Harlow District Council

HRA for Harlow District Council Screening Report

Final
October 2010

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Revision Schedule

HRA Screening Report
October 2010

Rev	Date	Details	Prepared by	Reviewed by	Approved by
01	02/03/10	Draft HRA Screening Report	**Dr Graeme Down** Ecologist	**Dr James Riley** Principal Ecologist	**Dr James Riley** Principal Ecologist
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1 Introduction

1.1 Legislation

1.1.1 In October 2005, the European Court of Justice ruled that the UK had failed to transpose correctly the provisions of Articles 6(3) and (4) of Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora – the Habitats Directive – into national law. Specifically, the UK had failed to ensure that land use plans are subject to Appropriate Assessment where they might have a significant effect on a Natura 2000 site (Special Areas of Conservation, SACs and Special Protection Areas, SPAs). It is Government policy (as described in Planning Policy Statement 9: Biodiversity & Geological Conservation) for sites designated under the Convention on Wetlands of International Importance (Ramsar sites) to be treated as having equivalent status to Natura 2000 sites. As such, Appropriate Assessments should also cover these sites.

1.1.2 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 & Species Regulations 2010. The ultimate aim of HRA 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.

1.1.3 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.

1.1.4 In order to ascertain whether or not site integrity will be affected, an HRA should be undertaken of the plan or project in question:

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 & Species Regulations 2010

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*".

1.1.5 Following the European Court ruling, the former Office of the Deputy Prime Minister (ODPM; now CLG) indicated that the regulations implementing the Habitats Directive in the UK would be amended to ensure that HRA explicitly applies to land use plans. Planning Policy Statement (PPS) 9 states that Ramsar sites (wetlands of international importance) should receive the same protection as designated SACs and SPAs.

1.2 Scope and Objectives

1.2.1 The role of the *Natura 2000* sites (SACs, SPAs, Ramsar sites) is to provide statutory protection for terrestrial and coastal sites that are of European and global importance as a result of habitats or species contained within them. Scott Wilson has been appointed by Harlow District Council to assist in undertaking a Habitat Regulations Assessment (HRA) of the potential effects of the Core Strategy (CS) Issues and Options, on the *Natura 2000* network.

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 Waste development within Harlow.

1.2.3 Chapter 2 explains the process by which the HRA process as a whole will be carried out, focussing on the screening (Likely Significant Effects) stage – the subject of this report. Chapter 3 explores the relevant pathways of impact that form the criteria on which CS issues and options were screened in or out of assessment. Chapter 4 presents tables covering the screening of each issue and option. Chapter 5 then summarises the conclusions of screening and makes recommendations for the next stage of the CS production.

2 Methodology

2.1 Key Principles

2.1.1 This section sets out the basis of the methodology for the HRA. Scott Wilson 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 will use existing information to inform the assessment. This will include information gathered as part of the SA of the emerging LDF and information held by Natural England, the Environment Agency and others.
Consult with Natural England, the Environment Agency and other stakeholders	We will ensure continued consultation with both Natural England and the Environment Agency 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 LDF (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 AA process and findings are clearly documented in order to ensure a clearly discernible audit trail.

2.2 Process

2.2.1 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 2006[2] . As yet, no further formal guidance has emerged.

2.2.2 Figure 1 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.

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

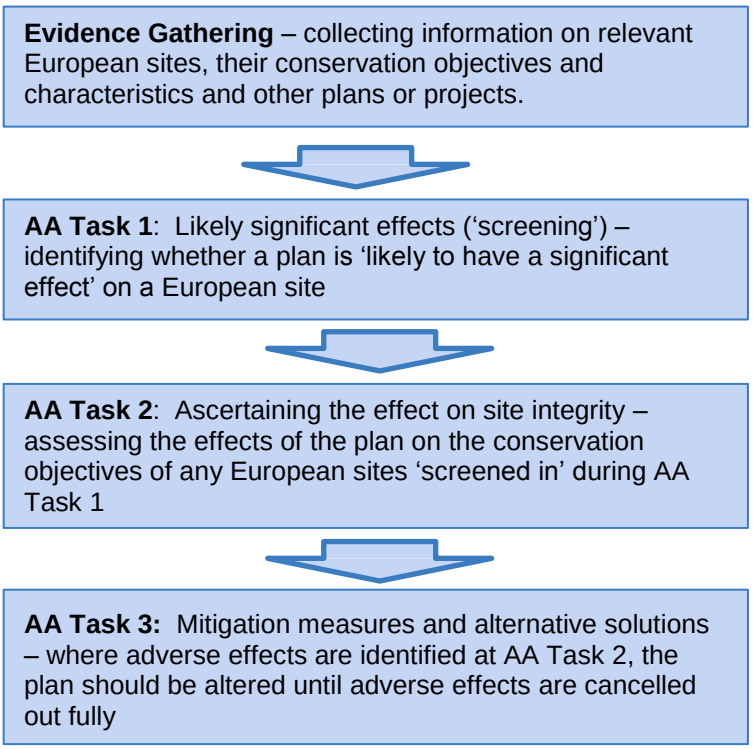

Figure 1 – Four-Stage Approach to Habitat regulations Assessment (Source: CLG, 2006)

2.3 Likely Significant Effects (LSE)

2.3.1 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?"

2.3.2 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.

2.3.3 That screening assessment is the purpose of this report.

2.4 Physical Scope of the Assessment

2.4.1 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)

2.4.2 Briefly defined, pathways are routes by which a change in activity within Harlow 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 Harlow District Council.

2.4.3 There are no European sites within Harlow, but the following sites require consideration because there is potential for CS Issues and Options to create significant effects even though the sites lie outside the authorities boundary:

- Epping Forest Special Area of Conservation (SAC);
- Lee Valley Special Protection Area (SPA) and Ramsar site; and
- Wormley-Hoddesdonpark Woods SAC

2.4.4 In order to fully inform the screening process, a number of recent studies have been consulted to determine LSE that could arise from the Harlow 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)
- The East of England Regional Spatial Strategy HRA (2006; now revoked); The East of England Regional Spatial Strategy: Proposed Changes and Further Proposed Changes HRA (2007; now revoked); the initial work on the HRA of the Draft Revision to the East of England Regional Spatial Strategy (now revoked)
- 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 data from the England Leisure Day Visits Survey in conjunction with judicious use of the precautionary principle
- The UK Air Pollution Information System (www.apis.ac.uk);
- Nature on the Map and its links to SSSI citations and the JNCC website (http://www.natureonthemap.naturalengland.org.uk/)

2.5 Principal Other Plans and Projects

2.5.1 It is neither practical nor necessary to assess the 'in combination' effects of the Core Strategy within the context of all other plans and projects within Hertfordshire 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 development proposed for other west Essex and Hertfordshire authorities over the lifetime of the Core Strategy.

2.5.2 Although the Regional Spatial Strategy for the East of England has now been revoked, its housing allocations provide the best introduction of the broad development proposals for Essex and 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 Core Strategy.

