

Habitats Regulations Assessment of Brentwood District Council Draft Local Plan: Preferred Site Allocations

Regulation 18 Consultation (January 2018)

Brentwood District Council

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Quality information

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1. Introduction

Background to the Project

- 1.1 AECOM has been appointed by Brentwood District Council to assist the Council in undertaking a Habitats Regulations Screening Assessment of its Draft Regulation 18 Consultation version Local Plan: Preferred Site Allocations (January 2018) (hereafter referred to as the ‘Plan’ or ‘Local Plan’). The Plan being assessed sets out the Council’s proposed strategy to meet the economic and housing needs in the District up to 2033. The Plan identifies sites for housing (including traveller accommodation) and employment. It also sets out development management policies and infrastructure requirements. The objective of this assessment is to identify any aspects of the Plan that would cause an adverse effect on the integrity of Natura 2000 sites, otherwise known as European sites (Special Areas of Conservation (SACs), Special Protection Areas (SPAs) and, as a matter of Government policy, Ramsar sites) and including Potential SPAs, possible SACs and Potential Ramsar site, either in isolation or in combination with other plans and projects, and to advise on appropriate policy mechanisms for delivering mitigation where such effects were identified.
- 1.2 Based on new data provided by the Office for National Statistics (ONS) and Department for Communities and Local Government (DCLG) the current objectively assessed housing need is 380 dwellings per annum (dpa) for the lifetime of the plan (2013-2033), a total of 7,600 dwellings across the time period.

Legislation

- 1.3 The need for Appropriate 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 2017. 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.
- 1.4 The Habitats Directive applies the Precautionary Principle¹ to European sites. 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. Plans and projects with predicted adverse impacts on European sites 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.
- 1.5 In order to ascertain whether or not site integrity will be affected, an Appropriate Assessment should be undertaken of the plan or project in question:

¹ The Precautionary Principle, which is referenced in Article 191 of the Treaty on the Functioning of the European Union, has been defined by the United Nations Educational, Scientific and Cultural Organisation (UNESCO, 2005) as:
“When human activities may lead to morally unacceptable harm [to the environment] that is scientifically plausible but uncertain, actions shall be taken to avoid or diminish that harm. The judgement of plausibility should be grounded in scientific analysis”.

Box 1: The legislative basis for Appropriate 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 2017

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 site's conservation objectives... The authority shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the European site".

- 1.6 Over time the phrase 'Habitats Regulations Assessment' (HRA) has come into wide currency to describe the overall process set out in the Habitats Directive from screening through to Imperative Reasons of Overriding Public Interest (IROPI). This has arisen in order to distinguish the process from the individual stage described in the law as an 'Appropriate Assessment'. Throughout this report we use the term Habitat Regulations Assessment for the overall process and restrict the use of Appropriate Assessment to the specific stage of that name.
- 1.7 The Conservation of Habitats and Species Regulations 2017 came into force on 30th November 2017. However, these simply consolidate changes made to the previous Regulations since 2010 and do not alter the law regarding HRA.

Scope of the Project

- 1.8 There is no pre-defined guidance that dictates the physical scope of a HRA of a Plan document. Therefore, in considering the physical scope of the assessment, we were guided primarily by the identified impact pathways rather than by arbitrary 'zones'. Current guidance suggests that the following European sites be included in the scope of assessment:
 - All sites within the Brentwood District boundary; and
 - Other sites shown to be linked to development within the District boundary through a known 'pathway' (discussed below).
- 1.9 Briefly defined, pathways are routes by which a change in activity provided within a Local Plan document can lead to an effect upon an internationally designated site. Guidance from the Department of Communities and Local Government states that the HRA should be '*proportionate to the geographical scope of the [plan policy]*' and that '*an AA need not be done in any more detail, or using more resources, than is useful for its purpose*' (CLG, 2006, p.6)². More recently, the Court of Appeal³ ruled that providing the Council (as competent authority) was duly satisfied that proposed mitigation could be '*achieved in practice*' such that the proposed development would have no adverse effect, then this would suffice. This ruling has since been applied to a planning permission (rather than a Local Plan document)⁴. In this case the High Court ruled that for '*a multistage process, so long as there is sufficient information at any particular stage to enable the authority to be satisfied that the proposed mitigation can be achieved in practice it is not necessary for all matters concerning mitigation to be fully resolved before a decision maker is able to conclude that a development will satisfy the requirements of the Habitats Regulations*'.
- 1.10 No European sites lie within Brentwood District. However, outside the District, the following sites require consideration because there is potential for impacts stemming from the Local Plan to create significant effects even though the site lies outside the authority boundary:
 - Epping Forest SAC located 6.4km west of the District.
 - Thames Estuary and Marshes Ramsar and SPA located 8.3km south-east of the District.

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

³ No Adastral New Town Ltd (NANT) v Suffolk Coastal District Council Court of Appeal, 17th February 2015

⁴ High Court case of R (Devon Wildlife Trust) v Teignbridge District Council, 28 July 2015

- Essex Estuaries SAC located 12.4 km east of the District.
- Crouch and Roach Estuaries Ramsar and SPA located 12.4 km east of the District.
- Benfleet and Southend Marshes Ramsar and SPA located 13.4km south-east of the District.
- Blackwater Estuary Ramsar and SPA located 19.8km north-east of the District

1.11 Other Essex Coastal European sites where considered. These include:

- Foulness Estuary SPA and Ramsar site (located more than 27km from the District)
- Dengie SPA and Ramsar site (located more than 35km from the District)
- Colne Estuary SPA and Ramsar site (located more than 37km from the District)
- Stour and Orwell Estuary SPA and Ramsar site (located more than 52km from the District)
- Hamford Water SPA and Ramsar site (located more than 57km from the District)

1.12 Due to the distances of these European designated sites, it is not considered realistic for impact pathways linking to the Plan to exist alone or in combination. As such those European sites listed in paragraph 1.11 are not discussed further with in this report.

1.13 Foulness Estuary SPA and Ramsar site and Dengie SPA and Ramsar site are both located more than 27km east of the District, with the Colne Estuary located more than 28km from the District. Due to the distances involved it is considered that the Plan will not affect these European sites. As such they are not discussed further within this report.

1.14 The Coastal European sites located along the Essex coast are referred to as the 'Essex Coast' European sites within this document.

1.15 The reasons for designation of these sites, together with current trends in habitat quality and pressures on the sites, are set out at Appendix A. All the European sites are illustrated in Appendix B, Figure B1.

1.16 In order to fully inform the screening process, a number of recent studies have been consulted to determine likely significant effects that could arise from the Submission Version of the Plan. These include:

- Final Water Resources Management Plan 2014. Essex & Suffolk Water. October 2014
- Future development proposed (and, where available, HRAs) for Barking & Dagenham, Basildon, Castle Point, Chelmsford, East Hertfordshire District Epping Forest, Harlow, Havering, Maldon, Redbridge, Rochford, Southend-on-Sea, Thurrock, and Waltham Forest Districts.
- Recreational activity, tourism and European site recreational catchment data has been used where this exists for individual European sites although this is limited. In such circumstances where data does not exist then this HRA has used appropriate proxy information from other European sites designated for similar features and in similar settings that has been agreed by Natural England; and,
- Multi Agency Geographic Information for the Countryside (MAGIC) and its links to SSSI citations and the JNCC website (www.magic.gov.uk)

This Report

1.17 Chapter 2 of this report explains the process by which the HRA has been carried out. Chapter 3 explores the relevant pathways of impact. Chapter 4 contains an initial sift of Plan allocations to determine which present potential scope for impacts on European sites. Chapters 5 and 6 then provide more detailed screening (likely significant effects test) of Epping Forest SAC and the Essex Coastal European sites. An assessment of the Plan in respect of each European site is carried out and mitigation strategies are proposed where necessary⁵. The key findings are summarised in Chapter 7: which provides overall conclusions and a summary of recommendations.

