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1.0 INTRODUCTION

Introduction

- 1.1 This Environmental Statement (ES) is submitted as part of the outline planning application to Cherwell District Council for residential development on Land North of Gavray Drive, Bicester, Oxfordshire.
- 1.2 The outline planning application is submitted by David Lock Associates (DLA) on behalf of Gallagher Estates Ltd. The ES forms part of a suite of documents comprising a Planning and Design Statement, Transport Assessment and Report of Consultation.
- 1.3 The application site ("the site") comprises a total of around 24.5ha of land kept by Park Farm as grassland forage cut once a year for silage, and arable set aside. The outline planning application seeks consent for **residential development (including affordable housing) incorporating a County Wildlife Site, together with the land reserved for a primary school, community facilities, public open space, rail chord and structure planting**. A full description of the site and the proposed development is set out in Chapter 2.

The Need for Environmental Impact Assessment

- 1.4 The Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999¹ ("the Regulations") require that before consent is granted for certain types of development, an environmental impact assessment must be undertaken. The Regulations are pursuant to European Directive No. 85/337/EEC as subsequently amended by Directive 97/11/EC which came into force on 14 March 1999.
- 1.5 The Regulations includes two schedules which specify the circumstances in which Environmental Impact Assessment (EIA) may be required: those development which must always be subject to Environmental Impact Assessment (Schedule 1 Development) and other developments which may require assessment if they give rise to significant environmental effects. "Urban development projects" of over 0.5 hectares (Schedule 2 Development).

¹ Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999 (SI No.293)

- 1.6 Schedule 3 to the regulations describes the criteria for determining whether a Schedule 2 development should in fact be subject to environmental impact assessment, the determining factor being whether the development, as proposed, is likely to give rise to significant environmental effects as a result of the development.
- 1.7 No screening opinion has been sought from the Local Planning Authority, Cherwell District Council, to determine whether an environmental impact assessment is required. However, although the location for the project is not considered to be within an environmentally sensitive location, in view of the scale of the project, it is considered prudent to undertake an EIA and to prepare an ES.

Scoping Assessment

- 1.8 The Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999 sets out the information to be included in an Environmental Assessment. The purpose of the process is to assess the main or the significant environmental effects. Each assessment is to be prepared “on a realistic basis and without unnecessary elaboration”²
- 1.9 Regulation 10 of the 1999 regulations provides for potential applicants to ask the local planning authority to state in writing the information that ought to be provided in an ES.
- 1.10 Based on background work and consultations a Scoping Outline was prepared by the applicants and submitted to the local planning authority on 24th February 2004. The scope set out by Cherwell District Council (CDC) in correspondence of 12-03-04, 02-04-04 and 30-04-04 have been taken into account in the EIA process.

² Para 82, Circular 2/99, “Environment Impact Assessment”, DETR

Structure of the Environmental Statement

1.11 The ES has been structured in accordance with best practice guidance produced by the former Department of the Environment³, the Department of Transport and the Regions⁴ and the Institute of Environmental Management and Assessment⁵. In accordance with the guidance, the ES comprises the following documents:

Non Technical Summary: Published separately, providing a concise non-technical explanation of the contents and conclusions of the ES.

Environmental Statement Volume 1 (this document): setting out the assessment methodology and the likely impacts and mitigation strategies for each topic addressed; together with the figures (at the back of the document) and tables.

Environmental Statement Volume 2: Technical Appendices – background technical data and plans used in the assessments by specialist consultants.

1.12 In order to meet the requirements of the regulations, taking account of the nature of the application site and the application proposals, the following topics have been addressed in the course of the assessment:

- Agriculture Land Classification and Farming
- Arboricultural Impact
- Landscape and Visual Amenity
- Ecology
- Hydrology
- Air Quality
- Noise
- Archaeology and Cultural Heritage
- Transport
- Socio Economic
- Services and Utilities

³ "Preparation of Environmental Statements for Planning Projects that require Environment Assessment: A Good Practice Guide", DOE, 1995.

⁴ "Environment Impact Assessment: A Guide to Procedures", DETR, Feb 2001.

⁵ Guidelines for Landscape and Visual Impact Assessment", IEMA, 2002

1.13 Each technical chapter is structured in a common format, as follows:

- an **introduction**;
- a description of **methodology**;
- a summary of **baseline conditions** and survey results (if appropriate);
- a description of the **predicted impacts** of development during construction and in operation;
- a description of mitigation proposed to reduce the potential impacts of development; and
- a description of the anticipated residual impacts of development.

Assessment Techniques

1.14 The effects are assessed according to four criteria:

- geographical significance – whether the impact is of local, district or regional significance;
- the nature of impact;
- the significance of impact; (see below); and
- duration of impact – whether the impact is temporary or permanent.

The impact that were considered to be potentially significant prior to mitigation have been identified in the ES. The significance of impacts reflects judgements on the importance or sensitivity of the affected receptor(s) and the nature and magnitude of the predicted changes.

Evaluation of Significance

1.15 The following terms have been used to describe the significance of impacts, where they are predicted to occur:

Major positive or negative impact – where the development would cause a significant deterioration or improvement to the existing environment. These impacts are likely to be important considerations in the planning process, depending upon the scale and relative importance attached to the issues in planning policy and development plan terms.

Moderate positive or negative impact – where the development would cause a noticeable deterioration (or improvement) to the existing environment. Adverse effects of this kind are not likely to require design changes. Mitigation measures and design changes are likely to remove some but not all of the adverse effects upon the affected interest.

Minor positive or negative impact – where the development would cause a barely perceptible deterioration (or improvement) to the existing environment. Adverse impacts of this nature are not key issues.

No change or neutral effect/impact- no discernible deterioration or improvement to the existing environment.

- 1.16 Each chapter will also include a summary matrix outlining the results of the assessment process having taken into account the mitigation measures proposed as part of the application.

The Assessment Team

1.17 The assessment team comprises the following specialists:

David Lock Associates	co-ordination of ES; development planning; master planning and urban design; application site and project description; policy framework & development of proposals; socio economic assessment.
Arup	air quality; and noise.
Colin Buchanan & Partners	transportation.
CPM	agricultural land classification; arboricultural impact; landscape and visual amenity; ecology and archaeology and cultural heritage.
Gallagher Estates Ltd	services and utilities.
JBA Consulting	hydrology.

Public Comment

1.18 A copy of this ES and Non Technical Summary is available to view at the following location during normal office hours:

Planning and Development Services
Cherwell District Council
Bodicote House
Bodicote
Oxfordshire
OX15 4AA

Copies of the ES and Appendices can be purchased from:

David Lock Associates
50 North Thirteenth Street
Central Milton Keynes
Buckinghamshire
MK9 3BP

- 1.19 Copies of the Non-Technical summary and an CD with the ES and application and supporting documents are available from the same address, subject to availability.
- 1.20 Written comments on the ES should be made to the planning department at Cherwell District Council** at the address set out above and will be taken into account as part of the consideration of the planning application.

2.0 APPLICATION SITE AND PROJECT DESCRIPTION

Outline Planning Application

- 2.1 The total area of Land North of Gavray Drive extends to some 24.5 ha.
- 2.2 The site is located in the south eastern quarter of Bicester. It is bounded by Gavray Drive to the south the Birmingham to Marylebone rail line (Chiltern Line) to the north, the Oxford to Bletchley railway line to the west and Bicester's eastern bypass to the east. Beyond Gavray Drive to the south, residential development has recently been completed at Langford Village and Bicester Fields Farm. Bicester town centre is located approximately 1.3km to the west of the western boundary of the site offering a range of retail, commercial, employment and residential activities. North of the Birmingham to Marylebone rail line is the Bicester Distribution Park which comprises large footprint B8 distribution units.
- 2.3 Gallagher Estates Ltd control the application site.

Existing Uses

- 2.4 The site is currently in agricultural use (arable set aside). The farmer rents the land as part of a partnership from the trustees on an annual tenancy agreement. There are no structures on the site. There are two public rights of way crossing the site and the site is also used as an area for dog walking and informal recreation.

Topography

- 2.5 The site is level, as is land to the east, west and south. A railway embankment approximately 10 metres high forms the northern boundary of the site, carrying the Birmingham to Marylebone rail line.

Landscape Character

- 2.6 The landscape character of the area is categorised by the Countryside Agency as being 'Upper Thames Clay Vales'. Urban development comprising light industry and employment areas are a dominant feature along the eastern edges of Bicester, following the main transport routes of the A4095 (Gavray Drive) and Birmingham to London railway line.

Ecology

- 2.7 The site supports a number of statutorily protected and/or notable species including plants, reptiles, amphibians, bats, birds and invertebrates. The Development Framework Plan (**Figure 102**) has been developed through an iterative process in order to accommodate as much of the habitat and species interest as possible.

Archaeology and Historic Buildings

- 2.8 There are no scheduled ancient monuments or historic buildings within or adjoining the site.

Public Access

- 2.9 Two public footpaths link Langford Village with the village of Launton and Langford Village with Bicester Distribution Park. These footpaths pass through the site and will be retained as part of the development.

Outline of the Development Proposal

- 2.10 The planning application is described in full detail and in the Planning and Design Statement that accompanies the application. In summary, the proposals are for ***residential development (including affordable housing) incorporating a County Wildlife Site, together with the land reserved for a primary school, community facilities, public open space, rail chord and structure planting.***
- 2.11 The proposals are set out in the Development Framework [**Figure 102**], which is to be approved as part of the planning application
- 2.12 Provision is also made for the retention of important ecological features including trees subject to Tree Preservation Orders (TPOs), water features and strategic landscaping (such as landscape and ecological corridors associated with hedgerows and along the eastern boundary of the site between the proposed residential development and Bicester eastern by-pass).

Housing Mix

- 2.13 The application comprises provision of some 500 dwellings; although the precise mix of dwellings is not specified, it will include a range of sizes and tenures. A significant proportion of smaller units will be provided as well as family housing, flats and sheltered accommodation.
- 2.14 Around 30% of all dwellings will be provided as affordable units, as required by the Revised Deposit Draft Local Plan. The affordable housing element will include social rented housing, subsidised home ownership (including shared ownership), key worker housing and low cost market housing. Consideration may be given to other appropriate tenures in agreement with the local planning authority.

Education

- 2.15 Land has been reserved within the application site for provision of a primary school.

Open Space and County Wildlife Site

- 2.16 The development will retain a number of areas of open space and a County Wildlife Site (CWS) (as agreed by Oxfordshire County Council).

Children's Play Space

- 2.17 The application proposals make provision for children's play space, broken down into Local Areas for Play which the NPFA standards characterise as very localised areas for young children within the residential areas.

Public Transport Accessibility

- 2.18 The development has been designed to ensure that it can be accessed by public transport.

Access and Circulation

- 2.19 Vehicular and pedestrian access to the site will be gained via the existing access points along Gavray Drive.

Objectives and Justification

- 2.20 The proposal is being promoted as a sustainable residential development, assisting in strategic housing delivery within Bicester. If planning permission is granted expeditiously the development can be delivered between 2006 and 2013. The comprehensive development of the site will also facilitate delivery of an enhanced CWS.
- 2.21 The development framework is based on an organic structure, embracing the ecological constraints of the site while providing a framework for a sustainable community.

Consideration of Alternatives

- 2.22 The principal of the development on Land North of Gavray Drive has been established since its allocation for employment use in 1987. The employment designation was maintained in the Deposit Draft Local Plan (December 2000). In response to representations to the Deposit Draft Land North of Gavray Drive was allocated for a residential led development with ancillary education and transport uses in the Revised Deposit Draft Local Plan (September 2002). The principal of development has therefore been subject to district-wide public inquiry between November 1993 and April 1994.
- 2.23 The current proposal broadly follows the development principles for Gavray Drive set out in that version of the plan. During the course of the Local Plan review only three major development areas have been considered by the district. Only Gavray Drive has been consistently identified for development in all versions of the local plan review. During this exhaustive process no acceptable alternative development site has been identified.

Design Philosophy

- 2.24 The Planning and Design Statement that accompanies the planning application sets out the basic design principles that have underpinned the development proposals and the Development Framework Plan. Key development principles are described below.
- 2.25 In physical terms the following is envisaged:
- a fine grained network of “streets” to promote easy access and activity, minimising distances travelled and promoting walking and cycling;

- effective protection of the environment;
- prudent use of resources; and
- promotion of economic well being and high standards of living.

Project Implementation

2.26 Land North of Gavray Drive will be implemented as a single coherent development. The development would continue to support the residential development of Langford Village and associated services. The development of the site would also assist with housing supply within the District and bring forward improvements to the CWS.

Site Management and Adoption

2.27 Gallagher Estates will act as town developer. This role requires a long term commitment that only substantial development companies can provide and sustain. Working in close consultation with the local planning authority, the town developer will be responsible for implementing a high quality development in accordance with the Development Framework. The town developer will fund and construct all infrastructure requirements and resolve related planning obligations. Gallagher Estates will place emphasis upon:

- quality of the built form;
- provision of the infrastructure;
- an inclusive approach to consultation and local involvement in the management of community assets; and
- long term management arrangements to maintain long term development quality.

Construction Programme

2.28 The construction programme will follow a logical phased release of land. A construction management programme will be prepared when detailed applications are submitted.

3.0 POLICY FRAMEWORK AND DEVELOPMENT OF PROPOSALS

Introduction

- 3.1 This section of the ES sets out the planning policy framework relating to the proposed development. All relevant policy guidelines have been taken into account in the formation of the development proposals for the site. More detailed consideration of planning policy relevant to the outline planning application is included within the accompanying Planning and Design Statement.

Assessment Method

- 3.2 For the purpose of the EIA, an appraisal of the general conformity of the proposals with the national regional and local planning policy framework has therefore been undertaken.

National Planning Policy

- 3.3 The following national planning policy documents have been reviewed:

- Draft PPS1 Creating Sustainable Communities (2004)
- PPG1 General Policy and Principles (1997)
- PPG3 Housing (2000)
- PPS7 Sustainable Development in the Countryside (2004)
- PPG9 Nature Conservation (1994)
- PPG13 Transport (2003)
- PPG16 Archaeology and Planning (1990)
- PPG17 Planning for Open Space, Sport and Recreation (2002)
- PPG24 Planning and Noise (1994)
- PPG25 Development and Flood Risk (2001)

A number of circulars have also been reviewed

- 3.4 National planning policy is set out in a series of Planning Policy Guidance Notes and Planning Policy Statements published by the Government. They provide guidance on specific topic areas, some of which relate to the proposed development at Land North of Gavray Drive, as set out below.

Draft Planning Policy Statement 1: General Policy and Principles

- 3.5 PPS1 seeks the protection and enhancement of the environment through positive policies on issues such as design to help to mitigate adverse effects on environmental quality. Part of Paragraph 1.22 states that Planning policies should seek to bring forward sufficient land of a suitable quality in the right locations to meet the expected needs for housing, for industrial development, and for retail and commercial development to provide for growth and consumer choice, taking into account accessibility and sustainable transport needs and the provision of essential infrastructure.

Planning Policy Guidance 1: General Policy and Principles

- 3.6 PPG1 emphasises the concept of sustainable development as the basis for national planning policy. Paragraph 4 of PPG1 states that sustainable development seeks to deliver (both now and in the future) economic development to secure higher living standards while protecting and enhancing the environment. Paragraph 5 of PPG1 recognises the important role of the planning system in regulating the development and use of land in the public interest.

Planning Policy Statement 7: Sustainable Development in Rural Areas

- 3.7 PPS7 sets out the national policies specific to development in rural areas. Part of the PPS's aim is to promote more sustainable patterns of development, in particular:
- *focusing most development in, or next to, existing towns and villages;*
 - *preventing urban sprawl;*
 - *discouraging the development of 'greenfield' land, and, where such land must be used, ensuring it is not used wastefully;*
 - *promoting a range of uses to maximise the potential benefits of the countryside fringing urban areas; and*
 - *providing appropriate leisure opportunities to enable urban and rural dwellers to enjoy the wider countryside.*

- 3.8 With regard to development in relation to best and most versatile land, agricultural land classification grades, 1, 2 and 3a are still recognised as the key categories. PPS7 includes some new advice on the identification of any major areas of agricultural land that are planned for development in the Local Plan. PPS7 advocates that Local Planning Authorities may wish to include policies in their plan to protect specific areas of best and most versatile land from speculative development.

Planning Policy Guidance 3: Housing

- 3.9 PPG3 echoes and expands upon the sustainable development objectives of PPG1. A key objective of PPG3 is to maximise the efficient use of land and to encourage the re-use of previously developed land in favour of greenfield sites. Circular 01/02 The Town and Country Planning (Revised Density) (London and South East England) Direction 2002 was published following the Deputy Prime Ministers statement on 18 July 2002 announcing the Government's intentions for tackling the housing shortage in London and South East. The statement confirmed that the Deputy Prime Minister would intervene in planning applications for housing that involve a density of less than 30 dwellings per hectare.
- 3.10 The net density of development of Land North of Gavray Drive will be an average of 35 dwellings per hectare, in accordance with PPG3 and Circular 01/02. The net density has also been calculated including the open space and associated circulation space (this calculation does not include the CWS). The development will also include a range of dwelling types and densities in accordance with the character areas as defined in the development framework.
- 3.11 Annex A to PPG3, titled 'Proposed change to planning policy for reallocating employment and other land to housing' identifies the reallocation of land for employment and other uses to that of housing (Currently in draft form). The full text to Paragraph 42 and Paragraph 42a are set out below:

Paragraph 42

Some local planning authorities have allocations of land for employment and other uses, which cannot realistically be taken up in the quantities envisaged over the lifetime of the development plan. Equally, since planning policies may have changed since some of this land was designated for particular land uses, it is possible that the designation is no longer compatible with policy set out in current PPGs. The Government regards this as a wasted resource, especially where such site include previously-developed land. Local planning

authorities should therefore review all their non-housing allocations when reviewing their development plan and consider whether some of this land might better be used for housing or mixed use developments.

Paragraph 42a

Applicants for planning permission for development that includes housing should be able to expect expeditious and sympathetic handling of planning proposals which concern land allocated for industrial or commercial use in development plans but which is no longer needed for such use, or redundant industrial or commercial buildings. This is particular the case where local planning authorities have yet to complete the review referred to in paragraph 42 above. Local planning authorities should consider such planning applications favourably unless:

- The proposal's fails to reflect the policies in this PPG, particularly those relating to a sites suitability for development and the presumption that previously-developed sites should be developed before greenfield sites;*
- The housing development would undermine the planning for housing strategy set out in RPG or the development plan where this is up-to-date, in particular if it would lead to over-provision of new housing where this will exacerbate, or lead to, low demand.*
- It can be demonstrated, preferably through an up-to-date review of employment land, that there is a realistic prospect of the allocation being taken up for its stated use in the plan period or that its development for housing would undermine regional and local strategies for economic development and regeneration.*

Planning Policy Guidance 9: Nature Conservation

- 3.12 PPG9 published in 1994, outlines the Government's commitment to the conservation of wildlife and natural features. It is mainly concerned with the protection of statutorily designated sites, although PPG9 also seeks to ensure that planning policies minimise any adverse effects on wildlife. The policies and guidance within PPGs are a material planning consideration.

Planning Policy Guidance 13: Transport

- 3.13 PPG13 states that planning and transport should integrate at the national, regional, strategic and local level in order to:
- promote more sustainable transport choices;
 - promote accessibility to jobs, shopping, leisure facilities and services by public transport, walking and cycling; and
 - reduce the need to travel, especially by car.

Planning Policy Guidance 16: Archaeology and Planning

- 3.14 PPG16 sets out the policy on archaeological remains and how they should be preserved or recorded. The guidance acknowledges that it is not always feasible to save all archaeological remains but that *“where nationally important archaeological remains, whether scheduled or not, and their settings, are affected by proposed development there should be a presumption in favour of their physical preservation”*.
- 3.15 To reduce the potential conflict between the needs of archaeology and planning, developers are recommended to discuss their preliminary plans for development with the planning authority at an early stage. A desk based evaluation of existing information should then be undertaken and *“where early discussions with local planning authorities or the developer’s own research indicate important archaeological remains exist, it is reasonable for the planning authority to request the prospective developer to arrange for an archaeological field evaluation to be carried out”* (para 21).
- 3.16 The archaeology and cultural heritage assessment, as reported under Chapter 11 of this ES confirmed that Archaeological investigation or preservation by record is the proposed mitigation for the scheme. This will be secured by a PPG16 planning condition. Archaeological mitigation in the form of preservation *in situ* of archaeological remains is proposed for the CWS and areas of open space within the Development Framework. Following mitigation there will be no residual impacts on archaeological remains.

Planning Policy Guidance 17: Planning for Open Space, Sport and Recreation

- 3.17 PPG17 sets out that well designed and implemented planning policies for open space, sport and recreation are fundamental to delivering broader Government initiatives. The aspects covered in the guidance include guidance for the planning system on 'maintaining an adequate supply of open space and sports and recreation facilities' and 'planning for new open space and sports recreational facilities'. The proposed development, as set out in detail in Chapter 2 will deliver open space to serve both the development and the wider area, through the CWS. There will also be the provision of children's play areas in accordance with local policy.

Planning Policy Guidance 24: Planning and Noise

- 3.18 PPG24 is the principal guidance adopted in the UK for assessing the impact of noise on proposed developments. The guidance sets out that for residential development, there are four Noise Exposure Categories (NEC's), ranging from NEC A, where noise need not normally be considered in determining planning applications, to NEC D where planning permission should normally be refused on noise grounds. Chapter 10 of this ES sets out the consideration of the noise exposure for all the proposed development.

Planning Policy Guidance 25: Development and Flood Risk

- 3.19 PPG25 was published in July 2001 to explain how flood risk should be considered at all stages of the planning and development process in order to reduce future damage to property and loss of life. In preparing proposals, applicants are advised to consult the Environment Agency on the potential risk their development, the likely effects of their proposals on flood risk to others and whether mitigation would be likely to be effective and acceptable. Chapter 08 of this ES sets out the consideration of flood risk arising from the development of Land North of Gavray Drive Phase 1 in accordance with the requirements of PPG25.

Regional Planning Guidance: South East (RPG9)

- 3.20 Regional Planning Guidance for the South East was approved by the secretary of state for the Environment, Transport and the Regions in March 2001. It covers the period up to 2016. The primary purpose of RPG9 is provide a regional framework for the preparation of local authority development plans.

- 3.21 Key principals of RPG9 include:
- The use of urban areas as the main foci for development
 - The provision of sufficient housing, especially affordable housing for all who need to live or work in the region; and
 - The planning of development to enable more sustainable use of transport facilities and natural resources.
- 3.22 The guidance identifies that an additional 23,000 households should be accommodated with the South East on an annual basis, of which 2,430 are to be located within Oxfordshire.

Oxfordshire Structure Plan

- 3.23 The adopted Structure Plan incorporates the overriding principle of sustainable development and subsequently outlines the following broad aims to:
- protect and enhance the environment and character of Oxfordshire;
 - provide for development to meet the economic needs of the county's residents and local businesses;
 - provide for the construction of sufficient new dwellings of Oxfordshire's people;
 - encourage the efficient use of energy and avoid the wasteful use of land and other natural resources;
 - help reduce pollution and emission of greenhouse gases by reducing the need to travel and encouraging more of the trips which are made on foot, by cycle and by public transport.
- 3.24 Oxfordshire's Structure Plan to 2011, adopted in 1998, makes provision for 35,000 additional dwellings between 1996 and 2011. Cherwell District's share of the allocation is 11,250. The Oxfordshire Structure Plan 2016 Deposit Draft was published for public consultation in September 2003. The draft Plan sets out proposals and policies for development upto 2016 and also includes the County Councils views on where development might take place after 2016.
- 3.25 The Oxfordshire Structure Plan 2016 Deposit Draft proposed the provision of 36,500 net additional dwellings between 2001 and 2016. This is consistent with the recommendation in Draft Revised RPG9 that 2,430 dwellings per year be provided during the period 2001 to 2006. In the absence of regional guidance for the period beyond 2006 the RPG9 building rate for 2001 to 2006 has been applied for the whole Structure Plan period.

3.26 Development during the draft Structure Plan period will be focussed on the County's larger towns. Development currently planned in the adopted Structure Plan will continue. The distribution of proposed new dwellings during the period 2001-2016 is:

Table 3.1 Distribution of New Dwellings between 2001-2016

District	No: Dwellings
Cherwell	9,250
Oxford	5,500
South Oxfordshire	8,500
Vale of White Horse	6,750
West Oxfordshire	6,500

3.27 The Deposit Draft Structure Plan indicates that one of the main locations for new housing should be within Bicester (about 3,200 dwellings). The draft plan also includes a target of 55% of new homes to be built on previously developed land within urban areas or through conversions of existing buildings. This target is lower than the 60% Government target for the South East and reflects the fact that the level of urbanisation in Oxfordshire is lower than in other parts of the region.

3.28 The draft plan also considers the location of development beyond 2016. The draft plan considers that for the period after 2016 there could be further development at Bicester, Didcot and Grove. Bicester is proposed as the main growth location in the north of the County and there is an opportunity to provide an additional 3,000 to 4,000 new dwellings in the town in the ten to fifteen years after 2016.

3.29 Chapter 5 in the Deposit Draft Structure Plan identifies policies that seek to protect and preserve the natural environment. The following policies have specifically been taken into consideration when preparing the development framework.

- Policy EN1
- Policy EN5
- Policy EN6
- Policy EN7

3.30 The policies identified above seek to protect and enhance areas of ecological importance. Policy EN1 seeks to protect landscape character, Policy EN5 protects and seeks to enhance nationally important designations. Policy EN6 seeks to promote management agreements and opportunities to create new habitats. Policy EN7 protects woodlands, hedgerows and other ecological features.

South East Plan

3.31 On the 29th November 2004 SEERA published a Draft South East Plan. The South East Plan is being prepared by SEERA and seeks to set a vision for the region up and until 2026.

3.32 The South East Plan identifies six key issues for the Central Oxfordshire Sub region. This are: The key issues of particular significance for the sub-region include:

- the unique potential of the sub-region's dynamic and innovative economy, including its role as an international centre for education and innovation;
- congestion on road and rail, and the need to strengthen the public transport network, and promote alternatives to car and lorry traffic;
- requirements for physical, social and economic infrastructure to address historic backlogs in provision and to provide for new economic and housing growth;
- the need to improve housing availability and affordability;
- the character and setting of the city of Oxford and potential constraints to development posed by the Oxford Green Belt;
- the need to accommodate development in a sustainable way, meeting social and economic needs while protecting and enhancing the quality of the environment and ensuring the wise use of resources.

3.33 The sub- regional Strategy Steering Groups, charged with the responsibility of preparing a number of options for growth considered two broad spatial options:

- Option A – Development of larger settlements beyond the Green Belt; and
- Option B – Urban extensions to Oxford.

3.34 Option A is identified in paragraph 2.6

“Focusing growth at the towns of Bicester in the north of the sub-region and Didcot (and potentially at Wantage/Grove) in the south. These towns and surrounding areas are regarded as being relatively free of physical constraints, well located and served for transport connections, having potential to generate employment, and benefiting through greater and better planned investment in infrastructure. However, housing growth in these areas could also lead to growth in commuting from these towns, especially by car, if not matched by employment opportunities. This option would reflect the existing strategy of the Oxfordshire Structure Plan”.

Cherwell District Local Plan

3.35 The full council voted to abandon the Review of the Cherwell District Local Plan on 13-12-04. Therefore the adopted Cherwell Local Plan (November 1996) remains the development plan for the district and the Deposit Draft, Revised Deposit Draft and the Pre-Inquiry Changes will be a material consideration when deciding planning applications.

The Adopted Local Plan

3.36 The adopted Local Plan allocates the site for an employment led development with three main elements:

- committed site for employment generating development;
- proposed site for employment generating development (Policy EMP1 and EMP2); and
- recreational purposes.

3.37 Policy EMP1 states

**POLICY EMP1
EMPLOYMENT GENERATING DEVELOPMENT WILL BE PERMITTED ON
THE SITES SHOWN ON THE PROPOSALS MAP, SUBJECT TO THE
OTHER RELEVANT POLICES IN THE PLAN.**

- 3.38 A proportion of the site, that which is located within the current CWS is designated as Informal Open Space. The adopted Local Plan also makes provision for a linear park.
- 3.39 There are two public footpaths which cross the site. It is the Council's policy (Policy R4, 'Rights of Way and Access to the Countryside') to protect and enhance these public access routes. Policy R4 states

POLICY R4

THE COUNCIL WILL SAFEGUARD THE EXISTING PUBLIC-RIGHTS-OF-WAY NETWORK. DEVELOPMENT OVER PUBLIC FOOTPATH WILL NOT NORMALLY BE PERMITTED

Deposit Draft Local Plan

- 3.40 The Deposit Draft Local Plan, published in February 2001 broadly designates land north of Gavray Drive for employment generating development. The Proposals Map allocates the following land uses on Land north of Gavray Drive:

- proposed site for employment generating development;
- proposed multi modal transport interchange;
- proposed new or improved road; and
- proposed recreational use.

Revised Deposit Draft Local Plan

- 3.41 The Revised Deposit Draft Local Plan, published in September 2002 broadly designates land north of Gavray Drive for a residentially led development. The proposals maps identify the following land uses on the land north of Gavray Drive:

- proposed housing site;
- proposed primary school;
- proposed community facilities
- proposed multi modal transport interchange
- proposed new or improved road
- strategic footpath cycleway link
- proposed recreational use

Pre Inquiry Changes

3.42 In June 2004, Cherwell District Council published the Pre-Inquiry Changes to the Revised Deposit Draft Local Plan. Since publication of the Revised Deposit Draft Local Plan (September 2002), the Council have sought significant changes to the plan. The Pre-Inquiry Changes identify Land North of Gavray Drive for the following uses:

- an employment led allocation (Use class B1 and B2);
- land reserved for proposed recreational use and a retained CWS;
- land reserved for a proposed multi modal transport interchange;
- land safeguarded for connecting rail line (rail spur);
- A new road linking Launton Road with Gavray Drive and a strategic footpath;

The Pre-inquiry changes have now been adopted for DC purposes.

Consideration of Local Policy

3.43 The development framework plan has considered Local Plan policies; in particular those which seek to preserve and enhance the natural environment.

3.44 Policies with regard to 'conserving and enhancing the environment' which have been specifically taken into consideration in the development of the framework include Policies EN1, EN13, EN14, EN22, EN23, EN24, EN25, EN27, EN34, EN35, EN36. Policy EN1 states that the council will take into account the likely impact of a proposal on the built and natural environment. The policy also states that development which would have an unacceptable environmental impact will not be permitted.

3.45 Policy EN13 and EN14 consider the impact development will have on river corridors and flood risk. Whilst Policy EN14 prevents development within the floodplain Policy EN13 promotes the protection of watercourses, identifying that development proposals adjacent to watercourses should:

- conserve existing areas of value and wherever possible restore the natural elements within corridors and margins;
- not have an adverse impact on nature conservation, fisheries, landscape, public access or water related activities;
- promote appropriate public access;
- make adequate provision for buffer zones.

- 3.46 Policy EN22 and EN24 promote the incorporation of nature conservation features within the site and seek to limit the damage caused by development on sites within or near sites of ecological interest. Identifying that features of value should be retained and enhanced wherever possible. Policy EN22 is supported by Policy EN23 which requires developments which may affect a known or potential site of nature conservation to submit an ecological survey to establish the likely impact on the nature conservation resource (see Chapter 07).
- 3.47 Policy EN25 seeks the protection of species under schedule 1, 5 and 8 of the 1981 Wildlife and Conservation Act, and by the E.C. Habitats Directive 1992. Policy EN27 promotes the creation of new habitats and the interests of nature conservation within the context of new development. It states that it will 'establish or assist with the establishment of ecological and nature conservation areas where such areas would further the opportunity for environmental education and passive recreation'.
- 3.48 Policies EN34, EN35 and EN36 seek to protect and enhance the landscape character of the district. Policy EN34 seeks to conserve and enhance the character and appearance of the landscape through the control of development. Policy EN35 seeks the retention of woodlands, trees, hedges, ponds, walls and any other features which are important to the character or appearance of the local landscape as a result of their ecological, historic or amenity value. The policy then states 'proposals which would result in the loss of such features will not be permitted.
- 3.49 Policy EN36 further supports the implementation of additional woodlands, trees and hedgerows, identifying that the Council seeks opportunities to secure the enhancement of the character and appearance of landscape, particularly in urban fringe locations.
- 3.50 Chapter Seven of the Revised Deposit Draft Local Plan supports the inclusion, provision and protection of recreation and community facilities. Policy R3 identifies the council's aspiration to establish a series of open spaces in Bicester linked by public footpaths/ cycleways with the intention of creating a circular route through the town, further identifying that development that would prejudice this objective will not be permitted. This is followed through in Policy R4 which safeguards, and where possible seeks to enhance existing public rights-of-way.
- 3.51 The provision of public outdoor recreation playing space is identified in Policy R8. Cherwell District Council adopted the National Playing Fields 6 Acre standard, stating that for a population of 1,000 developments must accommodate 2.43ha (6 Acres) of

outdoor recreation space. Supporting paragraph 7.50.1 of the Revised Deposit Draft identifies the Council's supplementary guidance note entitled 'Recreation and Amenity Open Space Provision- A Guide.

- 3.52 In addition to the inclusion of outdoor recreation space the council seek for the inclusion of amenity areas which should be designed as an integral part of the development and, where possible, compliment and enhance neighbouring land.

Supplementary Planning Guidance

- 3.53 Other relevant documents published by the council include:
- Cherwell District Landscape Assessment, Cobham Resource Consultants, November 1995 - see Volume 2: Technical Appendices Landscape and Visual Amenity Technical Appendix;
 - Recreation and Amenity Open Space Provision, The Provision of Open Space in new Development: Guidance Note, Consultation Draft, December 2003;
 - Urban Design Strategy (Banbury, Bicester and Kidlington), Cherwell District Council, Roger Evans Associates, Hillier Parker, 1996; and
 - Delivering the Vision, A Housing Strategy for Cherwell to 2005, Cherwell District Council.

This guidance has been referenced throughout the assessment and used to influence the scheme design and mitigation proposals.

Summary of Evaluation

- 3.54 The Development Framework Plan and the planning application are in accordance with national planning policy, including, in particular key objectives relating to residential development set out in PPG3 and PPG13;
- 3.55 Paragraphs 3.102 of the Revised Deposit Draft Local Plan (September 2002) supporting Policy H12a which allocated land north of Gavray Drive as a residential allocation states

"It is intended that this area will be developed so that it will be integral with the existing Langford Village and Bicester Fields Farm developments to the south"

4.0 AGRICULTURAL LAND CLASSIFICATION & FARMING

Introduction

- 4.1 This chapter provides an assessment of the agricultural land quality and farming circumstances of land north of Gavray Drive, Bicester. CPM Environmental Planning and Design Limited (CPM) were commissioned by Gallagher Estates Ltd to undertake this report.
- 4.2 This agricultural land classification of land at Gavray Drive, Bicester is consistent with the approach set out in Planning Policy Statement 7 (PPS7): Sustainable Development in Rural Areas.
- 4.3 Accordingly, this agricultural assessment has involved:
- (i) The study of published information on climate, geology, soils and Ministry of Agriculture, Fisheries and Food (MAFF) provisional Agricultural Land Classification (ALC).
 - (ii) On-site verification of ALC Grades assessment by CPM.
 - (iii) An appraisal of the farming circumstances at the site and the potential impacts of future development on the farming circumstances.
 - (iv) In June 2001, the new Department for Environment, Food and Rural Affairs (DEFRA) took over all of the responsibilities of the former MAFF. As many of the relevant government publications are still in MAFF's name, MAFF has not been substituted by DEFRA in this document.

Potential Impacts

- 4.4 Built development on a greenfield site results in permanent loss of any agricultural land within it, both to the occupying farm business and to the national agricultural resource of farm land.
- 4.5 In addition to the land resource, farmland also comprises a soil resource. The uppermost (topsoil) horizon is of particular value as it is typically enriched with organic matter and more fertile. Being the surface horizon, topsoil is also the most vulnerable to structural damage, erosion and contamination. Soil may be recovered and relocated for beneficial reuse in another location. However, such handling may result in losses of soil material and quality so that it is no longer able to perform the same economic or environmental function.
- 4.6 In addition to any direct loss of land, the soil and any agricultural resource contained within it, development may have an impact upon adjoining land use. Agricultural land uses can be affected by development of neighbouring land, for instance the fragmentation of farm units, trespass originating from residential development or disruption of land drainage.

Policy Content

- 4.7 Policy relating to development in rural areas was previously set out in Planning Policy Guidance Note 7 (PPG7): The Countryside - Environmental Quality and Economic and Social Development (Feb 1997), as amended in March 2001. This has now been superseded by PPS 7.
- 4.8 PPS7 closely reflects much of the previous PPG7 guidance. With regard to development in relation to best and most versatile land, agricultural land classification Grades 1, 2 and 3a are still recognised as the key categories. PPS7 includes some new advice on the identification of any major areas of agricultural land that are planned for development in the Local Plan. PPS7 advocates that Local Planning Authorities may wish to include policies in their plan to protect specific areas of best and most versatile land from speculative development.
- 4.9 As set out in PPS7 paragraph 28, the occurrence of higher grade agricultural land is recognised as an important factor, but needing to be reviewed alongside other sustainability considerations:

“The presence of best and most versatile agricultural land (defined as land in grades 1, 2 and 3a of the Agricultural Land Classification), should be taken into account alongside other sustainability considerations (eg biodiversity: the quality and character of the landscape; its amenity value or heritage interest; accessibility to infrastructure, workforce and markets; maintaining viable communities; and the protection of natural resources, including soil quality) when determining planning applications. Where significant development of agricultural land is unavoidable, local planning authorities should seek to use areas of poorer quality land (grades 3b, 4 and 5) in preference to that of a higher quality, except where this would be inconsistent with other sustainability considerations. Little weight in agricultural terms should be given to the loss of agricultural land in grades 3b, 4 and 5, except in areas (such as uplands) where particular agricultural practices may themselves contribute in some special way to the quality and character of the environment or the local economy. If any undeveloped agricultural land needs to be developed, any adverse effects on the environment should be minimised.”

Paragraph 29 goes on to say:

“Development plans should include policies that identify any major areas of agricultural land that are planned for development. But local planning authorities may also wish to include policies in their LDDs to protect specific areas of best and most versatile agricultural land from speculative development. It is for local planning authorities to decide whether best and most versatile agricultural land can be developed, having carefully weighed the options in the light of competent advice.”

- 4.10 DEFRA took over all of the responsibilities of the former Ministry of Agriculture, Fisheries and Food (MAFF) and its executive agency, the Farming and Rural Conservation Agency (FRCA). This report continues to refer to MAFF and FRCA in relation to the relevant policy documents and publications that predate their dissolution.
- 4.11 The following sections detail the results of the agricultural land classification survey and farm business appraisal undertaken on land at Gavray Drive, Bicester and relate them to current relevant policy.

Methodology

Agricultural Land Classification

4.12 The MAFF ALC system of measuring land quality for land use planning purposes divides farmland into five grades according to the degree of limitation imposed upon land use by the inherent physical characteristics of climate, site and soils. Grade 1 land is of an excellent quality, whilst Grade 5 is very severely limited for agricultural use.

4.13 MAFF revised guidelines and criteria for ALC of October 1988 require that the following factors be investigated:

Climate: Average Annual Rainfall (AAR) and Accumulated Temperature above 0°C between January and June (AT0);

Site: Gradient, micro-relief and flooding;

Soils: Texture, structure, depth, stoniness and chemical toxicities;

Interactive Factors: Soil wetness, soil droughtiness and liability to erosion.

4.14 The impacts of the proposed development have been assessed using the assessment criteria set out in **Table 4.1**.

Table 4.1 Significance Criteria

Impact Magnitude	Definition
Major	<p>The proposed development would directly lead to the loss of over 50ha of “best and most versatile agricultural land” (Grades 1 / 2 / 3a)</p> <p>Or</p> <p>The impact of the development would render five or more farm businesses non-viable; or, would require significant changes in the day to day management / structure of over ten farm businesses and the site comprises mainly best and most versatile land..</p>
Moderate	<p>The proposed development would directly lead to the loss o between 20 and 50 ha of “best and most versatile agricultural land” (Grades 1 / 2 / 3a).</p> <p>Or</p> <p>The impact of the development would render one or more farm businesses non-viable; or, would require significant changes in the day to day management / structure of over five farm businesses and the site comprises mainly of Grade 3b or lower quality land.</p>
Minor	<p>The proposed development would directly lead to the loss of less than 20 ha of “best and most versatile agricultural land” (Grades 1 / 2 / 3a)</p> <p>Or</p> <p>Land take would not render any farm business non-viable and would require only minor changes to the farm enterprises.</p>
Neutral	No direct impacts upon agricultural land or farm business.

- 4.15 CPM surveyed the application site at a detailed resolution of approximately 1 auger boring per hectare to establish ALC grade.

Farming Circumstances

- 4.16 Assessing the possible effects of the proposed development upon the management of farmland requires analysis of the existing farm business operations. This has included discussions with the land owner and farmer in relation to the nature, extent and land use of the farming business occupying the site.

Baseline Conditions

The Site

- 4.17 The application site covers an area of approximately 24.5 hectares. All agricultural land on the site is permanent pasture. The site is topographically flat with some localised undulations in the south east and is dissected by a deep cut waterway running north to south. When surveyed, the south east of the application site was overgrown with long grass, the area west of the waterway was much shorter grassland with evidence of significant urban fringe effects including trail bikes, small fires and numerous pathways. No area of the site was in agricultural production at the time of survey.

Climate

- 4.18 The Meteorological Office, in collaboration with the Soil Survey and Land Research Centre (SSLRC) and MAFF have produced climatological data for ALC at points on 5km intersections of the National Grid. This information has been interpolated by CPM to provide site specific climatic data. The climate data for Land North of Gavray Drive, Bicester, are given in **Table 4.2**:

Table 4.2: Climate and Altitude Data for Land North of Gavray Drive, Bicester

Grid Reference	SP 596 224
Altitude (m aod)	66
Average Annual Rainfall	664
Accumulated Temperature > 0°C (Jan-June)	1429
Field Capacity Period	143
Moisture Deficit, Wheat	106
Moisture Deficit, Potatoes	97

- 4.19 The main parameters used in the assessment of an overall climatic limitation are average annual rainfall (AAR), as a measure of overall wetness and accumulated temperature above 0°C between January and June (AT0), as a measure of the general warmth of the site during the growing season.
- 4.20 Climate does not impose an overall limitation on ALC grade at this site. Climate does however have an important influence on the interactive limitations of soil wetness and soil droughtiness.

Soils and Parent Materials

- 4.21 The Soil Survey of England and Wales map sheet for south east England (Sheet 6, 1983) shows soil associations for the site to be a Wickham 2 series. This is described as a slowly permeable, seasonally waterlogged fine loam or fine silty over clay soil with small areas of slowly permeable calcareous soils on steeper slopes.
- 4.22 Field survey work by CPM identified topsoils with a predominantly clayey texture across the site. In a few auger borings soils were textured as clay loams with a sandy clay loam subsoil (as defined in Laboratory results Appendix 1 (Volume 2- Technical Appendix, Chapter 4)). Evidence of waterlogging (gleyic properties and ochreous mottles) was identified in some of the shallow topsoils and in all but one of the subsoils.

- 4.23 A slowly permeable layer (SPL), which suggests a wetness limitation, was consistently identified across the site in all but one of the auger borings. In general, characteristics of the SPL (gleyic properties and ochreous mottles) were clearly and strongly developed. The exception, auger boring 13 (as shown on **Figure 4.1**), had a topsoil texture of sandy clay loam underlain with coarse sand and gravels. The different textural properties in this isolated area coupled with the capability of gravel to assist with subsoil drainage are perhaps the reasons that no SPL could be identified here.

