



HRA for East Hertfordshire District Plan Scenarios

Screening Report

Final
December 2012



Prepared for
East Hertfordshire District Council

Revision Schedule

HRA Screening Report December 2012

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01	08/10/12	Draft HRA Screening Report	Dr Graeme Down Ecologist	Dr James Riley Principal Ecologist	Dr James Riley Principal Ecologist
02	17/12/12	Final Screening Report incorporating transport and air quality calculations	Dr Graeme Down Ecologist	Dr James Riley Principal Ecologist	Dr James Riley Principal Ecologist

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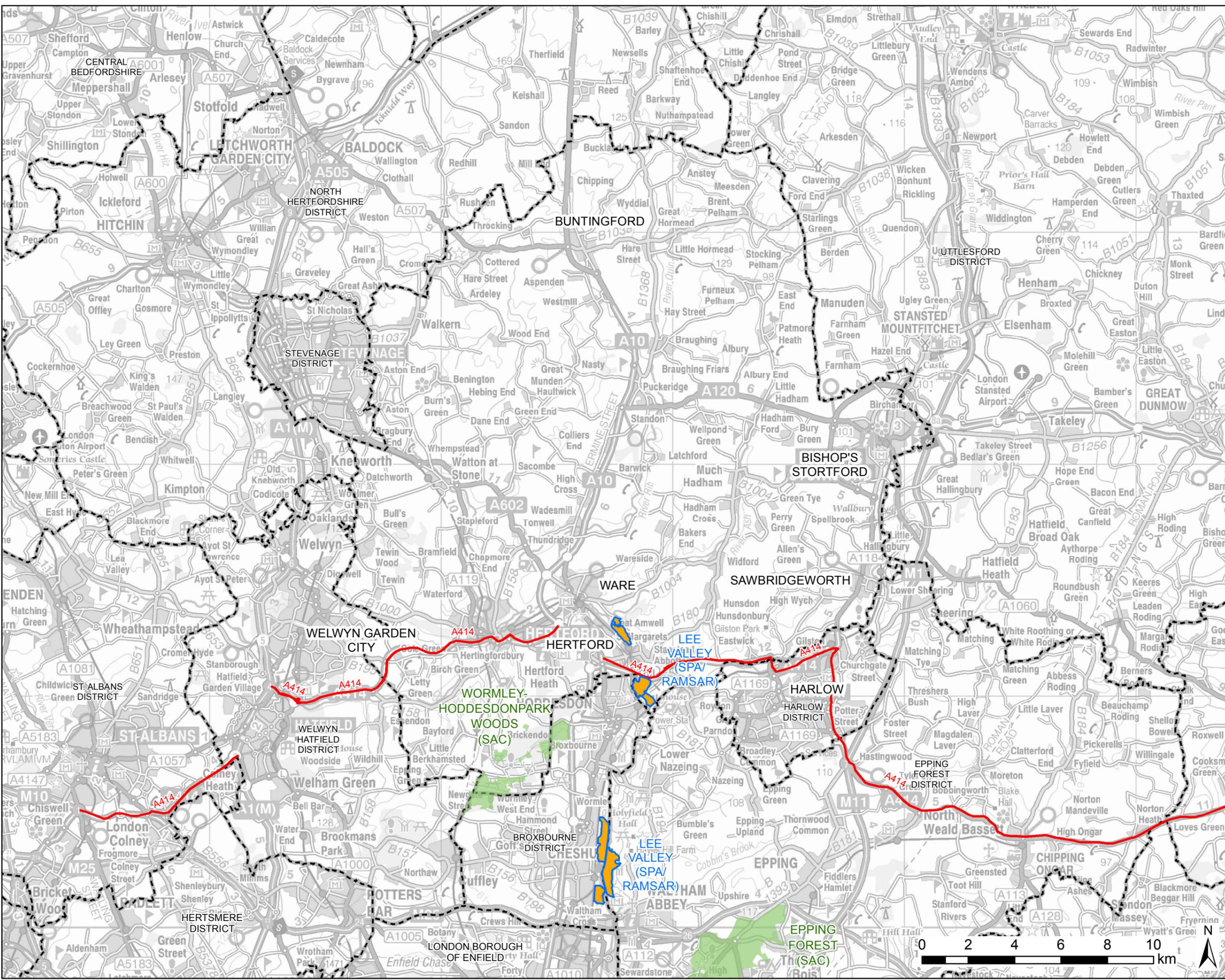
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1 Introduction

1.1 Legislation

- 1.1.1 The need for Habitat Regulations Assessment is set out within Article 6 of the EC Habitats Directive 1992, and interpreted into British law by the Conservation of Habitats and Species Regulations 2010. The ultimate aim of the Directive is to “*maintain or restore, at favourable conservation status, natural habitats and species of wild fauna and flora of Community interest*” (Habitats Directive, Article 2(2)). This aim relates to habitats and species, not the European sites themselves, although the sites have a significant role in delivering favourable conservation status. European sites (also called Natura 2000 sites) can be defined as actual or proposed/candidate Special Areas of Conservation (SAC) or Special Protection Areas (SPA). It is also Government policy for sites designated under the Convention on Wetlands of International Importance (Ramsar sites) to be treated as having equivalent status to Natura 2000 sites.
- 1.1.2 The Habitats Directive applies the precautionary principle to protected areas; plans and projects can only be permitted having ascertained that there will be no adverse effect on the integrity of the site(s) in question. This is in contrast to the SEA Directive which does not prescribe how plan or programme proponents should respond to the findings of an environmental assessment; it simply says that the assessment findings (as documented in the ‘environmental report’) should be ‘taken into account’ during preparation of the plan or programme. In the case of the Habitats Directive, plans and projects may still be permitted if there are no alternatives to them and there are Imperative Reasons of Overriding Public Interest (IROPI) as to why they should go ahead. In such cases, compensation would be necessary to ensure the overall integrity of the site network.
- 1.1.3 All the European sites mentioned in this document are shown in Figure 1. In order to ascertain whether or not site integrity will be affected, an HRA should be undertaken of the plan or project in question.



- NOTES
- Ramsar
 - Special Protection Area
 - Special Area of Conservation

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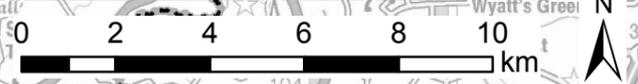
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Box 1. The legislative basis for Habitat Regulations Assessment

Habitats Directive 1992

Article 6 (3) states that:

“Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives.”

Conservation of Habitats and Species Regulations 2010 (as amended)

The Regulations state that:

“A competent authority, before deciding to ... give any consent for a plan or project which is likely to have a significant effect on a European site ... shall make an appropriate assessment of the implications for the site in view of that sites conservation objectives”.

1.2 Scope and Objectives

- 1.2.1 URS has been appointed by East Hertfordshire District Council to assist in undertaking a Habitat Regulations Assessment (HRA) of the potential effects of the seven District Plan (CS) housing scenarios on the *Natura 2000* network. This work builds upon a high-level HRA Screening exercise undertaken by Scott Wilson Ltd (now URS) on the District Plan Issues and Options in 2010.
- 1.2.2 The CS will define the strategic planning framework for the protection of the environment, sustainable transport priorities, and the scale, pattern and location of development within East Hertfordshire.

2 Methodology

2.1 Key Principles

2.1.1 This section sets out the basis of the methodology for the HRA. URS has adhered to several key principles in developing the methodology – see Table 1.

Table 1 - Key principles underpinning the proposed methodology

Principle	Rationale
Use existing information	We make the best use of existing information to inform the assessment. This will include information gathered as part of the SA of the emerging Plan and information held by Natural England, the Environment Agency and others.
Consult with Natural England, the Environment Agency and other stakeholders	We will ensure consultation with Natural England for the duration of the assessment. We will ensure that we utilise information held by them and others and take on board their comments on the assessment process and findings.
Ensure a proportionate assessment	We will ensure that the level of detail addressed in the assessment reflects the level of detail in the Plan (i.e. that the assessment is proportionate). With this in mind, the assessment will focus on information and impacts considered appropriate to the local level.
Keep the process as simple as possible	We will endeavour to keep the process as simple as possible while ensuring an objective and rigorous assessment in compliance with the Habitats Directive and emerging best practice.
Ensure a clear audit trail	We will ensure that the HRA process and findings are clearly documented in order to ensure a clearly discernible audit trail.

2.2 A Proportionate Assessment

2.2.1 The emerging District Plan considers development within East Hertfordshire, and so it is appropriate that the HRA should consider implications for European designated sites within East Hertfordshire or those outside the boundaries that could be affected by such development.

2.2.2 The HRA of the East Hertfordshire emerging District Plan is placed in context with both higher and lower tier plans which provide further detail on how development is to be delivered and would therefore be suitable for a greater level of analysis.

2.3 Process

2.3.1 The HRA is being carried out in the absence of formal Government guidance. Communities and Local Government released a consultation paper on Appropriate Assessment of Plans in 2006². As yet, no further formal guidance has emerged.

2.3.2 Figure 3 below outlines the stages of HRA according to current draft CLG guidance. The stages are essentially iterative, being revisited as necessary in response to more detailed information, recommendations and any relevant changes to the plan until no significant adverse effects remain.

