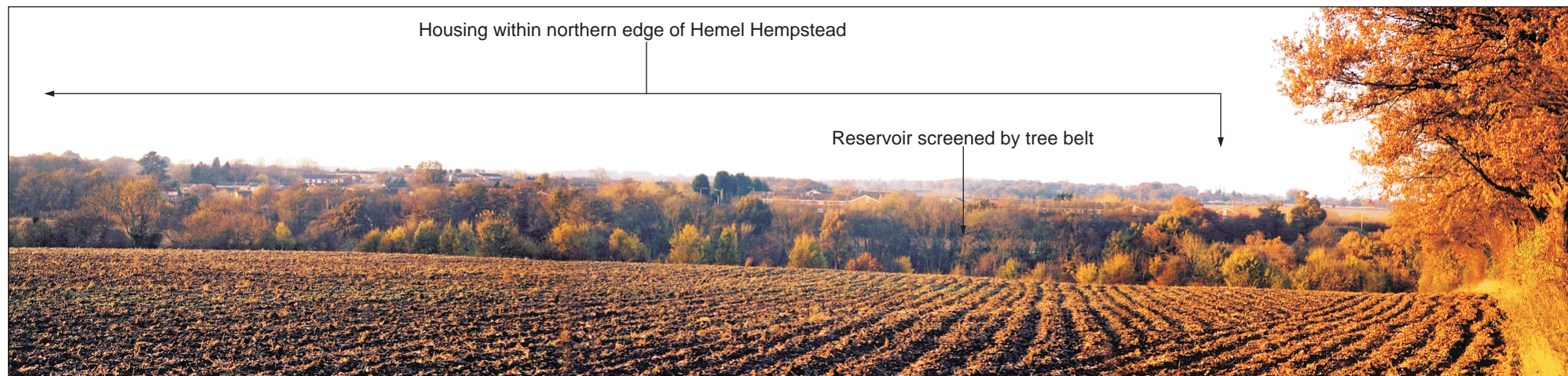
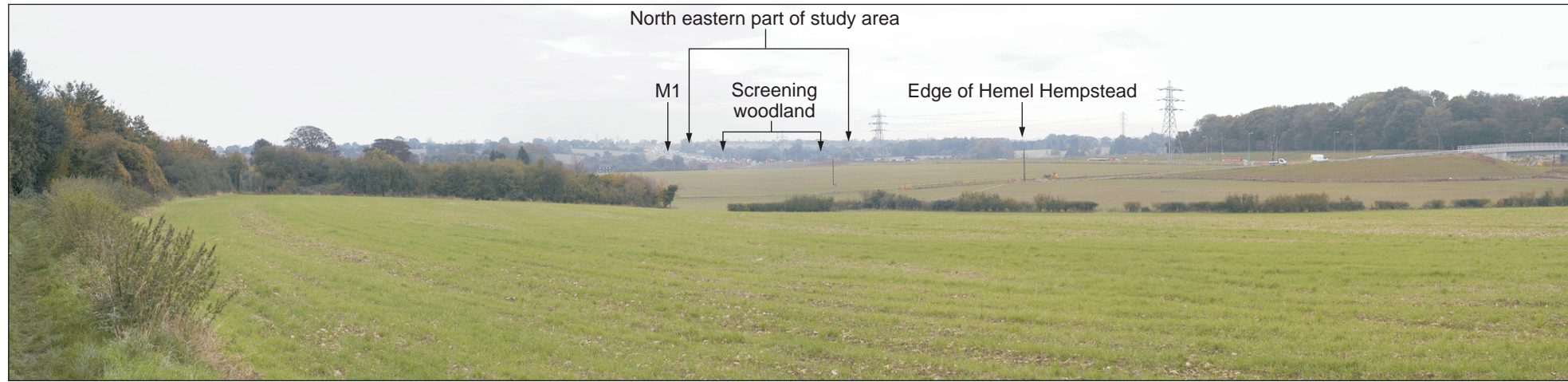




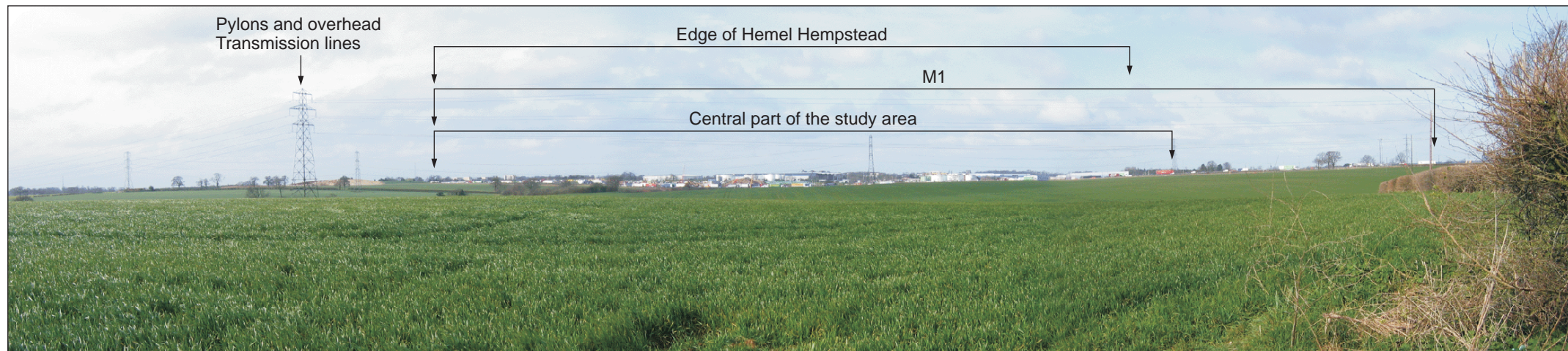
Viewpoint 1 Panoramic view looking south towards the eastern edge of Hemel Hempstead and northern part of the study area



Viewpoint 2 View northwest towards northern edge of Hemel Hempstead



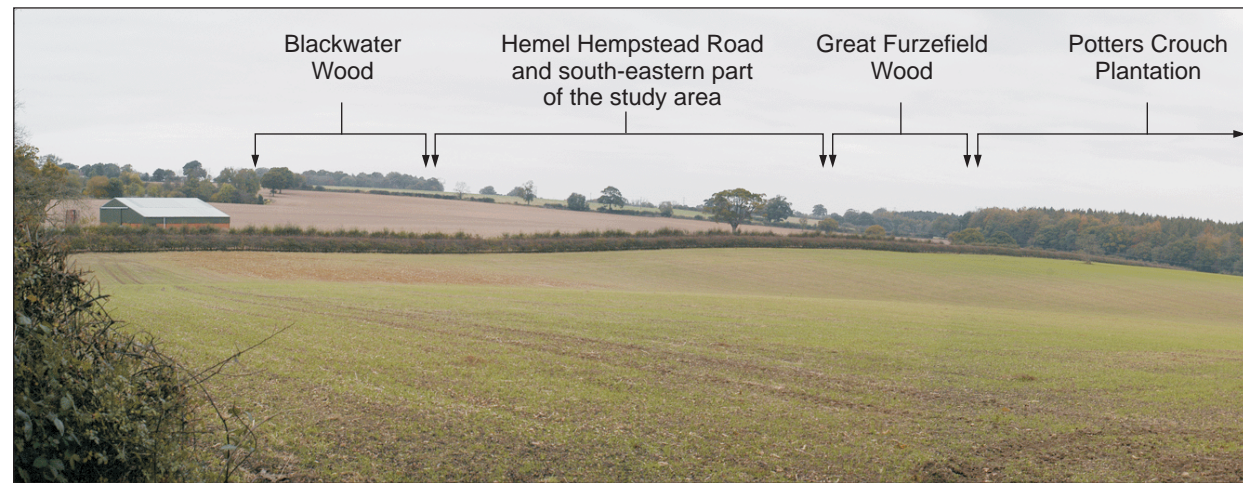
Viewpoint 3 View looking south towards north-western part of the study area and Hemel Hempstead



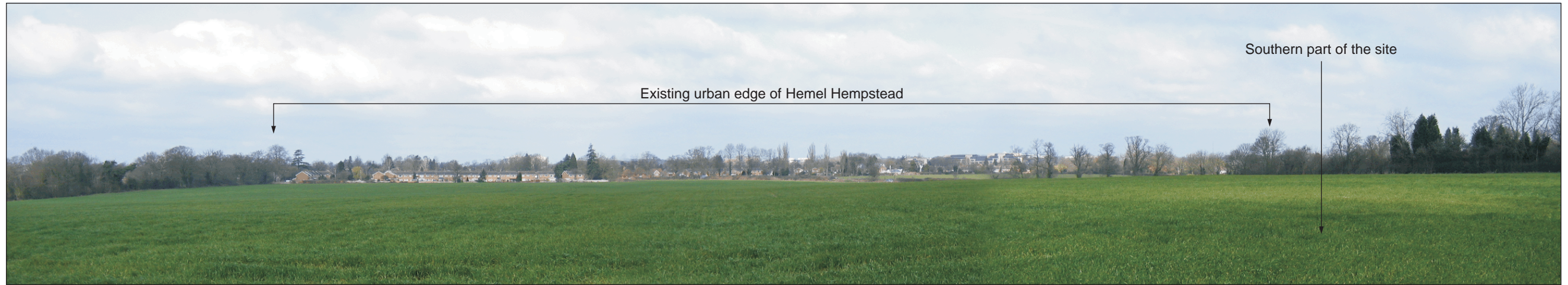
Viewpoint 4 View west towards central part of the study area



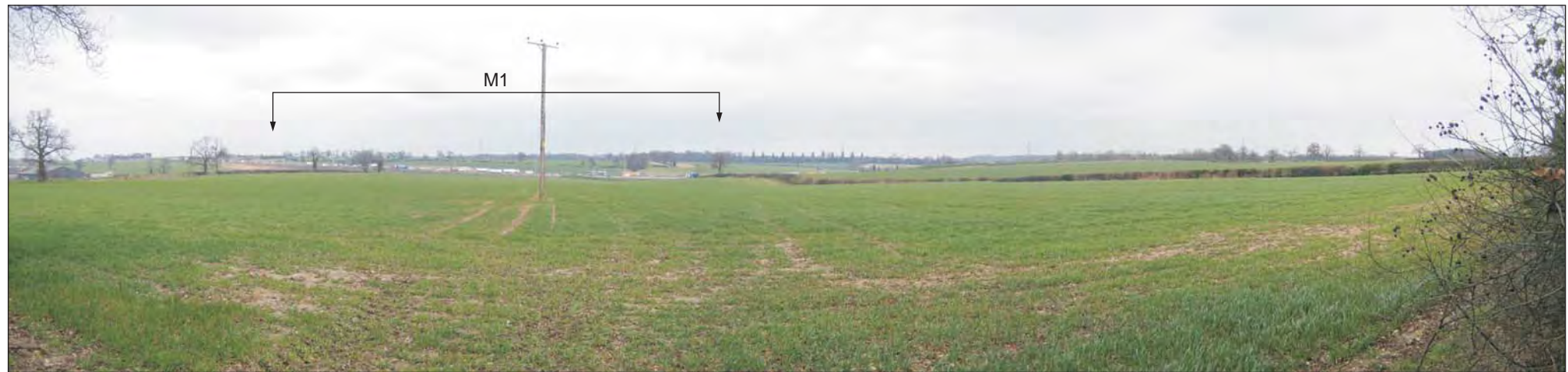
Viewpoint 5 View looking west, north and east across the southern part of the study area towards the village of Pimlico, Corner Farm and Great Furzefield Wood



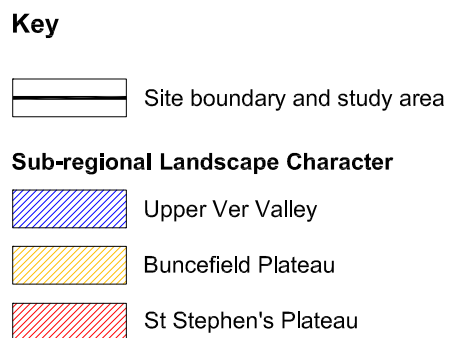
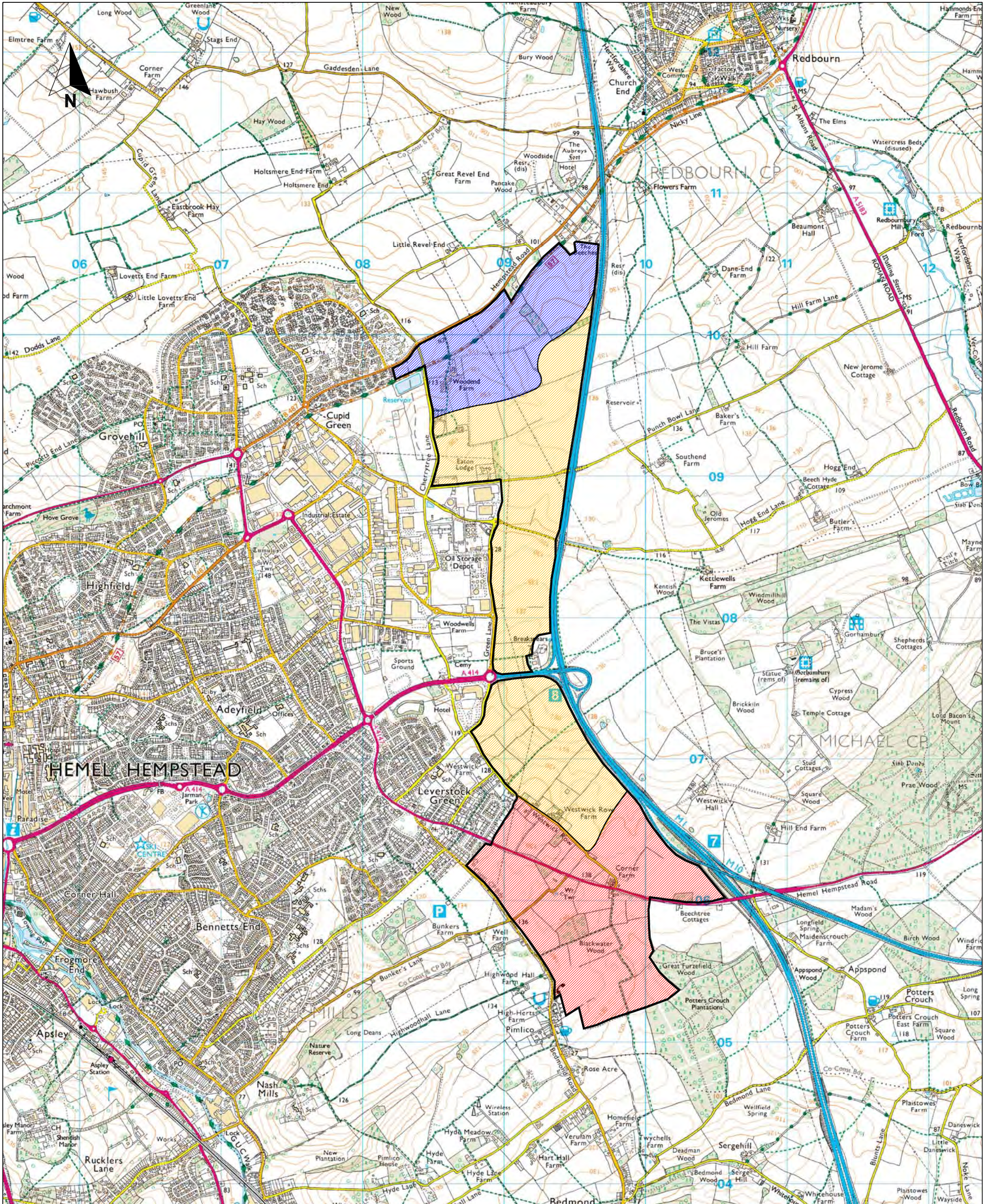
Viewpoint 6 View north towards Hemel Hempstead Road and the south-eastern part of the study area



Viewpoint 7 View looking north-west across the study area towards Hemel Hempstead

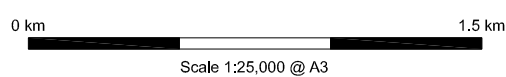


Viewpoint 8 View looking east across the central and southern parts of the study area towards the M1



The Crown Estate
Gorhambury LDF Submission

Figure B4.7
Landscape Character



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5. Transport

5.1 Introduction

The purpose of this chapter is to set out the key transport policy of relevance to the proposed development, to set out the initial response of the Highways Authority to the proposals, to set out details of the Hemel Hempstead Urban Transport Plan that is being developed, and to provide the transport context for the town. The chapter goes on to set out an initial evaluation of the challenges to delivering a sustainable transport strategy for the proposed development and a preliminary assessment of the likely transport impacts. This is however based on the limited existing transport data that is available. This assessment also examines the existing modal split and journey to work patterns for Hemel Hempstead which are a useful basis for further analysis.

Part D of the document then goes on to set out the development access strategy that has been developed from this baseline, and to highlight further areas of work that may be required.

5.2 Transport Policy

Planning Policy Statement 1: Delivering Sustainable Development (PPS1)

PPS1 describes the Government's objectives for the planning system. Sustainable development is the main principle underpinning planning. Planning has a key role to play in the creation of sustainable communities: communities that will stand the test of time; where people want to live; and which will enable people to meet their aspirations and potential.

Managing Our Roads (DfT, 2003) and The Future of Transport - a Network for 2030 (DfT White Paper, 2004)

These documents set out the Government's long-term strategy for transport. An underlying objective of the strategy set out in the White Paper is to deal with the pressures of increasing demand for travel by striking the right balance among environmental, economic and social objectives, now and into the future. In terms of the road network, this means:

- new capacity, where it is needed and justified on environmental and social grounds;
- locking in the benefits of new capacity through measures such as high occupancy vehicle lanes and tolling, where appropriate;
- the Government leading the debate on road pricing and the opportunity this gives to motorists to make better choices;
- better management of the network; and
- using new technology, so the travelling public can make smarter journey choices.



In terms of enhancing local travel, this means:

- freer-flowing local roads delivered through measures such as congestion charging;
- more, and more reliable buses enjoying more road space;
- demand-responsive bus services that provide accessibility in areas that cannot support conventional services;
- looking at ways to make services more accessible, so that people have a real choice about when and how they travel;
- tackling the environmental impacts of travel by encouraging more sustainable travel choices through promoting the use of school travel plans, workplace travel plans and personalised journey planning, and encouraging people to consider alternatives to using their cars; and
- creating a culture and improved quality of local environment, so that cycling and walking are seen as an attractive alternative to car travel for short journeys, particularly for children.

The Future of Transport and Future of Rail White Papers (DfT, 2004)

The White Papers set out the Government's approach to the rail industry, and for the use of rail in providing alternatives to road travel for people and freight. The railways are a vital part of the country's transport infrastructure, and the Government wants to see this continue and accelerate.

Planning Policy Guidance 13: Transport (PPG13)

PPG13 describes the link between planning and transport policy. The objectives of this guidance are to integrate planning and transport at the national, regional, strategic and local level. This is in order to promote more sustainable transport choices both for people and moving freight; promote accessibility to jobs, shopping, leisure facilities and services by public transport, walking and cycling; and reduce the need to travel, especially by car.

East of England Plan Regional Transport Strategy Objectives

These overarching policy objectives will be a template for all developments within the East of England to ensure consistency of approach across all authorities to addressing the challenges of increasing population and demand on transport infrastructure. A summary of the key points applicable at this stage of developing the Gorhambury Concept are set out below and are reflected in the Concept Plans for the development which are shown in the Urban Design section:

- improve opportunities for all to access jobs, services and leisure/tourist facilities;
- enable infrastructure programmes and transport service provision to support both existing development and that proposed in the spatial strategy;
- reduce the need to travel;
- minimise the environmental impact of transport provision and travel; and



- improve safety and security.

Hertfordshire Structure Plan review 1991-2011

The Structure Plan, adopted in April 1998, sets out the strategic development framework for the County. It sets out Hertfordshire's key policies in relation to transport, including the key measures such as a reduction of travel and car usage, and enhanced networks and facilities for non-motorised transport and buses.

Hertfordshire Local Transport Plan 2006/2007-2010/2011

The vision of this document is to provide a safe, efficient and affordable transport system that enables access to everyday facilities and also allows the opportunity and information to choose the most appropriate form of transport and time of travel.

It is recognised in the plan that the car will remain the dominant form of transport in terms of the number of journeys made, but that its physical dominance should be reduced so as to allow everyone a choice of travel mode. The main priorities of the plan can be summarised under a number of key areas:

- to improve safety through minimising the number of collisions and injuries occurring as a result of the transport system;
- to control congestion through effective design, maintenance, and management of the existing network and through the development of efficient, safe and affordable alternatives to using cars;
- to develop a transport system that provides access to employment, shopping, education, leisure and health facilities for all, including those without a car;
- to mitigate the effect of the transport system on the built and natural environment and on personal health; and
- to encourage use of more sustainable modes of transport.

Roads in Hertfordshire - A Guide for New Developments 2001

This document sets out the County Council guidelines for the layout of new developments and the specification of new infrastructure. The guidelines also cover the general requirements for the preparation of Transport Assessments, although they have recently been superseded by the DCLG/DfT guidelines.