Relief and Drainage

- 4.24 The site is topographically flat with a few local undulations in the small fields to the south east. At the time of survey (7 June 2004) surface waterlogging was not evident. Drainage of the site consists of one stream running north to south across the site. At the time of survey the stream was flowing although at a low level.
- 4.25 Land quality is not limited by gradient, micro topography, erosion or flood risk on any part of the application site.

Soil-Climate Interaction

- 4.26 In general terms, soils with a higher clay content can retain a larger volume of plant available water, reducing the soil droughtiness limitation. When wet, a soil with a higher clay content is more vulnerable to structural damage caused by cultivation, livestock and vehicle traffic. Soils with a high clay content in the topsoil are therefore subject to a higher soil wetness and workability limitation.
- 4.27 Topsoil across the site is predominantly clay with one area of medium and heavy clay loam. A S.P.L could be identified close to the surface in all but one of the auger samples by identification of significant gleying and ochreous mottling in the soil profile. This suggests that the soils found at Gavray Drive, Bicester, are subject to a water logging/wetness limitation (wetness class IV) as described in Appendix 2 (Volume 2- Technical Appendix, Chapter 4). Where a SPL could not be identified, a high proportion of gravel in the subsoil and sandy clay textured subsoils were found. This assists the subsoil drainage and reduces the water logging potential (wetness class II).

ALC Grades

- 4.28 The MAFF provisional Agricultural Land Classification Map (1:63,360 scale, sheet No. 143), an extract of which is given in Appendix 3 (Volume 2- Technical Appendix, Chapter 4), shows the site within an area of Grade 4 land. Although these classifications are valuable guidance, superseded methodologies used for these maps do not differentiate between ALC Grades 3a and 3b. CPM survey undertaken in accordance with revised MAFF guidelines (1988) enabled an accurate classification to be made.
- 4.29 The area of each ALC grade within the Gavray drive survey area is given in **Table 4.3** and shown on **Figure 4.1**.

Table 4.3: Results of the ALC Survey of Land North of Gavray Drive

ALC Grades	Area (ha)	Area (%)
2	1.0	4
3b	23.5	96
TOTAL	24.5	100

- 4.30 Grade 3b land (moderate quality agricultural land) is found covering approximately 96% of the application site. Soil profiles are typically shallow clayey topsoil over clay subsoil. The soils are restricted to Grade 3b by a wetness limitation (wetness class IV) and associated workability limitation related to the soil texture.
- 4.31 Grade 2 land covers a comparatively insignificant area (4%) in the centre of the site (see **Figure 4.1**). The profile typically consists sandy clay loam topsoils with no evidence of gleying, or ochreous mottles. Subsoils were textured as sandy clay, with no evidence of waterlogging in the profile. Sandy clay and underlying gravels assist drainage of this area (auger point 13, **Figure 4.1**). Although the wetness class according to the MAFF guidelines gives an outcome of wetness class I, this was downgraded to wetness class II due to the presence of rushes which suggest that the soils are not as freely drained as observations suggest. This land is restricted to ALC Grade 2 by a droughtiness limitation.
- 4.32 Best and most versatile land (Grade 3a or above) accounts for approximately 4% (1.0ha) of the total land area.

Farming Circumstances

- 4.33 The Gavray Drive site is under the ownership of Norman Trustees. The farmer (who is also a trustee) rents the land as part of a partnership from the trustees on an annual tenancy agreement.
- 4.34 The main farm unit based at Park farm, Middleton Stoney, Oxfordshire, consists of approximately 500ha of owner occupied land which has been held by the partnership for over 60 years. Land at Gavray Drive makes up a small proportion of the overall farm business and is isolated (approximately five miles away) from the rest of the land utilised by this farm business. Land at Gavray Drive contains no farm buildings these are all located at the centre of operations at Park Farm, Middleton Stoney.
- 4.35 The main income for the farm business is from arable (cereals, rape and beans), beef and pigs. None of these incomes would be affected by loss of land at Gavray Drive.
- 4.36 Land at Gavray Drive is utilised by Park Farm as grassland forage cut once a year for silage, and arable set-aside. This is mainly due to its isolated nature (from the rest of the farm business) and also due to the significant urban fringe effects experienced at the site.
- 4.37 The farmer reports significant urban fringe effects on most of the land at Gavray Drive from trail bikes, dog walkers and children.

Potential Significant Effects and Mitigation

Land Quality

- 4.38 The development will result in the loss to agricultural use of approximately 24.5 ha of agricultural land, 1ha of which is ALC Grade 2, (good quality agricultural land) considered to be among England's best and most versatile land (Grades 1,2 and 3a).
- 4.39 Loss of such land will therefore have an adverse effect upon the national resource of best and most versatile agricultural land. However, given that Grade 2 land comprises only 3.6% of land at Gavray Drive and this area is isolated and not defined by field boundaries it is of limited value and its loss to development can be considered to be an effect of **low / minor significance**.

- 4.40 As agricultural land quality is not an attribute that can be effectively translocated or recreated, there is no direct mitigation for the loss of agricultural land.

Farming Circumstances

- 4.41 Park Farm, Middleton Stoney, is a well established farm enterprise with incomes from arable production, beef and pigs. Park Farm own and farm approximately 500 ha of agricultural land elsewhere in Oxfordshire. As trustee and tenant of land at Gavray Drive the farmer will indirectly benefit from loss of this land on the one hand whilst also losing out on a small income generated from set aside and forage uses.
- 4.42 The land is described by the farmer as “an inconvenience when cropped, a handy income as set aside but never the less a bit of a hassle”, the farmer also stated that it would be “no great loss” to the farm business.
- 4.43 The application site is isolated from the rest of the farm business and is defined by physical boundaries on three sides; a railway to the northeast and roads to the east and southwest. Development will not result in any fragmentation of agricultural land outside of the application site.
- 4.44 The application site is already subject to substantial urban fringe effects which have dictated its current land-use. As the boundaries are defined by roads, railway and other developments and there is no adjacent agricultural land, the impact of urban fringe effects resulting from this development will be low.
- 4.45 Construction work may generate dust which could impact on agricultural land beyond the physical boundaries described above. This may be suppressed by damping down any exposed or dry soil surface during construction. The existence of physical boundaries around the site may reduce the potential distance which dust may be translocated therefore it is anticipated that this is an effect of low significance.

Residual Effects

- 4.46 The loss to agricultural use of the application site will be permanent and there is no practical mitigation for such a loss. Loss of agricultural land including some ALC Grade 2 land, will remain an adverse effect of low significance.
- 4.47 There will be no residual adverse significant effects upon the occupying farm business arising from development at Gavray Drive, Bicester.

Summary and Conclusions

- 4.48 CPM has surveyed the quality of the agricultural land at Gavray Drive, Bicester, which is proposed for development. The site is located to the south east of Bicester, adjacent to the railway line.
- 4.49 The agricultural land classification (ALC) of the site is based on a detailed site survey by CPM which was carried out in accordance with Ministry of Agriculture, Fisheries and Food (MAFF) revised guidelines and criteria for ALC produced in October 1988.
- 4.50 **Figure 4.1** shows the distribution of ALC grades as found by CPM survey work. This is summarised as Grade 3b (23.5 ha) and Grade 2 (1 ha).
- 4.51 The application site contains a small, isolated area of best and most versatile land (Grade 2) in the centre of the site. This area is less than a hectare in area and due to its isolation has little practical utility.
- 4.52 Land at Gavray Drive, Bicester consists of 4% best and most versatile land (Grade 3a or above). Following the advice of PPS7, this land would ideally be preserved. However, the isolated nature and small area of the Grade 2 land within the site limits its agricultural value. When taken as a whole the site is of limited agricultural value and it is considered in agricultural terms that development could proceed at the site without great loss to the national soil resource.
- 4.53 Permanent loss of the best and most versatile Grade 2 land will be an **minor (negative) effect of minor significance**. There will be **no adverse significant effects** upon Park Farm, Middleton Stoney.

5.0 ARBORICULTURAL

Introduction and Methodology

5.1 This chapter of the Environmental Statement is prepared by CPM Environmental Planning and Design Limited (CPM), and addresses the development proposals at Gavray Drive, Bicester, in relation to two principal issues:

(i.) Arboricultural Quality;

(ii.) Arboricultural Amenity.

5.2 The assessment of arboricultural quality and amenity value results from undertaking the following tasks:

(i.) Quality evaluation and description of the arboricultural amenity (existing baseline situation) associated with the application site through field assessment;

(ii.) Identification and analysis of significant changes to the existing site context as a result of the development proposals, and the impact this may have upon the tree stock;

(iii.) A description of measures adopted, in order to avoid, reduce and, if possible, offset any significant adverse effects of the development.

5.3 This arboricultural study has been developed from the following guidance, as no definitive arboricultural impact assessment guidance exists:

(i.) 'Guidelines for Landscape and Visual Impact Assessment', Landscape Institute (LI) and Institute of Environmental Management and Assessment (AIEMA) - 2002 Second Edition;

(ii.) 'BS5837: Trees in Relation to Construction', British Standards Institute (BSI) - 1991;

(iii.) 'Guidance Note No.4, Visual Amenity Valuation of Trees and Woodlands (The Helliwell System)', Arboricultural Association - 2003;

(iv.) 'Tree Preservation Orders: A Guide to the Law and Good Practice', UK Department of the Environment, Transport and the Regions (DETR) - 2000.

- 5.4 The LI and IEMA guidelines stipulate that the significance of any effect should be evaluated, both during the construction phase and following the completion of the development. The significance is determined by assessing the sensitivity of the site feature or receptor and the magnitude of change that will occur.
- 5.5 The assessment process aims to be objective and quantify impacts as far as possible. However, it is recognised that subjective judgement is appropriate, if it is based upon "professional expertise, supported by clear evidence, reasoned argument and informed opinion". Whilst changes to tree quality and site conditions can be factually defined, the evaluation of tree amenity does require qualitative judgements to be made. The conclusions of this assessment therefore combine objective measurement with informed professional interpretation.
- 5.6 The significance of arboricultural quality and amenity impact is a function of the sensitivity of the affected tree stock, and magnitude of change that it will experience. This approach is addressed in the assessment matrices, enclosed as **Figure 5.0** and **Figure 5.1**.
- 5.7 The nature of the impact (after construction of the proposal and maturation of the mitigatory measures) can be described as being very high, high, medium, low or negligible. This description can be further defined as being adverse, neutral or beneficial.
- 5.8 The assessment of the nature of the impact will depend on the degree to which the proposal and mitigation measures:
- (i.) Complement, respect and protect the existing trees and hedgerows;
 - (ii.) Enable enhancement, reinforcement and retention of the existing trees and hedgerows;
 - (iii.) Affect visually important, historic or TPO'd trees.

Baseline Conditions

- 5.9 Establishing the baseline from which change needs to be measured is an important first stage and involves considering:
- (i.) Relevant policies and designations affecting the site and associated tree stock;
 - (ii.) Species composition;
 - (iii.) Health;
 - (iv.) Age Class;
 - (v.) Quality Class;
 - (vi.) Amenity Value.
- 5.10 A full copy of the arboricultural baseline assessment is contained within Volume 2- Technical Appendix, Chapter 5 and summarised below. Findings of the Arboricultural Survey are illustrated on **Figure 5.4**.

Arboricultural Policies Affecting the Site

- 5.11 Arboricultural designations that cover the site are set out by policy at national, regional and district level. For the purposes of this assessment, district level policy has been reviewed, as set out in the Cherwell Local Plan 2011 (Revised Deposit Draft, September 2002).
- 5.12 A full description of the planning context is provided within Environmental Statement; however, a summary of the relevant arboricultural policy is set out below.

"POLICY EN35 - THE COUNCIL WILL SEEK TO RETAIN WOODLANDS, TREES, HEDGES, PONDS, WALLS AND OTHER FEATURES WHICH ARE IMPORTANT TO THE CHARACTER OR APPEARANCE OF THE LOCAL LANDSCAPE AS A RESULT OF THEIR ECOLOGICAL, HISTORIC OR AMENITY VALUE. PROPOSALS WHICH WOULD RESULT IN THE LOSS OF SUCH FEATURES WILL NOT BE PERMITTED."

"POLICY EN36 - THE COUNCIL WILL SEEK OPPORTUNITIES TO SECURE THE ENHANCEMENT OF THE CHARACTER AND APPEARANCE OF THE LANDSCAPE, PARTICULARLY IN URBAN FRINGE LOCATIONS, THROUGH THE RESTORATION, MANAGEMENT OR ENHANCEMENT OF EXISTING LANDSCAPES, FEATURES OR HABITATS AND WHERE APPROPRIATE THE CREATION OF NEW ONES, INCLUDING THE PLANTING OF WOODLANDS, TREES AND HEDGEROWS."

"POLICY EN37 - IN EXERCISING ITS DEVELOPMENT CONTROL FUNCTIONS THE COUNCIL WILL WELCOME OPPORTUNITIES FOR COUNTRYSIDE MANAGEMENT PROJECTS WHERE:

- (i) ALL IMPORTANT TREES, WOODLAND AND HEDGEROWS ARE RETAINED;
- (ii) THE ECOLOGICAL VALUE OF THE SITE WILL BE ENHANCED;
- (iii) NEW TREE AND HEDGEROW PLANTING USING SPECIES NATIVE TO THE AREA AND OF LOCAL PROVENANCE IS ENCOURAGED AND SUBSEQUENTLY MANAGED."

Arboricultural Designations Affecting the Site

5.13 Some of the trees surveyed by CPM are covered by a Tree Preservation Order (Ref: No.17, 1990, Trees at Bicester South East Development Site). The TPO schedule lists 29 individual trees and 4 groups of trees, located to the east of the Langford Brook.

5.14 TPO coverage is identified in **Figure 5.5** 'Tree Preservation Order Details'.

Species Composition

5.15 The trees themselves are dominated by Oak, Willow, Ash and Hawthorn. The findings of the survey reflect the fact that the site consists largely of neglected agricultural land with typical maturing internal field boundaries. The species were recorded in the following proportions, see **Table 5.1**:

Table 5.1 Species Recorded

Species	% Of Individual Trees and Groups of Trees
Oak	24%
Willow	17%
Ash	14%
Hawthorn / Blackthorn	14%
Elder	11%
Field Maple	11%
Elm	9%

Health and Age Class

5.16 The majority of the tree stock is mature in age and recorded as being in fair condition. This suggests that the tree stock had generally good life expectancy and will respond well to some active management. The most specific health problems noted during the survey include:

- (i.) Competition for Light and Space / Lack of Active Management: A number of the mature hedgerow trees are planted in close proximity to each other. Canopies are tightly bunched, and competition for light, nutrients and space is evident. In the absence of proper management, some of the trees are being suppressed by their more vigorous neighbours;
- (ii.) Age / Disease Related Decline: Several trees within the eastern land parcels of the site and numerous hedgerow Elm trees have died or appear to be in recession. The presence of deadwood material and general dieback in Oak and Ash does not necessarily mean that the trees have a poor life expectancy, as they can take many decades to die, and lifespan can be extended by judicious pollarding or pruning. However, any emergent Elm will struggle to mature as 'Dutch Elm Disease' takes hold.

Quality Class

5.17 The quality of the tree stock is summarised in **Table 5.2**:

Table 5.2: Quality of Tree Stock

Quality Class	% Of Individual Trees And Groups Of Trees
A	9%
B	26%
C	64%
D	1%

5.18 This distribution reflects the moderate quality condition of the tree stock, although some of the mature Oak trees warrant a Quality Class A classification. The moderate quality of the trees is largely due to the maturity class of the hedgerow vegetation and the presence of so much dead Elm. Poor vigour, competition for light and space and overall quality could be improved over time through active management and a replanting strategy.

Visual Amenity

5.19 The tree stock within the application area is an important component of the landscape and contributes to the existing setting and character of the immediate surroundings. Visually the groups of trees have a strong presence; however, few individual specimens have prominent positions or influence large visual areas.

Receptors of Change

5.20 The main arboricultural receptors, this is to say, the principal trees of the existing landscape to be affected by the proposed development are as follows:

- (i.) Mature and emergent hedgerow trees associated with the internal field boundaries;
- (ii.) Individual / isolated mature or newly planted tree species;
- (iii.) Trees associated with the river corridor.

Sensitivity to Change

- 5.21 Although some of the trees are covered by a TPO designation, the arboricultural sensitivity of the site is considered to be of 'Moderate Local Importance', and reasonably tolerant of change.

Arboricultural Impact Assessment

- 5.22 The receptors likely to experience change in quality and amenity arising from the proposed development have been identified below and classified according to their sensitivity into primary, secondary and tertiary.

Primary Arboricultural Receptors

- 5.23 Most sensitive trees or groups of trees i.e those Quality Class A trees, trees covered by the TPO, or fine trees with important amenity value:

T1, T2, T3, T4, T5, T6, T7, T8, T9, T12, T13, T14, T19, T22, T25, T26, T27, T29, T30, T31, T32, T33, T34, T35, T36, T37, T38, G1, G5, G6 and G14.

Secondary Arboricultural Receptors

- 5.24 Other sensitive trees or groups of trees i.e those Quality Class B or C trees, or trees with moderate amenity value:

T16, T20, T21, T23, T28, T39, T40, T41, T42, T43, T44, T47, G2, G3, G4, G7, G8, G9, G10, G11, G12, G13, G15, G16, G17 and G18.

Tertiary Arboricultural Receptors

- 5.25 Less sensitive trees or groups of trees i.e. those Quality Class C or D trees, dead, dying or dangerous trees, or trees with little amenity value:

T10, T11, T15, T17, T18, T24, T45, T46 and T48.

Impact Identification and Magnitude

- 5.26 The next task in preparing the impact assessment is the systematic identification of all the potential arboricultural impacts at different stages in the life cycle of the proposed development.
- 5.27 This process is based on the anticipated effects of the development, either temporary or permanent, as summarised below.

Temporary Impacts

- 5.28 In general terms the impacts resulting from the construction phases of the building programme will be temporary, with total construction time lasting approximately 7 years. Construction activities can be a source of significant disruption, albeit over a relatively short period of time. Appropriate measures will need to be put in place to avoid and reduce these impacts.
- 5.29 The principal components of the construction phase likely to affect the arboricultural quality and amenity include the following:
- (i.) Fencing to protect and wildlife areas and retained trees before and during construction;
 - (ii.) Site clearance and removal of vegetation;
 - (iii.) Flood alleviation works / land re-profiling to the west of the site;
 - (iv.) Site access and temporary haulage routes;
 - (v.) Fixed and mobile construction plant;
 - (vi.) Excavators, compressors and lorries;
 - (vii.) Cut, fill and disposal;
 - (viii.) Stockpile and material storage areas;
 - (ix.) Site huts and associated protective hoardings;

(x.) Utilities, including water, drainage, power and lighting.

Permanent Impacts

5.30 The impact of the development proposals will continue through its lifespan. The principal aspects of the proposals which are likely to have a permanent impact upon tree quality and amenity value can be summarised as:

- (i.) Development of approximately 500 units of residential development and associated infrastructure on largely unmanaged agricultural land;
- (ii.) Flood alleviation works and balancing pond creation associated with the river corridor;
- (iii.) The loss of trees and sections of hedgerow in association with the proposed internal access roads and associated utilities;
- (iv.) Change in ground level adjacent to / or beneath retained trees;
- (v.) New tree planting.

5.31 The impact of the new predicted permanent features will persist during the operational lifespan of the development, with some decrease over time due to the mitigation measures and receptor adjustments.

Indirect Arboricultural Impacts

5.32 The following consequential elements of the scheme could also impact upon arboricultural quality and amenity:

- (i.) Change in microclimatic conditions or the water / drainage regime of the site;
- (ii.) Poor management and maintenance practices.

Impact Prediction and Significance

5.33 The predicted impact on arboricultural quality and amenity is assessed using the matrices enclosed as **Figure 5.0** and **Figure 5.1**, and described within **Figure 5.2** and **Figure 5.3**.

Figure 5.2 - Predicted Arboricultural Quality Impacts - Primary Receptors

RECEPTORS	ARBORICULTURAL QUALITY	PROPOSAL	IMPACTS	IMPACT MAGNITUDE	IMPACT SIGNIFICANCE	MITIGATION	RESIDUAL IMPACT SIGNIFICANCE
T1	B	Residential development, highway infrastructure and associated open space.	Retained within landscape buffer.	No Change	Medium	Tree protection measures and retention as part of landscape buffer.	Negligible
T2	B-	Residential development, highway infrastructure and associated open space.	Retained within landscape buffer.	No Change	Medium	Tree protection measures and retention as part of landscape buffer.	Negligible
T3	B	Residential development, highway infrastructure and associated open space.	Retained within landscape buffer.	No Change	Medium	Tree protection measures and retention as part of landscape buffer.	Negligible
T4	B-	Residential development, highway infrastructure and associated open space.	Retained within landscape buffer.	No Change	Medium	Tree protection measures and retention as part of landscape buffer.	Negligible
T5	B	Residential development, highway infrastructure and associated open space.	Retained within landscape buffer.	No Change	Medium	Tree protection measures and retention as part of landscape buffer.	Negligible
T6	B	Residential development, highway infrastructure and associated open space.	Retained within landscape buffer.	No Change	Medium	Tree protection measures and retention as part of landscape buffer.	Negligible
T7	D	Residential development, highway infrastructure and associated open space.	Direct loss as a result of development proposals.	Very High	Negligible	Reinforcement native planting associated with retained buffers to compensate for direct loss.	Negligible

RECEPTORS	ARBORICULTURAL QUALITY	PROPOSAL	IMPACTS	IMPACT MAGNITUDE	IMPACT SIGNIFICANCE	MITIGATION	RESIDUAL IMPACT SIGNIFICANCE
T8	C+	Residential development, highway infrastructure and associated open space.	Retained within landscape buffer.	No Change	Low	Tree protection measures and retention as part of landscape buffer.	Negligible
T9	C+	Residential development, highway infrastructure and associated open space.	Retained within landscape buffer.	No Change	Low	Tree protection measures and retention as part of landscape buffer.	Negligible
T12	A-	Residential development, highway infrastructure and associated open space.	Direct loss as a result of development proposals.	Very High	High	Reinforcement native planting associated with retained buffers to compensate for direct loss.	Very High – High Adverse
T13	B-	Residential development, highway infrastructure and associated open space.	Retained within landscape buffer.	No Change	Medium	Tree protection measures and retention as part of landscape buffer.	Negligible
T14	B+	Residential development, highway infrastructure and associated open space.	Direct loss as a result of development proposals.	Very High	Medium	Reinforcement native planting associated with retained buffers to compensate for direct loss.	High – Medium Adverse
T19	A-	Residential development, highway infrastructure and associated open space.	Retained within landscape buffer.	No Change	High	Tree protection measures and retention as part of landscape buffer.	Negligible
T22	B+	Residential development, highway infrastructure and associated open space.	Direct loss as a result of development proposals.	Very High	Medium	Reinforcement native planting associated with retained buffers to compensate for direct loss.	Medium-High Adverse

RECEPTORS	ARBORICULTURAL QUALITY	PROPOSAL	IMPACTS	IMPACT MAGNITUDE	IMPACT SIGNIFICANCE	MITIGATION	RESIDUAL IMPACT SIGNIFICANCE
T25	A-	Residential development, highway infrastructure and associated open space.	Retained within landscape buffer.	No Change	High	Tree protection measures and retention as part of landscape buffer.	Negligible
T26	A	Residential development, highway infrastructure and associated open space.	Retained within landscape buffer.	No Change	Very High	Tree protection measures and retention as part of landscape buffer.	Negligible
T27	C+	Residential development, highway infrastructure and associated open space.	Retained within the designated County Wildlife Site and river corridor.	No Change	Low	Tree protection measures and retention as part of landscape buffer.	Negligible
T29	B+	Residential development, highway infrastructure and associated open space.	Retained within the designated County Wildlife Site and river corridor.	No Change	Medium	Tree protection measures and retention as part of landscape buffer.	Negligible
T30	C+	Residential development, highway infrastructure and associated open space.	Retained within the designated County Wildlife Site and river corridor.	No Change	Low	Tree protection measures and retention as part of landscape buffer.	Negligible
T31	B+	Residential development, highway infrastructure and associated open space.	Retained within the designated County Wildlife Site and river corridor.	No Change	Medium	Tree protection measures and retention as part of landscape buffer.	Negligible

RECEPTORS	ARBORICULTURAL QUALITY	PROPOSAL	IMPACTS	IMPACT MAGNITUDE	IMPACT SIGNIFICANCE	MITIGATION	RESIDUAL IMPACT SIGNIFICANCE
T32	C-	Residential development, highway infrastructure and associated open space.	Retained within the designated County Wildlife Site and river corridor.	No Change	Low	Tree protection measures and retention as part of landscape buffer.	Negligible
T33	B-	Residential development, highway infrastructure and associated open space.	Retained within the designated County Wildlife Site and river corridor.	No Change	Medium	Tree protection measures and retention as part of landscape buffer.	Negligible
T34	B	Residential development, highway infrastructure and associated open space.	Retained within the designated County Wildlife Site and river corridor.	No Change	Medium	Tree protection measures and retention as part of landscape buffer.	Negligible
T35	B	Residential development, highway infrastructure and associated open space.	Retained within the designated County Wildlife Site and river corridor.	No Change	Medium	Tree protection measures and retention as part of landscape buffer.	Negligible
T36	B+	Residential development, highway infrastructure and associated open space.	Retained within the designated County Wildlife Site and river corridor.	No Change	Medium	Tree protection measures and retention as part of landscape buffer.	Negligible
T37	C-	Residential development, highway infrastructure and associated open space.	Retained within the designated County Wildlife Site and river corridor.	No Change	Low	Tree protection measures and retention as part of landscape buffer.	Negligible

RECEPTORS	ARBORICULTURAL QUALITY	PROPOSAL	IMPACTS	IMPACT MAGNITUDE	IMPACT SIGNIFICANCE	MITIGATION	RESIDUAL IMPACT SIGNIFICANCE
T38	C+	Residential development, highway infrastructure and associated open space.	Retained within the designated County Wildlife Site and river corridor.	No Change	Low	Tree protection measures and retention as part of landscape buffer.	Negligible
G1	C+	Residential development, highway infrastructure and associated open space.	Direct loss as a result of development proposals.	Very High	Low	Reinforcement native planting associated with retained buffers to compensate for direct loss.	Medium Adverse
G5	C-	Residential development, highway infrastructure and associated open space.	Direct loss of TPO'd Willow as a result of development proposals.	Very High	Low	Reinforcement native planting associated with retained buffers to compensate for direct loss.	Medium Adverse
G6	A	Residential development, highway infrastructure and associated open space.	Retained within landscape buffer.	No Change	High	Tree protection measures and retention as part of landscape buffer.	Negligible
G14	C	Residential development, highway infrastructure and associated open space.	Retained within the designated County Wildlife Site and river corridor.	No Change	Low	Tree protection measures and retention as part of landscape buffer.	Negligible

Figure 5.3 - Predicted Arboricultural Amenity Impacts - Primary Receptors

RECEPTORS	ARBORICULTURAL AMENITY	PROPOSAL	IMPACTS	IMPACT MAGNITUDE	IMPACT SIGNIFICANCE	MITIGATION	RESIDUAL IMPACT SIGNIFICANCE
T1	Important position / covered by TPO / viewed from public footpath.	Residential development, highway infrastructure and associated open space.	Retained within landscape buffer.	Medium	Very High	Tree protection measures and retention as part of landscape buffer.	High – Medium <i>Beneficial</i>
T2	Important position / covered by TPO / viewed from public footpath.	Residential development, highway infrastructure and associated open space.	Retained within landscape buffer.	Medium	Very High	Tree protection measures and retention as part of landscape buffer.	High – Medium <i>Beneficial</i>
T3	Important position / covered by TPO / viewed from public footpath.	Residential development, highway infrastructure and associated open space.	Retained within landscape buffer.	Medium	Very High	Tree protection measures and retention as part of landscape buffer.	High – Medium <i>Beneficial</i>
T4	Important position / covered by TPO / viewed from public footpath.	Residential development, highway infrastructure and associated open space.	Retained within landscape buffer.	Medium	Very High	Tree protection measures and retention as part of landscape buffer.	High – Medium <i>Beneficial</i>

RECEPTORS	ARBORICULTURAL AMENITY	PROPOSAL	IMPACTS	IMPACT MAGNITUDE	IMPACT SIGNIFICANCE	MITIGATION	RESIDUAL IMPACT SIGNIFICANCE
T5	Important position / covered by TPO / viewed from public footpath.	Residential development, highway infrastructure and associated open space.	Retained within landscape buffer.	Medium	Very High	Tree protection measures and retention as part of landscape buffer.	High – Medium <i>Beneficial</i>
T6	Important position / covered by TPO / viewed from public footpath.	Residential development, highway infrastructure and associated open space.	Retained within landscape buffer.	Medium	Very High	Tree protection measures and retention as part of landscape buffer.	High – Medium <i>Beneficial</i>
T7	Dying tree with declining visual presence.	Residential development, highway infrastructure and associated open space.	Direct loss as a result of development proposals.	High	Negligible	Reinforcement native planting associated with retained buffers to compensate for direct loss.	Negligible
T8	Important position in hedgerow / covered by TPO / viewed from public footpath.	Residential development, highway infrastructure and associated open space.	Retained within landscape buffer.	Medium	Very high	Tree protection measures and retention as part of landscape buffer.	Medium – High <i>Beneficial</i>
T9	Important position in hedgerow / covered by TPO / viewed from public footpath.	Residential development, highway infrastructure and associated open space.	Retained within landscape buffer.	Medium	Very High	Tree protection measures and retention as part of landscape buffer.	Medium – High <i>Beneficial</i>
T12	Important hedgerow tree / covered by TPO.	Residential development, highway infrastructure and associated open space.	Direct loss as a result of development proposals.	High	High	Reinforcement native planting associated with retained buffers to compensate for direct loss.	High – Medium <i>Adverse</i>

RECEPTORS	ARBORICULTURAL AMENITY	PROPOSAL	IMPACTS	IMPACT MAGNITUDE	IMPACT SIGNIFICANCE	MITIGATION	RESIDUAL IMPACT SIGNIFICANCE
T13	Important hedgerow tree / covered by TPO.	Residential development, highway infrastructure and associated open space.	Retained within landscape buffer.	Low	High	Tree protection measures and retention as part of landscape buffer.	Low – Medium <i>Beneficial</i>
T14	Important hedgerow tree / covered by TPO.	Residential development, highway infrastructure and associated open space.	Direct loss as a result of development proposals.	High	High	Reinforcement native planting associated with retained buffers to compensate for direct loss.	High – Medium <i>Adverse</i>
T19	Important hedgerow tree / covered by TPO.	Residential development, highway infrastructure and associated open space.	Retained within landscape buffer.	Low	High	Tree protection measures and retention as part of landscape buffer.	Low – Medium <i>Beneficial</i>
T22	Well formed hedgerow tree / covered by TPO.	Residential development, highway infrastructure and associated open space.	Direct loss as a result of development proposals.	High	High	Reinforcement native planting associated with retained buffers to compensate for direct loss.	Medium – High <i>Adverse</i>
T25	Important position / covered by TPO / viewed from public footpath.	Residential development, highway infrastructure and associated open space.	Retained within landscape buffer.	Medium	Very High	Tree protection measures and retention as part of landscape buffer.	Medium – High <i>Beneficial</i>
T26	Important position / covered by TPO / viewed from public footpath.	Residential development, highway infrastructure and associated open space.	Retained within landscape buffer.	Medium	Very High	Tree protection measures and retention as part of landscape buffer.	Medium – High <i>Beneficial</i>

RECEPTORS	ARBORICULTURAL AMENITY	PROPOSAL	IMPACTS	IMPACT MAGNITUDE	IMPACT SIGNIFICANCE	MITIGATION	RESIDUAL IMPACT SIGNIFICANCE
T27	Important position / covered by TPO / viewed from public footpath.	Residential development, highway infrastructure and associated open space.	Retained within the designated County Wildlife Site and river corridor.	Medium	Very High	Tree protection measures and retention as part of landscape buffer.	Medium – High <i>Beneficial</i>
T29	Important position / covered by TPO / viewed from public footpath.	Residential development, highway infrastructure and associated open space.	Retained within the designated County Wildlife Site and river corridor.	Medium	Very High	Tree protection measures and retention as part of landscape buffer.	Medium – High <i>Beneficial</i>
T30	Important position / covered by TPO / viewed from public footpath.	Residential development, highway infrastructure and associated open space.	Retained within the designated County Wildlife Site and river corridor.	Medium	Very High	Tree protection measures and retention as part of landscape buffer.	Medium – High <i>Beneficial</i>
T31	Important position / covered by TPO / viewed from public footpath.	Residential development, highway infrastructure and associated open space.	Retained within the designated County Wildlife Site and river corridor.	Medium	Very High	Tree protection measures and retention as part of landscape buffer.	Medium – High <i>Beneficial</i>
T32	Important position / covered by TPO / viewed from public footpath.	Residential development, highway infrastructure and associated open space.	Retained within the designated County Wildlife Site and river corridor.	Medium	Very High	Tree protection measures and retention as part of landscape buffer.	Medium – High <i>Beneficial</i>
T33	Important riverside position / covered by TPO.	Residential development, highway infrastructure and associated open space.	Retained within the designated County Wildlife Site and river corridor.	Low	High	Tree protection measures and retention as part of landscape buffer.	Low – Medium <i>Beneficial</i>

RECEPTORS	ARBORICULTURAL AMENITY	PROPOSAL	IMPACTS	IMPACT MAGNITUDE	IMPACT SIGNIFICANCE	MITIGATION	RESIDUAL IMPACT SIGNIFICANCE
T34	Important riverside position / covered by TPO.	Residential development, highway infrastructure and associated open space.	Retained within the designated County Wildlife Site and river corridor.	Low	High	Tree protection measures and retention as part of landscape buffer.	Low – Medium <i>Beneficial</i>
T35	Important riverside position / covered by TPO.	Residential development, highway infrastructure and associated open space.	Retained within the designated County Wildlife Site and river corridor.	Low	High	Tree protection measures and retention as part of landscape buffer.	Low – Medium <i>Beneficial</i>
T36	Important riverside position / covered by TPO.	Residential development, highway infrastructure and associated open space.	Retained within the designated County Wildlife Site and river corridor.	Low	High	Tree protection measures and retention as part of landscape buffer.	Low – Medium <i>Beneficial</i>
T37	Important riverside position / covered by TPO.	Residential development, highway infrastructure and associated open space.	Retained within the designated County Wildlife Site and river corridor.	Low	High	Tree protection measures and retention as part of landscape buffer.	Low – Medium <i>Beneficial</i>
T38	Important riverside position / covered by TPO.	Residential development, highway infrastructure and associated open space.	Retained within the designated County Wildlife Site and river corridor.	Low	High	Tree protection measures and retention as part of landscape buffer.	Low – Medium <i>Beneficial</i>
G1	Visually significant understorey hedgerow / covered by TPO / viewed from public footpath.	Residential development, highway infrastructure and associated open space.	Direct loss as a result of development proposals.	Very High	Very High	Reinforcement native planting associated with retained buffers to compensate for direct loss.	High – Very High High Adverse

RECEPTORS	ARBORICULTURAL AMENITY	PROPOSAL	IMPACTS	IMPACT MAGNITUDE	IMPACT SIGNIFICANCE	MITIGATION	RESIDUAL IMPACT SIGNIFICANCE
G5	Less significant hedgerow group / only mature Willow covered by TPO.	Residential development, highway infrastructure and associated open space.	Direct loss of TPO'd Willow as a result of development proposals.	High	High	Reinforcement native planting associated with retained buffers to compensate for direct loss.	Medium – High Adverse
G6	Important tree group with strong visual presence / covered by TPO.	Residential development, highway infrastructure and associated open space.	Retained within landscape buffer.	Medium	Very High	Tree protection measures and retention as part of landscape buffer.	Medium – High Beneficial
G14	Less significant riverside trees / covered by TPO.	Residential development, highway infrastructure and associated open space.	Retained within the designated County Wildlife Site and river corridor.	Low	High	Tree protection measures and retention as part of landscape buffer.	Low – Medium Beneficial

Mitigation

5.34 This section describes how the temporary and permanent impacts on both arboricultural quality and amenity can be mitigated. Mitigation takes the form of:

- (i.) Avoidance of adverse effects;
- (ii.) Reduction of adverse effects;
- (iii.) Compensation of adverse effects.

Avoidance

5.35 The following will be actioned to ensure avoidance of any adverse effects in relation to the development proposed:

- (i.) Retention of trees associated with the river corridor and designated County Wildlife Site (CWS), and where possible those protected by the TPO designation;
- (ii.) Avoidance of development immediately adjacent to retained trees and hedgerows through the provision of green buffers;
- (iii.) Avoidance of unnecessary damage to retained trees and hedgerows through the implementation of protective fencing (in accordance with BS 5837) and a tree protection strategy;
- (iv.) Avoidance of unnecessary changes in ground level adjacent to retained trees and hedgerows;
- (v.) Avoidance of service provision / utility routes beneath the canopies of retained trees.

Reduction

5.36 The following will be actioned to reduce any adverse effects in relation to the development proposed:

- (i.) Manipulation of the siting of the internal road layout to enable the retention of important trees and principal hedgerow belts;
- (ii.) Construction of development parcels and the internal road layout at-grade with the existing topography, to reduce the impact upon sensitive tree roots;
- (iii.) Use of open space, green buffers and setback will reduce the impact of the development proposals on the amenity value of retained tree stock;
- (iv.) Retention of the existing boundary vegetation and bunds, to protect the amenity of the tree stock, particularly when viewed from Gavray Drive;

Compensation and Enhancement

5.37 The following will be actioned to compensate for any adverse effects in relation to the development proposed:

- (i.) Replacement tree and hedgerow planting to compensate for any direct loss during the construction phase;
- (ii.) The strengthening of existing tree belts and hedgerows by filling existing gaps;
- (iii.) Improved management of retained trees and hedgerows, to encourage healthy future growth and improving safe life expectancy.

Residual Effects

5.38 The arboricultural quality and amenity effects of the development proposals upon the wider landscape are considered to be negligible, as a result of the retention of the boundary trees; however, in terms of effects upon the site itself the impact of the development is slightly more significant.

Arboricultural Quality

5.39 A large proportion of the best quality trees are being retained as part of the development proposals, and the implementation of a management plan will help to improve the future health of the overall tree stock. The permanent residual effect upon arboricultural quality is considered as being low (adverse).

Arboricultural Amenity

- 5.40 The setting, relationship between the tree stock and the landscape, and the amenity value of the site will change as a result of the development proposals. The only exception to this being the retained central river corridor. Although the retention of most TPO'd trees, green buffers, the river corridor and new open space will assist in protecting the amenity of the trees, a significant degree of disturbance will be created. The permanent residual effect upon arboricultural amenity is considered as being medium (adverse).
- 5.41 In total, it is envisaged that only 6 individual trees (T7, T10, T11, T12, T14 and T15) will be lost (only T14 is covered by the TPO designation), and approximately 593 metres of hedgerow (including a small section of G2, G3, G5, G6 for internal access road, the majority of G7, and a small section of G17 and G18).

Summary and Conclusions

- 5.42 A comprehensive assessment of the effects of the proposed development upon the tree stock has been carried out in accordance with the relevant best practice guidelines. This has addressed the effects on arboricultural quality and amenity.
- 5.43 The development proposals have been designed to avoid and/or limit significant impact upon the tree stock where possible. A large proportion of the trees and hedgerows have been retained as linear buffers, internal road layout located to avoid direct conflict with trees, and ground level changes avoided in close proximity to tree canopies. Where tree loss is unavoidable, mitigation proposals have been developed to ensure that new planting is implemented and appropriate management regimes instigated to improve the longterm condition of the trees.
- 5.44 Without the development, the site would largely remain in unmanaged agricultural use, and it is unlikely that the condition of the existing trees and hedgerows would substantially improve without some active management.
- 5.45 The most significant effect of the proposed development upon the tree stock is the change in amenity, as the setting of many of the trees and their relationship with the landscape will be altered. However, the retention of many of the trees and associated buffers as part of the development proposals will improve the residential amenity of the scheme, and create a strong landscape framework.

6.0 LANDSCAPE AND VISUAL

Introduction and Methodology

6.1 This Chapter of the Environmental Statement addresses the development proposals at Land North of Gavray Drive, Bicester, Oxfordshire, with regard to two principal issues:

- (i.) Landscape Character: Impacts on the landscape or townscape may arise where the character of areas or features with a particular scenic quality or merit are modified by development. It is important to place the application site in its landscape context;
- (ii.) Visual Context: Impacts on views and visual amenity may arise where features intrude into or obstruct views, or where there is a qualitative change to the landscape within a view.

6.2 The assessment of landscape and visual impact results from undertaking the following tasks:

- (i.) Evaluation of the landscape and visual resources (Baseline Conditions) in and around the application site; by both desk top studies and field studies;
- (ii.) Identification and analysis of significant changes to the existing visual context and the landscape character as a result of the proposals;
- (iii.) A description of measures adopted, in order to avoid, reduce and, if possible, off set any significant adverse effects of the development.

6.3 CPM is an Assessor Grade Member of the Institute of Environmental Management and Assessment (IEMA). The impact assessment methodology used in the preparation of the landscape study has been developed from the following guidance:

- (i.) 'Landscape Character Assessment' produced by The Countryside Agency (Ref: CAX 84) in April 2002;
- (ii.) 'Guidelines for Landscape and Visual Impact Assessment' produced by the Landscape Institute (LI) and the Institute of Environmental Management and Assessment (IEMA) in 2002 (Second Edition).

- 6.4 CPM's resulting methodology is contained within Volume 2 Technical Appendices, Section 6 'Baseline Landscape Assessment' and summarised below.
- 6.5 The LI and IEA guidelines stipulate that the significance of any effect should be evaluated, both during the construction phase and following completion of the development. The significance is determined by assessing the sensitivity of the receptor and magnitude of the change that will occur.
- 6.6 The assessment process aims to be objective and quantify impacts as far as possible. However, it is recognised that subjective judgment is appropriate, if it is based upon 'professional expertise, supported by clear evidence, reasoned argument and informed opinion'. Whilst changes to a view can be factually defined, the evaluation of landscape character and visual impact does require qualitative judgments to be made. The conclusions of this assessment therefore combine objective measurement with informed professional interpretation.
- 6.7 The significance of landscape and visual impact is a function of the sensitivity of the affected landscape and visual receptors and magnitude of change that they will experience. These approaches are addressed in the assessment matrices illustrated in **Figure 6.0** and **Figure 6.1**.
- 6.8 The nature of the impact (after construction of the proposal and maturation of the mitigatory measure) can be described as being severe, very high, high, medium, low or negligible. This description can be further refined as being adverse, neutral or beneficial.
- 6.9 This assessment of the nature of the impact will depend on the degree to which the proposal and mitigation measures:
- (i.) Complement, respect and fit into the existing scale, landform and pattern of the landscape context;
 - (ii.) Enable enhancement, restoration or retention of the landscape character and visual amenity;
 - (iii.) Affect strategic and important views in addition to the visual context of receptors.

Baseline Conditions

- 6.7 Establishing the baseline from which change needs to be measured is an important first stage and this involves considering:
- (i.) Landscape policies and designations affecting the site and its setting;
 - (ii.) The landscape setting of the site;
 - (iii.) The landscape character of the site and surroundings;
 - (iv.) Visual assessment.
- 6.7 Comments received as part of the consultation process or as a result of informal discussions have also been considered.
- 6.8 A full copy of the Landscape Baseline Assessment is contained within the Volume 2 Technical Appendices, Section 6 'Baseline Landscape Assessment'.