Table 2. Housing levels proposed across Hertfordshire and west Essex under current proposals

Local Authority	Annual housing average	Total housing from 2001 to 2021	Draft total housing from 2011 to 2031
Broxbourne	255	5,100	5,100
Dacorum	315	6,300	6,100
East Hertfordshire	1,040	20,800	11,000
Hertsmere	210	4,200	5,000
North Hertfordshire	790	15,800	15,800
St. Albans	350	7,000	7,000
Stevenage	320	6,400	6,400
Three Rivers	180	3,600	4,000
Watford	230	4,600	5,100
Welwyn Hatfield	290	5,800	5,800
Epping Forest	150	3,500	3,200
Harlow	**1,010**	**16,000**	**16,000**

2.5.3 There are other plans and projects that are relevant to the 'in combination' assessment, most notably Thames Water's Water Resource Management Plan (2009), Essex and Suffolk Water's WRMP (2009), Three Valleys Water's WRMP (2009) and the Environment Agency's Catchment Abstraction Management Strategies for the Upper Lee (2006) and for London (2006). These are all taken into account in this assessment.

2.5.4 The Minerals and Waste Development Frameworks for Essex and Hertfordshire are also of some relevance, since these may well contribute to increased vehicle movements on the road network within Harlow (and thereby contribute to air quality impacts). The Essex and Hertfordshire 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 boroughs 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 Draft Replacement London Plan (2009) and the London Plan (2004).

2.5.5 In relation to recreational pressure, the following documents have been consulted for their plans and projects that may affect European sites in combination with development in Harlow: A Green Infrastructure Plan for the Harlow Area (2005); East Hertfordshire Parks and Open Spaces Strategy 2007-2012; Lee Valley Regional Park Authority Site management Plan 2006-2011; Epping Forest Management Plan 2004-2010; Hoddesdonpark Wood Management Plan 2006-2011.

3 Pathways of Impact

3.1 Introduction

3.1.1 This section of the report summarises the various impact pathways that can link development in Harlow with European sites.

3.1.2 The pathways of impact considered further due to the potential for them to impact upon relevant internationally designated sites are atmospheric pollution, recreational pressure, water resources and reduced water quality. Whether they are actually likely to arise from the Core Strategy is considered later in the report.

3.2 Atmospheric Pollution

3.2.1 Current levels of understanding of air quality effects on semi-natural habitats are not adequate to allow a rigorous assessment of the likelihood of significant effects on the integrity of key European sites.

Table 3. Main sources and effects of air pollutants on habitats and species

Pollutant	Source	Effects on habitats and species
Acid deposition	SO_2, NOx and ammonia all contribute to acid deposition. Although future trends in S emissions and subsequent deposition to terrestrial and aquatic ecosystems will continue to decline, it is likely that increased N emissions may cancel out any gains produced by reduced S levels.	Can affect habitats and species through both wet (acid rain) and dry deposition. Some sites will be more at risk than others depending on soil type, bed rock geology, weathering rate and buffering capacity.
Ammonia (NH_3)	Ammonia is released following decomposition and volatilisation of animal wastes. It is a naturally occurring trace gas, but levels have increased considerably with expansion in numbers of agricultural livestock. Ammonia reacts with acid pollutants such as the products of SO_2 and NO_X emissions to produce fine ammonium (NH_4+) containing aerosol which may be transferred much longer distances (can therefore be a significant trans-boundary issue.)	Adverse effects are as a result of nitrogen deposition leading to eutrophication. As emissions mostly occur at ground level in the rural environment and NH_3 is rapidly deposited, some of the most acute problems of NH_3 deposition are for small relict nature reserves located in intensive agricultural landscapes.
Nitrogen oxides NO_x	Nitrogen oxides are mostly produced in combustion processes. About one quarter of the UK's emissions are from power stations, one-half from motor vehicles, and the rest from other industrial and domestic combustion processes.	Deposition of nitrogen compounds (nitrates (NO_3), nitrogen dioxide (NO_2) and nitric acid (HNO_3)) can lead to both soil and freshwater acidification. In addition, NO_x can cause eutrophication of soils and water. This alters the species composition of plant communities and can eliminate sensitive species.

Pollutant	Source	Effects on habitats and species
Nitrogen (N) deposition	The pollutants that contribute to nitrogen deposition derive mainly from NO_X and NH_3 emissions. These pollutants cause acidification (see also acid deposition) as well as eutrophication.	Species-rich plant communities with relatively high proportions of slow-growing perennial species and bryophytes are most at risk from N eutrophication, due to its promotion of competitive and invasive species which can respond readily to elevated levels of N. N deposition can also increase the risk of damage from abiotic factors, e.g. drought and frost.
Ozone (O_3)	A secondary pollutant generated by photochemical reactions from NO_x and volatile organic compounds (VOCs). These are mainly released by the combustion of fossil fuels. The increase in combustion of fossil fuels in the UK has led to a large increase in background ozone concentration, leading to an increased number of days when levels across the region are above 40ppb. Reducing ozone pollution is believed to require action at international level to reduce levels of the precursors that form ozone.	Concentrations of O_3 above 40 ppb can be toxic to humans and wildlife, and can affect buildings. Increased ozone concentrations may lead to a reduction in growth of agricultural crops, decreased forest production and altered species composition in semi-natural plant communities.
Sulphur Dioxide SO_2	Main sources of SO_2 emissions are electricity generation, industry and domestic fuel combustion. May also arise from shipping and increased atmospheric concentrations in busy ports. Total SO_2 emissions have decreased substantially in the UK since the 1980s.	Wet and dry deposition of SO_2 acidifies soils and freshwater, and alters the species composition of plant and associated animal communities. The significance of impacts depends on levels of deposition and the buffering capacity of soils.

3.2.2 The main pollutants of concern for European sites are oxides of nitrogen (NOx), ammonia (NH_3) and sulphur dioxide (SO_2). NOx can have a directly toxic effect upon vegetation. In addition, greater NOx 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.

3.2.3 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. Ammonia emissions are dominated by agriculture, with some chemical processes also making notable contributions. As such, it is unlikely that material increases in SO_2 or NH_3 emissions will be associated with Local Development Frameworks. NOx 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 NOx (92%) will be made by the associated road traffic. Other sources, although relevant, are of minor importance (8%) in comparison[3]. Emissions of NOx could therefore be reasonably expected to increase as a result of greater vehicle use as an indirect effect of the LDF.

[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://uk-air.defra.gov.uk

3.2.4 The National Expert Group on Transboundary Air Pollution (2001)[4] concluded that:

- In 1997, critical loads for acidification were exceeded in 71% of UK ecosystems. This was expected to decline to 47% by 2010.
- Reductions in SO2 concentrations over the last three decades have virtually eliminated the direct impact of sulphur on vegetation.
- By 2010, deposited nitrogen was expected to be the major contributor to acidification, replacing the reductions in SO2.
- Current nitrogen deposition is probably already changing species composition in many nutrient-poor habitats, and these changes may not readily be reversed.
- The effects of nitrogen deposition are likely to remain significant beyond 2010.
- Current ozone concentrations threaten crops and forest production nationally. The effects of ozone deposition are likely to remain significant beyond 2010.
- Reduced inputs of acidity and nitrogen from the atmosphere may provide the conditions in which chemical and biological recovery from previous air pollution impacts can begin, but the timescales of these processes are very long relative to the timescales of reductions in emissions.

3.2.5 Grice et al[5] [6] do however suggest that air quality in the UK will improve significantly over the next 15 years due primarily to reduced emissions from road transport and power stations.

Local Air Pollution

3.2.6 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"[7].