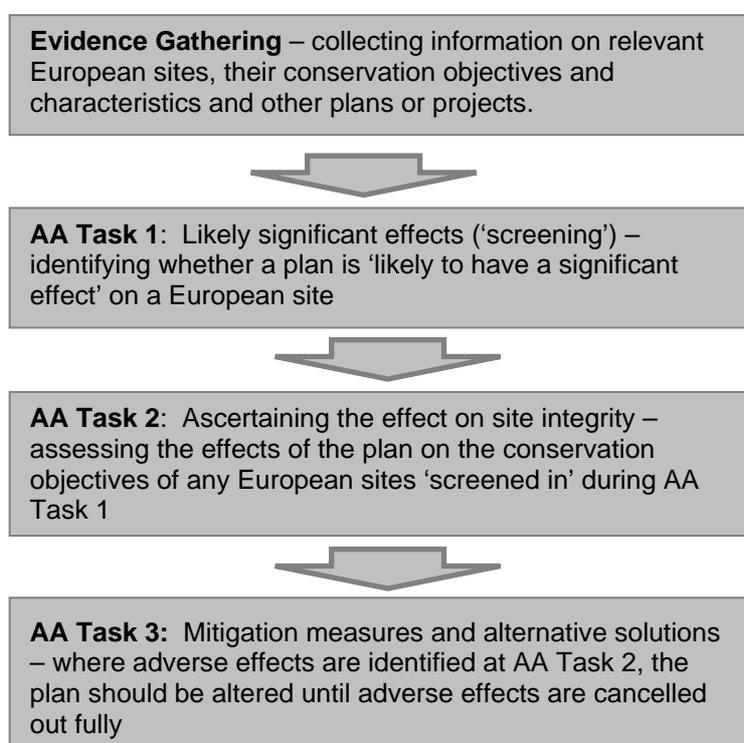


Figure 3 – Four-Stage Approach to Habitat regulations Assessment (Source: CLG, 2006)

2.4 Likely Significant Effects (LSE)

2.4.1 The first stage of any Habitat Regulations Assessment (AA Task 1) is a Likely Significant Effect (LSE) test - essentially a risk assessment to decide whether the full subsequent stage known as Appropriate Assessment is required. The essential question is:

"Is the Plan, either alone or in combination with other relevant projects and plans, likely to result in a significant effect upon European sites?"

2.4.2 The objective is to 'screen out' those plans and projects that can, without any detailed appraisal, be said to be unlikely to result in significant adverse effects upon European sites, usually because there is no mechanism for an adverse interaction with European sites.

² CLG (2006) Planning for the Protection of European Sites, Consultation Paper

2.4.3 That screening assessment is the purpose of this report.

2.5 Physical Scope of the Assessment

2.5.1 There is no pre-defined guidance that dictates the physical scope of an HRA of a land use plan. Therefore, in considering the physical scope of the assessment, we have been guided primarily by the identified impact pathways (using the Source-Pathway-Receptor approach) rather than by arbitrary 'zones'. Current guidance suggests that the following European sites be included in the scope of assessment:

- All sites within the authority's boundary; and
- Other sites shown to be linked to development within the authority's boundary through a known 'pathway' (discussed below)

2.5.2 Briefly defined, pathways are routes by which a change in activity within East Hertfordshire district can lead to an effect upon a European site. In terms of the second category of European site listed above, CLG guidance states that the AA should be '*proportionate to the geographical scope of the [plan policy]*'. The scope of the HRA has been informed by initial scoping work undertaken by Scott Wilson for East Hertfordshire District Council.

2.5.3 There are three European sites that lie partly within East Hertfordshire:

- Lee Valley SPA;
- Lee Valley Ramsar site; and
- Wormley-Hoddesdonpark Woods SAC

2.5.4 The following site also requires consideration because there is potential for CS Issues and Options to create significant effects even though the site lies outside the authority boundary:

- Epping Forest SAC

2.5.5 Eversden & Wimpole Woods SAC (located 16km to the north of East Hertfordshire) was given preliminary consideration since the barbastelle bat population at that site is known to forage well outside the site boundary. However, work undertaken for the South Cambridgeshire Biodiversity Strategy identifies the area of key importance for the barbastelle bats for which the SAC was designated. The southern-most part of this area of importance is situated approximately on a line with Whaddon and Meldreth and thus approximately 10km north of East Hertfordshire. Since the District Plan does not propose any development outside the district boundary this SAC is therefore not considered further.

2.5.6 The reasons for designation of these sites, together with current trends in habitat quality and pressures on the sites, are indicated in Chapter 3. All the European sites are illustrated in Figure 1.

2.5.7 In order to fully inform the screening process, a number of recent studies have been consulted to determine LSE that could arise from the East Hertfordshire CS Issues and Options. These include:

- 'Impacts of Growth on Water Quality in the East of England: Interim Report to support the RSS Review' (Entec/Environment Agency/Anglian Water, November 2009);

- 'The Impact of Housing and Water Efficiency Policies on Water Supplies to the East of England – Evidence for the Review of the East of England Plan – RSS14' (Environment Agency, March 2009);
- Rye Meads Water Cycle Study (Hyder Consultancy, October 2009);
- Core Strategies (and HRAs) for Harlow, Epping Forest District, Broxbourne District, Hertsmere Borough, London Borough of Waltham Forest, St Albans District, Stevenage Borough and Welwyn Hatfield District;
- Recreational activity, tourism and European site recreational catchment data – where available have used data that exists for individual European sites but in many cases these do not exist. In such circumstances have used appropriate proxy from other European sites designated for similar features and in similar settings;
- Hertford and Ware Urban Transport Plan (Hertfordshire County Council, 2010);
- The UK Air Pollution Information System (www.apis.ac.uk); and
- Nature on the Map and its links to SSSI citations and the JNCC website (www.natureonthemap.org.uk)

2.6 Principal Other Plans and Projects

2.6.1 It is neither practical nor necessary to assess the 'in combination' effects of the District Plan within the context of all other plans and projects within Hertfordshire and the neighbouring local authorities in south Cambridgeshire and west Essex. In practice therefore, in combination assessment is of greatest relevance when the plan would otherwise be screened out because its individual contribution is inconsequential. For the purposes of this assessment, we have determined that, due to the nature of the identified impacts, the key other plans and projects relate to the additional housing and commercial/industrial allocations proposed for other relevant Cambridgeshire, Essex and Hertfordshire authorities over the lifetime of the District Plan.

2.6.2 The Regional Spatial Strategy for the East of England is shortly to be withdrawn. However, it still provides a good introduction to proposals for Hertfordshire as a whole, and surrounding counties. At this stage, we have identified a range of plans and projects that may act in combination with the District Plan.

Table 2. Housing levels to be delivered across Hertfordshire as set out in the East of England RSS, provided for context.

Local Authority	Total housing from 2001 to 2021
Broxbourne	5,600
Harlow	16,000
Hertsmere	5,000
St. Albans	7,200
Stevenage	16,000
Welwyn Hatfield	3,500
Epping Forest	3,500

2.6.3 There are other plans and projects that are relevant to the 'in combination' assessment, most notably Thames Water's revised Water Resource Management Plan 2010-2015 (2012), Essex and Suffolk Water's WRMP (2009), Three Valleys Water's WRMP (2009), Cambridge Water

Company's WRMP (2009) and the Environment Agency's Catchment Abstraction Management Strategy for the Upper Lee (2006) and Review of Consents report for the Lee Valley SPA/Ramsar site. These are all taken into account in this assessment.

- 2.6.4 The Minerals and Waste Development Frameworks for Hertfordshire, Essex, London and Cambridgeshire are also of some relevance, since these may well contribute to increased vehicle movements on the road network within East Hertfordshire (and thereby contribute to air quality impacts). The Hertfordshire, Essex and Cambridgeshire Local Transport Plans to 2011 will also be important in determining vehicle movements on the highways network in the short term. However, the major impact is likely to be that of housing and commercial development within the surrounding districts as set out in Local Development Frameworks and these have therefore been the main focus of cumulative 'in combination' effects with regard to this HRA. In this context, we have also consulted the London Plan (2011).
- 2.6.5 In relation to recreational activity, the following documents have been consulted for their plans and projects that may affect European sites in combination with development in East Hertfordshire: East Hertfordshire Parks and Open Spaces Strategy; Lee Valley Regional Park Authority Site management Plan; Epping Forest Management Plan 2004-2010 and visitor surveys; Hoddesdonpark Wood Management Plan 2009-2014; Wormley Wood and Nut Wood Management Plan 2008-2013.

3 Ecological Information Regarding the European Sites

3.1 Epping Forest SAC

3.1.1 Epping Forest SAC is located approximately 10km south of East Hertfordshire district. 70% of the 1,600 hectare site consists of broadleaved deciduous woodland, and it is one of only a few remaining large-scale examples of ancient wood-pasture in lowland Britain. Epping Forest supports a nationally outstanding assemblage of invertebrates, a major amphibian interest and an exceptional breeding bird community.

Reasons for Designation

3.1.2 Epping Forest qualifies as a SAC for both habitats and species. Firstly, the site contains the Habitats Directive Annex I habitats of:

- Beech forests on acid soils: an example of such habitat toward the north-east of its UK range, containing a notable selection of bryophytes, fungi and dead-wood invertebrates;
- Wet heathland with cross-leaved heath; and
- Dry heath

3.1.3 Secondly, the site contains the Habitats Directive Annex II species Stag beetle *Lucanus cervus*, with widespread and frequent records.

Historic Trends and Current Pressures

3.1.4 Much of the value of Epping Forest stems from a long history of pollarding, and although this ceased at the end of the 19th century, re-pollarding of ancient beech trees was started in the early 1990s, and creation of maiden pollards was begun in 1995. This helped to reverse the decline of the forest's epiphytic bryophyte population. The slow recovery can also be attributed to the reduction of atmospheric pollutants since the passing of the 1956 Clean Air Act.

3.1.5 There is an active policy to leave felled timber on the ground to increase the habitat for stag beetle and other saproxylic insects. This is one of four outstanding localities for the beetle in the UK, and it is reliant on felled timber for development of its larvae, a process that takes several years.