Landscape Policies and Designations Affecting the Site

- 6.9 Landscape designations that cover the site are set out by policy at a national, regional and district level:
- (i.) Planning Policy Guidance (PPG's);
 - (ii.) The Oxfordshire Structure Plan 2011, adopted August 1998. This will be replaced by the Oxfordshire Structure Plan 2016 (OSP), currently on Deposit Draft since September 2003, predicted adoption Autumn 2005;
 - (iii.) The Local Plan is the Cherwell Local Plan, adopted copy, November 1996 (CLP). The Draft Cherwell Local Plan 2011 (DCLP), was placed on deposit in February 2001. This was then replaced by the emerging Revised Deposit Draft 2011, in September 2002, hereafter referred to as the emerging CLP, this has since been updated with the Pre-Inquiry Changes (PIC), June 2004.
- 6.10 A full description of the planning context was provided at Chapter 3 of this document; however, a summary of the relevant regional and district level landscape policies is set out below.

6.11 National planning guidance with regard to countryside and landscape designations is set out in Planning Policy Guidance Note 3 (PPG 3): Housing (March 2000). PPG3 provides general procedure for the preparation of Development Plan Policies and guidance for local authorities on planning for housing.

6.12 Relevant landscape policies within the OSP include:

Policy EN1: Protection of Landscape Character.

'The release of a Greenfield site in this location would affect local landscape character. It deals with the protection, maintenance and enhancement of landscape character, ensuring that development proposals are not detrimental to the local landscape';

Policy G2: Improving the Quality and Design of Development.

This policy is among several general policies relating to new development; sensitivity to scale / materials / layout / design and landscaping in relation to the surrounding area, as well as the promotion of reduced travel need.

6.13 The application area itself is covered by the following policies within the Cherwell Local Plan:

(ii.) The designation of 'Committed site for employment generating development' covers the majority of the site and is subject to Policy EMP1. This states that employment generating development will be permitted on designated sites subject to other relevant planning policies. A tract of land within the western portion of the application area is a 'Proposed site for employment generating development' so the above policy would also apply; and

(iii.) Policy R1 seeks to reserve portions of land for recreational purposes; this designation covers the areas adjacent to and including Langford Brook, which lies alongside the sites western boundary.

6.14 Although designations covering the application area have changed significantly through the progression of the Local Plan (see **Figure 6.2**), within the PIC, part of the portion of land designated as Proposed Recreational Use is retained and the site is proposed for mainly employment generating development. Changes include the

recognition of the County Wildlife Site, new road and footpath linkages and land reserved for future rail development.

- 6.15 Other relevant emerging CLP landscape policies that are applicable to the site and development proposals include:

Policy EN34: Landscape Character seeks *‘to conserve and enhance the character and appearance of the landscape through the control of development.’* Proposals that conflict with this policy and are inconsistent with local character would not be permitted;

Policy EN35: seeks to retain landscape features of importance *‘to the character or appearance of the local landscape as a result of their ecological, historic or amenity value. Proposals which would result in the loss of such features will not be permitted.’* Examples of such features within the application area would be the woodland belts, individual trees, ponds and hedgerows. Tree Preservation Orders (TPOs) exist on the site (see Volume 2 Technical Appendices, Section 6). In total there are sixteen individual and four group TPOs designated, all falling within the eastern portion of the site, under TPO (No.17), 1990 (designated before the construction of Gavray Drive – see Volume 2 Technical Appendices, Section 6);

Policy EN36: Landscape Enhancement

‘The Council will seek opportunities to secure the enhancement of the character of the landscape, particularly in urban fringe locations, through restoration, management or enhancement of existing landscapes, features or habitats and where appropriate the creation of new ones, including the planting of woodlands, trees and hedgerows’;

Policy EN37: Trees, Hedges and Landscaping seeks to promote management, enhancement and planting of native trees and hedgerows.

- 6.16 Two Public Rights of Way cross the application area: footpath ref. 3 and ref. 4 (see Volume 2 Technical Appendices, Section 6). The following two policies focus on the role of footpaths and seek to protect Public Rights of Way:

Policy R3: *‘The Council will seek to establish a series of open spaces in Bicester linked by public footpath/ cycleways with the intention of creating a circular route through the town’;*

Policy R4: Rights of Way and Access to the Countryside

'The Council will safeguard and where possible, enhance the existing public rights of way network. Development over Public Rights of Way will not be permitted unless a suitable diversion can be secured which will not prejudice public right';

Policy R8 deals with the provision of areas of public outdoor recreation playing space, specifying 2.43 hectares per 1,000 population, plus arrangements for long-term management. This is further detailed within the Councils Supplementary Guidance;

- (i.) Recreation and Amenity Open Space Provision, The Provision of Open Space in new Development: Guidance Note, Consultation Draft, December 2003;

Policy R9: Amenity Areas

'The District Council will seek in connection with all new residential development of 10 or more dwellings the provision of new amenity areas. Amenity areas should be designed as an integral part of the development and, where possible, complement and enhance neighbouring land';

Policy EN1: Conserving and Enhancing the Environment

'In determining planning applications the council will take into account the likely impact of a proposal on the natural and built environment and will seek to enhance the environment whenever possible. Development which would have an unacceptable environmental impact will not be permitted';

Policy EN13: Development adjacent to Watercourses deals with the protection and enhancement of watercourses, promoting public access;

Policy EN14: Flood Defence. The areas directly east of Langford Brook within the application area are identified by the Environment Agency as liable to flooding. This policy states that such areas will not be granted planning permission if the storage capabilities of the floodplain were affected, if the water flow were to be impeded or if the flood risk were increased; and

Policy EN28:

'The Council will seek to protect and enhance the ecological value, biodiversity and rural character of the following through the control of development: ...

(v) Otmoor and the floodplain of the River Ray.'

Supplementary Planning Guidance

6.17 Contact with Cherwell District Council confirmed that the following Supplementary Planning Guidance is available in relation to landscape issues:

- (i.) Recreation and Amenity Open Space Provision, The Provision of Open Space in new Development: Guidance Note, Consultation Draft, December 2003.

6.18 Other relevant documents published by the council include:

- (i.) Cherwell District Landscape Assessment, Cobham Resource Consultants, November 1995 - see Volume 2 Technical Appendices, Section 6);
- (ii.) Urban Design Strategy (Banbury, Bicester and Kidlington), Cherwell District Council, Roger Evans Associates, Hillier Parker, 1996;
- (iii.) Delivering the Vision, A Housing Strategy for Cherwell to 2005, Cherwell District Council.

6.19 This guidance has been referenced throughout the landscape assessment and used to influence the scheme design and mitigation proposals.

Summary of Policy

6.20 To comply with policy, development proposals, from a landscape perspective, must demonstrate:

- (i.) Protection of designated features such as the footpath;
- (ii.) Consistency and respect of the landscape context, nearby urban development and existing village settlements;

- (iii.) Consideration and mitigation in respect of hydrology and flooding issues associated with Langford Brook
- (iv.) Minimal impact on views;
- (v.) Incorporation of landscaping and boundary treatments that integrate with the surrounding environment and help create a sense of place.

Landscape Setting of the Site

- 6.21 The Oxfordshire Vales form a generally flat pastoral landscape of clay lowlands. The variations in the soils and slight elevations above the flood levels and poorly draining clays, have determined both agricultural activity and that of settlement and transport patterns (see **Figure 6.3**).
- 6.22 Graven Hill, approximately 1.5 kilometres from the application area, is the most dominant landscape feature in the valley, rising to approximately 115m AOD, however, being MOD land, there is limited public access.
- 6.23 In the floodplain the predominant landuse is pasture contained by thick and generally high hedgerows with occasional hedgerow trees of Oak and Ash. The riparian vegetation is significant, with pollarded willows, ash, poplar, alder and shrubby willows marking the locations of streams and rivers. Roadside hedgerows leading to Bicester are tall and dense, introducing a rural character into Bicester's urban edge.
- 6.24 Villages such as Launton, Ambrosden and Stratton Audley are compact and nucleated, forming a sparse settlement pattern, across the valley floor, surrounding Bicester. This is an area that has grown rapidly within recent years with a mix of housing, commerce and industry.
- 6.25 Where the vernacular architecture has been retained, typical materials are red brick and / or limestone with slate or thatch roofs.
- 6.26 Urban development comprising light industry and employment areas are a dominant feature along the eastern edges of Bicester, following the main transport routes of the A4095 (Gavray Drive) and Birmingham to London railway line. These transport links are significant features in the valley, influencing development and access to Bicester.

To the north lies the disused airfield of RAF Bicester (selected for future residential development within the CLP) and the MOD land of Graven Hill to the south.

- 6.27 The major transport corridor of the M40 lies approximately 4.5km to the west of the site. The site lies approximately at the intersection of two rail links; the Aylesbury Line and defining the western boundary of the application area, the Oxford and Thames Valley Line (a branch line connecting Bicester Town station to Oxford). The Aylesbury Line runs parallel to the north of the application area, connecting Bicester North station to Birmingham and London.

Landscape Character of the Site and the Surroundings

- 6.28 The purpose of assessing the landscape character is to ensure that any proposed changes would maintain, complement or enhance the distinct landscape character of the area.

- 6.29 Landscape character can be assessed at different scales, from the national and regional, down to the county, district and site specific.

- 6.30 Whilst no policy or best practice guidelines for suitable development within landscape character areas are generally provided, Cherwell District Council have produced an Enhancement Strategy as part of their Landscape Assessment, this is detailed from paragraph 6.35 of this document. The assessment of the landscape will assist in understanding what key features define the character so that:

- (i.) Features which make an essential contribution to the character and local distinctiveness are maintained, enhanced and managed;
- (ii.) Changes can be successfully accommodated within the existing context;
- (iii.) Improvements and enhancements can be made where uncharacteristic features detract from the natural beauty of an area.

- 6.31 The landscape character of the area is categorised by the Countryside Agency as being 'Upper Thames Clay Vales' (Character Area 108). An extract of the Character Area description is contained within Volume 2 Technical Appendices, Section 6. Principal characteristics include:

- (i.) Regular well-ordered patchwork field pattern with dense hedgerows;

- (ii.) Enclosed pastures of the claylands;
 - (iii.) 18th century enclosure landscapes;
 - (iv.) Gently undulating, low-lying landscape of mixed farmland; and
 - (v.) Lacking in woodland cover.
- 6.32 The 'Upper Thames Clay Vales' is characterised by enclosed pastures of the claylands within a flat, broad lowland landscape. Isolated areas of higher ground punctuate the flat open character of the landscape. Adjoining the river valleys are secluded pastoral areas on higher ground and open arable land with thick hedges.
- 6.33 Within the Upper Thames Clay Vales the gravels of the river terraces have been extensively exploited, resulting in an altered landform of active and disused water filled pits.
- 6.34 At a district level, the Cherwell District Landscape Assessment CDLA (Cobham Resource Consultants, November 1995) classifies the area including the site as the 'Otmoor Lowlands' character area.
- 6.35 The key characteristics of the Otmoor Lowlands Character Area are:
- (i.) Low lying, flat, wet landscape;
 - (ii.) Oxford clay;
 - (iii.) Overgrown Hawthorn and Blackthorn hedges.
- 6.36 A flat pastoral landscape of mixed farmland with willow lined watercourses (e.g. Langford Brook) in the floodplain of the River Ray.
- 6.37 Distinctive features within the landscape are the isolated hills rising up to 115m AOD, around 50m higher than the surrounding land, some of which are capped by woodland tree cover and in some cases military development. This military development takes on the form of uniform high-density housing development and high security fencing (i.e. Graven Hill and Bicester Airfield).

- 6.38 The CDLA further categorises the character areas into landscape types, the application area falling into the Urban Fringe landscape type (T5) due to the influence of adjacent industrial/employment areas and transport infrastructure.
- 6.39 The Enhancement Strategy for landscape intervention classifies the application area as a 'Restoration Landscape'. New developments within 'restoration landscapes' are required to have a strong landscape framework and seek to enhance the landscape as well as to integrate with the surrounding area.
- 6.40 The urban fringe character type which covers the application area is also classed as a 'Restoration Landscape' under the Enhancement Strategy for landscape intervention, as described below:
- (i.) *'Their character and structure are often quite seriously degraded, although they do retain some discernible remnants of their former character';*
 - (ii.) *'Potentially these landscapes have a greater capacity to accommodate positive change because their former character has already been so substantially weakened.'*
- 6.41 New developments within 'restoration landscapes' are required to have a strong landscape framework and seek to enhance the landscape as well as to integrate with the surrounding area.
- 6.42 The application area is typical of the above character types. Riverside pasture and grass leys are divided by thick hedgerows, many of which have a wet or seasonal ditch associated with them. Urban development, including housing, light industry and transport infrastructure are evident in the surrounding area.
- 6.43 The application area is characterised by pasture, small linear field compartments and tall, mature boundary hedgerows. The dominant, physical elements within the application area are the mature standard oak trees that are an important and sensitive landscape receptor.

Summary of Landscape Character

- 6.44 The landscape assets within the site include; the distinctive mature Oak trees, the riparian vegetation and watercourse of Langford Brook, open paddocks, the strong hedgerow network and the distant views across the valley landscape to rising ground to the south. In relation to landscape features within the application area, the site has a strong landscape character and is representative of the wider surrounding area. Scope exists to enhance these features / assets within the development framework.
- 6.45 The main detracting elements within the landscape are the large warehouse block visible to the north and west of the application area and the transport corridors that encompass the site, evoking an urban fringe character. In the context of this and nearby recent development (Langford Village and Bicester Fields Farm), residential development within the application area would add to the 'new character' of this 'built' landscape, having a limited impact on the existing landscape character and setting of the application area.

Receptors of Change

- 6.46 The main landscape receptors, that is to say, the principal elements of the existing landscape likely to be affected by the proposed development are as follows:
- (i.) Landscape character – potential loss of the enclosed pastureland field network;
 - (ii.) Topography – alteration of existing ground levels;
 - (iii.) Public rights of way – change in character and views.

Sensitivity to Change

- 6.47 Although there are no statutory landscape designations applicable to the application area or its immediate surroundings, the application area is considered to be of Medium Local Importance, with characteristics reasonably tolerant of change. Factors which influence the sites sensitivity to change include:
- (i.) Undamaged strong character of the application area, being representative of the wider surrounding landscape, though encroached upon by surrounding development and urban infrastructure;

- (ii.) Limited extent of the Visual Envelope.

Impact Assessment

The Visual Envelope

- 6.48 The Visual Envelope (VE) defines the area that is visible from the site, or the surrounding area from which any part of the proposed development will be seen. The VE was mapped in May 2004 whilst the vegetation was in full leaf. The VE has been based on views from external spaces within the public domain and not from inside buildings or private gardens. Views from within the application site have identified those private views, which would be affected by the proposed development. The extent of the VE is illustrated on **Figure 6.4**.
- 6.49 The most extensive views are from the central area of the site, where the flat valley landscape allows distant views to the south and the rising wooded ground associated with Graven Hill (115m AOD). The VE is limited to the north of the site, by the densely vegetated rising ground associated with the Aylesbury rail line.

Visual Context

- 6.50 Views to and from the application area form the basis of the assessment of visual impacts. Viewpoints for examination as part of the impact assessment, in order to provide a representative conclusion, vary in the sensitivity of the receptors, a factor that depends upon the location of the viewpoint and activities of the viewers.
- 6.51 The viewpoints to be assessed have been divided into primary and secondary views. This indicates the importance of the view, a principal factor in assessing the significance of any visual impact.

Principal Views

- 6.52 The survey has identified nine principal views towards / from the site. The photo viewpoints and a full description of the principal views are contained within Volume 2 Technical Appendices, Section 6 and illustrated on **Photo viewpoints 1-9**; the principal views include:

- (i.) Photo viewpoint 1: Looking southwest from Gavray Drive adjacent to the northeast corner of the application area, the rising ground to the north associated with the Aylesbury railway line is visible. There are no available long views from this point due to the flat topography and dense vegetation within the application area;
- (ii.) Photo viewpoint 2: From Gavray Drive / A4095 looking northwest towards the application area. The Aylesbury railway line is visible, passing over Gavray Drive, allowing train passengers glimpsed views onto the application area from an elevated viewpoint;
- (iii.) Photo viewpoint 3: Looking north from the corner of Gavray Drive, at the roundabout, the thick, high hedgerow boundaries limit views in all directions;
- (iv.) Photo viewpoint 4: From the bridge crossing the Langford Brook, looking west along Gavray Drive, clear views are available across the western portion of the application area, with a backdrop of mature woodland belts and an industrial warehouse. Rooftops of three storey residential dwellings associated with Bicester Fields Farm are visible beyond dense vegetation associated with the open space adjacent to Langford Brook.
- (v.) Photo viewpoint 5: From the southern section of Gavray Drive, looking south towards the properties overlooking Langford Brook linear park. Filtered / limited views are available beyond dense strips of vegetation, from first floor windows of these private dwellings;
- (vi.) Photo viewpoint 6: Looking northeast from within the application area, on footpath ref. 3, large industrial blocks exist adjacent to the site, to the north and west. The view is fringed and limited by mature hedgerows and woodland belts, both internally and along boundaries.
- (vii.) Photo viewpoint 7: View from footpath ref. 3, in the northwest corner of the application area, looking out across the flat extent of the western portion of the site, towards Gavray Drive. Views are available to a limited number of private dwellings to the south of Gavray Drive;
- (viii.) Photo viewpoint 8: Looking west upon entering the application area on footpath ref. 4, from Gavray Drive. Dense hedgerows and scrub vegetation limits and filters views in all directions;

- (ix.) Photo viewpoint 9: From the elevated position of bridleway ref. 9 on Blackthorn Hill (80m AOD) some 1.6km southeast, there are distant filtered views to the application area, which can be located by the large warehouse block associated with Bicester Park which lies to the north of the site.

Receptors of Change and Their Sensitivity

- 6.53 The main receptors likely to experience visual change arising from the proposed development have been identified below and classified according to their sensitivity into primary, secondary and tertiary viewpoints. These receptors are illustrated on **Figure 6.5: Viewpoint Sensitivity Plan** and Viewpoint and Landscape Character Assessment Sheets that follow.

Primary Viewpoints

- 6.54 Views from the most sensitive receptors i.e. those places from which the greatest magnitude of change may be experienced:
- (i.) Public Footpath ref. 3, which crosses the western portion of the site (see Photo viewpoint 6);
 - (ii.) Public Footpath ref. 4, which crosses the eastern portion of the site (see Photo view point 8).

Secondary Viewpoints

- 6.55 Views from sensitive receptors within 1 kilometre of the site i.e. those places where a moderate magnitude of change may be experienced. Secondary receptors include views from people engaged in outdoor sports or recreation, including people in cars and those driving on local roads. Such views can be classified as Medium Sensitivity receptors:
- (i.) Sections of Gavray Drive and associated private properties;
 - (ii.) Oxford and Thames Valley railway line;
 - (iii.) Aylesbury railway line.

- 6.56 It is recognised that there are also glimpsed views from Low Sensitivity receptors, such as views from public places and private properties over 1km from the application area and/or glimpsed filtered and within 1km of the application area. These tertiary views are not illustrated as photo viewpoints, with the exception of Photo viewpoint 9.

Impact Identification and Magnitude

- 6.57 The second task in preparing the Impact assessment is the systematic identification of all the potential landscape and visual impacts at different stages in the life cycle of the development.
- 6.58 This process is based on the anticipated effects of the development, either temporary, or permanent as summarised below.

Temporary Impacts

- 6.59 In general terms the impacts resulting from the construction phase of the building programme will be temporary, operating over several phases, lasting no more than seven years. Construction activities can be a source of significant disruption and visual intrusion, albeit over a relatively short period of time. Appropriate measures will need to be put in place to avoid and reduce these impacts.
- 6.60 The principal components of construction phase likely to affect the landscape and visual amenity include the following:
- (i.) Fencing to identify and protect wildlife areas and retained trees before and during construction;
 - (ii.) Site clearance, removal of vegetation;
 - (iii.) Site access and haulage routes;
 - (iv.) Fixed construction plant such as cranes;
 - (v.) Mobile construction plant, such as pneumatic breakers;
 - (vi.) Excavators, compressors and lorries;
 - (vii.) Cut, fill and disposal;

- (viii.) Stockpile and material storage areas;
- (ix.) Site huts and protective hoardings;
- (x.) Utilities, including water, drainage, power and lighting.

Permanent Impacts

6.61 The impact of the development will continue through its lifespan. The principal aspects of the proposals, which are likely to have a permanent impact on the landscape character, landscape features and visual amenity, are summarised as:

- (i.) Loss of selected hedgerows and a limited number of mature trees;
- (ii.) Loss of existing site surface of approximately 13ha (32 acres) in relation to residential development of approximately 500 dwellings of maximum 10 metres (three storeys) in height;
- (iii.) Introduction of lighting into the application area, along roads and throughout the development;
- (iv.) Ground level alterations of a maximum of 1 metre elevation to parts of the western portion of the site only;
- (v.) New landscape planting.

6.62 The impact of the new predicted permanent features will persist during the operational lifespan of the development, with some decrease over time due to the mitigation measures and receptor adjustments.

Indirect Impacts

6.63 The following consequential elements of the scheme could have a landscape and visual effect:

- (i.) Upgrading of local highway infrastructure and new signs including highway modifications;

- (ii.) Upgrading of rail network.

Impact Prediction and Significance

6.64 The predicted impact on the landscape and visual receptors along with significance of the impacts is assessed using the matrices shown in **Figures 6.0 and 6.1**. These are based on published best practice. The impact on the landscape character receptors listed and the visual receptors are also described and assessed in the figures and summarised within tables within the figures.

Direct Impacts on Landscape Character

Temporary Impacts:

- (i.) Change in character to the river corridor associated with Langford Brook as a result of adjacent construction activities;
- (ii.) Change in character of application area in general from enclosed pastureland to construction site;
- (iii.) Change in character of public rights of way in the vicinity of the site from principally rural / urban fringe to construction site with visual and noise disturbance due to construction activity.

Permanent Impacts:

- (i.) Change in character of the application area from semi-enclosed grassland / paddocks to residential development and associated infrastructure;
- (ii.) Change in the character of public rights of way in the vicinity of the site from principally rural with urban influence to residential development and associated infrastructure;
- (iii.) Change in the character of the river corridor of Langford Brook due to enhancement and habitat creation.

Impacts on Visual Amenity

Temporary Impacts:

- (i.) Distant views north from the bridleway ref. 9 at Blackthorn Hill towards the construction activities and site compounds during the period of construction;
- (ii.) Restricted access and disturbance of views from footpaths ref. 3 and ref. 4 as a result of construction activities and associated site compounds; and
- (iii.) Glimpsed, filtered views from sections of Aylesbury / Oxford & Thames Valley railway lines, Gavray Drive and associated residential properties of construction activities and associated site compounds.

Permanent Impacts:

- (i.) Distant indistinct views northwest from bridleway ref. 9 on Blackthorn Hill towards the application area and associated traffic movements of Gavray Drive. At this distance the most significant affect will be the reflection of natural light off moving vehicles, during winter months and the presence of vehicle lighting during hours of darkness;
- (ii.) Glimpsed, filtered views from residential properties along limited sections south of Gavray Drive, within the Langford Village Development;
- (iii.) Views from public footpaths ref. 3 and ref. 4 will be directly affected by the development, especially where the footpath passes through the application area itself;
- (iv.) Impact on views to the application area from residential dwellings alongside the northern section of the Langford Brook linear park, pedestrian and vehicular users of Gavray Drive. The areas immediately adjacent to Langford Brook are visually sensitive due to the open characteristics of the views across semi-enclosed grassland paddocks will be disturbed by the presence of residential dwellings as a backcloth and the associated movement of traffic through the landscape.

Lighting:

- 6.65 The development will require the use of lighting along all internal roads. This will introduce new sources of light into a landscape that is currently unlit, although the southern parts of the site are influenced by the light sources associated with the existing residential development to the south of Gavray Drive and along the road corridor of Gavray Drive / A4095.
- 6.66 The impact of lighting will be seen slightly further away than the physical structure of roads or the vehicles using it, due to the glow effect. Light pollution originates from:
- (i.) Light spill – light that trespasses beyond the area of need;
 - (ii.) Upward Light and Upward Reflected Light – also known as ‘sky glow’ this results from misaligned lights and reflected from surface treatments;
 - (iii.) Light Scatter – light will be defracted by dirt on the glass or in the atmosphere.
- 6.67 Whilst modern lighting installations can be more carefully considered these factors have been accounted for in the design of the residential development and public open space.
- 6.68 The proposed development will include the introduction of lighting into the application area. The potential receptors of visual impact have been identified above, within this chapter. However, it is likely that the existing degree of enclosure and landscape framework upon the site will reduce the magnitude of impact of night time lighting.
- 6.69 Effects on the night time views will be significant due to the need to extend lighting into the development site currently only affected by light spill and scatter from the adjacent edge of the urban area. The lighting effects should be seen in the context of the urban area. Nevertheless mitigation measures will need to be incorporated into the lighting design strategy to minimise such impacts as set out below.

Mitigation

- 6.70 The project landscape consultants have been involved with the development of the scheme proposals throughout the design process. Therefore the proposals have responded to landscape issues as appropriate. How landscape and visual mitigation has been included within the scheme design is detailed below (see **Figure 6.16: Proposed Landscape Mitigation and Enhancement Framework Plan**).
- 6.71 This section describes how the temporary and permanent impacts on both landscape character and visual amenity can be mitigated. Mitigation takes the form of:
- (i.) Avoidance of adverse effects;
 - (ii.) Reduction of adverse effects;
 - (iii.) Compensation of adverse effects.
- 6.72 This section also explains how the scheme goes further than providing basic mitigation, by yielding opportunities for the enhancement of some aspects of the wider landscape and visual resources of the site.

Avoidance of:

- (i.) Unnecessary diversion of existing footpaths;
- (ii.) Built development immediately adjacent to the most visually sensitive areas such as adjacent to the river corridor of Langford Brook;
- (iii.) Use of unnecessary road embankments and associated infrastructure such as lighting;
- (iv.) Unnecessary damage to existing trees and hedgerows by fencing off vegetation to be retained before construction;
- (v.) Removal of existing hedgerows and tree belts by incorporating them within the development open space and footpath network. Only one tree, protected by a TPO will be lost due to the development.

Reduction:

- (i.) Construction of built form to a maximum height of three storeys (approximately 10m), in small groups across the application area in accordance with surrounding developments, maintaining the open characteristics of the landscape and retaining glimpsed/filtered views southeast to the rising ground;
- (ii.) Manipulation of the siting, scale, form, density and massing of the proposed buildings and use of combined landscape elements including fencing, hedging and tree planting within the development to enhance the character of the site;
- (iii.) Dwellings will be built in clusters, courtyards and cul-de-sac for social and environmental reasons. This will also tend to contain the effects of street lighting;
- (iv.) The location of housing areas will utilise the sites existing compartmentalised structure based on the field pattern, retained hedgerows, hedgerow trees and protective buffers and bunding. Retained hedgerows and tree belts will provide green wedges separating housing areas and provide sites for new planting, incidental open space and pedestrian links between the clusters, existing parts of Bicester and open grassland areas;
- (v.) Restricting the height of light columns and increasing the number deployed as far as providing a safe environment for pedestrian and vehicles;
- (vi.) Retention of the existing boundary vegetation and bunding associated with Gavray Drive;
- (vii.) The reinforcement of existing hedgerow and tree planting, enhancing the 'green link' of the Langford Brook linear park;
- (viii.) Careful choice of route alignment for roads and footpaths/cycleways to minimise impact on mature trees and hedgerows within the application area;

- (ix.) Within the constraints presented by planting seasons, the implementation of landscape planting will be phased so that it occurs concurrently with construction work;
- (x.) Retention of public footpaths ref. 3 and ref. 4 across the site following the construction phase.

6.73 Considering lighting provision for the development and the link road, potential light pollution will be addressed and mitigation measures adopted. As follows:

- (i.) Consultation of relevant literature, BS 5489, EN 13201, and Lighting in the Countryside: Towards Good Practice (Countryside Commission 1997);
- (ii.) Lighting only up to the edge of the area needed for public amenity and safety;
- (iii.) Lighting equipment will be chosen to minimise the upward spread of light;
- (iv.) To reduce glare the main beam angle will be adjusted so that it is not directed towards potential observers.

Compensation:

- (i.) Replacement native tree and hedgerow planting, and new grassland mix to compensate for the surface vegetation and habitats lost during the construction phase;
- (ii.) Pond restoration and creation to replace habitats lost during construction;
- (iii.) Loss of relatively open views along footpaths will be remedied by the retention of long views out to local hills from areas of public open space and by providing new footpaths and footpath / cycleways within the application area;
- (iv.) Improved management of trees retained alongside areas where trees have been felled, to encourage healthy future growth;

- (v.) Strengthening of existing hedgerows by filling existing gaps with new planting to compensate for loss of hedgerows and gaps created for new access.

Enhancement Measures:

- (i.) Enhancement through a strengthened management plan for the areas of grassland retained, adjacent to Langford Brook will allow for the establishment of seasonally flooded wetland areas and associated marginal native planting. Since these areas are to be retained and physically unaffected by development;
- (ii.) Existing trees, hedgerows and ponds will be protected, maintained and managed to ensure a healthy condition is created and sustained. This will involve some planting within existing woodland belts to improve the age structure. Existing ponds within the application area will be re-excavated where required and enhanced with new marginal planting to improve the pond habitat and its ecological potential. These features will provide visual interest and benefits for local wildlife;
- (iii.) Individual tree planting throughout the site in the form of street trees and parkland trees in areas of open space and new hedgerow planting.

Residual Effects:

- 6.74 The landscape character and visual effects of the development proposals upon the wider landscape are considered to be negligible; however, in terms of local landscape and visual effects the impacts of the proposals are slightly more significant.

Landscape Character:

- 6.75 The mitigation proposals include ecological enhancements to areas adjacent to Langford Brook, adoption of approximately 4.7ha (2.21 acres) as a County Wildlife Site and the implementation and management of a new wetland habitat. The proposed retention of grassland areas adjacent to Langford Brook, to the west of the application area, will involve some a management strategy to enhance the wetland habitat, flora and fauna. The mitigation strategy would reduce the permanent residual effects of the adjacent development to be low (beneficial).

- 6.76 The change in the setting of public footpaths (ref. 3 and ref. 4) due to the proximity of the residential development would impact upon the character of the footpath, from principally rural to more urban in character. Mitigation measures for the retention of the existing Public Rights of Way and the creation of new footpaths and cycleways are considered to be medium (adverse), since, although the route will remain unchanged there will be a substantial permanent alteration to the character of the existing right of way.
- 6.77 Loss of some 593m of tree belts/hedgerows and loss of a limited number of trees, 6no. in total. This would have a low (adverse) impact upon the landscape character of the application area provided that future management plans for the protection and enhancement of the existing trees and hedgerows were implemented and replacement planting carried out.
- 6.78 There would be a noticeable change in the character of the landscape of the application area. The enclosed linear parcels of pastureland of the eastern portion of the site and the open paddock of the western portion would become residential development land, including associated infrastructure. There would be a significant increase in activity due to the increase in residential dwellings, the proposed primary school and local facilities. Mitigation planting and management will be used to enhance an otherwise neglected landscape, thus creating an additional area of public access land; the permanent residual landscape effects upon the existing floodplain paddock landscape, are considered to be low (adverse).

Visual Amenity

- 6.79 The permanent residual effect on the visual amenity of Public Footpaths ref. 3 and ref.4 is considered to be medium (adverse) due to the inherent sensitivity of Public Rights of Way and the significant change in views, from more open and rural to residential and enclosed.
- 6.80 Views from the retained footpaths (ref. 3 and ref. 4) will be significantly affected, especially where the footpaths pass through residential areas. The degree of visual effect is considered to be medium (adverse); however, views across the retained grassland and river corridor will be improved through the implementation of native planting, management and enhancement schemes.

- 6.81 Views from and across the northern section of the Langford Brook linear park and from associated private dwellings towards the application area will change as a result of development and increased traffic along Gavray Drive.
- 6.82 Although the majority of the development will be at-grade with the existing landscape and the limited views across the site to distant higher ground will be retained, a significant degree of visual disturbance will be created by the movement of traffic, especially during hours of darkness. The permanent residual visual effects upon the users and residents to the south of Gavray Drive are considered to be medium (adverse).
- 6.83 Although a number of existing landscape features will be reinforced and new planting of native species will add visual interest to localised views, a significant degree of visual disturbance will be created by the increased movement of traffic, especially during hours of darkness. The permanent residual visual effects upon users of Gavray Drive are considered to be low (adverse).
- 6.84 The visual effect on the passengers travelling on the two railway lines which border the site (Aylesbury railway line and Oxford & Thames Valley line) will be negligible (adverse) due to the filtered/glimpsed views only available at speed.

Monitoring

- 6.85 There is no proposed monitoring of landscape impacts following completion of the project.

Conclusion

- 6.86 A comprehensive assessment of the landscape and visual effects of the residential development and associated infrastructure has been carried out in accordance with the relevant good practice guidelines. This has addressed the effects on landscape character of the Upper Thames Valley and the effect on views across the application area from Langford Village and Bicester Fields Farm.
- 6.87 Without the development, the grassland paddocks would largely remain in agricultural use as grazed farmland. It is unlikely that the condition of the existing landscape features such as the overgrown hedgerows and declining health of trees would be substantially improved otherwise.

- 6.87 The effects considered of medium adverse significance (and therefore the most effected) from the completed development with mitigation will be:
- (i.) The change in character and in views from the two footpaths which traverse the application area;
 - (ii.) The change in views from existing residential properties adjacent to Gavray Drive.
- 6.88 These effects have been assessed to be of medium significance largely due to the change in character from predominantly rural urban fringe to urban in nature.
- 6.89 The overriding landscape principle for the development is to integrate the residential development and associated infrastructure into the existing landscape and the developments of Bicester Fields Farm and Langford Village. This will be realised by constructing the large proportion of the development at-grade with the existing topography, reinforcing existing landscape features and retaining principal views. However, the development will alter the character of the Otmoor lowlands. Views across the valley to the distant rising ground of Graven Hill and Blackthorn Hill will also be restricted in places as a result of two-three storey dwellings in the close vicinity.
- 6.90 The residential development would include infrastructure such as a primary school and local facilities; as well as increasing traffic and general activity in the area, this would benefit the local community and increase available resources.
- 6.91 The construction and implementation impacts of the development can be summarised as being low (adverse), and where avoidance mitigation has not been possible, planning, design and landscape planting measures seek to reduce the effects.
- 6.92 The most significant effect of the mitigated development will be the increased activity and visual disturbance of moving traffic through the landscape, particularly the presence of vehicular lighting during hours of darkness.
- 6.93 The detailed execution of the landscape mitigation proposals for the residential development will be controlled and developed through consultation with Cherwell District Council, and thereafter, through the development control process.

6.94 The scheme proposed for Land North of Gavray Drive, complies with policy and respects landscape character in the following ways:

- (i.) Protection of Public Footpaths ref. 3 and ref. 4, retaining pedestrian links to the wider landscape;
- (ii.) Loss of relatively open views along footpaths will be remedied by the retention of long views out to local hills from areas of public open space and by providing new footpaths and footpath / cycleways within the application area;
- (iii.) Consistency and respect of the landscape context, nearby urban development and existing village settlements, through design, materials, scale, form and density;
- (iv.) Careful choice of route alignment for roads and footpaths/cycleways to minimise impact on mature trees and hedgerows within the application area;
- (v.) Incorporation of existing boundary treatments that integrate with the surrounding environment and help create a sense of place; and
- (vi.) Reinforcement, integration, protection and enhancement of existing landscape features within the development and open space provision to replace habitats lost during the construction phase.

7.0 ECOLOGY

Introduction

- 7.1 This ecological impact assessment has been prepared by CPM Environmental Planning and Design Ltd (CPM). It is an assessment of the significance and consequences of the potential ecological impacts arising from the proposed development at a site adjacent to Gavray Drive, Bicester, Oxfordshire.
- 7.2 More specifically, this chapter describes and evaluates the potential ecological receptors, predicts the likely biophysical changes and assesses the resultant ecological impacts on valued ecological receptors. Enhancement, impact avoidance and mitigation measures have been developed throughout the assessment process and have been integrated into the site design and layout as inherent mitigation.
- 7.3 The approach taken in this assessment is made with reference to the draft guidelines produced by the relevant steering group of the Institute of Ecology and Environmental Management (IEEM) in November 2002¹.
- 7.4 The scope and method of this assessment and features of the design of the proposed development have been discussed with local ecological consultees, including Oxfordshire's County Wildlife Site Selection Panel, which includes Oxfordshire's County Ecologist and representatives from English Nature, the BBOWT and Oxfordshire's Biological Records Centre.
- 7.5 Ecological information was gathered from local environmental organisations in 2002 and 2004, and through site surveys undertaken during the period 2002 to 2004.
- 7.6 The ecological impact assessment has been made with reference to the development proposals as set out in Chapter 2 and the Development Framework Plan **Figure 102**.

Methodology

Desk Study

- 7.7 A desktop search for relevant ecological records was undertaken in 2002 and 2004 to focus the survey effort and aid the evaluation process by providing contextual information. Records were collated for an area of 2km radius centered on the site

¹ IEEM (2002) *Guidelines for Ecological Impact Assessment (Draft)*.

which is considered to cover the key zone of influence of the proposed development.
The organisations contacted for existing ecological records included:

- (i) Berkshire, Buckinghamshire and Oxfordshire Wildlife Trust (BBOWT);
- (ii) Botanical Society of the British Isles;
- (iii) English Nature;
- (iv) Environment Agency;
- (v) North Oxfordshire Ornithological Society;
- (vi) Oxfordshire County Council;
- (vii) Oxfordshire Badger Group;
- (viii) Oxfordshire Bat Group.

7.8 Pertinent information received from the parties listed above has been incorporated into the relevant section of this report with due acknowledgement.

7.9 In addition to information supplied by the above organisations, the following information was also reviewed as part of the desk study:

- (i) As part of an archaeological investigation undertaken by Oxford Archaeology Unit (OAU) undertaken during 1996, a hedgerow survey was undertaken in order to assess the age of the hedgerows by the number of species present within each hedgerow;
- (ii) Cherwell District Council commissioned Scott Wilson Kirkpatrick & Co. Ltd (SWK) to undertake an ecological study of several sites allocated for development in the emerging local plan. The Gavray Drive site was included in this assessment. The relevant parts of the report are reproduced at Appendix 1;
- (iii) After the SWK survey, the site was visited by the Berkshire, Buckinghamshire and Oxfordshire Wildlife Trust (BBOWT) as part of a wider survey programme designed to identify sites that qualify for Wildlife Site (WS) status.

The report is reproduced in full at in Volume 2, Technical Appendices, Chapter 7, Appendix 2.

Scoping Consultations

7.10 During the period 2002 to 2004, the scope of the ecological investigations and mitigation options have been developed in consultation with the following organisations:

- (i) English Nature;
- (ii) County Wildlife Site Selection Panel (CWSSP) (which includes Oxfordshire County Council's ecologist and representatives from BBOWT and English Nature).

7.11 During 2003, meetings and discussions with the CWSSP were held to agree an area of the CWS that would be retained when the proposed development is implemented. Copies of the meeting notes are included as Volume 2, Technical Appendices, Chapter 7, Appendix 3.

Field Surveys

7.12 To establish baseline conditions on the site a number of ecological surveys were undertaken during 2002, and where applicable, these surveys were updated during 2004.

7.13 The survey technique adopted for general appraisal work was at a level intermediate between the Nature Conservancy Council (NCC) (1990)² standard 'Phase I' and 'Phase II' surveys. This level of survey involves identifying and mapping the principal habitat types, and identifying the dominant plant species. Observations were also made on the fauna present and, in particular, evidence of, and the potential for, protected and notable species. The survey is sufficient to describe the habitats present and evaluate the likely impact of development proposals. However, this level of survey does not provide a comprehensive list of either flora or fauna. The initial general appraisal work was undertaken on the 26th April 2002.

² Nature Conservancy Council (1990) Handbook for Phase I Habitat Survey – A Technique for Environmental Audit. JNCC, Peterborough.

- 7.14 This work was updated to check for any material changes on the general ecological survey of habitats described above was most recently updated on the 30th April 2004.
- 7.15 A number of more detailed surveys have also been completed in relation to particular species/species groups and habitats. These include:
- (i) Grassland survey (2002 only);
 - (ii) Hedgerow and scrub survey (2002 only);
 - (iii) Pond survey (2004);
 - (iv) Bat survey (2002 and 2004);
 - (v) Amphibian survey (2002 and 2004);
 - (vi) Reptile survey (2002 and 2004);
 - (vii) Water vole survey (2002 and 2004);
 - (viii) Badger survey (2002 and 2004).
- 7.16 During the course of the detailed surveys, incidental records of other fauna were also recorded.
- 7.17 Details of the survey methodologies are provided below.

Vegetation and Habitats

- 7.18 In addition to the general site appraisal undertaken on the 26th April 2002, updated on the 30th April 2004, which identified and plotted the main vegetation and habitat types, the site was visited on subsequent occasion to undertake detailed habitat-specific surveys.
- 7.19 The update of the general appraisal work during 2004 did not identify any significant material change in the grassland, hedgerow and scrub habitats within the site since the detailed surveys of these habitats undertaken during 2002. It was therefore considered that the detailed surveys undertaken during 2002 for these habitats were still pertinent.

- 7.20 The state of much of the site made access to some parts very difficult, a problem also alluded to in the Wildlife Trust report (Volume 2, Technical Appendices, Chapter 7, Appendix 2). A full assessment of some areas was therefore not possible and the lists of species given in this report are inevitably incomplete. The site has, however, now been well-studied by CPM, the Wildlife Trust and Scott Wilson Kirkpatrick and the level of information available is certainly considered adequate to characterise the level of ecological interest of the various parts.

Grassland Survey

- 7.21 A subjective assessment of the abundance of plant species was made using the DAFOR scale during the grassland survey. In two fields, quantitative information about plant cover was collected using 2 x 2m quadrats.

Hedgerow Survey

- 7.22 The hedgerow survey was undertaken with reference to the approach set out in the Hedgerows Regulations 1997. An example survey sheet is included at Volume 2, Technical Appendices, Chapter 7, Appendix 4. Many of the hedgerows have expanded into the adjacent fields, creating broad strips of scrub. This made it difficult to survey the hedges strictly in accordance with the Regulations because the flora in the hedge base and shrubs in the hedge centre were often impossible to examine closely.

Pond Survey

- 7.23 A qualitative assessment of the ponds was made to provide a description of the habitats and to provide a background to understanding the amphibian population within the site.

Species

Reptile Survey

- 7.24 During the general appraisal work, potential reptile habitat was identified within the site. Detailed reptile surveys were undertaken during 2002 and 2004. On both occasions, the detailed surveys involved setting out artificial reptile refugia in potential reptile habitats across the site. The refugia consisted of sheets of roofing felt and

carpet tiles measuring approximately 50 x 50cm. The refugia were allowed to 'bed-down' for at least seven days prior to being checked for reptiles on three subsequent occasions during suitable weather conditions. Refugia can also be used by amphibians during their terrestrial phase. A summary of the timing, weather conditions and the number of refugia used in 2002 and 2004 is provided in **Table 7.1**.

