initiatives. These have included the proposed creation of broadleaved woodland habitat, diverse grasslands and wetland features;

- Identify supplementary, transitional and buffer habitat creation opportunities. These have included creation of allotments, orchard planting, diverse grassland buffers alongside hedgerows, and wetland features and grassland around SuDS features.

- Identify opportunities for biodiversity within the built environment. Proposals include bat 'bricks' and bat boxes, bird boxes, green walls, and tree and shrub planting within home zones and along streets;

- Provide good wildlife linkages between habitats across the proposed development and to the wider countryside thus allowing the free passage of fauna. The retention and enhancement of the hedgerow network and the River Bure and its tributary riparian corridor;

- Produce a Landscape and Ecology Conservation Management Plan highlighting how habitats and other features will be managed in the long term for biodiversity benefit;

- Identify an appropriate implementation and funding mechanism for the Landscape and Ecology Conservation Management Plan. Heads of terms have been provided within this ETBS;

- Ensure the Landscape and Ecology Conservation Management Plan incorporates an ecological review process, to ensure the conservation objectives are being met, and if required management prescriptions altered;

- Identify opportunities for the new proposed development residents to become involved with their local environment, encouraging ownership of their local environment and a greater understanding of the eco-town ethos; and

- Ensure that biodiversity gains and contributions to the local BAP process arising from the implementation of the proposed development are recorded and documented, potentially though the BARS reporting protocol.

Appendix A

Heads of terms for Landscape and Ecology Conservation Management Plan

The following heads of terms present the various elements and format that a Landscape and Ecology Management Plan is likely to include. It does not at this stage include the individual prescriptions and objectives for each habitat, but provides some generic examples.

Introduction

This will consist of an introduction to the proposed Exemplar development and the aims of the management plan.

Site Description

This will be a description of the habitats and species present on site, incorporating the development proposals outlined in the masterplan.

Evaluation

This section will be an evaluation of the habitats and species that the proposed development supports. This will include for example:

- Retained hedgerows and the River Bure and its tributary;
- New areas of tree and scrub planting;
- Diverse grassland;
- Allotments and orchard planting;
- SuDS and other wetland features;
- Green walls; and
- Bird, bat and invertebrate boxes incorporated in the managed habitat areas and the built environment.

Aims and Objectives of Management

This section will set out the broad aims and objectives for the Landscape and Ecology Management Plan and will consider each habitat type and area.

When considering the setting of management objectives, consideration will be given to involvement from the local community so that they have an ownership of their local environment and an understanding of the requirements and benefits coming from conservation management. The exact mechanism for how this may occur, together with setting of management objectives, will be discussed and agreed with the Local Planning Authority and key stakeholders before finalising the management plan.

Table 2 (below) presents an example of broad management objectives for a management compartment, the habitat features that the conservation management would aim to enhance or create, and the flora and fauna likely to benefit from this management objective. This process would be expanded to include all the 'Key habitats' and valuable features present within the proposed Exemplar development which will require conservation management.

Table 2. Management Objectives (example only)

Management Compartment	Broad management objectives	Habitat features enhanced or created and species likely to benefit
Retained hedgerow network	Objective 1 – Ensure appropriate long-term management of hedgerow network	Likely to improve habitat for invertebrates, nesting birds and foraging bat species.
	Objective 2 – Ensure hedgerows function as wildlife corridors	Will benefit a wide variety of flora and fauna species allowing movement across the Exemplar development.
	Objective 3 – Encourage and maintain a breeding bird assemblage through provision of bird boxes in appropriate areas of retained hedgerow network	Will benefit bird species
Newly created diverse grassland margins	Objective 1 – Adopt an appropriate management regime for grassland margins	Likely to benefit wild flowers and invertebrate species, providing food resource for foraging birds and bat species.
New tree and shrub planting	Objective 1- Ensure that, where applicable the new tree and scrub planting provides appropriate screening where required.	Likely to benefit invertebrates and bird and bat species.
Wetland features such as SuDS	Objective 1 - Encourage the establishment of wild flower planting around balancing ponds.	.Benefit wild flowers and invertebrate species providing additional foraging resources for other wildlife.
	Objective 2 – Encourage SuDS system to retain areas of permanent water	Will benefit amphibians and aquatic invertebrates

Prescriptions

This section would describe the management prescriptions for each management compartment in order to achieve the management objectives outlined above. The prescriptions detail the management operations that should be carried out, and provide appropriate timing for the

works. This would include retained habitats, newly created habitats and green infrastructure incorporated into the built environment.

Prescriptions would be agreed with the Local Planning Authority and other relevant stakeholders before finalising the management plan. This section would also identify the appropriate governance body and funding mechanism for implementation of the management plan.

For example:

Retained Hedgerows

Objective 1 – Ensure appropriate long-term management of hedgerow network

Prescription 1

[Draw up a long-term rotational programme of hedge-laying for all sections of hedgerow]

Lay *X*m of hedge each year on rotation.