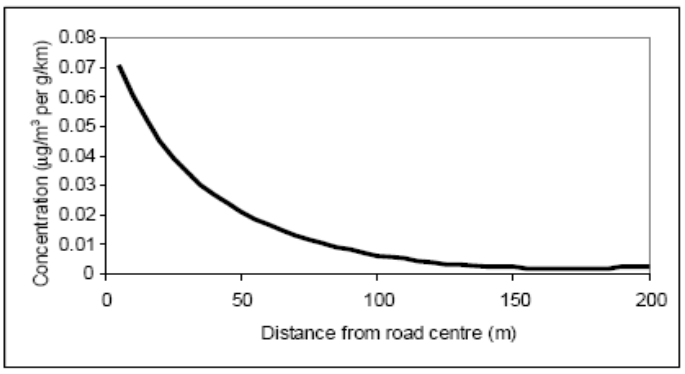

Figure 2 - Traffic contribution to concentrations of pollutants at different distances from a road (Source: DfT)

[4] National Expert Group on Transboundary Air Pollution (2001) Transboundary Air Pollution: Acidification, Eutrophication and Ground-Level Ozone in the UK
[5] Grice, S., T. Bush, J. Stedman, K. Vincent, A. Kent, J. Targa and M. Hobson (2006) Baseline Projections of Air Quality in the UK for the 2006 Review of the Air Quality Strategy, report to the Department for Environment, Food and Rural Affairs, Welsh Assembly Government, the Scottish Executive and the Department of the Environment for Northern Ireland.
[6] Grice, S., J. Stedman, T. Murrells and M. Hobson (2007) Updated Projections of Air Quality in the UK for Base Case and Additional Measures for the Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2007, report to the Department for Environment, Food and Rural Affairs, Welsh Assembly Government, the Scottish Executive and the Department of the Environment for Northern Ireland.
[7] http://www.dft.gov.uk/webtag/

3.2.7 This is therefore the distance that has been used throughout this HRA in order to determine whether European sites are likely to be significantly affected by development under the Core Strategy.

Diffuse Air Pollution

3.2.8 In addition to the contribution to local air quality issues, development can also contribute cumulatively to an overall change in background air quality across an entire region (although individual developments and plans are – with the exception of large point sources such as power stations – likely to make very small individual contributions). In July 2006, when this issue was raised by Runnymede District Council in the South East, Natural England advised that their Local Development Framework *'can only be concerned with locally emitted and short range locally acting pollutants'* [8] as this is the only scale which falls within a local authority remit. It is understood that this guidance was not intended to set a precedent, but it inevitably does so since (as far as we are aware) it is the only formal guidance that has been issued to a Local Authority from any Natural England office on this issue.

3.2.9 In the light of this and our own knowledge and experience, it is considered reasonable to conclude that it must be the responsibility of higher-tier plans to set a policy framework for addressing the cumulative diffuse pan-authority air quality impacts, partly because such impacts stem from the overall quantum of development within a region (over which individual districts have little control), and since this issue can only practically be addressed at the highest pan-authority level. Diffuse air quality issues will not therefore be considered further within this HRA.

3.3 Urbanisation

3.3.1 Urbanisation effects result from increased populations within close proximity to sensitive sites. The list of urbanisation impacts can be extensive, but core impacts can be singled out:

- Increased fly-tipping - Rubbish tipping is unsightly but the principal adverse ecological effect of tipping is the introduction of invasive alien species with garden waste. Garden waste results in the introduction of invasive aliens precisely because it is the 'troublesome and over-exuberant' garden plants that are typically thrown out[9]. Alien species may also be introduced deliberately or may be bird-sown from local gardens.
- Cat predation - A survey performed in 1997 indicated that nine million British cats brought home 92 million prey items over a five-month period[10]. A large proportion of domestic cats are found in urban situations, and increasing urbanisation is likely to lead to increased cat predation.

3.3.2 The most detailed consideration of the link between relative proximity of development to European sites and damage to interest features has been carried out with regard to the Thames Basin Heaths SPA.

[8] English Nature (16 May 2006) letter to Runnymede Borough Council, 'Conservation (Natural Habitats &c.) Regulations 1994, Runnymede Borough Council Local Development Framework'.
[9] Gilbert, O. & Bevan, D. 1997. The effect of urbanisation on ancient woodlands. British Wildlife 8: 213-218.

[10] Woods, M. et al. 2003. Predation of wildlife by domestic cats *Felis catus* in Great Britain. Mammal Review 33, 2 174-188.

3.3.3 After extensive research, Natural England and its partners produced a Thames Basin Heaths 'Delivery Plan'[11] which made recommendations for accommodating development while also protecting the interest features of the SPA. This included the recommendation of implementing a series of zones within which varying constraints would be placed upon development. While the zones relating to recreational pressure expanded to 5km (as this was determined from visitor surveys to be the principal recreational catchment for this European site), that concerning other aspects of urbanisation (particularly predation of the chicks of ground-nesting birds by domestic cats) was determined at 400m from the SPA boundary. The delivery plan concluded that the adverse effects of any development located within 400m of the SPA boundary could not be mitigated since this was the range within cats could be expected to roam as a matter of routine and there was no realistic way of restricting their movements, and as such, no new housing should be located within this zone.

3.3.4 It should be noted that this is not directly applicable to Harlow since the main driver behind the definition of these zones was that the Thames Basin Heaths authorities are to deliver a very large quantum of housing (more than 90,000 new dwellings) over their Core Strategy periods and this may therefore lead to a very large increase in the local cat population.

3.3.5 Harlow is situated approximately 5km from Epping Forest SAC and 6km from Wormley-Hoddesdonpark Woods SAC and the Lee Valley SPA and Ramsar site. Moreover, it is separated from all these European sites by additional urban development, mainline railways and/or major roads such as the M25, A414 and A10. As such it is considered that impacts of urbanisation do not need further consideration in this report.

3.4 Recreational Pressure

Trampling and Nutrient Enrichment

3.4.1 Most types of aquatic or 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)[12] 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)[13] 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

[11] http://www.southeast-ra.gov.uk/documents/sustainability/thames_basin_heaths/delivery_framework_march2009.pdf
[12] 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
[13] 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

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)[14] 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 tramplers caused a greater reduction in vegetation height than lighter tramplers, but there was no difference in effect on cover.
- Cole & Spildie (1998)[15] 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.

3.4.2 Epping Forest SAC receives millions of visits per year. Over 50% visitors come from within 1 mile; 96% of visitors come from within 10 miles. Harlow, Broxbourne, Epping Forest fall within 10km of this SAC, so 28,500 new dwellings proposed within these authorities from 2011 to 2031 could contribute cumulatively to a material increase in visitor numbers.

Disturbance of Wildlife

3.4.3 Concern regarding the effects of disturbance on birds in particular, stems from the fact that they are expending energy unnecessarily and the time they spend responding to disturbance is time that is not spent feeding[16]. Disturbance therefore risks increasing energetic output while reducing energetic input, which can adversely affect the 'condition' and ultimately survival of the birds. In addition, displacement of birds from one feeding site to others can increase the pressure on the resources available within the remaining sites, as they have to sustain a greater number of birds.[17] Moreover, the more time a breeding bird spend disturbed from its nest, the more its eggs are likely to cool and the more vulnerable they are to predators. Finally, regular disturbance can also render some areas of otherwise suitable habitat unavailable for nesting such that breeding territories fail to be established or are limited to sub-optimal habitat.