Table 7.1 Reptile Survey Timings, Weather Conditions and Number of Refugia

Year	Date	Weather Conditions During Survey	No. of Refugia
2002	15 th May 2002	Slightly overcast but sunny, mild with light breeze	100
	21 st May 2002	Initially warm and dry but rain later	
	16 th July 2002	A hot day, air temperature reaching 22°C	
2004	13 th May 2004	Mild with light breeze, sunny	145
	21 st May 2004	Clouds, but some sunny spells	
	24 th May 2004	A hot day, air temperature reaching 24°C	

Amphibian Survey

7.25 The amphibian surveys were undertaken initially during 2002 and updated during 2004.

7.26 Three standard techniques were used to determine the presence and abundance of amphibians in the ponds and other water bodies shown on **Figure 7.1 - Habitat Features Plan**. The survey was particularly intended to establish whether great crested newts (*Triturus cristatus*) were present at the site and, if present, assess the population levels. Therefore, the surveys were undertaken in accordance to the survey standards set out in English Nature guidelines³. The techniques are described more fully elsewhere⁴ but are summarised below:

- (i) Torching: This involves searching water bodies by torchlight between dusk and midnight and is an effective means of detecting adult newts. A four-cell MAGLITE® torch was used during 2002. A Clulite torch was used during the 2004 surveys;

³ English Nature (2001) *Great Crested Newt Mitigation Guidelines*, English Nature, Peterborough.

⁴ e.g. Langton, T.E.S., Beckett, C.L. and Foster, J.P. (2001). *Great Crested Newt Conservation Handbook*, Froglife, Halesworth.

- (ii) Netting: This involves use of a dip-net to detect adult newts or, later in the year, newt larvae. A net with 250 mm frame and 2 mm mesh was used;
- (iii) Bottle Trapping: This involves the use of funnel traps (made from 2 litre plastic bottles) that are inserted into the water around the pond margin during the evening and checked the following morning. Newts are able to gain easy access but become trapped by the funnel arrangement;
- (iv) Egg Searching: An egg search was also undertaken but the scarcity of aquatic plants limited the usefulness of this method in the present case.

7.27 The amphibian surveys were undertaken by English Nature licensed surveyors for great crested newts. The dates of survey and conditions during the surveys are given at **Table 7.2**. **Table 7.3** identifies the number of bottle traps used during the 2002 and 2004 survey.

Table 7.2: Amphibian Survey Conditions

Date	2004												
	2002	9 th May	15 th May	21 st May	22 nd May	6 th June	14 th June	18 th March	1 st April	27 th April	29 th April	6 th May	12 th May
Water temperature	Min (°C)	11	15	15	14	15	16	7	10	Not	7	5	12
	Max (°C)	12	15	15	14	15	16	70	13	Recorded	10	5	13
Evening air temperature (°C)		12	14	15	15	15	21	7	14	10	12	4	7
Evening Weather conditions		Overcast	Overcast	Overcast with rain	Clear	Overcast	Overcast	Clear	Overcast	Overcast	Overcast after heavy rain	Clear after heavy rain	Overcast

Table 7.3: Bottle Traps used for Newt Surveys

Location	Number of Bottle Traps	
	2002	2004
Pond P1	2-4 bottle traps, median = 3	6 bottle traps
Pond P2	1-3 bottle traps, median = 1	4 bottle traps
Pond P3	6 bottle traps on each occasion	6 bottle traps
Pond P4	3-5 bottle traps, median = 4	10 bottle traps
Pond P5	4-6 bottle traps, median = 5. No traps used on final visit when pond dry	31 bottle traps ⁵
Pond P6	1-6 bottle traps, median = 3	6 bottle traps
Pond P7	Not surveyed	10 bottle traps
Pond P8	Not surveyed	10 bottle traps
Channel	4-8 bottle traps, median = 5	4 bottle traps

Bat Survey

7.28 The SWK report identified the need for a bat survey at Gavray Drive, particularly on the basis of foraging potential. The initial general appraisal work also identified the potential for notable bat interest within the site on the basis of:

- (i) A network of hedgerows and treelines that might provide important flight lines for bats passing through the site from off-site roosts to foraging grounds elsewhere;
- (ii) A network of habitats including stream, grassland and treelines that has the potential to provide bat foraging in its own right;
- (iii) The mature trees that may provide roost sites for some bat species.

7.29 Bats use ultrasound to navigate and locate insect prey. Normally inaudible to humans, the ultrasound can be made audible through the use of an ultrasonic bat detector. The bat detector can assist with the identification of a bat to species or species group and also identify the type of activity of the bat. Bat detectors are therefore an important element in many bat surveys.

⁵ Since P5 has expanded in size since the survey undertaken during 2002, the number of traps used was significantly higher during the 2004 survey.

- 7.30 There are three kinds of bat detector in common use: heterodyne, frequency division and time expansion. In general, heterodyne and frequency division bat detectors are best for studies designed to record the type and abundance of bat activity whilst time expansion detectors are best if greatest certainty in identification is required.
- 7.31 All bat species are protected in Britain. Certain identification to species level was therefore considered to be less important than obtaining information on the amount and type of bat activity (i.e. the extent of any constraint) at Gavray Drive. A combined approach using the two real-time systems of heterodyne and frequency division detection was therefore adopted. The former provided a good indication of the types of bat activity encountered in the field and the latter allowed for computer analysis of ultrasound to assist with the identification process. This twin approach is gaining popularity and has been recommended for use in the National Bat Monitoring Programme⁶.
- 7.32 Sixteen sampling locations were identified at the site on the basis of the initial habitat survey. Owing to the way many bat species follow linear features when commuting from roost sites to foraging areas, sampling points were chosen in locations along hedgerows and treelines. The sampling arrangement is shown on **Figure 7.2** - Bat Survey Sampling Locations and is such that any bat traversing the site is likely to pass at least one of the sampling points.
- 7.33 During 2002, all sampling points were surveyed for a ten minute period on each of two occasions from dusk onwards. Sample points were surveyed in a different order during the two occasions. On the first visit, sample points 1-16 were surveyed by two teams of two surveyors each on the same evening. The second visit involved a single ecologist surveying locations 1-8 on one evening and 9-16 on the following evening.
- 7.34 During 2004, all sampling points were surveyed for a ten minute period on one occasion from dusk onwards. On the first visit, sample points 1-8 were surveyed by a team of two surveyors. On the second visit, sample points 9-16 were surveyed in the same manner as the first visit.
- 7.35 At each point during each visit, a tally was kept of the numbers of bats of each species identified and the type of activity observed. A general record of bat activity was also maintained when walking between ten minute sampling locations. Bat activity was classified as foraging if regularly patrolling a 'beat' or if a 'feeding buzz'

⁶ Catto, C. (2002). Bat Monitoring Post, April 2002, p17-18.

was detected (pulses of ultrasound emitted at a characteristically increasing rate as the bat homes in on its prey). Commuting activity was recorded if the bat showed clear directional movement without feeding. In some cases, contact was too brief either to identify the species of bat or the type of activity.

7.36 Details of the survey times and conditions for the 2002 survey are given in **Table 7.4**.

Table 7.4: Survey Times and Conditions for 2002 Bat Survey

		Sample Locations	
		1-8	9-16
First Survey	Date and Time	26 th June 2002, 9:45-11:35 pm	26 th June 2002, 9:45-11:35 pm
	Weather Conditions	Slight breeze from SW, 0/8 to 6/8 cloud cover, air temperature 16°C dropping to 12.5°C, no rain	Slight breeze from SW, 0/8 to 6/8 cloud cover, air temperature 16°C dropping to 12.5°C, no rain
Second Survey	Date and Time	16 th July 2002, 9:30-11:25pm	15 th July 2002, 9:30-11:25pm
	Weather Conditions	Still to light breeze from N, 0/8 to 3/8 cloud cover, air temperature 17°C dropping to 14°C, no rain	Light breeze from N, 8/8 cloud cover, air temperature 21.5°C dropping to 20°C, no rain

7.37 Details of the survey times and conditions for the 2004 survey are given in **Table 7.5**.

Table 7.5: Survey Times and Conditions for 2004 Bat Survey

		Sample Locations	
		1-8	9-16
First Survey	Date and Time	19 th May 2004 9.00 – 10.45pm	Not surveyed
	Weather Conditions	Warm	Not surveyed
Second Survey	Date and Time	Not surveyed	24 th May 2004 8.30 – 10.30pm
	Weather Conditions	Not surveyed	Still, high cloud cover, air temperature approximately 15°C

- 7.38 A Batbox Duet bat detector was used for ultrasonic detection. The heterodyne output was used in the field to assist in the identification process and the frequency division output recorded onto a Sony MZ-R700 minidisc recorder for computer analysis using BATSOUND 3.10, as required. The survey data is presented in Volume 2, Technical Appendices, Chapter 7, Appendix 5 and summarised below.

Water Vole Survey

- 7.39 During the water vole survey undertaken in 2002 and updated in 2004, the brook was walked and evidence of water vole activity searched for including:

- (i) Burrows and runs;
- (ii) Feeding stations;
- (iii) Footprints.

Badger Survey

- 7.40 During the badger survey undertaken in 2002 and updated in 2004, the site was walked and evidence of badger activity searched for including:

- (i) Setts (the underground tunnel system occupied by badgers);
- (ii) Well-worn pathways;
- (iii) Dung pits;
- (iv) Badger hairs snagged on fencing wire, branches etc;
- (v) Characteristic footprints;
- (vi) Signs of foraging activity such as 'snuffle holes'.

Incidental Records

- 7.41 During the course of the various surveys undertaken at the site between 2002 and 2004, incidental records of other fauna were recorded, including otters.

Evaluation

Table 7.6: Guidance Regarding Evaluation of the Level of Importance for Sites, Habitats and Species

Level of importance	Examples of features or resources		
	Sites	Habitats	Species (including populations, assemblages, communities)
International	Biosphere Reserve; World Heritage Site (where natural features are a reason for designation); Designated, candidate or proposed SAC, SPA or Ramsar site; Any area which the relevant country agency has determined meets the published selection criteria for such designation irrespective of whether or not it has yet been designated.	Any viable area of an internationally important habitat type, e.g. priority habitats as identified in Annex I of the Habitats Directive; Any area of habitat that is regularly used to support a critical phase of the life cycle of an internationally important species that is rare or threatened in the UK.	Any nationally significant number of an internationally important species that is rare or threatened in the UK, i.e. a UK Red Data Book Species or species occurring in 15 or fewer 10km squares in the UK (categories 1 and 2 in UK BAP).
National	Designated or proposed NNR, MNR, SSSI, ASSI; Any area which the relevant country agency has determined meets the published selection criteria for such designation irrespective of whether or not it has yet been designated.	A viable area of a nationally important habitat type, e.g. priority habitat identified in the UK BAP; Any area of habitat that is regularly used to support critical phases of the life cycle of nationally important species that is rare or threatened in the region.	Any population of a nationally important species that is rare or threatened in the region.
Regional		Viable areas of key habitat of regional importance as identified in Natural Area Profile or regional BAP.	A locally significant number of a regionally important species.

County/ Metropolitan	County/Metropolitan Site of Importance for Nature Conservation (SINC); Local Nature Reserves (LNR); Nature Reserve owned or managed by County Wildlife Trust, Woodland Trust, RSPB (or equivalent body).	A viable area of habitat identified in County BAP.	A locally significant number of an important species in the County/ Metropolitan context.
District/Borough	A District site designated using published selection criteria (for example, Sites of Local Importance for Nature Conservation, semi-natural woodlands in the Ancient Woodland Inventory Area.	Areas of habitat identified in a sub-County (District/Borough) BAP or in the relevant Natural Area profile; Habitats that are scarce within the District/Borough or which appreciably enrich the District/Borough habitat resource, e.g. a diverse and/or ecologically valuable hedgerow network.	A locally significant number of a District/ Borough important species.
Local	Group TPO's (not individual trees).	Areas of habitat considered to appreciably enrich the nature conservation resource to context, e.g. species-rich hedgerows, species-rich verges, ponds, woodlands.	

7.42 The key ecological receptors within the site have been evaluated with reference to the Institute of Ecology and Environmental Management's (IEEM) emerging guidelines for ecological impact assessment. The approach taken by IEEM for the evaluation of key ecological receptors is illustrated in Table CPM 6 over the page.

7.43 Broadly, the evaluation of key ecological receptors was made with reference to the following:

- (i) Legislation (e.g. Wildlife and Countryside Act 1981 (as amended));
- (ii) Policy (e.g. Planning Policy Guidance Note 9 – Nature Conservation (PPG9));
- (iii) Conservation trends and initiatives (e.g. Biodiversity Action Plans).

7.44 The nature conservation value ascribed to the key ecological receptors within the study area is used in the assessment of significance of the effect of the proposals on the receptors.

Ecological Impact Assessment Methodology

7.45 Initially, the potential ecological impacts of a preliminary version of the development framework plan were identified. The masterplan was then refined so that these impacts were avoided or reduced in severity. This process of refinement was repeated over several iterations. The final masterplan therefore incorporates a large degree of 'inherent' mitigation. The potential ecological impacts of the scheme based on the final plan for the Phase I development were then predicted.

7.46 The magnitude of the impact (measured using a quantitative value wherever possible):

- (i) The sensitivity of the receptor in ecological terms (e.g. robustness of the ecosystem and importance within the site's wider ecological context);
- (ii) The value of the receptor (generally measured in legislative, policy and/or conservation status terms);
- (iii) The type of impact (e.g. beneficial or adverse);
- (iv) The duration of the impact;
- (v) The reversibility of the impact.

- 7.47 The level of impact significance was divided into the following broad categories:
- (i) Low – the predicted impact has significance only at a local scale;
 - (ii) Moderate – the predicted impact has a significance at a County scale;
 - (iii) High – the predicted impact has a significance at a national or higher scale.
- 7.48 In some cases, significant impacts could not be completely removed by mitigation. These are reported as significant residual impacts.

Legislative Background

- 7.49 The European Council Directive on the Conservation of Natural Habitats and of Wild Flora and Fauna 1992, often referred to as The Habitats Directive, provide for the protection of key habitats and species considered of European importance. Annexes II and IV of the Directive, list all species considered of community interest. The legal framework to protect the species covered by the Habitats Directive has been enacted under UK law through The Conservation (Natural Habitats, &c.) Regulations 1994.
- 7.50 In Britain, the Wildlife and Countryside Act (WCA) 1981 (as amended) forms the key legislation protecting habitats and species. Sites of Special Scientific Interest (SSSIs), representing the best examples of our natural heritage, are notified under the WCA 1981 by reason of their flora, fauna, geology or other features. Bird species listed under Schedule 1 are subject to the most stringent protection. Animals, other than birds, that receive protection are listed under Schedule 5, with various levels of protection afforded to different species. Schedule 8 provides protection for certain plants and fungi. The Countryside and Rights of Way (CRoW) Act 2000 strengthens the species enforcement provisions of the WCA and makes it an offence to “recklessly” disturb a place of rest or shelter of a protected animal or nest site.
- 7.51 In addition, a number of individual Acts legislate for certain species or groups of species. For example, The Protection of Badgers Act 1992 draws together and tightens earlier badger related legislation and The Hedgerows Regulations 1997 describe ecological, landscape and archaeological criteria for assessing ‘important’ hedges, which are afforded some protection.

Planning Policy Guidance

National Planning Policy

7.52 Planning Policy Guidance 9 (PPG9) published in 1994, outlines the Government's commitment to the conservation of wildlife and natural features. It is mainly concerned with the protection of statutorily designated sites, although PPG9 also seeks to ensure that planning policies minimise any adverse effects on wildlife. The policies and guidance within PPGs are a material planning consideration.

The Oxfordshire Structure Plan 2011 (Adopted)

Policy EN5: *"The following sites of at least national importance will be protected from damaging development:*

- *Sites of European wildlife importance;*
- *National Nature Reserves and Sites of Special Scientific Interest; and*
- *Sites which support specially protected species."*

Policy EN6: *"The local planning authorities will promote:*

- *Management agreements to help protect and enhance sites and features important for nature conservation;*
- *Opportunities for creating new habitats."*

Policy EN7: *"Development which would damage woodlands and hedgerows which are important for landscape, ecological, amenity or forestry reasons will not be permitted. The local planning authorities will encourage the planting of appropriate new woodland and trees."*

Cherwell Local Plan November 1996 (Adopted)

Policy C1: *"The Council will seek to promote the interests of nature conservation. Development which would result in damage to or loss of Sites of Special Scientific Interest or other areas of designated wildlife or scientific importance will not normally be permitted. Furthermore, the Council will seek to ensure the protection of sites of local nature conservation value. The potential adverse affect of development on such*

sites will be a material consideration in determining planning applications.”

Policy C2: *“Development which would adversely affect any species protected by Schedule 1, Schedule 5 and Schedule 8 of the 1981 Wildlife and Countryside Act, and by the E.C. Habitats Directive will not normally be permitted.”*

Policy C3: *“Where appropriate, proposals for interpretative facilities and schemes that provide or increase access to wildlife and geological sites will normally be permitted.”*

Policy C4: *“The Council will seek to promote the creation of new habitats. In urban areas the council will promote the interests of nature conservation within the context of new development and will establish or assist with the establishment of ecological and nature conservation areas, where such areas would further the opportunity for environmental education and passive recreation and would not conflict with other policies within the plan.”*

Cherwell Local Plan 2011 – Revised Deposit Draft (September 2002)

Policy EN22: *“Development proposals will be expected to incorporate features on nature conservation value within the site. Features of value should be retained and enhanced wherever possible. The use of planning conditions or planning obligations will be sought to secure their protection and management, or the provision of compensatory measures where appropriate.”*

Policy EN23: *“Before determining an application for development which may affect a known or potential site of nature conservation value, applicants will be required to submit an ecological survey to establish the likely impact on the nature conservation resource.”*

Policy EN24: *“The Council will seek to promote the interest of nature conservation through the control of development. Proposals which would result in damage to or loss of a site of ecological or geological value will not be permitted unless:*

- *In the case of an internationally important site, there is no alternative solution and there are imperative reasons of over-riding public interest for the development; or*
- *In the case of a nationally important site, the reasons for the development clearly outweigh the ecological or geological value of the site and the national policy to*

safeguard the national network of such sites; or

- *In the case of a site of regional or local importance for its ecological or geological value, the reasons for the development clearly outweigh the ecological or geological value of the site.*

In all cases where development is permitted, damage must be kept to a minimum. The council will use conditions or planning obligations to protect and enhance the site's ecological or geological interest and to provide compensatory measures where appropriate."

Policy EN25: *"Development which would adversely affect any species protected by Schedule 1, Schedule 5 and Schedule 8 of the 1981 Wildlife and Countryside Act, and by the E.C. Habitats Directive 1992, or its habitat will not be permitted."*

Policy EN27: *"Development proposals should incorporate the creation of new habitats, particularly those concerning priority habitats or species, wherever possible. The council will promote the interests of nature conservation within the context of new development and will establish or assist with the establishment of ecological and nature conservation areas, where such areas would further the opportunity for environmental education and passive recreation."*

The Biodiversity Action Plan Process

- 7.53 Following The Convention on Biological Diversity (1992), the UK Biodiversity Action Plan was published in 1994 to guide national strategy for the conservation of biodiversity through Species Action Plans (SAPs) and Habitat Action Plans (HAPs), which set conservation targets and objectives. Most areas now possess a local Biodiversity Action Plan (BAP) to complement the national strategy where priority habitats and species are identified and targets set for their conservation.
- 7.54 Oxfordshire's BAP currently contains Action Plans for 18 habitats (HAPs) and 21 species (SAPs) which are coordinated by the Oxfordshire Nature Conservation Forum.
- 7.55 SAP's include ones for bats and water vole while HAP's include those for ponds, hedgerows and grasslands.

Baseline Conditions

Natural Area Profile

7.56 English Nature has identified 120 biogeographic zones termed 'Natural Areas' throughout England. The site at Gavray Drive is located within the English Nature defined Thames and Avon Vales Natural Area (63), the central section of an extensive belt of low-lying land running through south central England from Somerset to Lincolnshire. It forms an important element of an English lowland scene; river valley landscape with a mixture of arable and pasture surrounded by thick hedgerows and interspersed with small woods. Overall, the Natural Area consists of a rural area with Oxford, Aylesbury and Swindon the only large built-up areas. The geology of the Natural Area is Jurassic and Cretaceous clay. This gives rise to slowly permeable, seasonally waterlogged clay soils.

Designated Sites

7.57 Statutory designated sites for nature conservation include Sites of Special Scientific Interest (SSSI), Special Areas of Conservation (SAC) and Special Protection Area (SPA).

7.58 No statutory nature conservation designations cover any part of the site or adjacent land⁷. Within approximately 5km of the site there are three SSSI's, namely:

- (i) Ardley Cutting and Quarry – The SSSI is notified due to its geological and biological interest. In terms of its biological interest it supports one of the largest limestone grassland sites in the Oxfordshire Cotswolds. The SSSI also supports woodland habitat which contains notable species. In terms of fauna, the SSSI supports a rich invertebrate population as well as a large population of great crested newts;
- (ii) Arcott Bridge Meadows – The SSSI is notified due to it supporting hay meadows and pasture with a wide variety of plants which are largely confined to old, unimproved, neutral grassland;
- (iii) Stratton Audley Quarries – The SSSI is notified based on solely its geological interest.

7.59 No impact on these sites from the proposed development is anticipated.

⁷ Information obtained from MAGIC from a 5km radius search for statutory sites.

7.60 The Oxfordshire Structure Plan identifies non-statutory sites known as County Wildlife Sites (CWSs) which are subject to Structure and Local Plan policy protection. Part of the site is designated as CWS – known as Gavray Drive Meadows. The Oxfordshire Wildlife Site Citation for the Gavray Drive Meadows is included as Volume 2, Technical Appendices, Chapter 7, Appendix 8. Based on the CWS citation, the site is notable for the following.

7.61 Three other CWSs lie within 2km of the site⁸, namely:

- (i) Graven Hill – which lies approximately 2km to the south west of the site is notable for its woodland habitat and the species that it supports, namely a snail (*Helicella italia*), grasshopper warbler (*Locustella naevia*) and willow warbler;
- (ii) Meadow south west of Launton – which lies approximately 1km to the south east of the site and is designated due to its meadow habitat. This meadow is now thought to be improved⁹; and
- (iii) Meadows NW of Blackthorn Hill – which lies approximately 1.5km to the south east of the site and is designated due to meadow habitat.

7.62 The locations of the CWSs within 2km of the site are shown in a plan provided by the Thames Valley Environmental Records Centre, which is included as Volume 2, Technical Appendices, Chapter 7, Appendix 7.

Vegetation and Habitats

7.63 The distribution of the different vegetation types and habitats is shown on **Figure 7.1 – Habitat Features**. These comprise hedgerows, treelines, scrub, grassland and ponds. They are described below.

Grassland

7.64 All fields within the site support at least some grassland. Few of the fields continue to be regularly managed as grassland. Due to the lack of grassland management the grasslands are gradually becoming succeeded by rank grassland species and encroached by scrub and young trees. A list of species recorded from the different

⁸ Information supplied by the Thames Valley Environmental Records Centre during 2004.

⁹ Observation supplied by Thames Valley Environmental Records Centre during 2004.

areas is given at Volume 2, Technical Appendices, Chapter 7, Appendix 10. The grassland composition within the different fields is summarised here. Fields 4, 5, 6, 7, 11 and 12 are designated as a CWS.

- 7.65 Field 1 has been disturbed in recent years, with revegetated soil mounds, small bare areas, vehicle ruts and tipped building materials including concrete and pipe segments. The topsoil appears to have been stripped. This work is likely to have arisen as a result of building activities associated with the adjacent estate and the area may have functioned as a construction compound during part of the development period. The vegetation is very patchy in terms of species dominance. This reflects the results of past disturbance in which some areas have become more compacted than others and also chance recolonisation events.
- 7.66 The soil mounds tend to be recolonised by bramble (*Rubus fruticosus* agg.) with grasses including couch (*Elytrigia repens*), false oat-grass (*Arrhenatherum elatius*), rough-stalked meadow-grass (*Poa trivialis*), cock's-foot (*Dactylis glomerata*) and Yorkshire fog (*Holcus lanatus*). Areas of disturbed or compacted ground that tend to collect water have become colonised by tufted hair-grass (*Deschampsia cespitosa*), creeping bent (*Agrostis stolonifera*), marsh foxtail (*Alopecurus geniculatus*), compact rush (*Juncus conglomerates*), hard rush (*J. inflexus*), soft rush (*J. effusus*), jointed rush (*J. articulatus*), greater bird's-foot trefoil (*Lotus pedunculatus*), common fleabane (*Pulicaria dysenterica*), marsh thistle (*Cirsium palustre*), creeping buttercup (*Ranunculus repens*) and the moss (*Calliergonella cuspidate*). A range of sedges is present including false fox sedge (*Carex otrubae*), hairy sedge (*C. hirta*), spiked sedge (*C. spicata*), glaucous sedge (*C. flacca*) and oval sedge (*C. ovalis*).
- 7.67 The sward is of comparatively recent origin having developed on heavily disturbed land. Both the CPM survey and the BBOWT report suggest the topsoil has been removed. There is therefore little likelihood of any significant historical continuity between the current vegetation and the vegetation that previously occupied the area. No rare plants have been recorded from Field 1 although oval sedge is regarded as 'uncommon' (although widespread) in Oxfordshire¹⁰. It was, however, only found in a single clump.
- 7.68 Field 2 is unmanaged and becoming rank grassland with scrub encroachment in places. Four long channels have been dug into the grassland. These retain water during wetter times of the year.

¹⁰ Killick, J., Perry, R. & Woodell, S. (1998). The Flora of Oxfordshire. Pisces.

- 7.69 False oat-grass and Yorkshire fog are abundant with meadow foxtail (*Alopecurus pratensis*) and other grasses including sweet vernal grass (*Anthoxanthum odoratum*), red fescue (*Festuca rubra*), tall fescue (*F. arundinacea*) and meadow barley (*Hordeum secalinum*) on the drier ground. Forbs include tufted vetch (*Vicia cracca*), meadow buttercup (*Ranunculus acris*), curled dock (*Rumex crispus*) and creeping thistle (*Cirsium arvense*). Bramble scrub is locally dominant. Regeneration of pedunculate oak (*Quercus robur*) is occurring widely across the area and blackthorn (*Prunus spinosa*) is encroaching from some parts of the adjacent hedges. The damper ground is occupied by plants such as marsh foxtail, floating sweet-grass (*Glyceria fluitans*), creeping bent, tufted hair-grass, compact rush and soft rush. There are small patches of other plants including greater burnet (*Sanguisorba officinalis*) and meadowsweet (*Filipendula ulmaria*).
- 7.70 Field 3 has very evident ridge and furrow patterns. It is much less rank than the adjacent Field 2. There is no significant build up of dead vegetative material.
- 7.71 The sward comprises abundant Yorkshire fog, meadow fox-tail, red fescue, meadow buttercup and sorrel (*Rumex acetosa*). Other plants include cock's-foot, sweet vernal grass, meadow barley, crested dog's-tail (*Cynosurus cristatus*), small Timothy (*Phleum bertolonii*), rough-stalked meadow-grass, common bent (*Agrostis capillaries*), common mouse-ear (*Cerastium fontanum*), creeping cinquefoil (*Potentilla reptans*) and lesser stitchwort (*Stellaria graminea*). Damper parts support tufted hair-grass, creeping bent, floating sweet-grass, marsh foxtail, soft rush, hard rush, hairy sedge, creeping buttercup, marsh thistle and American willowherb (*Epilobium ciliatum*).
- 7.72 Field 4 occupies disturbed ground dominated by patchy rank vegetation with locally dense scrub.
- 7.73 The sward comprises plants such as tufted hair-grass, compact rush, hairy willow-herb, meadow buttercup, marsh thistle, tufted vetch, Yorkshire fog, field bindweed (*Convolvulus arvensis*), American willow-herb, broad-leaved dock (*Rumex obtusifolius*) and ox-eye daisy (*Leucanthemum vulgare*) with blackthorn, willow (*Salix* sp.) and bramble scrub developing in places. Wetter areas support reedmace (*Typha latifolia*), marsh bedstraw (*Galium palustre* ssp. *palustre*) and hard rush.
- 7.74 Field 5 is an unmanaged area with much build-up of leaf litter, the sward having developed a tussocky appearance. Some moderately-sized ant hills are also present, indicating a lack of soil disturbance.

- 7.75 The sward is dominated by tufted hair-grass, with other plants indicative of damp ground including greater bird's-foot trefoil, marsh thistle and compact rush. Bramble scrub is developing in places but, in small areas where the sward is shorter, a greater variety of plants is evident including common spotted orchid (*Dactylorhiza fuchsii*). The greater part of the sward is poor in species although locally it is more diverse and interesting than most other parts of the site.
- 7.76 Field 6 comprises a rank and species-poor sward in the north western end, but is shorter and botanically more varied to the south-east where only localised rank patches of vegetation are evident.
- 7.77 Meadow buttercup and creeping buttercup are abundant across much of the sward with a range of grasses including tufted hair-grass, Yorkshire fog, red fescue, meadow foxtail, creeping bent, meadow barley, rough-stalked meadow-grass, tall fescue, false oat-grass, perennial rye-grass (*Lolium perenne*), meadow fescue (*Festuca pratensis*) and the hybrid between the latter two species (*Festulolium loliaceum*). In the wetter areas, sedges such as lesser pond sedge (*Carex acutiformis*), glaucous sedge (*Carex flacca*), slender tufted sedge (*Carex acuta*), false fox sedge and brown sedge (*Carex disticha*) predominate. Rushes such as compact rush, soft rush, jointed rush and hard rush and grasses such as marsh foxtail and reed canary grass (*Phalaris arundinacea*) are also prominent. Forbs in the wetter areas include marsh bedstraw, greater bird's-foot trefoil and water forget-me-not (*Myosotis scorpioides*). Localised patches with common spotted orchid are also evident. In shorter areas of grassland, the agaric (*Hygrocybe conica*) (a 'waxcap' toadstool) was recorded.
- 7.78 Field 7 is becoming dominated by bramble scrub in places. Elsewhere coarse grasses predominate.
- 7.79 The sward is dominated by tufted hair-grass with a range of other grasses including false oat-grass, cock's-foot, Yorkshire fog, meadow foxtail, smooth-stalked meadow-grass (*Poa pratensis*), sweet vernal grass, small Timothy and meadow barley. Some remnants of greater floristic diversity still remain, however, with great burnet, betony (*Stachys officinalis*) and devil's-bit scabious being locally prominent together with a varied range of other forbs at low frequency. Quadrat data (quadrats 1-5) are given at Volume 2, Technical Appendices, Chapter 7, Appendix 11.

- 7.80 Field 7 is becoming impoverished through lack of management which has resulted in a very rank sward.
- 7.81 Fields 8 and 9 are very similar to Field 3, with a species-poor sward over ridge and furrow that has evidently been subject to agricultural improvement.
- 7.82 In the furrows, tufted hair-grass, creeping bent, meadow foxtail and creeping buttercup predominate. On the ridges, meadow buttercup, Yorkshire fog, sorrel, meadow barley and sweet vernal grass tend to be most abundant.
- 7.83 Fields 8 and 9 are semi-improved grassland. They are described as 'species-poor' in the BBOWT report, a view supported by the CPM findings. They do not contain a significant element of unimproved grassland and are, in fact, identified as "improved" in the SWK report.
- 7.84 Field 10 comprises a rough neglected grassland on locally disturbed ground with considerable build up of dead vegetative material.
- 7.85 The sward is locally dominated by couch grass (*Elytrigia repens*) with other grasses such as false oat-grass also abundant. Forbs are few but include species indicative of nutrient enriched conditions such as hogweed (*Heracleum sphondylium*) and stinging nettle (*Urtica dioica*).
- 7.86 The botanical interest of this grassland is negligible. It is described in the BBOWT report as "very rank" and identified as species-poor semi-improved grassland in the SWK report.
- 7.87 Field 11 comprises a generally species poor grassland on rather poorly preserved ridge and furrow.
- 7.88 Two main areas are identified. The outer part is species poor and grass dominated, the most abundant species including Yorkshire fog, tufted hair-grass and creeping bent. The central part has been burnt and is also species poor although there is locally dense regeneration of great burnet. This species occurs in MG4 grasslands although it is clear that the affinities of Field 11 lie elsewhere owing to the scarcity or lack of characteristic species such as meadowsweet and the impoverished sward. The mean number of species per quadrat in MG4 grasslands is 28 (range 17 – 38, see footnote 2) but was found to be 9.6 (range 8 – 12) in Field 11. The distribution of great burnet in Oxfordshire is wider than the distribution of the MG4 community itself.

Occurrences are even known in some semi-improved grasslands¹². Quadrat data (quadrats 6-10) are given at Volume 2, Technical Appendices, Chapter 7, Appendix 11.

- 7.89 The botanical value of the grassland is limited although the locally dense regeneration of great burnet after fire is of some interest. It is possible that the fire has had the result of keeping in check the more competitive grasses that dominate most of the rest of the field.
- 7.90 Field 12 is similar to the grass dominated parts of Field 11, again over weak ridge and furrow. In a few small areas the sward is shorter and slightly more diverse.
- 7.91 The most abundant forbs in the comparatively species poor sward are meadow buttercup and sorrel, with grasses such as Yorkshire fog, creeping bent and tufted hair-grass also occurring abundantly. In one very small area of shorter sward the agaric (*Hygrocybe conica*) was recorded. Field 12 is generally species-poor and similar to the grass-dominated parts of field 11.
- 7.92 Fields 13a and 13b comprise grassland that has evidently developed on former arable land, being of patchy dominance, on flat ground and dominated by species that are characteristic colonists of disturbed, nutrient enriched ground.
- 7.93 The sward is locally dominated by couch grass, Yorkshire fog, creeping thistle, false oat-grass and curled dock (*Rumex crispus*) with creeping bent and scattered plants of other species including dandelion (*Taraxacum* agg.) (Sect. Ruderalia) and ragwort (*Senecio jacobaea*).
- 7.94 The sward of field's 13a and 13b is species poor, having recently developed over arable land.
- 7.95 Overall, due to the lack of grassland management, the grassland interest for which part of the site is designated as a CWS is being gradually lost. The absence of appropriate management allows natural succession processes to occur (e.g. scrub encroachment) which are detrimental to maintaining the botanical interest of the grasslands.
- 7.96 The grasslands designated as CWS are considered, due to their designation, to be of County value. However, it is considered that the grasslands will gradually lose the

features for which they are designated if not appropriately managed. Grasslands not designated as CWS are considered to be of Local to District value.

Hedgerows, Treelines and Scrub

- 7.97 There is a dense hedgerow network in the south-eastern part of the site. Hedges are much fewer in the north-western part.
- 7.98 The majority of the hedgerows are thick and many have a wet or seasonal ditch associated with them. The most frequently encountered hedgerow shrubs are common hawthorn (*Crataegus monogyna*) and blackthorn. Scrubby elm (*Ulmus* sp.) is also frequent, showing signs of elm disease. Shrubs associated with calcareous soils such as dogwood (*Cornus sanguinea*), guelder rose (*Viburnum opulus*) and buckthorn (*Rhamnus cathartica*) occur in some hedgerows. Other shrubs include dog rose (*Rosa canina*), elder (*Sambucus nigra*), midland hawthorn (*Crataegus laevigata*) and holly (*Ilex aquifolium*).
- 7.99 Mature trees within the hedgerows include ash (*Fraxinus excelsior*) and pedunculate oak, with crack willow (*Salix fragilis*) occurring in the marshier areas and along the stream. Other trees include field maple (*Acer campestre*) and alder (*Alnus glutinosa*).
- 7.100 The flora of the hedge bottom was difficult to examine in many places owing to the density of scrub alongside but a moderate range of species was recorded including wood meadow-grass (*Poa nemoralis*) in the hedge between Field 1 and Field 2, hairy brome (*Bromopsis ramosa*) and cuckoo-pint (*Arum maculatum*).
- 7.101 Individually, most hedgerows are moderately diverse although no rare or noteworthy plants were identified. Hedgerows 2 and 3 are considered to be 'important' in terms of the Hedgerows Regulations 1997. Several others, including hedges H7, H8 and H13 come close to qualifying as important and might prove so were it possible to examine the hedge base more closely. The hedgerows and treelines are considered to be of ecological value primarily because they provide additional habitat diversity within the site. They may also act as a terrestrial link between ponds. The hedgerow network overall is judged to be of ecological value at the district level although individually none is considered to be of more than local value.
- 7.102 Continuous scrub is locally dense, typically extending from the hedgerows into the fields. The most abundant species are bramble and blackthorn.

7.103 The continuous scrub is considered to be of no more than local ecological value. Its presence reflects the deterioration in quality of the grasslands which are being encroached upon although it is likely to provide nesting habitat for birds and a resource for some other wildlife.

Ponds

7.104 The site includes a number of ponds. During periods of high rainfall, other areas of standing water occur within the site. In addition to the ponds within the site, ponds within the potential receptor area for great crested newts (P7 and P8) located immediately to the east of the site are also described. The ponds are characterised below.

Pond 1 (P1)

7.105 P1 lies in the north eastern corner of Field 8 adjacent to Hedgerows 5 and 11. P1 is a broadly circular pond and approximately 7m wide and long. The pond has shallow sloping sides with approximately a water depth of 0.5m toward the centre. The pond consists mainly of open water with a thick layer of dead vegetative material in the bottom. The margins of the pond are vegetated with small amounts of floating sweet grass, creeping bent and soft rush with an immature willow overhanging the eastern perimeter of the pond.

Pond 2 (P2)

7.106 P2 lies adjacent to Hedgerow 5 within Field 7. P2 is an elongated, oval shaped pond which is approximately 5m long and 2m wide. The eastern and southern margins of the pond are overhung by dense scrub while the northern and western margins consist of soft rush and creeping bent. The open water area within the pond is characterised by floating sweet grass. The bottom of the pond consists of a dense accumulation of dead vegetative material. The deepest part of the pond is characterised by water depths of approximately 0.75m.

Pond 3 (P3)

7.107 P3 is located immediately outside the northern boundary of the site at the base of the railway embankment toward the north eastern corner of Field 5. The pond is broadly tear-shaped, approximately 5m long and 4m wide. The majority of the pond is

densely shaded by willow, which limits the amount of aquatic vegetation. The bottom of the pond is predominantly characterised by accumulations of leaf litter.

Pond 4 (P4)

7.108 P4 is located within Field 1 and consists of a number of small depressions and hollows created following recent disturbance. The water bodies have been colonised by aquatic species including sweet float grass, reed mace and sedges. Water depth within the ponds is variable.

Pond 5 (P5)

7.109 P5 is located in the eastern portion of Field 2, adjacent to a line of mature standard oak trees. P5 seems to have increased in size since the original 2002 amphibian survey. P5 now consists of approximately five linear water bodies which seem to have formed within the furrows of the evident ridge and furrow system. Aquatic vegetation consists of locally dominant floating sweet grass and dense algal growth.

Pond 6 (P6)

7.110 P6 lies to the east of Hedgerow 2 within Field 9. P6 is a broadly oval pond, approximately 5m long and 4m wide. The hedgerow encompasses and overhangs the western margin of the pond. The eastern margin of P6 has shallow, sloping margins. During 2004, the water depth at the centre of P6 was approximately 0.5m. Aquatic vegetation within the pond consisted of dense floating sweet grass.

Man-made Channel

7.111 A linear man-made channel is located along the northern boundary of Field 5. Areas of open water are intermittent, between dense overhanging bramble scrub. The aquatic vegetation within the pond consists of occasional tussocks of soft rush along the margin and dense algal growth within open water.

7.112 The ponds have been unmanaged and have either become shaded by surrounding vegetation or have become shallow and filled with plant debris as a result. Aquatic vegetation is very limited, with only common plants such as floating sweet grass, rushes, reedmace and water forget-me-not being recorded.

7.113 The ponds are considered to be of local ecological value and will further deteriorate

unless appropriately managed. It is considered that the current, unmanaged status of the ponds limit the opportunities for the amphibian population within the site, including that of great crested newts.

Species

Reptiles

7.114 The results of the refugia survey are set out at **Table 7.7**

Table 7.7: Reptile Refugia Search

Year	Date	Results
2002	15 th May	No reptiles
	21 st May	One common lizard (<i>Lacerta vivipara</i>) on the south facing bank in the field close to P4
	16 th July	One grass snake (<i>Natrix natrix</i>) in the field close to P4
2004	13 th May	<ul style="list-style-type: none"> • Two common lizards next to rubble in field 1 • One common lizard next to hedgerow H13
	21 st May	Two common lizards found in field 10
	24 th May	<ul style="list-style-type: none"> • One juvenile grass snake close to pond P4 • One common lizard close to bramble in field 4 • One adult grass snake and two common lizards in field 7 • One common lizard close to hedgerow H8 • Four common lizards in field 10

7.115 Grass snake and common lizard are given a very basic level of protection under Appendix 3 of the Berne convention and Schedule 5 of the Wildlife and Countryside Act. Neither species is of conservation concern. The value of the site in terms of its reptile interest is considered to be negligible.

Amphibians

7.116 The amphibian survey results are summarised over the page (**Table 7.8**) and set out in full at Volume 2, Technical Appendices, Chapter 7, Appendix 12.

7.117 Both during the 2002 and 2004 surveys, the egg search yielded no information that was not already obtained through the other survey methods. Eggs were found on submerged water forget-me-not and willowherb in P3 and P7.

- 7.118 Common toads (*Bufo bufo*) were found to be widely distributed across the site during the refugia searches on 15 and 21 May 2002.
- 7.119 Small numbers of common frog (*Rana temporaria*) were found during the survey.
- 7.120 Smooth newts (*Triturus vulgaris*) were recorded from every water body surveyed and had the highest maximum counts of all newt species recorded. Palmate newt (*Triturus helveticus*) was trapped in one pond and a possible record was obtained from another water body within the site during 2002.
- 7.121 Great crested newts were recorded from all of the water bodies in low numbers. Numbers of great crested newts suggest that the populations within the majority of the ponds were 'small'¹¹, however two ponds (P3 and P4) within the site supported populations at a level intermediate between a 'small' and 'medium' population. However, given that the ponds are likely to form a network for supporting the overall population, it is considered that the site as a whole is considered to support a population intermediate between 'small' and 'medium'. The population seems to be higher during the 2004 survey, however the survey visits were undertaken during different timeframes within the survey window, as shown in **Table 7.8**. This makes direct comparison difficult. The population is also not evenly distributed throughout the site. Based on the 2004 data, the population is highest within P4 and P3, which is probably associated with the quality of the pond habitat combined with the availability of suitable terrestrial habitats, particularly suitable hibernation sites.

Table 7.8: Summary of Amphibian Survey Results.

Location	2002			2004		
	Great Crested Newt	Smooth Newt	Palmate Newt	Great Crested Newt	Smooth Newt	Palmate Newt
Pond P1	0	1	0	1	7	0
Pond P2	2	1	0	1	3	0
Pond P3	2	3	0	10	5	0
Pond P4	3	9	0	9	12	0
Pond P5	0	35	0	1	10	0
Pond P6	4	8	1	3	9	0
Channel	4	4	?2*	1	2	0

The maximum observed numbers for each species are shown in the cells. For great crested newts,

¹¹ English Nature (2001) *Great Crested Newt Mitigation Guidelines*

numbers of males and females were recorded separately (see Appendix 10) and have been added to give the overall figure in this table. * These animals were observed poorly during the torch light survey and their identity is not certain.

- 7.122 Common toads, common frogs and smooth newts are widely distributed across England. Palmate newt is much more patchily distributed in central England. There are, however, other records of palmate newt from 10km grid squares adjacent to the site¹². All three species are given a very basic level of protection under Appendix 3 of the Berne Convention and Schedule 5 (Section 9(5)) of the Wildlife and Countryside Act.
- 7.123 Of greatest significance in terms of legislation is the presence of great crested newts, recorded from all ponds. Great crested newts are known from several other localities in Bicester and the surrounding area.
- 7.124 Great crested newts are strictly protected under European Communities Council Directive on the Conservation of Natural Habitats and Wild Fauna and Flora¹³.
- 7.125 The site supports five amphibian species although in comparatively low numbers. The results of the amphibian survey are fairly typical of those undertaken in the locality and the site is therefore considered to be of local value for amphibians.