5.3 Policy Conclusions

The Concept being developed for Gorhambury is based around a number of sustainable principles and on creating specific environments within the development area, for example; using historic data on an ancient and long disappeared settlement in the south a new community could be created that reflects the former settlement but which is based on new and evolving concepts for street design and integrated transport. To the north, modern energy efficient industrial and commercial layouts would be integrated with the Maylands development and the regeneration initiatives being developed for this area. The Concept for Gorhambury will contribute significantly to meeting the policy objectives.



The Regional Strategy seeks to widen and improve travel choice, reducing reliance on the car. Quality transport interchanges and efficient services are part of this Strategy in addition to promoting and integrating existing transport infrastructure. Park and ride facilities and creation of quality public transport corridors on main radials into the town centre would assist in addressing current transport issues. Efficient public transport, walking and cycling links within the new developments are also part of the development philosophy.

The objectives of the Hertfordshire Structure Plan and Local Transport Plan to reduce the dominance of the car and to enhance the availability and accessibility of public transport are strongly reflected in the Gorhambury proposals. In addition to the existing public transport routes, the energy efficient industrial and commercial layouts that are proposed for the Maylands east/central area will be directly linked to the existing and proposed residential areas to the south through provision of a new public transport route running north to south thus minimising the necessity for car use.

The proposals may also facilitate in part changes to the A414 Brakespear Way to provide an efficient high speed bus corridor; an efficient and convenient alternative to car travel as advocated by the Hertfordshire Local Transport Plan. The high speed bus corridor will also service a new Park and Ride scheme proposed on land adjacent to the motorway which could significantly reduce the number of cars entering the town centre in accordance with the objectives of Hertfordshire Structure Plan and Local Transport Plan.

5.4 Initial Response of Highways Authorities

In order to introduce the Gorhambury Concept to Hertfordshire County Council and the Highways Agency and to understand initial concerns/issues a meeting was held in March 2007.

Anticipated longer term impacts on the A414 corridor and the M1 Junction 8 were raised as issues.

Hertfordshire will seek a viable balance between the level of housing and the levels of new and existing employment.

There are currently no transport models for Hemel Hempstead and existing data is considered too old for meaningful analysis of a development such as Gorhambury. Given the size of the development it will be necessary to tie assessment years and travel plan targets to the development phases.

In general it was considered that many of those employed in Maylands are local residents but many are driving because of poor public transport. This is also reflected in the county wide Travel Survey carried out in 2005. An area wide travel plan should be produced which includes the existing employment uses and shows how network capacity could be increased/reallocated by removing local trips. There has been some study work on bus Park and Ride.

The Highways Agency stated its intention to 'lock-in' the benefits of the current motorway widening by designating the fourth lane for High Occupancy Vehicles. Programmed for completion in 2010, Active Traffic



Management is also being considered. The authorities confirmed that both the M1 and A414 corridor have air quality and noise issues.

Neither authority had any preconceived views on the potential impact of the development and was generally open to the principle of the development and transport concepts described, subject to more detailed feasibility assessment. As such there is an excellent opportunity to integrate the principles of this development in the evolving strategies for Hemel Hempstead as described below.

5.5 Hemel Hempstead Urban Transport Plan

Dacorum Borough Council has recently appointed consultants to carry out a study culminating in the production of a Transport Plan for Hemel Hempstead. The study is in two stages as summarised below:

Stage 1

- consider the process for the study;
- review existing policies, strategies and development;
- identify issues; and
- consider whether the process is robust and that there are no major omissions taking account of changes proposed for the town.

Stage 2

- produce a robust analysis of current and future demand for transport services in the town;
- develop a land use and transport policy focusing on areas where there is greatest potential for further policy formulation;
- recommend transport policies, measures, proposals and options for schemes; and
- extend the Transport Plan for Hemel Hempstead.

A key output from Stage 1 is to advise where additional data collection or modelling may be needed. In view of the scope of the brief it is our view that Stage 2 will require the development of a multi-modal transport model for Hemel Hempstead; as confirmed by Hertfordshire, there are no current models for the town. The study is progressing through the early stages and the issue of a transport model has been recognised. If a model is built, it is unlikely to be available before mid 2008. Hertfordshire have indicated that they may be looking for financial contributions from developers towards the cost of building this model. However, it is likely that greater certainty would be needed on the direction for growth of the town before developers would consider financial contributions.



A requirement is to develop forward looking practical schemes and policies endorsed by both the Council and stakeholders. In view of the potential for the Gorhambury development to contribute in a positive way to the future of the town it is important for The Crown Estate to be recognised as a key stakeholder and engage as early as possible with Dacorum in order to shape the development of these policies and to ensure that the transport philosophy is embodied in the policies that will be developed through the study.

The timescales for the study suggest conclusion in late 2008. As Stage 2 is likely to see the development of a transport model, or at least the comprehensive collection of up-to-date data, it would be advisable to work with Dacorum so that these facilities can be used for the future more detailed assessment of infrastructure proposals for Gorhambury thereby ensuring consistency with the evolving Urban Transport Plan.

5.6 The Area in Transport Context

Entec has been involved in several development proposals on the eastern edge of Hemel Hempstead. This has provided us with a detailed insight into local accessibility issues and we have referred to this work along with more site specific observations to understand issues relative to an extensive mixed use development to the east of the town. We have also referred to the 2005 travel survey and traffic data held by Hertfordshire to establish an initial understanding of travel habits and traffic sensitive corridors in the town.

5.6.1 2005 Travel Survey

The 2005 survey of travel habits county wide showed the majority of Hertfordshire's residents work in the County travelling on average around 13 miles. Around a quarter of residents commuted to London. It also revealed that almost two thirds (64%) of journeys to work were made by car as a driver. Around 19% were using public transport (train, bus or underground) and around 9% walked or cycled.

Residents of Hertfordshire set out their highest priorities as maintaining existing roads improving bus and rail facilities and reducing traffic congestion.

5.6.2 Overview of Road Network Conditions

Overall road safety in Hertfordshire reflects the national trend for reduction in personal injury accidents but overall shows a 2% better than the national average rate of reduction between 2004 and 2005 in serious and slight injuries. However, Hemel Hempstead is in one of the areas with the highest accident rate per miles travelled within the County.

Three radial routes serve Hemel Hempstead from the east of the Region; north of the site the B487 Redbourn Road serves Redbourn and links to the north/south A1081, Harpenden and Luton. South of the site the A4147 connects St. Albans, crossing Breakspear Way then continuing north through the Maylands area to its junction with the



B487. Figure B5.1 shows the existing transport corridors on the eastern side of Hemel Hempstead and Figure B5.2 shows potential transport corridors.

The A414 Breakspear Way is a major dual carriageway link from Junction 11 of the M1 to the centre of Hemel Hempstead bisecting the site.

Traffic data from 2005 available from Hertfordshire shows the two-way Average Annual Daily Traffic on all major links within the county. The A414 Breakspear Way carried in excess of 48,854 vehicles a day and is one of the busiest 'A' roads in the county. Comparing this with data from 2004 there was a very slight drop in traffic however this was so small it suggests that traffic on this link was relatively stable over the past two years.

Traffic data from the A414 St. Albans Road west of Maylands Avenue showed daily traffic flows of around 40,401 suggesting that the A4147 Maylands Avenue/Leverstock Road is carrying significant volumes from the A414. Again, a slight increase over the 2004 traffic but not significant; traffic flows were reasonably stable over this time. Overall the A414 route represents a significant barrier to the communities north and south of the Town.

The busy A4147 through Maylands severs the commercial and industrial areas from the town centre. North of the A414 the route was carrying around 16,090 vehicles in 2005. South towards St. Albans this flow reduces slightly. Traffic flows increased more or less in line with Low Growth forecasts between 2004 and 2005 at 2.4%.

Taken from a count just west of the M1 bridge, the 'B' classified Redbourn road was carrying traffic flows around 16,188 in 2005. Compared with 2004 traffic (14,864) an increase of 9% appears to have occurred, more than double high growth forecasts.

The Maylands development is typical of business park development conceived in the mid twentieth century; there are few amenities for people working in the area, a lack of public spaces and as a whole a lack of a sense of place. The A4147 severs the area from the town centre and the environment as a pedestrian and cyclist is poor. Creating links both to and through Maylands will be important to the success of Gorhambury.

Two country lanes, Hogg End Lane and Punch Bowl Lane pass through the site to the north of Breakspear Way, connecting to the A1081. Although these serve no strategic role within the network there are opportunities to integrate these within Gorhambury.

Pedestrian/Cycle

In the north of the site and running parallel with A487 the Nicky Line is a former single track railway branch line which closed in 1947. It now forms part of a leisure cycle network although the environment north of the site which is deep in tree lined cutting does not feel secure. It is understood that parts of the route towards the centre of the town have been redeveloped.

Bus

The proposed development area is presently well serviced by the local bus network. Currently the southern section is served by direct bus services to central Hemel Hempstead, Hemel Hempstead railway station and nearby towns



including Stevenage, whilst the northern section also benefits from direct links to the town centre, Watford and Luton. The terminus of a number of bus routes serving the town is also located close to the northern section. Direct bus services to London run along Breakspear Way through the middle of the plan area. The services available from the development site are summarised in Table B5.1.

Rail

There are three railway stations that have potential to serve Gorhambury; Hemel Hempstead, Aspley and Kings Langley. None of the stations are particularly accessible from the site. Aspley station south of the town is relatively close to the proposed residential areas to the south of the site although road links are not good. Kings Langley is too far from the development for all but the most committed cyclists and would not be an easy route by bus or car.

Hemel Hempstead rail station is located approximately three miles west of the development site. Whilst this is beyond the distance normally expected for walk-based trips to a rail station, it is within a reasonable cycling distance from the site. Furthermore, as outlined above, a number of bus services also provide a link between Maylands and the rail station. In addition, 'PLUSBUS' ticketing is available at Hemel Hempstead, whereby rail passengers can add unlimited bus travel within Hemel Hempstead to their rail ticket for a small additional charge. Passenger rail services from Hemel Hempstead are operated by Silverlink on the Birmingham - London Euston line. The level of service is summarised in Table B5.1.

Table B5.1 Rail Services from Hemel Hempstead

Route	Day	Approx Service Times	Max. Frequency/ Service Level
Birmingham - Northampton - London Euston*	Mon - Fri	04:00-00:35	4 services per hour
Northampton - London Euston	Sat	04:10-02:15	4 services per hour
Northampton - London Euston	Sun	05:45-00:50	2 services per hour
London Euston - Northampton - Birmingham*	Mon - Fri	05:55-02:30	4 services per hour
London Euston - Northampton	Sat	06:05-03:10	4 services per hour
London Euston - Northampton	Sun	06:50-02:05	2 services per hour

* Majority of services originate and terminate at Tring, Milton Keynes or Northampton. No direct service to Birmingham.

The proposed residential development to the south of the site will also be located approximately three miles from Aspley station. Aspley station is also served by direct trains to a number of destinations including London Euston, Milton Keynes, and Watford Junction however the level of service is lower than that at Hemel Hempstead. The level of service from Aspley is summarised in Table B5.2.



Table B5.2 Rail Services from Apsley

Route	Day	Approx Service Times	Max. Frequency/ Service Level
Northampton - London Euston*	Mon - Fri	05:35-23:40	2 services per hour
Northampton - London Euston*	Sat	06:10-23:40	2 services per hour
Northampton - London Euston	Sun	05:50-00:50	1 service per hour
London Euston - Northampton *	Mon - Fri	05:35-23:40	2 services per hour
London Euston - Northampton*	Sat	06:00-03:10	2 services per hour
London Euston - Northampton	Sun	06:45-01:05	1 services per hour

* Majority of services originate and terminate at Tring.

Overall Journey times to and from Hemel Hempstead and Apsley are good; approximately 30 minutes to both London Euston and Milton Keynes.

It should be noted that further transport work is being undertaken, as outlined below:

- quantifying the level of development using traffic generation techniques;
- identifying existing routes this traffic could take (by mode);
- modifying development traffic route assumptions based on initiatives outlined in this paper;
- considering potential targets for sustainability; and
- quantifying relative impacts on base level traffic by mode in line with TA guidelines.

Other work will include considering the location of the site relative to network constraints and policy including the benefits of Gorhambury when compared with some of the smaller competing sites.

5.7 Qualitative Evaluation of Transport Issues

Unlike the north, west and southern boundaries of Hemel Hempstead, the Gorhambury development would be contained by the M1 corridor to the east and would be a natural extension to the Maylands area which is effectively a second centre to Hemel Hempstead. The development would provide a balance between the employment opportunities in Maylands and the town centre and the proposed residential, employment and new local amenities at Gorhambury which should reduce the travel footprint of the development. The integration of Gorhambury into the established and regenerated (Maylands) area and transport corridors, coupled with new transport schemes and initiatives, would represent a natural development of Hemel Hempstead.



The following provides an overview of transport issues that are likely to be relevant to alternative developments proposals in or on the edge of each quadrant of the existing town and examines how Gorhambury could:

- assist the Borough and County Council in the development of sustainable transport solutions;
- dovetail with the planned regeneration of the Maylands Employment area; and
- deliver a benefit to the wider population of Hemel Hempstead and those travelling to the town for work and leisure.

5.7.1 To the North and Northwest

The traditional spread of housing estates has already occurred to the north of the B487, Redbourn Road around St. Agnells Lane and Shenley Road. Beyond these is relatively open countryside. There are plans for residential development around Spencer's Park to the south of the B487; however, this is effectively infill development between the existing residential developments and the northern edge of the Maylands development. The development of land around Piccotts End would subsume this settlement into the urban sprawl from Hemel Hempstead.

In Transport terms any proposed urban extension to the north and north-west could increase pressure on the B487 and A4146. Whilst local bus services and improved cycle links could be provided across the area to widen the choice of travel within Hemel Hempstead, this area has no real connection with the centre of Hemel Hempstead or wider strategic rail and motorway routes; expansion on this edge of the town would increase traffic movements through the town and there would be less opportunity to introduce sustainable transport initiatives to offset this and also have an impact on the existing travel patterns and attitudes.

5.7.2 To the West

Considerable development has already taken place around the Gadebridge Park area and the southern end of this possible development is relatively well placed to access Hemel Hempstead railway station. The area is not however well placed for employment opportunities within Hemel Hempstead/Maylands centres. Development along the edge of Gadebridge Park would increase pressure on the local road network as traffic accesses the A414 and A416 for routes north and south (to the A41) or across town to gain access to Maylands and the M1 corridor. There are no obvious opportunities to develop a transport strategy for developments in this area that would provide a wider benefit for people living and working in the town.

5.7.3 To the Southwest and South

Land between the A41 and the mainline railway would be well placed to access Apsley and Hemel Hempstead railway stations and pockets of commercial and industrial developments to the east. However, links to other locally



strategic road routes would be either via the A41 via the A4251 or the A4251 leading to the A4146 north or the A414 to the east and the M1 motorway corridor.

The network in this area would have limited opportunity for expansion to provide bus priority or other sustainable transport measures. The physical constraints of the railway and A41 corridors could also limit the opportunities to provide links to the wider area.

5.7.4 East, Gorhambury Area

Bisected by the A414 Breakspear Way and bounded by the M1 motorway to the east and the eastern edge of the built up area, the Gorhambury site is approximately 2.5 kilometres in length. To the south the site includes areas around Leverstock Green and several routes pass through this area including the A4147 Leverstock Green Road/Hemel Hempstead Road which links the A414 to St. Albans.

North of the A414, Green Lane forms the western boundary of the site and there are opportunities for this to be extended to fulfil a north east distributor role serving the proposed development, a regenerated Maylands area (including the Buncefield Oil Depot), and linking to the B487.

The existing access roundabout on the A414 linking the A4147 and Green Lane is the first junction encountered by traffic leaving the M1 via Junction 8. A park and ride site is proposed to the south of the A414. This high profile location linked with measures to create a quality bus corridor along the A414 with priority where required would create a reliable and efficient route into the centre of town and parts of the Maylands site. This could prove to be a good interceptor of inbound commuter trips reducing peak hour demand on the A414. The A414 is already a high frequency route used by local and longer distance bus services to London (frequent 758 and 768) that could benefit from bus improvements on the A414.

A similar facility could also be provided on the B487 Hemel Hempstead Road and links into the Maylands area to the west and to the A5183 Redbourn Road to the east of the M1 although opportunities for bus priority are less on this route. The Nicky Line now forms route 57, part of the national cycle network. The route has a perception of poor personal security but, with some engineering works there is potential for part of this to provide a 'green corridor' link between the northern areas of Gorhambury and the town centre.

Lanes beneath the motorway connect with the B5183 and these again offer an opportunity to create quiet lanes for leisure use or as low key bus corridors providing a direct link from the northern part of the site to one of St. Albans major radial routes.

The site is not directly linked to the main railway station in St. Albans, however, to the south Bunkers Lane appears to have potential to form a bus/cycle link along a more direct route to Apsley railway station. With the creation of good bus links and bus priority within the development this could prove to be a successful transport interchange for Gorhambury.



Maylands is effectively a second centre to Hemel Hempstead. The planned regeneration of the area should result in an improved working environment with facilities and meeting places for those working in and visiting the area. The potential residential areas in the north of the Gorhambury site would be planned with good permeability to Maylands and the existing and planned (Spencer's Park) residential developments nearby. The Nicky Line could be a key part of this strategy.

5.7.5 Conclusions on Site Evaluation

The opportunities associated with a linked development at Gorhambury are summarised below.

- There are few residential areas to the east of the town centre (comparative to the size of Maylands). Gorhambury would therefore be a natural extension to the Maylands Centre creating a better balance in terms of movement trends between Maylands centre and Hemel Hempstead town centre.
- The Crown Estate's landholding is sufficiently extensive to provide a mixture of local amenities and new employment opportunities which should reduce the need to travel longer distances.
- The site is bisected by the A414 and as such is a natural gateway to the town from the M1 and existing radial routes from St. Albans and Redbourn.
- Development would deliver strategic bus Park & Ride sites which would provide a wider benefit to transport around Hemel Hempstead.
- There is potential to create quality bus corridors between the area and the Maylands and Hemel Hempstead centres.
- There is opportunity for several connection routes for various transport modes west from the development into Maylands and, to a lesser extent, to the east via Hogg Lane, in line with current guidance on street design.

Comparing the above opportunities with the transport issues that would arise from major development and urban extensions in other parts of the Town, the following conclusions can be drawn:

- it is more difficult to produce a cohesive transport strategy for several smaller sites/urban extensions especially if these are developed independently;
- development of other sites on the western side of Hemel Hempstead town centre will compound the unbalanced effect of two centres as there is a lack of large scale residential development on the eastern side of the town centre;
- other sites could be less well placed to access strategic transport corridors or have opportunities to promote sustainable transport especially within Hemel Hempstead; and
- pockets of development around the west of the town could lead to an increase in traffic through the centre of town seeking access to the M1 corridor and compounding peak period congestion.



5.8 Estimating the Potential Impacts

The philosophy behind developing a transport strategy for Gorhambury is to create a resident and business community that has access to a wide choice of transport facilities and modes. Creating a balance between proposed housing and future employment opportunities in Maylands and the proposed Gorhambury development will be a key element of creating sustainable travel behaviour. However, in order to understand the potential traffic impacts associated with the Gorhambury development, an initial estimation of maximum traffic generating characteristics has been carried out along with an analysis of existing travel patterns around Hemel Hempstead based on census data.

5.8.1 Journeys to Work

This initial analysis as set out in table B5.3 shows that around 68% of journeys to work within Hemel Hempstead are all within the town, with only around 32% of work trips to or from wards outside of the area.

To put this into context an evaluation of work trips within towns in similar locations has been carried out (i.e. on a London strategic radial route in this quadrant of the M25). This is set out in the following Table:

Table B5.3 Comparison of Percentage Journeys To Work Within Town Area

Area	% Internal Journeys to work	Total Journeys to Work	Population
Hemel Hempstead	68*	41,071*	89,066
St. Albans	48*	33,871*	63,602
Luton	66	82,410	184,371
Harlow	62	38,813	78,768

* Small counts of residents are adjusted to prevent identification of the individual. Such adjustments are present in both the Hemel Hempstead and St. Albans areas. For the purposes of this exercise these counts have been ignored.

The factors affecting the journey patterns will be a combination of many elements including the skill base of the local population and the available employment. In the case of Hemel Hempstead the Maylands area offers a wide range of employment opportunities which will be further expanded through the regeneration of this area. However, it could also be concluded that this may be typical of similar large settlements such as Luton and Harlow although the result for Hemel Hempstead is the highest of our small sample. St. Albans, a relatively short journey from Hemel Hempstead appears to have fewer employment opportunities within the town, reflected in its work journey patterns.



5.8.2 Current Modal Splits

Building on this current trend for living and working within the local area, the proposed Gorhambury development could contribute to meeting local targets to promote sustainable journeys to work and to contain peak hour traffic growth.

Table B5.4 illustrates the current modal splits for journeys to work for the population of Hemel Hempstead. The data indicates that currently only 9% of people utilise public transport and a further 11.8% of people either walk or cycle to work.