[14] 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.
[15] 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
[16] Riddington, R. *et al*. 1996. The impact of disturbance on the behaviour and energy budgets of Brent geese. *Bird Study* 43:269-279
[17] Gill, J.A., Sutherland, W.J. & Norris, K. 1998. The consequences of human disturbance for estuarine birds. *RSPB Conservation Review* 12: 67-72

3.4.4 The potential for disturbance may be less in winter than in summer, in that there are often a smaller number of recreational users and birds are not breeding. However, winter activity can still cause important disturbance, especially as birds are particularly vulnerable at this time of year due to food shortages. Several empirical studies have, through correlative analysis, demonstrated that out-of-season recreational activity can result in quantifiable disturbance:

- Tuite et al[18] found that during periods of high recreational activity, bird numbers at Llangorse Lake decreased by 30% over a time period correlating with an increase in recreational activity. During periods of low recreational activity, however, no such correlation was observed. In addition, all species were found to spend less time in their 'preferred zones' (the areas of the lake used most in the absence of recreational activity) as recreational intensity increased.
- Underhill et al[19] counted waterfowl and all disturbance events on 54 water bodies within the South West London Water bodies Special Protection Area and clearly correlated disturbance with a decrease in bird numbers at weekends in smaller sites and with the movement of birds within larger sites from disturbed to less disturbed areas.
- Evans & Warrington[20] found that on Sundays total water bird numbers (including shoveler and gadwall) were 19% higher on Stocker's Lake LNR in Hertfordshire, and attributed this to displacement of birds resulting from greater recreational activity on surrounding water bodies at weekends relative to week days. However, recreational activity was not quantified in detail, nor were individual recreational activities evaluated separately.
- Tuite et al[21] used a large (379 site), long-term (10-year) dataset (September – March species counts) to correlate seasonal changes in wildfowl abundance with the presence of various recreational activities. They found that shoveler was one of the most sensitive species to disturbance. The greatest impact on winter wildfowl numbers was associated with sailing/windsurfing and rowing.

3.4.5 Human activity can affect birds either directly (e.g. through causing them to flee) or indirectly (e.g. through damaging their habitat). The most obvious direct effect is that of immediate mortality such as death by shooting, but human activity can also lead to behavioural changes (e.g. alterations in feeding behaviour, avoidance of certain areas *etc.*) and physiological changes (e.g. an increase in heart rate) that, although less noticeable, may ultimately result in major population-level effects by altering the balance between immigration/birth and emigration/death.[22]

3.4.6 The degree of impact that varying levels of noise will have on different species of bird is poorly understood except that a number of studies have found that an increase in traffic levels on roads does lead to a reduction in the bird abundance within adjacent hedgerows - Reijnen et al

[18] Tuite, C. H., Owen, M. & Paynter, D. 1983. Interaction between wildfowl and recreation at Llangorse Lake and Talybont Reservoir, South Wales. *Wildfowl* 34: 48-63
[19] Underhill, M.C. *et al.* 1993. *Use of Waterbodies in South West London by Waterfowl. An Investigation of the Factors Affecting Distribution, Abundance and Community Structure.* Report to Thames Water Utilities Ltd. and English Nature. Wetlands Advisory Service, Slimbridge
[20] Evans, D.M. & Warrington, S. 1997. The effects of recreational disturbance on wintering waterbirds on a mature gravel pitlake near London. International Journal of Environmental Studies 53: 167-182
[21] Tuite, C.H., Hanson, P.R. & Owen, M. 1984. Some ecological factors affecting winter wildfowl distribution on inland waters in England and Wales and the influence of water-based recreation. *Journal of Applied Ecology* 21: 41-62
[22] Riley, J. 2003. Review of Recreational Disturbance Research on Selected Wildlife in Scotland. Scottish Natural Heritage.

(1995) examined the distribution of 43 passerine species (i.e. 'songbirds'), of which 60% had a lower density closer to the roadside than further away. By controlling vehicle usage they also found that the density generally was lower along busier roads than quieter roads[23].

3.4.7 Activity will often result in a flight response (flying, diving, swimming or running) from the animal that is being disturbed. This carries an energetic cost that requires a greater food intake. Research that has been conducted concerning the energetic cost to wildlife of disturbance indicates a significant negative effect.

3.4.8 Disturbing activities are on a continuum. The most disturbing activities are likely to be those that involve irregular, infrequent, unpredictable loud noise events, movement or vibration of long duration. Birds are least likely to be disturbed by activities that involve regular, frequent, predictable, quiet patterns of sound or movement or minimal vibration. The further any activity is from the birds, the less likely it is to result in disturbance.

3.4.9 The factors that influence a species response to a disturbance are numerous, but the three key factors are species sensitivity, proximity of disturbance sources and timing/duration of the potentially disturbing activity.

Sensitivity of Species – Waterfowl

3.4.10 The distance at which a species takes flight when approached by a disturbing stimulus is known as the 'tolerance distance' (also called the 'escape flight distance') and differs between species to the same stimulus and within a species to different stimuli. These are given in Table 4, which compiles 'tolerance distances' from a literature review. It is reasonable to assume from this that disturbance is unlikely to be experienced more than a few hundred metres from the birds in question. In addition, the regular mechanized noise that is associated with waste sites is likely to be less disturbing that the presence of visible human activity in areas in which the birds are not used to observing such activity.

Table 4 - Tolerance distances of 21 water bird species to various forms of recreational disturbance, as described in the literature. All distances are in metres. Single figures are mean distances; when means are not published, ranges are given. Tydeman (1978)[24], Keller (1989)[25], Van der Meer (1985)[26], Wolff et al (1982)[27], Blankestijn et al (1986).[28]

	Type of disturbance		
Species	Rowing boats/kayak	Sailing boats	Walking
Little grebe		60 – 100 [1]	
Great crested grebe	50 – 100 [2]	20 – 400 [1]	
Mute swan		3 – 30 [1]	
Teal		0 – 400 [1]	

[23] Reijnen, R. et al. 1995. The effects of car traffic on breeding bird populations in woodland. III. Reduction of density in relation to the proximity of main roads. Journal of Applied Ecology 32: 187-202
[24] Tydeman, C.F. 1978. *Gravel Pits as conservation areas for breeding bird communities*. PhD thesis. Bedford College
[25] Keller, V. 1989. Variations in the response of Great Crested Grebes *Podiceps cristatus* to human disturbance - a sign of adaptation? *Biological Conservation* 49:31-45
[26] Van der Meer, J. 1985. De verstoring van vogels op de slikken van de Oosterschelde. Report 85.09 Deltadienst Milieu en Inrichting, Middelburg. 37 pp.
[27] Wolf, W.J., Reijenders, P.J.H. & Smit, C.J. 1982. The effects of recreation on the Wadden Sea ecosystem: many questions but few answers. In: G. Luck & H. Michaelis (Eds.), Schriftenreihe M.E.L.F., Reihe A: Agnew. Wissensch 275: 85-107
[28] Blankestijn, S. et al. 1986. Seizoensverbreding in de recreatie en verstoring van Wulp en Scholkester op hoogwatervluchplaatsen op Terschelling. Report Projectgroep Wadden, L.H. Wageningen. 261pp.

Species	Type of disturbance		
	Rowing boats/kayak	Sailing boats	Walking
Mallard		10 – 100 [1]	
Shoveler		200 – 400 [1]	
Pochard		60 – 400 [1]	
Tufted duck		60 – 400 [1]	
Goldeneye		100 – 400 [1]	
Smew		0 – 400 [1]	
Moorhen		100 – 400 [1]	
Coot		5 – 50 [1]	
Curlew			211 [3]; 339 [4]; 213 [5]
Shelduck			148 [3]; 250 [4]
Grey plover			124 [3]
Ringed plover			121 [3]
Bar-tailed godwit			107 [3]; 219 [4]
Brent goose			105 [3]
Oystercatcher			85 [3]; 136 [4]; 82 [5]
Dunlin			71 [3]; 163 [2]

3.4.11 Given that the Lee Valley SPA and Ramsar site are designated in part for over-wintering shoveler populations, then it will be important to determine that recreational pressure arising from increased population levels in Harlow does not contribute to LSE within a few hundred metres of the species – i.e. unsustainable water sport levels, or terrestrial activities creating visual intrusion within such distance.