⁵ Legal precedent confirms that it is perfectly acceptable to reference mitigation measures at the screening stage of HRA, if that is the stage at which they can be identified.

2. Methodology

Introduction

- 2.1 The HRA has been carried out in the continuing absence of formal central Government guidance, although general EC guidance on HRA does exist⁶. The former Department of Communities and Local Government (DCLG) released a consultation paper on the Appropriate Assessment of Plans in 2006⁷. As yet, no further formal guidance has emerged. However, Natural England has produced its own internal guidance⁸ as has the RSPB⁹. Both of these have been referred to in undertaking this HRA.
- 2.2 Figure 1 below outlines the stages of HRA according to current draft DCLG 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.

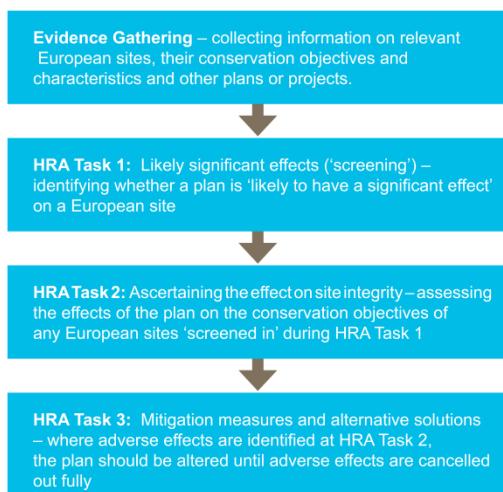


Figure 1: Four Stage Approach to Habitats Regulations Assessment. Source CLG, 2006.

HRA Task 1: Test of Likely Significant Effects (TOLSE)

- 2.3 Following evidence gathering, the first stage of any Habitats Regulations Assessment and the purpose of this assessment is a Test of Likely Significant Effect (TOLSE) - 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 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.
- 2.5 Case law has established that it is legally permissible to take mitigation measures into account in drawing a conclusion on likely significant effects. Therefore, where such measures are already included in the Local Plan or related initiatives, these have been taken into account in determining whether an adequate policy framework is in place to ensure no effects will result.

⁶ European Commission (2001): Assessment of plans and projects significantly affecting Natura 2000 Sites: Methodological Guidance on the Provisions of Article 6(3) and 6(4) of the Habitats Directive.

⁷ CLG (2006) Planning for the Protection of European Sites, Consultation Paper

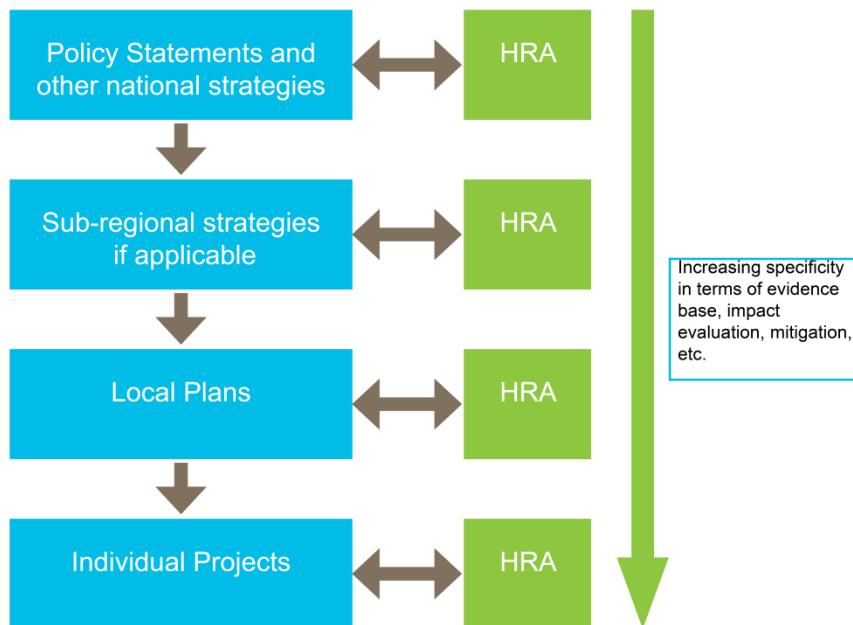
⁸ http://www.ukmpas.org/pdf/practical_guidance/HRGN1.pdf

⁹ Dodd A.M., Cleary B.E., Dawkins J.S., Byron H.J., Palframan L.J. and Williams G.M. (2007). *The Appropriate Assessment of Spatial Plans in England: a guide to why, when and how to do it.* The RSPB, Sandy.

HRA Task 2: Appropriate Assessment (AA)

- 2.6 Where it is determined that a conclusion of 'no likely significant effect' cannot be drawn, the analysis has proceeded to the next stage of HRA known as Appropriate Assessment. Case law has clarified that 'appropriate assessment' is not a technical term. In other words, there are no particular technical analyses, or level of technical analysis, that are classified by law as belonging to appropriate assessment rather than determination of likely significant effects. Therefore it is legal to undertake the fullest level of technical assessment possible and still term the analysis an investigation into likely significant effects. Drawing the line between the studies that belong in the 'likely significant effects' section of analysis and those that belong in the 'appropriate assessment' of the analysis is therefore a judgment to be made by each competent authority. The ultimate legal requirement is that, whether the analysis is termed an investigation into likely significant effects or an appropriate assessment, the analysis supports the conclusion.
- 2.7 In making judgments regarding mitigation, it is important to note that mitigation measures can be tiered. This 'tiering' of assessment is summarised in Box 2.

Box 2: Tiering in HRA of Land Use Plans



HRA Task 3: Avoidance & Mitigation

- 2.8 Where necessary, measures will be recommended for incorporation into the Plan in order to avoid or mitigate adverse effects on European sites. There is considerable precedent concerning the level of detail that a Local Plan document needs to contain regarding mitigation for recreational impacts on European sites. The implication of this precedent is that it is not necessary for all measures that will be deployed to be fully developed prior to adoption of the Plan, but the Plan must provide an adequate policy framework within which these measures can be delivered.
- 2.9 In evaluating significance, AECOM has relied on professional judgement as well as the results of previous stakeholder consultation regarding development impacts on the European sites considered within this assessment.
- 2.10 When discussing 'mitigation' for a Local Plan document, one is concerned primarily with the policy framework to enable the delivery of such mitigation rather than the details of the mitigation measures themselves since the Local Plan document is a high-level policy document.

Principal Other Plans and Projects That May Act ‘In Combination’

- 2.11 In practice 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 relevant Essex, Hertfordshire and London authorities over the lifetime of the Plan. These were selected if they related to bordering authorities or if the authority encompassed one of the discussed European designated sites discussed (e.g. Southend-on-Sea, within which the Benfleet and Southend Marshes Ramsar and SPA is located). These have therefore been taken into consideration.

Table 1: Housing levels to be delivered across Brentwood District and surrounding authorities, provided for context.