Bats

- 7.126 There are a small number of bat records from within 2km of the site¹⁴. None of these records was from within the site. The records originate from three main clusters, namely north west Bicester, central Bicester and within the village of Launton to the north east of the site. The records include roosts for an unidentified species of pipistrelle bat (*Pipistrellus* sp.) and brown long-eared bats (*Plecotus auritus*). The findings of the 2002 and 2004 surveys are discussed separately below.

2002 Survey

- 7.127 Several recordings of common pipistrelles were made under good conditions and analyzed after the survey. The sonogram showed the characteristic pipistrelle shape¹⁵ and the peak frequency was within the range 45.6-47.6 kHz, clearly

¹² See e.g. Beebee, T.J.C and Griffiths, R.A. (2000). New Naturalist: Amphibians and Reptiles. HarperCollins, p.61

¹³ Enforced in Britain by The Conservation (Natural Habitats, &c.) Regulations 1994, amended 2000.

¹⁴ Information supplied by the Oxfordshire Bat Group during 2004.

¹⁵ An FM sweep with a constant frequency tail.

identifying these as common pipistrelles (*Pipistrellus pipistrellus*) rather than the closely-related soprano pipistrelle (*P. pygmaeus*) which has a peak frequency around 55 kHz or the much rarer Nathusius' pipistrelle (*P. nathusii*) which has a peak frequency of around 41 kHz. On several occasions the bats were clearly seen in flight. They were small and exhibited the fast and erratic flight typical of pipistrelle bats. The identification of these bats is therefore considered to have been established with a high degree of certainty.

- 7.128 Contact was made with *Myotis* bats. In most cases the bats were foraging in tree canopies where no clear views of the bats could be obtained. The identification to genus is considered to have been established with a high degree of certainty owing to the nature of the ultrasound¹⁶ but there are five species of *Myotis* bat normally resident in Britain and they are notoriously difficult to separate unless captured and examined in the hand. No attempt at species identification is made here.
- 7.129 Brief contact was made with noctule (*Nyctalus noctula*) bats. The identity of these bats is considered to have been established with a high degree of certainty although the bats themselves were not seen. The ultrasound is quite characteristic¹⁷.
- 7.130 During an earlier visit to the site (on one of the evening newt surveys), a large bat was observed by sampling point 14. The broad wings and slow flight of the bat close to the trees were strongly suggestive of serotine (*Eptesicus serotinus*) bat. During the bat survey itself, very brief contact was made with a bat considered likely to have been a serotine some distance from the nearest sampling location. It is therefore possible that serotine bats also use the site.
- 7.131 Bat activity levels were found to be low. The majority (62% of contacts) of bat activity that was detected represented common pipistrelle bats foraging in the lee of hedgerows or treelines. Common pipistrelle bats typically roost in houses (over 50% of known roosts are in houses built after 1970) and it is very likely that the bats encountered within the site roost off-site on one of the adjacent housing estates. No significant flight lines for pipistrelle bats were identified and it appears likely that the bats simply permeate the site, foraging as they go. Some common pipistrelles probably enter the site from Gavray Drive. The main value of the site for common pipistrelles is in the foraging habitat it provides although the bats not only forage within the site but also rely on other nearby foraging locations including the planting

¹⁶ A wholly FM sweep audible down to around 30 kHz resulting in a series of dry clicks on the heterodyne bat detector, the comparatively loud call ruling out the possibility of long-eared bats.

¹⁷ Producing a 'chip chop' sound on the heterodyne bat detector when tuned to a low frequency. Analysis of the calls showed a peak frequency of 19.6 kHz.

alongside Gavray Drive itself.

7.132 *Myotis* bats accounted for 24% of contacts made during the survey. It has not been possible to establish the species present within the site and therefore likely roost locations are unknown. Roosting within the site is possible. Natterer's (*Myotis nattereri*) bats will occupy tree roosts, for example. During the first visit on June 26th, the first bat detected in the northern part of the site was a *Myotis* bat. This suggests that the bat was either roosting within the site or very close to it. No significant flight lines for *Myotis* bats were identified, and the main value of the site for *Myotis* bats appears to be the foraging and possibly roosting opportunities provided, particularly by the trees.

7.133 Noctule bats accounted for 14% of contacts made during the survey. Noctules roost in trees and may both be roosting and foraging within the site. They are not dependent on flight lines to the extent that many other bat species are, and are likely to forage over other off-site areas too. There is some evidence that serotine bats may also forage within the site.

2004 Survey

7.134 As found during the 2002 bat survey, bat activity within the site was low (Volume 2, Technical Appendices, Chapter 7, Appendix 5). Contact was made with predominantly Pipistrelle bats with a small number of contacts with *Myotis* bats. The bat activity recorded was predominantly foraging activity.

7.135 Bats and their roosts are strictly protected under European Communities Council Directive on the Conservation of Natural Habitats and Wild Fauna and Flora¹⁸. But the overall level of constraint posed by bats within the site is considered to be low owing to low levels of bat activity and no evidence of significant flight lines. The site is therefore regarded as being of local value for bats.

Badgers

7.136 There is a known sett located to the south of Gavray Drive¹⁹, however this sett is now largely separated from Gavray Drive by a significant area of new residential development. Some well-worn paths were identified, particularly in the north western part of the site. It is possible that these may link with badger setts on private land off-

site, particularly along the railway embankment. No other potential or actual badger signs were found within the site in either 2002 or 2004. It is considered that the low lying character of the site, combined with poor drainage restricts potential opportunities for sett construction, however, the habitats within the site could be suitable for foraging.

- 7.137 Badgers and their setts are protected under the Protection of Badgers Act 1992. The legislation does not provide specifically protection for foraging habitat. Badgers are common and widespread in lowland England. The protection afforded to badgers is therefore primarily on animal welfare grounds rather than due to their conservation status. The site is regarded as being of negligible value for badgers.

Water Voles

- 7.138 Confidential data supplied by BBOWT reveal the presence of water voles within Bicester itself including a location close to the railway line to the north of the site at Gavray Drive. No records relate to the Gavray Drive site itself. No signs of water voles were found during detailed surveys of the Langford Brook undertaken during 2002 and 2004.
- 7.139 Water vole receives protection under the Wildlife and Countryside Act 1981 (as amended) and The Countryside and Rights of Way Act 2000. The protection is afforded to structures that water voles use for shelter or protection and protects water voles from disturbance whilst they are using these structures. Currently, water voles are not legally protected when outside their burrows.

¹⁸ Enforced in Britain by The Conservation (Natural Habitats, &c.) Regulations 1994, amended 2000.

¹⁹ Information supplied by the Oxfordshire Badger Group during 2004. The exact sett location is not included for animal welfare reasons.

7.140 Since no water voles were found within the site, impacts on this species are not considered. However, mitigation and enhancement measures will include provision to maintain and enhance opportunities for water voles within the site, should they colonise in the future.

Otters

7.141 BBOWT also supplied records of otter (*Lutra lutra*) from unspecified locations within 40 km of the site. More specifically, information supplied by the Environment Agency during 2004 confirms that otters have been recorded within the catchment of the River Cherwell. The territorial range of otters may extend over 40 km and so these records are of relevance. However, no evidence of otters within the site was seen during the course of the water vole survey.

7.142 Otters and their habitat are protected under European Communities Council Directive on the Conservation of Natural Habitats and Wild Fauna and Flora²⁰ and The Wildlife and Countryside Act 1981 (as amended). Since signs of otter activity were found within the site, impacts on this species are not considered further. However, mitigation and enhancement measures will include provision to maintain and enhance opportunities for otter movement within the site, should they utilise the brook within the site in the future.

Invertebrates

7.143 Various butterfly species were recorded including ringlet (*Aphantopus hyperantus*), marbled white (*Melanargia galathea*), meadow brown (*Maniola jurtina*), common blue (*Polyommatus icarus*), large skipper (*Ochlodes venatus*), large white (*Pieris brassicae*) and speckled wood (*Pararge aegeria*). Field 1 was found to support large numbers of adult butterflies owing to the varied range of nectar-bearing flowers present there. The BBOWT survey also reported small heath (*Coenonympha pamphilus*) butterfly. This may well occur in the Gavray Drive site although the BBOWT survey area included additional land to the south east.

7.144 Other notable invertebrates which have been recorded at the site²⁰ include three nationally scarce²¹ species, namely (*Bembidion gilvipes*), which is a ground beetle, (*Philonthus fumarius*), which is a rove beetle, and (*Lythraia salicariae*), known as the

²⁰ Information supplied by The Thames Valley Environmental Records Centre.

²¹ Nationally Scarce (Notable) B: Taxa which don't fall within the IUCN categories but are uncommon in Britain and occur in 31-100 10km squares or for less well recorded groups between 8 and 20 vice counties.

Loosetrife flea beetle. (*Sepedophilus pedicularius*), a notable rove beetle, has also been recorded from the site.

Crayfish

7.145 Historical records of native white-clawed crayfish (*Austropotamobius pallipes*) are available from 1990's. However since 1997, only non-native signal crayfish (*Pacifastacus leniusculus*) have been found²². Non-native crayfish out compete native crayfish, they also carry the crayfish plague. No information has been supplied on the exact location of native crayfish on Longford Brook. Given the presence of non-native crayfish within Longford Brook combined with the lack of suitable habitat within the section of Longford Brook within the site, it is not considered that the site provides opportunities for native crayfish.

Birds

7.146 A varied range of birds was recorded from the site, with most species being either familiar garden species or species typical of woodland, hedgerows or scrub. Birds holding territory include wood pigeon (*Columba palumbus*), wren (*Troglodytes troglodytes*), greenfinch (*Carduelis chloris*), blue tit (*Parus caerulea*), dunnock (*Prunella modularis*), chiffchaff (*Phyllitis collybita*), whitethroat (*Sylvia communis*), willow warbler (*Phylloscopus trochilus*), robin (*Erithacus rubecula*), blackbird (*Turdus merula*), song thrush (*Turdus philomelus*), crow (*Corvus corone*) and magpie (*Pica pica*).

7.147 Characteristic farmland birds were few but include linnet (*Carduelis cannabina*) and pheasant (*Phasianus colchicus*), the former in song and the latter a female with chicks.

7.148 A sedge warbler (*Acrocephalus schoenobaenus*) was recorded from damp scrubby ground in Field 4 and a hobby (*Falco subbuteo*) seen hunting overhead. A pair of bullfinches (*Pyrrhula pyrrhula*) was seen frequenting the taller hedgerows of the site.

7.149 Additional birds recorded during the BBOWT survey include reed bunting (*Emberiza schoeniculus*), garden warbler (*Sylvia borin*), lesser whitethroat (*Sylvia curruca*) and yellowhammer (*Emberiza citrinella*). These birds may occur within the Gavray Drive site although the BBOWT survey area included additional land to the south east. With particular regard to reed bunting, it is understood that most records relate to birds off-

²² Information supplied by Environment Agency during 2004.

site to the south-east but, by implication, at least one singing male was recorded from within the site itself and another was seen to fly between off-site land and the Gavray Drive site.

7.150 Of the birds recorded from the site, song thrush, linnet, yellowhammer, bullfinch and reed bunting are listed as being of high conservation concern whilst dunnock and blackbird are listed as being of medium conservation concern¹⁸. None of these birds is rare. All of the red-listed birds, for example, have UK populations of over 10,000 pairs. Some, such as the amber-listed blackbird, remain common. They have, however, been identified as being of conservation concern as a result of population declines over recent decades.

7.151 Overall, the species present are generally common in both a local and national context, however there a number of species recorded which are of conservation concern. The site is therefore considered to be of District value for birds.

Potential Impacts

7.152 The assessment of potential impacts is based on the final development framework plan which incorporates the 'inherent' mitigation as a result of an iterative assessment and design process. The potential impacts are assessed with the inherent mitigation included but in the absence of the scheme are summarised in **Table 7.9** over the page.

¹⁸ The Population Status of Birds in the UK. Birds of conservation concern 2002-2007. RSPB.

Designated Sites - Statutory	Ecological Receptor	Evaluation	Phase	Type of Impact	Impact Description	Inherent Mitigation	Permanent or Temporary	Magnitude of Impact on Feature	Ecological Sensitivity	Significance without additional mitigation	
	Ardley Cutting and Quarry SSSI	National		No potential impacts anticipated							
	Ancorr Bridge Meadows SSSI	National		No potential impacts anticipated							
	Stratton Audley Quarries SSSI	National		No potential impacts anticipated							
Designated Sites - Non-statutory	Gavray Drive Meadows CWS	County		Construction	Loss of habitat	Approximately 3ha of the CWS will be lost as a result of the proposed development	Approximately 7.5ha of CWS retained. Area of retained CWS agreed with CWS steering group ²³	Permanent	Approximately 3ha of the CWS lost	Uncertain	Moderate

²³ Area of retained CWS agreed with the CWS Steering Group following the consideration of alternative options. Copies of meeting notes included as Appendix 4.

				Fragmentation of habitat	CWS already partially fragmented as a result of the circular road around Bicester. However the CWS will be further fragmented into two spatially distinct portions	is approximately 7.5ha of CWS retained. Area of retained CWS with agreed CWS steering group	Permanent	Uncertain	Fragmentation is likely to lead to a reduction in connectivity and resource availability between other similar habitats within the local area	Low
				Disturbance of habitat	Construction works may cause disturbance to the retained CWS area due to incursion by traffic and personnel	None	Temporary	Uncertain	Semi-natural grassland sensitive to disturbance, which may cause botanical changes resulting in the loss of notable flora	Low

Designated Sites – Non-statutory	Graven Hill CWS	County	No potential impacts anticipated							
	Meadow south-west of Launton	County	No potential impacts anticipated							
	Meadows NW of Blackthorn Hill	County	No potential impacts anticipated							
Vegetation and Habitats	Grassland within Gavray Drive Meadows CWS (Fields 4, 5, 6, 7, 12 and 11)	County	See <i>Designated Sites – Gavray Drive Meadows CWS</i>							
	Grassland outside the Gavray Drive Meadows CWS (Fields 1, 2, 3, 8, 9, 10, 13a and 13b)	Local to District	Construction	Loss of habitat	The majority of the grassland habitats, outside the Gavray Drive Meadows CWS will be lost to development. Small areas of grassland may be retained adjacent to green corridors	Areas of grassland retained adjacent to green corridors and along the western edge of the Brook	Permanent	Uncertain, however areas of grassland retained adjacent to green corridors and along the western edge of the Brook	Not applicable	Low

	Hedgerows and Trees	Collectively, District value, nearly fulfil requirement for ecologically 'important' hedgerows	Construction	Loss of hedgerows	Hedgerows and mature trees will be lost during construction	The majority of hedgerow and mature trees will be retained within areas of open space and green corridors	Permanent	Hedgerows and mature trees will be lost during construction	The sensitivity of hedgerows is mainly related to their ecological connectivity. Ecologically 'important' hedgerows also provide a continuity of habitat over a long period	Low
				Severance and fragmentation of hedgerow network	Increased severance and fragmentation of hedgerow network due to development and infrastructure works	Severance and fragmentation minimised through the retention of green corridors and sensitive layout design	Permanent	Hedgerows and mature trees will be lost during construction	The sensitivity of hedgerows is mainly related to their ecological connectivity	Low
			Operation	Increased disturbance of hedgerows	Impact resulting from increased disturbance from new residents	None	Permanent	Uncertain	Hedgerows require management such as trimming and laying to maintain their function. Hedgerows are sensitive to the lack of such management	Low

Vegetation and Habitats	Ecological Receptor	Evaluation	Phase	Type of Impact	Impact Description	Inherent Mitigation	Permanent or Temporary	Magnitude of Impact on Feature	Ecological Sensitivity	Significance without additional mitigation
	Scrub	Local	Construction	Loss of scrub	Loss of scrub	None	Permanent	Uncertain	Low sensitivity since scrub is an easily re-creatable habitat	Not significant
			Operation	Increased disturbance of scrub	Increased disturbance and loss of scrub during management of site to restore retained grassland habitats	None	Permanent	Uncertain, however areas of scrub likely to decrease gradually as the area of retained grassland is restored and managed	Low sensitivity since scrub is an easily re-creatable habitat	Not significant
	Construction	Loss of ponds	Loss of 3 ponds. (P4, P5 and man-made channel)	Retention of 3 ponds within a network of green corridors which connect to areas of open space. Provision of at least 6 new ponds within open space	Permanent	Loss of 3 ponds	Sensitive due to the significant loss of ponds in recent history as a result of changes in agriculture and development	Low		
	Ponds	Local								

					Increased siltation	Silt-laden runoff resulting in increased siltation of ponds	None	Temporary	Siltation would eventually lead to the ponds drying up and the loss of flora and fauna including protected amphibian species	Ponds are sensitive to siltation and infilling	Low
				Disturbance	Disturbance	Construction works may cause disturbance due to incursion by traffic and personnel	None	Temporary	Uncertain	The species and habitats that the ponds support are likely to be sensitive to changes in water quality	Low
Vegetation and Habitats	Ponds	Local	Operation	Disturbance	Disturbance from residents within the new residential development		None	Permanent	Uncertain	Ponds themselves are often not sensitive to disturbance, however the habitats and species that they support are often sensitive	Low

Species	Amphibians	Local	Operation	Killing and Injury	Infrastructure and drainage system may lead to amphibians being killed and/or injured	None	Permanent	Uncertain, however a population intermediate between a small and medium size will be more sensitive to loss of individuals than a medium to large population	Uncertain, however a population intermediate between a small and medium size will be more sensitive to loss of individuals than a medium to large population	For common species, not significant. For great crested newts, low subject to conformance with legislation
				Disturbance	Disturbance from residents within the new residential development	None	Permanent	Uncertain.	Uncertain	Low
In addition, please also see potential impacts for Habitats – Ponds										
	Bats	Local	Construction	Disturbance, killing and injury	Mature trees may be used by bats as places of refuge	None	Permanent and Temporary	Bats sensitive to disturbance. Low populations of some species may be sensitive to loss of even small numbers	Low due to low activity levels	Low, subject to conformance with legislation

					Artificial light	If construction works are required during the evening/night, artificial lighting lead to disturbance of foraging activity	None	Temporary	Uncertain.	Sensitivity to light pollution into foraging habitats varies between bat species	Low
				Operation	Artificial light	Street lighting and other sources of artificial lighting may impact on bat activity within the site	None	Permanent	Uncertain.	Sensitivity to light pollution into foraging habitats varies between bat species	Low
Species	Badgers	Negligible	No potential impacts anticipated								
	Water Voles	Negligible	No potential impacts anticipated								
	Others	Negligible	No potential impacts anticipated								
	Invertebrates	County	Construction and Operation	Loss or change in habitat	Proposed development may result in the loss or change in habitat, particularly for notable species	Existing habitat retained within open space	Permanent	Uncertain	Uncertain	Probably Low	

Birds	District	Construction	Disturbance	Disturbance of breeding birds, their nests, eggs and young	None	Temporary	Uncertain	Birds are sensitive to disturbance during the breeding period	Low, subject to conformance with legislation
		Construction	Loss of habitat	Construction will result in the loss of habitat, particularly hedgerow, trees and scrub	Existing habitat retained	Permanent	Construction will result in the loss of some mature trees, hedgerow, scrub and grassland habitat	The availability and type of habitat is likely to determine the population and species of bird present	Low
		Operation	Disturbance	Residents within the new development may result in increased disturbance of habitat	None	Permanent	Uncertain	Birds are sensitive to disturbance, particularly during the breeding period	Low
			Predation	New development may increase predation from cats	None	Permanent	Uncertain	Bird populations are sensitive to predation, particularly during the breeding period	Low

Mitigation and Enhancement

- 7.153 As outlined above, the proposed development includes a significant element of inherent mitigation which has been incorporated during the iterative process of drawing up the development framework plan. Not all potential impacts can be avoided or reduced in severity through inherent mitigation alone, hence additional measures are required to mitigate outstanding potential impacts wherever possible and conform with statutory obligations.
- 7.154 The additional mitigation also includes measures to ensure that the proposed development complies with the level of statutory protection afforded to certain species.
- 7.155 In addition to mitigating potential impacts, the proposed development has the potential to provide new habitats as well as enhancing retained existing habitats for the benefit of nature conservation.

Construction Phase

- 7.156 All detailed species surveys will be updated within 12 month of the development of each phase. The findings will be used to inform the measures set out over the page.
- 7.157 Detailed measures to protect habitats and species during the construction phase will be set out in an *Ecology Construction Method Statement* (ECMS). The ECMS will include the following measures:
- (i) Measures to protect the retained CWS, hedgerows, trees and ponds from incursion;
 - (ii) Measures to prevent pollution incidents and to minimise dust;
 - (iii) Measure to protect breeding birds, their nests, eggs and young;
 - (iv) Measures for the translocation of colonies of notable flora from the developed CWS to the retained CWS;
 - (v) Design and implementation of new ponds;
 - (vi) Restoration of existing ponds;

- (vii) Preparation of proposed great crested newt receptor site;
- (viii) Method Statement for great crested newts, which will be agreed with English Nature and form part of the DEFRA licence;
- (ix) If required, Method Statement for bats, which will be agreed with English Nature and form part of the DEFRA licence;
- (x) Method Statement for reptiles, which will be agreed with English Nature.

7.158 An Environmental Clerk of Works (ECW) will be employed by the Developer to implement the ECMS prior to and during the construction phase. The ECW will be responsible for all licensable actions.

Operational Phase

7.159 A Wildlife Management Plan (WMP) will be developed to ensure the long-term conservation of habitats and species within the site. An outline WMP is included as Volume 2, Technical Appendices, Chapter 7, Appendix 13. It will be necessary for the outline WMP to be developed in detail prior to the initiation of the construction phase. It will also be necessary prior to the construction phase to identify the implementation responsibilities of the WMP.

7.160 The WMP will incorporate measures to raise public awareness of the ecology of the site and to manage recreational pressure.

7.161 The WMP will include a commitment to monitoring in order to ensure the effectiveness of the management measures.

7.162 The WMP will be initially for a 5 year period. Monitoring the effect of the implemented measures of the WMP for the initial 5-year period will form the basis for a revision of the plan after 5 years. The Developer will provide a financial contribution to secure the long-term implementation of the WMP. A Section 106 Agreement attached to the planning consent for the scheme will be used to ensure the implementation of the Plan as part of the development process.

Designations

7.163 No additional mitigation measures are anticipated with respect to statutorily designated sites.

- 7.164 Additional mitigation measures with respect to non-statutorily designated sites are proposed for the retained Gavray Drive Meadows CWS. No additional measures are anticipated with respect to the other non-statutorily designated sites within 2km of the Gavray Drive site.
- 7.165 The key additional mitigation measure that will be implemented for the retained CWS will be the implementation of the WMP. The WMP will secure the establishment of a management regime to maintain, restore and enhance the existing grassland habitat. The outline WMP is provided in Appendix 13. In addition to the agreed area of CWS within the site, the proposed great crested newt translocation site also lies within part of the CWS. This will also be managed as part of the WMP. The WMP will ensure that there is no further degradation of the grassland interest of the site through natural processes.
- 7.166 In addition to the WMP, an attempt will be made in advance of construction to translocate any colonies of notable floral species within the developed CWS to the retained CWS.

Habitats

Hedgerows and Trees

- 7.167 The WMP includes measures to manage and maintain the retained hedgerows within the site over the long-term. The WMP will also include measures to raise public awareness of the ecological interest of the new development.

Ponds

- 7.168 At least six new ponds will be incorporated within areas of open space but outside the 1 in 100 year floodplain.
- 7.169 In addition to the creation of new ponds, existing retained ponds will be restored as part of the ECMS.
- 7.170 The long-term management of retained and new ponds will be secured through the implementation of measures set out in the WMP.

Species

Reptiles and Amphibians

- 7.171 To ensure conformance with the level of protection afforded to the reptiles known to occur within the built footprint, a method statement will be developed as part of the ECMS in consultation with English Nature to protect reptiles from being killed and injured as a result of the construction works.
- 7.172 With respect to amphibians, particularly great crested newts, a Method Statement will be developed as part of the ECMS in consultation with English Nature to protect amphibians during the construction works and secure the conservation status of great crested newts within the site and locality. The Method Statement would form part of the DEFRA licence application for great crested newts.
- 7.173 Broadly, a combined reptile and amphibian Method Statement will be developed where the areas known to support reptiles and amphibians will be divided into a series of fenced compartments. The compartments will be fenced with reptile/amphibian fencing. Each compartment will be subject to a capture exercise between April and October, inclusive, involving setting out a high density of artificial refugia. The reptiles will be captured and translocated to a receptor site within the site. The detailed Method Statement will be developed as part of the ECMS. This strategy is outlined in **Figure 7.3 – Outline Great Crested Newt Mitigation Strategy**. If necessary additional receptor sites will be sourced within close proximity to the site.
- 7.174 With respect to great crested newts, each compartment will be subject to a capture exercise involving a range of capture techniques in accordance to English Nature guidance²⁴. The captured newts will be translocated into retained open space, which will include new, established pond habitat within the site.
- 7.175 The receptor site will be prepared in advance of the translocation in order that the translocated newts can be accommodated. The preparations will involve the excavation of at least six new ponds, the restoration of existing ponds and the provision of permanent artificial hibernacula and refugia.

Bats

- 7.176 In advance of any tree removal or surgery works, a bat roosting survey will be undertaken. If any bats are present the works will be undertaken under DEFRA

²⁴ English Nature (2001) The Great Crested Newt Mitigation Guidelines, EN, Peterborough.

license. The DEFRA license will be accompanied by a Method Statement which will be incorporated within the ECMS, which will set out how the works will be undertaken and what mitigation will be provided for the disturbance or loss of the roost. The level of mitigation will be proportionate to the size and type of roost that will be disturbed or lost as set out in English Nature guidance²⁵.

- 7.177 The provision of new pond habitats and landscape planting will provide supplementary foraging habitat for bats, which will partly mitigate the loss of foraging habitat. Although, it is difficult to make a quantitative comparison between the amount of potential foraging habitat lost and the amount of foraging habitat created and enhanced.
- 7.178 To minimise light pollution during the construction works, the ECMS will include measures to minimise the amount of artificial lighting. Any artificial lighting that will be used adjacent to retained habitats will involve directional lighting sources.
- 7.179 During the operation phase, the used of artificial lighting within and adjacent to retained habitats will be minimised. Where required, the lighting will be directional to avoid light spillage.
- 7.180 The EMP will incorporate measures for the overall maintenance and enhancement of bat habitat opportunities within the areas of retained open space, which will include the erection of a range of bat boxes within retained habitats.

Invertebrates

- 7.181 It is envisaged that since the development retains a significant area of open space that will be managed for nature conservation benefit, the invertebrate fauna will benefit indirectly. It is expected that this will ensure that the populations of rare and notable species will be retained within the site.
- 7.182 Any dead wood within the built footprint will be removed and used to form wood piles and artificial hibernacula within the open space and proposed great crested newt receptor site.

Birds

- 7.183 The ECMS will include measures to protect breeding birds, their nests, eggs and young during the construction phase through the sensitive timing of certain works.

²⁵ English Nature (2004) The Bat Mitigation Guidelines, EN, Peterborough.

7.184 The EMP will incorporate measures for the overall maintenance and enhancement of bird habitat opportunities within the areas of retained open space, which will include the erection of a range of bird boxes within retained habitats.

Residual Impacts

7.185 The significant residual impacts, which are those that could not be completely removed by inherent mitigation, as summarised in **Table 7.10** over the page.

Ecological Receptor		Evaluation	Residual Impacts	Residual Impact Significance
Designated Sites - Statutory	Ardley Cutting and Quarry SSSI	National	None	N/A
	Ancorr Bridge Meadows SSSI	National	None	N/A
	Stratton Audley Quarries SSSI	National	None	N/A
Designated Sites – Non-statutory	Gavray Drive Meadows CWS	County	Overall loss and fragmentation of habitat, but ecological interest of retained area secured in the long-term.	Initially, low but expected to be beneficial in the long-term.
	Graven Hill CWS	County	None	N/A
	Meadow south-west of Launton CWS	County	None	N/A
	Meadows NW of Blackthorn Hill CWS	County	None	N/A
Vegetation and Habitats	Grassland within Gavray Drive	County	See <i>Designated Sites – Gavray Drive Meadows</i>	
	Meadows CWS (Fields 4, 5, 6, 7, 12 and 11)		CWS	
	Grassland outside the Gavray Drive Meadows CWS (Fields 1, 2, 3, 8, 9, 10, 13a and 13b)	Local to District	Overall loss, however, but ecological interest of retained area secured in the long-term.	Not significant
	Hedgerows and Trees	Collectively, District value, that nearly fulfil requirements for ecologically 'important' hedgerows.	Overall small loss, but retained hedgerows secured in the long-term.	Not significant

Ecological Receptor		Evaluation	Residual Impacts	Residual Impact Significance
Species	Scrub	Local	Overall loss of scrub for development and to secure the ecological interest of the grassland habitats.	Not significant
	Ponds	Local	Loss outweighed by the provision of new ponds and the restoration of retained ponds. Management of new and retained ponds secured in the long-term.	Beneficial
	Reptiles	Negligible	None	Not significant.
	Amphibians	Local	Loss of ponds and terrestrial habitat outweighed by securing the long-term management of retained habitats and a purposely managed great crested newt receptor site in the long-term.	Initially, low, but expected to be beneficial in the long-term.
	Bats	Local	None	Beneficial increase in bat roosting opportunities.
	Badgers	Negligible	None	N/A
	Water Voles	Negligible	None	N/A
	Otters	Negligible	None	N/A
	Invertebrates	County	Initial loss of habitat off-set in the long term through the ecological management of retained habitats.	Initially, low, but expected to be beneficial in the long-term.

Ecological Receptor	Evaluation	Residual Impacts	Residual Impact Significance
Birds	District	Initial loss of habitat off-set in the long term through the ecological management of retained habitats.	Initially, low but expected to be beneficial in the long-term.

Table 7.10: Residual Impacts

Conclusion

- 7.186 The ecological assessment work has been undertaken with reference to the emerging IEEM guidelines on ecological impact assessment.
- 7.187 The assessment has been based on desk studies combined with general and detailed survey work of the site initially in 2002 and updated in 2004.
- 7.188 The baseline data and some of the mitigation strategies, particularly with respect to the CWS have been discussed with English Nature and the CWS Selection Panel.
- 7.189 The site is not covered or adjacent to any statutory nature conservation designation. It is not anticipated that the proposed development will have any impacts on statutory sites in close proximity (within 2km) of the proposed development.
- 7.190 The site is partially covered by and adjacent to the Gavray Drive Meadows CWS – a non-statutory site of County value. It is not anticipated that the proposed development will have any impacts on other non-statutory sites in close proximity (within 2km) of the proposed development.
- 7.191 The site supports a range of habitats including the Gavray Drive Meadows CWS, hedgerows, trees, scrub and ponds. The habitats vary in value up to County value.
- 7.192 The site supports a number of statutorily protected and /or notable species including plants, reptiles, amphibians, bats, birds and invertebrates.
- 7.193 The development framework plan has been developed through an iterative process in order to accommodate as much of the habitat and species interest as possible.
- 7.194 In addition to inherent mitigation, additional measures include the provision of an Ecological Construction Method Statement during the construction phase, which will be implemented by an appointed Ecological Clerk of Works, and an Ecological Management Plan to secure the long-term management and maintenance of habitats and species within the site and the proposed great crested newt receptor site.
- 7.195 It is considered that the implementation of the inherent and additional mitigation will minimise residual impacts to low levels and in some cases will result in significant beneficial impacts.

8.0 HYDROLOGY AND DRAINAGE

Introduction

Background

8.1 Gallagher Estates commissioned JBA consulting to undertake a Flood Risk Assessment for a proposed development at Gavray Drive, Bicester. This ES chapter provides a Flood Risk Assessment and supporting information on the nature of the flood risk to the proposed development site and reports the likely impact that the development will have on the hydrological regime of the immediate area.

8.2 The main flood risk to the site is considered to be from one source; the Langford Brook, which flows through the middle of the site.

Planning Policy Guidance Note 25

8.3 Planning Policy Guidance Note 25 (PPG251) was issued by the ODPM in July 2001. This introduced the sequential tests and the risk based approach to flood risk and development and priorities based on flood zones as outlined in PPG25. In accordance with PPG25, the main study requirement is to identify flood risk zones for the proposed development site, based on assessments for both current conditions and in 50 years time (to take into account the effects of possible climate change). A review of PPG25 and other policy guidance is identified in Chapter 3.

The Environment Agency

8.4 The Environment Agency is a statutory consultee for all planning applications and will give comments and recommendations to the planning authority for any proposed developments affecting a watercourse.

8.5 The Indicative Floodplain Maps (IFMs) were superseded on 1st July 2004 with the 2004 Flood Zone Maps, derived using JFLOW 2-dimensional modelling and currently have been issued to all councils. The flood extents of these maps, available for viewing at the local council, have been reproduced below in **Figure 8.1**. These maps show quite extensive flooding of the site, extending to 250m on the left bank of the Langford Brook and up to 150m to the right bank. Although being produced using more technologically advanced methodologies than the previous Indicative Floodplain Maps (IFMs), they are still only a guide and a detailed assessment is required to determine an accurate 1% AEP (1 in 100-year) flood outline across the site. As such,

a comprehensive hydrological and hydraulic modelling analysis was undertaken for the Langford Brook, using a detailed land survey to produce a digital terrain model (DTM), from which the flood outline could be derived.

Hydrological and Hydraulic Modelling Approach

- 8.6 The Flood Estimation Handbook (FEH) is the methodology recommended by the Environment Agency for hydrological modelling. The handbook consists of two main methods of flow estimation, namely the Statistical method (FEH-Stat) and the Rainfall-Runoff method (FEH-RR). Both methods have been used in the study. The methods rely on catchment descriptors taken from the FEH CD-ROM. As no previous model exists for the Langford Brook, JBA developed a new steady state HEC RAS hydraulic model is also reported.

Topographic Survey

- 8.7 JBA commissioned K.V. Surveys of Malvern, Worcestershire, to undertake a topographical survey of the Langford Brook. Details of river structures were also recorded. The cross sections, to Ordnance Datum, were surveyed in July 2004. The Client supplied JBA with a land survey of the site.

Climate Change

- 8.8 The period October to December 2000 ranks as the second wettest three-month sequence for England and Wales in the last 200-years. Unusual though recent climate change patterns have been, several broadly comparable wet episodes can be identified. These include the October to January periods of 1960/61, 1929/30 and 1952/53. Also, although the high storm rainfall totals recorded, for example in mid-October 2000, are rare; they are by no means unprecedented. The recorded rainfalls are well within the envelope of meteorological fluctuations that characterise the climate of England and Wales.
- 8.9 Recent research by the Environment Agency suggests that over the next 30 to 50 years the probability of occurrence of severe flood flows will increase. Unfortunately, this increase in severity cannot, as yet, be accurately quantified and analyses of the annual maximum flood series at the longer term gauging stations do not provide compelling evidence for any climate driven trend. Without such a trend or other quantifiable increase in flood magnitudes it is impractical to incorporate the possible effects of climate change into the design of flood alleviation schemes.

- 8.10 Various organisations have addressed the need to take a precautionary approach to the possibility of enhanced risks due to climate change by adopting an arbitrary percentage increase in the flood estimates computed from historic data sets. For example MAFF (now DEFRA) recommends:

“sensitivity analysis of river flood alleviation schemes should take account of potential increases of up to 20% in peak flows over the next 50 years”.

- 8.11 DEFRA do not make clear however, whether both design flood peaks and flood volumes should be increased by 20%. For some larger rivers the impact of such an increase might involve a shift from a 100-year event to a 1000-year event, in today's terms, depending on the slope of the relevant frequency curve(s).
- 8.12 Therefore, while we endorse the need to consider the implications of the occurrence of a flood larger than the design event, and we do not rule out the possibility that climate change may affect future flood flows; an agreed value for climate change is not available. As a precautionary measure we recommend the DEFRA guideline of a 20% increase in flow be used as part of the sensitivity analysis.

Hydrology Analysis

Approach to the Hydrology

- 8.13 The hydrological assessment has been undertaken to derive the 1% AEP (1 in 100-year) flow for the Langford Brook, which flows through the centre of the proposed development site.
- 8.14 A flow estimate was made for the following inflow point of the Langford Brook:
- OS NGR SP 459636 222565

Methodology

- 8.15 The Flood Estimation Handbook (FEH) describes two different approaches to flood estimation; the Statistical method and the Rainfall -Runoff method. The Statistical method is based on the estimation of an index flood, and uses information from hydrologically similar sites for flood frequency analysis. The Rainfall-Runoff method is a conceptual unit hydrograph-based model, which derives flood frequency curves from rainfall characteristics.

- 8.16 The Langford Brook at the above flow estimation point has a catchment area of 17.02 km². No gauging stations are located within the catchment. The hydraulic model used to estimate the flood risk to the site is a steady-state model, which requires peak flow estimates.

Catchment Descriptors

- 8.17 The FEH CD-ROM provides catchment boundaries derived from a digital terrain model (DTM). The DTM uses information from 1:50,000 OS maps to position likely drainage paths on a grid of 50m x 50m. The catchment descriptors are then computed digitally from this information. The major descriptors used in this report are shown in **Table 8.1**.

Table 8.1 Definition of Selected FEH Catchment Descriptors

Descriptor	Description
AREA	Catchment area (km ²).
BFIHOST	Baseflow index derived from the HOST soil classification system.
DPLBAR	Mean drainage path length (km).
DPSBAR	Mean drainage path slope (m/km).
FARL	Index to describe the attenuation due to lakes and reservoirs within the catchment area. A value of 1 indicates no attenuation.
PROPWET	Index to describe the proportion of time when soil moisture deficit (SMD) was below 6mm during the period 1961-90.
SAAR	Standard average annual rainfall, taken from the period 1961-90.
SPRHOST	Standard percentage runoff derived from the HOST soil classification system (%).
URBEXT ₁₉₉₀	Extent of urbanisation. This has been taken from an index of urban and suburban land cover formulated in 1990.

- 8.18 It is generally accepted that urbanisation augments flow. Therefore, adjustments to flow estimates can be made on the strength of the URBEXT₁₉₉₀ descriptor. If URBEXT₁₉₉₀ is greater than 0.025, an adjustment is required for the Statistical method, whereas for the Rainfall-Runoff method an adjustment should be made if URBEXT₁₉₉₀ is greater than 0.125. URBEXT₁₉₉₀ has been updated using the urban expansion factor noted in **Equation 8.1**.

Equation 8.1

$UEF = 0.8165 + 0.2254 \tan^{-1} \{ (Year - 1967.5)/21.25 \}$
<p>Where UEF = Urban expansion factor Year = subject year</p>

8.19 **Table 8.2** shows the catchment descriptors for the Langford Brook catchment and the two analogue catchments discussed in Paragraph 8.20 to 8.22.

Table 8.2 Selected Subject Site and Analogue Site Catchment Descriptors

Descriptor	Catchments		
	Langford Brook (subject site)	29009 Ancholme @ Toft Newton	30017 Witham @ Colsterworth
NGR	4596 2225	5033 3877	4929 3246
AREA (km ²)	17.02	29.55	50.23
FARL	0.990	1.000	1.000
PROPWET	0.32	0.26	0.27
BFIHOST (m ³ /s/km ²)	0.684	0.628	0.657
DPLBAR (km)	4.43	5.39	7.38
DPSBAR (m/km)	15.6	12.42	22.59
SAAR (mm)	634	616	641
SPRHOST (%)	23.2	25.6	22.6
URBEXT ₂₀₀₄	0.046	0.005	0.007

Hydrological Data

8.20 The catchment areas defined by the DTM were verified with boundaries derived manually from topographical maps. No discrepancies were identified.

8.21 In flood hydrology, observed data are preferable to improve flow estimates. In the absence of gauged data within the catchment, donor or analogue catchments can be used to transfer data to the subject site. No suitable donor catchments were identified; instead analogue catchments were selected to improve the subject site QMED estimate. The top four stations selected in the pooling group were analysed for their suitability with respect to the subject catchment. Dowles Brook @ Dowles

was considered unsuitable because the permeability of the catchment is lower than that of the subject site catchment and below the FEH permeability threshold of 20%. River Foulness @ Holme Farm was not used as the area of the catchment is too large, following guidelines outlined in FEH, which state that a factor of 4 to 5 is appropriate.

8.22 Ancholme @ Toft Newton and Witham @ Colsterworth, although located in the Anglian region, were considered suitable analogue catchments having similar catchment descriptors to that of the subject catchment. The suitability of analogue catchments is not easy to judge, and therefore both analogue catchments have been used instead of placing reliance on one alone. A summary of the gauging stations can be found in **Table 8.3** below.

Table 8.3 Summary of Analogue Catchments

Station Name	FEH Number	OS NGR	Catchment Area (km ²)	Period of record	Comments on Data Quality
Ancholme @ Toft Newton	29009	5033 3877	29.55	1974-2001	Flat V weir (3.03m wide) with theoretical calibration confirmed by check gaugings. There is no drowning or bypassing, and the station is immediately u/s of entry point of flows from Toft Newton reservoir. No major abstractions or returns.
Wotham @ Colsterworth	30017	5629 2233	50.23	1978-2001	Flat V weir 4.996m wide; theoretical calibration. Summer flows very heavily augmented by transfers from Rutland Water until Jun 1985, when direct Rutland/Saltersford pipeline opened. <i>Notes: 3 summer flows prior to June 1985 excluded from the AMAX dataset due to flows being heavily augmented.</i>

Statistical Analysis – Methodology

8.23 The FEH Statistical methodology is based on the analysis of annual maximum flows, and the index flood is the median annual maximum (AMAX), denoted by QMED. For gauged sites QMED is the median value of either the AMAX or POT series. Where sites are not gauged, the index flood is estimated from catchment descriptors or by data transfer. The index flood (QMED) is then scaled by a growth factor derived from either a mathematical distribution of flow data at the site or a 'pooling group' of gauged UK catchments if the site is ungauged. This pooling group is selected using similar hydrological characteristics to the subject site, and the attributes of their flood data are statistically combined to produce a growth curve, from which growth factors are extracted.

Statistical Analysis – Index Flood

8.24 QMED for the site under consideration was derived for all the analogue catchments, using **Equation 8.2** shown below. **Equation 8.3** calculates QMED_{CD}. Note that an adjustment for urbanisation was required as the subject site catchment had an URBEXT2004 value of 0.046. The index floods of the two analogue catchments are shown in **Table 8.4**, whilst the index flood values for the ungauged site can be seen in **Table 8.5**.