3.5 Water Quality

3.5.1 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:

3.5.2 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.

3.5.3 Sewage and some industrial effluent discharges contribute to increased nutrients in the European sites and in particular to phosphate levels in watercourses. Rye Meads SSSI component of the Lee Valley SPA/Ramsar site is situated 2.5km to the west of Harlow and is particularly sensitive to eutrophication (nutrient enrichment) resulting from the discharge of treated sewage effluent from Rye Meads STW. The draft detailed Rye Meads Water Cycle Study has indicated that the growth in the Stevenage and East Hertfordshire areas is constrained by the environmental capacity of the River Lee and associated Lee Valley SPA and by wastewater infrastructure issues in terms of timescale for delivery.

3.5.4 Diffuse pollution (for example from agricultural practices or urban runoff) is a key contributor to water pollution in rivers. Through its Review of Consents process, the Environment Agency has identified diffuse pollution to be a major factor in causing unfavourable conservation status of European sites. Although agriculture remains a primary source of eutrophication and pollution, urban runoff is a significant source of aquatic contamination. The rate of conversion of land to residential use has been shown to be related to poor water quality[29].

3.6 Water Resources

3.6.1 The East of England is generally an area of high water stress (see Figure 3).

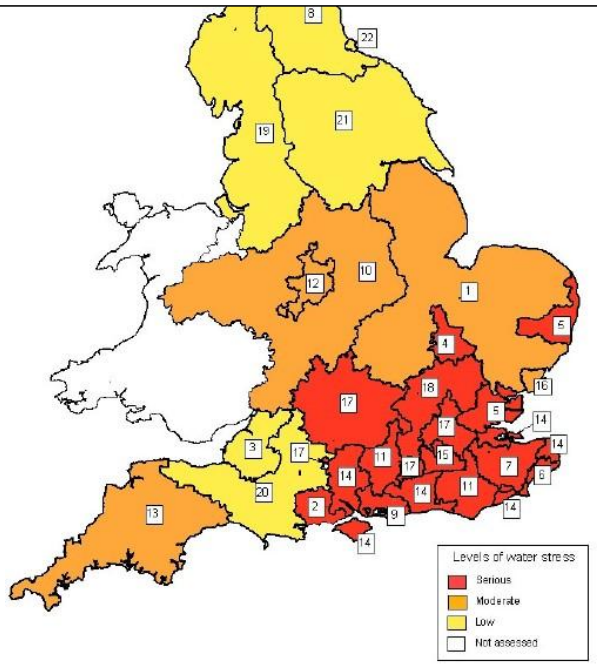

Figure 3. Areas of water stress within England. It can be seen from this map that Harlow is classified as being an area of high water stress (coded red).[30]

3.6.2 The (now revoked) East of England RSS noted that 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

[29] Atasoy, M., R. Palmquist, and D. Phaneuf, Estimating the effects of urban residential development on water quality using micro data, Journal of Environmental Management 79 (2006): 399-408

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

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.

3.6.3 However, in a recent draft report from the Environment Agency, 'Impact of East of England Housing and Economic Growth Scenarios on Regional Water Supplies' the roll forward of the existing housing policy 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 is that the housing to be delivered under current regional development proposals 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. It is important to note however, that the study did not take into account findings from the stage 3 Review of Consents process, and as such the findings must be treated with a certain degree of caution.

3.6.4 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.

3.6.5 Rye Meads SSSI component of the Lee Valley SPA/Ramsar site is situated 2.5km to the west of Harlow and is particularly sensitive to high levels of freshwater abstraction (resulting in a reduction in water levels within the SPA).

3.6.6 Recent consultation responses from the Environment Agency concerning the scope of the HRA for the Epping Forest District Core Strategy have identified that no further work will be required regarding current existing abstraction licences relating to the Lee Valley SPA/Ramsar site. However, any proposals for new abstraction proposals will need to be screened for any likely significant effect.

4 Screening Tables

4.1.1 The following tables present the screening assessments for each Issue and Option that have been put forward for consideration. Green shading in the final column indicates a policy option that has been screened out of further consideration due to the absence of any mechanism for an adverse effect on European sites.

Table 5 – Screening of Developing Policy Options

Theme	Strategic Objective	Policy Area to be Considered	HRA Implications
Placeshaping Enhancing the quality of the buil and natura environment	Protecting, enhancing and promoting access to/use o the Green Infrastructure network (including Greer Wedges, landscape and sites of nature conservation importance)	Designation of sites important for nature conservation purposes and biodiversity	None – this policy area is positive with respect to biodiversity and ecology
		Define the role and function of Green Wedges	None
		Protection and enhancement of the setting of the River Stort and other significant landscape features	None
	Creating accessible, safe and attractive public spaces	Creation and enhancement of footpath and cycleway links between green spaces, adjoining neighbourhoods and the countryside	None – may be positive if reduces use of cars for recreational visits
		Ensuring public spaces are safe and accessible for the community	None
		Promotion of secure by design within new development	None
		Promotion and integration of good quality public art within development and appropriate public spaces	None
		Definition and protection of the network of green spaces in the district	None – policy area is positive in that is should help to relieve recreationa pressure on European sites outside the district
		Provision of new and enhancement of existing public spaces across the town	None

Theme	Strategic Objective	Policy Area to be Considered	HRA Implications
	Promote growth in sustainable locations	Promotion of the development of brownfield land at appropriate location within the town	None –development locations within the town itself do not create LSE
		Establish criteria to guide development to the most sustainable locations	None
		Definition of the extent of the Green Belt	Possibly – if policy area will involve a green belt review, this could create LSE through development in close proximity to European sites than is currently the case
		Avoid development in areas identified at risk from flooding and support flood retention initiatives	None – this policy area is positive with regard to sensitive European sites such as the Lee Valley SPA/Ramsar.
		Promotion of mixed use development in neighbourhood centres and, where appropriate, at hatches	None
	Delivering high quality urban design and architecture and protecting and enhancing buildings and places of heritage value	Protection and enhancement of listed buildings and Conservation areas	None
		Protection of Scheduled Ancient Monuments and Registered Parks and Gardens	None
		Protection of the distinct architectural character and design of Harlow	None
		Acknowledging the role of the design principles established by Gibberd in securing sustainable development	None
		Encouraging and promoting best practice in the design of new buildings to include energy conservation measures and the provision of lifetime homes	None – though policy area could be even stronger if it included water conservation measures also
		Use of appropriate materials in new buildings	None
		Promotion of Sustainable Drainage Systems to alleviate flooding	None – this is positive in terms of avoiding run-off into water courses that