3.1.6 In 1988, the Corporation of London, who own and manage the forest, agreed a management strategy with English Nature (now Natural England) to take forward the management. A comprehensive management plan was completed and consented in 1998. The site is subject to the provisions of the Epping Forest Act of 1878.

Air quality

3.1.7 The main pollutants of concern for European sites are oxides of nitrogen (NO_x), ammonia (NH₃) and sulphur dioxide (SO₂). NO_x can have a directly toxic effect upon vegetation. In addition, greater NO_x or ammonia concentrations within the atmosphere will lead to greater rates of nitrogen deposition to soils. An increase in the deposition of nitrogen from the

atmosphere to soils is generally regarded to lead to an increase in soil fertility, which can have a serious deleterious effect on the quality of semi-natural, nitrogen-limited terrestrial habitats.

3.1.8 Sulphur dioxide emissions are overwhelmingly influenced by the output of power stations and industrial processes that require the combustion of coal and oil as well (particularly on a local scale) shipping. As such, it is unlikely that material increases in SO₂ emissions will be associated with Core Strategies. NO_x emissions, however, are dominated by the output of vehicle exhausts (more than half of all emissions). Within a ‘typical’ housing development, by far the largest contribution to NO_x (92%) will be made by the associated road traffic. Other sources, although relevant, are of minor importance (8%) in comparison³. Emissions of NO_x could therefore be reasonably expected to increase as a result of greater vehicle use as an indirect effect of the District Plan.

3.1.9 According to the Department of Transport’s Transport Analysis Guidance, “Beyond 200m, the contribution of vehicle emissions from the roadside to local pollution levels is not significant”⁴.

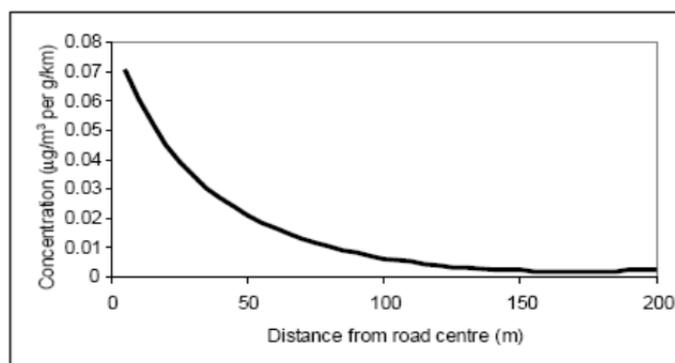


Figure 4 - Traffic contribution to concentrations of pollutants at different distances from a road (Source: DfT)

3.1.10 Deteriorating air quality and under-grazing are the two key pressures that currently affect the site.

Table 3: Critical nitrogen loads, actual rates of nitrogen deposition, NO_x concentrations⁵ and sulphur dioxide concentrations for Epping Forest SAC. Red shading indicates exceedance of thresholds.

Site	Grid reference	Most nitrogen sensitive habitat	Minimum ⁶ critical loads (Kg N/ha/yr)	Actual nitrogen deposition ⁷ (Kg N/ha/yr)	Actual NO _x concentration (µgm ⁻³)	Actual SO ₂ concentration (µgm ⁻³)
Epping Forest SAC	TL446009	Beech woodland	10	35	28.1	1.7

³ Proportions calculated based upon data presented in Dore CJ et al. 2005. UK Emissions of Air Pollutants 1970 – 2003. UK National Atmospheric Emissions Inventory. <http://www.airquality.co.uk/archive/index.php>

⁴ www.webtag.org.uk/archive/feb04/pdf/feb04-333.pdf

⁵ Calculated as NO₂

⁶ APIS provides a critical load range – on a precautionary basis, this assessment uses the lowest figure in that range

⁷ To a resolution of 5 km

- 3.1.11 It should also be noted that all of the figures provided by APIS are background values modelled at 1km² resolution or lower, and do not reflect the much higher pollution levels/loads which can be present within 200m of the roadside – according to Natural England, roadside NO_x levels at the Wake Arms Roundabout are believed to be in excess of 100µgm⁻³.
- 3.1.12 It is clear from Table 3 that nitrogen deposition is already a problem within Epping Forest SAC. According to the APIS website, fully 20% of nitrogen currently deposited within Epping Forest derives from road transport exhaust emissions. It should be noted that Natural England commented when consulted on the HRA Scoping Report for the Hertfordshire Local Transport Plan that in their opinion 20% is likely to be a considerable underestimate. Other evidence, has suggested that the ratio between background pollution and that which is locally traffic-derived varies considerably across the Forest, but that the contribution from traffic (including that from NH₃) may be as much as 50% of the total. In addition, the background pollution, which mostly blows in from London, will also include a proportion which is derived from traffic within London. This proportion is unknown, but data in the GLA's Air Quality Strategy suggests that it may be as high as 50% of the background pollution. Therefore, the overall contribution from road traffic may potentially be in the order of 60-75% of the total⁸.

Recreational activity

- 3.1.13 Epping Forest SAC receives millions of visits per year. A programme of detailed formal visitor surveys has been initiated in recent years and these have considerably refined our understanding of visitor catchments for Epping Forest. The most recent available visitor survey report⁹ identifies that those living within 2km of the edge of the Forest comprise at least 95% of all visitors. As such, nowhere within East Hertfordshire lies within the core recreational catchment for Epping Forest SAC. This pathway is therefore not considered further with regard to this European site.
- 3.1.14 The environmental requirements of Epping Forest SAC are mainly:
- The need to continue to manage recreational access so as to minimise damage to the important habitats present.
 - The need to counter negative changes to low-nutrient habitats resulting from atmospheric nutrient deposition. The site is adjacent to the busy M25 and is bisected by numerous 'rat runs.'
 - The need to provide optimal grazing input to manage heathland and grassland habitats.
 - The need to avoid water pollution
 - The need to avoid introduction of non-native species.

3.2 Lee Valley SPA and Ramsar

- 3.2.1 The Lee Valley comprises a series of embanked water supply reservoirs, sewage treatment lagoons and former gravel pits along approximately 24 km of the valley. These waterbodies support internationally important numbers of wintering gadwall and shoveler, while the reedbeds support a small but internationally important population of bittern. In addition to the

⁸ Letter from Natural England (Gordon Wyatt) to URS (James Riley) following consultation as part of the scoping exercise to inform the HRA of the Hertfordshire Local Transport Plan (2010)

⁹ Alison Millward Associates. 2011. Epping Forest Visitor Survey 2011: Results Summary

ornithological interest, the site also qualifies as a Ramsar site on account on rare and scarce plants and invertebrates present.

- 3.2.2 The Lee Valley SPA/Ramsar consists of four Sites of Special Scientific Interest, of which Turnford and Cheshunt Pits SSSI, Rye Meads SSSI and Amwell Quarry SSSI all lie on the Hertfordshire/Essex border. Walthamstow Reservoirs SSSI lies within London Borough of Waltham Forest. The Special Protection Area is managed by the Lee Valley Regional Park Authority and by Thames Water.

Reasons for Designation

- 3.2.3 The Lee Valley site is designated as an SPA and Ramsar for its Birds Directive Annex I species that over-winter, and these are¹⁰:

- Bittern *Botaurus stellaris*: 6 individuals = 6% of the wintering population in Great Britain;
- Gadwall *Anas strepera*: 445 individuals = 2.6% of the wintering population in Great Britain; and
- Shoveler *Anas clypeata*: 287 individuals = 1.9% of the wintering population in Great Britain.

- 3.2.4 In addition, the site qualifies as a Ramsar under criterion 2 (UN, 2005), by supporting the nationally scarce plant species whorled water-milfoil *Myriophyllum verticillatum* and the rare or vulnerable invertebrate *Micronecta minutissima* (a water-boatman).

Historic Trends and Current Pressures

Water quality

- 3.2.5 The quality of the water that feeds European sites is an important determinant of the nature of their habitats and the species they support. Poor water quality can have a range of environmental impacts:

- 3.2.6 At high levels, toxic chemicals and metals can result in immediate death of aquatic life, and can have detrimental effects even at lower levels, including increased vulnerability to disease and changes in wildlife behaviour.

- Eutrophication, the enrichment of plant nutrients in water, increases plant growth and consequently results in oxygen depletion. Algal blooms, which commonly result from eutrophication, increase turbidity and decrease light penetration. The decomposition of organic wastes that often accompanies eutrophication deoxygenates water further, augmenting the oxygen depleting effects of eutrophication. In the marine environment, nitrogen is the limiting plant nutrient and so eutrophication is associated with discharges containing available nitrogen.
- Some pesticides, industrial chemicals, and components of sewage effluent are suspected to interfere with the functioning of the endocrine system, possibly having negative effects on the reproduction and development of aquatic life.