Equation 8.2

$$QMED_{s,adj} = QMED_{s,cds} \times (QMED_{g,obs} / QMED_{g,cds})$$

where QMED_{s,adj} = adjusted QMED for subject site
 QMED_{s,cds} = QMED derived by catchment descriptors for subject site
 QMED_{g,obs} = QMED of donor site from observed data
 QMED_{g,cds} = QMED of donor site from catchment descriptors

Equation 8.3 Summary of Analogue Catchments

$$QMED_{rural} = 1.172 \text{ AREA}^{\left(1 - 0.015 \ln \left(\frac{\text{AREA}}{0.5}\right)\right)} \left(\frac{\text{SAAR}}{1000}\right)^{1.560} \text{ FARL}^{2.642} \left(\frac{\text{SPRHOST}}{100}\right)^{1.211} 0.0198^{\text{RESHOST}}$$

where QMED_{RURAL} = as-rural index flood (m³/s)
 AREA = catchment area (km²)
 AE = 1 - 0.015 ln (AREA/0.5)
 SAAR = standard average annual rainfall (mm)
 FARL = index to show attenuation by lakes
 SPRHOST = standard percentage runoff derived from HOST soil classification (%)
 RESHOST = BFIHOST + 1.3 (SPRHOST/100) - 0.987
 BFIHOST = baseflow index derived from HOST soil classification

Table 8.4 Index Flood (QMED) for the Analogue Catchments

Gauging Station	QMED _{AMAX} (m ³ /s)	QMED _{cd} (m ³ /s)	Ratio
29009 Ancholme @ Toft Newton	1.8	2.8	0.66
30017 Witham @ Colsterworth	5.8	4.3	1.35

Table 8.5 Index Flood for the Ungauged Catchment

Location	Donor Catchment	QMED _{s,cds} (m ³ /s)	Ratio	QMED _{s,adj} (m ³ /s)
L_Sub 1	Toft Newton	1.5	0.66	1.0
L_Sub1	Colsterworth	1.5	1.35	2.0

8.25 In this instance it is necessary to apply the multi-site adjustment procedure as outlined in FEH Volume 3, Chapter 4. Using this methodology, the final QMED estimate is obtained as a weighted average of the individually transferred estimates (using Equation 8.4).

Equation 8.4 Index Flood (QMED) for the Analogue Catchments

Gauging Station	QMED _{AMAX} (m ³ /s)	QMED _{CD} (m ³ /s)	Ratio
29009 Ancholme @ Toft Newton	1.8	2.8	0.66
30017 Witham @ Colsterworth	5.8	4.3	1.35

8.26 The choice of weights W_i reflects the similarity of the gauged sites to the subject site. Both analogue sites had similar catchment descriptors to that of the subject site, as shown in Table 8.2. Greater emphasis was applied to the analogue catchment Ancholme @ Toft Newton, as the catchment area was more similar to that of the subject site. The final weightings applied are shown in **Table 8.6**.

Table 8.6 Multi-Site Adjustment Procedure Weightings

Location	Weights (W_i)
29009 Ancholme @ Toft Newton	0.6
30017 Witham @ Colsterworth	0.4

The final $QMED_{s,adj}$ derived using the methodology outlined above was calculated to be;

$$QMED_{s,adj} = 1.3m^3/s$$

Statistical Analysis – Growth Curve

- 8.27 The pooling group is a group of hydrologically similar catchments whose combined growth curves produce the growth factors with which to scale the index flood. The number of sites within the pooling group is dictated by the target return period (T), where the combined station record of all the pooling sites within the group should be greater than 5T. Therefore, if the target return period is 100-years then the total record length for the whole pooling group should be greater than 500 years.
- 8.28 Sites for the pooling group are selected by hydrological similarity using three catchment descriptors; namely AREA, SAAR, and BFIHOST, and is carried out by the WINFAP-FEH database. Once chosen, the pooling group can be altered. Stations can be added or taken away if desired. This is determined by a measure of discordancy and record length amongst others.
- 8.29 A pooling group was constructed for the subject site. The initial pooling group consisted of 22 gauging stations with a total of 501 years of AMAX data. The initial pooling group was characterised as heterogeneous, and thus the entire pooling group was reviewed. Several stations had to be removed due to drowning and bypassing of the gauge. The revised pooling group consisted of 20 gauging stations and included 502 years of AMAX data and was characterised as homogeneous and therefore, a further review of the pooling group was not required. WIN FAP FEH selected the General Logistic (GL) distribution as the most suitable to construct the pooled flood frequency curve, as it closely weighted the average L-Kurtosis and L-Skewness of the pooling group sites.
- 8.30 The final 1% AEP (1 in 100-year) Statistical design flow estimate is shown in **Table 8.7**.

Table 8.7 Final Statistical Design Flow Estimates

Catchment	Return Period/AEP	
	100-year (1%)	100-year +20% (Climate Change)
L_Sub1	3.5	4.2

Rainfall-Runoff Method

- 8.31 The FEH Rainfall-Runoff method is a conceptual model that uses a hypothetical unit hydrograph and design rainfall to produce a flow hydrograph. Whereas the Statistical method uses a growth curve to estimate flood frequency, the Rainfall-Runoff method estimates the flood frequency curve by factoring the design rainfall for the appropriate return period. These rainfall frequency statistics can be obtained directly from the FEH CD-ROM.
- 8.32 There are three main parameters that govern the Rainfall-Runoff method. These are:
- Time to peak (Tp)
 - Standard percentage runoff (SPR)
 - Baseflow (BF)
- 8.33 These can be estimated using catchment descriptors. However, it is stated in the FEH that flow estimation is greatly improved if parameters (in particular SPR and Tp) are identified directly from observed data or adjusted by data from a suitable donor or analogue catchment.
- 8.34 Using the UK Event Archive, published in Volume 4, Appendix A, flood event data was only available for one of the analogue catchments (30017 Witham @ Colsterworth). It was considered inappropriate to derive Rainfall-Runoff estimates from observed data using only one analogue catchment where the records available are only for a period in the 1980's. Therefore, the Rainfall- Runoff 1% AEP flow was derived using catchment descriptors only.
- 8.35 The FEH Rainfall-Runoff model has been implemented in the iSIS modelling software v2.2. This modelling software is capable of performing all the required calculations.
- 8.36 Due to the catchment being classified as 'essentially rural' a time step of $\Delta t = 1.0$ hours was chosen.

8.37 The extent of urbanisation in the catchment is low (URBEXT < 0.125 for Rainfall-Runoff threshold) and therefore a winter storm profile was chosen.

8.38 The critical storm duration was estimated as in **Equation 8.5**. A storm duration of 13.0 hours was chosen.

Equation 8.5

$$D=TP(1+SAAR/1000)$$

Design Flow Estimates

8.39 Using the iSIS FEH module, the 1% AEP (100-year) design flow estimate for the Langford Brook using catchment descriptors is shown in **Table 8.8**.

Table 8.8 Final Rainfall-Runoff Design Flow Estimates

Catchment	Return Period/AEP	
	100-year (1%)	100-year +20% (Climate Change)
L_Sub1	7.5	9.0

Choice of Method

8.40 The 1% AEP flow estimates using both the Statistical and Rainfall-Runoff methodologies were;

- 7.5m³/s (Rainfall-Runoff)
- 3.5m³/s (Statistical)

8.41 As shown, the two methods produced different results. Although the pooling group created using the Statistical analysis was considered to be homogeneous and therefore quite a good representation in relation to the subject site. The subject site had an URBEXT value of 0.046 the Statistical method is generally considered to be suitable for essentially rural catchments.

- 8.42 The subject catchment is also small; 17.02km², and the FEH favours the Rainfall-Runoff method for smaller catchments.
- 8.43 In choosing the final methodology, it was considered that 3.5m³/s Statistical derived flow estimate was too low for a 100-year estimate for a catchment of 17.02km², for which there were no apparent reasons. It was therefore thought that the flow of 7.5m³/s was more representative for this study catchment.

Hydraulic Modelling

General

- 8.44 In the absence of an existing model of the Langford Brook at Bicester, JBA constructed a steady state model of the brook using the HEC-RAS version 3.1.1 hydraulic modelling software. The software was developed by the US Army Corps of Engineers and was released in May 2003. HEC-RAS can simulate water levels in open channels as well as in various types of structures, and will also resolve the transition from sub-critical to super-critical flow.
- 8.45 The Langford Brook model extends for just over 1200m, from its upstream extent approximately 300m downstream of the A4421 Charbridge Lane (OS NGR SP 599 230), to approximately 200m downstream of Gavray Drive at OS NGR SP 594 221. Both upstream and downstream boundary conditions were set at the 'normal depth', calculated from the gradient of the river bed.
- 8.46 Where structures are present in the model, HEC-RAS requires there to be a cross-section at both the upstream and downstream face of the structure, therefore some of the sections had to be duplicated, as the surveyor did not always survey both the faces of the structure, if they were seen to be very similar. On structures that appeared to differ from upstream to downstream, or where complex structures were present, for example Gavray Drive bridge, both the upstream and downstream faces of the structure were surveyed.

Hydraulic Modelling Methodology

- 8.47 Two hydraulic modelling methodologies were available for use in this study, namely steady state modelling and unsteady state hydrodynamic modelling. The choice of methodology utilised is dependent on engineering judgements made on the nature of the watercourse in question and associated flood routing.

- 8.48 The main limitation of steady state modelling is that it does not simulate time-varying behaviour such as flood wave attenuation due to storage and time-based operation of control structures and pumps. A hydrodynamic model directly calculates these effects and also provides the opportunity to distinguish between such issues as areas of floodplain serving as purely static storage and those actively conveying flow (functional floodplain).
- 8.49 For this study, a steady state model was thought to be appropriate, as due to the short model length, the attenuation of flow in the floodplain was considered to be low.
- 8.50 It was also thought appropriate to use a steady state model to ensure that if the structures at Charbridge Way (upstream of the site) were modified or removed in the future, the model would represent this, as a steady state model assumes the same flow throughout the reach, and ignores any online flood storage due to undersized culverts.

Data Collection

- 8.51 JBA appointed K.V. Surveys of Malvern to undertake a topographical channel and floodplain survey of the Langford Brook at Gavray Drive, Bicester. This survey consisted of 13 watercourse sections from grid reference OS NGR SP 599 230 at the upstream extent of the model, to grid reference OS NGR 594 221 downstream of the site, and included details of all the structures present along the modelled stretch of watercourse. The survey, to ordnance datum, was undertaken in July 2004.
- 8.52 JBA staff, with experience in hydrology and hydraulic modelling, undertook a walkover survey during July 2004. Details of watercourse and floodplain roughness values, structures and possible flow routes were assessed and recorded during this survey. This information provided a starting point to develop the hydraulic model.

Open Channel Sections

- 8.53 The hydraulic model of Langford Brook contained a total of 16 open channel sections (three of the original survey sections had been duplicated as a result of the presence of structures). Survey sections six, five and four were extended to approximately 500m on both the left and right banks, using a topographic spot level survey which was provided to JBA by the client. **Figure 8.2** shows the locations of the cross-sections in the HEC-RAS model.

Roughness Coefficients

- 8.54 Channel and floodplain roughness is represented by Manning's 'n' values in the model. Initial values were determined by experience and by reference to published literature (e.g. Chow 1959²). Geomorphological and hydraulic literature documents the general case that in most rivers, the 'n' value decreases with increasing stage and discharge. During periods of relatively low flow, irregularities on the bed (form roughness) and the effects of bed and bank vegetation tend to elevate the 'n' value, whereas during periods of flood with significant depths above the main channel and floodplain, the value of 'n' is dramatically diminished as bathymetric and topographic irregularities are 'drowned' out and vegetation cover is submerged. The latter is particularly the case between Autumn and Spring when floods are most common and vegetation cover declines.
- 8.55 The final values were chosen following a walkover survey by an experienced modeller and consideration of the above commentary. As Langford Brook is winding with some weeds and stones, a value of 0.035 was used in the model for the main channel (below the bankfull reference level). When the floodplain is inundated, changes in vegetation within the main channel are considered unlikely to have a marked effect on the stage of flow. For the floodplain a value of 0.040 was adopted, as the land adjacent to the channel consists of light brush and trees in summer.
- 8.56 A Manning's 'n' value of 0.014 was chosen for the three culverts under the Gavray Drive Bridge. A Manning's 'n' value of 0.011 represents a smooth, concrete culvert, straight and clear of debris, therefore a slightly higher Manning's 'n' of 0.014 was deemed appropriate for these culverts.

Structures

- 8.57 The modelled reach of the Langford Brook contains a large number of structures, details of which were obtained from the topographical survey. The following details the location of the structures:
- Structure 11.5 – Railway bridge at grid reference OS NGR SP 598 228.
 - Structure 10.25 – Bridge near Charbridge Way at grid reference OS NGR SP 592 228.
 - Structure 7.95 – Wooden footbridge at grid reference OS NGR SP 596 226.
 - Structure 6.5 – Railway bridge at grid reference OS NGR SP 596 225.
 - Structure 3.5 – Gavray Drive bridge at grid reference OS NGR SP 595 225.

- Structure 1.7 – Wooden bridge at grid reference OS NGR SP 595 221.

8.58 Contraction and expansion coefficients are essential in the hydraulic model computations, to determine the energy losses due to the expansion and contraction of flow, between two adjacent cross-sections during the standard step profile calculations. These coefficients were determined using the HEC-RAS manual³. The manual suggests that typical values of contraction and expansion coefficients are 0.1 and 0.3 respectively for a gradual transition along an open channel. These values therefore have been adopted for the open channel section. However, the values 0.3 and 0.5 are recommended for the bridge contraction and expansion coefficients respectively in all the relevant HEC-RAS publications. The same values were therefore used in this study.

Floodplains

8.59 The floodplains of the Langford Brook are represented in the model as single cross-sections which extend either side of the main channel. For the sections which flow past the site, the floodplain was extended to approximately 500m from both the left and right banks, using information from a topographical spot level survey, which had been provided by the client.

Model Runs and Results

8.60 The HEC-RAS model of Langford Brook was run for a range of scenario's, detailed below:

- 1% AEP (1 in 100-year) flow.
- Sensitivity to flow - 1% AEP flow + 20% (climate change scenario).
- Sensitivity to variations in Manning's 'n'.
- Sensitivity to changes in downstream boundary.

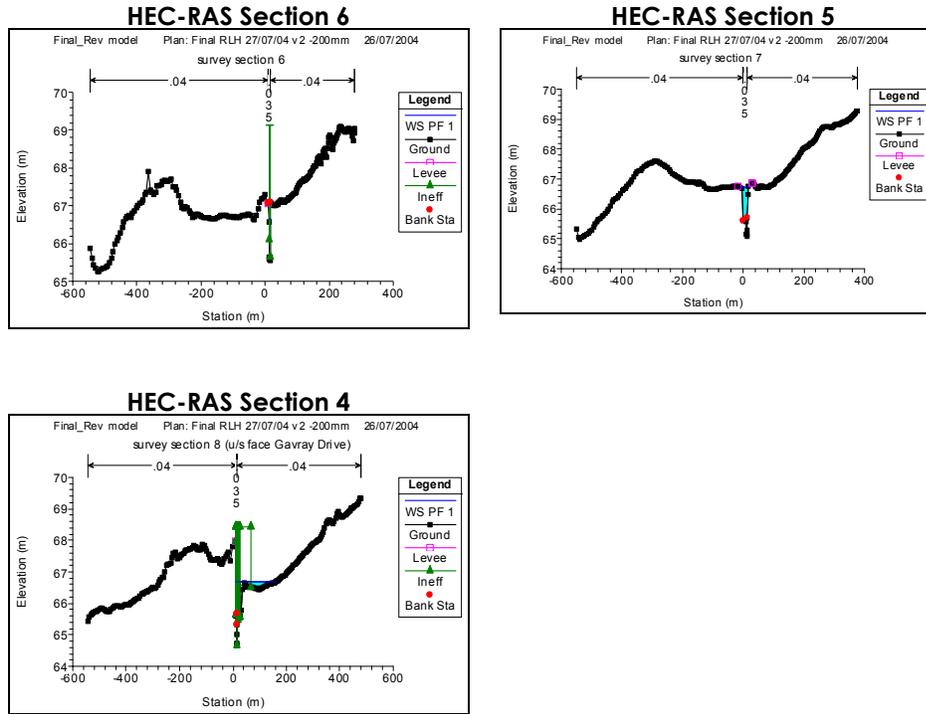
8.61 The Rainfall-Runoff derived 1% AEP (1 in 100-year) peak flow of 7.5m³/s was used for the Langford Brook. DEFRA recommend that a 20% increase in this value is used as a sensitivity analysis, and also to assess possible enhanced risks due to climate change. The 20% flow increase, gives a 'climate change' flow of 9.0m³ /s.

8.62 Summary results from the model are shown in **Table 8.9** and cross sections adjacent to the site and the model longitudinal section are shown in **Graph 8.1** and **Graph 8.2** respectively.

Table 8.9 Summary of Model Results

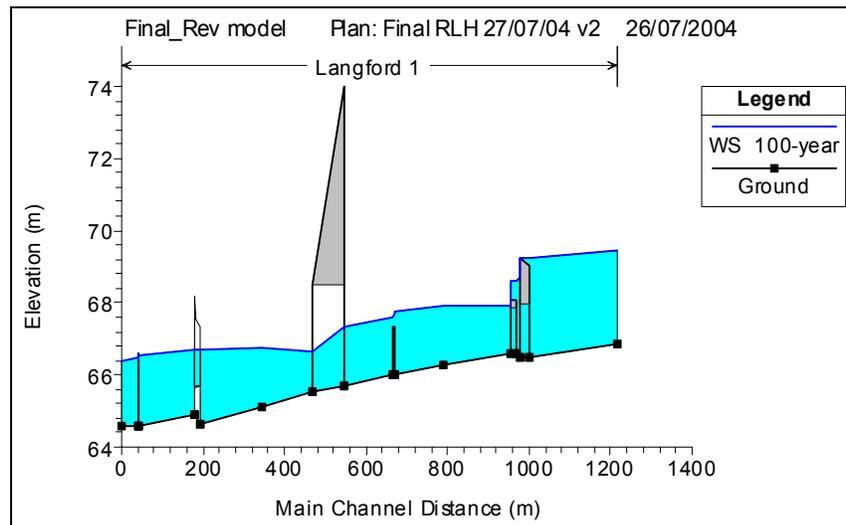
HEC-RAS Label	1% AEP Water Level (m AOD)	1% AEP + 20% Water Level (m AOD)
13	69.44	69.55
12	69.22	69.31
11	68.70	68.77
10.5	68.63	68.66
10	67.90	68.06
9	67.90	68.00
8	67.75	67.87
7.9	67.61	67.80
7	67.31	67.50
6	<i>66.65</i>	<i>66.64</i>
5	<i>66.74</i>	<i>66.86</i>
4	<i>66.69</i>	<i>66.85</i>
3	66.67	66.82
2	66.54	66.67
1.5	66.48	66.57
1	66.41	66.51
Notes: <i>Bold & Italic</i> text are the cross sections which are adjacent to the site		

Graph 8.1 HEC-RAS Cross Sections Adjacent to the Site



8.63 The effect of the 1% AEP (1 in 100-year) modelled water levels on the site, are discussed in section 4.3.

Graph 8.2 HEC-RAS Model Longitudinal Section



- 8.64 As shown in **Figure 8.3** the structures in the location of Charbridge Way, upstream of the site, are a restriction on flow. The downstream structure at Gavray Drive is surcharged but does not have a significant head loss.

Flow

- 8.65 A sensitivity analysis to flow has been carried out for the Langford Brook HEC-RAS model, by increasing the 1% AEP (1 in 100-year return period) flow by 20%. The flow used was 9.0m³/s. The model results for the flow sensitivity analysis can be seen in Table 3-1.

Roughness

- 8.66 A sensitivity analysis was carried out on the Manning's 'n' values that were chosen to represent the channel and banks of the watercourses. Manning's 'n' values were altered by both -20% and +20%. Results are shown in Table 3-2.
- 8.67 The results illustrated that the model is sensitive to change in Manning's 'n', and it is therefore recommended that the channel is regularly maintained to ensure that particularly between Autumn and Spring, when larger flood events are more likely to occur, the channel does not become overgrown or obstructed.

Downstream Boundary

- 8.68 In the absence of known stage-discharge information for the downstream boundary, a sensitivity analysis was carried out on the downstream boundary. This was done by varying the water depth by +/- 200mm. On completion of the 1% AEP (1 in 100-year) flow model run, the water surface elevation of the last cross-section (section 1), was noted. This value was modelled to be 66.41m AOD. Results are shown below in **Table 8.10**.

Table 8.10 Sensitivity Analysis on Mannings 'n' and Downstream Boundary

HEC-RAS Label	Mannings 'n' -20% Water Level (m AOD)	Mannings 'n' +20% Water Level (m AOD)	Downstream Boundary - 200mm Water Level (m AOD)	Downstream Boundary +200mm Water Level (m AOD)
13	69.41	69.47	69.44	69.44
12	69.21	69.24	69.22	69.22
11	68.68	68.73	68.70	68.70
10.5	68.63	68.65	68.63	68.63
10	67.90	67.97	67.90	67.90
9	67.86	67.95	67.90	67.90
8	67.74	67.80	67.75	67.75
7.9	67.50	67.73	67.61	67.61
7	67.18	67.44	67.31	67.30
6	66.49	66.65	66.65	66.70
5	66.62	66.80	66.74	66.84
4	66.58	66.80	66.69	66.83
3	66.55	66.79	66.67	66.81
2	66.41	66.64	66.54	66.71
1.5	66.37	66.57	66.48	66.64
1	66.29	66.51	66.41	66.61

Notes: Bold & italic text are the cross sections which are adjacent to the site

Flood Risk

Planning Policy Guidance Note 25 (PPG25)

8.69 In July 2001 the DTLR issued Planning Policy Guidance note 25 (PPG25), now published by the ODPM. This introduced the sequential tests and the risk based approach to flood risk and development. Development priorities are to be based on flood zones as outlined in PPG25. The flood zones are shown in **Table 8.11**.

Table 8.11 PPG25 Flood Risk Zones

FLOOD ZONE (see note a)	Appropriate Planning Response
Zone 1: Little or No Risk Annual probability of river flooding 0.1% (1 in 1000-year)	No constraints due to river flooding.
Zone 2: Low to Medium Risk Annual probability of river flooding 0.1% to 1.0% (1 in 1000-1 in 100-year)	Suitable for most development. For this and higher flood risk zones, flood risk assessment is required appropriate to the scale and nature of the development. Subject to operational requirements in terms of response times, these and higher risk zones are not generally suitable for essential civil infrastructure, such as hospitals, fire stations, emergency depots etc.
Zone 3: High Risk (see note b) Annual probability of flooding with defences where they exist 1% or greater (less than a 1 in 100-year protection).	
Zone 3a: Developed Areas	These areas may be suitable for residential, commercial, and industrial development providing the appropriate minimum standard of flood defence (including suitable warning and evacuation procedures) can be maintained for the lifetime of the development.
Zone 3b: Undeveloped and sparsely developed areas	These areas are generally not suitable for residential, commercial and industrial development unless a particular location is essential, e.g. for navigation and water based recreation uses, agriculture and essential transport and utilities infrastructure, and alternative lower-risk location is not available.
Zone 3c: Functional floodplains	These areas may be suitable for some recreation, sport, amenity and conservation uses (providing adequate warning and evacuation procedures are in place). Built development should be wholly exceptional and limited to essential transport and utilities infrastructure that has to be there. Such infrastructure should be designed and constructed so as to remain operational even in times of flood.

Notes:

Zone 3 is split into three sub-zones.

Tidal flooding risks have not been included in this table.

Appropriate Planning Responses have been limited to those relevant to this flood risk assessment.

Note a: All risks relate to the time at which a land allocation decision is made or an application submitted. The Environment Agency will publish maps of these flood zones. Flood Zones should be identified from Agency flood data ignoring the presence of flood defences. Local Authorities should, with the Agency, identify those areas currently protected by those defences and the standard of protection provided by those defences.

Note b: Development should not be permitted where existing sea or river defences, properly maintained, would not provide an acceptable standard of safety over the lifetime of the development, as such land would be extremely vulnerable should a flood defence embankment or sea wall be breached, in particular because of the speed of flooding in such circumstances (see PPG25 paragraph 69).

Flood Risk to the Site

- 8.70 Flood risk to the site is considered to be from one main source; the Langford Brook. The appropriate standard for flood protection is 1% AEP (1 in 100-year).

Derivation of the 1 in 100-year Flood Outline

- 8.71 The 1% AEP (1 in 100-year) water level estimates, derived from the Langford Brook model, have been used to plot the 1% AEP flood outline across the site. This process was achieved by firstly creating a digital terrain model (DTM) of the study area (illustrated in **Figure 8.4**) based on the land survey supplied to JBA by the Client. Secondly, the maximum stage results from the hydraulic model were combined with the DTM to create a water surface, detailing the extent of the flood event. The 1% AEP (1 in 100-year) flood extent across the site is shown in.
- 8.72 As shown in **Figure 8.5**, due to the topography of the area, a small area of the site will be affected by flooding during a 1% AEP flood event. At CS 6, the model is in bank and therefore the northern area of the site should not be affected by flooding. At CS 5 the model is slightly out of bank and at CS 4, at the southern part of the site, the model shows increased out of bank flooding. The maximum water level across the site is 66.74m AOD, with the lowest spot level being approximately 66.39m AOD. The maximum depths of flooding could therefore be approximately 0.35m.
- 8.73 The 1% AEP (1 in 100-year) outline derived represents the worst case scenario, as to derive the outline the water levels from the model were projected across the

floodplain until the topography of the site is equal to the 1% AEP water level. In reality there may not be sufficient volume of water to reach these extents.

- 8.74 Note that, as shown in **Figure 8.4**, on the left bank of the Langford Brook, the topography of the site is lower immediately adjacent to the watercourse (blue/green shading), rising gently to an area of higher ground. It is this area of higher ground which protects the very eastern part of the site, which is lower, from being affected by flooding.

Environment Agency

- 8.75 Following discussions with the Environment Agency, it was considered appropriate to derive the flood outline using the water levels derived running the model with +20% Manning's 'n' values. Deriving the outline with these slightly higher water levels would incorporate intolerances in the survey data and sensitivity within the model runs.
- 8.76 The flood extent was derived in the same way as outlined above and the final flood outline across the site is illustrated in

Flood Zone of the Proposed Site

- 8.77 The proposed site at Gavray Drive, Bicester, lies within PPG25 flood risk zones 2 and 3 – medium to high risk. The area of the site which lies outside of the 1% AEP (1 in 100-year) flood extent is considered to be suitable for most development. Zone 3 of the site, the area which lies within the 1% AEP (1 in 100-year) flood extent, may be suitable for residential development providing the appropriate minimum standard of flood defence (including suitable warning and evacuation procedures) can be maintained for the lifetime of the development.

Proposed Finished Floor Levels

- 8.78 The Environment Agency recommends that floor levels of all new developments be set a minimum of 600 mm above the 1 in 100-year flood levels.
- 8.79 The maximum estimated 1 in 100-year water level in the vicinity of the site was 66.74 m AOD. Floor levels of the proposed development should therefore be constructed at a minimum elevation of 67.34 m AOD.

Flood Risk Downstream of the Site

- 8.80 At this stage, the exact details of the site drainage are unknown, however it is envisaged that surface water from the development will discharge into the existing public surface water sewers. It will be necessary to demonstrate that adequate surface water sewers exist and that the surface water runoff from the development site will be no more than existing runoff.

Dry Access

- 8.81 The Environment Agency states that during times of flooding in a 1% AEP (1 in 100-year) flood event, a dry means of access must be available to the site. A dry means of access would be available to the site from all main access roads, particularly the A4421.

Climate Change

- 8.82 PPG25 states that ‘... best estimates, based on the most up-to-date findings, should also be made of climate change impact on probabilities. The assessment should ensure that the development meets an acceptable standard of flood defence for the design life of a development.’
- 8.83 The HEC-RAS model developed by JBA was run with a 20% increase in flow, to assess the effect of climate change. Discussion and model results for this are shown in paragraphs 8.65 to 8.68.

Flood Plain Compensation

General

- 8.84 Part of the proposed development site lies within the flood outline and it is proposed to rationalise the floodplain on the site rather than have a layout that fits around the existing floodplain outline. In order to undertake this, floodplain compensation calculations have been carried out to ensure that the new development does not reduce the floodplain capacity.
- 8.85 An extract of the proposed development plans are illustrated in **Figure 8.7** with the full plan being shown in **Figure 102**. The area of land to be raised is 0.5 hectares and the land available for compensation is 0.9 hectares.

- 8.86 The floodplain compensation calculations have been undertaken by spreadsheet calculations. Using Vertical Mapper (VM), the ground levels within the area to be raised were extracted to determine the depths of flooding. All depths within the area, apart from two small areas illustrated in **Figure 8.8**, were lower than 300mm and therefore it was considered necessary to compensate in one band only and provide a like for like compensation.
- 8.87 The volume was derived by using the cell size of the grid of 2.5m. The total volume within the area to be developed was calculated to be 673.40m³, for the derived flood outline.
- 8.88 It was considered feasible to use only 0.4 hectares (hatched area on **Figure 8.7**) of the available land for compensation, the area immediately adjacent to the Langford Brook. Using the methodology outlined above, ground levels within this compensation area were extracted. To provide sufficient compensation it is considered necessary to lower the ground levels to a constant level of 66.6m AOD.
- 8.89 By lowering the area to a level of 66.6m AOD this will provide a storage capacity of 742.2m³, which is sufficient to compensate for the area being raised and will slightly increase the floodplain volume.

Conclusions and Recommendations

Conclusions

- 8.90 JBA were appointed by Gallagher Estates in June 2004, to undertake a Flood Risk Assessment for a proposed site at Gavray Drive, Bicester. The existing site is open fields.
- 8.91 The study has considered flooding from the Langford Brook, which flows through the centre of the site. This Flood Risk Assessment and this report follow the relevant sections of the guidelines in Appendix F of PPG25 – Planning Guidance Development and Flood Risk.
- 8.92 The Environment Agency's 2004 Flood Zone Maps which were obtained from the local council were initially used to determine the flood risk to the site.

- 8.93 JBA commissioned K.V. Surveys of Malvern to undertake a topographical survey of the watercourse. This survey provided information on the shape of the channel and the dimension of any structures found along the watercourse, and was undertaken in June 2004.
- 8.94 Flows for input in the model were obtained using the FEH Rainfall-Runoff methodology. The 1% AEP flow was estimated to be 7.5m³/s, and the +20% increase in flow, to take into account the possible effects of climate change, was taken to be 9.0m³/s.
- 8.95 A steady state HEC-RAS model was developed using the new topographic survey, with the cross sections adjacent to the site being extended across the floodplain using the land survey provided to JBA by the Client.
- 8.96 A DTM of the site was created using the land survey, from which the 1% AEP (1 in 100-year) flood extent was derived. Following discussions with the Environment Agency it was considered appropriate to derive the flood outline using the water levels when the model was ran with a 20% increase in Manning's 'n' values. This would take into account any intolerance in the survey data and sensitivity of the model runs. The model results indicated that an area of the site would be at risk from flooding with all but a small area of the site experiencing depths of flooding less than 300mm.
- 8.97 The proposed site at Gavray Drive, Bicester lies within PPG25 flood risk zones 2 and 3 – medium to high risk. The area of the site which lies outside of the 1% AEP (1 in 100-year) flood extent is considered to be suitable for most development.
- 8.98 The Environment Agency states that during times of flooding in a 1% AEP (1 in 100-year) flood event, a dry means of access must be available to the site. A dry means of access would be available to the site from all main access roads, particularly the A4421.

Mitigation

- 8.99 The Environment Agency recommends that floor levels of all new developments be set a minimum of 600 mm above the 1 in 100-year flood levels. The estimated 1 in 100-year water level in the vicinity of the site was 66.74 m AOD. Floor levels of the proposed development should therefore be constructed at a minimum elevation of 67.34 m AOD.

8.100 Floodplain rationalisation has been considered and it is proposed to rationalise the floodplain on the site rather than have a layout that fits around the existing floodplain outline.

9.0 AIR QUALITY

Introduction

- 9.1 The proposed development of Land North of Gavray Drive, Bicester, has the potential to affect local air quality, therefore an air quality assessment needs to be undertaken in order to consider the likely impacts and effects of the proposed development.
- 9.2 This chapter discusses the relevant European and national air quality standards, explains the methodology used to assess any potential impacts that could occur as a result of the planned development and also looks at assumptions made in the absence of data for the assessment.
- 9.3 In the assessment of air quality for the proposed development, an initial evaluation of the existing (baseline) air conditions surrounding Bicester was made and this was then used as a basis to investigate the likely impacts to future air quality. The air quality assessment has been carried out using the *Design Manual for Roads and Bridges* (DMRB) “screening” methodology. To determine the significance of the air quality impacts they have been compared to the national and European air quality standards and also to the number of nearby residential properties, the number of people who could be affected, the duration of any effects and their likelihood of occurring.

Assessment Methodology

Approach

- 9.4 The assessment was carried out using the screening method outlined in *Version 1.02 (Environmental Assessment) of the Design Manual for Roads and Bridges (DMRB) (Highways Agency, November 2003)*, assessing the five key pollutants recommended in the methodology. These pollutants include carbon monoxide, benzene, 1,3-butadiene, nitrogen dioxide (NO₂) and particulate matter (PM₁₀).
- 9.5 The DMRB methodology allows the assessment of changes in local air quality as a result of changes in traffic flows and proportions of Light Duty Vehicles and HGVs, associated with the proposed development. Given the relatively small scale of the development (500 residential units, with associated facilities), its residential nature as opposed to industrial or commercial and the existing forecast that air quality standards and objectives will be met by the relevant dates, it was considered that this

was an appropriate approach to be taken for the assessment rather than full-scale modelling.

- 9.6 The purpose of the methodology is not for use as an indicator of exact pollutant concentrations, but provides a useful tool to make comparisons between various scenarios. In this assessment comparison is made between the existing 2004 scenario and the future (2006, 2010 and 2016) scenarios without the development in place, with a 500 unit development in place. This methodology also identifies where further, more detailed assessment could be necessary.
- 9.7 For the assessment of pollutant concentrations surrounding the development site, receptors in close proximity to the site and on roads immediately affected, representative of other nearby properties, were chosen. Four existing residential properties were chosen as receptors and two further proposed residential properties on-site were also chosen as receptors, assessed for the scenarios with the proposed development in place.
- 9.8 The receptors used in the DMRB assessment are:
- Residential property with rear façade backing centre of Gavray Drive (7 Heron Court)
 - Residential property at the corner of Gavray Drive and the Eastern Distributor Road (rear façade of property backing onto Shearwater Drive)
 - Residential property between Peregrine Way entrance and exit (rear façade of property on Ravenscroft backing onto Eastern Distributor Road)
 - Residential property on Peregrine Way (property on the northern 'exit' portion of the road)
 - Proposed residential property on-site, property at the corner of Gavray Drive turning north onto the Eastern Distributor Road
 - Proposed residential property on-site, property at the northern most limit of the eastern portion of the site (adjacent to railway line)
- 9.9 The receptors have been assumed to be at ground floor level as the DMRB method does not make a distinction between receptor heights. The methodology used in this assessment therefore can be described as providing a "worst-case" scenario, as receptors at a higher vertical level will generally be exposed to lower pollutant concentrations compared with those at ground level.

Assumptions

- 9.10 Due to a lack of data, a number of assumptions have been made in the air quality assessment. The first of these assumptions are the existing background pollutant concentrations. As the scope of this assessment does not require a full-scale modelling assessment, no monitoring of local air quality has been carried out, therefore background pollutant concentrations on which to base the air quality assessment have been taken from the Government's National Air Quality Archive.
- 9.11 The other assumptions that were made were due to deficiencies in traffic data. A requirement of the DMRB screening assessment is that the traffic numbers are given in AADT (Annual Average Daily Traffic), however, the data were provided in the form of AM and PM AADT peaks. So in order to use these data in the correct format an average was taken of the two.
- 9.12 Within the traffic data, assumptions were also made of the percentage of HGVs in the overall totals and the speed limits along the various roads. Percentages of HGVs were provided for the existing scenario, but it was not anticipated by the traffic consultants (Colin Buchanan and Partners) that there would be a significant change in these in the future and so the same proportions of HGVs have been used for all scenarios in the assessment. The speeds that vehicles would be travelling at for the roads surrounding the site were not provided for the assessment either. A reasonable estimate was made, however, as to what the speed limits on the particular roads would be.
- 9.13 All calculated flows for the present and estimated traffic flows and background pollution concentrations used in the DMRB screening assessment are given in Volume 2, Technical Appendix, Chapter 09.

Significance Criteria

- 9.14 The following criteria have been applied to the construction and operational effects of the development:

Major positive or negative effect	Where the development would cause a significant deterioration (or improvement) to the existing environment. These effects are likely to be important considerations in the planning process, depending upon the scale and relative importance attached to the issues in planning policy and development plan terms. Mitigation measures and detailed work are unlikely to remove all the effects upon the affected interests.
Moderate positive or negative effect	Where the development would cause a noticeable deterioration (or improvement) to the existing environment. Adverse effects of this kind are not likely to require design changes. Mitigation measures and design changes are likely to remove some but not all of the adverse effects upon the affected interest.
Minor positive or negative effect	Where the development would cause a barely perceptible deterioration (or improvement) to the existing environment. Adverse impacts of this nature are not key issues. These effects are minor issues that are of importance to the consideration of the design of the proposals and the mitigation measures proposed.
No change or neutral effect	No discernible deterioration or improvement to the existing environment.

Regulatory Background

Air Quality Objectives and Limit Values

- 9.15 European Union (EU) air quality policy provides the basis for UK national air quality policy. The EU Air Quality Framework Directive on Ambient Air Quality Assessment and Management was brought into operation in September 1996, with succeeding daughter directives following on from this and setting Europe-wide air quality standards.
- 9.16 Within the UK the Environment Act (1995) brought about the National Air Quality Strategy (1997) (NAQS), which is responsible for forming the UK air quality standards and objectives (guidelines) for specific pollutants. The NAQS also sets out measures for local authorities to work towards meeting the standards and objectives under Local Air Quality Management (LAQM). The NAQS was revised in 2000 as the Air Quality Strategy for England, Scotland, Wales and Northern Ireland (DETR, 2000a) and an addendum to this was published in 2003 (DEFRA, 2003a). Standards and

objectives relevant to LAQM are set in the Air Quality Regulations (England) (2000 and 2002) and are set in order to ultimately protect the most vulnerable groups in society in terms of human health and in some cases for the protection of vegetation and ecosystems.

9.17 Objectives are set in the Air Quality Regulations for seven key pollutants and those relevant to this assessment are shown below in **Table 9.1**.

Table 9.1: UK Air Quality Objectives set in Regulations

Pollutant	Averaging Period	UK Objectives/ Limit Values	Year for Compliance	EU Limit Values	Year for Compliance
Benzene	Running annual mean	16.25 µg/m ³	31 Dec 2003	5 µg/m ³	1 st Jan 2010
	Annual mean (Eng & Wales)	5 µg/m ³	31 Dec 2010		9.18
1,3-butadiene	Running annual mean	2.25 µg/m ³	31 Dec 2003	N/A	N/A
Carbon monoxide	Maximum daily running 8 hour mean	10.0 mg/m ³	31 Dec 2003	10.0 mg/m ³	2005
Nitrogen dioxide	1 hour mean	200 µg/m ³ (not to be exceeded more than 18 times per year)	31 Dec 2005	200 µg/m ³ (not to be exceeded more than 18 times per year)	2010
	Annual mean	40µg/m ³	31 Dec 2005	40µg/m ³	2005
PM₁₀ (gravimetric)	24 hour mean	50 µg/m ³ (not to be exceeded more than 35 times per year)	31 Dec 2004	50 µg/m ³ (not to be exceeded more than 35 times per year)	2005
	Annual mean	40 µg/m ³	31 Dec 2004	40 µg/m ³	2005

Baseline Conditions

Air Pollution Sources

- 9.19 The primary air pollution source for the immediate vicinity of the site at present is road traffic, with the associated pollutants being nitrogen dioxide, particulate matter, carbon monoxide, benzene, and 1,3-butadiene.
- 9.20 Two railway lines also border the site to the north and to the west, both bringing electric and diesel powered trains in close proximity to the site. Such locomotives emit nitrogen oxides, sulphur dioxide and particulate matter. Moving locomotives do not, however, make a significant contribution to short-term pollutant concentrations.
- 9.21 Exposure to stationary locomotives may be more significant, but only if locomotives are regularly stationary for periods of 15-minutes or more and if there is regular outdoor exposure within 15m of the stationary locomotives. The nearest stations to the Gavray Drive site are at a great enough distance for emissions from these to be considered insignificant.

Cherwell District Review and Assessment of Air Quality

- 9.22 The most recent Review and Assessment of Air Quality and subsequent Updating and Screening Assessment (*Air Quality Updating and Screening Assessment for Cherwell (Draft), February 2004*), concluded that there would be no exceedence of the air quality objectives for any of the seven key pollutants in the relevant years and therefore no Air Quality Management Area has been declared in the district.

Background Pollutant Concentrations

- 9.23 The screening method requires annual mean background concentrations for each pollutant assessed. The background concentrations for all pollutants were taken from the background pollution tables for Cherwell District Council available in the Government's National Air Quality Archive (<http://www.airquality.co.uk/archive/laqm/tools.php?tool=background>) at National Grid Reference 462500, 224500. These were obtained for the present scenario of 2004 and for 2006, 2010 and 2020 using the procedures detailed on the National Air Quality Archive website.

9.24 Background concentrations used in the DMRB screening assessment are shown below in **Table 9.2**.

Table 9.2: Annual Average Background Pollutant Concentrations

Pollutant	Annual Average Concentration ($\mu\text{g m}^{-3}$)			
	2004	2006	2010	2016
CO	0.19	0.16	0.12	0.11
Benzene	0.21	0.19	0.18	0.17
1,3-butadiene	0.09	0.07	0.06	0.06
NO₂	19.37	17.72	15.4	13.97
PM₁₀	17.8	17.58	16.4	16.4

Potential Impacts

Construction Effects

9.25 Atmospheric emissions from construction activities will depend on a combination of the potential for emission (the type of activities) and the effectiveness of control measures. In general terms, there are two sources of emissions that will need to be controlled to minimise the potential for adverse environmental effects:

- Exhaust emissions from site plant, equipment and vehicles
- Fugitive dust emissions from site activities.

9.26 The operation of site equipment, vehicles and machinery would result in emission to the atmosphere of un-quantified levels of waste exhaust gases but such emissions are unlikely to be significant, particularly in comparison to levels of similar emissions from road traffic. The principal construction activities with transportation implications are:

- Removal of materials from any demolition work
- Delivery of materials for new development
- Movement of heavy plant.

Construction traffic could have any impact on adjoining occupiers if not properly controlled, however mitigation measures will reduce these impacts.

9.27 The construction activities that are the most significant potential sources of fugitive dust emissions are:

- Demolition activities;

- Earth moving, due to excavation, handling, storage and disposal of soil and subsoil materials;
- Construction aggregate usage, due to the transport, unloading, storage and use of dry and dusty materials (such as cement powder and sand);
- Movement of heavy site vehicles on dry untreated or hard surfaces;

Movement of vehicles over surfaces contaminated by muddy materials brought off the site, for example, over public roads.

Operational Effects

9.28 Referring back to the national air quality standards and objectives (see Table 9.2), all pollutants are well within all relevant standards and objectives for all pollutants assessed. Pollutant concentrations also decrease or remain at the same level over time from the 2006 scenarios to the 2016 scenarios as they do from the Do Minimum to Do Something scenarios. This is as a result of improving vehicle technologies and removal of older cars from the national vehicle fleet over time. Any increases are negligible, however, and all remain well within the respective standards and objectives.

9.29 In comparison with the 2004 pollutant concentrations, the predicted concentrations for the greater majority of the future scenarios, both with and without the proposed development in place, show slight decreases.

9.30 As previously discussed the railway lines to the north and west of the site do not represent a significant problem in terms of air quality to the site.