Local Authority	Total housing provided
Epping Forest	11,400 (to 2033) ¹⁰
Havering	17,550 (to 2031) ¹¹
Barking and Dagenham	17,850 (to 2024/25) ¹²
Basildon	15,260 (to 2034) ¹³
Uttlesford	These three authorities with Epping Forest District are working together as part of a
East Hertfordshire	HMA. Where impacts in combination such as air quality impacts are considered, these
Harlow	assessments will be based in the level of development provided within the HMA.
Chelmsford	18,515 (to 2036) ¹⁴
Havering	17,550 (2016 - 2031) ¹⁵
Redbridge	16,845 (2015-2030) ¹⁶
Waltham Forest	10,320 (2012 - 2026) ¹⁷
Castle Point	No details on housing allocation provided; awaiting new local plan.
Southend-on-Sea	No details on housing allocation provided; awaiting new local plan.
Rochford	4,600 (to 2021) ¹⁸
Maldon	4,650 (to 2029) ¹⁹
Thurrock	10,010 (to 2021) ²⁰
Waltham Forest	10,320 (to 2026) ²¹

¹⁰ <http://www.efdclocalplan.org/wp-content/uploads/2017/12/Submission-Version-Local-Plan.pdf> [accessed 18/01/2018]

¹¹ https://www.havering.gov.uk/download/downloads/id/1567/proposed_submission_for_the_local_plan.pdf [accessed 18/01/2018]

¹² <https://www.lbbd.gov.uk/wp-content/uploads/2014/10/Adopted-Core-Strategy.pdf> [accessed 18/01/2018]

¹³ <http://www.basildon.gov.uk/CHtppHandler.ashx?id=6599&p=0> [accessed 18/01/2018]

¹⁴ <https://www.chelmsford.gov.uk/planning-and-building-control/planning-policy-and-new-local-plan/new-local-plan/developing-the-new-local-plan/?entryid1139=67198> [accessed 18/01/2018]

¹⁵ <http://havering.objective.co.uk/file/4645335> [accessed 18/01/2018]

¹⁶ https://www.redbridge.gov.uk/media/2268/final-web-pdf_redbridge-local-plan_reduced.pdf [accessed 18/01/2018]

¹⁷ <https://branding.walthamforest.gov.uk/Documents/adopted-core-strategy.pdf> [accessed 18/01/2018]

¹⁸ https://www.rochford.gov.uk/sites/default/files/planningpolicy_cs_adoptedstrategy.pdf [accessed 18/01/2018]

¹⁹ http://www.maldon.gov.uk/download/downloads/id/14807/approved_maldon_district_local_development_plan_2014-2029.pdf [accessed 18/01/2018]

²⁰ https://www.thurrock.gov.uk/sites/default/files/assets/documents/core_strategy_adopted_2011_amended_2015.pdf [accessed 19/01/2017]

²¹ <https://static.walthamforest.gov.uk/sp/Documents/adopted-core-strategy.pdf> [accessed 19/01/2018]

- 2.12 The Minerals and Waste Development Plans for Essex, London and Suffolk are also of some relevance, since these may contribute to increased vehicle movements on the road network within Brentwood (and thereby contribute to air quality impacts). The Essex and Suffolk Local Transport Plans to 2031 will also be important in terms of encouraging sustainable transport. However, the major impact is likely to be that of housing and commercial development within the surrounding districts as set out in Local Plans and these have therefore been the main focus of cumulative 'in combination' effects with regard to this HRA.
- 2.13 In relation to recreational activity, the Epping Forest Management Plan and visitor surveys have been consulted for their plans and projects that may affect European sites in combination with development in Epping Forest District.

3. Pathways of Impact

Introduction

3.1 In carrying out an HRA it is important to determine the various ways in which land use plans can impact on internationally designated sites by following the pathways along which development can be connected with internationally designated sites, in some cases many kilometres distant. Briefly defined, pathways are routes by which a change in activity associated with a plan document/ development can lead to an effect upon an internationally designated site. The following impact pathways for consideration are:

- Recreational pressure
- Atmospheric pollution
- Water abstraction
- Water quality

Recreational Pressure

3.2 Recreational use of an internationally designated site has potential to:

- Cause damage through mechanical/ abrasive damage and nutrient enrichment;
- Cause disturbance to sensitive species, particularly ground-nesting birds and wintering wildfowl; and
- Prevent appropriate management or exacerbate existing management difficulties.

3.3 Different types of internationally designated sites are subject to different types of recreational pressures and have different vulnerabilities. Studies across a range of species have shown that the effects from recreation can be complex.

Mechanical/abrasive damage and nutrient enrichment

3.4 Most types of land based internationally designated site can be affected by trampling, which in turn causes soil compaction and erosion. Walkers with dogs contribute to pressure on sites through nutrient enrichment via dog fouling and also have potential to cause greater disturbance to fauna as dogs are less likely to keep to marked footpaths and move more erratically. Motorcycle scrambling and off-road vehicle use can cause serious erosion, as well as disturbance to sensitive species.

3.5 There have been several papers published that empirically demonstrate that damage to vegetation in woodlands and other habitats can be caused by vehicles, walkers, horses and cyclists:

- Wilson & Seney (1994)²² 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)²³ conducted experimental off-track trampling in 18 closed forest, dwarf scrub and meadow and 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

²² 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

²³ 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

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)²⁴ 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 & Spilde (1998)²⁵ 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.

- 3.6 The total volume of dog faeces deposited on sites can be surprisingly large. For example, at Burnham Beeches National Nature Reserve over one year, Barnard²⁶ estimated the total amounts of urine and faeces from dogs as 30,000 litres and 60 tonnes respectively. The specific impact on Epping Forest SAC has not been quantified from local studies; however, the fact that habitats for which the SAC is designated appear to be subject already to excessive nitrogen deposition, suggests that any additional source of nutrient enrichment (including uncollected dog faeces) will make a cumulative contribution to overall enrichment. Any such contribution must then be considered within the context of other recreational sources of impact on sites.

Disturbance

- 3.7 Concern regarding the effects of disturbance on birds stems from the fact that they are expending energy unnecessarily and the time they spend responding to disturbance is time that is not spent feeding²⁷. Disturbance therefore risks increasing energetic output while reducing energetic input, which can adversely affect the 'condition' and ultimately the 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 birds²⁸.
- 3.8 The potential for disturbance may be less in winter than in summer, in that there are often a smaller number of recreational users. In addition, the consequences of disturbance at a population level may be reduced because birds are not breeding. However, winter activity can still cause disturbance, especially as birds are particularly vulnerable at this time of year due to food shortages, such that disturbance which results in abandonment of suitable feeding areas can have severe consequences. Several empirical studies have, through correlative analysis, demonstrated that out-of-season (October-March) recreational activity can result in quantifiable disturbance:
- Underhill et al²⁹ 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 & Warrington³⁰ 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.

²⁴ 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

²⁵ Cole, D.N., Spilde, D.R. (1998) Hiker, horse and llama trampling effects on native vegetation in Montana, USA. *Journal of Environmental Management* 53: 61-71

²⁶ Barnard, A. (2003) Getting the Facts - Dog Walking and Visitor Number Surveys at Burnham Beeches and their Implications for the Management Process. *Countryside Recreation*, 11, 16 - 19

²⁷ Riddington, R. et al. 1996. The impact of disturbance on the behaviour and energy budgets of Brent geese. *Bird Study* 43:269-279

²⁸ Gill, J.A., Sutherland, W.J. & Norris, K. 1998. The consequences of human disturbance for estuarine birds. *RSPB Conservation Review* 12: 67-72

²⁹ 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

³⁰ Evans, D.M. & Warrington, S. 1997. The effects of recreational disturbance on wintering waterbirds on a mature gravel pit lake near London. *International Journal of Environmental Studies* 53: 167-182