Table B5.4 Mode of travel to work for residential population of Hemel Hempstead

	Total	% Total
All People	40,922	100.0
Work from Home	3,326	8.1
Underground	118	0.3
Train	1,494	3.7
Bus	2,053	5.0
Taxi	238	0.6
Driving	25,561	62.5
Passenger in Car	2,758	6.7
Motorcycle	455	1.1
Bicycle	603	1.5
On Foot	4,218	10.3
Other	98	0.2

Source: Census 2001

5.8.3 Trip Generations

The trip generations that are outlined below are based on the proposed development mix of around 5,500 residential units and around 50ha of employment area of which it is assumed around 30% (15.5ha) will be developed into usable employment space. The trip rates set out were obtained from the TRICS 2006(a) database.

The residential trip rates are based on similar developments of mixed private housing in the southeast region. It is likely that this will overestimate the number of trips generated as it is anticipated that a relatively high proportion of the development will be affordable housing which generally produces lower trip rates. The employment trip rates are based on business park developments in the Southeast and Eastern regions which are located outside of the main commercial area.



For the purpose of this exercise, the person trip generation of the combined residential and employment uses has been taken to represent external trip demand in order to assess the robustness of the surrounding transport network to cater for the impact of the development proposals. In reality this is likely to represent an overestimate of likely external demand for the following reasons:

- the philosophy behind the development is to create a sustainable community which makes use of the nearby existing and proposed development employment site;
- a travel plan for both residential and commercial developments will be managed to ensure that car use is reduced below typical rates on which this analysis is based; and
- in addition to softer travel plan measures the infrastructure within the site will be designed to encourage a mixture of travel mode such as bus and cycle only roads and a network of direct walking and cycling routes between existing and proposed residential and employment areas.

In view of the scale and nature of the development, the opportunity exists for a proportion of linked trips between these uses. It is however recognised that there will be a minor element of external trip demand associated with the other supporting land uses on the site such as schools and neighbourhood centres that would, to a degree, offset this assumption.

Table B5.5 provides a summary of the anticipated a.m. and p.m. peak hour vehicle trips for the proposed development.

Table B5.5 Peak Hour Vehicle Trip Rates

Area	No./Area of Units	AM Peak Hour				PM Peak Hour			
		Arrivals		Departures		Arrivals		Departures	
		Trip Rate	Veh	Trip Rate	Veh	Trip Rate	Veh	Trip Rate	Veh
Residential	5,500	0.09	495	0.41	2,257	0.38	2,092	0.17	936
Business Park	1,550	1.4	2,176	0.11	171	0.12	186	1.09	1,694
Totals			2,671		2,428		2,278		2,630

5.8.4 Trip Distribution

To establish an indicative directional split for the generated trips, 2001 Census Origin and Destination data for people travelling to work in or from Dacorum has been examined. It has been assumed that the district wide



distributions will be representative of the distributions for Hemel Hempstead. As shown in Table B5.6 the origins and destinations have been assigned to one of the six most likely routes into/out of Hemel Hempstead. It should be noted that this is a preliminary analysis of traffic impact and no allowance has been made at this stage for effective travel planning that will be a core part of the transport strategy for Gorhambury; for similar strategies that are likely to evolve from the regeneration of the Maylands employment area, or for wider initiatives and schemes that will be delivered through Hertfordshire's Local Transport Plan.

Table B5.6 Assignment of Journeys to Work Inbound To and Outbound From Hemel Hempstead

Route	Trips Originating from Hemel	Trips with Hemel as Destination
Remains within Hemel Hempstead	66%	63%
A414 East	14%	19%
A4147 South-east	3%	3%
A41 South	7%	11%
A41 North-west	5%	2%
A4146 North	4%	1%
B487 North-east	1%	1%

Source: Census 2001

It should be noted that small counts of residents are adjusted to prevent the disclosure of information about an identifiable individual. These adjustments mean that counts in these tables will not necessarily sum to equivalent counts.

The distributions outlined in Table B5.6 have been used to provide an indication of the potential traffic impacts of the development. Table B5.7 shows the number of trips on the routes in and out of Hemel Hempstead that it is predicted will be generated by the development during the peak hour periods.

Table B5.7 Trips Generated by the Development Assigned To Routes

Route	AM Peak Hour				PM Peak Hour			
	Arrivals		Departures		Arrivals		Departures	
	%	Trips	%	Trips	%	Trips	%	Trips
Remains within Hemel Hempstead	66	1,763	63	1,529	66	1,503	63	1,657
A414 East	14	374	19	461	14	319	19	500



Route	AM Peak Hour				PM Peak Hour			
	Arrivals		Departures		Arrivals		Departures	
	%	Trips	%	Trips	%	Trips	%	Trips
A4147 South-east	3	80	3	73	3	68	3	79
A41 South	7	187	11	267	7	159	11	289
A41 North-west	5	134	2	49	5	114	2	53
A4146 North	4	107	1	24	4	91	1	26
B487 North-east	1	27	1	24	1	23	1	26

The assumption has been made that all generated traffic on the network during the peak hours will follow the distribution for existing journeys to work. As the development proposals become more refined this analysis will also be refined to reflect this. Therefore this should be regarded as a very preliminary analysis at this stage.

5.8.5 Traffic Impacts

This section aims to provide a basic understanding of the potential maximum traffic impact of the proposed Gorhambury development on the radial routes. It must be stressed that this is an initial estimate based on limited information. The objective is to create a development that is sustainable in every aspect including transport. Many factors will influence transport during the long-term development of Gorhambury; both as a result of the design of the development, local transport strategies and changes in national policy. At this stage we would anticipate as a minimum a 20% to 25% reduction in the traffic initial estimations of traffic generations put forward in this assessment.

There is traffic data from 2006 held on both the DfT and Hertfordshire web sites for the major radial routes connecting Hemel Hempstead and a 'rule-of-thumb' calculation has been applied based on the general assumption that a peak hour flow on a link is around a ninth of the daily traffic flow. The annual average daily traffic flows for 2006 are set out in Table B5.8.

Using an average of the a.m. and p.m. two-way traffic flow set out in Table B5.6 and multiplying these by nine, an approximate daily development traffic flow has been derived. Excluding the trips that are within Hemel Hempstead, the remainder has been distributed onto the network and compared as a percentage against the AADF from 2006. The results are set out in Table B5.8 and also shown in Figure B5.1 along with the existing Transport corridors within Hemel Hempstead.



Table B5.8 Gorhambury Traffic Count (AADF, 2006) Source: DfT

Site No	Location	AADF
1.	A414 East	47,210
2.	A4147 South-east	11,804
3.	A41 South	38,740
4.	A41 North-west	35,809
5.	A4146 North	9,197
6.	B487 North-east	9,819*

* Calculated from 2006 AAWD (Factor 0.915)

Table B5.9 Initial Estimation of Potential Traffic Impact

Route	AADF	Estimated Daily Development Traffic	% Impact
A414 East	47,210	7443	16%
A4147 South-east	11,804	1350	11%
A41 South	38,740	4059	10%
A41 North-west	35,809	1575	4%
A4146 North	9197	1116	12%
B487 North-east	9819	450	5%

5.8.6 Conclusions on Initial Impact Analysis

The simple analysis of traffic generation and potential impact has to be considered against the sustainable development philosophy for Gorhambury which encompasses traffic and transport. A development of the size envisaged for Gorhambury has the potential to generate a significant volume of additional vehicles onto the network. However, the capacity of the network will limit traffic growth which in turn should also lead to a change in travel habits especially if efficient and attractive alternatives are developed. Further information on these possible alternatives associated with Gorhambury is set out in Part D Chapter 3 of this document.

The following provides a narrative on the impact on each radial route.



A414 East - This is the main road corridor connecting the M1 and M10. Not surprisingly the existing data shows this to be the busiest radial route carrying over 47,000 vehicles a day in 2006. The proposed bus Park & Ride linked with other schemes along the A414 could increase traffic around the proposed site accesses but, provided it is designed to allow for this and priority for buses is included in the design, car drivers may be persuaded to leave their cars and transfer to the bus. The traffic on the A414 beyond this into the centre of Hemel Hempstead could reduce as a result especially in the peak hours, which may open up opportunities for changes on this link.

A4147 Southeast - As the main link to St. Albans, this also has a considerable traffic flow but is lower than routes connecting to the national and local strategic network (M1/A41). Improved bus services with the potential to create bus only links within the development may offset impacts on this link.

A41 Northwest and A41 South - Linking Watford and Aylesbury there are many small and attractive settlements off this road which are potential commuter origins with impacts of 4% and 10% north and south. Traffic destined for Gorhambury is likely to use the A414 or lesser routes across the town. Effective travel planning for both employees and residents combined with better links to the mainline railway at Apsley will be part of the transport strategy for Gorhambury which may reduce this impact.

A4146 North - Although there is potentially a high impact (12%) on this route, this is against a relatively low base flow of around 9,000 vehicles per day. It is probable that the A4147 and B487 would be the logical route to the proposed development. The available traffic data suggests these also carry relatively low traffic volumes. Whilst there may be capacity on these routes to accommodate increased traffic it is anticipated that generated traffic would be reduced through the transport strategy for Gorhambury.

B487 Northeast - The Gorhambury proposals include a bus Park & Ride site which should reduce the impact of existing traffic provided that efficient bus routing/journey times to the centre of St. Albans and Maylands can be achieved.

Further work will be required to identify in more detail the level of impact on the network and also the effects of schemes promoted as part of the development. A preliminary study of Hemel Hempstead commissioned by Hertfordshire County Council has concluded that there is very little existing transport data available.

We understand that further studies are now being undertaken and that these will be used in the LDF process. We also understand that the development of a Transport Model is likely to commence in the spring of 2008 with completion anticipated late in 2008. This model should be the basis for quantitative studies to provide a better understanding of traffic movement around the Town and as a basis for assessing the effects of LDF proposals and other factors influencing transport within the Dacorum area.

5.9 Gorhambury and Local Transport Plan Targets

It should be borne in mind that the impacts described in the previous section are based on the limited amount of existing background information and the existing travel trends based on census data. The vision for Gorhambury is



longer term. The increasing awareness of the impact of modern lives on the environment is accelerating changes in attitude and policies governing future built development and associated travel planning. It is therefore reasonable to expect a corresponding change in existing travel habits with less travel by car, reduced distances travelled and increased use of bus, walking and cycling for local trips. Hertfordshire's LTP for 2010/11 sets out various targets and Table B5.10 is a distillation of Table 11.1 of the LTP and indicators considered particularly relevant to Gorhambury.

Table B5.10 Extract from LTP Table 11.1 'Summary of Indicators and Targets' with Commentary

Indicator	Baseline (2003/2004)	Target (2010/11)
Killed and Seriously Injured	1,084 (1994-98)	No more than 600
The layout of the development will follow latest DfT Guidance set out in Manual for Streets. The aim will be to create a safe and modern environment where traffic speeds are restricted naturally by the design of the highway environment. The development will also be designed to encourage use of other transport modes as an alternative to the car to reduce the need to travel. Reducing car use (overall) and designing a safe layout within the site should contribute to achievement of this target.		
Public Transport Patronage	31 million journeys/year	31 million journeys/year
Currently some 37% of people living in Hemel Hempstead either work from home (8%) or use sustainable transport for their journey to work. 9% of these journeys are by public transport. The proposed new bus links and services within the site and the potential to create dedicated routes to the wider network and other transport interchanges should increase journeys by public transport.		
Bus Punctuality	80% (2004/05)	80%
It is proposed to develop a network of bus only and bus quality/priority routes to serve the development. Although the LTP target is to maintain the current good level of performance there is potential for the reliability of a journey time to increase and further improve on this.		
Cycling Trips	2,397 trips/day (2004/05)	2,658 (11% increase)
Recent reports have highlighted a 5% increase in cycling within Hertfordshire. The Gorhambury proposals include a number of cycle links and improvements to link the Nicky Line into the development. This, coupled with effective travel planning and a residential layout that encourages cycling will add further momentum to the achievement of this target.		
Change in Peak Period traffic flows	St. Albans/Hatfield: 16415	17,289 (+5% in 6 years)
Recent statistics show that traffic growth on Trunk Roads and Motorways is increasing at twice the national average. Traffic nationally is rising at around 2% per annum. The LTP target is therefore ambitious. Relative to the Gorhambury proposals, there is already a high percentage of people living and working within Hemel Hempstead. Improving bus routes and journey time reliability could encourage bus use as an alternative to a short local car trip to work. Effective travel planning for both the residential and commercial development will also contribute to achieving this target. Statistics show that already 8% of the population of Hemel Hempstead work from home. Incorporation of live/work homes would also contribute to this.		

5.10 Conclusions

This section is an initial estimation and consideration of the transport issues likely to arise from a comprehensive development of Gorhambury. Whilst it outlines the issues and how these could be addressed, more detailed



transport assessments and proposals will come forward as the proposals for the site evolve and the shape and quantum of the development becomes more defined through the masterplan process. It should not be regarded as a definitive transport statement.

The study commissioned by Hertfordshire and Dacorum Councils and the transport model to be developed in 2008 will provide an agreed basis for testing the effects of Gorhambury and other LDF proposals and other changes to the network that may come forward as part of the transport study.

Qualitative Evaluation of transport issues

The proposed Gorhambury development would compliment the Maylands second centre to Hemel Hempstead providing a balance between the employment opportunities on Maylands and the proposed residential employment and new local amenities all within the Gorhambury site. Bounded to the east by the M1 corridor, the integration of Gorhambury into the established and regenerated (Maylands) area and transport corridors, coupled with new transport schemes and initiatives would represent a natural development of Hemel Hempstead.

The potential residential areas in the northern proposed neighbourhood would be planned with good permeability to Maylands and the existing and proposed (Spencer's Park) residential developments nearby.

A development of the scale of that proposed at east Hemel Hempstead will include a range of new local amenities and the proposals also include a balance of new employment with residential development. This should therefore reduce the need for new residents to travel longer distances for day to day needs.

Estimating the Potential Impacts

A preliminary study of Hemel Hempstead commissioned by Hertfordshire County Council has concluded that there is very little existing transport data available.

Our preliminary analysis has shown that around 68% of journeys to work within Hemel Hempstead are all within the centre and with only around 32% of work trips to or from wards outside. This is high compared with a small sample of three other settlements on strategic radial routes from London. Only 9% of people utilise public transport and a further 11.8% of people either walk or cycle to work.

Using available DfT traffic surveys from 2006 and an initial estimations of the maximum traffic generating potential of Gorhambury the A414 is predicted to take the highest impact at 16% with the A4147, A4146 and A41 (south of Hemel) at 10% to 12%.

However, this initial estimation of impact must be considered as a worst case for motorised traffic generation without taking into account the real potential to reduce this as a direct result of effective travel planning. The philosophy behind the development is to create a sustainable community integrated with Hemel Hempstead and Maylands centres. Effective Travel Planning and complimentary schemes coupled with other design elements and changes in local and national policy over the long-term development of the site will influence car use to levels well



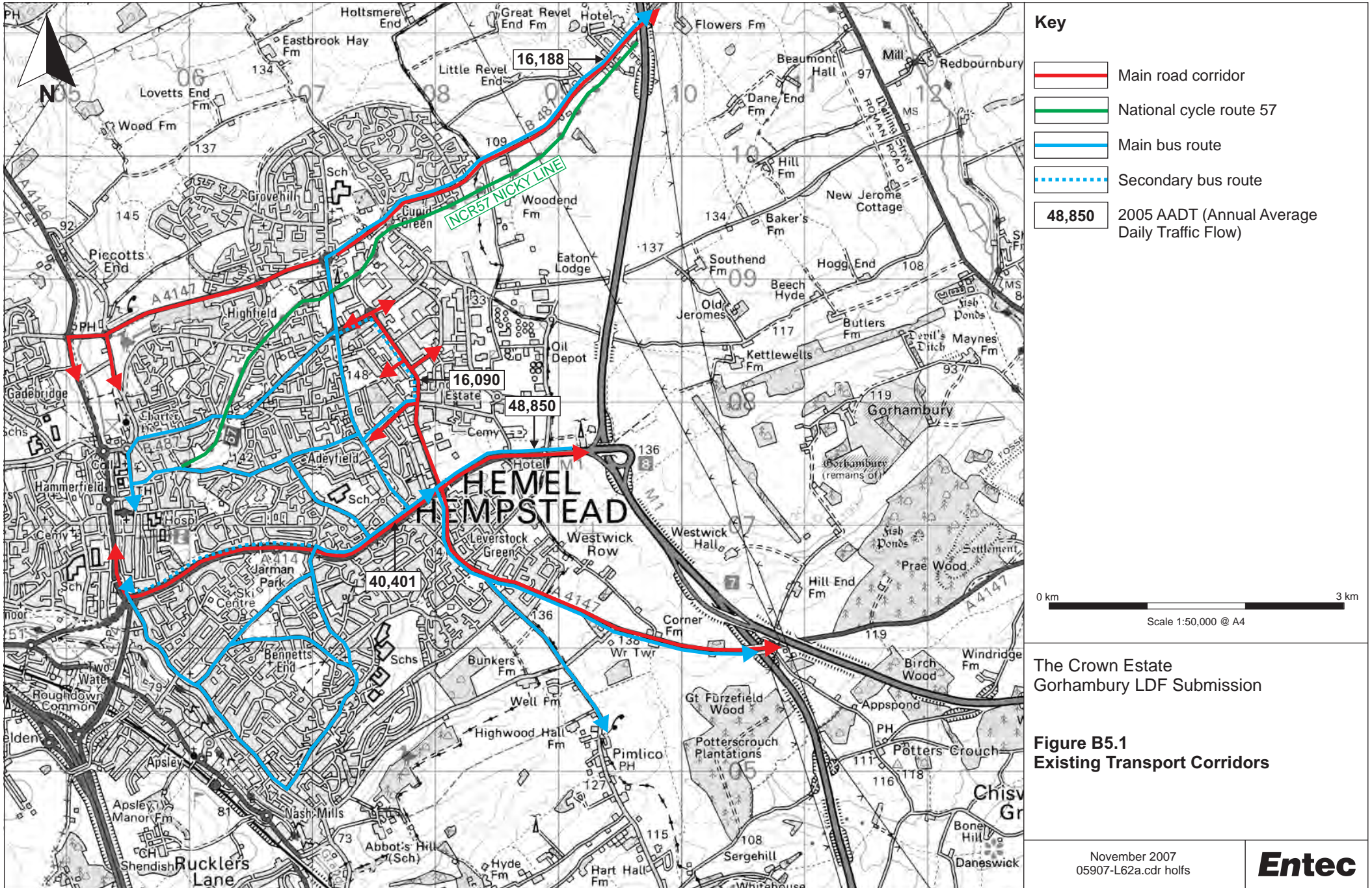
below typical rates on which this preliminary analysis is based. Furthermore, the capacity of the network will limit traffic growth which in turn should also lead to a change in travel habits especially if efficient and attractive alternatives are developed.

Gorhambury and Local Transport Plan Targets

Similar to the objectives of most Local Transport Plans, the vision for Gorhambury is long term. Increasing awareness of the environmental and social impact of our modern lives including travel is changing attitudes and policies on built development and associated travel planning.

The sustainable development philosophy underpinning the Gorhambury proposals compliment the objectives of the Hertfordshire LTP and the associated schemes and initiatives could assist Hertfordshire in achieving its LTP targets. Further details of the sustainable transport measures that are proposed to be incorporated within the Gorhambury proposals are set out in Part D chapter 3.