Mitigation Measures

Proposed Construction Mitigation Measures

9.31 Prior to commencement of construction activities, a Code of Construction Practice (CoCP) will be agreed with the local council to ensure the potential for adverse environmental effects on local receptors will be avoided. The Code is expected to contain the following air quality mitigation measures:

- Wheel washing facilities to prevent mud from construction operations being transported on to adjacent public roads;
- Damping down of site haul roads during prolonged dry periods;
- Regular cleaning of hard-surfaced site entrance roads;

- Ensuring that dusty materials are stored and handled appropriately (e.g. wind shielding or complete enclosure, storage is away from site boundaries, drop heights of materials are restricted, watersprays are used where practicable to reduce fugitive dust emissions);
- Ensuring that dusty materials are transported appropriately (e.g. sheeting of vehicles carrying spoil and other dusty materials);
- Confinement of vehicles to designated haul routes within the site;
- Restricting vehicle speeds on haul roads and other unsurfaced areas of the site;
- Hoarding and gates to prevent dust breakout;
- Appropriate dust site monitoring is included within the site management practices to inform site management of the success of dust control measures used.

9.32 Construction activities would hereby be controlled to reduce as far as possible the potential environmental impacts, and therefore limiting residual impacts.

Proposed Operational Mitigation Measures

9.33 In terms of the five key pollutants (carbon monoxide, benzene, 1,3-butadiene, nitrogen dioxide and particulate matter) the proposed development has no negative impact on the local air quality, especially so over time and therefore no mitigation measures are proposed with respect to operational traffic.

Residual Effects

9.34 With suitable mitigation measures in place, **minor negative** to **neutral** effects on local air quality are expected as a result of the construction of the Gavray Drive site. These effects would be relatively short-term and temporary. No long-term residual effects are expected as a result of the construction of the proposed development.

9.35 The effects of the proposed development on local air quality are primarily positive with the majority of receptors showing the development effects to be **neutral**.

Conclusions

- 9.36 This air quality assessment examines existing air quality, outlines the relevant air quality standards and objectives and assess the potential changes in air quality arising from the development of the Gavray Drive site in Bicester.
- 9.37 Cherwell District Council's Review and Assessment of Air Quality concluded that there would be no exceedence of the air quality objectives in the relevant years and therefore no Air Quality Management Area has been declared in the district. This conclusion was recently confirmed by Cherwell District Council's Updating and Screening Assessment (*Air Quality Updating and Screening Assessment for Cherwell (Draft), February 2004*).
- 9.38 The principal construction effect of the proposed development on local air quality will be where dust causes a nuisance for the limited time of construction activities. Such nuisance will be controlled, however, through mitigation measures contained within the code of Construction Practice, making certain that adverse impacts of construction on air quality are kept to an absolute minimum or completely avoided
- 9.39 Impacts to local air quality from the proposed development with a range of community facilities will be from associated road traffic. The pollutants assessed were carbon monoxide, benzene, 1,3-butadiene, nitrogen dioxide and particulate matter. Together with background pollutant concentrations for the site, traffic data with anticipated changes in traffic flows due to the developments were used to predict air pollution concentrations for the existing scenario (2004) and in the future years 2006, 2010 and 2016, with and without the development in place.
- 9.40 The predicted concentrations indicated that all national air quality objectives will be met by the relevant years with and without the development in place. The predicted concentrations also indicate that the effects of the proposed development on local air quality is **negligible**.

10.0 NOISE AND VIBRATION

Introduction and Scope Of The Assessment

- 10.1 It is proposed that the site adjacent to Gavray Drive in Bicester be developed for residential purposes and for a rail link. Arup Acoustics has carried out a noise examination of the proposals and this is attached to this EIA as a Technical Report. The findings included in this Report form the basis upon which this assessment has been prepared.
- 10.2 This assessment examines the potential noise changes that are likely to occur in the surrounding area as a result of these proposals. The short term sources associated with the construction phases and the long term occupational noise consequences are separately considered. The occupational sources are limited to the changes in traffic flow or composition on the existing road network with the possible importation of additional sources from plant and equipment to serve the school and associated community buildings.
- 10.3 The assessment does not consider the suitability of the site for residential development as part of the EIA but this point is fully examined in the Technical Report.

Reference Material and Assessment Method

Construction Noise

- 10.4 The most significant civil engineering work on this site will be that associated with the provision of the internal estate roads and the building of the new school. There will be some groundwork required with regard to local levelling but large scale earthworks are not envisaged. At this stage of the process details are not available as to the type of plant that would be used, nor the timing or timescale of a particular activity. It is noted that Gavray Drive has been laid out in such a way as to incorporate access points into the proposed development site and this will limit the amount of disruption of traffic on this road that may occur. It will also result in their being a separation of some 40-50 m from the facades of the nearest buildings to the on-site activity.

Traffic Noise

- 10.5 The proposed development of this area of land for residential purposes will result in increased traffic flows along Gavray Drive and the Eastern Distributor Road around Bicester. In order to gauge the likely effect of these increases in noise terms an analysis has been carried out that examines the change in noise exposure that would result. Two scenarios have been compared. The 'do minimum' situation which would reflect the situation where no development takes place and the 'do something' situation which reflects the situation where the development is in place and fully operational.
- 10.6 The following significance descriptors are proposed for traffic noise assessment. The threshold at which traffic noise change becomes significant is based on relevant research [Harland (1977)] and current guidance [Department of Transport (1994)]. For greater noise changes, increasing significance categories have been assigned at 5 dB(A) increments as changes of this magnitude are generally accepted as being noticeable by most people. This framework of significance levels, although not based on any official guidance document, is widely recognised and has been frequently adopted in traffic noise assessments.
- **major adverse:** Noise levels warrant mitigation of residential properties on a widespread basis in a community where practicable. This would relate to increases in noise level of 11-15 dB(A).
 - **major beneficial:** Reduction of traffic noise to a level where it does not have a significant influence on the ambient noise in the area;
 - **moderate adverse:** Noise levels warrant mitigation of residential properties in a community where practicable. This would relate to increases in noise level of 5-10 dB(A).
 - **moderate beneficial:** Reductions in noise level of 5-10 dB(A) at residential communities;
 - **slight adverse:** Increases in noise levels of 3-5 dB(A) in residential areas or at outdoor recreational areas in close proximity to the highway.
 - **slight beneficial:** Reductions in noise level of 3-5 dB(A) at residential communities;
 - **negligible:** Changes in noise level of less than 3 dB(A) in residential areas or at outdoor recreational areas in close proximity to the highway.

Plant Noise

- 10.7 The potential for any installed plant to generate complaints will be assessed using the Methods and Procedures of BS 4142 *Method for Rating Industrial Noise Affecting Mixed Residential and Industrial Areas*. This method compares the pre-existing background noise level and compares it with the incoming noise level. This incoming level is weighted to take account of its acoustic characteristics. The difference is taken as an indicator of the likelihood of complaints arising. Differences of 5 dB are of *marginal* significant and rating noise around 10 dB greater than the background noise is taken as a *positive indication that complaints could arise*.

Assumptions Limitations and Technical Difficulties

- 10.8 The traffic noise changes were calculated using the predicted road traffic volumes at the appropriate times. Absolute traffic noise levels were not calculated. There was no information available concerning the construction methods that would be employed at this site. This is not unusual at this stage of a proposal and generic equipment and procedures were assumed to be relevant to this scheme.

Existing Conditions

- 10.9 The existing noise condition in the local area were examined with a baseline noise survey. This was carried out by Arup Acoustics' engineers Jamie Walker and Julien Francois over a period from 12:00 on Tuesday 29 July 2004 to 12:00 on Wednesday 30 July 2004. Measurements were taken at locations 1 to 4 in rotation over each hour. A logging meter was set up at location 5 to log data every 5 minutes for the 24 hour period.
- 10.10 For each noise measurement, the sound level meter used, noise climate, wind speed and direction, and the precise measured noise levels were noted. LA10, LA90, LAeq and LMax, noise indices were recorded as was traffic counts on adjacent roads where necessary. The results are reported in the Technical Report.

Measurement Location Descriptions

- 10.11 Noise measurements were taken at five locations during the survey period and these are shown in **Figure 10.1** and detailed below.

Location 1- North-east corner of the site

- 10.12 The sound level meter (SLM) was sited 3 m to the north of a virtually dry pond and 12 m west of the hedge which runs along the east side of the field. The field is covered with long grass and surrounded on all sides by hedges. Gavray Drive was 260 m away to the south-west, the A4421 was 140 m to the east and the London to Bicester railway line was approximately 100 m to the north-east.
- 10.13 During the daytime the A4421 dominated with some very intermittent noise from Gavray Drive. Cars on Gavray Drive were only just audible, though larger vehicles were noticeable. When the A4421 and Gavray Drive were quiet distant road noise from the A41 in the west-south-west was audible. There was some, sporadic noise from children playing around lunch time. Birdsong was particularly significant just before sunset and in the morning. There were occasional trains throughout the day though those in the evening, when other noise sources were quiet were more noticeable. There were occasional aircraft over head and some noise from the wind in the trees. There was no noise from the depot on the north side of the railway line.
- 10.14 During the night-time noise from the A41 was almost constantly heard with intermittent noise from the A4421, a number of HGVs passed which were particularly noisy. Noise from Gavray Drive was also present but very intermittent. The A4421 got louder before the A41.

Location 2 – South-east corner of the site

- 10.15 The SLM was sited 7 m north-west of the corner of the field and had hedges 5 m away to the south-east and south-west. To the north-west, north and north-east was an open field covered in long grass. Location 1 was approximately 120 m to the north-east with the railway 100 m further away in the same direction. Gavray Drive was approximately 150 m away to the south-west and the A4421 was approximately 120 m away to the east.
- 10.16 The daytime noise climate was dominated by the A4421 together with the A41 audible during quiet periods. Very infrequent traffic on Gavray Drive was audible including one or two vans and HGVs. Trains were audible though not visible and not

frequent. There were a number of aircraft overhead during the day including a loud flypast by a helicopter. There was occasional low noise from Bicester town centre and from the wind in the trees. Birds also had some local input though this varied greatly throughout the day.

- 10.17 The night-time noise was dominated by intermittent traffic on the A4421 including HGVs and fairly constant noise from the A41, the roads were quietest between 02:00 and 05:00. At around 04:00 just as it started to get light, noise from bird song was as significant as road noise from all sources. Trains in the early hours (02:00) of the day and up until midnight were heard, though not throughout the rest of the night.

Location 3 – On the footpath between Gavray Drive and Peregrine Way

- 10.18 The measurement location was on the east side of the path adjacent to the rear façade of the closest house on Merganser Drive. Gavray Drive was approximately 30 m away to the north-east and visible at the end of the footpath. The A4421 was approximately 130 m away to the south-east and screened by hedges and two storey residential buildings. The edge of the proposed development was approximately 50 m to the north east.

- 10.19 The daytime noise climate was dominated by the A4421 together with the intermittent traffic on Gavray Drive. The A41 was audible when other noise sources were quiet. Noise from people on the footpath was loud but brief. Lawn mowing and gardening 20-30 m away as well as people in their gardens were heard throughout most of the daytime measurements though, except for the lawn mower, these events were relatively quiet. Occasional bird song and aircraft overhead also had some input though neither was significant during the day.

- 10.20 The night-time measurements were dominated by the A4421 and the A41 with intermittent input from Gavray Drive. A very small number of trains were heard, although from this location these were very quiet. Bird song was significant during the early hours reaching a peak around 04:00, although bird song was the loudest noise at this time it was still intermittent.

Location 4 – On the footpath at the western end of the site

- 10.21 The measurement location was at the northern end of the field 15 m south of where the footpath crossed the line of the north to south hedge. The London to Bicester railway was 60m away to the north-east and the freight railway was 60 m to the north-west. Approximately 90 m to the north was the London to Bicester railway bridge

over the freight railway. The footpath continued to the north under this same bridge. Gavray Drive was approximately 150 m away to the south-west and hidden from view by the hedge along the southern edge of the field. The London to Bicester railway was on an approximately 10 m high embankment and trains on it were visible for some distance in both directions.

- 10.22 Day time noise was from a large number of intermittent sources. Trains on the London to Bicester line were frequent and often blew their horns before crossing the bridge over the Freight line and a noise like trains shunting was heard at various times to the west. Traffic on the A41 provided a fairly constant background noise which was audible when other sources were quiet, the same was true of the A4421 though this was more intermittent noise. Bird song was fairly loud at times but not constant. The wind through the trees was audible when the wind was strongest. Some noise sounding like an industrial fan was heard to the west though as this was relatively quiet it was mainly heard when other noise sources were quiet. There were a number of aircraft overhead including two helicopters which were particularly loud though only briefly in the area. In the evening children camping in a field adjacent to the measurement location meant that it was necessary to move the measurement location 100 m along the footpath to the south-west. This noise continued throughout the whole evening and night.
- 10.23 Night-time noise also had no single dominant source except that the noise from the A41 was the most consistent. Intermittent traffic on the A4421 could be heard faintly, traffic on Gavray Drive was also heard though this was even more infrequent. Birdsong at first light was particularly noisy though only after 03:30. A single freight train on the north to south railway line was heard; this was a large train with 50+ aggregate trucks.

Location 5 – The Logging Meter

- 10.24 The logging meter was placed 10 m east of a hedge 160 m north-east of Gavray Drive. The SLM was on the edge of a large field with a hedge approximately 35 m to the north-east. The London to Bicester railway was approximately 180 m to the north-east and was almost completely obscured by trees along its edge. Location 1 was 200 m away to the east but obscured by a large mature hedge.
- 10.25 Location 3 was the only position that was not on the site and accordingly the only measuring point strictly relevant to the EIA examination. However the other points do give an indication to the character of the local noise climate. At location 3 the daytime background noise levels ranged from 35 – 46 dB(A) L_{A90} with the evening

part of the day recording the lower level. During the night time period the levels ranged from 31-41 dB L_{A90} . The level in the quietest part of the night falling to 31 dB. The general character of the noise in this area was dominated by traffic on the A41 and the A4421. During the day traffic on Gavray Drive was noted. The noise from trains was not at a significant level at this location. Traffic noise exposure in terms of L_{A10} or L_{eq} were well below any level where action would be taken under the Noise Insulation Regulations.

Potential Impacts

Construction

- 10.26 Notwithstanding the limited potential for adverse effects from construction activities, it remains relevant to consider the means whereby this source may be controlled. The Code of Practice BS 5228 sets out methods and procedures whereby construction noise may be minimised and would require that these methods are followed. The selection of the quietest machinery available to carry out any given task would, for example be an advantage if piling operations are to be carried out. Timing a particular on site operation to coincide with the noisier ambient conditions, perhaps during peak traffic periods, would serve to limit the impact of that operation. The erection of a temporary noise screen would assist in some circumstances.
- 10.27 In order to ensure that the favourable circumstances of this development are maintained it is recommended that a Construction Schedule is drawn up with the contractor at the appropriate time and that this is agreed with the Local Authority. In this way the most appropriate mitigation measure can be specified if required and the overall residual noise from construction activity reduced to a level where it is not significant.

Operational

- 10.28 For this site potential operational impacts are limited to those from road traffic changes and incoming plant. The calculated road traffic changes are set out in the technical appendix and reproduced in **Table 10.1** below for convenience.

Table 10.1 Change in noise level resulting from traffic change as a result of the development

	2006 no dev. Do minimum	2016 with dev Do something	Increase factor	Change in noise level

	18 hour AAWT	18 hour AAWT		dB L _{A10} , 18 hour
Gavray Drive	1780	6237	3.50	+5
EDR	14963	20636	1.38	+1

Assessment of Traffic Noise

- 10.29 The classification of effects was set out in paragraph 10.6. Using these indications it can be seen in Table 10.1 that the increase in traffic noise will expose the dwellings adjacent to Gavray Drive to an increase that can be classified as on the boundary between a **slight adverse** effect and a **moderate adverse** effect. It would be expected that most of the exposed population would recognise that an increase of traffic noise had taken place.
- 10.30 Although traffic noise levels are forecast to increase with the scheme in place, it is considered that the noise levels would still be acceptably low. To put this into context, the forecast traffic noise levels would be well below guideline levels for outdoor living areas recommended by the World Health Organisation. Using this same criterion, traffic noise levels are not considered high enough to cause annoyance.
- 10.31 For the dwellings that are primarily exposed to the traffic noise from the eastern distributor road the traffic noise increase would be considered to be **negligible**. The residents of these dwellings would not be expected to register the change in noise exposure.
- 10.32 The traffic noise analysis set out above assumes that the increases in traffic volumes for the phases of the development are relevant for the whole length of Gavray Drive. Traffic figures are available only for the activity at the junction of Gavray Drive with the Eastern Distributor Road. This being the case the analysis is restricted to the area between the last exit onto Gavray Drive, from both the existing development and the proposed development, and the junction. However, in reality it can reasonably be assumed that the proportional change, and therefore the noise level increase, would be relevant to any position adjacent to this road.

Installed Plant Noise

- 10.33 There is almost no likelihood that there will be any significant plant or machinery installed with the residential element of this development. The school building would almost certainly opt to install natural ventilation and the only plant would be that associated with heating. The school is some 70 m from the nearest existing dwelling and at this distance such plant would not have a significant effect. The proposed community facility would be expected to have some plant provided, such as a chiller or heating plant. To avoid any such impact on the existing residential receptors on the adjacent area of Gavray Drive, any such plant should be specified such that the

resulting noise sensitive receptor does not have a rating level that exceeds the existing background noise level.

Mitigation

10.34 After consideration of the potential noise effects as set out above, it is concluded that no significant adverse effect is likely. Accordingly no mitigation measures are proposed and there would be no adverse residual effects.

11.0 ARCHAEOLOGY AND CULTURAL HERITAGE

Introduction

- 11.1 This Chapter assesses the impact of the proposed development on potential archaeological resources on land at Gavray Drive, Bicester, Oxfordshire.
- 11.2 It describes the methods used to assess the impacts, the baseline conditions currently existing at the site and in the vicinity, the potential direct and indirect impacts of the development arising from construction activities, and the mitigation measures required to prevent, reduce or offset the impacts and the residual impacts.

Methodology

- 11.3 The archaeological background has been assessed using the Oxfordshire Sites and Monuments Record which reports on chance discoveries and archaeological site works. A brief history of the development site has been documented by a study of historical maps, books and articles in the Centre for Oxfordshire Studies and the Oxfordshire Archives. Aerial photographs at the National Monuments Record in Swindon have also been consulted.
- 11.4 This assessment has been carried out in accordance with standards set by the Institute of Field Archaeologists (IFA 2001) and English Heritage Guidelines for archaeological desk-based assessments. It follows guidance set out in the Department of Environment document 'Planning Policy Guidance: Archaeology and Planning (PPG16) which identifies the need for early consultation in the planning process to determine the impact of construction schemes upon any buried archaeological strata. It indicates that there is a presumption in favour of preservation *in situ* over excavation, where remains are of national importance. PPG16 goes on to state that once the results of a desk-based assessment and, where necessary, the follow-up trial work is known, an informed decision for determining whether any further archaeological work is required in advance of, or during, the development programme can be made (paragraphs 19 and 20).

11.5 In summary, the work has involved:

- (i) A review of policy considerations and the legislative framework and requirements;
- (ii) Review of previous archaeological reports on Bicester Park and Bicester Fields Farm;
- (iii) Undertaking a geophysical survey on the western part of the site;
- (iv) Examination of relevant publications, articles, historic maps and plans;
- (v) An evaluation of likely impacts of the development and of the need for further work, based upon the potential for resources to be present at the site;
- (vi) A review of information held by the Oxfordshire Sites and Monuments Record (OSMR).

National Planning Policy

Planning Policy Guidance Note 16 (PPG16) - Archaeology and Planning

11.6 PPG16 sets out the Government's policy on the preservation and recording of archaeology. The general policy is similar to that for the historic environment in that archaeological remains are seen as finite and non-renewable and therefore require appropriate management to ensure their preservation in a good condition. Field evaluations and early consultations with planning authorities are advocated where proposed developments impact upon archaeological remains.

Local Planning Policy

11.7 Policies relating to archaeology in the adopted Cherwell Local Plan (adopted November 1996) mirror advice contained in PPG16. Policy C25 states the council will want to maintain its overall historic character and will protect, enhance and preserve scheduled ancient monuments, other nationally important archaeological sites and monuments of special local importance, where appropriate. C26 states that for determination of an application for development that may affect a known or

potential site of archaeological interest or its setting, applicants will be required to provide detailed information, and may be asked to provide an archaeological field evaluation.

- 11.8 Policies are similar in the Cherwell Local Plan Deposit Draft February 2001. Policy EN47 states there will be a presumption in favour of preservation *in situ* of archaeological remains of national importance including scheduled ancient monuments. It would not permit development that would adversely affect archaeological remains and their settings unless the applicant can demonstrate that the archaeological resource will be physically preserved *in situ*, or a suitable strategy has been put forward to mitigate the impact of development proposals. Measures will be secured either by a planning agreement or by a suitable planning condition.

Significance Criteria

- 11.9 The following significance criteria have been adopted in undertaking the assessment of impacts.

Substantial Adverse

- 11.10 Adverse effects caused to sites of High Archaeological Potential or Archaeological Priority Areas, Scheduled Ancient Monuments including their settings and to other archaeological sites of importance in breach of PPG16 and archaeology policies in Local Plans. The severity of the effects would require the impacts to be redesigned, to allow for *in situ* preservation and/or considerable archaeological works. Demolition of a Grade I Listed Building.

Moderate Adverse

- 11.11 The adverse effects would be to archaeological resources at a local level by engineering impacts which would leave large areas of the resource *in situ*. Archaeological investigation would provide a positive contribution to research agendas. Extensive change to the setting of a Grade II* listed building. Encroachment upon a Conservation Area, historic parkland or other historic landscapes where the quality of the setting or its amenity would be noticeably impaired.

Minor Adverse

11.12 Minor adverse effects are to small areas of known or potential resources at a local level. The monitoring of the effects and recording of any resources would be achieved by an archaeological watching brief. The removal of the archaeological resource would not effect future archaeological investigation and would increase archaeological knowledge. Slight adverse change to the setting of a Grade II* listed building or significant adverse change to the setting of a Grade II listed building. Demolition of a locally listed building. Encroachment upon a Conservation Area or historic parkland, but where no intrusive views are created or affects upon its integrity would result.

Negligible

11.13 No effects on a known or predicted archaeological resources or their settings. Mitigation protects the resource from accidental impacts and adverse effects.

Minor Beneficial

11.14 Change of land use or management to enhance the preservation of identified archaeological deposits.

Baseline Conditions

Introduction

11.15 The following summarises the most pertinent archaeological and built heritage information relating to the proposed development site. The location of the sites taken from the Oxfordshire Sites and Monuments Record in the vicinity of the site are tabled in Appendix 1 and indicated on **Figure 11.1** using the OSMR reference number.

Prehistoric

11.16 SMR information indicates prehistoric and Romano-British occupation on the edge of Bicester including the floodplain of the Langford Brook is greater than previously thought and the area was more extensively farmed.

11.17 Prehistoric ring ditches and an enclosure are recorded on the SMR in two locations to the north of the site (D5630 and D5631). Archaeological investigations at Slade Farm, on the north western side of Bicester, recovered worked flint dating to the Mesolithic period, as well as evidence of Bronze Age and Iron Age occupation. This

included a wide linear ditch of Iron Age date possibly relating to a droveway. Several pits and possible palisade gullies appeared to be associated with this feature. An Iron Age ring ditch was identified to the west of the linear feature, which is probably a foundation trench for the wall of a roundhouse. In addition, an irregular sub-rectangular feature and a linear gully with two possible postholes at its base contained Mesolithic microliths (BUFAU 1996).

- 11.18 Recent archaeological investigations in the form of geophysical survey and trial trenching at Bicester Fields Farm to the south of the site (OX36/OX47/16120) revealed evidence of later prehistoric settlement in the form of a sub rectangular enclosure and associated pits and gullies. A possible circular structure was also revealed on the outer edge of the enclosure ditch. The pottery indicated a Middle to Late Iron Age date (OAU July 1998). Post-Medieval quarrying had destroyed any archaeology in the south eastern part of the site.
- 11.19 The following open area excavation expanded the results of the evaluation and revealed the plan of a substantial rectilinear ditched enclosure of Middle to Late Iron Age date occupying around a hectare, with a possible causeway formed of a dump of burnt stone (OAU November 1998). A central building was indicated by a group of stone-packed postholes and curvilinear gullies. There was also evidence of animal and human burial.
- 11.20 Excavations undertaken by the Birmingham University Field Unit in 1996 at Oxford Road, Bicester recorded transitional Iron Age / Romano British activity on the floodplain of Langford Brook. The site was buried by post-Roman alluvium. Iron Age and Roman pottery and features including a ditch and a posthole were discovered to the north east of the site on the Bicester Perimeter Road (16540).

Romano-British

- 11.21 Bicester is located approximately 2km north of the Roman town of Alcester, which was built near the cross roads of Akeman Street and the Alcester to Towcester Roman roads. Late Iron Age to early Roman settlement is known in the area from an investigation on the A421 and an excavation to the south west of the site at the Bicester Village shopping centre.
- 11.22 An evaluation on the eastern part of the site on behalf of Unipart in 1996 revealed evidence of a low status Roman settlement of 2nd century date (OX103/16071) (Oxford Archaeology Unit 1996). The evidence consisted of a number of ditches and

gullies interpreted as a phase of unenclosed settlement succeeded by an enclosed settlement.

Early Medieval to Post-Medieval

- 11.23 The evaluation on the eastern part of the site in 1996 also revealed Anglo-Saxon activity indicated by small quantities of pottery. A parish boundary along the southern boundary of the site may be late Saxon in date. A hedgerow survey carried out by EPCAD in 1996 indicated that the hedge associated with the parish boundary was one of the oldest on site, possibly as early as the late Medieval period. An earthwork survey of surviving ridge and furrow was also undertaken in 1996. The Medieval earthworks formed a more widespread arrangement of ridge and furrow than was evident on air photographs.
- 11.24 The site lies within the parish of Bicester, Launton and a small section in Ambrosden. Although the town of Bicester probably had Roman origins, it grew in the Middle Ages around the River Buse. The Domesday records of 1086 state that Bernecestre had two mills and was ruled by Robert d'Oilly, Sheriff of Oxfordshire. The place name Bernestre, the old English for Bicester, might come from the words byrgen (meaning burial mound), and ceaster (meaning Roman fort or market). Alternatively, the origins of the name might come from Birinus, a Saxon who traditionally founded a frontier garrison by the ruins of Alcester.
- 11.25 In the 12th century the town became a religious centre and housed the nuns of Markgate at Nonnes Place. In 1182 Gilbert Bassett, heir to Milo de Crispin's Norman estates, established a priory for eleven Black cannons. In c1239 King Henry III gave a grant of a market to William de Longspee and floodplain areas near the river were reclaimed to build new properties. Waterlogged archaeological deposits dating to the Medieval period were encountered during excavation.
- 11.26 The Saxon name Launton means the "long tun" and was a large settlement in the Medieval period. The 18th century village is shown on Davis's map of 1797 (**Figure 11.2**). The first enclosure for pasture was made in 1582 by agreement between the manor of Launton and a Ralph Heydon, farmer. At enclosure in 1814 there remained around 1,650 acres of open field arable and waste shown on Davis's map as Launton Field. Documentary research carried out by OAU in 1996 consulted a parish map of 1607 in a private collection at Stratton Ardley House. The map shows no detail on it, as at this time it had already been enclosed, possibly as part of the 1582 agreement. The ridge and furrow is evidence that it was once part of the open field system. The

current field boundary ditches and hedges on the eastern part of the site studied are shown on the 1607 map (OAU 1996).

- 11.27 **Figure 11.3** is an extract from the Pre-Ordnance Survey map of 1812-1814 that shows field systems in the site area prior to enclosure in 1814.
- 11.28 The first edition Ordnance Survey map of 1885 (not reproduced) shows the field boundaries as almost identical to today's layout (see 1923 Ordnance Survey map **Figure 11.4**). The position of the green lanes which run east-west and north-south are also shown on the Tithe Map of 1850 (not reproduced).
- 11.29 A Scheduled Ancient Monument, Wretchwick Deserted Medieval Village, lies to the south east of the site (3257). Wretchwick dates from before 1234, when part of the manor was given to Bicester Priory. The final part of the manor was given to the priory in 1279. At this time Wretchwick is believed to have had 7 cottages. The village was depopulated by the Prior of Bicester in 1488. After the Dissolution in 1536 the land was given to Charles Brandon, Duke of Suffolk. Well-preserved earthworks survive around Middle Wretchwick Farm, however, no evidence for the village was found during construction work in the field west of Middle Wretchwick Farm.
- 11.30 A Medieval / Post Medieval windmill mound survives at (12695) to the north of the site at Launton.
- 11.31 SMR 12779 refers to ditched earthworks that may relate to fish ponds belonging to Bicester priory, which have since been destroyed by development. Medieval pottery was recovered at 8-16 London Road to the south west of the site (11500). In Launton are the Medieval Cross at St Mary's Church (2789) and the church itself (5142). The remains of a market cross (2790) also lie in Launton. Post-Medieval ornamental ponds are also recorded (2791).
- 11.32 The nearest references to the site are SMR 558, the site of a builders brickyard which was later used as a rubbish tip, and the Bicester London Road railway station (SMR 601). Other buildings recorded on the SMR relate to a Post-Medieval pest house (D1801), the site of a tollhouse (10165), 17/17A London Road buildings and lock up and the site of 8-16 London Road.
- 11.33 There are also two ancient hedgerows marked on the SMR at Love Alley (16633) and Jarvis Lane (16631).

Historic Buildings

- 11.34 There are no listed or locally listed buildings in the vicinity of the site.

Geophysical Survey

- 11.35 Archaeological services WYAS conducted a geophysical survey on the western part of the site in June 2004. The detailed survey was negative and no anomalies likely to be indicative of archaeological activity were identified. It was suggested in the report (Archaeological Services WYAS 2004) that alluvium from the Langford Brook could be masking magnetic responses from any underlying features.

Analysis of Aerial Photographs

- 11.36 The collection of aerial photographs held by the National Monuments Record Centre (NMRC) at Swindon was searched in May 2004. A total of seventeen oblique and 47 vertical aerial photographs, showing the proposed development site and its immediate environs, were made available for inspection and analysis. These photographs span the period from 1930 to 2001.
- 11.37 The seventeen oblique aerial photographs held in the NMRC's collection span the period from 1930 to 1998. Of these, fourteen showed the Middle to Late Iron Age enclosed settlement just to the south of the site (OX36/OX46/16120) under excavation in July 1998 (NMR 18074, 18077 & 18102). Although the very southern edge of the proposed development site is shown in a number of the photographs, no detail is discernible and no archaeological features can be identified.
- 11.38 Three oblique photographs (CCC 5249), which are dated 1st January 1930, show the western part of the site. The quality of the images is relatively poor, but the three photographs appear to show an area of ridge and furrow earthworks, which represent the remains of medieval or post-medieval ploughing.
- 11.39 The 47 vertical aerial photographs span the period from 1947 to 2001. The majority of the photographs show an area of ridge and furrow earthworks in the western part of the site. However, these earthworks appear to respect the alignments of the existing field boundaries and trackways and suggest that they are either contemporaneous with, or later than, the field system with which they are associated. This therefore suggests that they are of post-medieval, rather than medieval, date.

11.40 Detailed examination of the vertical photographs has also shown that the central part of the site have been extensively ploughed for the cultivation of arable crops since at least 1954 (1563). This is likely to have impacted upon any sub-surface archaeological deposits that may exist within the boundaries of the proposed development site. The only other noteworthy vertical photograph is one taken on 19th September 2001 (13884), which is the first to show the roads that define the southern and eastern boundaries of the site. Otherwise, the vertical photographs do not show any hitherto unidentified archaeological sites or features within the application site.

Assessment of Potential Impacts

11.41 The construction of residential units may have an adverse impact on potential archaeological remains. The ground conditions recorded on the eastern part of the site during the archaeological evaluation in 1996 consisted of topsoil overlying a Medieval plough soil, which was up to 0.40m deep, that in turn overlay an orange-brown to blue-grey subsoil containing features of Roman date. Construction activities such as topsoil and subsoil stripping, foundation construction and installation of services as part of the development may have an impact on archaeological remains.

11.42 There will be no impacts on archaeological remains in the area that is to remain a County Wildlife Site. Similarly, areas designated as open space on the Development Framework will also not impact on archaeological remains, unless the creation of landscaped areas will involve tree planting and ground reduction.

Mitigation

11.43 An archaeological evaluation has already been undertaken on the eastern part of the site prior to the determination of a previous application in 1996. As the eastern area is known to lie in an area of archaeological potential with a low status Roman settlement on the eastern part of the site and an Iron Age settlement to the south of the site, the Development Control Archaeologist at Oxfordshire County Council is likely to recommend further archaeological investigation in areas of impact secured by a PPG 16 planning condition. However, some archaeological remains will be preserved *in situ* under areas of open space within the Development Framework. The archaeological mitigation for the central area will also be preservation *in situ* as this area will remain a County Wildlife Site.

11.44 A geophysical survey has also been undertaken on the western part of the site, but no archaeological features were recorded during the survey. This does not necessarily mean that no archaeological remains are present. Further archaeological investigation in the form of trial trenching will be required on the western area to mitigate any impacts from the development.

Assessment of Likely Residual Impacts

11.45 Following mitigation detailed above, to include preservation *in situ* in areas of open space and preservation by record in areas of development, there will be no residual impacts.

Conclusions

11.46 This assessment has been carried out in accordance with standards set by the Institute of Field Archaeologists (IFA 2001) and follows guidance set out in Planning Policy Guidance: Archaeology and Planning (PPG16) and Local Plan policies on archaeology.

11.47 An assessment of the baseline conditions included a review of the Oxfordshire SMR, a study of aerial photographs in the NMR, assessment of historic maps and the undertaking of a geophysical survey on the western part of the site.

11.48 No historic buildings will be affected by the development proposals.

11.49 The baseline study and previous archaeological evaluation indicates the eastern part of the site has a high potential for archaeological remains. An archaeological evaluation has been carried out on the eastern part of the site to inform a previous planning application.

11.50 The construction of residential units is likely to involve topsoil stripping, service installation and foundation construction. There are likely to be impacts to archaeological remains from these activities.

11.51 Further archaeological evaluation will be required on the western part of the site. Archaeological investigation or preservation by record is the proposed mitigation for the eastern part of the site. This will be secured by a PPG16 planning condition. Archaeological mitigation in the form of preservation *in situ* of archaeological remains

is proposed for the County Wildlife Site and areas of open space within the Development Framework.

11.52 Following mitigation there will be **no residual impacts** on archaeological remain.

12.0 TRANSPORT

Introduction

- 12.1 This section considers and assesses the transport aspects of the proposed development of 500 residential units and a primary school at Gavray Drive, Bicester. It should be read in conjunction with the Transport Assessment set out in a separate folder.
- 12.2 It is important that the impact of traffic generation from the development is fully considered to ensure that the implications on the surrounding highway network are fully understood. In particular, the potential to alter current and future traffic flows must be examined and where there are significant deteriorations in the free flow of traffic, adequate mitigation measures should be identified.
- 12.3 Of at least equal importance to providing highway improvements as mitigation is the provision of improvements to more sustainable modes of transport. These will offer new (and existing) residents opportunities to reduce their dependence on the private car. The Transport Assessment gives a full review of all of these issues and a summary is included in this section of the ES.

Policy Background

National Policies

- 12.4 In recent years the Government's approach to rising levels of car traffic has changed. In the past, the approach has been to meet increasing demand for road capacity by simply increasing supply. During the early nineties it was recognised that the construction of new roads alone leads to the generation of more traffic and an ever escalating spiral was in effect. This led the Government to review its policy on development traffic and to issue new guidelines which allow for new road building but as part of more integrated traffic solutions. Current guidance includes:
- PPG 1: General Policy and Guidance
 - PPG 3: Housing;
 - PPG 13: Transport;
 - Places Streets and Movement: Companion Guide to Design Bulletin 32

PPG 1 General Policy and Guidance February 1997

- 12.5 PPG1 reaffirms that the role of the planning system is to enable the provision of homes and buildings, investment and jobs, in a way which is consistent with the principles of sustainable development, stating at paragraph 4:

“Sustainable development seeks to deliver the objective of achieving, now and in the future, economic development to secure higher living standards while protecting and enhancing the environment. The most commonly used definition is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. (World Commission on Environment and Development 1987). The Government is committed to the principles of sustainable development set out in Sustainable Development: the UK Strategy (1984).”

Planning Policy Guidance 3 - Housing

- 12.6 PPG3: Housing reinforces the Government’s commitment to promoting development in a sustainable manner and advocates that development plans should aim to increase residential densities to a minimum of 35 dwellings per hectare.
- 12.7 The PPG introduces a sequential approach to the allocation of land for housing development, stressing that any land allocated must be in locations accessible by a range of modes of transport, particularly non-car modes.

Planning Policy Guidance 13 - Transport

- 12.8 The PPG supports the approach found in PPG 3, that new residential development should be located close to a range of retail, service and leisure facilities as well as jobs, so as to reduce the need to travel. The PPG encourages higher density residential development to occur at transport nodes.
- 12.9 The development at Gavray Drive accords with these principles by providing a high quality, dense development adjacent to an existing urban area. Additional public transport will be provided to serve the site and enhance accessibility. Local facilities provided as part of the development along with existing services further help to ensure that the development proposals accord with PPG 13 and the objective of minimising car use.

Places, Streets and Movement: Companion Guide to Design Bulletin 32

- 12.10 This guide identifies good practice in designing development layouts that help to promote sustainable trip making. In particular the need for safe, well connected, good quality and direct footpath and cycle links are identified. Pedestrian links should be separated from but also visible to car traffic. Roads should be designed to be safe for cyclists and where cyclists and pedestrians share links, segregation is preferred.
- 12.11 Car traffic should be calmed ideally by design at the outset through good streetscape layout either by narrow curvatures or by frequent junctions. Traffic calming such as road cushions or chicanes can be used, but these need to be considered carefully along bus routes.
- 12.12 These principles have been embraced in the design of the development which ensures that walking, cycling and public transport use are encouraged by providing direct and accessible pedestrian and cycle routes. The flow of car traffic through the development is controlled by a carefully designed road layout that discourages drivers from speeding and dissuades through traffic movements that are not related to the development.

The Bicester Integrated Transport and Land Use Study (BITLUS)

- 12.13 The Bicester Integrated Transport and Land Use Study (BITLUS, March 2000) was produced by W S Atkins for Oxfordshire County Council (OCC) and Cherwell District Council (CDC). Its aim was to:

“identify appropriate policies and practical, implementable and achievable measures which will create a more sustainable transport framework and improve the environment of the town as a whole without detriment to its vitality and viability. Taking account of sustainable transport requirements, the study will seek to establish the most suitable locations for developments for inclusion in Bicester “Directions for Growth” proposals.”

12.14 The general aims of the BITLUS Report, to reduce the reliance on the private car and to encourage the use of more sustainable modes of transport, obviously have a bearing on any new development in Bicester. In addition, there are a number of specific proposals / suggestions identified in BITLUS that relate closely to the Gavray Drive site. These include:

- East-West Rail
- New station east of Bicester Town Centre
- 'Green Link' connecting Gavray Drive to Launton Road
- Extension of bus services to Gavray Drive

Public Transport

Rail

12.15 There are two railway stations in Bicester.

- Bicester North located on the main line between London Marylebone and Birmingham and served by Chiltern Railways.
- Bicester Town, located on a branch line with Thames Trains providing services to Oxford.

12.16 Of the two stations, Bicester North is the most heavily used as it has direct and frequent services to London with extensive car parking facilities. By comparison, Bicester Town has a poor service to Oxford, is a rundown station with little or no passenger facilities. Bicester Town station is, however, located on a line which is the subject of East West Rail's proposals for new services between Oxford and Bedford (and by extension to other destinations further a field such as Bristol and Cambridge / Norwich).

12.17 Phase 1A of the ongoing Project Evergreen has been completed by Chiltern Railways. This involved providing a second 9 mile section of track north of Bicester North station at a total cost of £16 million. As part of the project, line speeds were upgraded to 100mph between Banbury and South Ruislip, extra tracks around Beaconsfield and between West and South Ruislip were also provided. These works have resulted in increased capacity between Banbury and Marylebone with better operational stability.

12.18 These improvements, alongside the introduction of new rolling stock, have led to a 26% increase in the number of train services across the week from between May 1996 and September 2001. In 2002, a number of stations, including Bicester North, had their platforms lengthened in order to accommodate longer trains, thereby further increasing capacity.

12.19 Phase 2 of Project Evergreen is currently in progress and concerns mainly improvements at Marylebone including two new platforms and extra signalling and points on the station approaches. These measures will further improve operational performance.

12.20 Future committed plans include:

- more frequent services (twice hourly) to Birmingham;
- more frequent services both in the peak and off-peak periods to Banbury via Bicester North; and,
- provision of a new £22 million depot for rolling stock at Wembley and expenditure of a further £6 million improving the Aylesbury depot.

12.21 Chiltern Railways also have aspirations for the following projects:

- a new interchange at West Hampstead linking Chiltern directly to the Jubilee Line, the Metropolitan Line, the North London Line and Thameslink services (for Gatwick & Luton airports);
- a new through line to Oxford;
- re-opening the Aylesbury to Bletchley/Milton Keynes line and the provision of a new Aylesbury Parkway station to the north of the town;
- re-opening the old Great Central route to a point near the M1/M6 intersection; and
- a half hourly Chiltern 'Metro' service from the suburban stations to Marylebone.

12.22 Of particular interest is Chiltern's aspirations to provide through services to Oxford. This will require a new rail 'chord' linking the Chiltern line with the East West Line thus enabling trains from London Marylebone to run direct into Oxford via Bicester Town. Bicester North already attracts many passengers from the area around the north of Oxford because of the ease of access via the A34, and the better quality service offered by Chiltern. The recently opened fifth Park & Ride site for Oxford at

Water Eaton which the Bicester Town line passes, also adjacent to the A34, is central to their plans.

- 12.23 Land at the western end of Gavray Drive would be required to construct this link and this has been safeguarded as part of the development plans.

Buses

- 12.24 There are three bus routes that pass through or near to the Langford area of Bicester. Of these, two are commercially operated by Stagecoach. The most proximate bus route to the site is route 27, which runs between Langford and Oxford via Glory Farm in the north part of Bicester. Service 29 also passes fairly close to the Langford area en route from Arncliff to Oxford via Ambrosden. These routes both operate on an hourly frequency. They are timetabled together with the route 28 to provide a 20-minute headway for services to Oxford.

- 12.25 In addition to the two Stagecoach services there is also a town service (route 22) operated by Graylines Coaches serving the Langford area of Bicester. This service is supported by Oxfordshire County Council and operates a 30-minute headway, Monday to Saturday.

- 12.26 In addition, Chiltern Railways operate a Taxibus service to and from Bicester North Station for use by Chiltern Rail customers. The Taxibus network is currently made up of four urban services and four rural services. The services operate as regular timetabled bus services during the peak periods, and as taxi services in the off-peak. Each vehicle can accommodate up to seven people and one of the vehicles is designed to accommodate wheelchair users.

- 12.27 Chiltern Railways have indicated that the scheme has been quite successful, particularly in the urban areas. This is attributable to several factors including:

- Well-designed routes that serve key Chiltern commuter catchment areas;
- Provision of branded customised vehicles and a uniformed driver;
- A dedicated interchange and priority measures for Taxibus vehicles at Bicester North station; and
- Fares well below the parking prices at Bicester North station.

- 12.28 Currently, there is one Taxibus route that runs from Bicester North to Langford Village, passing close to the development site.