¹⁰ All bird count data in this document is sourced from the SPA Review site accounts as available on the Joint Nature Conservation Committee website www.jncc.gov.uk/page-1412

- 3.2.7 Sewage and some industrial effluent discharges contribute to increased nutrients in the European sites and in particular to phosphate levels in watercourses.
- 3.2.8 Change in water quality is the main pathway through which the Lee Valley SPA/Ramsar site could be adversely affected. Two parts of the Lee Valley SPA/Ramsar site lie within East Hertfordshire: Amwell Quarry and Rye Meads. Rye Meads consists of non-operational land at and around the Rye Meads Wastewater Treatment Works (WwTW).
- 3.2.9 'Poor fens' (i.e. acidic fens) are strongly nitrogen limited. In other words, nitrogen availability is the factor which ultimately controls vegetation response to other nutrients and a small change in nitrogen inputs can result in a major change in the vegetation composition. In contrast, other types of fen with a relatively alkaline pH (called 'rich' fens) such as those at Rye Meads are phosphorus-limited, meaning that phosphorus availability is the factor which ultimately controls vegetation response to other nutrients. This also applies to fluvial flood-plain grasslands like those at Rye Meads SSSI. In a phosphorus limited system, high nitrogen availability will not result in a deleterious effect on vegetation provided that phosphorus availability is controlled¹¹. That is not to say that nitrogen inputs would therefore be irrelevant, but it does mean that when nitrogen is already in excess (and phosphorus inputs can be controlled) a proportionate response must be made to the risk posed by small additional nitrogen inputs. Effluent discharges from Rye Meads Sewage Treatment Works (STW) into Tollhouse Stream. The stream flows through the SSSI and has been known to back up into the marsh grassland parts of the SSSI during periods of high flow.
- 3.2.10 The current discharge consent for Rye Meads WwTW has been subjected to a review by the Environment Agency and Thames Water (Review of Consents) specifically for the purpose of determining whether the current consented phosphorus limits on the discharge are leading to an adverse effect on the Lee Valley SPA/Ramsar site, and if so, to amend the consent in order to avoid such an effect. As such, provided effluent from new development within the Rye Meads catchment can be accommodated within the existing volumetric discharge consent for the WwTW it can be concluded with confidence that an adverse effect on the SPA/Ramsar site is unlikely to occur from this pathway.
- 3.2.11 However, once the WwTW ceases to have capacity within its existing discharge consent for effluent from additional dwellings, it will be necessary for Thames Water to apply to the Environment Agency to increase the consented discharge volume, or direct flows to an alternative treatment facility. The Environment Agency is very unlikely to consent to an increase in discharge volume from the WwTW unless the phosphate concentration within the effluent can be further tightened to ensure no deterioration in water quality in Tollhouse Stream. There is a technical limit (known as the limit of Best Available Technology) to how much phosphorus removal a WwTW can incorporate. If this situation arises, there is a risk that future dwellings within the catchment could not be accommodated at Rye Meads WwTW, requiring an alternative treatment solution that does not as yet exist. Investigating these issues was one of the purposes of the Rye Meads Water Cycle Study (2009). Water quality is therefore an important pathway to investigate with regard to future development within the Rye Meads WwTW catchment.
- 3.2.12 With regard to East Hertfordshire, the key settlements of Hertford, Ware and Sawbridgeworth are all located within the catchment of Rye Meads WwTW, while development north of Harlow

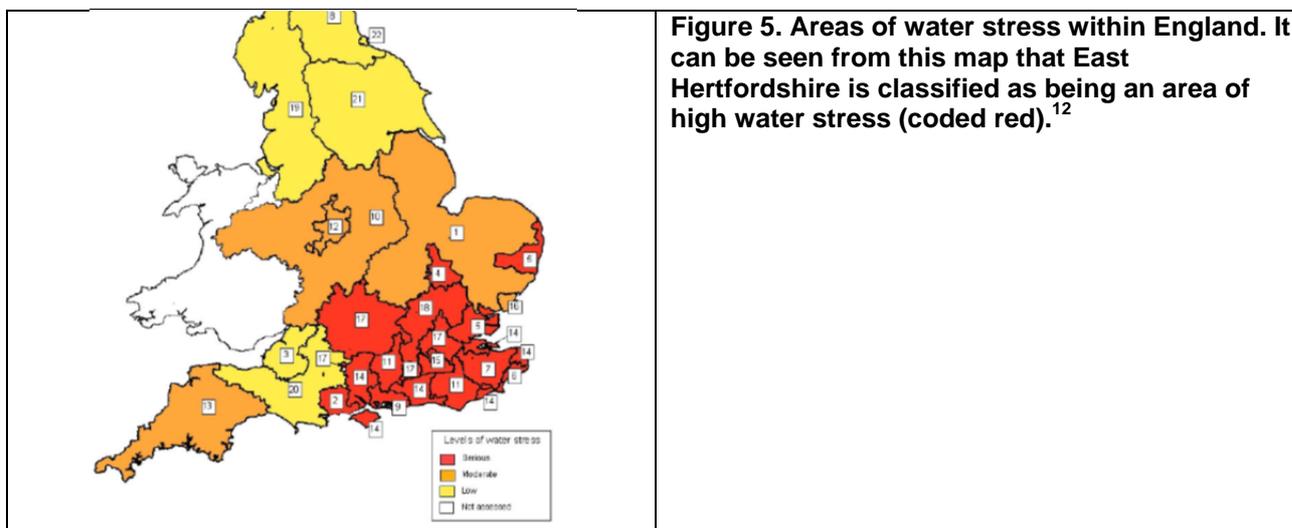
¹¹ 'In a nutrient limited system, excess of the non-limiting nutrient may not result in any signs of enrichment in the vegetation as the plants are unable to make use of one nutrient without sufficient amounts of the other'. Source: Understanding Fen Nutrients <http://www.snh.gov.uk/docs/A416930.pdf>

and east of Welwyn Garden City is also likely to be served by Rye Meads WwTW. The key settlements of Bishops Stortford and Buntingford are outside the catchment of Rye Meads WwTW. The bulk of wastewater volumes treated by the WwTW come from Stevenage, Welwyn Garden City and Harlow but settlements in East Hertfordshire also make a significant contribution.

3.2.13 Using less water per person in this way will reduce the impact the new development has on the hydraulic capacity at Rye Meads WwTW, allowing more development to be catered for with the existing capacity, and preventing the need for a larger volumetric discharge consent prior to 2021. However, the WwTW may require additional treatment capacity to be constructed to ensure that the more concentrated incoming wastewater (from existing and new dwellings) is sufficiently treated to achieve the quality consent.

Water resources

3.2.14 The East of England is generally an area of high water stress (see Figure 5).



3.2.15 The East of England is particularly vulnerable to climate change now and in the future. It is already the driest region in the country and the predicted changes will affect the amount and distribution of rainfall, and the demand for water from all sectors. The average natural summer flows of rivers could drastically reduce; the period where groundwater resources are replenished could be shorter; and resources could become much more vulnerable. By 2050, climate change could reduce water resources by 10 -15% on an annual average basis, and reduce summer river flows by 50 -80%. Drought and floods may become more frequent in the future. The reliability of existing reservoirs, groundwater extractions and river intakes will change. Some infrastructure, critical for providing water supplies, may be more vulnerable to flooding. The delivery of housing and economic development throughout the region could therefore result in adverse effects on many internationally designated sites in the region including those listed in preceding sections.

3.2.16 However, in the Environment Agency report, 'Impact of East of England Housing and Economic Growth Scenarios on Regional Water Supplies' the roll forward of the proposed RSS housing

¹² Figure adapted from Environment Agency. 2007. Identifying Areas of Water Stress. <http://publications.environment-agency.gov.uk/pdf/GEHO0107BLUT-e-e.pdf>

levels showed that this scenario is broadly consistent with the latest water resources management plans prepared by water companies supplying the region. Taking into consideration that much of the region's local water resources are fully developed and in some cases over-committed, and considering the impact of varying different levels of water resource aspirations in helping to meet these increased housing growth rates, nonetheless the conclusion of the report was that the housing to be delivered under the revision to the RSS could meet the water needs of the region without an adverse effect on internationally designated sites, provided a range of water efficiency measures are introduced.

- 3.2.17 The most recent full CAMS assessment for the Upper Lee found that the Management Unit for Rivers Lee, Mimram, Beane, Ash, Rib and Upper Stort was over-abstracted. Rye Meads SSSI component of the Lee Valley SPA/Ramsar site is situated within East Hertfordshire and is particularly sensitive to high levels of freshwater abstraction (resulting in a reduction in water levels within the SPA).

Air quality

- 3.2.18 With specific reference to the Rye Meads part of the Lee Valley SPA/Ramsar site, there is also a potential (though lesser) impact pathway from atmospheric nitrogen deposition. The most sensitive parts of the Rye Meads site to nutrient input (from air, grazing animals and treated effluent from the WwTW) are the fen and flood meadow habitats in the north-eastern part of the site. These lie within 200m of the A414. As previously discussed, habitats that lie within 200m of the centreline of a road can potentially be influenced by nitrogen deposition linked to exhaust emissions from traffic on that road. Nitrogen deposition from atmosphere already exceeds the Critical Load within the Rye Meads site for the relevant habitats (alkaline fens & reedbeds/grazing marsh), being 19.3 kgN/ha/yr for a centroid in the middle of the site, compared to a critical load range of 10-15 kgN/ha/yr. This impact pathway is also therefore be explored in the HRA.

Recreational activity

- 3.2.19 The two parts of the SPA/Ramsar site within East Hertfordshire are Amwell Quarry (Amwell Nature Reserve) and Rye Meads Nature Reserve. These are managed by Hertfordshire and Middlesex Wildlife Trust and the RSPB. Both reserves are laid out in considerable detail with a network of hides (ten at Rye Meads, three at Amwell) and clearly marked footpaths/boardwalks with screening vegetation that are specifically laid out and designed to route people away from the sensitive areas and minimise disturbance while at the same time accommodating high numbers of visitors. Moreover, no dogs are allowed (except registered assistance dogs) and the wet and marshy/open water nature of the habitats on site inherently limits off-track recreational activity, rendering it difficult to accomplish and unappealing. For these reasons it is considered that the vulnerability of Amwell Nature Reserve and Rye Meads Nature Reserve to the potential adverse effects of recreational activity that can affect other less well-managed sites is very low. Within Turnford and Cheshunt Pits, which lie outside East Hertfordshire but within the Lee Valley Country Park, recreational activity is similarly regulated through zoning of water bodies. The majority of the site is already managed in accordance with agreed management plans in which nature conservation is a high or sole priority.
- 3.2.20 It is also noted that the HRA of the Lee Valley Park Development Framework (UE Associates, 2009) was able to conclude that there would be no likely significant effect of the numerous measures and policies intended to increase public accessibility to the Regional Park (including those areas of international importance) due to the Regional Park authorities overriding commitment to managing the Regional Park and their past experience of delivering increased

access while avoiding disturbance and their ongoing commitment to visitor access management in the more sensitive parts of the Park. If proposals to improve accessibility in the Park can be concluded as being unlikely to lead to a significant effect, then logically, changes in the number of residents within the visitor catchment of the Park can be scoped out.