- Tuite et al³¹ 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 on inland water bodies shoveler was one of the most sensitive species to disturbance. The greatest impact on winter wildfowl numbers was associated with sailing/windsurfing and rowing.
 - Pease et al³² investigated the responses of seven species of dabbling ducks to a range of potential causes of disturbance, ranging from pedestrians to vehicle movements. They determined that walking and biking created greater disturbance than vehicles and that gadwall were among the most sensitive of the species studied.
 - A three-year study of wetland birds at the Stour and Orwell SPA, Ravenscroft³³ found that walkers, boats and dogs were the most regular source of disturbance. Despite this, the greatest responses came from relatively infrequent events, such as gun shots and aircraft noise. Birds seemed to habituate to frequent ‘benign’ events such as those involving vehicles, sailing and horses, but there was evidence that apparent habituation to more disruptive events related to reduced bird numbers – i.e. birds were avoiding the most frequently disturbed areas. Disturbance was greatest at high tide on the Orwell, but birds on the Stour showed greatest sensitivity.
- 3.9 A number of studies have shown that birds are affected more by dogs and people with dogs than by people alone, with birds flushing more readily, more frequently, at greater distances and for longer. In addition, dogs, rather than people, tend to be the cause of many management difficulties, notably by worrying grazing animals, and can cause eutrophication near paths. Nutrient-poor habitats such as heathland are particularly sensitive to the fertilising effect of inputs of phosphates, nitrogen and potassium from dog faeces³⁴.
- 3.10 Underhill-Day³⁵ summarises the results of visitor studies that have collected data on the use of semi-natural habitat by dogs. In surveys where 100 observations or more were reported, the mean percentage of visitors who were accompanied by dogs was 54.0%.
- 3.11 However the outcomes of many of these studies need to be treated with care. For instance, the effect of disturbance is not necessarily correlated with the impact of disturbance, i.e. the most easily disturbed species are not necessarily those that will suffer the greatest impacts. It has been shown that, in some cases, the most easily disturbed birds simply move to other feeding sites, whilst others may remain (possibly due to an absence of alternative sites) and thus suffer greater impacts on their population³⁶. A literature review undertaken for the RSPB³⁷ also urges caution when extrapolating the results of one disturbance study because responses differ between species and the response of one species may differ according to local environmental conditions. These facts have to be taken into account when attempting to predict the impacts of future recreational pressure on internationally designated sites.
- 3.12 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 (such as those often associated with construction activities). 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.
- 3.13 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.
- 3.14 Effects of increased recreational activities as a result of increased residential development stemming from the Plan on both Epping Forest SAC and the Essex Coastal Sites are assessed further in Chapter 51. And 6.1 respectively.

³¹ 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

³² Pease, M.L., Rose, R.K. & Butler, M.J. 2005. Effects of human disturbances on the behavior of wintering ducks. *Wildlife Society Bulletin* 33 (1): 103-112.

³³ Ravenscroft, N. (2005) Pilot study into disturbance of waders and wildfowl on the Stour-Orwell SPA: analysis of 2004/05 data. Era report 44, Report to Suffolk Coast & Heaths Unit.

³⁴ Shaw, P.J.A., K. Lankey and S.A. Hollingham (1995) – Impacts of trampling and dog fouling on vegetation and soil conditions on Headley Heath. *The London Naturalist*, 74, 77-82.

³⁵ Underhill-Day, J.C. (2005). A literature review of urban effects on lowland heaths and their wildlife. Natural England Research Report 623.

³⁶ Gill et al. (2001) - Why behavioural responses may not reflect the population consequences of human disturbance. *Biological Conservation*, 97, 265-268

³⁷ Woodfield & Langston (2004) - Literature review on the impact on bird population of disturbance due to human access on foot. *RSPB research report No. 9*.

Atmospheric Pollution

- 3.15 The main pollutants of concern for European sites are oxides of nitrogen (NOx), ammonia (NH₃) and sulphur dioxide (SO₂). Ammonia can have a directly toxic effect upon vegetation and research suggests that this may also be true for NOx at very high concentrations. More significantly, greater NOx or ammonia concentrations within the atmosphere will lead to greater rates of nitrogen deposition to vegetation and soils. An increase in the deposition of nitrogen from the atmosphere 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.

Table 2 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 SO ₂ emissions and subsequent deposition to terrestrial and aquatic ecosystems will continue to decline, it is likely that increased NOx emissions may cancel out any gains produced by reduced SO ₂ 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 NOx 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.
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 40 ppb. 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.

- 3.16 Sulphur dioxide emissions are overwhelmingly influenced by the output of power stations and industrial processes that require the combustion of coal and oil. Ammonia emissions are dominated by agriculture, with some chemical processes also making notable contributions. 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 comparison³⁸. Emissions of NOx could therefore be reasonably expected to increase as a result of greater vehicle use as an indirect effect of the plan.
- 3.17 Whilst Epping Forest SAC is located more than 6km from the district boundary, the SAC is known to already be in exceedance of its Critical Load for nitrogen deposition. Chapter 5.2 investigates the potential for increased traffic movements stemming from the Plan to interact with the SAC.

Water Abstraction

- 3.18 The East of England is generally an area of high water stress. It is particularly vulnerable to future climate change. It is already the driest region in the country and the predicted changes could 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. 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.
- 3.19 Brentwood District lies within the Essex and Suffolk Water supply area, specifically within the Essex Water Resource Zone (WRZ) which also serves all major settlements in Essex, including the London Boroughs of Redbridge, Barking and Havering. Intrinsic water resources include the Essex rivers, the Chelmer, Blackwater, Stour and Roman River which support pumped storage reservoirs at Hanningfield and Abberton, and treatment works at Langford, Langham, Hanningfield and Layer. The remaining water sourced from inside the Essex WRZ is derived from Chalk well and adit sources in the south and south west of the zone. Water is also transferred into the supply area from the Lea Valley Reservoirs and under the Ely Ouse to Essex Transfer Scheme³⁹.
- 3.20 Epping Forest SAC is not vulnerable to changes in water levels. Brentwood Borough's 2011 Water Cycle Study⁴⁰ states that '*Based on water company plans, water supply is not seen as a constraint to potential growth in Brentwood Borough*', as such this impact pathway is not investigated further within this report.

Water Quality

- 3.21 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:
- 3.22 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.
- 3.23 Sewage and some industrial effluent discharges contribute to increased nutrients in the European sites and in particular to phosphate levels in watercourses.

³⁸ 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>

³⁹ Essex and Suffolk Water (2014) Final Water Resource management Plan, 2015-2040.

⁴⁰ <http://www.brentwood.gov.uk/pdf/21032011165157u.pdf> [accessed 25/01/2018]

3.24 The Plan provides for development within the following settlements that are served by the following Wastewater Treatment Works (WwTW):

Table 3 Wastewater Treatment Works with Catchments Serving Settlements Identified to Provide New Development in the Local Plan.⁴¹

WwTW	Settlements with WwTW Catchment	Residential Allocations Located within the WwTW Catchment and Approximate Quantum	Discharge Waters and Distance to European Sites.
Brentwood (Nags Head)	Brentwood Warley Pilgrims Hatch	Land at Hunter House – 48 dwellings Chatham Way/Crown Street Car Park – 31 dwellings Westbury Road car Park – 45 dwellings Wates Way Industrial Estate – 80 dwellings Brentwood Railway Station Car Park – 100 dwellings William Hunter Way Car Park – 179 to 300 dwellings Land east of Nags Head Lane – 125 dwellings Land at Honeypot Lane – 200 dwellings Land off Doddinghurst Road – 200 dwellings Council Depot – 123 dwellings Ford Offices, Eagle Way – 350 dwellings Land adjacent to Carmel – 9 dwellings	Discharges into Ingrebourne River (ultimately entering the River Thames at Rainham); connected to River Thames Estuaries and Marshes SPA/Ramsar 35km along an approximate south-east course.
Shenfield & Hutton	Brentwood Hutton Pilgrims Hatch	Eagle and Child Pub site – 20 dwellings Land at Crescent Drive – 55 dwellings Land at Priests Lane – 95 dwellings Land east of Chelmsford Road - 215 dwellings Officer's Meadow – 510 dwellings Land North of A1023 – 100 dwellings	Discharges into the River Wid at Little Crowbridge Grange, west of Billericay. The River Wid passes north-east into the River Chelmer before emerging into River Blackwater SPA/Ramsar site. The designated site is approximately 20km along a downstream course from the discharge site.
Upminster	Upminster West horndon Warley	West Horndon – 580 dwellings Dunton Hills Garden Village – 2500 (within plan period)	Discharges into the River Mar Dyke near Childerditch (ultimately entering the River Thames at West Thurrock); connected to River Thames Estuaries and Marshes SPA/Ramsar 25km along an approximate south-east course.
Ingatestone	Ingatestone	Ingatestone Garden Centre – 218 dwellings Land adjacent to Ingatestone by-pass – 57 dwellings Land adjacent to Ingatestone Garden Centre – 41 dwellings	Discharges into the River Wid east of Ingatestone. The River Wid passes north-east into the River Chelmer before emerging into River Blackwater SPA/Ramsar site. The designated site is approximately 20km along a downstream course from the discharge site.
Doddinghurst	Doddinghurst Kelvedon Hatch	Land off Stocks Lane, Kelvedon Hatch – 30 dwellings Brizes Corner Field, Blackmore Road, Kelvedon Hatch – 23	Discharges east of Doddinghurst which enters the River Wid. This ultimately reaches River Blackwater SPA/Ramsar approximately 27km along a north-east