Review

In order to assess whether management aims are being met the conservation management should be subject to regular review. The management plan should be reviewed by a suitably qualified ecologist after three years of management activity, to ensure that the broad aims and objectives are being met. Following this it is suggested that the plan is reviewed on a five yearly basis for the duration of the management plan (considered to be 10 years minimum). The actual mechanism for review of the management plan will be agreed with the Local Planning Authority and key stakeholders before finalisation. Whilst this is considered to be an appropriate time period for overall review of the management plan, the routine management prescriptions and any regular monitoring of species will provide more frequent opportunities to identify any problems with the management plan prescriptions and will allow any necessary rectifying actions to take place, should they be required.

Reporting

Another important aspect of the review process will be to highlight conservation success and monitor and record biodiversity. Consideration will be given to initiatives such as the following:

- Monitoring the contribution the proposed Exemplar development is making to national and local BAP initiatives and how this will be reported; and
- Encouraging the local community resident within the proposed development to monitor and record their local biodiversity and pass the records to local and national recording initiatives.

Management Timetable

Table 3 provides an example of the structure of a 10 year management timetable.

Management Compartment Figure or Plan

The management plan would include a large scale Landscape and Ecology Plan of the site divided into appropriate management compartments. The figure would identify areas in which management prescriptions need to occur.

This, in conjunction with the management timetable, will enable the production of a simple ‘Job Card’ for each management prescription enabling whoever undertakes management activities to have a clear understanding of what is required and when.

Table 3. Management Timetable.

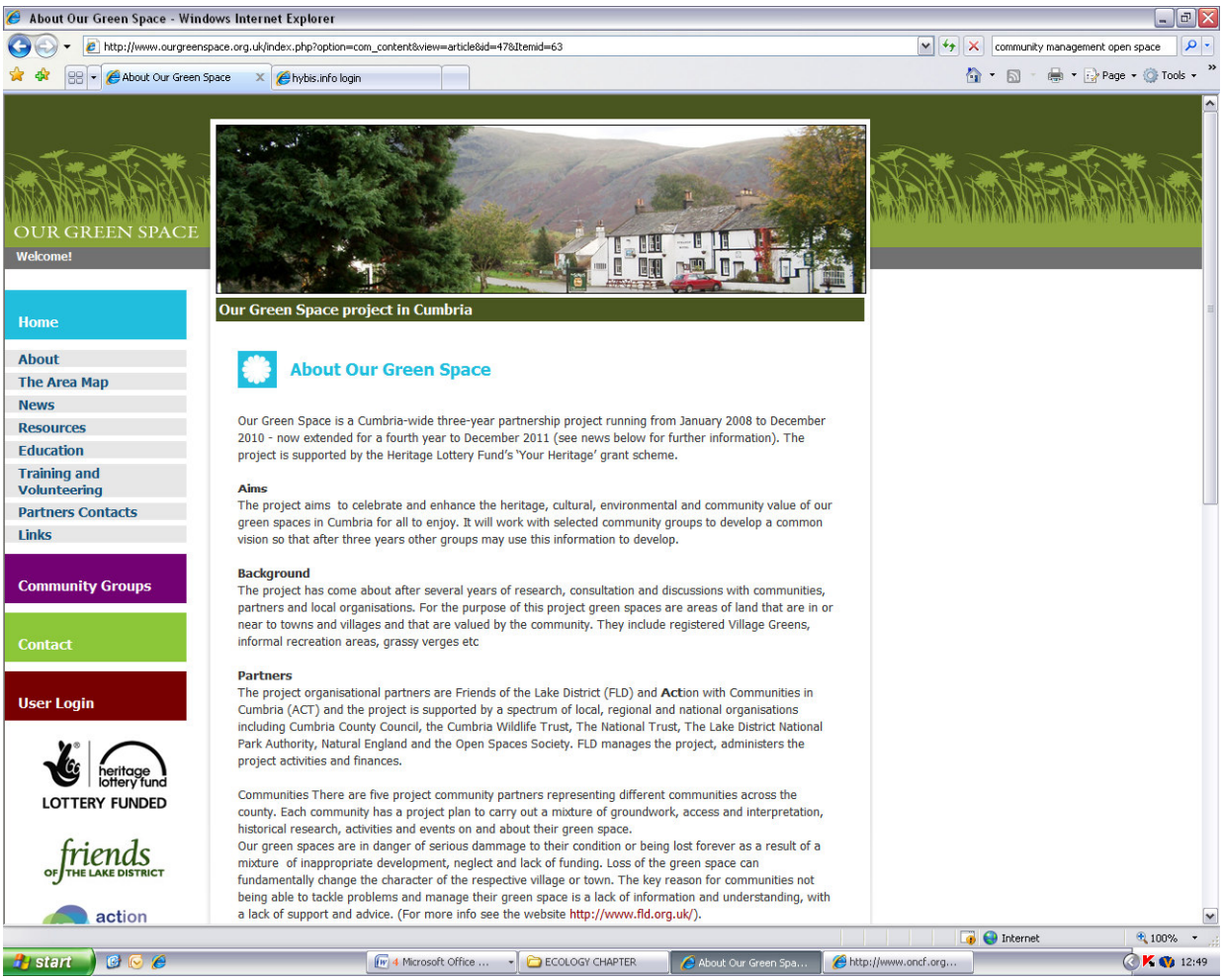
Objectives	Prescription	Timing	Year									
			1 (2010)	2	3	4	5	6	7	8	9	10
OB1 *Ensure appropriate long-term management of hedgerow network*	PR1 Lay x m of hedge each year on rotation	Nov to Feb	✓		✓	✓	✓	✓			✓	✓