Key

- Main road corridor
- National cycle route 57
- Main bus route
- Secondary bus route
- 48,850** 2005 AADT (Annual Average Daily Traffic Flow)

0 km 3 km
Scale 1:50,000 @ A4

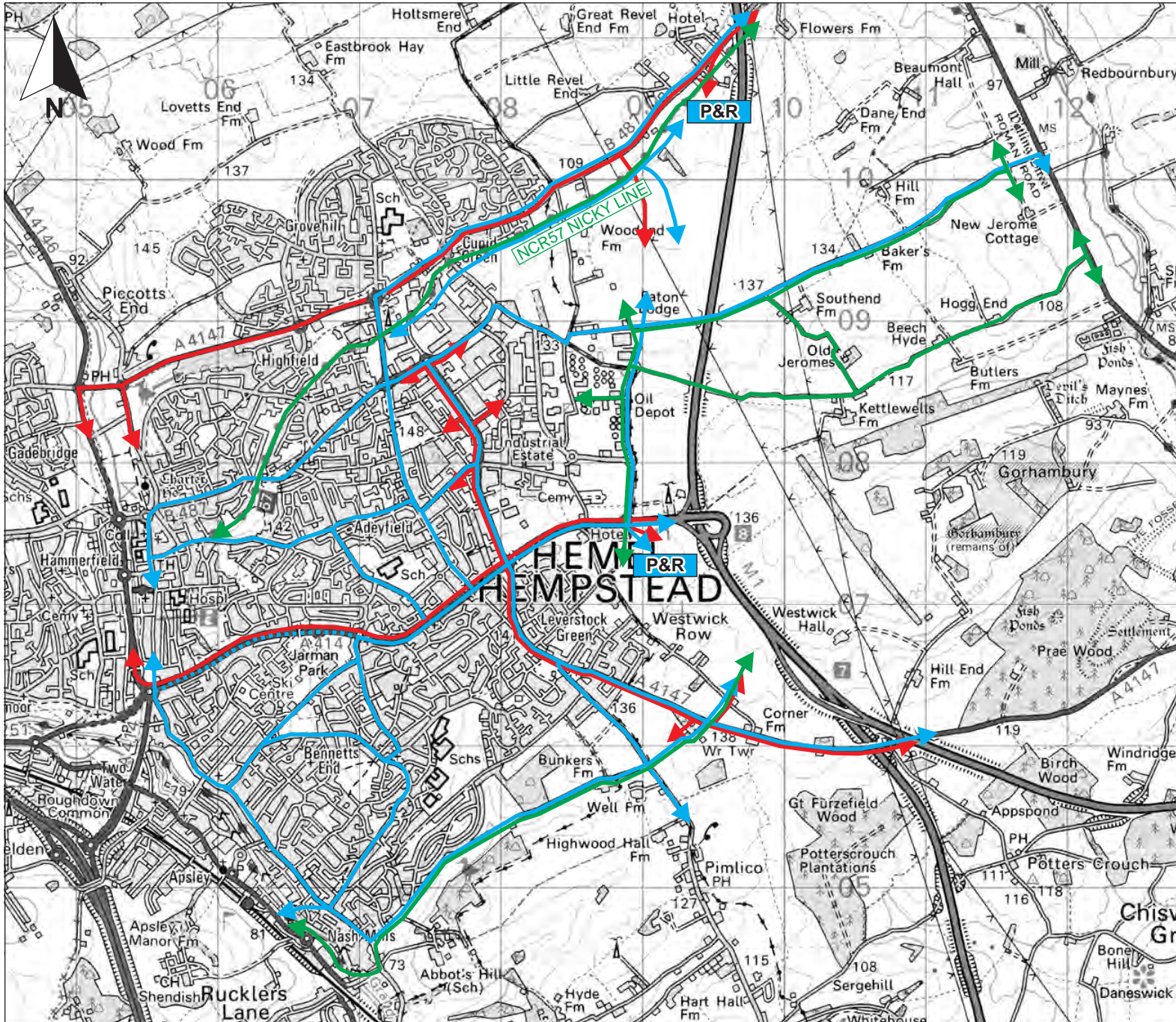
The Crown Estate
Gorhambury LDF Submission

Figure B5.1
Existing Transport Corridors





November 2007
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Key

-  Main road link
-  Pedestrian and cycle routes (on street or dedicated route)
-  Bus (long distance and high frequency "clean" routes within development)
-  Bus Park and Ride

0 km 3 km
 Scale 1:50,000 @ A4

The Crown Estate
 Gorhambury LDF Submission

Figure B5.2
Existing and Potential
Transport Corridors

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6. Historic Environment

6.1 Introduction

The purpose of this chapter is to consider the opportunities and constraints arising from the historic environment at Gorhambury. This assessment has been informed by a preliminary archaeological appraisal, which is set out in Appendix A.

Both the rural and urban environment has a historical dimension that contributes to its quality and character. This is apparent in both a physical form and as a series of values. The term 'historic environment' refers to all these aspects:

- The physical dimension includes the built heritage, ancient monuments, archaeological sites and landscapes, historic buildings, townscapes, parks, gardens and designated landscapes, and other remains resulting from human activity of all periods. It encompasses the context, or setting, in which these features sit and the patterns of past use in landscapes, towns, villages and streets.
- Values might include evidential, historical, aesthetic, and communal considerations, through which people's experience and understanding may deepen as a consequence of increased knowledge of the historic environment. At a more specific level these values may include memories, experiences, identity, customs, beliefs, and local distinctiveness, factors which are fundamental to sense of place, quality of life and cultural identity. Recent policy statements, including the Heritage White Paper, promote a greater recognition of these values as the basis of historic environment conservation and management decisions.

6.2 Methodology

The following sources were consulted:

- Hertfordshire County Council Historic Environment Record (a county based register of known archaeological and historical sites);
- Hertfordshire Historic Landscape Characterisation Data (Hemel Hempstead/Gorhambury area);
- Hemel Hempstead Extensive Urban Survey Project Assessment Report;
- cartographic and historic documents;
- aerial photographs;
- place and field name evidence; and
- published sources.



These were obtained from the following organisations:

- Hertfordshire Historic Environment Record;
- Hertfordshire Archives and Local Studies;
- English Heritage (National Monuments Record); and
- Leverstock Green Chronicle - varied local historic resources compiled by Barbara Chapman (<http://bacchronicle.homestead.com/LGChronicle.html>).

6.3 The Historic Environment

6.3.1 Background

The Gorhambury Concept Area is located immediately east of Hemel Hempstead, which was expanded, from the Old Town and its nineteenth century industrial suburb, during the post-War New Town programme. The Concept Area is bounded on the east by the M1 motorway, which forms a permeable barrier, separating the site from the rural outskirts of St. Albans. The cultural heritage of the Gorhambury Concept Area reflects its proximity to these contrasting towns and the largely rural character of the area prior to the early twentieth century New Town expansion and the development of a national motorway network.

6.3.2 Designations

- There are no Scheduled Ancient Monument within the Concept Area, although the Iron Age Aubrey's Camp and the Roman temple at Wood Lane End immediately adjoin the Area.
- A number of Grade II Listed Buildings, primarily agricultural buildings dating from the medieval period to the nineteenth century, are found within the Concept Area and others occur in the immediate vicinity. These are detailed in Appendix A (Tables A2 and A3).
- There are no Conservation Areas, Registered Historic Parks and Gardens or Registered Historic Battlefields in the Concept Area or in the general vicinity.
- Three Areas of Archaeological Importance occur within or immediately abut the Concept Area. These are non-statutory Local Plan designations, identifying areas of archaeological potential, largely reflecting the distribution of known medieval farms.

6.3.3 Purpose of this Statement

The statement is informed by an archaeological appraisal of the Concept Area and its immediate environs (Appendix A). This indicates the modest quality of the historic environment within the Concept Area, perhaps with the exception of the area surrounding Westwick Row. However, it is also apparent that the Concept Area sits



within a wider historic landscape which is highly significant. These circumstances suggest that large scale development within the Concept Area is likely to be achievable without significant adverse effects on the immediate historic environment, whilst providing a significant opportunity to generate public participation in the wider historic environment. The quality of the historic environment might also serve to promote the benefits of the Area as a residential and employment location and contribute to existing cultural and tourism initiatives, particularly to the east of the M1.

This statement further considers these matters by describing key features and issues and assessing opportunities and constraints that arise from development within the local and wider historic environment.

6.3.4 The Historic Environment: Key Features

The archaeological phases identified during this appraisal of the Concept Area cover a timeline extending to approximately 6,000 years. Figure B6.1 shows the principal features in relation to the Concept Area. It is clear that throughout this period, cultural activity has been a major aspect of landscape dynamics along the River Ver and the southern edge of the Chilterns. Details of individual discoveries and the general baseline conditions are given in Appendix A, however, the more relevant and important aspects are described below:

- Significant evidence of Iron Age remains demonstrates relatively intense patterns of settlement. Various unenclosed settlement sites have recently been discovered, such as the remains reported during recent work on the M1. These are possibly associated with the Iron Age hill fort at Aubrey's Camp, immediately to the north of the Concept Area, or the pre-Roman Iron Age oppidum at Prae Wood (c1.3km to the east of the M1). Iron Age remains in the vicinity of St. Albans are particularly important, as the area was central to the events and circumstances that led to the Roman invasion of Britain.

The Iron Age earthworks at Prae Wood is part of a monument class described as Unenclosed Oppida. Associated with the Prae Wood oppidum are further earthworks at Devils Dyke, to the east of Gorhambury, which may be part of a contemporary territorial boundary. In Britain oppida appear following the abandonment of hill forts, such as the neighbouring Aubrey's Camp. They are linked to the emergence of Late Iron Age tribal areas under a shifting hierarchy of chiefdoms whose subjugation was a principal objective of Caesar's campaigns in 55BC and 54BC and the AD 43 Claudian invasion (see *The Matter of Britain* and *Cunobelinus* box).

The construction and operation of oppida is part of a cultural signature found across southern Britain and western and central Europe in the late second/early first century BC and into the first century AD, reflecting the expanding cultural and political influence of Rome. The two centuries before the Claudian conquest saw dramatic political changes in south eastern Britain and the comparatively rapid enhancement of strong trading links with the adjacent continent probably associated with the Romanization of Gaul.

It has been suggested that oppida were developed in direct response to Caesar's incursions of 55-54BC as 'economic ports of trade', which might explain the apparent reorientation of trade from southern to eastern Britain around this time, with pro-Roman tribes of Britain given a virtual monopoly of trade from Roman Gaul.

Associated cultural changes include the use of cremation burial rites and coinage the introduction of the potter's



wheel and the acquisition of exotic goods derived from the Mediterranean. They are perceived to have been chieftain strongholds with diverse functions including manufacturing and redistribution of goods (Cunliffe 1995¹).

In addition to Prae Wood oppida are known north of the Thames at Wheathampstead, Braughing, and at *Camulodunum* (Colchester), which identify neighbouring settlements and, in the case of *Camulodunum*, a competing tribal centre. Oppida have also been identified at Canterbury, Rochester and possibly at Woolwich, revealing a similar distribution of tribal centres to the south of the Thames on or adjacent to the dip slope of the North Downs.

Cunobelinus is known from the writing of classical historians *Suetonius* and *Dio Cassius*, and from his many inscribed coins. He appears to have controlled a substantial portion of south-east England, and is called "*Britannorum rex*" ('King of the Britons') by *Suetonius*. He also appears in British legend as Cymbeline, the subject of a Shakespeare play.

Historically, *Cunobelinus* was the grandson, or great grandson, of *Cassivellaunus*, who founded the *Catuvellauni* tribe, in territories that included modern Hertfordshire, Bedfordshire and south Cambridgeshire, possibly extending as far south as the banks of the Thames. *Cassivellaunus* commanded the combined British forces against Julius Caesar during his second British campaign of 54BC. These events are described in Caesar's '*Commentaries on the Gallic Wars*', making *Cassivellaunus* the first named British individual known to recorded history.

The relatively short history of the *Catuvellauni* is notable for the aggression displayed towards its neighbours, especially the *Trinovantes* who occupied the territories in modern day Essex and Suffolk. Their military success ensured they were the dominant tribal group in southern Britain during the first century AD.

Cunobelinus successfully invaded the *Trinovantes*, a Roman ally whose independence was protected by a treaty made by *Cassivellaunus* and Julius Caesar in 54BC. He was allowed to govern from the *Trinovantes* capital at *Camulodunum*, whilst his father, *Tasciovanus*, who had succeeded *Cassivellaunus* c.20BC, continued to rule the *Catuvellauni* heartlands from the capital he founded at *Verlamion*.

After succeeding *Tasciovanus* c.AD10, *Cunobelinus* moved the *Catuvellauni* capital to *Camulodunum*. He developed a reputation as a successful statesman and diplomat, and it seems likely that his kingship over the joint *Catuvellaunian/Trinovantian* kingdom was ratified by Rome. He continued to rule the combined tribes from *Camulodunum*, which became the focal point of British politics, learning and trade.

During the move to *Camulodunum*, *Cunobelinus* had left part of the *Catuvellaunian* nobility behind at *Verlamion*, which had prospered and expanded. *Verlamion* became the focus of anti-Roman opposition, which was led by his sons, *Togodumnus* and *Caratacus*, when *Cunobelinus*' authority diminished due to ill health, c.AD40. A third brother, *Adminius*, having been granted administrative authority over *Cantium* (modern Kent and part of Sussex) at some time around AD30, was driven out by his brothers c.AD40, because of his pro-Roman position. *Caratacus*' conquest of the Roman client kingdom of the *Atrebates* (modern Hampshire, West Sussex and Surrey) c.AD41 resulted in the flight of the deposed chief *Verica* to Rome, providing *Claudius* with a pretext for the conquest of Britain.

Cunobelinus died some time around AD42, just before the Roman invasion in AD43. At his death *Catuvellauni* tribal

¹ Cunliffe B 1995 Iron Age Britain, English Heritage.



territories extended to most of south east Britain, but *Catuvellauni* authority was left facing the challenges posed by the political alliances between deposed British chiefdoms and an expansionist Rome.

Caratacus and *Togodumnus* led the initial resistance to the Roman forces. *Togodumnus* was killed during the battle to prevent the Romans advancing beyond the River Medway. *Caratacus*, however, survived, and continued to lead the resistance. *Tacitus*' *Annals* describe him leading the *Silures* and *Ordovices*, in what is now Wales, against the Roman governor *Publius Ostorius Scapula*.

Ostorius defeated *Caratacus* in a set-piece battle, known as the Battle of *Caer Caradoc*, in AD51, capturing members of his family, but *Caratacus* again escaped. He fled north to the *Brigantes* (northern England excluding Humberside), but their queen, *Cartimandua*, who was loyal to the Romans, handed him over in chains.

Caratacus was exhibited as a war-prize in Rome, but his speech to the Senate was so impressive that he and his family were freed and allowed to live in peace in Rome. The conquest was a personal victory for Emperor *Claudius*. It strengthened his political standing in Rome and marked the start of nearly 400 years of Roman administration over much of the British Isles. This is a significant European historical event, which resonates through later cultural, artistic and literary endeavours which have contributed to definitions of British national identity.

- The Roman town of *Verulamium*, built on the east bank of the River *Ver* (c.2.8km to the east of the M1). The Concept Area occupies an extensive area within the rural hinterland of this major Roman town. A number of significant Roman villas surround the Area, at *Gorhambury*, *Boxmoor House* (SAM 27916) and *Gadebridge* (SAM 27881), which identify large agricultural estates in close proximity to the market town. A Roman temple is also located at *Wood Lane End* (SAM 27921), immediately adjoining the Concept Area.

Verulamium was granted the rank of a *municipium* in AD50, which conferred either Latin or full Roman rights on the inhabitants. It is very likely that the town was granted this honour at such an early date as reward for the tribe's early surrender to the Roman army. Around AD55 the settlement's first defensive system was constructed, consisting of a large bank and ditch which enclosed an area of 119 acres (48 hectares).

These town defences were soon to prove inadequate. During the emperorship of *Nero*, King *Prasutagus*, of the neighbouring *Iceni* tribe, died, and the subsequent depredations of the *Icenian* homelands by the procurator of Britain, *Decianus Catus*, was to foment rebellion within the client-kingdom in East-Anglia. *Verulamium* was almost completely destroyed in the revolt of *Boudicca* during the winter of AD60/61, but was soon to recover and quickly rebuilt.

The town soon boasted a market and several large town houses, built into a typical Roman grid-like pattern of streets, which was probably first laid out before AD49. By AD79 the town's first monumental forum and basilica was completed, and by the early second century the town had expanded to such a degree that the earlier defences had to be removed in places, to allow communication between the extra-mural parts of the settlement.

Around AD155 a fire destroyed almost 52 acres (21 hectares) of the town, but the new settlement that arose from its ruins was twice the size of the old one, with more stone than timber used in its construction. This new city had a small theatre, which was built close to the forum and basilica. The half-demolished *Claudian* defences were completely razed, to be replaced by a massive bank and an enormous ditch which surrounded the entire town, pierced by



monumental twin-arched gates on all four sides. Over the next two centuries the town established itself as a wealthy market centre, perhaps the most important in Roman Britain, with comfortable houses, fine mosaics, Italian marble and a piped water supply.

By the fourth century, *Verulamium* was the third-largest city of Roman Britain after *Londinium* (London) and *Corinium* (Cirencester). By the mid-fourth century, the theatre had become a rubbish dump, and by AD430 the town had fallen into decline. Excavation has shown that the late-Roman cemetery of Verulamium was on a hill outside the town, which later became the site of St. Albans Abbey, in commemoration of the Christian martyr Alban, and in due course the focus of the modern town.

- The Concept Area forms part of the medieval Manor of Westwick, which, by Domesday in 1086, was under the control of the Benedictine Abbey of St. Albans, who granted the estate to the de Goreham and de Ver families for a period during the twelfth and thirteenth centuries. The principal settlement of the medieval estate may have been located at Westwick. Various sources suggest that Westwick Row represents the shrunken remains of a medieval ‘vill’ or township, and the surrounding area includes surviving fragments of medieval fields, lanes and hedgerows. Recent investigations have also revealed that Westwick Cottage contains the remains of a timber-frames aisled hall house constructed between 1184-1219, which may denote the site of an early manor house.
- Following the Dissolution (1540/41) the Manor of Westwick was granted to Sir Ralph Rowlatt. In 1561 Rowlatt sold the manors of Gorhambury, Westwick and Pre to Sir Nicholas Bacon, Lord Keeper of the Great Seal of England and who, from 1559, exercised the jurisdiction of the Lord Chancellor. Bacon set about consolidating the estate and built a new house at Gorhambury. Work started on the Tudor mansion (SAM HT41) in 1563 and finished in 1568. On his death Gorhambury passed, via his wife Ann, to his younger son Sir Francis Bacon.

Francis Bacon, 1st Viscount St. Alban (22 January 1561 - 09 April 1626) was an English philosopher, statesman and essayist, but is best known as a philosophical advocate and defender of the scientific revolution.

His works established and popularized an inductive methodology for scientific inquiry, often called the Baconian method or simply, the scientific method. In the context of his time such methods were connected with the occult trends of hermeticism and alchemy. Nevertheless, his demand for a planned procedure of investigating all things natural marked a new turn in the rhetorical and theoretical framework for science, much of which still surrounds conceptions of proper methodology today.

Bacon was knighted in 1603, created Baron Verulam in 1618, and created Viscount St. Alban in 1621; without heirs, both peerages became extinct upon his death.

- After Sir Francis’s death in 1662, the estate was eventually acquired by Sir Harbottle Grimston and Gorhambury has remained in the family since. Sir Harbottle had been elected Speaker of the House of



Commons and was appointed Master of the Rolls shortly after the Restoration. Bacon's house continued to be used until the late eighteenth century, when the present day Palladian Gorhambury was constructed. Work on the new mansion began in 1775 and was fully complete by 1790. Further consolidation of the estate occurred under successive members of the Grimston family. However, facing financial pressures arising from the 1930's depression, much of the estate farmland was sold to The Crown Estate.

- Twentieth century social transformations have had a profound local effect, reflecting the emergence of the car culture, population expansion and movement and industrial and technological change. In particular, post-War infrastructure development has shaped much of the Concept Area landscape and is part of the heritage of the nation's recent past:
 - Hemel Hempstead New Town is an example of the Government's post-War recovery effort through centralised urban planning; and
 - The M1 motorway, which opened in 1959, is considered to be the first full-length inter-urban motorway.

In the immediate aftermath of the Second World War Great Britain faced a legacy of damaged homes and disrupted industrial infrastructure. Restoration provided an opportunity for improving urban conditions on a grand scale.

New Towns were an important element in this strategy: they aimed to improve living and working conditions both in damaged areas and in wholly new settlements. Ebenezer Howard's writings, including *Garden Cities of Tomorrow* (1902), and his garden cities of Letchworth and Welwyn, set a template for post-war New Town development: which were to have a green and open quality with a successful balance between living and working.

New Town policy emerged from a number of wartime Government Commissions, which led to Patrick Abercrombie's *Plan for London* in 1944. This Plan envisaged moving 1.5 million people from London to new and expanded towns, reflecting a strong consensus to halt the uncontrolled sprawl of London and other large cities, under the axiom '*if we can build better, we can live better*'.

A New Towns Committee, set up under the chairmanship of Lord Reith in October 1945, led to the New Towns Act 1946. Of the 11 New Towns designated in Britain between 1946 and 1955, eight were London 'overspill' or satellite towns.

Hemel Hempstead was announced as candidate No 3 in accordance with the National Government's 'policy for the decentralisation of persons and industry from London'. Following a public inquiry the following year, the town got the go-ahead and Hemel officially became a New Town on 04 February 1947.

The initial plans were drawn up by architect Geoffrey A. Jellicoe, a widely regarded and prominent British landscape architect. His view of Hemel Hempstead, was "not a city in a garden, but a city in a park." However the plans were not well-received by locals and less radical proposals were drawn up.

Like other first generation New Towns, a group of neighbourhoods were devised. These were built on the high ground surrounding the Old Town and mainly located in the east. The original Masterplan of 1947 envisaged six neighbourhoods, Adeyfield, Bennets End, Highfield, Warner's End, Chaulden and Gadebridge. Each was to have its own character and to be self contained, with local amenities, including primary schools, shops and public buildings. Each neighbourhood is designed around a few major feeder roads with many smaller cul-de-sacs and crescents,



intended to minimise traffic and noise nuisance.

The first developments proceeded in July 1948 with the construction of Adeyfield. The first houses erected were in Longlands, Adeyfield, and went up in the spring of 1949. The first new residents moved in early 1950. By the end of 1951, there was a waiting list of about 10,000 wishing to move to Hemel.

The redevelopment of the town centre was started in 1952, with a new centre based on Marlowes south of the old town. The old centre of the High Street was to remain largely undeveloped, though the market square closed and was replaced by a much larger one in the new centre. The former private estate of Gadebridge was opened up as a public park.