⁴¹ Brentwood Scoping and Outline Water Cycle Study - <http://www.brentwood.gov.uk/pdf/21032011165157u.pdf>

	dwellings Chestnut Field, Hook End – 10 dwellings Land adjacent to Tipps Cross Community Hall – 10 dwellings Blackmore (Land south of Redrose Lane, north of Orchard Piece) – 40 dwellings Blackmore (Land south of Redrose Lane, north of Wppard way) – 56 dwellings	course.
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- 3.25 Epping Forest SAC is not vulnerable to changes in water levels, as such this impact pathway is investigated further with regards to the Essex Coastal sites only in Chapter 5.1

4. Screening of Site Allocations

- 4.1 In the following screening tables where Site Allocations have been coloured green in the 'HRA implications' column, this indicates that the Allocations do not contain potential impact pathways linking to European designated sites and have been screened out from further consideration in isolation. Where Site Allocations have been coloured orange in the 'HRA Implications' column, this indicates that the Allocations have potential impact pathways linking to European designated sites and have been screened in for further consideration in isolation within this report. Allocations for employment and traveller sites are discussed below.
- 4.2 For Residential and Traveller Site Allocations, impacts relating to recreational pressure in combination have been screened out for Allocations located more than 5km from Epping Forest SAC, 24km from Essex Estuaries SAC, 10km from Crouch & Roach estuaries SPA and Ramsar site, and 8km from Blackwater Estuary SPA and Ramsar site. Issues relating to urbanisation as a specific issue distinct from recreational pressure are screened out where an Allocation is located more than 400m from a European designated site. The reasoning for these distances is discussed in Chapter 5.
- 4.3 The current Objectively Assessed Housing Need (2017) of Brentwood District was identified as 7,600, of which 6,151 dwellings have been allocated within Brentwood District for the period of the Local Plan.

Table 4 Screening Assessment of Residential Site Allocations

Settlement	Site Allocation	Distance from Internationally Designated Sites
Brentwood	Land at Hunter House – 48 dwellings Chatham Way/Crown Street Car Park – 31 dwellings Westbury Road car Park – 45 dwellings Wates Way Industrial Estate – 80 dwellings Brentwood Railway Station Car Park – 100 dwellings William Hunter Way Car Park – 179 to 300 dwellings Land east of Nags Head Lane – 125 dwellings Land at Honeypot Lane – 200 dwellings Land off Doddinghurst Road – 200 dwellings Council Depot – 123 dwellings Ford Offices, Eagle Way – 350 dwellings Land adjacent to Carmel – 9 dwellings	14.1km from Epping Forest SAC; between 14.7km and 29.5km to the encompassing Essex Estuaries SPA/Ramsar sites. Nearest SPA/Ramsar site is Thames Estuary & Marshes, 14.7km south east of the settlement.
Shenfield & Hutton	Eagle and Child Pub site – 20 dwellings Land at Crescent Drive – 55 dwellings Land at Priests Lane – 95 dwellings Land east of Chelmsford Road - 215 dwellings Officer's Meadow – 510 dwellings Land North of A1023 – 100 dwellings	More than 17km from Epping Forest SAC; between 12km and 24km to Essex Estuaries SPA/Ramsar sites. Nearest SPA/Ramsar site is Thames Estuary & Marshes, 12km south east of the settlement.
Upminster	West Horndon – 580 dwellings Dunton Hills Garden Village – 2500 (within plan period)	More than 16.5km from Epping Forest SAC; between 8.5km and 26.7km to the encompassing Essex Estuaries SPA/Ramsar sites. Nearest SPA/Ramsar site is Thames Estuary & Marshes, 8.5km south east of the settlement. The following residential allocations are located within the zone of influence for Thames Estuary & Marshes SPA/Ramsar: <ul style="list-style-type: none"> • Horndon Industrial Estate (9.97km) • Land East of West Horndon Industrial Estate (9.96km)

Settlement	Site Allocation	Distance from Internationally Designated Sites
		<p>Moreover, several strategic site options also fall within the zone of influence:</p> <ul style="list-style-type: none"> • Dunton Hills Garden Village • Entire Land East of A128 • Land East of A128 • Entire Land east of A127 • Area east of A128 towards Timmermans Garden Centre • Entire Land east of A128, south of A127 • Land East of Thorndon Avenue
Ingatestone	Ingatestone Garden Centre – 218 dwellings Land adjacent to Ingatestone by-pass – 57 dwellings Land adjacent to Ingatestone Garden Centre – 41 dwellings	More than 17.5km from Epping Forest SAC; between 14.1km and 19.8km to the encompassing Essex Estuaries SPA/Ramsar sites. Nearest SPA/Ramsar site is Crouch & Roach Estuaries, 14.1km south east of the settlement.
Doddinghurst	Land off Stocks Lane, Kelvedon Hatch – 30 dwellings Brizes Corner Field, Blackmore Road, Kelvedon Hatch – 23 dwellings Chestnut Field, Hook End – 10 dwellings Land adjacent to Tipps Cross Community Hall – 10 dwellings Blackmore (Land south of Redrose Lane, north of Orchard Piece) – 40 dwellings Blackmore (Land south of Redrose Lane, north of Wppard way) – 56 dwellings	More than 8.8km from Epping Forest SAC; between 18.9km and 26.2km to the encompassing Essex Estuaries SPA/Ramsar sites. Nearest SPA/Ramsar site is Thames Estuary & Marshes, 18.9km south east of the settlement.

- 4.4 The screening undertaken in Table 4 of Residential Site Allocations identify sites that are located within 10km of Thames Estuary & Marshes SPA/Ramsar and 24km of the Essex Coast SAC and as such are screened in for further discussion relating to recreational impact pathways in combination with other plans. These are discussed in Chapter 6.1. Additionally Site Allocations located within the Settlements of Ingatstone, Doddinghurst and Kelvedon Hatch are discussed within Chapter 6.2 in relation to water quality. Further, in combination impacts relating to recreational pressure and atmospheric pollution are discussed in Chapter 5.1, and 5.2 in combination.
- 4.5 Currently, no details on site allocation have been provided for Gypsy and Traveller pitch sites. However, the need for 78 pitches for the period 2016-2033. Therefore, no screening can be undertaken to identify potential impact pathways.

Table 5: Screening Assessment of Employment Site Allocations

Settlement	Site Allocation	Distance from Internationally Designated Sites
Brentwood	Brentwood Enterprise Park – 25.85ha North of A1023 – 2.0ha	1.9km from Epping Forest SAC; more than 8km from Lee Valley SPA/ Ramsar site; more than 14km from Wormley-Hoddesdonpark Woods SAC.
Upminster	Childerditch Industrial Estate (the range) – 2.34ha Childerditch Industrial Estate (new extension) – 2.30ha Codham Hall (new extension) – 2.80ha Land at East Horndon Hall – 5.50ha	2.4km from Epping Forest SAC; 1.0km from Lee Valley SPA/ Ramsar site; more than 7km from Wormley-Hoddesdonpark Woods SAC.

Settlement	Site Allocation	Distance from Internationally Designated Sites
	Dunton Hills Garden Village Strategic Allocation – 5.50ha Warley Street – 5.34ha	
Ingatestone	Land adjacent to Ingatestone by-pass – 2.60ha Hutton Industrial Estate – 10.84ha	More than 4km from Epping Forest SAC; more than 11km from Lee Valley SPA/ Ramsar site; more than 13km from Wormley-Hoddesdonpark Woods SAC.