3.2.21 Recreational activity is therefore not considered further as an impact pathway with regard to this site.

3.2.22 Currently, the SPA/Ramsar remains in favourable condition.

3.2.23 The environmental requirements of Lee Valley SPA/Ramsar are mainly:

- The need to control recreational impacts so as to avoid bird disturbance.
- Maintenance of appropriate vegetation management through grazing, mowing and other relevant techniques.
- Continued inputs of freshwater at appropriate flow volumes
- The need to avoid further eutrophication of water bodies within the SPA/Ramsar, and to avoid any other pollution events.
- The need to avoid introduction of non-native species.
- The need to provide suitable habitat outside the boundaries of the designated area that can be utilised by key species as supporting habitats.

3.3 Wormley-Hoddesdonpark Woods SAC

3.3.1 This SAC consists of two SSSIs – Wormley-Hoddesdonpark Woods North and Wormley-Hoddesdonpark Woods South and is situated on the southern border of East Hertfordshire, with part of the SAC in Broxbourne. The semi-natural woodland is of national importance as an example of lowland south-east sessile oak/hornbeam type with the pedunculate oak/hornbeam variant also present. Additionally, small ponds and streams are important habitats for bryophytes.

Reasons for Designation

3.3.2 Wormley-Hoddesdonpark Woods qualifies as a SAC through its habitats, containing the Habitats Directive Annex I habitat:

- Oak-hornbeam forests – this is one of only two outstanding locations for such habitat in the UK.

Historic Trends and Current Pressures

Recreational activity

3.3.3 Most types of terrestrial European site can be affected by excessive levels of recreational activity. For example, there have been several papers published that empirically demonstrate that damage to vegetation in woodlands and other habitats can be caused by high volumes of recreational users. While these are not directly referencing European sites considered within this HRA they do clearly demonstrate that trampling can be an issue for sensitive habitats:

- Wilson & Seney (1994)¹³ examined the degree of track erosion caused by hikers, motorcycles, horses and cyclists from 108 plots along tracks in the Gallatin National Forest, Montana. Although the results proved difficult to interpret, it was concluded that horses and hikers disturbed more sediment on wet tracks, and therefore caused more erosion, than motorcycles and bicycles.
- Cole et al (1995a, b)¹⁴ conducted experimental off-track trampling in 18 closed forest, dwarf scrub and meadow & grassland communities (each tramped between 0 – 500 times) over five mountain regions in the US. Vegetation cover was assessed two weeks and one year after trampling, and an inverse relationship with trampling intensity was discovered, although this relationship was weaker after one year than two weeks indicating some recovery of the vegetation. Differences in plant morphological characteristics were found to explain more variation in response between different vegetation types than soil and topographic factors. Low-growing, mat-forming grasses regained their cover best after two weeks and were considered most resistant to trampling, while tall forbs (non-woody vascular plants other than grasses, sedges, rushes and ferns) were considered least resistant. Cover of hemicryptophytes and geophytes (plants with buds below the soil surface) was heavily reduced after two weeks, but had recovered well after one year and as such these were considered most resilient to trampling. Chamaephytes (plants with buds above the soil surface) were least resilient to trampling. It was concluded that these would be the least tolerant of a regular cycle of disturbance.
- Cole (1995c)¹⁵ conducted a follow-up study (in 4 vegetation types) in which shoe type (trainers or walking boots) and trampler weight were varied. Although immediate damage was greater with walking boots, there was no significant difference after one year. Heavier trampers caused a greater reduction in vegetation height than lighter trampers, but there was no difference in effect on cover.
- Cole & Spildie (1998)¹⁶ experimentally compared the effects of off-track trampling by hiker and horse (at two intensities – 25 and 150 passes) in two woodland vegetation types (one with an erect forb understorey and one with a low shrub understorey). Horse traffic was found to cause the largest reduction in vegetation cover. The forb-dominated vegetation suffered greatest disturbance, but recovered rapidly. Higher trampling intensities caused more disturbance.

3.3.4 The majority of the woods in the complex are in sympathetic ownership, with no direct threat (Hoddesdon Park Wood for example, is managed by the Woodland Trust). There is some pressure from informal recreation, and there has been limited damage in the past (for example from four-wheel drive vehicles). However, recreation is actively promoted on this site and most recreation is concentrated on well-established paths. Most of the complex is covered by a High Forest Zone Plan (Hertfordshire County Council 1996) which sets out a framework for woodland management across the whole area. It aims to restore a varied age structure and

¹³ Wilson, J.P. & J.P. Seney. 1994. Erosional impact of hikers, horses, motorcycles and off road bicycles on mountain trails in Montana. *Mountain Research and Development* 14:77-88

¹⁴ Cole, D.N. 1995a. Experimental trampling of vegetation. I. Relationship between trampling intensity and vegetation response. *Journal of Applied Ecology* 32: 203-214

Cole, D.N. 1995b. Experimental trampling of vegetation. II. Predictors of resistance and resilience. *Journal of Applied Ecology* 32: 215-224

¹⁵ Cole, D.N. 1995c. Recreational trampling experiments: effects of trampler weight and shoe type. Research Note INT-RN-425. U.S. Forest Service, Intermountain Research Station, Utah.

¹⁶ Cole, D.N., Spildie, D.R. 1998. Hiker, horse and llama trampling effects on native vegetation in Montana, USA. *Journal of Environmental Management* 53: 61-71

natural stand types through sustainable forestry. There have been some instances of fly-tipping in the past, and this does increase the risk on non-native species, such as cherry laurel and privet from garden waste. This has been coupled with instances of car dumping.

- 3.3.5 No visitor survey data that identifies the recreational catchment could be sourced for Wormley Hoddesdonpark Woods. However, data does exist for other large woodland European sites, such as Ashdown Forest¹⁷ and Epping Forest (discussed above). These indicate that core visitor catchments (i.e. the zone within which the majority of visitors are concentrated) tend to lie between 2km (Epping Forest) and 7km (Ashdown Forest) from the site. If the more precautionary figure of 7km is used, this zone would include Hertford and Ware within the recreational catchment of Wormley Hoddesdonpark Woods SAC, and potentially also the East of Welwyn Garden City settlement. It would however exclude the rest of the district. Although there is no reason to believe that Wormley Hoddesdonpark Woods SAC would receive unmanageable levels of recreational activity, the potential for risk due to development in Hertford, Ware and East of Welwyn Garden City is included as a pathway for consideration in this HRA.

Air quality

- 3.3.6 Wormley Hoddesdonpark Woods SAC Wormley Hoddesdonpark Woods SAC does lie within 200m of the A10 at grid reference 535600,208750. However, this applies to a very small part of the site (approximately 500m²) much of which is a track/path/arable field boundary and which constitutes approximately 0.01% of the SAC. Moreover it is situated on the edge of the 200m zone, being no closer to the A10 than 190m at any point.



¹⁷ Clarke RT, Sharp J & Liley D. 2010. Ashdown Forest Visitor Survey Data Analysis (Natural England Commissioned Reports, Number 048)
UE Associates and University of Brighton. 2009. Visitor Access Patterns on the Ashdown Forest: Recreational Use and Nature Conservation

- 3.3.7 As such, it is considered that increases in traffic movements on the A10 could not lead to a likely significant effect on the interest features of this SAC through changes in local air quality, due to the very small area of the SAC potentially affected. Air quality on this site is not considered further.
- 3.3.8 The environmental requirements of Wormley-Hoddesdonpark Woods SAC are mainly:
- The need to minimise impacts from vandalism arson, fly-tipping and dumping, and coupled with this, to avoid introduction of non-native species.
 - The need to ensure that recreational levels do not lead to excessive trampling of ground flora, or increased nutrient levels through dog fouling.
 - The need to ensure continued hydrological balance on the site with high-quality streams running eastward along the shallow valleys (Wormleybury Brook and Spital Brook), and several ponds.
 - The need to avoid negative changes to habitats resulting from atmospheric nutrient deposition.

4 Screening Tables for Scenarios

- 4.1.1 The following section sets out the screening assessment regarding the seven scenarios URS was asked to evaluate. Note that only those settlements/housing quantities that are changed from scenario to scenario are covered in the table below. Housing settlements and quantities that are constant across all seven scenarios are not discussed since they do not aid in distinguishing between the impacts of different scenarios. They are however factored into transport modelling that has informed the transport/air quality aspect of this analysis.