By 1962 the redevelopment of the new town as originally envisaged was largely complete, though further expansion plans were put forward. Dacorum College, the library, new Police station and the Pavilion (theatre and music venue) were all built during the 1960's. The last of the originally-planned neighbourhoods, Grovehill, began construction in 1967. However, further neighbourhoods of Woodhall Farm and Fields End were later built as part of the extended plans.

In keeping with the optimism of the early postwar years, the town features examples of modernist architecture, with many unusual and experimental designs for housing. New housing technology such as prefabrication started to be used from the mid-50's, which dramatically increased house building rates. The notorious double 'magic' roundabout at Moor End was opened in 1973.

6.3.5 The Historic Environment: Key Values

Identifying values helps establish the wider relevance of the historic environment to contemporary communities and society in general. A number of values have been identified at this preliminary stage. These are predominantly inter-related evidential, historic, and, to a degree, aesthetic/intellectual values. Further consideration would need to be given to these and others, especially communal values, including the social and spiritual dimension.

Communal

- The monuments and landscape surrounding the Concept Area contains places that illustrate major episodes in the development of Great Britain from a prehistoric tribal society to a twentieth century nation state.

Historic

- The Concept Area forms the eastern part of a coherent historic landscape unit, which may have emerged as early as the late Iron Age or the Roman period, but is most clearly expressed in the extent of the medieval Manors of Gorhambury, Westwick, and Prae, with strong historic links to Gorhambury and St. Albans.
- The apparent bucolic character of the rural historic landscape to the east of the M1, which reflects the management of the agricultural estate since the 18th century, contrasts with the nature of underlying themes and processes. These typically involve expressions of 'authority', vested in successive social, religious and political entities, which was exercised through the control of territory, lands or property.



- Construction of the M1 motorway has radically altered the historic environment, resulting in severance of the early historic landscape and separating associated historic features e.g. West Hall and Westwick Row.

Evidential

- Well documented archetypal Iron Age monument classes occur in close proximity within a relatively well preserved landscape setting. These chart the transformation of prehistoric tribal society to Roman urban communities and wealthy rural estates, with the adoption of cultural traits originating in the Classical world.
- A diverse built historic environment - employing widely contrasting architectural styles, which reflect the very different origins and development timeframes associated with the adjoining urban areas. The creation of large scale planned neighbourhoods during the 30 year programme of expansion at Hemel Hempstead, contrasts with the pattern to the east, which reflects the accretion, contraction and relocation of rural estates and settlement in the hinterland of St. Albans, a process which spans the best part of a millennium.
- Responsible stewardship of the historic agricultural estate has ensured partial survival of pre-eighteenth century and ancient field patterns and lanes, notably around the shrunken medieval village at Westwick and the parkland surrounding Gorhambury. However extensive losses occurred during the twentieth century, especially as a result of the construction of the M1.

Aesthetic and Intellectual

- Historic places immediately adjoining the Concept Area are directly associated with individuals whose achievements contribute to artistic, literary and scientific advancements that are recognised as an important aspect of the wider European cultural sphere:
 - The recorded exploits of the Catuvellauni royal dynasty provide unique insight to prehistoric Britain, whilst also describing the dire consequences that befell elements of the elite British celtic society as a result of early direct contacts with the Classical world. These events produce some of the first recorded eye witness accounts of the British Isles and contribute to the oral legendary history codified in the Matter of Britain, which Geoffrey of Monmouth describes in his *Historia Regum Britanniae*. This becomes a major source that inspired literary innovations in twelfth century Europe, as well as providing subject matter for Shakespeare's sixteenth century works. These literary associations have pan-European and global cultural significance.
 - Sir Francis Bacon's intellectual, philosophical and scientific achievements, in particular his *Instauratio magna*, was a significant contribution to the sixteenth/seventeenth century scientific revolution, the prelude to the European Age of Enlightenment.
 - The prehistoric and Roman remains in the vicinity of St. Albans have attracted the attention of many eminent archaeologists who have advanced the technical development of the discipline. Individuals, such as Mortimer Wheeler and Sheppard Frere, established reputations of international status on the basis of work undertaken at Verulamium. Verulamium Museum was opened in 1939, to display the finds from the excavations of Mortimer and Tessa Wheeler between 1930 and 1934.



The result of this, and subsequent excavations, is one of the most important late Iron Age and Romano-British collections within the UK.

- Hemel Hempstead New Town is an example of a mid-twentieth century centralised planning approach to urban renewal. It was conceived with aspirations similar to those that drive current sustainability doctrines, but was pursued in the context of urgent post-War social and political objectives and drew on contemporary construction technology. As well as inherent historic qualities, in terms of planning, design and architecture, the New Town has a contextual importance for the Concept Area:
 - sets the physical context,
 - establishes a historic pattern of growth through neighbourhood accretion; and
 - provides an exemplar, relevant to its time, against which contemporary approaches to sustainable urban renewal can be considered.

6.3.6 Historic Environment: Opportunities and Constraints

Given the importance of the wider historic environment, both in terms of the quality of surviving remains and the important values that relate to these remains, development of the Concept Area presents many positive challenges that would benefit from a proactive approach.

Principally, the historic environment displays patterns of former lives and memories, which new large-scale development can 'key' into, reducing the perceived sense of cultural dislocation associated with the previous New Town programme. It also further addresses concepts behind Jellicoe's design philosophy for the original New Town expansion programme at Hemel Hempstead, i.e. the environment has to be seen as an ecological and cultural continuum.

In addition there are wide ranging opportunities to make a direct and substantive contribution to current policies concerned with public participation and sustainable management of the historic environment. These opportunities could be advanced through any number of specific initiatives, with examples outlined below, although further consideration should involve extensive dialogue with Local Authorities and other local stakeholders.

6.3.7 Public Policy

Recent research underlines the popularity of the historic environment, which is emerging as a significant factor in public policy.

Research carried out on behalf of English Heritage, as part of its national report on the state of the historic environment highlights aspects of public use and benefits. It reports on a number of key indicators, based on data produced by Taking Part, a continuous national survey of adults aged 16 and above living in a representative cross-section of private households in England. In particular it has established:



Attending historic environment sites: Based on the first three quarters of the Taking Part survey, from mid-July 2005 to mid-April 2006, around 69% of all adults attended a designated historic environment site during the past 12 months. Lower attendance figures were recorded for various groups, including adults from black and minority ethnic backgrounds, adults with a limiting disability or illness, and adults from lower socio-economic groups.

Volunteering in the historic environment: Based on the first three quarters of results from the first year of the survey (2005/06), it is estimated that about 1.1% of the adult population in England, equivalent to around 400,000 adults, were involved in heritage volunteering. However, this estimate is based on a small number of survey responses (207) and so there is a wide confidence interval around the estimate. Strictly speaking one can only say that somewhere between around 200,000 and 600,000 adults undertook some kind of voluntary activity in the last 12 months in relation to the historic environment. Taking Part survey also confirms that there are significant numbers of volunteers involved in the many other organisations related to the historic environment.

Attitudes to the historic environment: Based on the first three quarters of results from the first year of the Taking Part survey (2005/06):

- 70.1% of respondents agreed or strongly agreed that they were interested in the history of the place where they lived and 13.6% disagreed or strongly disagreed; and
- 91.6% of respondents agreed or strongly agreed that when trying to improve local places, it's worth saving their historic features and 2.5% disagreed or strongly disagreed.

The Government has responded to these findings and seeks to tackle the barriers to participation among certain groups, thereby maximizing opportunities for inclusion and involvement. The recently published White Paper states:

“Levels of public participation in the historic environment are high, and are rising. Whether through visiting, volunteering, or studying, substantial numbers of people choose to access or care for heritage in their free time. While participation rates are lower amongst people from ethnic minorities, with disabilities or from lower socio-economic groups, levels of engagement are good compared to other parts of the cultural sector, and improving them further remains a top priority for Government.”

Development of the Concept Area offers opportunities to address Government policy on public participation, which might positively influence attitudes towards an ambitious program of development that might be outlined for the Concept Area. Furthermore facilitating access to the historic environment might help establish community identity and cohesion, as well as promoting the benefits of a development location with access, albeit constrained, to a high quality historic environment.

6.3.8 Sustainability and the Historic Environment

The historic environment is not static, it has a dynamic and positive contribution to make to society. It has continually adapted to meet changing needs over a very long period of time, whilst underlying concepts of what is



important also develop and change. Careful and active management can ensure the historic environment is sustained and delivers benefits to individuals, communities and visitors.

St. Albans City and District Council Cultural Strategy recognizes that the historic environment makes an important contribution to the wider social and cultural sphere. It identifies the Verulamium Museum, Verulamium Park and other historic open spaces as important means of delivering cultural services and developing economic activity, especially through tourism. It has invested, through partnership, in developing and extending access to the historic environment, including provision for public participation in archaeological field investigations, an archaeological guided tour of Verulamium Park accessed via mobile phone and events at Old Gorhambury to encourage people to take a closer look at one of the District's less visited monuments.

The Council proposes to achieve further cultural benefits through the following aims and objectives, which are likely to be relevant to the Concept Area:

1. To enable all residents and visitors to have access to a range of cultural opportunities, including:
 - improving opportunities for local communities to participate in cultural activities; and
 - providing new quality cultural experiences for everyone in the community to try.
2. To maximise the contribution culture makes to the health, wellbeing and safety of everyone, including:
 - improving partnership working between the public, private and voluntary sectors; and
 - stimulating lifelong participation in cultural activities.
3. To develop a sustainable cultural economy that contributes to the prosperity of the district, including:
 - working towards attracting inward investment into the district through cultural initiatives; and
 - encouraging business involvement in the development of cultural provision.
4. To protect and enhance our environment and heritage, including:
 - seeking to ensure the delivery of cultural facilities and services is undertaken in a sustainable and environmentally sensitive manner;
 - encouraging and promoting high quality and appropriate design in all new developments; and
 - promoting environmental awareness and responsibility to the local community.

The Council's Cultural Strategy also informs An Archaeological Strategy for the Historic Centre of St. Albans (Draft) 2005 and the St. Albans Museum Service Development Plan.



The challenge in managing the historic environment is to identify key characteristics and to establish the parameters within which change can continue so that it enhances rather than diminishes historic character. The Cultural Strategy and supporting strategies and plans provides a useful framework in which to consider ways of realizing beneficial changes that might emerge as a result of development in the Concept Area.

A Historic Environment Cultural Framework for the Concept Area and adjoining areas could be achieved by further identifying heritage values, relating these to the fabric of the local historic environment and making these considerations an integral mechanism to the development design and delivery processes. This would provide an opportunity to maximize commercial opportunities within the Concept Area, contributing to local tourism and public participation objectives, whilst also applying recent guidance on the conservation and stewardship of the historic environment. There is, therefore, an attractive prospect of presenting the Concept Area, as a development-led exemplar in the application of values-based historic environment conservation practice in the UK, which could be delivered, at least in part, in partnership with existing Local Authority cultural strategies.

6.4 Specific Opportunities

The following opportunities can be identified from this review:

- Utilise the existing roads and rights of way to improve permeability and reduce the severance effect of the M1 motorway on the historic landscape, including:
 - The historic Manor of Westwick, which is not only separated by the motorway, but is now divided between Dacorum Borough Council and St. Albans City and District Council. Developing links would allow the historic Manor to be read as a more coherent entity allowing relationships between different elements to be better understood. It also offers opportunity for coordination across District boundaries to the mutual benefit of residents within both administrative areas.
 - Enhance access for urban communities within and adjoining the Concept Area to the high quality rural historic landscape of the wider Gorhambury Estate, and establish further connections to Roman Verulamium and the medieval town and cathedral of St. Albans.
- Some of the existing public highway/rights of way are themselves likely to be residual elements of early historic landscapes or, as in the case of the Nicky Line, based on former transport links. These offer many opportunities to create themed recreational routes in the area east of the M1 motorway and within an expanded Hemel Hempstead. These might focus on post-War urban design/architecture, major Iron Age remains (Aubrey Camp and Prae Wood), Roman monuments (Wood Lane End Roman temple, Gorhambury Villa and Verulamium) or explore the medieval and later manor estate, with Old Gorhambury House and the Palladian Gorhambury mansion as central features.
- Respond positively to the residual elements of the medieval settlement and field patterns around Westwick Row, to establish both development diversity (with emphasis on density, scale and materials, but not necessarily constrained to vernacular styles) and ensure this sensitive area is developed in a sympathetic manner that respects the fragile historic character and protected historic buildings.



- Establish an archaeological research framework for the Concept Area, to ensure any investigations undertaken in response to future development activity are properly co-ordinated and advances understanding of the historic environment. Whilst the generation of knowledge is a justifiable end in itself, this does offer additional benefits. By creating a sense of greater value, it may be possible to encourage people to care for and enjoy the historic environment, encouraging a desire to gain yet further understanding. In this sense future archaeological research can generate a self-perpetuating dynamic that encourages wider involvement in and stewardship of the historic environment.
- Engage the public in the preparation of an Interpretation Plan, as a means of further exploring important values and as an opportunity to establish partnership projects involving both St. Albans and Dacorum Councils. It will be possible to develop interpretative narratives featuring historic literary associations that have mass popular appeal. A particularly strong local connection with the story of the Catuvellani and the Roman conquest of Britain exists and already features in existing provisions through the Verulamium Museum, which could be expanded and enhanced through the development of links between the Museum and relevant locations in the landscape.

6.5 Potential Constraints

National

There are a number of possible constraints to development within the site.

- There are eight listed buildings along Westwick Row, all of which are farmhouses, cottages or barns. Possibly the most important of these may be Westwick Cottage, which has been identified as being built around a twelfth century aisled hall. In dealing with any application for development within the vicinity of a listed building the planning authority is required to consider the impact on the setting of the listed building. Westwick Row retains a rural character within the immediate vicinity of the listed buildings and additional development along Westwick Row would need to respect this setting. However, development can use existing screening in the forms of the hedgerows and contours to retain the existing setting. From a cultural heritage perspective the development potential of this immediate area needs to consider these factors.
- In addition to the known archaeological sites, it would be prudent to anticipate further archaeological remains, which are, as yet, unknown. Until these are identified it would be premature to dismiss the possibility that there may be further sites of national or regional importance. It would be sensible, therefore, to anticipate the need for a phased archaeological evaluation programme, to be co-ordinated with development design stages, which could form part of an archaeological research strategy and would ensure appropriate design treatment if important features are to be preserved.

6.6 Conclusions

This chapter has shown that there are no Scheduled Ancient Monuments, Conservation Areas, Registered Historic Parks and Gardens or Registered Historic Battlefields in the Concept Area, although there are a number of Grade II Listed Buildings. Development in the Concept area can be achieved without significant adverse effects on the



immediate historic environment and it provides an opportunity to generate public participation in the wider historic environment and to ensure that the historic environment is managed sustainably.

The next stage of work might involve the preparation of a Historic Environment Cultural Framework for the Gorhambury Concept Area, in consultation with Local Authorities, English Heritage and other stakeholders. The Framework might comprise a number of sections including:

- Archaeological Research Strategy (to include a provisional Archaeological Evaluation Program);
- Historic Environment Interpretation Plan;
- Historic Environment Access Plan; and
- Historic Environment Guidance for Masterplanning and Development Design at Gorhambury Concept Area.

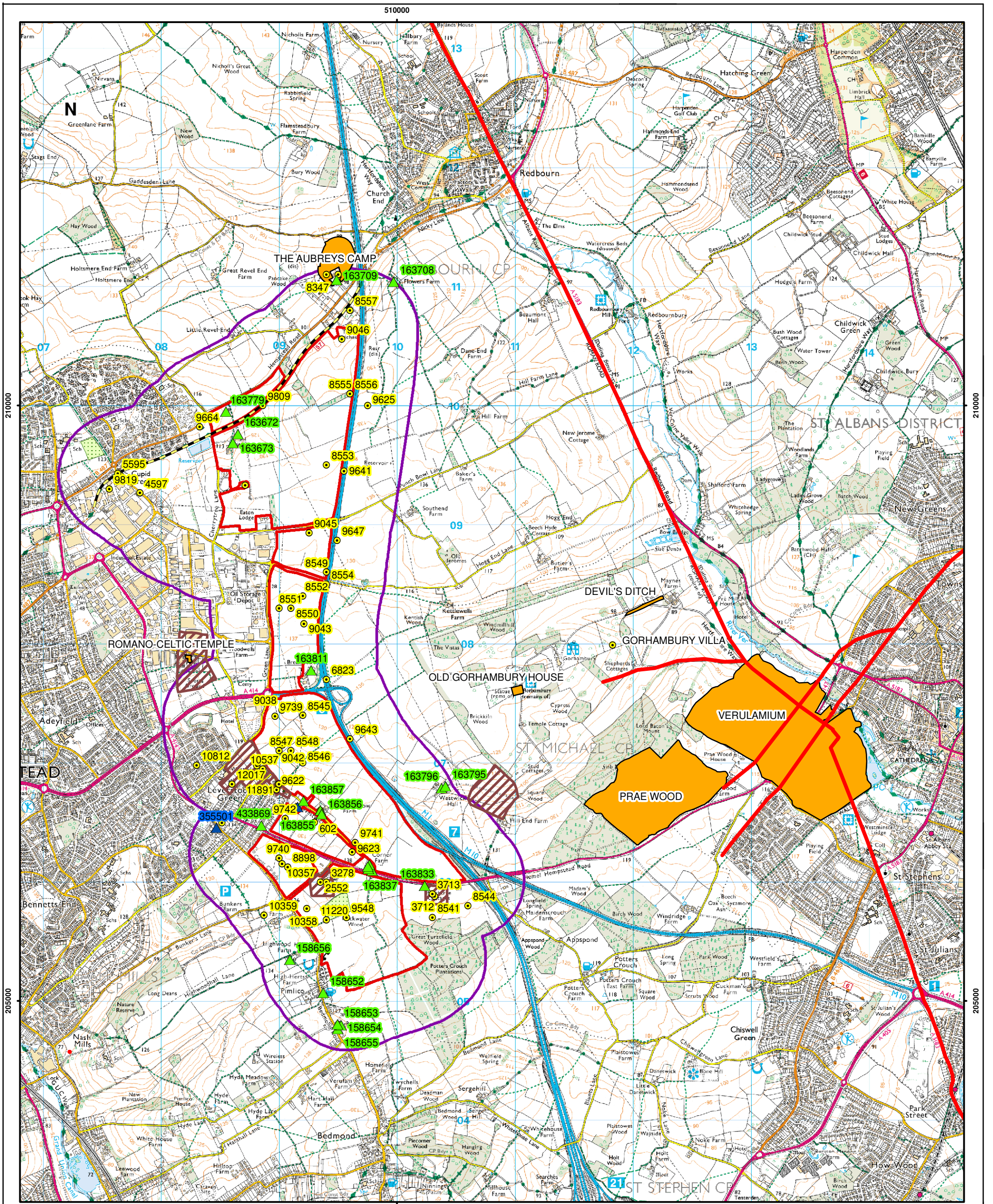
This Framework would assist in promoting the Gorhambury Concept area development in the context of future planning policy and would provide clear parameters that could be considered in a future Masterplan and ES.









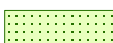




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Key:				The Crown Estate Gorhambury LDF Submission Figure B6.1 Key Cultural Heritage Features	
	Main Site Area		Listed Building - Grade II		
	500 m Study Area		Listed Buildings - Grade II*		
	Areas of Archaeological Interest		SMR Data Points		
	Scheduled Monuments		Known Roman Roads		
	Ancient Woodland		Nicky Line		



Scale: 1:30,000 @ A3

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7. Ecology

7.1 Introduction

This section of the report sets out a review of biodiversity considerations which are relevant to the Gorhambury Estate (the Estate). This is focussed upon the area to the west of the M1 motorway (Estate-west), as this area is where development is proposed. However, the remainder of the Gorhambury Estate to the east of the motorway is also considered (Estate-east), as this area may provide opportunities for habitat enhancement or creation.

7.2 Methodology

This report is based on a previous report produced by Entec in 2001 and updated in 2005 (Entec 2005). The findings of the 2005 report have been verified using the following methods.

- Desk study: Information on statutory designated sites and ancient woodland within 2km of the Estate was obtained from www.magic.gov.uk. Information on non-statutory designated sites (Wildlife Sites) and records of protected species and veteran trees within 2km of the Estate were obtained from Hertfordshire Biological Records Centre (HBRC);
- Map and aerial photograph interpretation: Ordnance Survey maps (pathfinders 1095 (dated 1990) and 1119 (dated 1992)) and online aerial photography (www.maps.live.com, date unknown) were used to record the general habitat types present within the Estate (arable fields, hedgerows, woodland, trees), and identify habitats and features which may be of nature conservation value; and
- Field survey: The Estate-west was visited on 24 May 2007 by Charlotte Webbon, an Entec ecologist, to verify the results of the aerial photograph interpretation and gather additional information on habitats and features identified as potentially being of nature conservation value using the methods described above.

Ecological data for the Estate-east is based predominantly on the results of the desk study and aerial photograph interpretation.