- 4.6 In total, 48.89ha of land has been set out as potential employment allocation within the Brentwood District Local Plan for B-Class uses (Table 5). Screening of the Employment Site Allocations undertaken in Table 5 does not identify any potential impact pathways linking to European designated sites beyond in combination affects relating to changes in air quality as a result of increased traffic movement resulting from development provided by the Plan.
- 4.7 Table 4 and Table 5 identify that all site allocations (both residential and employment sites) can be screened out individually. However, in combination linking impact pathways potentially still remain. As such the subsequent chapters discuss the potential for European sites to be effected in combination with other projects and plans. Chapter 5 investigates impact pathways that could affect Epping Forest SAC, whilst Chapter 6 investigates impact pathways that could impact Essex Coastal European sites.

5. Epping Forest SAC

Recreational Pressure

5.1. Epping Forest SAC receives a great many visits per year (estimated at over 4 million) and discussions with the City of London Corporation have identified long-standing concerns about increasing recreational use of the Forest resulting in damage to its interest features. A programme of detailed formal visitor surveys has been undertaken in recent years. A 2011 visitor survey report⁴² identified that those living within 2km of the edge of the Forest comprise at least 95% of all visitors. However, further analysis of these data was undertaken by Footprint Ecology in September 2016⁴³. This further analysis identified that, although the scale of the data was substantial (in 2014 alone almost 900 questionnaires were returned) the catchment appeared to be larger than suggested by previous reports. Based on 2014 data it appeared that 89% of survey respondents originated from within 5km of the SAC and 76% originated from within 4km. Some uncertainties with the data were identified as follows:

- It is not clear to what extent the postcodes reflect a random sample of visitors due to the nature of the survey method, which enabled completion online as well as collection of data from people who attended the visitor centres, rather than based on encounters with people on footpaths and at car parks across the site. Therefore, although the scale of response is good, respondents are a self-selecting group to some extent. However, in order to try and address this staff and volunteers targeted visitors from the harder to reach groups such as under 16s, ethnic minorities, the elderly and disabled, at the busier locations with the hard copy version to be completed by themselves or with help from staff and volunteers; and
- The data show an uneven distribution of postcodes from which visitors originated. It showed that the southern portion of Epping Forest SAC (427ha of the total area of 2476ha), receives more than half of visitors, who focus on a few key honeypot sites (Wanstead Flats, Bush Wood, Wanstead Park, Hollow Ponds, Connaught Water and High Beach), with the northern portion of the SAC receiving a smaller

⁴² Alison Millward Associates. 2011. Epping Forest Visitor Survey 2011: Results Summary

⁴³ Footprint Ecology (2016). Initial review of current visitor data for Epping Forest

proportion of visitors. This is not really surprising given that far more people live within 5km of the southern part of the SAC than the northern part. However, it does mean that, while the data indicate that 89% of 2014 survey respondents live within 5km this may over-estimate the catchment for the northern part of the SAC within Epping Forest district.

- 5.2. It should be noted that the distances mentioned above are distances measured from the SAC boundary because interview location wasn't always known and in many cases questionnaires were completed online or at visitor centres rather than out on site. This survey therefore applied a slightly different method to those for other European sites, where visitor origin data has been typically been presented as the distance between the interview location (which is usually an entry point such as a car park) and home postcode. This doesn't change the distribution of respondents' post-codes around Epping Forest SAC, but means that the catchment information from the Epping Forest visitor surveys is not directly comparable to data collected on other European sites by other methods.
- 5.3. However, given that all Site Allocations are situated at a minimum distance of 8.8km from Epping Forest SAC (i.e. more than 3.8km beyond the current recreational Zone of Influence) and that the amount of residential allocations are largely modest, no significant impact from recreational pressure is expected. As such, this impact pathway can be screened out in isolation and in combination. This assessment will be updated for future iterations of the Local Plan based on any further data emerging from the visitor survey currently underway.

Atmospheric Pollution

Likely Significant Effects

- 5.4. Epping Forest SAC is known to be adversely affected by relatively poor local air quality alongside the roads that traverse the SAC and this has been demonstrated to have negatively affected the epiphytic lichen communities of the woodland. The nature of the road network around Epping Forest SAC is such that journeys between a number of key settlements around the Forest by car, van or bus effectively necessitate traversing the SAC. Modelling undertaken for the West Essex/East Hertfordshire Housing Market Area (HMA) authorities in 2016 indicates that even on B roads through the SAC vehicle flows are substantial (e.g. a 2014 base case of c.20,000 AADT on the B1393 with roadside NO_x concentrations of 60µgm⁻³, twice the critical level) while the A121 between Wake Arms Roundabout and the M25 had 2014 base flows of 25,000 AADT. Moreover, lengthy queues are known to build around most arms of Wake Arms Roundabout, which increases emissions compared to the same volume and composition of free-flowing traffic. In response to this, the HMA Authorities have co-signed a Memorandum of Understanding⁴⁴ (MoU) that identifies the need for a mitigation strategy to address potential increases in atmospheric pollution at Epping Forest SAC as a result of planned development.
- 5.5. Whilst Epping Forest SAC is more than 6km from the District, in combination effects of the development provided by the Brentwood Plan require further consideration.

Appropriate Assessment

- 5.6. The Office for National Statistics identified that Brentwood District has a population of 76,400⁴⁵. Further, the Office for National Statistics⁴⁶ identified that there are 14,221 journeys to work from the district to surrounding authorities by car or van. The most frequent destinations are Havering (24% of journeys), Basildon (21% of journeys), Chelmsford (17% of journeys), and Thurrock (8% of journeys). To access these authorities does not require journeys to traverse or pass within 200m of Epping Forest SAC. As such these journeys would not affect Epping Forest SAC. However, approximately 7% of journeys for work by car or van are to Redbridge, with a further 7% to Epping Forest. Both these authorities contain parcels of Epping Forest SAC.

⁴⁴ MoU on Managing the impacts of growth within the West Essex/ East Hertfordshire Housing Market Area on Epping Forest Special Area of Conservation (draft September 2016)

⁴⁵ 2016 data: <https://www.nomisweb.co.uk/reports/lmp/la/1946157212/printable.aspx> [accessed 24/01/2018]

⁴⁶ 2001 data: <https://www.nomisweb.co.uk/> [accessed 24/01/2018]

- 5.7. Epping Forest SAC is located within the northwest corner of the London Borough of Redbridge. Within Redbridge the SAC is traversed by the A110, A104 and the A121. However these roads are not main through routes (such as the M11 which also passes through the Borough) that directly link with Brentwood. Additionally the A110 passes west into the neighbouring Borough of Waltham Forest which is not identified by the Office for National Statistics as a significant destination for journeys to work from Brentwood (i.e. it is not identified in the top 10 destinations for journeys to work from Brentwood). The A104 and A121 run in a broad north –south direction broadly from Epping (located in Epping Forest District) in the north to Woodford (located in the London Borough of Redbridge) in the south. It is unlikely to be a key commuting route for traffic from Brentwood. These roads also pass through Epping Forest District.
- 5.8. Within Epping Forest District, the only settlement that is located to the west of the SAC that may require traffic from Brentwood to traverse or pass within 200m if the SAC is Waltham Abbey. To access Waltham Abbey from Brentwood, commuters would likely use the M25 which passes within approximately 10m of the SAC to its northern extent in proximity to the entrance to Bell Common Tunnel. As such an increase in journeys along this route could contribute to increased atmospheric pollution to the SAC.
- 5.9. The Office of National Statistics identified that approximately 560 daily journeys to work are made to Epping Forest District from Brentwood, however from the Office of National Statistics data available to us we do not know how many of these journeys involve travel along the M25 through Bell Common Tunnel (and thus within 200m of the SAC). Additionally there is a lot of Epping Forest District that is accessible to residents of Brentwood without the need to traverse or pass within 200m of Epping Forest SAC. However, the analysis of the currently available data does suggest that the contribution to traffic flows at Epping Forest SAC from Brentwood are likely to be minimal.
- 5.10. **At this early stage in the Plan development (i.e. Reg. 18) it is appropriate that both traffic modelling and air quality modelling are undertaken to confirm Brentwood's contribution to traffic flows (and thus atmospheric pollution contributions) within Epping Forest SAC to inform future iterations of the Plan.** This modelling will confirm if traffic flows from Brentwood to Epping Forest SAC are minimal (and can be screened out), or, if traffic flows are not found to be minimal, the modelling results will provide a factual basis for participation in the emerging mitigation strategy for the SAC proportionate to their contributions.
- 5.1 Based on the current data our expectation is that the contribution to traffic Flows at Epping Forest SAC as a result of the increased traffic from the Brentwood plan will be minimal. As more data becomes available, this conclusion can be reviewed. However, it **can** be concluded that the location of development provided by the site allocations in Brentwood (as opposed to total amount) is unlikely to influence the authorities contribution to flows through the SAC.