Theme	Strategic Objective	Policy Area to be Considered	HRA Implications
			may drain to the Lee Valley SPA/Ramsar
		Encourage crime prevention measures to be incorporated into the design of new development	None
	Secure regeneration at key locations to improve environmental characte and economic prosperity	Promoting urban renewal measures to secure regeneration within the town	None
		Promotion of the regeneration of the town centre, neighbourhood centres and priority estates	None
		Provision of appropriate mechanisms to secure funding to assist regeneration	None
Housing - Delivering housing at the right scale, of the right type and in the right location to meet the needs of the whole community	Identify sites in Harlow to meet local needs and aspirations	Provision of housing to meet local needs and aspirations	Yes- quantum of development is the driver for any likely LSE arising from Pathways of impact identified in Chapter 3 of this screening report. Development must be considered in the context of almost 75,000 new dwellings that are likely to be delivered by surrounding authorities from 2011 to 2031, with potential for LSE from wider catchments also (e.g. London Plan)
		Indication of locations of growth	Yes – distribution of growth has potential to influence LSE on European sites, though in reality most scenarios for Harlow are likely to create simila LSE and it will be the quantum o development that requires greate consideration
		Ensuring infrastructure provision keeps pace with house completions	None – this is fundamental in mitigating any LSE particularly relating

Theme	Strategic Objective	Policy Area to be Considered	HRA Implications
			to water resource or quality issues with respect to Lee Valley SPA/Ramsar
		Where possible build on previously developed land first (sequential approach)	None
		At appropriate locations regenerate existing residential areas to improve the quality and supply of housing	None
	Meeting the housing needs of the community both now and in the future	Provision of affordable housing to meet Harlow's needs now, and in the future reflecting the viability of sites	None
		Provision for elderly and disabled people and other special needs housing	None
		Provision of additional pitches for gypsies and travellers	No – although this will involve additional development locations over and above housing allocations the small scale of provision likely to be required may mean that LSE will only occur if provision is in close proximity to European sites – which is unlikely to be the case in Harlow.
	Providing a range of house types	Ensuring new housing development provides a range of dwelling types to cater for all the community	None
		Making the best use of land by developing minimum density requirements	None
	Providing homes for a range of tenures	Addressing issues associated with dwellings in multiple occupation	None
		Securing a mix of housing tenures to reflect Harlow's current and future needs	None
	Improve the quality of homes in the district	New development in existing areas to reflect the character of the area	None
		Provision of lifetime homes	None

Theme	Strategic Objective	Policy Area to be Considered	HRA Implications
		Ensure all homes are built in accordance with the "Building for Life " criteria	None
		Ensure all homes are built in accordance with the "Code for Sustainable Homes " criteria	None – should include positive measures relating to water efficiency
	Regenerating existing neighbourhoods with a focus on priority estates	Identification of areas that are a priority for regeneration	None – unless focuses a very large quantum of development in a specific location
		Provision of a planning policy framework to support regeneration initiatives within the town	None
Prosperity - Securing economic growth and regeneration in order to improve employment and educational opportunities in the town to reflect its strategic role	- Enhancing and reinforcing Harlow's sub regional role and improving the town's image	Develop and diversify the role of Harlow as a gateway to Europe and as a major location for employment, retail and leisure	Yes – promotes employment development within Harlow which could create LSE through demands on resources and through increased travel Development must be considered in the context of over 110,000 new jobs that are likely to be delivered by surrounding authorities from 2011 to 2031, with potential for LSE from wide catchments also (e.g. London Plan)
		Reinforce the role of the Town Centre as a major destination	None – unlikely to create increased traffic pressures on European sites
		Preparation of Area Action Plans and/or development briefs to reinforce the role and viability of neighbourhood centres	None
		Promotion of mixed use development and higher densities within and around existing centres	None - unless focuses a very large quantum of development in a specific location
		Securing environmental improvements around neighbourhood centres including upgrades to the public realm	None

Theme	Strategic Objective	Policy Area to be Considered	HRA Implications
		Restructuring town centre to create permeability across town-centre and linkages with other centres	None – in itself has no impact as relates to town centre only, bu linkages to other centres could involve increased transport on certain routes and hence air quality considerations
		Improving the quality of employment space	Yes – promotes employmen development within Harlow which could create LSE through demands or resources and through increased travel
		Promoting enterprise and business start ups	Yes – promotes employmen development within Harlow which could create LSE through demands or resources and through increased travel
	Meeting the employment needs of the town	Promotion of Harlow as a strategic employment location	Yes – promotes employmen development within Harlow which could create LSE through demands or resources and through increased trave Development must be considered ir the context of over 110,000 new jobs that are likely to be delivered by surrounding authorities from 2011 to 2031, with potential for LSE from wide catchments also (e.g. London Plan)
		Identification of new employment areas to meet current and future needs	Yes – promotes employmen development within Harlow which could create LSE through demands or resources and through increased travel

Theme	Strategic Objective	Policy Area to be Considered	HRA Implications
		Retaining existing employment sites in their existing uses	None
		Provision of a range of sites to meet employment needs	Yes – distribution of growth has potential to influence LSE on European sites, though in reality most scenarios for Harlow are likely to create simila LSE and it will be the quantum o development that requires greate consideration
		Enhancing transport linkages and other infrastructure to support business development	Yes – needs to promote public transport or leaves open the possibility of LSE through reduced air quality Development must be considered in the context of almost 75,000 new dwellings and over 110,000 new jobs that are likely to be delivered by surrounding authorities from 2011 to 2031, with potential for LSE from wide catchments also (e.g. London Plan).
	Reinforcing Harlow's reputation as a key centre for Research and Development	Securing investment by strengthening and identifying opportunities for growth in the town	None – does not appear to relate directly to development per se
		Facilitating research and development and growth at appropriate locations	Yes – defines a quantum o development within Harlow which could create LSE through demands on resources and through increased travel Development must be considered in the context of over 110,000 new jobs that are likely to be delivered by surrounding authorities from 2011 to 2031, with potential for LSE from wide catchments also (e.g. London Plan)

Theme	Strategic Objective	Policy Area to be Considered	HRA Implications
	Enhancing and diversifying educational and skills training opportunities in the town	Promotion of Harlow as a university town	None – does not define levels of development
		Facilitate and support the expansion of existing and the provision of new educational facilities in the town	Yes – defines a quantum of development within Harlow which could create LSE through demands on resources and through increased travel Development must be considered in the context of over 110,000 new jobs that are likely to be delivered by surrounding authorities from 2011 to 2031, with potential for LSE from wide catchments also (e.g. London Plan)
		Recognising the links between the further education and emerging sectors to meet the future skill requirements of employers	None
	Encourage diversification and investment in the towns employment base	Identification of locations to attract new employment opportunities to the town	Yes – distribution of growth has potential to influence LSE on European sites, though in reality most scenarios for Harlow are likely to create similar LSE and it will be the quantum of development that requires greater consideration
		Promote mixed use development at appropriate locations	None
	Regenerating the town centre and reinforcing its retail role in the sub region.	Defining key retail areas within the town	None
		Identify sites to accommodate new retail development	Yes – distribution of growth has potential to influence LSE on European sites, though in reality most scenarios for Harlow are likely to create similar