Appendix B

Examples of initiatives to involve local residents in their local environment


Surveys | iSpot - Windows Internet Explorer
http://ispot.org.uk/surveys
iSpot
your place to share nature
News
Groups
Forums
Observations
Keys
Surveys
Help
Home » Content
Surveys
OPAL biodiversity survey: Take part in the biodiversity survey and uncover the diverse range of wildlife in our hedges. You'll contribute to valuable research and learn more about the importance of hedges and how you can improve them.
OPAL water survey: By taking part in the water survey, you'll help scientists learn more about how polluted our lakes and ponds actually are – something we know surprisingly little about.
OPAL air survey: The air survey is studying lichens found on trees and also looking for tar spot fungus on sycamore leaves. Both can tell us a great deal about local air quality.
OPAL soil and earthworm survey: Taking part is simple and fun. To get started, download one of our free survey packs, which include easy-to-follow instructions and a detailed earthworm identification key.
Sign up to iSpot
Search iSpot
Go
Login
Username: *
Password: *
Log in
OU users log in here
Sign in using one of these accounts
Request new password
Learn About The Open University | About us | Terms of use | Contact | Help
Home of the Biodiversity Observatory


homepage - Windows Internet Explorer
http://www.bto.org/gbw/
BTO
Garden BirdWatch
About Garden BirdWatch
Information on Birds & Gardens
Results and Maps
Garden BirdWatch Participants
Join Garden BirdWatch
BTO Homepage
Home > GBW > homepage
Search
Welcome to Garden BirdWatch
Your Options
About Garden BirdWatch
JOIN GARDEN BIRDWATCH
Latest Press Releases
GDW Online login
View maps and results
Focus on species
Postcode Birds
with Garden BirdWatch
Latest news: 15 October, 2010
ONLINE STATUS: View any reported problems.
AOL Users click here for important details....
BTO Garden BirdWatch is a year-round project that gathers important information on how different species of birds use gardens and how this use changes over time. Gardens are an important habitat for many wild birds, providing a useful refuge for those affected by changes in the management of our countryside.
Some 16,000 participants currently take part in Garden BirdWatch and send in simple weekly records of the bird species using their gardens. This information is either submitted on paper count forms or by using Garden BirdWatch Online. Each participant also supports the project financially through an annual contribution of £15. In return, they receive the quarterly colour magazine Bird Table, count forms and access to advice on feeding and attracting garden birds.
Disease in Greenfinches
Greenfinch populations in central England dropped by a third within a year of the emergence of a new disease, reports a newly published study using BTO Garden BirdWatch data.
Click here for more information.
Bird Table 63 published
Done
Internet
100%
start
12:26


About Our Green Space - Windows Internet Explorer
http://www.ourgreenspace.org.uk/index.php?option=com_content&view=article&id=47&Itemid=63
OUR GREEN SPACE
Welcome!
Home
About
The Area Map
News
Resources
Education
Training and Volunteering
Partners Contacts
Links
Community Groups
Contact
User Login
LOTTERY FUNDED
Our Green Space project in Cumbria
About Our Green Space
Our Green Space is a Cumbria-wide three-year partnership project running from January 2008 to December 2010 - now extended for a fourth year to December 2011 (see news below for further information). The project is supported by the Heritage Lottery Fund's 'Your Heritage' grant scheme.
Aims
The project aims to celebrate and enhance the heritage, cultural, environmental and community value of our green spaces in Cumbria for all to enjoy. It will work with selected community groups to develop a common vision so that after three years other groups may use this information to develop.
Background
The project has come about after several years of research, consultation and discussions with communities, partners and local organisations. For the purpose of this project green spaces are areas of land that are in or near to towns and villages and that are valued by the community. They include registered Village Greens, informal recreation areas, grassy verges etc
Partners
The project organisational partners are Friends of the Lake District (FLD) and Action with Communities in Cumbria (ACT) and the project is supported by a spectrum of local, regional and national organisations including Cumbria County Council, the Cumbria Wildlife Trust, The National Trust, The Lake District National Park Authority, Natural England and the Open Spaces Society. FLD manages the project, administers the project activities and finances.
Communities There are five project community partners representing different communities across the county. Each community has a project plan to carry out a mixture of groundwork, access and interpretation, historical research, activities and events on and about their green space.
Our green spaces are in danger of serious dammage to their condition or being lost forever as a result of a mixture of inappropriate development, neglect and lack of funding. Loss of the green space can fundamentally change the character of the respective village or town. The key reason for communities not being able to tackle problems and manage their green space is a lack of information and understanding, with a lack of support and advice. (For more info see the website http://www.fld.org.uk/).

Drawings

Drawing 7M-1 The landscape proposals

Drawing 7M-2 Figure to illustrate biodiversity losses and gains.