The results of the desk study, and habitats and features found within the Estate are summarised in Figure B7.1, and are described with reference to numbered sites and features of nature conservation value shown in Figure B7.1. The Estate-east and Estate-west are considered separately.

7.3 Gorhambury Estate West of the M1 Motorway

It should be noted that whilst development is proposed to the west of the M1, not all of the area to the west as considered in the section below is proposed for development.



7.3.1 Statutory and Non-Statutory Nature Conservation Designations

There are no statutory sites of nature conservation value within the Estate-west. There are three non-statutory Wildlife Sites (WS) within this area, and one outside, but adjacent to it. These sites are described below.

Blackwater Wood WS (HBRC record 66/007; Figure B7.1, 1)

This WS lies in the south of the Estate-west. It comprises 3.3ha of semi-natural ancient woodland, consisting of standard oak (*Quercus sp.*), ash (*Fraxinus excelsior*), beech (*Fagus sylvatica*) hornbeam (*Carpinus betulus*) and cherry (*Prunus avium*) and hazel (*Corylus avellana*) coppice. The ground flora is dominated by either bluebell (*Hyacinthoides non-scriptus*) or bracken (*Pteridium aquilinum*) and bramble (*Rubus fruticosus* agg.). It also includes several species which could be considered indicative of ancient woodland. A mature hedge of hawthorn (*Crataegus monogyna*), elder (*Sambucus nigra*), holly (*Ilex aquifolium*) and hazel surrounds the site. The site is known to be visited by badgers (*Meles meles*), evidence of which was seen on the site visit. The woodland is managed by The Crown Estate to enable public access whilst maintaining a traditional form of management to enhance the biodiversity of the site. The site is also designated as ancient woodland.

Westwick Row Wood WS (Figure B7.1, 2)

This is a small area of woodland which is described in HBRC's records as "ancient semi-natural woodland supporting a canopy of ash, field maple (*Acer campestre*), oak, hornbeam and cherry, with an understorey of hazel. There are several large field maple coppices around the eastern boundary. The ground flora includes brambles, woodland grass species, abundant bluebell, and occasional wood sorrel (*Oxalis acetosella*) and three-veined sandwort (*Moehringia trinervia*)." The woodland is surrounded by a hedge with field maple, elder, holly, hawthorn and hazel. Sycamore (*Acer pseudoplatanus*) was also recorded within the wood during the 2007 site visit.

Nicky Line/Way Dismantled Railway WS (Figure B7.1, 3)

This is a linear woodland feature along the embankment of the disused railway between Redbourn and Hemel Hempstead, which is now used as a footpath and cycleway. Part of the Nicky Way WS crosses the northern edge of the Estate-west. Areas of rough grassland, tall herb vegetation, hedgerow and scrub are also present along the track. HBRC records also note that the hedgerow contains woodland indicator species. The site is an important linear feature used as feeding/commuting habitat for pipistrelle bats (*Pipistrellus sp.*).

The woodland areas include hawthorn, ash, oak, elder, dogwood (*Cornus sanguinea*), blackthorn (*Prunus spinosa*) with a ground flora that includes false-brome (*Brachypodium sylvaticum*), dog's mercury (*Mercurialis perennis*) and herb bennet (*Geum urbanum*).

Potters Crouch Plantation WS (Figure B7.1, 4)

This WS lies outside, but adjacent to the southern boundary of the Estate-west. This is described by HBRC as a "Plantation with ancient semi-natural woodland remnants... mainly to the north and around the margins where there are old hedge banks of coppiced hornbeam. A total of 12 ancient woodland indicator species have been recorded with abundant bluebells around the woodland edge." Pipistrelle bats have been recorded foraging in the wood, and there is a probable noctule (*Nyctalus noctula*) roost in the south of the wood. The majority of the wood consists of a conifer plantation, mainly comprising of larch (*Larix sp.*) and pine (*Pinus sp.*).



7.3.2 Habitats

The majority of the Estate-west comprises arable fields of negligible ecological value. However, there are some habitats and features of ecological interest within the area, in addition to those which have been designated as Wildlife Sites. These are described below.

Woodland

There are several small copses and areas of woodland, mainly in the north and south of the Estate-west. These mainly comprise standard oak and ash with hazel coppice, and are surrounded by hedges of hawthorn, blackthorn, hazel and elder (Figure B7.1, 5, 6, 8, and 9). There is also a small area of plantation woodland in the south of the Estate-west adjacent to the Hemel Hempstead Road (Figure B7.1, 7). It mainly comprises pine with some aspen and a ground flora of bluebells. A strip of semi-natural deciduous woodland lies adjacent to the road, including oak and hazel. An area of Japanese knotweed was recorded on the eastern edge of the wood.

In addition to the woodlands noted above, there are several small copses or wooded areas, mainly within or adjacent to private gardens.

Hedges

The majority of field boundaries within the Estate-west are provided by hedgerows. Those to the south of the A414 road are of most nature conservation value, forming a well-connected network of species-rich hedgerows and tree lines, with hawthorn, blackthorn, holly, hazel, elm (*Ulmus sp.*), elder and field maple being abundant. There are numerous hedgerow trees, mainly oak and ash. Honeysuckle (*Lonicera periclymenum*) and traveller's joy (*Clematis vitalba*) also occur. These hedges are considered to provide valuable corridors for wildlife to move through the landscape.

There are few hedgerows within the central area of the Estate-west, between the A414 and Punch Bowl Lane, with those remaining comprising short, relatively species-poor lengths.

In the north of the Estate-west, there are several species-rich hedgerows and tree lines, although these are less well connected than those in the south of the site. Species present are similar to those recorded in the southern hedgerows.

At the time of the field survey, hedgerows alongside the M1 to the north of the A414 had been removed as part of the M1 widening works. Those remaining to the south were tall, unmanaged and dominated by hawthorn.

Veteran trees

HBRC provided records of three veteran trees along a hedgerow in the south of the Estate-west.

Grassland

There are several small areas of improved grassland within the Estate-west, most of which are heavily grazed by horses, with areas of bare ground. Most of these are located within the south of the Estate-west.



Water bodies

There are three small ponds within the Estate-west, to the south of the A414. One of these (Figure B7.1, B11) is located adjacent to the A414 within an area of disturbed ground associated with the nearby M1 widening scheme. It appears to have been recently dredged, with bare earth banks and little aquatic or marginal vegetation with the exception of reedmace (*Typha latifolia*). Another pond lies within an areas of scrub to the south of the Hemel Hempstead Road (Figure B7.1, B12). Approximately half of the pond is heavily shaded by willows (*Salix sp.*), with abundant emergent vegetation in the remainder. There is also a small pond adjacent to a layby to the north of the Hemel Hempstead Road (Figure B7.1, B13). It is shaded with steep banks and no marginal or aquatic vegetation.

7.3.3 **Fauna**

Badger

HBRC provided 47 records of badger from within 2km of the Estate, of which around 18 were from within or adjacent to the Estate-west. Most of these records were collected by Hertfordshire Badger Group. In particular, there were several records from along the Nicky Way Dismantled Railway WS and in Blackwater Wood WS.

Evidence of badgers (paths and foraging signs) was seen within Blackwater Wood WS during the 2007 site visit, and a badger sett was recorded along the part of Nicky Way Dismantled Railway WS within the Estate-west. The woodland copses and hedgerows within the Estate provide potential sett building habitat, as do the wooded embankments of the M1 adjacent to the Estate-west.

Bats

HBRC provided 68 bat records collected by Hertfordshire Bat Group, although these relate to only 32 sites within 2km of the Estate, five of which are located within or adjacent to the Estate-west. No information was given on the species recorded. The HBRC WS citation states that pipistrelles are known to use the Nicky Way Dismantled Railway WS as a corridor for foraging/commuting. It is also possible that other bat species use the line in a similar way.

Noctule bats are known to roost within Potterscrouch Plantation WS, which lies just outside the Estate-west. Foraging activity by pipistrelle has also been noted within the area.

It is likely that some of the mature and veteran trees within the Estate-west have the potential to provide bat roosts. Some of the buildings within the Estate-west may also support bats. The woodlands and hedgerows within the Estate-west provide potential foraging and commuting habitat for bats.

Hazel Dormice

The National Biodiversity Database (www.searchnbn.net) holds records of hazel dormice (*Muscardinus avellanarius*) occurring at Flamsteadbury (TL085125) approximately 3km to the north of the Estate-west. The network of species-rich hedgerows and woodland with hazel coppice within the Estate-west provide potential habitat for this species.



Water Voles

HBRC provided five records of water voles (*Arvicola terrestris*) within 2km of the Estate, none of which were from the Estate-west. There is no suitable habitat for water voles within this part of the Estate.

Reptiles

HBRC provided one record of grass snake (*Natrix natrix*) occurring approximately 1.5km to the east of the Estate-east. The hedgerows and field margins within the Estate-west provide potential habitat for reptiles, particularly slow worm.

Amphibians

HBRC provided one record of great crested newt (*Triturus cristatus*) within 2km of the Estate, at Redbournbury water cress beds (TL 109121). The ponds within the Estate-west provide potential, although sub-optimal habitat for great crested newt, due to a general lack of marginal vegetation and surrounding terrestrial habitat.

Birds

The arable farmland comprising the majority of the Estate provides potential habitat for farmland birds, including declining species such as skylark (*Alauda arvensis*), tree sparrow (*Passer montanus*) and grey partridge (*Perdix perdix*) which are included in the UK BAP and HBAP and the JNCC conservation status listings (Gregory et al., 2002). Skylark were recorded throughout the Estate-west during the 2007 site visit.

7.4 Area to the East of the M1 Motorway

Whilst there are no proposals for development to the east of the M1 motorway, much of this land is in the ownership of The Crown Estate and this section considers if there are any opportunities for possible mitigation/improvements to the east of the motorway.

7.4.1 Statutory and Non-Statutory Nature Conservation Designations

There are no statutory sites of nature conservation within the Estate-east. There are four non-statutory Wildlife Sites (WS) within this area, and a further three outside, but adjacent to it. These all lie to the south and east of the Estate-east.

Kettlewell's Farm WS (Figure B7.1, 14).

This site is designated for its buildings and environs which are important for protected species. Which species is not specified, however, HBRC provided records of a bat roost at this location.

Hedge's Farm West Woodland WS (Figure B7.1, 15)

This site lies across the eastern boundary of the Estate-east. It is a remnant area of ancient hornbeam coppice woodland, with large oak standards and some sycamore. The woodland ground flora is dominated by dog's mercury, but includes some ancient woodland indicator species.



Redbournbury Meadows WS (Figure B7.1, 16)

Redbournbury Meadows are situated along the valley of the River Ver in the east of the Estate-east. They consist of a mosaic of 45ha of marsh, grasslands and scrub, which border the River and its associated streams and ditches. Herb rich marshy grasslands are scattered throughout the site and support plants such as ragged robin (*Lychnis flos-cuculi*), marsh marigold (*Caltha palustris*), fen bedstraw (*Galium uliginosum*), marsh ragwort (*Senecio aquaticus*), water horsetail (*Equisetum fluviatile*), cuckooflower (*Cardamine pratensis*) and bog stichwort (*Stellaria alsine*). The aquatic and bankside vegetation is typical of chalk streams supporting watercress (*Rorippa nasturtium - aquaticum*) and a range of other species. It is the only site in Hertfordshire for the aquatic liverwort *Ricciocarpus natans*, which is found in the ditches. The site is also known to be of considerable importance for wintering and breeding birds.

As one of the “finest sizeable stretches of relatively undisturbed river valley in Hertfordshire” (HBRC record 55/001), Redbournbury Meadows have been the focus of a substantial restoration programme carried out by The Crown Estate with assistance from Hertfordshire County Council Countryside Management Service, the Environment Agency and local organisations. The programme aims to preserve the flora and fauna of the River Ver by the use of sensitive rural management.

Ver Valley by Chequer Lane WS (Figure B7.1, 17)

This is an area of disused watercress beds and an associated willow plantation adjacent to the River Ver.

Windmillhill Wood and adjoining woodland WS (Figure B7.1, 18).

This lies outside but adjacent to the southern boundary of the Estate-east. This is a landscape avenue and woodland incorporating ancient woodland fragments.

Bow Marsh Bridge and Plantation WS (Figure B7.1, 19)

This site lies adjacent to the south-west boundary of the Estate-east. This site consists of an area of species-rich fen/swamp on former fish ponds with a poplar plantation.

Shafford Farm WS (Figure B7.1, 20)

This site also lies adjacent to the south-west corner of the Estate-east. It is designated for its buildings and surrounding habitat, which are important for protected species. Which species is not specified, however, HBRC provided records of a bat roost at this location.

7.4.2 Habitats

The majority of the area to the east of the M1 consists of arable farm land, of negligible nature conservation value. In addition to the designated sites described above, the main features of nature conservation value are woodland and hedgerows, as described in the following paragraphs.

Woodland

There are a few small fragments of woodland within the Estate-east. These are largely on the periphery, or form the boundary of the Gorhambury Estate.



Hedges

The majority of field boundaries within the Estate-east are provided by hedgerows. Some hedgerows within the area were surveyed for the South Hertfordshire Hedge and Verge Survey (1986), reported in Entec (2005). The hedgerows surveyed were generally mature and comprised a mixture of field maple, hazel, hawthorn, blackthorn, elder and ash. The Crown Estate has replanted some six miles of new mixed species hedgerows since 1992, improving the continuity and diversity of hedgerows on the Estate.

7.4.3 Fauna

Badger

HBRC provided seven badger records for the area to the east of the M1, the majority of which were around Redbournbury and the River Ver. Records were also provided from Windmillhill Wood, adjacent to the southern boundary of the Estate-east.

Bats

HBRC provided bat records from four sites within the Estate-east, including Kettlewell's Farm, Shafford Farm, and around Redbournbury. The Entec (2005) report notes that the roosts of five species of bat have been recorded, either within the Estate-east or within grid squares which partly overlap with the Estate-east (Table B7.1).

Table B7.1 Locations of known bat roosts to the east of the M1

Location	NGR	Pipistrelle	Brown long-eared (<i>Plecotus auritus</i>)	Natterer's (<i>Myotis nattereri</i>)	Noctule	Serotine (<i>Eptesicus serotinus</i>)
Redbourn Church	TL100116	√	√	√		√
Kettlewell's Farm	TL104084	√	√			√
Shafford Farm area	TL1209	√	√	√		√
Westwick Hall area	TL1006		√	√		
Gorhambury Icehouse woodland area	TL1108			√		

√ = roost site

The following features are identified in Entec (2005) as likely to be of 'high importance' for bats:

- hedgerows from Kettlewell's Farm at TL102083 leading to the Kentish Wood area;
- hedgerow at TL105083 joining Windmillhill woodland avenue; and
- hedgerow and tree line extending from Kentish Wood area (TL102080) to the River Ver in the east (TL124088).



Water Voles

HBRC provided records of water vole (*Arvicola terrestris*) along the River Ver (at TL119108 and TL123103) from 1993.

7.5 Opportunities and Constraints

The remainder of this section identifies habitats and species that should be considered as constraints to any future development. It also explores opportunities for enhancing the Estate's value for biodiversity.

In identifying constraints, we have focused on the Estate-west, which is the area where development is being proposed. The identification of opportunities for habitat enhancement and creation, and to benefit individual species has also focused on the Estate-west. However, it is possible that, subject to the agreement of tenant farmers, there may be scope to carry out enhancement and habitat creation work within the Estate-east. Such opportunities could, for example, provide compensation for habitat loss associated with any new development on the Estate-west. In considering opportunities on the Estate-east, we have excluded the River Ver and adjacent grasslands, much of which are already subject to conservation management.

7.5.1 Woodland

Constraints

The main areas of woodland are Blackwater Wood and Westwick Row Wood, which, along with several other smaller copses and woods, lie within the southern part of the Estate-west. Both Blackwater Wood and Westwick Row Wood are classified as 'ancient woodland' and are WSs. Nicky Way Dismantled Railway provides a linear woodland habitat and is also designated as a WS. These areas of woodland should be retained. Other areas of semi-natural broad-leaved woodland also provide valuable wildlife habitat and should be retained within the proposed development.

Opportunities

It is important that the retained areas of woodland are managed in such a way that their existing biodiversity value is maintained and enhanced. In Blackwater Wood, this should include the continuation of coppicing.

The creation of new woodland areas would contribute towards the target in the HBAP to create 1,200ha of new woodland. It could also contribute to the sustainability of any new development by providing a carbon sink function. New woodland will be particularly valuable where it extends or links existing woodland areas, whether these are located within or outside the Estate. For example, there may be scope for creating new woodland adjacent to the Nicky Way Dismantled Railway. A connection could also be created with isolated copses, such as that in the south of the Estate-west (Figure 7.1, 5). There may be an opportunity to improve the links between Blackwater Wood and Great Furzefield Wood/Potters Crouch Plantation, which lie to the south of the Estate.

Where possible, natural regeneration should be employed as a means of establishing new woodland, especially where ancient woodlands are being extended. However, this may not always be a practical option, especially in



areas of high public access on the urban fringe, due to issues associated with vandalism and trespass. Natural regeneration is usually a slow process and away from ancient woodlands, it will often be better to create woodlands by planting. Planting mixtures should reflect the species composition of existing woodlands within this part of Hertfordshire, and planting stock should be of local provenance.

New woodland could provide a valuable focus for informal recreation, with access to the woodland provided from existing and any new development. In planning public access provision, consideration will need to be given to minimising adverse effects on areas of ancient woodland and on disturbance-sensitive species.

7.5.2 Hedgerows

Constraints

Additional survey work may be required to provide the information that is needed to make a detailed assessment of the value of the hedges on the Estate. However, based on the data that are currently available, the best hedges appear to be those in the southern part of Estate-west. The hedges here form a well connected network that links a number of copses. These hedgerows, some of which are likely to merit protection under The Hedgerow Regulations 1997, should (subject to confirmation from further detailed survey work) be viewed as a constraint to development. No development is proposed for this southern part of Estate-west.

Hedges can be retained within development, although it is important to recognise that this inevitably leads to the physical continuity of hedgerows being affected (e.g. where an access road is constructed across the line of a hedge). This results in the reduction in the value of the interlinked habitat network, of which the hedge forms a part. Furthermore, once hedges are incorporated within a development, they inevitably lose some of their value, for example in relation to their use as nest sites by farmland birds. They also lose their agricultural function and it can then be difficult to perpetuate the type of management that is needed to retain their nature conservation value.

Based on the available data, the hedgerows in the central and northern areas of the Estate-west are likely to present less of a constraint to development, although they still have some nature conservation value and as such, every effort should be made to retain them within any future development proposal.

Opportunities

Hedges, both east and west of the motorway, could be managed to improve their value for biodiversity. With regard to species-rich hedges, this improvement in management would contribute to the hedgerow management target in the UK BAP. Appropriate improvements include gapping-up hedges, establishing hedgerow trees and reducing the frequency of hedge cutting. Such management could be offered as an environmental benefit associated with any new development, and could also be implemented within the Estate-east.

The planting of new hedgerows could play a valuable role in linking existing hedgerows, thereby increasing the connectivity of the hedgerow network. Similarly new hedgerows could play an important role in connecting woodlands. These considerations should be taken on board when identifying locations for compensatory planting to mitigate the loss of hedgerows that results from new development. The length of compensatory hedge planting



should exceed that lost, on the basis that the maturity of the hedgerows lost cannot be replaced for many years. New hedgerows should also be incorporated within any development, for example alongside any new public footpaths that are created as part of future development.

The species used in hedgerow planting mixes should reflect the species composition of existing hedgerows. Plants should be of local provenance.

7.5.3 Arable Land

Constraints

The arable farmland which makes up the majority of the Estate is of negligible nature conservation value, and as such does not present a constraint to development. However, it does provide habitat for farmland bird species, the populations of many of which are in serious decline throughout Britain. Potential constraints relating to this are discussed in section 7.5.11.

Opportunities

Opportunities exist for improving the value of some areas of arable land through measures such as the creation of wildlife-rich field margins. These may include un-cropped wildlife strips between the field boundary and the crop, or cropped conservation headlands that are managed with reduced pesticide inputs. These types of cereal field margins are a priority habitat within the UK BAP. The creation of such field margins at Gorhambury would therefore contribute to the national target for this habitat type. Field margins are a standard part of the Environmental Stewardship scheme. Areas of land within the Estate-east are included in this scheme, leaving substantial areas of conservation grassland margins, around specific arable fields.

7.5.4 Grassland

Constraints

There are very few areas of grassland within the Estate, and those which are present are of relatively poor nature conservation value and do not represent a constraint to development.

Opportunities

Existing areas of grassland could be managed to enhance their nature conservation value.

Where possible, new areas of species-rich grassland should be created. These could contribute to the target in the UK BAP for lowland meadows and in the HBAP for the creation of new areas of neutral grassland. Such areas could also serve a valuable function as public open space. One option would be to manage one or more areas as 'urban commons'.



7.5.5 Water Bodies

Constraints

The three existing water bodies should be retained in any proposed development.