Table 4. Housing levels considered under the seven scenarios. Note that only those settlements where housing levels alter between scenarios are summarised in the table below

Location	Scenario 1A 10K at Harlow North	Scenario 1B 5K at Harlow North	Scenario 1C Nothing at Harlow North	Scenario 2A	Scenario 2B	Scenario 2C	Scenario 2D - inc 2,000 in Welhat
North of Harlow A	8,000	0	0	0	0	0	0
North of Harlow B	0	5000	0	0	0	0	0
South of Bishop's Stortford	0	0	0	800	0	800	0
East of Bishop's Stortford	0	0	0	0	150	0	0
Sawbridgeworth West	0	0	3000	2000	3000	0	2000
Ware North (1700) Ware East (1300)	0	3000	3000	1700	0	1,300	0
Buntingford A (2000) and B (500)	0	0	0	1500	500	2000	0
East of WGC (East Herts 2000, Welhat 2000)	0	0	2000	0	2000	2000	4,000

4.1.2 In order to calculate potential changes in NO_x concentrations and increases in nitrogen deposition from road transport it is necessary to calculate the flows as Annual Average Daily Traffic (AADT) for the base case (in this case the 2011 baseline), the 'Do Minimum' case (i.e. traffic growth factored up based on expected population changes, without the strategic allocations being considered in the Local Plan) and the 'Do Something' case (i.e. the traffic growth taking into account the strategic allocations being considered in the Local Plan). These data were obtained for the A414 as it lies within 200m of the Lee Valley Special Protection Area & Ramsar site (grid reference 538817,210792) for the worst-case scenario (which in transport terms is Scenario 1A including 10,000 dwellings at Harlow North). For Scenario 1A the flows were determined to be as follows.

Table 5. Flows on the A414 past Rye Meads Nature Reserve (Lee Valley SPA/Ramsar site)

	2011 Base Case	Do Minimum Scenario	Scenario 1A
AADT on A414	27,868	30,401	40,535

4.1.3 These flows were then used for air quality calculations to determine the change in NO_x and nitrogen deposition. Average vehicle speeds and percentage Heavy Duty Vehicles (42.9 mph and 5.7%, respectively) were also used to calculate the air quality changes. The results of the analysis are as follows:

Table 6: Background Pollutant Concentrations

Site: Nearest Road	1 km x 1 km OS Grid Square	Annual mean background NO _x concentrations (µg/m ³)
A414	538500,210500	26.09

Table 7: NO_x Concentrations

Distance from named link ¹⁸ (m)	Annual Mean NO _x (µg/m ³)			Change (µg/m ³)	
	Base	Do-Minimum	Do-Something	Do-Some – Do-Min	Do-Some – Base
38	35.36	35.69	36.85	+1.16	+1.49
88	28.87	28.97	29.32	+0.35	+0.45
138	26.93	26.396	27.06	+0.11	+0.14

4.1.4 The most important figures in the NO_x concentration table above are the 'Do-Some – Do-Min' row, since this identifies the difference between expected traffic growth without the Local Plan strategic allocations and expected growth with the Local Plan strategic allocations and therefore identifies the contribution made by the Local Plan strategic allocations. It can be seen that the contribution of traffic associated with the strategic allocations under Scenario 1A would be equivalent to over 1% of the critical level for NO_x of 30 µg/m³ although this would be restricted to a corridor less than 100m wide; moreover, except very close to the road (i.e. within 88m) the total NO_x concentration under the 'Do Something' scenario would fall below the Critical Level for NO_x of 30 µg/m³. Nonetheless, in accordance with Environment Agency guidance it would not be possible to dismiss a likely significant effect on the interest features of the SPA/Ramsar site as a result of Scenario 1A. It is however sufficiently small that Scenarios which would deliver a smaller quantum of housing (i.e. Scenarios 1B – 1C and 2A – 2D) would probably fall below the '1% of the critical level' threshold.

¹⁸ Assumes no improvements in background concentrations or emission rates between baseline year (2011) and opening year

Table 8: Nitrogen Deposition Rates

Distance from named link ¹⁹ (m)	Year	Nitrogen deposition rate (kg N/ha/yr)		
		Road Contribution	Average Rate in 5km square	Total
38	Base	0.27	16.27	16.54
	Do-Minimum	0.27	16.27	16.54
	Do-Something	0.30	16.27	16.58
	DS-DM	-	-	+0.03
	DS-Base	-	-	+0.04
88	Base	0.08	16.27	16.35
	Do-Minimum	0.09	16.27	16.36
	Do-Something	0.10	16.27	16.37
	DS-DM	-	-	+0.01
	DS-Base	-	-	+0.02
138	Base	0.03	16.27	16.30
	Do-Minimum	0.03	16.27	16.30
	Do-Something	0.03	16.27	16.30
	DS-DM	-	-	+<0.01
	DS-Base	-	-	+<0.01
Critical Load for fenland				10

4.1.5 The most important figure in the nitrogen deposition table above is the 'DS-DM' row, since this identifies the difference between expected traffic growth without the Local Plan strategic allocations and expected growth with the Local Plan strategic allocations and therefore identifies the contribution made by the Local Plan strategic allocations under Scenario 1A. It can be seen that in all cases the contribution of traffic generated under Scenario 1A would constitute less than 1% of the Critical Load for nitrogen deposition. In accordance with Environment Agency guidance therefore, this would be a trivial contribution that could effectively be dismissed without further analysis.

4.1.6 The results of this appraisal and the potential likely significant effect via NOx concentrations as a result of Scenario 1A have been factored into the analysis that follows in Table 5.

¹⁹ Assumes no improvements in background concentrations, emission rates or deposition rates between baseline year (2011) and opening year

Table 5. Assessment of each scenario with regard to impacts on European sites, structured by impact pathway

Pathway	Scenario 1A	Scenario 1B	Scenario 1C	Scenario 2A	Scenario 2B	Scenario 2C	Scenario 2D
Air quality (Lee Valley SPA/Ramsar site and Epping Forest SAC)	Placing 8,000 dwellings north of Harlow is a substantial increase within both the M11 corridor and the A414 corridor. The A414 corridor lies within 200m of the Lee Valley SPA/Ramsar site while the M11 corridor could form a route to the M25 and other roads that traverse Epping Forest SAC. Given the scale of dwellings proposed a substantial increase in traffic movements could result and transport/air quality calculations have confirmed that a Likely Significant Effect on the SPA/Ramsar site could not be	Moving 3,000 dwellings from Harlow to Ware reduces the risk to Epping Forest SAC by moving development from the M11 corridor but it still places significant development close to the A414 corridor.	Moving 2,000 dwellings from North of Harlow to East of Welwyn Garden City is likely to reduce flows on the M11 corridor. It may also somewhat reduce flows on the A414 past the Lee Valley SPA/Ramsar site compared to scenarios 1A and 1B, given the distances involved. This option is the most favourable of the three 'option 1' scenarios (1A to 1C) for Epping Forest SAC as it places the least development in the M11 corridor (3,000 dwellings at Sawbridgeworth).	This scenario would be preferable to some others with regard to Lee Valley SPA/Ramsar site since it places significant housing well away from the A414 corridor (1,500 dwellings at Buntingford), although it still places 3,700 dwellings within the A414 corridor.	This scenario would place 5,000 additional dwellings along the A 414 corridor at East of Welwyn Garden City and Sawbridgeworth. Although placing 2,000 dwellings at East of Welwyn Garden City may also be preferable for the SPA/Ramsar site than other scenarios, since although Welwyn Garden City is located on the A414 corridor, it is situated 10km from the relevant section of the road and there are numerous opportunities for traffic to disperse along other routes between Welwyn Garden City and the Lee Valley SPA/Ramsar site.	This is the most preferable scenario from the point of view of the Lee Valley SPA/Ramsar site because it distributes the largest number of dwellings away from the A414 corridor (2,800 dwellings at Buntingford and Bishops Stortford). The placement of 2,000 dwellings East of Welwyn Garden City may also be preferable for the SPA/Ramsar site than other scenarios, since although Welwyn Garden City is located on the A414 corridor, it is situated 10km from the relevant section of the road and there are numerous	This scenario would place 5,000 additional dwellings along the A 414 corridor at East of Welwyn Garden City and Sawbridgeworth. It would however be a good scenario for Epping Forest SAC (although not as good as 2B) as it places only 2,000 dwellings within the M11 corridor.

Pathway	Scenario 1A	Scenario 1B	Scenario 1C	Scenario 2A	Scenario 2B	Scenario 2C	Scenario 2D
	dismissed.					<p>opportunities for traffic to disperse along other routes between Welwyn Garden City and the Lee Valley SPA/Ramsar site.</p> <p>This scenario is also the most favourable from the point of view of Epping Forest SAC since it places the least development within the M11 corridor.</p>	
Water quality (Lee Valley SPA/Ramsar site)	<p>Scenarios 1A to 1C are, from the point of view of water quality in European sites, identical as they all propose approximately 8,000 additional dwellings within the catchment of Rye Meads WwTW. These are therefore the least preferred options from the water quality point of view as they will place the greatest burden on the WwTW.</p>			<p>Scenario 2A proposes 3,970 dwellings within the catchment of Rye Meads WwTW (at Ware, Sawbridgeworth and Harlow (Terlings Park)). This is much less than scenarios 1A – 1C and is therefore more suitable than those scenarios.</p>	<p>Scenario 2B places almost all the additional housing within the catchment of Rye Meads WwTW, but proposes a smaller quantity than scenarios 1A-1C (5,000 additional dwellings at Sawbridgeworth and East of Welwyn Garden City)</p>	<p>Scenario 2C is the most preferred from the point of view of water quality in European sites, because it provides for the lowest development levels within the catchment of Rye Meads WwTW by including large scale development at Bishops Stortford</p>	<p>Scenario 2D is very similar to 2B, placing almost all the additional housing within the catchment of Rye Meads WwTW (6,000 additional dwellings at Sawbridgeworth and East of Welwyn Garden City)</p>

Pathway	Scenario 1A	Scenario 1B	Scenario 1C	Scenario 2A	Scenario 2B	Scenario 2C	Scenario 2D
						and Buntingford (both of which are served by other WwTWs) and by proposing smaller levels of housing at Sawbridgeworth, Ware, North of Harlow and East of Welwyn Garden City (which are all served/most likely to be served by Rye Meads WwTW) than any of the other scenarios (3,300 additional dwellings in total).	
Recreational activity (Wormley Hoddesdonpark Woods SAC)	Scenario 1A is the scenario likely to have the lowest risk of significantly increasing recreational activity within the SAC as this places the least housing at Hertford, Ware or East of Welwyn Garden City. This is followed by Scenario 2A, Scenario 2B, Scenario 1B, Scenario 2C/Scenario 2D and Scenario 1C on the basis that these place progressively greater levels of housing within 7km of the SAC.						