6. Essex Coastal European Sites

Recreational Pressure

- 6.1 It has been identified that coastal European sites in Essex are vulnerable to increased recreational pressure. As such Natural England has been working with neighbouring district, borough and county authorities to devise a strategic mitigation strategy to ensure that the increase in residential development within these authorities does not affect the sensitive European sites. In November 2017, Natural England issued interim advice regarding the 'Essex Recreational Disturbance Avoidance and Mitigation Strategy (RAMS)'. This identified core recreational catchments for the Essex Coastal sites as follows:

Table 6. The Recreational Zone of Influence for Essex Coastal European Sites⁴⁷

European Site	Zone of Influence (km)	Distance from the District Boundary (km)
Essex Estuaries SAC	24	12
Thames Estuary and Marshes Ramsar and SPA	10	8.3
Crouch and Roach Estuaries Ramsar and SPA	10	12.4
Benfleet and Southend Marshes Ramsar and SPA	10	13.4
Blackwater Estuary Ramsar and SPA	8	19.8

- 6.2 Table 6 identifies that two European sites have a recreational Zone of Influence that extends to Brentwood District. These are Essex Estuaries SAC (with a recreational Zone of Influence of 24km) and Thames Estuary and Marshes Ramsar and SPA (with a recreational Zone of Influence of 10km).
- 6.3 It is these two sites that are discussed further within this Chapter. Due to the distances involved the three remaining Essex Coastal sites (Crouch and Roach Estuaries Ramsar and SPA, Benfleet and Southend Marshes Ramsar and SPA, and Blackwater Estuary Ramsar and SPA) can be screened out as recreational pressure from Brentwood is not a realistic linking impact pathway.
- 6.4 The following residential site allocations are located within less than 10km of the Thames Estuary and Marshes SPA and Ramsar site:
- Horndon Industrial Estate, Station Road, West Horndon (site ref: 021)
 - Land East of Horndon Industrial Estate (site ref: 152)
 - Entire Land East of A128, south of A127 (site ref: 200) and,
 - Dunton Hills Garden Village (site ref: 200A)
- 6.5 The closest site allocation is Dunton Hills Garden Village (site ref: 200A) located 8.3km from the Thames Estuary and Marshes SPA and Ramsar site.
- 6.6 All residential site allocations in Brentwood are located within less than 24km of the Essex Estuaries SAC: The closest site allocation is Land at Parklands, High Street, Ingatestone (site ref: 078), located more than 14km from the SAC.
- 6.7 As such, all site allocations identified within the Plan are located within at least one recreational Zone of Influence and new residential development within these locations could result in an adverse effect upon the integrity of the either Essex Coast SAC, with the four residential site allocations identified above also potentially effecting the integrity of the Thames Estuary and Marshes SPA and Ramsar site.

⁴⁷ Taken from Natural England interim guidance letter dated 16th November 2017 'Essex Recreational disturbance Avoidance and Mitigation Strategy (RAMS) – Interim advice to ensure new residential development and any associated recreational disturbance impacts on European designated sites are compliant with the Habitats Regulations'

6.8 To ensure that residential site allocations do not affect the integrity of a European site in combination, it is recommended that the Council adhere to the interim strategic guidance set out by Natural England in their letter⁴⁸. This sets out the following recommendations:

- ‘As these sites fall within the 10km ‘Zone of Influence’ identified in the local plan HRA report, the following interim approach to avoidance and mitigation measures set out in the Essex Recreational disturbance Avoidance and Mitigation Strategy (RAMS) is as follows:
- “Appropriate funding should be collected on the basis that it can be used to fund strategic measures at the relevant European designated sites, proportionate to the level of housing development.
- A delivery mechanism for the agreed measures must be secured and the measures implemented from the first occupation of dwellings, thereby ensuring that the level of recreational disturbance is not increased by future residential development.
- Your councils may wish to consider identifying and funding specific projects which can be delivered in the interim period to increase the resilience of European designated sites to recreational pressures. Identifying projects to be funded now can provide certainty and reduce the risk of receiving funds without a delivery mechanism in place. Natural England would be happy to work with you to help identify potential ‘off-site’ mitigation projects (i.e. in and around European designated sites) which could be delivered using developer contributions for recreational disturbance impacts prior to the adoption of the Essex RAMS.
- It should be ensured that emerging Local Plans have a policy that sets out how likely recreational disturbance impacts from new residential development will be mitigated. This should include a policy commitment to the production and implementation of the Essex RAMS.
- In the absence of a relevant policy or a Local Plan in place, an alternative approach would be to consider developing an Interim Policy Statement, or similar mechanism. This letter may help inform any such interim policy statement.’

6.1. It is noted that currently, no bespoke visitor survey data exists for the Thames Estuary & Marshes SPA/Ramsar to inform the recreational Zone of Influence. However, the evidence base for recreation disturbance for this site and all other internationally designated sites within the Essex Coastal region is to be refined, as required, through the addition of bespoke visitor surveys. It is therefore possible that the recreational Zone of Influence for each site will be subject to change. However, in light of the most current data the above Zones of Influence stand. As the RAMS development progresses, Natural England’s advice and recommendation may change. As such this HRA assessment may require updating in time. However, provided the Council implement the above recommendations in line with the RAMS it can be concluded that increased recreational pressure stemming from increased residential development provided by the Plan will not affect the integrity of any of the Essex Coastal European sites, alone or in combination.

Water Quality

6.9 All site allocations within Brentwood District were dismissed in the initial sift from potentially posing likely significant effects on Essex Coastal European sites as result of changes to water quality from treated wastewater discharge in isolation, however in combination consideration is required. This is the subject of this section.