Opportunities

There are relatively few water bodies within the estate, and creation of new ponds would enhance biodiversity and contribute to the HBAP target of increasing the pond resource by 1%. New water bodies could include both dedicated wildlife ponds and appropriately designed balancing ponds forming part of a Sustainable Drainage System. Any new water bodies should be restricted to relatively small ponds; larger water bodies would be out of character with the local landscape and existing habitats.

The existing water bodies would benefit from improved management, to reduce shading and increase marginal and aquatic vegetation.

7.5.6 Badgers

Constraints

Many of the woods within the southern part of the Estate-west, including Blackwater Wood and Westwick Row Woodland, are inhabited by badgers (the precise location of active badger setts is however, not known). Badger setts are also present along Nicky Way Dismantled Railway. Other areas of woodland and hedgerows provide suitable sett-building habitat for badgers.

Badgers and their setts are legally protected under the Protection of Badgers Act 1992. Work that disturbs badgers whilst occupying a sett is illegal without a licence. Badgers could be disturbed by work near a sett even if there is no direct interference or damage to the sett. Natural England guidelines (English Nature 2002) state that the following actions are likely to cause disturbance and thus require a licence:

- use of heavy machinery (generally tracked vehicles) within 30m of any entrance in an active sett;
- use of lighter machinery (generally wheeled vehicles) for any digging operation within 20m; and
- light work such as hand digging or scrub clearance within 10m.

As a starting point, badger setts should be treated as a constraint to development. This means that the sett and land within 30m of the sett should remain undeveloped. Furthermore, there is a need to retain corridors for badger movement and to ensure that sufficient foraging habitat is retained to allow existing badger social groups to survive. It is sometimes feasible to meet these requirements in areas that adjoin new developments.

A much less satisfactory alternative is to close badger setts under licence from English Nature. This is most likely to be permissible where the setts are outliers from the main sett and their loss is unlikely to have any significant effect on the social group of badgers.



It is recommended that a detailed survey for badgers is undertaken of any proposed development site to locate any badger setts within the site and the surrounding area.

Opportunities

Any new woodland, scrub, grassland and hedgerows created would provide additional habitat for badgers.

7.5.7 Hazel dormice

Constraints

The network of species-rich hedgerows and woodland with hazel coppice within the Estate provide potential habitat for hazel dormice. Hazel dormice are protected under Section 9 of the Wildlife and Countryside Act 1981 (as amended), and are also protected under the Conservation (Natural Habitats &c.) Regulations 1994 (known as the Habitats Regulations).

In practice, this means that any works which would affect hazel dormouse habitat (hedgerows, woodland, scrub, bramble, trees) must be done under licence from Natural England. Where a licence is granted, it is likely that mitigation, and/or compensation will be required in the form of the provision of new habitat, and/or capture and translocation of affected animals.

A dormouse survey should be undertaken of the site of any proposed development prior to submission of a planning application to determine whether this species is present.

Opportunities

Even if hazel dormice are not found within the proposed development area, the suitability of habitat for this species within the Estate could be enhanced by improving connections between woodlands. This could be achieved through the management of existing hedgerows, and the creation of new ones. These should connect to areas of suitable habitat outside the Estate where possible. New woodland and scrub planting would also provide potential hazel dormouse habitat, and would be particularly beneficial if provided adjacent to existing areas of habitat.

7.5.8 Bats

Constraints

All British bat species are afforded protection under Section 9 of the Wildlife and Countryside Act 1981 (as amended). Bats and their roosts are also protected under the Habitats Regulations.

Some of the buildings and mature trees within the area may provide potential roost sites for bats. Any buildings or trees to be removed or altered as a result of any development proposals should therefore be surveyed to determine whether they are used by roosting bats.

Wherever possible, such roosts should be protected, as should valuable foraging habitats in the vicinity of the roosts. Where development work is proposed that would affect a bat roost, there will be a need to obtain a license



to carry out the work from Natural England. Where a licence is granted, a requirement may well be imposed for the creation of roost sites to compensate for any losses.

The hedgerows and woodlands within the Estate-west provide potential foraging and commuting habitat. It is recommended that bat activity surveys be undertaken within any proposed development site and the surrounding area to determine any areas of particular importance for bats. Any such areas identified should be retained, and care taken to maintain their connections to other areas of suitable habitat.

Opportunities

The arable farmland forming the majority of the Estate provides relatively poor habitat for bats. As such there is potential for improving the availability of foraging habitat within the Estate by creating new areas of species-rich grassland, hedgerows, scrub and woodland areas. There is also the opportunity for providing potential roost sites within any proposed development through the creation of dedicated bat roosts or incorporation of features such as bat lofts, brick or tiles within proposed buildings.

7.5.9 Reptiles

Constraints

Species of reptile that might occur within the Estate (i.e. common lizard (*Lacerta vivipara*), slow worm (*Anguis fragilis*) and grass snake), are protected from killing and injury under the Wildlife and Countryside Act, 1981 (as amended).

Although there are no known records of reptiles occurring within the Estate, parts of the Estate contain suitable habitat to support populations of these species. It is recommended that any development sites should be surveyed for reptiles prior to works commencing. Should reptiles be found to occur, measures will be required to avoid the killing or injury of any reptiles. This may include exclusion of animals from the area and capture and translocation to areas of suitable habitat (either existing or newly created).

Opportunities

The arable farmland forming the majority of the Estate provides poor habitat for reptiles, and as such, there are opportunities for increasing habitat availability by the creation of rough grassland habitats. This could be achieved both by provision of open space within any proposed development, or the creation of buffer strips along arable field margins.

7.5.10 Great crested newts (GCN)

Constraints

The GCN is protected under the Wildlife and Countryside Act, 1981 (as amended) and the Habitats Regulations. Any development works affecting great crested newt habitat (both aquatic and terrestrial) would require a licence from Natural England. This would require provision of appropriate mitigation, the level of which would depend



upon the effects on the GCN population, but which may include creation of new breeding ponds, terrestrial habitat (grassland and scrub) and translocation of any animals present.

GCN occur within the vicinity of the Estate and it is possible that they breed in one or more of the ponds within the Estate or in ponds within 500m of the Estate (GCN will utilise terrestrial habitat within 500m of their breeding sites and therefore, could occur on the Estate where there are breeding ponds within 500m). Surveys should therefore be carried out to determine whether GCN are present in any ponds within 500m of any development area.

Opportunities

The ponds within the Estate-west are spaced fairly far apart and with little suitable terrestrial habitat between them. Additional habitat could be provided by creating new ponds within 500m of existing ponds, and providing areas of terrestrial habitat (rough grassland, hedgerows, scrub) linking ponds and other areas of terrestrial habitat. This would contribute to both UK BAP and HBAP targets for this species.

7.5.11 Breeding birds

Constraints

The arable farmland which makes up the majority of the Estate provides potential habitat for farmland bird species, the populations of many of which are in serious decline throughout Britain. As part of the UK BAP and HBAP, Species Action Plans (SAPs) have been prepared for those ‘priority species’ that are of greatest conservation concern, including skylark, tree sparrow and grey partridge. It is likely that some of these declining bird species occur on arable land at Gorhambury. It is recommended that surveys be undertaken for farmland birds to determine whether these species are present, and may be adversely affected by any proposed development. The survey results would inform any mitigation or compensation which may be required. This would be likely to take the form of measures to improve the value of areas of arable farmland retained elsewhere on the Estate to achieve a net increase in the populations of the affected species.

There is also the requirement to adhere to the relevant legislation relating to nesting birds. All wild birds, their nests and eggs are protected by the Wildlife and Countryside Act 1981 (as amended). It is normally recommended that the removal of vegetation that may contain nests occurs outside of the bird breeding season (i.e. avoiding March-July inclusive). Should it be necessary to remove nests within the bird nesting season, all vegetation should be checked for bird nests by an ecologist prior to its removal. If any active nests are present, it will be necessary to delay the removal of the vegetation concerned until after the young have fledged.

Opportunities

There is the opportunity to increase the diversity of habitats available to birds, and thus the range of bird species present within the Estate, by creating new areas of habitat, including species-rich grassland, scrub and water bodies. Opportunities also exist for improving the suitability of retained arable land for farmland bird species as discussed in section 1.5.3.



7.6 Conclusions

The arable farmland forming the majority of the Estate is of negligible nature conservation importance. The majority of constraints within the Estate-west area are provided by woodlands and hedgerows, particularly in the south of the Estate-west, although much of this area is not proposed for development. Some of these are designated as Wildlife Sites and/or ancient woodland. These should be retained within any proposed development. There are three ponds within the south of the Estate-west, which should also be retained. The Estate provides potential habitat for a number of protected species, including badgers, bats, hazel dormice, reptiles, and great crested newts, surveys for which should be undertaken prior to any development proposals. There are ample opportunities for any required mitigation or compensation and biodiversity enhancement within both any proposed development and the remainder of the Estate-east, subject to agreement of tenants of the latter.

7.7 References

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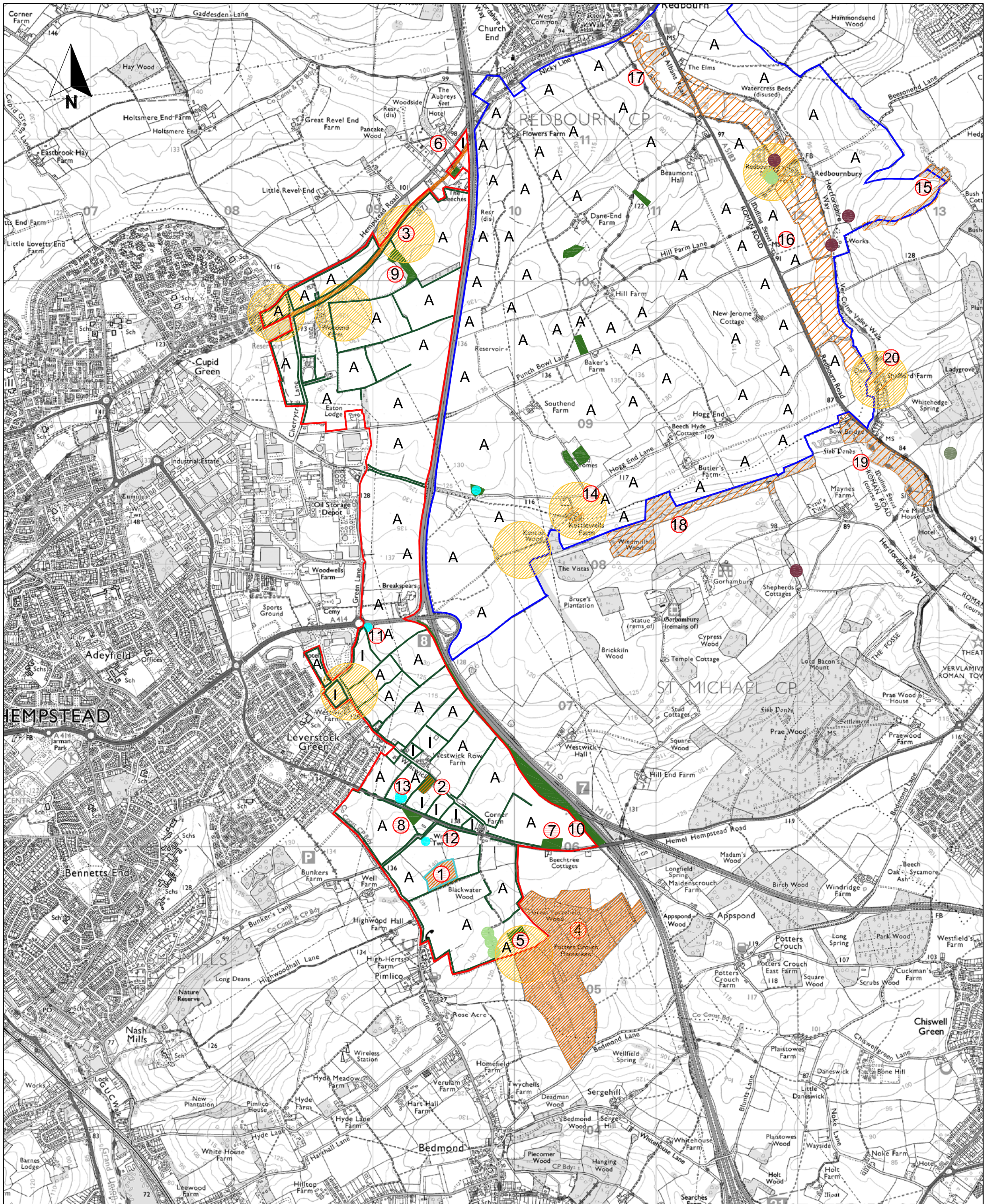
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- Key**
- Survey boundary
 - Other Crown Estate land
 - Wildlife sites*
 - Ancient woodland
 - Other woodland
 - Hedgerows (Survey area only)
 - Veteran tree records
 - Bat records - approximate location*
 - Water vole records*
 - Ponds
 - Grass snake records*
 - 1 Sites and features of nature conservation value
 - A Arable
 - I Improved grassland

The Crown Estate
Gorbamby LDF Submission

Figure B7.1
Ecological Survey and Constraints

*Data provided by Hertfordshire Biological Records Centre

0 km 1.5 km

Scale 1:25,000 @ A3

November 2007
05907-L46b.dwg bernb

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8. Infrastructure and Utilities

8.1 Introduction

The purpose of this chapter is to identify the location and extent of existing utility services in and around the vicinity of the proposed development site at Gorhambury as well as to identify the needs to serve the proposed development. In addition, the issues and constraints associated with each service are identified and potential indicative supply needs are set out.

For the purposes of this chapter, identifying services, land to the east of the motorway which is not proposed for development is included within the study area.

This chapter should be read alongside the content of Part C of this document on Climate Change and Sustainability which sets out a number of measures which seek to minimise water and energy use and have the potential to significantly reduce the water and energy requirements of the proposed development. At this stage these measures are put forward as possible options. Therefore they have not been taken into account in this chapter which sets out the likely energy and water requirements without these measures.

8.2 Planning Policy Context

The study also sets out to address the main sentiments identified under the following relevant planning policy statements.

Planning Policy Statement 12 ‘Local Development Frameworks’ states at paragraph B4:

“It has always been an important purpose of the planning system to co-ordinate new development with the infrastructure it demands. This, in particular, is a reason why the core strategy development plan document should look forward over a reasonable length of time. The bodies that are responsible for infrastructure provision can then plan on the basis of a clear picture of the future shape of the community.”

It continues at paragraph B8:

“Provision of completely new infrastructure in some cases, might take several years from identification of need to commissioning, so local authorities should discuss the possible phasing of development during their discussions with utility companies. Water companies have Environment Agency agreed 25 year plans for maintaining water supplies and it will be essential for local authorities to consult with the companies to help ensure that these plans take account of development proposals.”



8.3 Range of Services Investigated

The range of services investigated in or around the development together with the associated Statutory Undertaker responsible for installing and maintaining the service is shown in the Table B8.1.

Table B8.1 Statutory Undertakes Contacted

Service Type	Service Provider Contacted	Contact Details
Electricity	National Grid	National Grid House, Warwick Technology Park, Gallows Hill, Warwick, CV34 6DA
Electricity	EDF Energy	Networks Branch Connections, Project Gateway, Metropolitan House, Darkers Lane, Herts, EN6 1AG
Water (supply)	Three Valleys Water	Developer Services, London Road, Rickmansworth, Herts, WD3 1LB
Water (sewerage)	Thames Water	Developer Services, 1st Floor, Rose Kiln Court, Rose Kiln Lane, Reading, RG2 0HP
Gas	National Grid	National Grid House, Warwick Technology Park, Gallows Hill, Warwick, CV34 6DA
Telecommunications	British Telecommunications	CAMBRIDGE TRUNKS (SOUTH) (LNG-CB), 109-117 Long Road, Cambridge, Cambridgeshire, CB2 2HG
Oil/Fuel	BPA	Land and Wayleaves Department, BPA, 5-7 Alexandra Road, Hemel Hempstead, HP2 5BS
Oil/Fuel	Total Pipeline Operations	Hertfordshire Oil Storage Ltd, Buncefield Terminal, Green Lane, Hemel Hempstead, Hertfordshire, HP2 7HZ
Oil/Fuel	BT GEO Network	FGP Limited, Top Floor Suite, Charles House, 2 Royal Court, Tatton Street, Knutsford, Cheshire, WA16 6EN

Notes:

- Entec is aware that there may be other mobile phone companies and television operators that own equipment within the area. These secondary undertakers have not been contacted at this stage as it is unlikely that their apparatus will prevent the project from being taken forward.
- As details of the preferred development layout materialises, further undertakers may need to be contacted to confirm the extent of their existing apparatus in the area.

Table B8.2 Summary of Services Present

Service	Underground Apparatus Present in or Near the Site Boundary	Service Likely to be Physically Affected by the Development
Electricity	✓	✓
Gas	✓	✓
Water	✓	✓



Service	Underground Apparatus Present in or Near the Site Boundary	Service Likely to be Physically Affected by the Development
Sewage	✓	✓
Oil and Fuel	✓	✓
Telecommunications	✓	✓

Records of all the data, plans and information have been summarised in Figure B8.1.

8.4 Understanding the Existing Situation

8.4.1 Typical General Layout of Services

It is anticipated that the majority of services will be generally located within the footway. However, all services should be verified on site before undertaking any works by carrying out a computed axial tomography (CAT) scan, with locations of services marked out on the surface.

8.4.2 Electricity

Plans received from National Grid show the location of high voltage electrical services crossing and running adjacent to the site. The existing electrical service comprises of the following.

- Two overhead 400kV transmission lines owned by National Grid, one of which runs through the proposed development area. The first line crosses the northern section of the site entering the site from the north just east of Wood End Cottages and leaving it to the south east just below Junction 8 of the M1. The second line runs north to south along the eastern edge of the M1 motorway through the area that is not proposed for development. There are also a number of lower voltage transmission lines.

The location of the major electricity network is shown in Figure B8.1.

8.4.3 Gas

Plans received from National Grid show a combination of low, medium, intermediate and high pressure mains crossing and running adjacent to the site. The existing supply comprises of the following.

- A series of low pressure mains are located around the Buncefield depot. It is assumed that these mains operate between 21mBar to 75mBar.
- A series of medium pressure gas mains are located around the Buncefield depot. It is assumed that the mains operate between 270mBar to 2Bar.



- An intermediate pressure gas main runs eastwards following the A4147 from Leverstock Green. This main then turns south just west of Great Furzefield Wood. It is assumed that the main operates between 2Bar to 7Bar.
- A high pressure gas main is known to run north to south following the eastern edge of the M1 motorway. It is assumed that this main operates up to 85Bar.

The condition of the existing network can not be ascertained at this time. However, it is assumed that such a network would need to be kept in good condition as it is usual practise for the network to be continually monitored by in-house network analysts ensuring that if any problems do occur they are dealt with immediately.

Usually all gas mains have varied easement widths, providing a zone where construction work is not permitted.

Typical values of these widths across the mains are as follows:

- 3m for low pressure mains;
- 6m for medium pressure mains; and
- 6m to 10m for intermediate and high pressure mains.

The location of the gas mains are shown in Figure B8.1.

8.4.4 Oil and Fuel

It is understood that there are two sets of operated oil/fuel pipeline in or around the vicinity of the site. These pipelines are:

- two British Pipeline Agency (BPA) pipelines; and
- one Total operated pipeline.

The two BPA pipelines run north to south skirting along the western edge of the site until Junction 8 of the M1. At this point, the pipelines cross the site in a south easterly direction before running parallel to the western edge of the M1 motorway. It is understood that these pipelines serve the existing Buncefield Oil Depot with multi product type fuels. According to BPA records, the pipelines are 150mm in diameter and 200mm in diameter and operate at 1,200psi.

The other pipeline operated by Total is understood to cross the northern section of the site according to records. This pipeline is connected to the Buncefield Oil Depot and heads in an easterly direction before turning north just on the east side of the M1. It is also understood that this pipeline accommodates multi product fuels and comprises of a 250mm diameter main operating at 1,500psi.



It is expected that these pipelines identified have a 6m plus pipe diameter easement corridor associated with them (i.e. 3m either side of the outer face of the pipeline). That is to say, no development is allowed to be constructed within this zone.

The location of the pipelines are shown in Figure B8.1.

8.4.5 Water Supply

The water supply network in this area is understood to cross the site at a number of locations. Generally, the diameter of the pipe work ranges between 3” to 9” and the pipe materials vary between cast iron and uPVC. The operating pressure fluctuates between 1 to 1.5Bar.

It is assumed that all water mains in the area have generally a 6m easement corridor associated with them (i.e. 3m each side of the main). It is favourable that no development is allowed to be constructed within this zone.

The location of the water supply mains are shown in Figure B8.1. Figure B8.2 illustrates the drainage catchment area.

8.4.6 Sewage

The main storm water drainage in the area consists of a range of pipe diameters up to 525mm in diameter connecting into local watercourses. Generally the network is split into the following distinct networks.

- Network on Redbourn Road Reservoir to the River Ver. This network runs north east from the main reservoir serving Cupid Green to an outfall into the River Ver at Church End, located to the east of the M1 motorway. The pipe diameter is in the order of 450mm however, its performance and condition are currently unknown.
- Network from Hemel Hempstead (Leverstock Green) to the River Ver. This 375mm diameter network accommodates Leverstock Green and runs approximately east passing the M1 motorway just south of Junction 8 before discharging into the River Ver near Gorhambury.