4.2 Water quality at Lee Valley SPA/Ramsar site

- 4.2.1 In summary, it can be concluded that **Scenario 2C is the most preferred** from the point of view of water quality in European sites, because it provides for the lowest development levels within the catchment of Rye Meads WwTW by including large scale development at Bishops Stortford and Buntingford (both of which are served by other WwTWs) and by proposing smaller levels of housing at Sawbridgeworth, Ware, North of Harlow and East of Welwyn Garden City (which are all served/most likely to be served by Rye Meads WwTW) than any of the other scenarios (3,300 additional dwellings in total).
- 4.2.2 Scenario 2A is the next most preferred option since this includes a larger proportion of dwellings at Ware, Sawbridgeworth and Harlow (Terlings Park) – a total of 3,970 additional dwellings but still places considerable development outside the catchment of the WwTW.
- 4.2.3 Scenarios 2B and 2D are both very similar in that they place almost all the additional housing within the catchment of Rye Meads WwTW (6,000 additional dwellings at Sawbridgeworth and East of Welwyn Garden City under scenario 2D and 5,000 at those same settlements under scenario 2B).
- 4.2.4 Scenarios 1A to 1C are, from the point of view of water quality in European sites, identical as they all propose approximately 8,000 additional dwellings within the catchment of Rye Meads WwTW. These are therefore the least preferred options from the water quality point of view and carry the highest deliverability risk.
- 4.2.5 Calculations undertaken for the Rye Meads Water Cycle Study suggested that Rye Meads WwTW should be able to operate within its existing volumetric discharge consent limit past 2021 (using the housing levels set out in the East of England Regional Spatial Strategy). However, upgrades will be needed in this period to increase the existing treatment capacity of the works, to ensure the required chemical and biological standards of the discharged effluent are met. Thames Water and the Water Cycle Study both expressed the view that these upgrades, with appropriate measures, can be implemented without significantly impacting the adjacent Rye Meads nature reserve and the Lee Valley Special Protection Area.
- 4.2.6 The Water Cycle Study notes that the requirement for an increased volumetric discharge consent at Rye Meads WwTW after 2021 will be dependent on the development that actually occurs within the catchment. It recommends that local authorities such as Stevenage, East Herts and Welwyn Hatfield can reduce the risk of this by developing outside of the catchment where possible, although it does identify that a key factor in this will be the destination of wastewater from any development sites to the North, East and West of Stevenage. The Water Cycle Study identifies a range of alternative options for treating this wastewater, such as upgrading a WwTW in the Anglian Water Services region and the possibility of a new WwTW, closer to Stevenage, in the Thames Water region.
- 4.2.7 The Water Cycle Study concluded that planned upgrades at Rye Meads WwTW should allow development to continue in the medium term, although a long-term solution beyond 2021 has not yet been agreed upon by the Water Cycle Study stakeholders, as this will require further investigation. The need for an increased Dry Weather Flow consent to account for additional growth to 2031 is a risk, as there can be no guarantees that such a consent would be granted, or that the quality of the discharge required would not be cost prohibitive, particularly given the emerging requirements of the Water Framework Directive.

- 4.2.8 Given this, the selection of scenarios that places the least development within the catchment of Rye Meads WwTW (i.e. those that focus development on Bishops Stortford and Buntingford) would be the more precautionary approach with regard to the protection of European sites, particularly with regard to housing that is likely to be delivered after 2021.
- 4.2.9 The Water Cycle Study recommends that in order that future development is not constrained, Local Authorities must continue to communicate with Thames Water as the phasing and location of this development becomes more certain and East Hertfordshire Council have been engaging in such a dialogue. The Water Cycle Study also recommended that Thames Water should closely monitor the development rates and actual flows from Rye Meads whilst optimising the operational strategy at the works through the planned AMP5 upgrades.
- 4.2.10 In line with this recommendation, Thames Water has continued to monitor capacity at Rye Meads WwTW. According to the East Hertfordshire District Plan, since the Water Cycle Study was commissioned, forecast volumes of treated effluent discharged to the river have been lower than were forecast at the time of the Rye Meads study. This is because of reduced consumption and also lower rates of house building than were envisaged at the time. Difficulties with the West of Stevenage proposals are an example of this. Therefore concerns about capacity have somewhat receded over the next twenty year period. Whilst Thames Water continues to monitor the situation closely, it does not believe that there are sufficient grounds for refusing particular developments during the plan period due to capacity constraints at Rye Meads WwTW.
- 4.2.11 Given the level of confidence indicated by Thames Water with regard to their ability to treat development at Rye Meads WwTW without an impact on Rye Meads reserve and the Lee Valley SPA/Ramsar site, and the fact that more capacity remains at Rye Meads WwTW than was originally estimated to be the case at this point in time, there is no evidence to conclude that any of the Scenarios cannot be accommodated. However, those Scenarios that place the greatest level of housing within the Rye Meads WwTW catchment carry the greatest risk and therefore Scenario 2C remains the most preferred Scenario.
- 4.2.12 Whichever Scenario is selected, the District Plan should incorporate an appropriate policy with regard to phasing of development that makes it clear the development within the Rye Meads WwTW catchment (particularly at Sawbridgeworth, Hertford, Ware, North of Harlow and East of Welwyn Garden City) must maintain pace with the identification of wastewater treatment solutions that will protect water quality and particularly the Lee Valley SPA/Ramsar site, especially after 2021. To aid delivery of this policy, the Council should continue their dialogues with Thames Water and the Environment Agency.
- 4.2.13 The District Plan should also (as recommended by the Environment Agency) include an appropriate policy that promotes high levels of water efficiency in new development. If effectively delivered such a policy can reduce the burden on the wastewater treatment infrastructure in the district and thus potentially expand the period over which Rye Meads WwTW can continue to accommodate new development without substantial physical or process upgrades.

4.3 Water resources

- 4.3.1 Almost all settlements within East Hertfordshire receive their potable water supply through Veolia Water. As such, the spatial aspect of the various Scenarios is not relevant to an assessment of the burden that they pose and the water resource assessment focuses entirely

on the quantum of development proposed. On that basis, **Scenario 2B is the most favourable**, proposing the lowest level of development in the district (12,178 dwellings), followed by Scenarios 2A and 2D (12,258 dwellings) and Scenario 2C (12,358 dwellings). In reality however, the difference between the four scenarios is very small. In contrast, Scenarios 1A – 1C propose 14,258 dwellings in the district, which renders them the least favourable scenarios from a water resources point of view.

- 4.3.2 Within its catchment Veolia Water abstracts water from two European sites (or tributaries of those sites): Lee Valley SPA/Ramsar site and South West London Waterbodies SPA/Ramsar site; the effect of current licenced abstractions on both of these sites was undertaken as part of the Environment Agency Review of Consents process for those sites. It is noted in the Rye Meads Water Cycle Study that *'Three Valleys Water [as Veolia Water was named at the time] are confident that optimisation of existing resources coupled with an extensive demand management scheme, involving accelerated penetration of customer water meters, will prevent a supply/ demand deficit occurring in the study area prior to 2035'*.
- 4.3.3 Veolia Water's current Water Resources Management Plan (March 2010), has been agreed by the Environment Agency and OFWAT (the water regulator). The demand projections used in the plan are based on 90% rollout of water meters by 2030, leading to a reduction in daily per capita consumption of 132 litres by that date. Without metering, demand by the same date is forecast at 148 litres. Based on the assumptions about rollout of metering, the plan suggests that there is likely to be sufficient water to meet demand through to 2035 without developing new water resources, subject to the Environment Agency's licensing requirements for water abstraction. In reaching this conclusion Veolia acknowledges uncertainty around several variables, but has allowed a margin of error and remains flexible in its approach. The Water Resource Management Plan does not propose any increase in licenced abstraction volumes from any European sites. Since existing abstraction licences will have been subject to a Review of Consents process by the Environment Agency in order to confirm that their impact on European sites is acceptable (and no reductions in licenced abstraction volume with regard to the Lee Valley SPA/Ramsar site or South West London Waterbodies SPA/Ramsar site were proposed as part of the Review of Consents), abstraction that remains within existing licenced volumes will not result in a likely significant effect on any European sites.
- 4.3.4 This is however based on a very high level of water metering and demand management. Given this, the Rye Meads Water Cycle Strategy recommended that water efficiency targets would reduce the burden of development on water resources and water supply infrastructure. The concept of offsetting water demand from new development by increased water efficiency and reduced demand in existing buildings is referred to as water neutrality. This allows water to remain in the environment for ecological and leisure purposes and negates the need for new resources such as reservoirs. The strategy suggested that *'water neutrality should always be the aim of Local Authorities, the water companies and developers'*. In discussions during the preparation of the District Plan the Environment Agency has recommended that to reflect this recommendation the Council should introduce a water efficiency policy. If such a policy is devised, then within the context of the Water Resource Management Plan and its conclusions a likely significant effect on European sites should be avoidable. The selection of housing levels within the ranges set out in scenarios 2A-2D would however considerably reduce any residual risk in comparison to Scenarios 1A-1C.