- 12.29 The existing Chiltern Railways Taxibus route as it stands is currently suitable for diversion through the site without adverse effects to existing Chiltern customers. Using this route as a base a simple alternative routing scenario has been considered.
- 12.30 In both the peak periods the Taxibus service is timed to connect with train departures for London in the morning, and train arrivals from London in the evening. The main objective for the Taxibus service is to provide a connection with Chiltern rail services thereby eliminating the need for commuters to park at the station. Therefore any adjustment to the route must maintain the same running time in order to ensure that connections to train services can be made in a similar manner.
- 12.31 The option presented has been examined in terms of the extra length added to the route and the impact this may have on running times. The proposed route alteration adds only around 200 metres to the current route. Assuming average speed remains the same as the current operation, this adds less than a minute extra to the overall journey time.
- 12.32 This proposed route has been discussed with Chiltern Railways, and they have agreed in principle with the diversion of the Taxibus into the development. This may require additional funding, including the provision of an extra vehicle should it be required to meet the train departures and arrivals at Bicester North station.

Walking

- 12.33 Gavray Drive is a 7.3m wide single carriageway road with 2 metre wide footways on both sides. The condition of paving is good. Gavray Drive ends at the rail line to the west that serves Bicester Town Station and no link across the railway is provided at this point. However, there is a footpath link that connects to Gavray Drive to the east of the railway line. This runs southwards to an un-controlled level crossing and on to connect to Launton Road. This footway is generally 2m wide and its provided with street lighting along its length. The level crossing is already well used by pedestrians walking from the Banbury Fields and Langford Village developments. The northern section of this footpath is less well used, but usage would increase as a result of these development proposals. Appendix 3 includes photographs of this pedestrian route, along with other routes in the area of the site.

- 12.34 Immediately to the north of where this footpath connects to Launton Road there is a Toucan crossing provided to give access for pedestrian and cyclists using the shared footway/cycleway on the western side of Launton Road. The footway on the western side of Launton Road is generally 3m wide, but as it approaches the town centre, it narrows in places to less than 2m and cyclist dismount markings are provided to improve safety.
- 12.35 This route will form an important link from the site to the centre of Bicester, which is approximately 1.5km from the centre of the development.
- 12.36 To the east of the site, Wretchwick Way is a busy road and forms part of the Eastern Distributor Road around Bicester. It is well lit and a 3 metre wide footway/cycleway runs along the length of the western side only. This is constructed from bituminous material and is generally of good quality.
- 12.37 There are also several footpath links from Gavray Drive running to the south through Langford Village and the open space then runs along the watercourse. These are generally for use by pedestrians and cyclists, although most have a thermoplastic marking running along the centre to segregate the two user groups. These routes provide good access to the local centre and primary school in Langford Village and certain of them can be used to walk to Bicester Town Station to the south.
- 12.38 As part of the development proposals there is the potential to introduce measures to reduce vehicles speeds along Gavray Drive. In particular, in order to ensure pedestrian linkages between the site and the existing residential development are good, it would be beneficial to introduce crossing facilities at the main pedestrian desire lines (i.e. where existing footpaths join Gavray Drive on its southern side). These could take the form of uncontrolled crossings with a central island and, potentially, the road surface raised to the same level as the footway. Alternatively, if demand was anticipated to be sufficient, signal controlled Pelican crossings could be installed where necessary.
- 12.39 No detailed scheme has yet been developed for this, but crossing facilities could also be accompanied by other measures to discourage high vehicles speeds, such as carriageway narrowing, chicanes, changes of surface texture, etc.

Cycling

- 12.40 The BITLUS study reviewed the issue of cycle facilities in Bicester, recognising that beneficial routes exist and that the current level of provision is considered sufficient but that it could be improved upon.
- 12.41 Gavray Drive currently forms part of the Sustrans National Cycle Network and provides a segregated route extending towards the town centre to the west and Wretchwick Way to the east.
- 12.42 The north section of Wretchwick Way also forms part of the Sustrans Cycle network which then extends to the east towards Launton.
- 12.43 At present no facilities exist along the length of Peregrine Way but there is a network of segregated footway/cycleway through the Layford Village developments.
- 12.44 Cycle distances of up to 5miles are generally considered as reasonable by most members of the cycling community and such journeys would take up to 27½ minutes. On this basis, the whole of Bicester, Ambrosden, Middleton Stoney, Upper Arcott and Marsh Gibbon are all accessible within a 30minute cycle ride.
- 12.45 In order to mitigate traffic impact it is proposed to install traffic signals at the Neunkirchen Way arm of the A41 roundabout. One beneficial effect of these is that they would enable pedestrians / cyclists to cross from the footway on the east side of Neunkirchen Way to that on the north side of the A41 West. Although it is only proposed to operate the signals during the AM peak period, the crossing facility could be set up to operate on demand (i.e. push button operated) during other periods.
- 12.46 This addresses a specific concern that was raised by residents at the public consultation at Langford Village Community Centre on the 5th June 2004 on the development proposals, who felt that the current movement between the A41 West and Neunkirchen Way cycle routes was hazardous.

Traffic Impact

Existing Highway Network

- 12.47 The site under consideration is bounded to the south by Gavray Drive and by the Bicester Eastern Distributor Route to the east. Gavray Drive is a wide single carriageway road without frontage development, but it provides access to residential development to the south via Mallards Way and Whimbrel Close. A number of bellmouths have been constructed along the northern side of Gavray Drive to enable future development, even though the area is currently open grassland. Gavray Drive terminates just short of the rail line that serves Bicester Town Station to the south.
- 12.48 Wretchwick Way (A4421) forms part of the Eastern Distributor Route which skirts the eastern side of Bicester, connecting the A41 in the south to the A421 to the north. Where it passes the site it is a wide single carriageway. The junction between Gavray Drive and Wretchwick Way is located at the south-east corner of the site and takes the form of a normal three-armed roundabout.
- 12.49 To the south of Gavray Drive, Wretchwick Way provides access to Peregrine Way, which is effectively a large crescent acting as the main spine road to the Langford Village development. The northern connection between Peregrine Way and Wretchwick Road takes the form of a ghost island priority junction, whilst the southern junction is a normal three arm roundabout.
- 12.50 To the south of this roundabout the A4421 is dualled with two lanes on each carriageway, before joining the A41 at a large five-arm roundabout. As well as the A41, this roundabout also gives access to the town centre via London Road. The fifth arm accesses a Ministry of Defence site to the south.

Existing Junction Performance

- 12.51 In order to be able to assess the effects of the proposed development accurately, a number of junctions have been identified in discussion with Oxfordshire County Council that require detailed capacity assessment. These have been tested using industry standard software and traffic flows obtained from recent surveys. These tests provide the basis from which to compare the impact of any additional traffic generated by the proposed development. The junctions tested are:

- Gavray Drive / Mallards Way priority junction
- Gavray Drive / Wretchwick Way roundabout
- Peregrine Way / Wretchwick Way priority junction
- Peregrine Way / Wretchwick Way /Neunkirchen Way roundabout
- Boundary Way / London Road / Neunkirchen Way roundabout.

12.52 The results of traffic surveys undertaken at these junctions in early 2004 are included in the Transport Assessment.

12.53 The junction modelling software for priority junctions and roundabouts (PICADY and ARCADY) gives output in terms of ratios of flow to capacity (RFC) and queue lengths. RFC's below 0.85 indicate that the junction is operating within capacity, between 0.85 and 1.0 that the junction is over its practical capacity but within its theoretical capacity and over 1.0 the junction is over-capacity and significant levels of queuing would be expected.

12.54 The following tables summarise the performance of the junctions under existing traffic flows. The full results can be seen in the Transport Assessment.

Table 12.1 Gavray Drive /Mallards Way Priority Junction – Existing Performance

	0800-0900			1700-1800		
	RFC	Modelled Queue	Observed Queue	RFC	Modelled Queue	Observed Queue
Mallards Way – left	0.004	0	0	0.011	0	0
Mallards Way – right	0.118	0	0	0.066	0	0
Gavray Drive - right	0.014	0	0	0.000	0	0

Table 12.2 Gavray Drive / Wretchwick Way Roundabout – Existing Performance

	0800-0900			1700-1800		
	RFC	Modelled Queue	Observed Queue	RFC	Modelled Queue	Observed Queue
Wretchwick Way	0.294	0	0	0.286	0	0
Gavray Drive	0.061	0	0	0.029	0	0
Charbridge Road	0.316	0	0	0.310	0	0

Table 12.3 Peregrine Way / Wretchwick Way Priority Junction – Existing Performance

	0800-0900			1700-1800		
	RFC	Modelled Queue	Observed Queue	RFC	Modelled Queue	Observed Queue
Peregrine Way – left	0.285	0	0-4	0.195	0	0
Peregrine Way – right	0.274	0	0-4	0.118	0	0
Wretchwick Way – right	0.189	0	0	0.310	0	0

Table 12.4 Peregrine Way / Wretchwick Way / Neunkirchen Way Roundabout – Existing Performance

	0800-0900			1700-1800		
	RFC	Modelled Queue	Observed Queue	RFC	Modelled Queue	Observed Queue
Neunkirchen Way	0.178	0	0	0.389	1	0-4
Peregrine Way	0.316	1	0-2	0.179	0	0-2
Wretchwick Way	0.393	1	0-7	0.243	0	0-4

Table 12.5 Boundary Way / London Road / Neunkirchen Way Roundabout – Existing Performance

	0800-0900				1700-1800			
	RFC	Modelled Queue	Observed Queue		RFC	Modelled Queue	Observed Queue	
			Near side	Off side			Near side	Off side
Neunkirchen Way	1.085	48	8-27	3-27	0.474	1	0-3	0-1
A41 East	0.640	2	0-9	0-3	0.815	4	0-6	0-1
MoD Access	0.114	0	0		0.131	0	0-3	
A41 West	0.638	2	0-3	0-3	0.718	3	0-9	0-3
London Road	0.551	1	0-8	0-2	0.805	4	0-5	0-2

12.55 Under existing traffic flows the only junction to have capacity problems is the Boundary Way / London Road / Neunkirchen Way Roundabout. In the AM peak this junction has queues on the Neunkirchen Way arm.

Traffic Growth

12.56 Discussions with Oxfordshire County Council have resulted in a number of different growth scenarios being identified for testing. These are:

- Opening year based on TEMPRO traffic growth
- Opening year based on NRTF central traffic growth
- Design year of 10 years after opening based on TEMPRO traffic growth
- Design year of 10 years after opening based on NRTF central traffic growth.

12.57 The anticipated opening year for the development is 2006, which means that the proposed design year is 2016.

12.58 The traffic flows used in assessing the existing conditions are from surveys in early 2004. The relevant growth factors from this year are shown in the following table.

Table 12.6 Growth Factors

	AM Peak	PM Peak
2004 – 2006 TEMPRO	1.033	1.033
2004 - 2006 NRTF	1.034	1.034
2004 – 2016 TEMPRO	1.178	1.178
2004 – 2016 NRTF	1.200	1.200

12.59 As the NRTF factors are higher, these have been applied to give a ‘worst case’ assessment.

Committed Development

12.60 It is normal practice to include within the assessment of traffic impact estimates of traffic from other developments in the area under consideration which have planning approval but have not yet been implemented. Enquiries have been made with Cherwell District Council but it appears that there are no committed developments that are likely to significantly change traffic in the area under consideration.

Trip generation

12.61 In order to estimate what level of traffic the proposed 500 residential units are expected to generate, reference has been made to the Transport Assessment for the nearby Bicester Fields development. The following table shows the trip rates that were agreed with Oxfordshire CC for the purpose of this development.

Table 12.7 Residential Trip Rates Agreed for the Bicester Fields Development

	In		Out		Total	
	Private	Affordable	Private	Affordable	Private	Affordable
0800-0900	0.17	0.09	0.63	0.26	0.8	0.35
1700-1800	0.59	0.26	0.16	0.2	0.75	0.46

12.62 As these rates were previously considered to acceptably reflect residential traffic generation in the area, they have been adopted for the proposed Gavray Drive development. It has been assumed that of the 500 units proposed, 30% will be

affordable housing. On this basis the anticipated residential traffic generation would be as shown in the following table.

Table 12.8 Residential Trip Generation – 500 Units

	In		Out		Total	
	Private	Affordable	Private	Affordable	Private	Affordable
0800-0900	60	14	221	39	281	50
1700-1800	207	39	70	30	277	69

12.63 As part of the development proposals it is intended to reserve a site for a single form of entry primary school on the site. Reference has been made to the TRICS database to obtain car trip rates for primary schools. The selected TRICS sites and output are shown in Appendix 4. The proposed school is to accommodate 210 pupils. The prospective development would be expected to generate 125 primary aged pupils (25 per 100 dwellings). These pupils would not generate car trips on the wider road networks and it is therefore only necessary to estimate car trips from the remaining 85 pupils. The TRICS trip rates and anticipated traffic generation can be seen in the following table.

Table 12.9 Primary School Trip Rates and Traffic Generation

	In		Out		Total	
	Trip Rate	Car Trips	Trip Rate	Car Trips	Trip Rate	Car Trips
0800-0900	0.23	20	0.18	15	0.41	35
1700-1800	0.03	3	0.03	3	0.06	6

Trip Distribution

12.64 All vehicular access to the site is to be from Gavray Drive. The wider distribution of residential trips has been based on 2001 Census Data (journeys to work by current residents) and the aggregate assumptions are as follows:

- 13% A4421 North
- 6% A41 South
- 7% London Road
- 74% A41 towards M40.

12.65 The trips to/from the primary school will be much more local in nature and the following assumptions have been made:

- 20% to the north
- 30% from Layford Village
- 30% from Bicester Fields
- 20% from the town centre.

Traffic Impact

12.66 The following tables summarise the performance of the junctions under 2006 and 2016 traffic flows with and without the full development of 500 residential units and a primary school. Full junction model output can be found in the Transport Assessment.

Table 12.10 Gavray Drive / Mallards Way –RFC's (500 units + School)

	0800-0900				1700-1800			
	2006		2016		2006		2016	
	NRTF Base	NRTF with Dev	NRTF Base	NRTF with Dev	NRTF Base	NRTF with Dev	NRTF Base	NRTF with Dev
Mallards Way – Left	0.004	0.004	0.004	0.004	0.011	0.011	0.013	0.013
Mallards Way - Right	0.121	0.122	0.141	0.142	0.066	0.066	0.077	0.077
Gavray Drive – Right	0.014	0.014	0.017	0.017	0.000	0.000	0.000	0.000

Table 12.11 Gavray Drive / Wretchwick Way Roundabout –RFC's (500 units + School)

	0800-0900				1700-1800			
	2006		2016		2006		2016	
	NRTF Base	NRTF with Dev	NRTF Base	NRTF with Dev	NRTF Base	NRTF with Dev	NRTF Base	NRTF with Dev
Wretchwick Way (South)	0.331	0.374	0.385	0.427	0.319	0.442	0.371	0.495
Gavray Drive	0.069	0.334	0.084	0.364	0.033	0.117	0.039	0.139
Charbridge Lane (North)	0.422	0.479	0.490	0.555	0.323	0.350	0.374	0.404

Table 12.12 Peregrine Way / Wretchwick Way Priority Junction –RFC's(500 units + School)

	0800-0900				1700-1800			
	2006		2016		2006		2016	
	NRTF Base	NRTF with Dev	NRTF Base	NRTF with Dev	NRTF Base	NRTF with Dev	NRTF Base	NRTF with Dev
Peregrine Way – Left	0.298	0.313	0.361	0.402	0.230	0.247	0.252	0.285
Peregrine Way – Right	0.297	0.352	0.392	0.477	0.157	0.173	0.168	0.218
Wretchwick Way - Right	0.196	0.208	0.234	0.248	0.361	0.352	0.397	0.442

Table 12.13 Peregrine Way / Wretchwick Way Roundabout – RFC's (500 units + School)

	0800-0900				1700-1800			
	2006		2016		2006		2016	
	NRTF Base	NRTF with Dev	NRTF Base	NRTF with Dev	NRTF Base	NRTF with Dev	NRTF Base	NRTF with Dev
Neunkirken Way (South)	0.184	0.218	0.214	0.242	0.427	0.516	0.496	0.586
Peregrine Way	0.328	0.343	0.397	0.409	0.193	0.225	0.238	0.280
Wretchwick Way (North)	0.408	0.558	0.484	0.635	0.285	0.328	0.333	0.377

Table 12.14 Boundary Way / London Road / Neunkirchen Way Roundabout – RFC's (500 units + School)

	0800-0900				1700-1800			
	2006		2016		2006		2016	
	NRT F Base	NRT F with Dev	NRT F Base	NRT F with Dev	NRT F Base	NRT F with Dev	NRT F Base	NRT F with Dev
Neunkirchen Way	1.189	1.446	1.589	1.929	0.500	0.566	0.621	0.657
A41 East	0.627	0.674	0.748	0.762	0.848	0.879	1.012	1.044
MOD Access	0.079	0.126	0.151	0.159	0.145	0.162	0.251	0.272
A41 West	0.733	0.756	0.857	0.890	0.752	0.904	0.932	1.085
London Road	0.590	0.605	0.739	0.771	0.851	0.971	1.109	1.194

12.67 The only junction to have any capacity problems after the addition of development traffic is the Boundary Way / London Road / Neunkirchen Way Roundabout it can be seen that during the AM peak hour all base-line tests (2006 – 2016) show the Neunkirchen Way arm of the junction as being over-capacity (i.e. RFC's greater than 0.85). The addition of development traffic worsens this situation.

12.68 The PM peak period in 2006 and 2016 the addition of development traffic pushes the A41 east, A41 west and London Road arms of the junction over-capacity; thereby

requiring significant junction improvements to accommodate the predicted traffic levels.

Proposed Junction Mitigation Measures

12.69 The only junction to require improvement in the case of development with the proposed residential use is the junction between the Boundary Way / London Road / Neunkirchen Way Roundabout. The main problem at this junction occurs during the morning peak hour on Neunkirchen Way. This is caused by the volume of traffic travelling from the A41 West and London Road towards the A41 East offering very few gaps for traffic to join the roundabout from Neunkirchen Way. The logical way to resolve this problem would be to introduce part-time traffic signals on the roundabout and the Neunkirchen Way arm of the junction to provide guaranteed opportunities to exit. These signals would only need to be operational during the AM peak period.

Table 12.15 AM Peak junction Performance (RFC and Degree of Saturation) with 500 Units and a Primary School

	2006		2016	
	Baseline (RFC)	Signals + Dev (%Sat)	Baseline (RFC)	Signals + Dev.(%Sat)
London Road	0.590	32	0.739	37
Neunkirchen Way	1.189	90	1.589	95
A41 East	0.626	46	0.748	54
MoD Access	0.079	5	0.151	5
A41 West	0.733	51	0.857	59
Neunkirchen Way (Northbound)		65		73
Circulatory Carriageway		75		86
		75		86
		11		12

- 12.70 A part-time signal arrangement at this junction has been modelled using TRANSYT. The results of this test are summarised in the following table.
- 12.71 The output from TRANSYT has a different format to that of roundabout models. The junction performance is given as degree of saturation, which is the flow along a link as a percentage of its capacity. Degrees of saturation of 90% or below indicate that the junction is operating acceptably, whilst result between 90% and 100% show that the particular link exceeds its practical capacity, but is within its theoretical capacity.
- 12.72 The results shown in the above table indicate that in 2006 the junction would operate within capacity with the flow from 500 residential units and a primary school (i.e. 90% maximum degree of saturation). This is based on the signals running with a 42 second cycle time and results in a mean maximum stationary queue on the roundabout circulatory carriageway of 5.8 vehicles, which would not be expected to block the exit from the previous arm. In 2016, the maximum degree of saturation increases to 95% on Neunkirchen Way, with a cycle time of 50 seconds. In addition, the mean maximum queue on the circulatory carriageway would increase to 8.4 vehicles, and the London Road arm of the junction would be blocked by this for approximately 10 seconds out of every 50 seconds. However, as this arm of the junction is under capacity we would not expect this reduction in exit opportunities to cause a significant problem. With the signals in place the queue on Neunkirchen Way would be 17 vehicles in 2006 and 26 vehicles in 2016, both with the development in place. This is a significant improvement on the current AM peak period, when queues in excess of 50 vehicles were observed.
- 12.73 In the PM peak situation in 2006, the introduction of traffic from 500 residential units and a Primary School causes the A41 East and London Road arm of the junction to have RFC's in excess of 0.85. In 2016 these arms, as well as the A41 west, are over-capacity without development and the introduction of development traffic exacerbates the situation. In order to mitigate for these impacts, the entry width at London Road and the flare length on the A41 can be increased as shown in Figure 58. The PM peak performance of the junction with these changes to the geometry implemented can be seen in the following table.

Table 12.16 PM Peak Junction Performance (RFC) with 500 Units and a Primary School

	2006		2016	
	Baseline	Imp + Dev	Baseline	Imp + Dev
Neunkirchen Way	0.500	0.568	0.621	0.717
A41 East	0.847	0.844	1.012	1.011
MoD Access	0.144	0.162	0.251	0.308
A41 West	0.752	0.798	0.932	0.965
London Road	0.850	0.782	1.109	1.011

12.74 It can be seen that with these improvements in place in 2006 after the development is complete the roundabout would operate within capacity during the PM peak hour. In 2016, some arms of the roundabout would have RFC's over 0.85 but an overall improvement is achieved compared with the situation without development or the changes to the roundabout.

Statement of Effects

12.75 The analysis of the transport impact of the proposed development has examined the baseline situation under current traffic flows, and the baseline and with development scenarios in the anticipated year of opening (2006) and 10 years after opening (2016). The findings show that the proposed junction improvements and the package of supporting transport measures associated with the development will result in improvements to the traffic situation when compared to the baseline. In particular, at the Boundary Way / London Road / Neunkirchen Way Roundabout there will be significant improvements in capacity.

12.76 Overall, the proposed development can be accommodated on the transport network and the proposed highway improvement scheme will improve the current situation for all traffic.

13.0 SOCIO ECONOMIC ISSUES

Introduction

- 13.1 This chapter provides an assessment of the socio economic impacts the proposed development of Land North of Gavray Drive, Bicester. This Chapter was prepared by David Lock Associates.
- 13.2 The potential impacts of the proposed development upon human beings are also examined in other specific sections of the ES (e.g. air quality, noise etc). This chapter concentrates on those aspects that are not covered elsewhere. These include impacts associated with an increase in population in the area (residents, working and visiting), the pressure this may place on services and facilities in the area and any necessary mitigation.
- 13.3 The potential impacts can be summarised as follows:
- impact upon resident population of the area:
 - impact on land use and property;
 - impact upon the economy of the area
 - impact upon education facilities; and
 - impact upon open space.
- 13.4 Due to inherent difficulties in considering the significance of socio-economic impacts, it is inevitable that there will be a degree of subjectivity in assessing the nature of the impacts described. Nevertheless, this section does describe the principal effects in terms of whether the impact and any residual effects are positive or negative; permanent or temporary; and major, moderate, minor or neutral.
- 13.5 The socio economic impacts of the development will affect the resident population of the site and the surrounding areas of Langford Village. Having established a baseline position, the assessment methodology will consider the direct changes brought about by development (such as the additional dwellings) and will consider the indirect impacts by assessing the needs generated by the proposed development and how such needs are to be accommodated. Impacts will be assessed during both the construction and operational phases of the development.

Method of Assessment

- 13.6 Assessment has been undertaken with reference to 2001 Census information available from the Office for National Statistics. Reference has also been made to the adopted Cherwell District Local Plan (1996) and the Revised Deposit Draft Local Plan (2002). Unless otherwise referenced, figures relate to 2001 Census results.

Existing Conditions

- 13.7 The site is located within Bicester South Ward. The ward is characterised by the residential development of Langford Village, Langford Village local centre and primary school, Langford Brook and associated open space which runs through the centre of the ward north to south.

Population and Population Characteristics

- 13.8 Bicester has an estimated population of about 28,670 people¹. Planning policies indicate that Bicester will have a population of 35,000 by 2011. Bicester remains the fastest growing town in Cherwell. Bicester South has an estimated population of 4,369.
- 13.9 Bicester South contains a younger population than the Cherwell District average. The average age in Bicester South is 29 years old, compared with 37 throughout Cherwell District, in particular Bicester South has a proportionately larger number of people aged 20 to 29 and 30 to 59. In contrast only 0.8% of Bicester South residents are aged over 75, as opposed to Cherwell District where 6.3% of residents are over 75 years.

Marital Status

- 13.10 33% of Bicester South residents are single, in contrast to 27% in Cherwell District. This supports and reinforces the wards relatively low average age within the area.

Health and Provision of Care

- 13.11 84% of Bicester South residents describe their health as "good", 11% more than in Cherwell District. The number of residents who describe their health as "not good" (3% within Bicester South) is lower than the District (6%).

¹ Census 2001

Existing Local Economy

- 13.12 Oxfordshire is recognised as one of Europe's leading centres of enterprise and innovation. The county's economy is one of the most successful in the UK and acknowledged globally as a centre of excellence for learning and research.
- 13.13 The main economic centres within Cherwell District are Banbury and Bicester. Bicester remains the fastest growing town within the District and benefits from superior infrastructure and transport links to Oxford and London. Bicester's economy has grown rapidly since 1991. The working population of the town and its hinterland is forecast to grow from 22,600 in 1996 to 28,800 in 2011.

Existing Unemployment

- 13.14 Oxfordshire has one of the lowest long term unemployment rates within the UK. This is reflected on a ward level where unemployment in the ward is low, 85% of those economically active are employed, in contrast with 70% in Cherwell District and 60% in England and Wales.

Deprivation

- 13.15 The Index of Multiple Deprivation 2000 (IMD 2000) rankings provide analysis at ward level of a range of statistical indicators ('domains'), including income, employment, health deprivation and disability, education, skills and training, housing and geographical access to services. The deprivation index of each ward is ranked against all other wards in England and provides a comparison of deprivation. Each domain is ranked individually, but is also included in a weighted average score for all domains.
- 13.16 With weighted factors, the IMD 2000 rankings identify Bicester South as the 3,974th most deprived ward in England (of 8,414 wards). By way of comparison, Neithrop is the most deprived ward in Cherwell District, with an overall ranking of 1,797; Deddington is the least deprived ward in Cherwell District with a ranking of 8,050.

Existing Community Facilities (inc Health, Social Services and Emergency Services)

- 13.17 There are no existing community facilities within the site, although the site is used on an unofficial basis by local residents for dog walking and informal recreation.

13.18 Beyond the site boundary there is a range of existing community facilities. The closest facilities for the new residents are those at Langford Village local centre. The local centre lies approximately half a kilometre to the south of the site and contains:

- medical practice;
- community centre;
- pharmacy;
- supermarket and newsagent (approximately 300m² of floor space);
- takeaway; and
- public house

13.19 All of the facilities listed above will benefit from increase local patronage. Within the local area, there are two core areas of commercial activity which will benefit from the additional increase in local population: Bicester Town Centre, located 1.3km from the western boundary of the site and Bicester Village, located 1.8km from the site.

Existing Educational Facilities

13.20 The present pattern of schooling in Oxfordshire is diverse, principally because of the historic roots of the system. All secondary schools are comprehensive in terms of ability, but within this the schools in Bicester accommodate the 11-16's with a mushroom sixth structure (Oxfordshire School Organisation Plan 2004-2009).

13.21 The Organisation Plan also identifies the appropriate size of a primary or secondary school within the context of provision made in the LEA area. The LEA considers that the position of small primary schools, defined as those with fewer than 60 full time equivalent pupils. For Secondary schools the organisation plan states that schools of less than 600 pupils will not be able to offer a good range of course options and a breadth of staff expertise.

13.22 Within Bicester there are thirteen primary schools, two secondary schools and one 6th Form College (Bicester Community College). In addition to the potential primary school located within the Gavray Drive scheme, the closest existing primary schools are:

- Langford Village Community School (some 700 metres from the site centre o)
- Longfields Primary School and Nursery (900m from the centre of the site)
- Launton Church of England Primary School (1.3km from the centre of the site)
- St Edburghs Church of England (VA) School (1.5km from the centre of the site)

13.23 In October 2004 Oxfordshire County Council agreed the School Organisation Plan 2004-2009. The latest 'Agreed' report identifies the growth of Bicester. Paragraphs 97 and 98 summarise the position in Bicester.

"Following further pupil growth at the Bure Park Estate in Bicester, at primary level, a further two classrooms are being provided to bring Bure Park School up to a fourteen-class primary school. Numbers are falling at some of the older estates in the town and temporary classrooms are being removed at Glory Farm Primary School and a replacement of timber-framed buildings at Brookside School will reduce the overall capacity.

The Structure Plan 2011 and draft Cherwell Local Plan provide for a new settlement on land at RAF Upper Heyford comprising about 1,000 dwellings (700 new houses and 300 houses which were part of the housing stock on the former airbase). A new 9/10 class voluntary aided primary school and nursery class will be built to accommodate children from families moving to this development. It is likely to be some time before this development begins. While Marlborough is the current catchment area school, it is anticipated that secondary-age pupils will transfer to additional provision in Bicester over the next few years. The draft Cherwell Local Plan also provides for an urban extension to Bicester including 1585 dwellings, a primary school funded by the developer and a site for a secondary school on greenfield land to the south-west of the town. "

13.24 The recent provision of a 6 classroom extension and nursery class at Langford Village School and 7 classrooms and enlarged nursery at Southwold Primary School.

- 13.25 The Schools Organisation Committee identifies that new housing development leads to a demand for school places. Paragraph 89 states

“Where this extra demand for school (including nursery) places cannot satisfactorily be met by existing provision, developers will be expected to ensure that the necessary additional accommodation and site requirements arising from the new residential development are made at no extra public cost. Requirements for funding to meet the costs of such facilities will accord with government policy and advice such as Circular 1/97”.

- 13.26 The plan forecasts the number of surplus places or insufficient capacity. The figures take into account housing developments that have received planning permission. Surplus places are calculated by comparing each school’s capacity with forecast pupil numbers. **Table 13.1** identifies school capacity for the nearest schools to Gavray Drive.

Table 13.1 Oxfordshire School Organisation Plan 2004-2009, Agreed, November 2004

School	Distance from Site	Net Capacity	Temp	2003	2004	2005	2006	2007	2008	2009	2010
Primary School											
Langford Village Community School	700m	406	60	37	33	12	21	22	34	39	39
Longfields Primary and Nursery School	900m	315	90	70	69	54	50	47	47	53	49
Launton CE (VC) Primary School	1.3km	90	30	-13	-18	-21	-28	-31	-32	-29	-32
St Edburghs Church of England (VA) School	1.5km	227	0	71	73	67	66	74	73	76	72
Secondary Schools											
Bicester Community College	2.1km	1462	18	202	199	105	118	102	68	69	59
The Cooper School	1.7km	1179	0	134	113	147	161	167	141	134	117

(- means places needed)

Source: Oxfordshire County Council

- 13.27 The School Organisation Plan 2004-2009 sets out the following information
- demographic information relevant to the supply of school places;
 - policies and principals relevant to the provision of school places; and
 - need to add/remove places

13.28 The plan forecasts the number of surplus or insufficient capacity. The figures take into account housing developments that have received planning permission. Surplus places are calculated by comparing each school's capacity with forecast pupil numbers.

Predicted Effects

Construction Phase - Population and Population Characteristics

13.29 Due to the limited size of the development it is considered unlikely that there will be any significant migration of construction workers to the area during the construction phase of the development.

Operational Phase

13.30 The development of the land to the north of Gavray Drive will generate approximately 1200 residents which assumes some 500 dwellings with an average occupancy rate of 2.4 persons per dwelling (the local and national average).

13.31 The dwelling mix within the scheme has yet to be determined; there will nevertheless be a mix of dwelling types across the grid square as a whole. There will be a mix of housing tenure to facilitate access to the new dwellings by all sections of the community. It is proposed that 30% of the development will be affordable housing. The range of house types and tenures will provide the opportunity for local residents to find alternative accommodation within the local community as their needs change. This positive impact is of moderate scale and permanent in nature and will contribute to the vitality of the development.

Existing Local Economy

13.32 The economic impact of the application proposal must be seen in the context of the local economy as a whole area, and the impacts assessed against the likely economic outputs arising from the development.

13.33 During the construction phase of the development there will be employment created on the site. This employment will have a positive impact on the local economy of minor significance through expenditure in local shops for example at lunch breaks. There will also be indirect effects through the supply of materials from local businesses and through the expenditure of salaries in the wider locality.

Existing Community Facilities (Inc Health, Social Services and Emergency Services)

13.34 The impacts on local community facilities during the construction phase and operational phase are the same but will vary in magnitude dependent on the increase in resident population. The additional population within the area will place an additional demand upon the existing community facilities in the immediate area and on the town as whole. This might include increased use of existing community centres and bolstering of existing community activities such as churches and libraries for example. The impact of this additional use is expected to be beneficial and minor in magnitude.

13.35 As well as the increase in patronage on local community facilities. The scheme proposes the inclusion of a primary school and land reserved for community facilities. This and the anticipated increase in people in the area may well give rise to the setting up of new activities and the enriching of community life. This positive impact is considered to be minor in magnitude.

13.36 With the increased population the housing development will produce it is inevitable that additional demand will be generated for health care facilities. It is anticipated that emergency services can be provided within the appropriate response times. The impact on these public services is therefore assessed to be neutral.

Existing Educational Facilities

13.37 The impacts on educational facilities during the construction phase and the operational phase are the same but will vary in magnitude dependent on the release of dwellings for sale and resident population. Oxfordshire County Council have identified the following formula for calculating pupil yields:

- Primary School: For every 100 residents, 25 will require a primary school place.
- Secondary School: For every 100 residents, 20 will require a secondary school place.

13.38 Adopting this formula in the Gavray Drive context the proposed development of approximately 500 dwellings could generate:

- primary school places: 125 pupils
- secondary school places: 100 pupils

Note: This assessment takes no account of phased housing completions.

Existing Sport and Recreational Facilities

13.39 The impacts on sport and recreational facilities during the construction phase and the operation phase are the same but will vary in magnitude dependent on the resident population. Provision, as identified in the Ecology Chapter, will be made to ensure that the County Wildlife Site is protected throughout the construction phase and a management plan adopted to manage access.

13.40 The proposals which include open space in a variety of contexts. Specifically the proposals include the County Wildlife Site (CWS), creation of new water features, provision LAPs and LEAPs as prescribed by local policy, provision of greenways and the retention of existing vegetation throughout the proposals. The development therefore offers a range of formal and informal recreational opportunities. The provision of open space within the development is complementary to the wider recreational opportunities in the wider area.

13.41 Given the proximity to Langford Village and the existing open space along Langford Brook it is anticipated that the open space associated with the CWS will be used by the wider community. This use is anticipated as part of extending the green corridors throughout Bicester. The proposals, other than the County Wildlife Site, are not expected to attract visitors from beyond the immediate vicinity. Therefore no detrimental impact in terms of additional traffic generated is anticipated and this impact is assessed as being neutral.

Minimisation of Demand- Energy Strategy

13.42 Consumption of energy and its subsequent production of green house gases, such as CO₂, is a major issue facing all new development. Meeting national and international commitments on mitigating climate change should be a primary consideration for all new development projects. Design considerations will consider the two areas of energy efficiency and energy supply, as each play an important, but different, role in

reducing energy consumption. Both microclimate design and energy efficiency will form the basis of the energy strategy for the development.

Microclimate design

13.52 Energy demands can be reduced through careful consideration of the orientation and design density of the development and should be optimised to achieve good microclimatic properties to reduce the basic need for energy.

13.53 Solar gains can lead to substantial reductions on the demand for space heating in winter and the inter-season, but unwanted direct gains in summer should be avoided. Maximising the benefits of solar heat requires good solar access to external spaces and surfaces, and attention to the thermal properties of building and landscape materials will be required.

13.54 These and the following factors are incorporated into the Framework Plan where possible:

- where possible windows will be placed facing south and north facing windows will be minimised;
- aim where possible to site dwellings to allow for one elevation to face within 25° of due south;
- adequate spacing between the units to minimise overshadowing; advantage may be taken of the topography to reduce minimum spacing where possible;
- adaptability to seasonal variations to allow for solar gains in winter but exclude high level direct solar radiation in the summer;
- the use of exposed masonry to provide thermal storage in rooms with high solar gains;
- avoidance of dark rooms which require constant use of artificial lighting through establishing target daylight factors for residential developments;
- where possible, putting temperature sensitive rooms or constantly occupied rooms on the western elevation; and
- reduction in wind exposure through control of orientation, density and height of buildings.

13.55 The incorporation of these measures will mitigate effects on the microclimate resulting in a minor impact.

Energy Efficiency

- 13.56 In order to reduce the energy requirement, the new community needs to reduce heat losses and balance infiltration and ventilation such that energy use is minimised whilst maintaining a healthy internal environment. The applicants have considerable experience of adopting best practice in this regard and will develop a comprehensive strategy for the promotion of energy efficiency.
- 13.57 Designs of dwellings in the development will demonstrate compliance with an appropriate standard of construction and energy efficiency. This may be related to the Ecohomes standards set by Building Research Establishment. Specific targets will be developed in consultation with the relevant authorities. Nevertheless in the sections below the elements to be considered in an appropriate strategy are highlighted.
- 13.58 This approach is particularly relevant to the Government's commitments under the Kyoto agreement. Through the benchmark of energy performance of a New Community home against design specifications, targets for energy (and carbon dioxide, CO₂) reductions can be set and can contribute to the Government's Kyoto target of a 20% reduction in CO₂ by 2010 on 1995 levels.
- 13.59 The appropriate standard should address a wide range of opportunities to minimise the energy requirements of the development such as:
- the thermal properties of the building envelope;
 - the energy efficiency rating of supplied appliances;
 - the specification of appropriate boiler systems;
 - the specification of appropriate insulation; and
 - the installation of low energy lighting.
- 13.60 Specific examples of matters to be considered for inclusion in the appropriate standard include:
- the selection of efficient building forms and layout
 - air tightness standards with good detailing at joints;
 - the installation of double-glazing with Low Energy coating;
 - the glazing area of unfavourably oriented windows;
 - appropriate insulation standards using the *Standard Assessment Procedure* (SAP Rating System);
 - insulation to hot water tanks and pipes and specification of efficiency standards and Nitrous Oxide emissions of all installed boilers;

- effective use of heating controls and where appropriate zonal heating can make significant energy and CO₂ savings and will be promoted;
- the provision of internal drying space/utility;
- the use of insulation with zero-ozone depletion potential;
- the installation of low energy lighting.

13.61 The establishment of appropriate standards and the incorporation of a range of the mitigation measures outlined above will mitigate the effects of additional green house gas emission and so the impact is assessed as being insignificant, although insofar as the development demonstrates best practice in terms of energy efficiency then the impact of the development will be beneficial.

Minimise demand for water

13.62 In order to minimise the demand for water supply in the development, measures for minimising water usage will be incorporated. The management of water consumption will be achieved through setting targets for maximum water consumption. One way of establishing such targets would be through the use of a standard, based on cubic metres per bedspace per annum, to be delivered by adopting a range of measures such as the following:

- the collection and re-use of rain water;
- the promotion the use of water metering;
- the use of aerated taps to basins using reduced mains pressure flow;
- the use of low flow/dual flush WCs;
- where appropriate, the use of baths and showers with reduced filling capacity and with environmental economy settings; and
- the provision of white goods, dishwasher and washing machine, meeting water consumption and efficiency A/B ratings.

Renewable energy

13.63 Renewable energy should be considered as a component of any good energy strategy. There are a range of renewable energy options that can be considered:

- advances in technology over the timescale of the development;
- uncertainty for potential residents as a result of investing in unreliable emerging technology;
- high market and investment costs incurred due to limited supply;

- immature market conditions meaning there are limited specialists to install and maintain the equipment;
- difficulties in reliably estimating the energy supply and matching this to energy demand; and
- unwillingness of energy providers to receive back excess energy on the grid, due to penalty clauses in electricity trading agreements.

13.64 Despite these difficulties no energy strategy should be complete without evaluating the opportunity. Consideration will be given in the detailed design of the development to the use of renewable energy technologies, in conjunction with the relevant local authorities and taking account of changing government funding to support the installation of such measures. Design of dwellings and commercial development should, as a minimum, safeguard the retrofitting of renewable energy technologies in the design.

Residual impacts

- 13.65 It is inevitable that the development will result in the consumption of additional energy resources. However following mitigation it is anticipated that the impact on energy supplies will be minor.
- 13.66 The possible upgrading of existing supplies to the site will have no long term effects but will result in short term adverse impacts assessed as moderate but local.
- 13.67 Design measures to promote efficiency in the use of resources will have the primary role of mitigating the demand for energy but will also have a long term beneficial impact in terms of demonstrating the application of best practice approaches. Careful attention to microclimate design will also have a beneficial effect on the consumption of energy.

14.0 SERVICES AND UTILITIES ISSUES

Introduction

14.1 This section of the ES investigates the likely impacts of the proposed development on the existing utilities and of the strategy for serving the proposed development.

14.2 The following statutory undertakers were contacted to determine the availability and capacity of gas, water, electricity and telecommunications service:

- Southern Electric
- Thames Water
- British Gas Transco

Reference Material and Assessment Method

14.3 This assessment has been undertaken by contacting the relevant service providers and confirming the current status and spare capacity of their services with respect to the proposed development as outlined in Chapter 2.

Existing Site Conditions

14.4 There are no existing services within the site itself. The majority of the services run along Gavray Drive which borders the site to the south.

Potential Impacts of the Proposal- Construction Phase

14.5 During construction the provision of services and utilities by the different service providers will be co-ordinated with road and footway construction inline with best practice. This will minimise disturbance and disruption to occupiers of initial phases of development as latter phases are constructed. This impact is seen as neutral subject to the adoption of best practice.

Potential Impacts of the Proposal – Operational Phase

14.6 Southern Electric do not foresee any problems in providing a supply to land north of Gavray Drive, sufficient for approximately 500 domestic properties together with a

- primary school and an area of potential community facilities. A high voltage power cable currently runs along Gavray Drive, which require reinforcing with 1950m of cable offsite to the Heron Way substation. After these works have been carried out there will be adequate supplies available to all elements of the proposed development. The impact of the operational phase of the development on electricity infrastructure is therefore considered to be minimal.
- 14.7 BT ducting was placed in Gavray Drive during its construction, along which BT will extend their cables from existing apparatus in Cambridge Way and Langford Village. The company does not require additional ducting, as the original proposals allowed for commercial development of the site. Adequate telecommunications services will therefore be available to all elements of the proposed development. The impact of the operational phase of the development on telecommunications infrastructure is therefore considered to be neutral.
- 14.8 Thames Water has advised that there is sufficient capacity within the Bicester supply zone for any additional demand generated by the development of land north of Gavray Drive. There will therefore be adequate water services available to all elements of the proposed development from the existing 200mm main in Gavray Drive. The impact of the operational phase of the development on water supply infrastructure is therefore considered to be neutral.
- 14.9 Thames Water has advised that there is sufficient capacity within the local foul water infrastructure to support any additional demand generated by the development on land north of Gavray Drive. There will therefore be adequate foul water provision to all elements of the proposed development. The impact of the operational phase of the development on water supply infrastructure is therefore considered to be neutral.
- 14.10 British Gas Transco has been consulted on the capacity of infrastructure to supply the proposed development as a whole and have confirmed the adequacy of existing supplies. British Gas Transco have confirmed that no services currently cross the site, however they have identified a 250mm low pressure pipeline running along Gavray Drive which can supply the proposed development at land north of Gavray Drive. The impact of the operational phase of the development on gas supply and infrastructure is therefore considered to be neutral.

14.11 Substations, where required, will be carefully located as part of detailed schemes submitted in due course. Locations will be provided for appropriate maintenance access whilst minimising any adverse visual impacts on the private realm or on the amenities of occupiers. On the basis of the identification of appropriate sites within the development, the impact of this infrastructure is considered to be neutral.

Conclusion and Summary

14.12 There will be no residual impacts on the existing supply of services and utilities as a result of the development; therefore the development is proposed to have a **neutral** impact.