The condition and performance of these sewers is currently not known.

With respect to the foul water drainage, there is one distinct sewer running from north to south generally following the A5183 which conveys foul drainage away from the catchment area.

Thames Water has confirmed that the majority of the foul sewer system is running at full capacity. The main Sewage Treatment Works serving this catchment is at Maple Lodge. Maple Lodge is located some 18km south of the site next to Rickmansworth and is used in conjunction with the treatment works at Aldenham to serve the whole of west Hertfordshire of up to a population of 550,000 people.

The location of the sewers are shown in Figure B8.1.



8.4.7 Telecommunications

British Telecom (BT) has confirmed that the majority of the area within the site boundary is connected to the network. Distribution points can be found across the majority of the site, particularly in the region of Buncefield. The principal routes of the lines follow the path of the main highways which surround the site.

Figure B8.1 shows the general location of the telecommunications network.

8.5 Future Demand Assessment

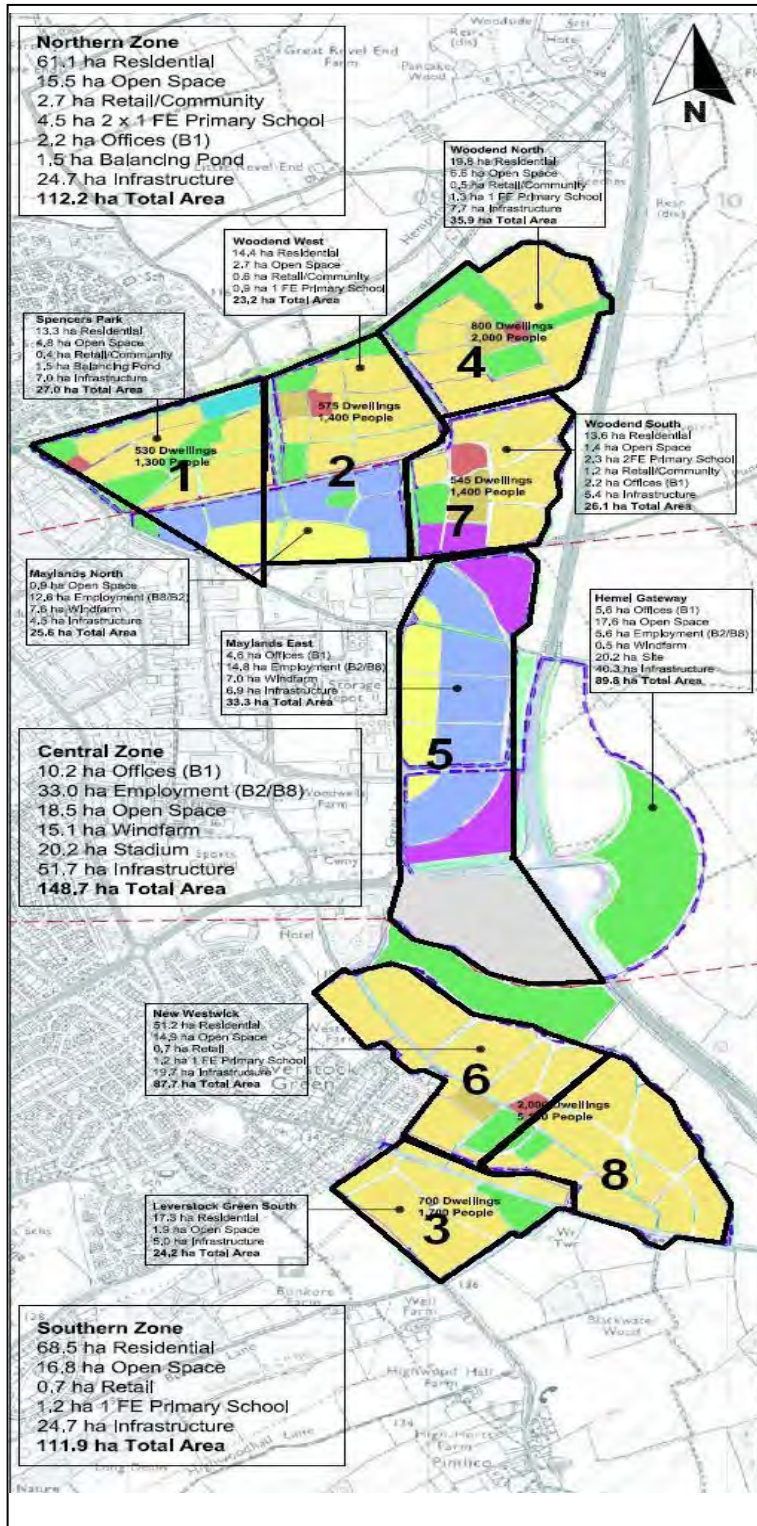
8.5.1 Introduction

In some circumstances the service companies have not been able to identify the extent of spare capacity within their existing networks nor the amount of additional reinforcement works required to serve the proposed development. This is usually only possible once the proposed development has entered the detailed design stage and not at concept stage.

Therefore, to help identify some of the headline issues, initial high level potential loadings have been calculated and issued to the service companies for comment. These calculations have been based on the following theoretical concept development layout and makes reference to the developable area shown for the northern, central and southern zones.



Figure B8.3 Indicative Development Schedule



A possible breakdown of the different development areas is provided in Table B8.5, although this will be subject to change. These possible areas have been used to identify the theoretical indicative loadings.

Table B8.3 Summary of Development Area

Development Zone	Phasing	Type of Development	Gross Area	% Adjustment for Built Development	Adjusted Area Used in the Loading Calcs
Northern Zone	1 North, 2 North, 4, 7	Residential	61.1ha	50	30.5
		Open Space	15.5ha	0	0
		Retail/ Community	2.7ha	25	0.7
		FE Primary School	4.5ha	30	1.3
		Offices	2.2ha	25	0.6
		Balancing Pond	1.5ha	0	N/A
		Infrastructure	24.7ha	100	N/A
		112.2ha			33.1ha
Central Zone	1 South, 2 South, 5	Offices	10.2ha	25	2.6
		Employment	33ha	20	6.6
		Open Space	18.5ha	0	N/A
		Wind Farm	15.1ha	0	N/A
		Infrastructure	51.7ha	100	N/A
		128.5ha			9.1ha
Southern Zone	3, 6, 8	Residential	68.5ha	50	34.3
		Open Space	16.8ha	0	0
		Retail	0.7ha	25	17.5
		FE Primary School	1.2ha	30	0.4
		Infrastructure	24.7ha	100	N/A
		111.9ha			52.2ha



8.5.2 Electricity

Table B8.4 Indicative Electricity Loading Requirements

Area of Development	Anticipated Loading
Northern Zone	6,622kVA
Central Zone	9,423kVA
Southern Zone	5,849kVA

Notes:

1. The above loadings should be used with caution due to the limited amount of detail available on the development aspirations, the proposed type of development anticipated and the proposed layout/footprint details. Once these details are made available the loadings will need to be reviewed and possibly altered.
2. Calculations of the loadings assume a typical density of the overall gross development area that might be anticipated for the development class identified. This area is then multiplied by a typical loading rate per square metre to produce the final loading. The usage rate has made some allowance for diversity, efficiency, frequency of use and peak demand.

8.5.3 Gas

Table B8.5 Indicative Gas Loading Requirements

Area of Development	Anticipated Loading
Northern Zone	60MW
Central Zone	16.5MW
Southern Zone	63MW

Notes:

1. The above loadings should be used with caution due to the limited amount of detail available on the development aspirations, the proposed type of development anticipated and the proposed layout/footprint details. Once these details are made available the loadings will need to be reviewed and possibly altered.
2. Calculations of the loadings assume a typical density of the overall gross development area that might be anticipated for the development class identified. This area is then multiplied by a typical loading rate per square metre to produce the final loading. The usage rate has made some allowance for diversity, efficiency, frequency of use and peak demand.

8.5.4 Oil and Fuel

Loadings not applicable.



8.5.5 Water Supply

Table B8.6 Indicative Water Supply Requirements

Area of Development	Anticipated Loading
Northern Zone	7l/s
Central Zone	2l/s
Southern Zone	7l/s

Notes:

1. The above loadings should be used with caution due to the limited amount of detail available on the development aspirations, the proposed type of development anticipated and the proposed layout/footprint details. Once these details are made available the loadings will need to be reviewed and possibly altered.
2. Calculations of the loadings assume a typical density of the overall gross development area that might be anticipated for the development class identified. This area is then multiplied by a typical loading rate per square metre to produce the final loading. The usage rate has made some allowance for diversity, efficiency, frequency of use and peak demand.

8.5.6 Sewage

Table B8.7 Indicative Sewage Loading Requirements

Area of Development	Anticipated Loading
Northern Zone	4l/s
Central Zone	1l/s
Southern Zone	4l/s

Notes:

1. The above loadings should be used with caution due to the limited amount of detail available on the development aspirations, the proposed type of development anticipated and the proposed layout/footprint details. Once these details are made available the loadings will need to be reviewed and possibly altered.
2. Calculations of the loadings assume a typical density of the overall gross development area that might be anticipated for the development class identified. This area is then multiplied by a typical loading rate per square metre to produce the final loading. The usage rate has made some allowance for diversity, efficiency, frequency of use and peak demand.

8.5.7 Telecommunications

Loadings not applicable.



8.6 Issues and Constraints

8.6.1 Electricity

Issues Associated with the National Grid Supply

National Grid has confirmed that due to environmental, technical and cost reasons, National Grid prefers to retain these lines in situ as well as encouraging developers to plan and design their development taking the presence of the overhead line into account. National Grid recognises that there may be exceptional circumstances where development is of national or regional significance that may justify the moving or ‘under-grounding’ of existing overhead power lines.

Concern over health impacts associated with Electro Magnetic Fields remains an issue and recent advice in relation to other developments has suggested a 50 metre buffer between such lines and development but this has no statutory basis. Placing the line underground would also be an option, however a similar sized buffer would still be required to allow National Grid access to the underground cables to carry out essential maintenance. The cost of under-grounding would also be significant.

The extensive nature of The Crown Estate’s landholding at this location makes the re-location of electricity lines possible although this would need to be subject to National Grid agreement.

The above ground network is supported by numerous pylons. The size, height and spacing of the pylons are determined by the topographical, operational, safety and environmental constraints. However, it is possible that variations in pylon design and specifications exist to accommodate different voltages in the area. The overall height of a typical pylon in this area is considered to be approximately 46m.

A direct connection to the 400kV supply would not be allowed.

Issues Associated with the EDF Supply

EDF has confirmed that the existing network in this area is performing well without any major problems.

The existing easement widths for cables up to 11kV in size is generally 1m wide (i.e. 0.5m each side of the centre line) while the easement width of the 33kV cables is in the order of 2m to 5m wide (i.e. 1m to 2.5m each side of the centre line) depending on the formation of cables used. 132kV cables require up to 5m easement widths.

EDF originally confirmed that in order to provide this level of supply, there would be a need to make a connection from the 132kVA supply with two number 30MVA primary sub stations (it total of 60MVA is needed). EDF has since confirmed that it may be more appropriate to carry out localised reinforcement to the existing infrastructure on site to cater for the first phase of the development rather than constructing a new primary sub-station.



Lead in times for providing any necessary alterations to the design would be in the order of three years.

At detailed design stage, EDF has confirmed that a full network assessment would be required to ascertain the exact level of redesign.

8.6.2 Gas

Issues Associated with the National Grid Supply

National Grid operates the main infrastructure in this area for the supply of gas. A number of medium and intermediate pressure gas supply pipes cross the development area, and the location of these services will need to be taken into account at the design stage, to ensure that the appropriate buffers areas are maintained to allow for maintenance.

It is anticipated that off site infrastructure improvements would be needed to serve a development of this size. Although the extent of infrastructure improvement can only be properly identified during the detailed planning stage, it is anticipated that the necessary supply would originate from the medium pressure network.

It is worth noting that in addition to the essential easement and maintenance strips required by National Grid, the Health and Safety Executive may require increased protection zones centred on the pipeline due to a number of factors concerning the contents of the pipe, the nature of the development and the density of populations.

8.6.3 Oil and Fuel

Issues Associated with BPA and Total Pipelines

It is considered extremely unlikely that any of the oil/fuel pipelines can be diverted due to the significant costs required. As a result, it is recommended that the location of these pipelines should remain in their current position with the development designed around it.

Further consultation with the authorities is required at an early stage of the design phase to ensure that the requirements of the British Pipeline Agency are met, especially with respect to maintaining the required minimum cover, obtaining approval to carry out any adjacent work and maintaining the stipulated 3m easement width either side of the outer face of the pipeline.

Any proposed works identified above or below the BPA or Total Pipelines apparatus (e.g. new access road) will not be allowed to commence until:

- The status and condition of the apparatus is fully investigated in the first instance. All investigation and works around the pipeline will need to be carried out by an approved contractor, recognised by the



relevant pipeline authorities. This will include all excavation and any testing, repair or protection works ordered by the authorities once the pipeline has been exposed.

- An S16 agreement may need to be signed with the Secretary of State for Defence. This agreement takes between five to six weeks to approve.

In addition to the essential easement and maintenance strips required by the Pipeline Agency, the Health and Safety Executive may require increased protection zones centred on the pipeline due to number of factors concerning contents of the pipe, nature of development (land use) and density of populations.

Any new service connections required to cross oil apparatus must be designed and installed to pass underneath. Further details for working near or crossing this pipeline should be understood by referring to the provider's guidelines.

Both pipeline Agencies have provided standard advice relating to the control of construction operations within the proximity of such facilities. This will be a matter for consideration at the detailed planning stage.

It is worth noting that in addition to the essential easement and maintenance strips required by the pipeline agencies, the Health and Safety Executive may require increased protection zones centred on the pipeline due to number of factors concerning contents of the pipe, nature of development (land use) and density of populations.

8.6.4 Water Supply

Issues Associated with Three Valleys Water

Three Valleys Water has indicated that off site infrastructure improvements will be required to serve any new development to the east of Hemel Hempstead. Their main reason for this was due to the elevated position of the development compared to the existing town.

During the initial review, reservations were made on whether or not there would be sufficient water resources to serve a proposed development of this scale. Although the water company confirmed that they have a duty under The Water Industry Act 1991 (clause 37) to 'develop and maintain an efficient system of water supply to persons who demand it', the sensitivity of water provision in this area necessitated the need to carry out a more detailed water resource investigation:

The outcome from this investigation is summarised as follows.

- Gorhambury is within the Colne Catchment Abstraction Management Strategy. A Consultation Strategy document was published by the Environment Agency in April 2007. This document states that all water resource management units are classified as currently over-licensed and over-abstracted.



- For the Colne catchment as a whole, the total licensed abstraction is 700MI/day with 60% of this for public water supply, and agriculture/industry accounting for most of the rest. 70% of licensed abstraction is from ground water and 30% from surface water sources.
- The Catchment Abstraction Management Strategies (CAMS) strategy states that the Environment Agency will not issue new licences for consumptive abstraction, however consideration would be given to non-consumptive abstractions (i.e. those where water is returned to the catchment close to the abstraction point).
- Discussion with the Water Resources Manager of Three Valleys Water has confirmed that water resources are scarce in the Gorhambury area exacerbated by the Buncefield Oil Depot close by. A contamination plume from this site has meant that one groundwater source has already been put out of action for the foreseeable future.
- The current Water Resource Plan published by the Three Valleys Water in 2004, covering the period up to 2030, identified no significant potential for development within the identified development Zone, or indeed the whole of the Three Valleys area. It should also be noted that Three Valleys Water is preparing its 2009 Water Resource Plan, but at this current time this will not account for water demand from the Gorhambury development as this is not currently in the Local Development Plan.

As a result, efforts are expected to be focused on the following:

- private developer investment;
- Three Valleys Water demand management measures including the possible use of a small aquifer storage and recovery scheme scheduled for 2018 as well as increased shared infrastructure usage; and
- the possible use of up to 10MI/d to meet peak demands from the proposed Thames Water Oxfordshire Reservoir Scheme expected to be available in 2021.

Early discussions with Three Valleys Water will be necessary to identify how the additional water demand will be met making reference to the above options. Chapter 3 in Part C of this supporting information document identifies a number of possible measures that can be incorporated into the scheme to reduce water consumption and work towards water neutrality. In particular the chapter focuses on minimising water use through efficient appliances and metering, reuse of water where appropriate through rainwater and grey water recycling, and sourcing water close to the development, and where possible treating wastewater on site. In the later stages of the development, these technologies are likely to improve and therefore be of greater benefit to the scheme.

Water availability is scarce in the eastern region and therefore sustainable use of water resources in the proposed development is very important. The scale of the development provides clear advantages when considering measures to reduce and recycle water. Opportunities to retro fit water saving appliances to existing homes within the Colne River catchment would also be considered as a way of achieving water neutrality.

Figure B8.2 shows the drainage catchment area.



8.6.5 Sewage

Issues Associated with STW at Maple Lodge

Maple Lodge STW is the original works for the catchment area around Hemel Hempstead. It was commissioned in 1951 and extended in the early 1960's. There are plans to improve both treatment works to accommodate the expected growth in the area.

The following is an extract from the Halcrow report compiled in December 2006 which outlines the suggested proposed works:

“With the expected expansion in the catchments, Maple Lodge is forecasted to undergo significant growth with a likely increase in population equivalent for the works of around 53,000 (11% growth). The assessment for this growth has been based on work carried out on gap analysis provided by Thames Water and of current operating performance provided by Thames Water’s operational managers.”

The gap analysis demonstrates that the Maple Lodge treatment works currently has sufficient storm tank capacity but this is supplemented by the storm tanks at Aldenham. The final settlement tanks at Maple Lodge are however reported as being undersized. Although the works is compliant at present, the final settlement tanks are likely to require expansion in the near future to accommodate the future growth.

The works is expected to exceed its flow consent circa 2016 based on a linear rate of development within the catchment. It currently has a low ammonia consent of 1mg/l which is expected to remain static. However, the EA are currently considering tightening other components of the consent to drive improved river quality. Tightening of the consent in 2016 or before would put additional demands on the works and increase the likely scale of investment required.

It is considered likely that an increase in the number of storm tanks, significant expansion of the final settlement tanks and general upgrade and improvement works would allow the facility to absorb the predicted growth and accommodate a tightened consent”.

The report produced by Halcrow also provides a high level insight into the capacity and performance of the existing sewage network.

In general, the sewerage networks are considered by the water company to operate at or close to capacity levels. Sewerage network capacity is unlikely to pose any limits to the strategic development planned. However, there may be local issues needed to be addressed and some impact upon the phasing of the development.

Typical delivery times for expansion have been indicated in the Halcrow report as follows:

- 18 months to three years for small sewer and sewage treatment work upgrades;



- three to five years for large upgrades; and
- up to 10 years for major expansion projects.

Thames Water has confirmed that a full network analysis would need to be carried out to identify the level of redesign. This is expected to be required at detailed design stage.

8.6.6 Telecommunications

Issues Associated with BT

Further discussions with BT will be required at detailed design stage to confirm that a local connection can be made from one of the several junction boxes around this site. BT has advised that fibre optic cables could be in the area, and the most effective way of confirming this is to carry out a site investigation in conjunction with their New Connections team.

Generally the infrastructure needed to deal with an increase in telephone lines is flexible enough to accommodate large developments. Usually by agreement between the Developer and BT, the phone company will supply all necessary cabling and ducting to the developer for installation and the phone company will seek to recover its costs through its standard charges of new connections and line rentals. Increased capacity within the telephone exchange is also carried out by the phone company at their expense.

Although there is no significant easement restrictions associated with BT apparatus, the location of existing telecom apparatus will still need to be lowered or diverted to accommodate any proposed works. Such works will be subject to approval of BT.

All new duct work will be allowed to be located within the extent of any existing or new highway.

8.7 Conclusions

This chapter has set out the location of key utility services in the Gorhambury area and provides an indication of the condition of the existing networks where known. With regard to electricity supply, EDF have indicated that localised reinforcement to the existing infrastructure on site to cater for the first phase of the development is likely to be more appropriate than constructing a new primary sub-station. Requirements will also be dependent on the extent to which renewable energy will be incorporated into the proposals.

Water supply is a major issue in the whole of the eastern region, and Three Valleys Water is focussing its efforts on private developer investment, demand management measures and the possible use of the proposed Thames Water Oxfordshire Reservoir Scheme (available in 2021) to meet peak demands. The scale of the proposed development at Gorhambury has advantages in terms of the opportunities to introduce water conservation measures. A number of measures are considered in Part C of this document such as rainwater and grey water recycling and sourcing



water close to the development, and where possible treating wastewater on site. Opportunities to retro fit water saving appliances to existing homes within the Colne River catchment would also be considered as a way of achieving water neutrality.

With regard to the sewage network, Thames Water has indicated that a full network analysis would need to be carried out to identify the required works to the network. This would need to be undertaken once more detail about the development is known.

Initial discussions have been undertaken with key utility providers. These can be taken further once there is more certainty about the direction and scale of proposed development.



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