Theme	Strategic Objective	Policy Area to be Considered	HRA Implications
			LSE and it will be the quantum o development that requires greate consideration
		Recognising the role other uses can play in reinforcing and adding vitality to the primary retail function of the town centre	None
	Protecting and enhancing neighbourhood centres and hatches	Protecting and reinforcing primary, secondary and specialist retail areas in the town, neighbourhood centres and hatches	None
Infrastructure - Ensuring growth and regeneration is supported by appropriate levels of infrastructure provision	Reduce need to travel by ensuring new developmen is located close to existing or new neighbourhood centres and good public transport networks	Consider the location of new development in a sequential manner	None
		Addressing traffic congestion in the town	None
		Make appropriate provision for car parking in development	None
		Enhancing public transport provision to meet the needs of the community	None – policy area provides opportunity to mitigate for any LSE from reduced air quality
	Improve transport links to secure good access to a range of community facilities, neighbourhood centres, employment areas and green spaces	Improving bus, cycleway and footpath links in the town	None – policy area provides opportunity to mitigate for any LSE from reduced air quality
		Encourage provision of community facilities on good transport corridors	None
	Secure new and enhanced community infrastructure to meet the needs of existing	Ensuring new development is supported by a range o infrastructure including education, health, social and othe uses to meet community needs	None

Theme	Strategic Objective	Policy Area to be Considered	HRA Implications
	and future residents	Securing developer contributions for infrastructure provision	None – this is a positive approach to addressing infrastructure needs
		Ensure there is appropriate provision of primary care and public health facilities	None
		Support the expansion of health facilities in existing health centres	None
	Enhance and promote the role of Harlow as a transport interchange along the M11 corridor	Securing improvements to rail and bus capacity to meet existing and future needs	None – policy area provides opportunity to mitigate for any LSE from reduced air quality
		Refurbishment and/or redevelopment of the rail and bus stations	None
		Ensuring strategic and other road capacity can meet future development requirements of the town	Yes – effectively promotes increased capacity which has implications for air quality effects on European sites (though these may not necessarily be adverse). Development must be considered in the context of almost 75,000 new dwellings and over 110,000 new jobs that are likely to be delivered by surrounding authorities from 2011 to 2031, with potential for LSE from wide catchments also (e.g. London Plan).
		Enhancement of public transport and cycleway links to rail and bus stations	None – policy area provides opportunity to mitigate for any LSE from reduced air quality
	Work with key providers to ensure that the infrastructure requirements to serve new development	Development of policies and initiatives to secure the provision of planned infrastructure	None – helps ensure avoidance of LSE through reduced water resources or water quality, reduced air quality or recreational pressure

Theme	Strategic Objective	Policy Area to be Considered	HRA Implications
	can be met	Promotion innovative transport measures such as Travel plans	None
	Ensure new development is provided through a phased approach in order not to overload existing infrastructure capacity	Development of phasing policies	None
		Delivery of mechanisms to secure provision	None
		Encouraging partnership working to prioritise delivery and funding	None – partnerships could be very useful in delivering mitigation to avoid LSE on European sites such as Epping Forest SAC and Lee Valley SPA/Ramsar
Lifestyles - Meeting the leisure, recreational and cultural requirements of the community in a sustainable manner	Protecting and enhancing sporting, leisure and recreation opportunities for all to	Ensure adequate provision of facilities for formal and informal recreation in new and existing developments which are accessible	None – reduces LSE from recreational pressures
		Provision of public spaces for events and other community uses	None – reduces LSE from recreational pressures
		Protecting and enhancing allotment provision at appropriate locations	None – though any new or expanded sites should avoid run-off to water courses that are upstream of the Lee Valley SPA and Ramsar
		Create, protect and enhance green space provision in the town, in particular, improvements to the Town Park	None – reduces LSE from recreational pressures
		Enhance the setting of and access to waterways and ponds in particular the River Stort.	None – unless improving accessibility leads to greater visitor numbers that could have a LSE
	Provide and enhance cultural opportunities in the town	Provide a comprehensive range of social and recreational facilities for young people in new developments	None

Theme	Strategic Objective	Policy Area to be Considered	HRA Implications
		Ensure new community facilities are flexibly designed to accommodate a broad range of activities and are accessible to all	None
		Secure appropriate developer contributions for public art and entertainment provision in new developments	None
		Secure the retention of cultural and entertainment facilities in the town, including a new theatre	None

Table 6 – Screening of commentary within Issues and Options document

Section of Issues and Options Document	Commentary with Relevance to HRA	HRA Implications
Part 5	The Core Strategy outlines some of the principles that will govern the location of new development including maximising regeneration and sustainability goals. This includes looking at all opportunities within the 'urban area boundary'. The Core Strategy also discusses opportunities to increase densities in certain parts of the town, whether undeveloped land or underused open spaces could be used for development and what the future role and function of the Green Wedges should be.	At this stage the Core Strategy simply asks for feedback on the principles that should direct development and does not set out any specific details. As such the HRA implications are not absolutely clear at this stage making it difficult to screen out the Issues and Options Paper. Future iterations of the Core Strategy will need to set out in more detail the scale and location of the preferred growth options in order for the HRA implications to be determined.

Section of Issues and Options Document	Commentary with Relevance to HRA	HRA Implications
Part 5.9 Employment	Options to accommodate new employment include: □ within existing employment areas and those identified in the Adopted Local Plan □ within the urban extensions being considered to accommodate growth in the area □ the identification of new employment areas at appropriate locations □ the promotion of live-work units at appropriate locations □ a combination of these approaches □ within existing employment areas and within urban extensions.	No one option is likely to be preferred over others from a HRA perspective as they will all require water resources, waste water infrastructure and transport access to and from outside Harlow.
Part 6	Option A (RSS: Northern Led) seeks to deliver 10,000 new dwellings to the north, 800 to the east and 100 each to the south and west Option B (Policy Led B) seeks to deliver 3,600 new dwellings to the north, 3,300 to the east, 2,800 to the west and 1,300 to the south Option C (Combined criteria Led) seeks to deliver 6,380 new dwellings to the north-east, between Harlow and the M11, with 3,520 to the south and 1,100 to the west Option D (Regeneration Led) seeks to deliver 5,720 new dwellings to the north, 2,300 to the east, 2,420 to the south and 550 to the west	Impacts on the three European sites considered within the scope of this HRA are unlikely to be more affected by one of the five spatial options over any of the others. Water quality and resource impacts on the Lee Valley SPA will not be related to the spatial distribution of housing but to whether treated effluent from the new dwellings discharges to Rye Meads STW or whether the water supply strategy involves abstraction from the River Lee and its associated reservoirs. It is likely that the answer to both these questions will be the same whichever of the five spatial options is chosen. While recreational pressure impacts are dependent to an extent on the spatial distribution of housing the

Section of Issues and Options Document	Commentary with Relevance to HRA	HRA Implications
	Option E (Transport Led) seeks to deliver 5,390 new dwellings to the north-east, between Harlow and the M11, with 2,530 to the north and 3,080 to the west **Taking into account socio-economic and environmental considerations consultants identified an option (not necessarily the Preferred Option) of 5,000 new dwellings to the north-east, between Harlow and the M11, 4,000 to the north, and 1,000 each to the south and west.**	three internationally designated wildlife sites covered by the scope of this HRA are all sufficiently distant from Harlow, and the five spatial options sufficiently similar, that it is unlikely that any one option will result in a greater recreational impact than any other option. **No spatial option poses insurmountable problems regarding impacts on internationally designated wildlife sites provided that either water resource and quality issues concerning Rye Meads STW and the Lee Valley SPA can be resolved or an alternative wastewater treatment solution is arrived at.**
Part 7 Developing a delivery strategy	A range of key infrastructure identified is summarised in the list below. As the Council's preferred spatial approach is developed the detailed infrastructure requirements will be refined to reflect and support the most appropriate spatial options.	The M11 links to the M25 orbital and therefore improved links between Harlow and the motorway network could lead to increased traffic past Epping Forest SAC, which is sensitive to reduced air quality.
	Road transport – New road links and improved junction arrangements could include a road link and new junction on the M11 to serve development to the north of Harlow	Positive – reduces car transport and therefore promotes better air quality