4.4 Air quality

Lee Valley SPA/Ramsar site

- 4.4.1 From the point of view of air quality on the Lee Valley SPA/Ramsar site, **Scenario 2C is the most preferred option** since it places the most development away from the A414 corridor between Hertford and Harlow (and thus past Rye Meads SSSI (Lee Valley SPA/Ramsar site)) by situating considerable development at Bishops Stortford and Buntingford and providing only 3,300 additional dwellings at Ware and East of Welwyn Garden City. This would be followed by Scenario 2A which would place 3,700 additional dwellings along the A414 corridor at Ware and Sawbridgeworth, Scenario 2B which would place 5,000 additional dwellings along that corridor at East of Welwyn Garden City and Sawbridgeworth and Scenario 2D which would place 6,000 additional dwellings at the same locations. Once again, Scenarios 1A to 1C would be the least preferred from this point of view since they would locate 8,000 dwellings along the A414 corridor at North of Harlow. It has been established through transport and air quality calculations that Scenario 1A would lead to a Likely Significant Effect on the Lee Valley SPA/Ramsar site and therefore would require the Local Plan to consider placing air quality mitigation measures into policy.

Epping Forest SAC

- 4.4.2 For Epping Forest SAC, **scenario 2C would also probably be the most favourable scenario** since it places the least development within the M11 corridor (800 additional dwellings at Bishops Stortford but no additional dwellings at Sawbridgeworth or North of Harlow); the M11 corridor could provide a direct route to the M25 and other routes through Epping Forest SAC. In contrast, the other scenarios all propose at least 2,000 additional dwellings within the M11 corridor, rising to 8,000 additional dwellings North of Harlow in the case of Scenario 1A. It is not possible to make a more categorical assessment until transport data for the M11 are available from the transport model for each scenario and therefore a precautionary approach is advocated.
- 4.4.3 However, it must be noted that the analysis of these Scenarios does not currently factor in the role of a bypass in conjunction with the North of Harlow development. Such a bypass could reduce vehicle flows on the M25 past Epping Forest SAC but could also increase vehicle flows on the A414 past the Lee Valley SPA/Ramsar site. On balance however, Epping Forest SAC is likely to be the most vulnerable and sensitive of the two European sites to air quality issues due to its habitats and the fact that nutrient inputs into Rye Meads SSSI/Lee Valley SPA/Ramsar site are overwhelmingly dominated by discharges from Rye Meads WwTW and other fluvial sources rather than deposition from air.

4.5 Recreational activity at Wormley Hoddesdonpark Woods SAC

- 4.5.1 **Scenario 1A is the scenario likely to have the lowest risk** of significantly increasing recreational activity within the SAC as this places the least housing at Hertford, Ware or East of Welwyn Garden City. This is followed by Scenario 2A, Scenario 2B, Scenario 1B, Scenario 2C/Scenario 2D and Scenario 1C on the basis that these place progressively greater levels of housing within 7km of the SAC. However, it is considered that this is a very precautionary analysis in that the actual core catchment of the SAC may be considerably more restricted than 7km (for example, that of Epping Forest SAC is just 2km), recreational activity within the SAC is likely to be manageable without an adverse effect even with a substantial increase in visitors

and it would be relatively straightforward to reduce the risk of unsustainable levels of recreational activity through provision of additional new natural greenspace (or opening access to areas currently inaccessible) in parallel with delivery of new housing. In contrast, mitigating for air quality or water quality issues on Epping Forest SAC and Lee Valley SPA/Ramsar site respectively is likely to be considerably more involved and these pathways/sites are likely to pose more of a constraint to the location and phasing of development than Wormley Hoddesdonpark Woods SAC.

4.6 Other plans and projects

- 4.6.1 The evaluation of water quality impacts on Lee Valley SPA/Ramsar site already takes into account other plans and projects as the key additional sources of wastewater for Rye Meads WwTW over the plan period were factored into the Water Cycle Study calculation and Thames Water's own assessment upon which this HRA analysis is based. Similarly, the evaluation of water resource impacts draws upon Review of Consents work and the Water Resource Management Plan which take into account proposed development levels across the Veolia Water catchment.
- 4.6.2 The evaluation of air quality impacts on Epping Forest SAC and Lee Valley SPA/Ramsar site will, in its completed form, take into account surrounding developments that may increase traffic flows on the A414 and roads through Epping Forest, since the transport modelling on which it will draw takes into account population changes over the District Plan period. The assessment will also take account of new/consented significant point sources within the vicinity of Rye Meads WwTW e.g. Energy from Waste facilities.
- 4.6.3 In addition to new housing in East Hertfordshire, it is likely that parts of Broxbourne, Welwyn Hatfield district and Hertsmere district (Potter's Bar) may also lie within the recreational catchment of Wormley Hoddesdonpark Woods SAC. Most development in Welwyn Hatfield district will be based at Welwyn Garden City and Hatfield and therefore probably outside the recreational catchment, but the majority of recreational visitors to the SAC are likely to come from Broxbourne district, since the largest settlements in close proximity to the SAC are located in that district. Potter's Bar and Hertford/Ware may also make a significant contribution. It is considered that an adverse effect on the integrity of the Wormley Hoddesdonpark Woods SAC from increased recreational activity is not a high risk; however, when development at Ware in the East Hertfordshire scenarios is considered in combination with approximately 7,000 dwellings that may be delivered in Broxbourne²⁰ and 400 dwellings to be delivered at Potter's Bar it is considered that it cannot be ruled out at this stage. This will therefore be explored further in subsequent stages of the HRA; such an exploration will include consideration of the other semi-natural recreational greenspace within the district and any strategies to further improve greenspace accessibility over the District Plan period.

²⁰ Broxbourne are currently developing a Local Plan having stopped progress in their District Plan in July 2012; however, based on their previous housing proposals approximately 7,000 dwellings from 2006 – 2026 does not seem unlikely as a broad rule of thumb.

5 Overall conclusion

- 5.1.1 It is considered that overall, Scenario 2C is the most favourable from the point of view of minimising the risk of likely significant effects on European sites.
- 5.1.2 No Scenario is likely to be undeliverable, although Scenario 1A or any other Scenario based around 10,000 dwellings north of Harlow is likely to pose a number of issues requiring further investigation and resolution, mainly in relation to air quality on Lee Valley SPA/Ramsar site and Epping Forest SAC. The analysis for the HRA at this stage has identified that a likely significant effect on those sites cannot be ruled out as a result of the 10,000 north of Harlow scenario.
- 5.1.3 As the District Plan is developed further, the HRA can be undertaken to greater detail and analyse the individual proposed policies. Further transport/air quality modelling would be possible at that stage for the chosen scenario. That would enable deposition rates due to increased traffic to be calculated and thus the scale of any necessary mitigation to be identified.
- 5.1.4 However, it must be noted that the purpose of District Plan-level HRA is to define a policy framework to enable the delivery of measures that would ensure that no adverse effect resulted, rather than to undertake detailed impact assessment of individual developments and devise the details of the mitigation measures themselves since the District Plan is a high-level policy document.
- 5.1.5 It is recognised that the strategy for development in East Hertfordshire will consist of development in the urban areas and small urban extensions prior to 2021, and transport modelling/air quality calculations have not identified any air quality issues relating to these scales of development. A large urban extension at Bishop's Stortford North, even prior to 2021, would be unlikely to have significant effects on the European sites, primarily because of the distance of these sites from Bishop's Stortford.
- 5.1.6 With the exception of Bishop's Stortford North, large urban extensions such as north of Harlow or alternatives for large urban extensions at other East Herts towns would only become important for housing delivery in East Hertfordshire after 2021. Given this, a reasonable approach would be to have a criteria-based policy within the District Plan which guards against development coming forward post-2021 until issues regarding air quality etc. have been resolved. This would also enable time for the cumulative impacts of development proposals not just in East Herts but also in other local authorities to be taken into account.
- 5.1.7 Criteria-based policy wording could be something along these lines:
- 5.1.8 *'Development at [X, Y large development sites] shall only be permitted after 2021 if it can be determined that no adverse effect on the integrity of Special Areas of Conservation, Special Protection Areas and Ramsar sites would result, either alone or in combination with other projects and plans. If an adverse effect cannot be avoided then Part 1 of the District Plan will need to be reviewed to include an alternative strategy for development after 2021.'*

- 5.1.9 In consultation on Core Strategies for other local authorities, Natural England have referred to best practice guidance²¹ for air quality improvement measures that could be included in Local Plans. The guidance identifies four broad types of mitigation measure:
- Behavioural measures and modal shift - reducing the amount of traffic overall;
 - Traffic management - modifying traffic behaviour to control where emissions are generated;
 - Emissions reduction at source - reducing the emissions level per vehicle; and
 - Roadside barriers - reducing the impact on the public of emissions.
- 5.1.10 East Hertfordshire Council should therefore give consideration to incorporating such measures into their Plan.
- 5.1.11 It is important that where air quality problems are identified there is also a mechanism established to monitor the effectiveness of the measures adopted (using the critical load/level as a monitoring target against which the success or failure of mitigation measures can be evaluated) and amend them as required. This is in line with practice in other local authorities where traffic-related air quality has been identified as a potential concern. In order to ensure that the Council's measures to improve air quality across the district are shown to be effective in terms of protection of the European sites, the Council should adopt a partnership approach to monitoring of air quality on these European sites. Monitoring is an essential factor when dealing with an issue such as air quality which has a high degree of uncertainty, since it will enable the effectiveness of air quality improvement measures to be evaluated and amended over the Local Plan period.

²¹ Best Practice Guide for Assessment of Traffic and Air Quality Impacts (West London Air Quality Cluster Group, 2005)
<http://www.westlondonairquality.org.uk/uploads/documents/Best%20Practice%20Guide/WLA%20Best%20Practice%20Air%20Quality%20and%20Transport%20Guide%2020051.pdf>