Section of Issues and Options Document	Commentary with Relevance to HRA	HRA Implications
	Public transport – Enhanced rail and bus services to serve the Harlow area including new bus lanes and improvements to Harlow Mill and Town stations Cycleway/footpaths – New and enhanced links to serve new and existing development through the town Open space and leisure - Improvements and enhancements of existing provision Utilities – Enhancements to existing and provision of new facilities to meet water supply, waste water and energy supply requirements	Positive – reduces car transport and therefore promotes better air quality Positive – could reduce recreational pressure on European sites Positive – needs to be delivered in a timely manner – i.e. ahead of or in parallel with housing and employment growth
	Waste management – making appropriate provision to meet the needs of the growth requirements for the area	Waste facilities can have water quality and air quality effects on European sites, as can the transport of waste. Appropriate provision should include commitments to waste reduction and re-cycling.
Securing Provision	The Council appointed consultants to prepare a Harlow Infrastructure Study in order to examine the scale, phasing and timing of the delivery of infrastructure to underpin growth in the area.	This text is positive in that it promotes means to address key infrastructure issues that are important in avoiding LSE on European sites
Monitoring Framework	Commits to annual monitoring, and to consideration of Core Strategy review where necessary. Infrastructure provision will be monitored and linked to the housing monitoring framework, to help reinforce the importance of infrastructure provision being provided in a timely fashion.	Positive, especially in terms of acknowledging the need to monitor timely provision of infrastructure.

5 Conclusions

5.1 Screening of Issues and Options

5.1.1 Issues and Options that cover the delivery of housing, employment and infrastructure have been screened for Appropriate Assessment since these either promote or direct the scale and spatial distribution of development within Harlow. At this stage there is insufficient specificity within the Issues and Options Paper to enable the plan to be 'screened out'. This is not unusual for an issues and options document, which is intended to invite comment on issues and potential policy directions identified so far as well as on a range of potential spatial approaches to address with the growth proposed in the area.

5.2 Next steps

5.2.1 Although at this stage of the CS development it is not possible to screen out some of the Issues and Options because pathways of impact exist whereby LSE on European sites could result, it is likely that at the Preferred Options stage of the CS process, the more spatially specific and quantified levels of development will enable many of these concerns to be satisfied from a HRA perspective. In order to be able to conclude no LSE on the European sites considered in the Screening Report, the Council should seek to ensure the following:

- Clarification should be made as to how waste water and sewerage issues arising from proposed growth will be dealt with; specifically where this will take place, how the infrastructure requirements will be met and how this will be delivered in a timely manner. This is likely to require a commitment to engage with the Environment Agency and Thames Water at the earliest possible opportunity.
- Clarification as to the ability to meet water resource requirements to support development, so that it can be concluded that adverse impacts on the Lee Valley SPA and Ramsar sites will be avoided.
- The Council should seek to provide details within the Preferred Options of the quantum of green space, its function, and timeliness of delivery, and mechanism of delivery, building on the approaches outlined within the Issues and Options.
- The Council should continue to promote alternative modes of transport to car usage, and should commit to undertaking a transport analysis of any plans to increase linkages between Harlow and the M11, which should include a projection for increased volumes (and network capacity) between the proposed new junction and the M25 orbital that would result from growth within the district. This would enable an evidence-based approach to determining whether development in Harlow contributes to LSE on Epping Forest SAC through reduced air quality.

APPENDIX 1 - BACKGROUND ON EUROPEAN SITES REFERENCED IN THIS DOCUMENT

Epping Forest SAC

5.2.2 Epping Forest SAC is located approximately 5km south of Harlow 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

5.2.3 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

5.2.4 Secondly, the site contains the Habitats Directive Annex II species Stagbeetle *Lucanus cervus*, with widespread and frequent records.

Historic Trends and Current Pressures

5.2.5 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.

5.2.6 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.

5.2.7 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.

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

Table 7: Critical nitrogen loads, actual rates of nitrogen deposition, NOx concentrations[31] and sulphur dioxide concentrations for Epping Forest SAC. Red shading indicates exceedance of thresholds.

Site	Grid reference	Most nitrogen sensitive habitat	Minimum [32] critical loads (Kg N/ha/yr)	Actual nitrogen deposition[33] (Kg N/ha/yr)	Actual NOx concentration (μgm^{-3})	Actual SO_2 concentration (μgm^{-3})
Epping Forest SAC	TQ425985	Beech woodland	10	36.4	30	3.7

5.2.9 It is clear from Table 7 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. However, it is noted from recent Natural England consultation responses to the HRA scoping exercise for the Epping Forest District Core Strategy that air quality differs considerably in different parts of the site and for the purposes of the Appropriate Assessment data for several locations may provide a more accurate picture than data from a single point.

5.2.10 While recreational pressure is a considerable impact in some areas, these are localised; however, funding of management on the SAC is governed largely by donation and contributions from the Corporation of London and it is likely that the ability to adequately manage recreation on the SAC will come under increasing pressure as the population of northeast London, Epping Forest and east Hertfordshire increases.

5.2.11 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.

Lee Valley SPA and Ramsar

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

[31] Calculated as NO_2
[32] APIS provides a critical load range – on a precautionary basis, this assessment uses the lowest figure in that range
[33] To a resolution of 5 km

5.2.13 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, Thames Water, RSPB and Hertfordshire & Middlesex Wildlife Trust.

Reasons for Designation

5.2.14 The Lee Valley site is designated as an SPA and Ramsar for its Birds Directive Annex I species that over-winter, and these are[34]:

- 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.

5.2.15 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

5.2.16 The Lee Valley is vulnerable to eutrophic water quality; but this is being addressed via AMP4 funding under the Urban Waste Water Treatment Directive and a Water Cycle Study.

5.2.17 The other main threat is that of human recreational pressure, although this is regulated through zoning of water bodies within the Lee Valley Regional Park. The majority of the site is already managed in accordance with agreed management plans in which nature conservation is a high or sole priority.

5.2.18 There is also a potential problem from over-extraction of surface water for public supply, particularly during periods of drought.

5.2.19 Presently, the SPA/Ramsar remains in favourable condition.

5.2.20 The HRA undertaken for the Regional Park Authority's Park Development Framework identified the following vulnerabilities:

- Habitat loss/damage (recreation, adjacent development);
- Eutrophication (hydrological pollution);
- Disturbance (recreation);
- Abstraction (hydrological regime);
- Climate change/drought (hydrological regime); and
- Food availability for SPA waterfowl.

5.2.21 We would also include the following:

[34] All bird count data in this document is sourced from the SPA Review site accounts as available on the Joint Nature Conservation Committee website http://jncc.defra.gov.uk/page-1412

- 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 (such as Stoke Newington Reservoirs in Hackney).

Wormley-Hoddesdonpark Woods SAC

5.2.22 This SAC consists of two SSSIs – Wormley-Hoddesdonpark Woods North and Wormley-Hoddesdonpark Woods South and is situated approximately 5km to the west of Harlow. 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

5.2.23 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

5.2.24 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, 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 natural stand types through sustainable forestry.

5.2.25 There have been some instances of fly-tipping in the recent 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.

5.2.26 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.

APPENDIX 2 – 'TIERING' IN HABITAT REGULATIONS ASSESSMENT