6.2. Five wastewater treatment works (WwTW) serve the urban areas in Brentwood. These are:

- Doddinghurst WwTW
- Ingatestone WwTW
- Shenfels and Hutton WwTW
- Upminster WwTW

⁴⁸ Natural England (ref 231488) ‘Essex Recreational disturbance Avoidance and Mitigation Strategy (RAMS) – Interim advice to ensure new residential development and any associated recreational disturbance impacts on European designated sites are compliant with the Habitats Regulations’ 16th November 2017

- Brentwood WwTW

- 6.10 These are all provided by Anglian Water other than Brentwood WwTW which is provided by Thames Water (see Table 3 for the catchments of each of these WwTW).
- 6.11 The Brentwood Scoping and Outline Water Cycle Study (WCS) (2011)⁴⁹ identified that '*Brentwood WwTW and Shenfield and Hutton WwTW have the greatest spare flow capacity, and should be able to accommodate more of the proposed development. Upminster works also has capacity for additional growth*'. It identified that both Doddinghurst WwTW and Ingatestone WwTW have limited head room capacities. The Waste Water Treatment Works Needs Assessment in Essex and Southend-on-Sea (2014)⁵⁰ identified that for Ingatestone WwTW '*planned growth will bring the WwTWs close to its limit. Additionally, the WwTWs must currently treat wastewater to a high standard which could potentially limit growth*'. In 2014 this WwTW only had capacity for an additional 55 dwellings. Additionally, the WCS suggests that for the purposes of Plan preparation, these two WwTW should be considered to be at capacity and not able to accommodate increased growth.
- 6.12 Water from both Ingatestone WwTW (serves the settlement of Ingatestone) and Doddinghurst WwTW (Serves the settlements of Doddinghurst and Kelvedon Hatch) discharges into the River Wid, and ultimately the River Chelmer before flowing into the River Blackwater and the Blackwater Estuary SPA and Ramsar site and the Essex Estuaries SAC more than 19km downstream from the District boundary (in a straight line).
- 6.13 Due to the estuarine conditions and dynamic tidal processes in the Essex Coastal European sites, water conditions are essentially cold and relatively turbid with high levels of water movement and wave action. As such, inflows into the estuarine sites are constantly changing and water is flushed away from the area dispersing any waste water and associated sedimentation, phosphates, ammonia and Biochemical Oxygen Demand (BOD). In addition, the conditions described above tend to result in the various Essex estuaries being less susceptible to excessive macro-algal summer growth and winter persistence (and thus smothering of underlying sediments) than the estuaries in the warmer, clearer, calmer waters of the south coast such as the Solent estuaries, notwithstanding their generally hyper-nutritified status. This is supported by the analyses contained in several of the Environment Agency's Stage 3 Review of Consents reports for these estuaries. As such, the features for which these sites are designated (see Appendix A) are likely to be affected by wastewater discharge to a much smaller extent than other estuarine sites, particularly at distances of more than 19km, with consequent extensive dilution.
- 6.14 It is ultimately up to the competent authority (in this case the Environment Agency) to determine headroom capacities of WwTW such as Ingatestone and Doddinghurst and it is the Environment Agency's Review of Consents process that will determine if a likely significant effect will ultimately result. **Nonetheless, in light of the fact that both Ingatestone and Doddinghurst WwTW's are at capacity, it is recommended that the Council prepare their Plan in consultation with Thames Water and Anglian Water to ensure that development is delivered in locations that can accommodate increased sewage inputs. If following reviews and possible upgrades to the WwTW, it is not possible for Ingatestone WwTW and Doddinghurst WwTW to accommodate the additional growth within the settlements they serve (Ingatestone, Doddinghurst and Kelvedon Hatch), the Council will need to locate this development within an alternative WwTW catchment to ensure no likely significant effects result.**

7. Summary of Recommendations and Conclusions

- 7.1 The HRA assessment undertaken provides recommendations as follows:

Epping Forest SAC: Atmospheric Pollution

- 7.2 The analysis of the currently available data suggests that the contribution to traffic flows at Epping Forest SAC from Brentwood are likely to be minimal.

⁴⁹ <http://www.brentwood.gov.uk/pdf/21032011165157u.pdf> [accessed 25/01/2018]

⁵⁰ URS Waste Water Treatment Works Needs Assessment in Essex and Southend-on-Sea (2014)

https://www.essex.gov.uk/Environment%20Planning/Planning/Minerals-Waste-Planning-Team/Planning-Policy/Documents/ECC_WwTW_Final_Part_A.pdf [accessed 25/01/2018]

- 7.3 At this early stage in the Plan development (i.e. Reg. 18) it is appropriate that both traffic modelling and air quality modelling are undertaken to confirm Brentwood's contribution to traffic flows (and thus atmospheric pollution contributions) within Epping Forest SAC to inform future iterations of the Plan. This modelling will confirm if traffic flows from Brentwood to Epping Forest SAC are minimal (and can be screened out), or, if traffic flows are not found to be minimal, the modelling results will provide a factual basis for participation in the emerging mitigation strategy for the SAC proportionate to their contributions.
- 7.4 Based on the current data our expectation is that the contribution to traffic Flows at Epping Forest SAC as a result of the increased traffic from the Brentwood plan will be minimal. As more data becomes available, this conclusion can be reviewed. However, it can be concluded that the location of development provided by the site allocations in Brentwood (as opposed to total amount) is unlikely to influence the authorities contribution to flows through the SAC.

Essex Coastal Sites: Recreational Pressure

- 7.5 To ensure that residential site allocations do not affect the integrity of a European site in combination, it is recommended that the Council adhere to the interim strategic guidance set out by Natural England in their letter⁵¹. This sets out the following recommendations:

- 'As these sites fall within the 10km 'Zone of Influence' identified in the local plan HRA report, the following interim approach to avoidance and mitigation measures set out in the Essex Recreational disturbance Avoidance and Mitigation Strategy (RAMS) is as follows:
- "*Appropriate funding should be collected on the basis that it can be used to fund strategic measures at the relevant European designated sites, proportionate to the level of housing development.*
- "*A delivery mechanism for the agreed measures must be secured and the measures implemented from the first occupation of dwellings, thereby ensuring that the level of recreational disturbance is not increased by future residential development.*
- "*Your councils may wish to consider identifying and funding specific projects which can be delivered in the interim period to increase the resilience of European designated sites to recreational pressures. Identifying projects to be funded now can provide certainty and reduce the risk of receiving funds without a delivery mechanism in place. Natural England would be happy to work with you to help identify potential 'off-site' mitigation projects (i.e. in and around European designated sites) which could be delivered using developer contributions for recreational disturbance impacts prior to the adoption of the Essex RAMS.*
- "*It should be ensured that emerging Local Plans have a policy that sets out how likely recreational disturbance impacts from new residential development will be mitigated. This should include a policy commitment to the production and implementation of the Essex RAMS.*
- "*In the absence of a relevant policy or a Local Plan in place, an alternative approach would be to consider developing an Interim Policy Statement, or similar mechanism. This letter may help inform any such interim policy statement.'*

Essex Coastal Sites: Water Quality

- 7.6 In light of the fact that both Ingatestone and Doddinghurst WwTW's are at capacity, it is recommended that the Council prepare their Plan in consultation with Thames Water and Anglian Water to ensure that development is delivered in locations that can accommodate increased sewage inputs. If following reviews and possible upgrades to the WwTW, it is not possible for Ingatestone WwTW and Doddingurst WwTW WwTW to accommodate the additional growth within the settlements they serve (Ingatestone, Doddinghurst and Kelvedon Hatch), the Council will need to locate this development within an alternative WwTW catchment to ensure no likely significant effects result.

⁵¹ Natural England (ref 231488) 'Essex Recreational disturbance Avoidance and Mitigation Strategy (RAMS) – Interim advice to ensure new residential development and any associated recreational disturbance impacts on European designated sites are compliant with the Habitats Regulations' 16th November 2017

Appendix A European Designated Sites Background

Epping Forest SAC

Introduction

Part of the Epping Forest SAC is located within Epping Forest District. Approximately 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 SAC supports a nationally outstanding assemblage of invertebrates, a major amphibian interest and an exceptional breeding bird community.

Reasons for Designation⁵²

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 with *Ilex* and sometime *Taxus* in the shrublayer.
- Wet heathland with cross-leaved heath; and
- Dry heath

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

Current Pressures and Threats⁵³

- Air pollution
- Under grazing
- Public disturbance
- Changes in species distribution
- Inappropriate water levels
- Water pollution
- Invasive species
- Disease

Conservation Objectives

Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:

- The extent and distribution of qualifying natural habitats and habitats of qualifying species
- The structure and function (including typical species) of qualifying natural habitats
- The structure and function of the habitats of qualifying species
- The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely
- The populations of qualifying species, and,
- The distribution of qualifying species within the site

⁵² JNCC (2015) Natura 200 Standard Data Form: Epping Forest SAC

⁵³ Natural England (2015). Site Improvement Plan: Epping Forest SAC

Thames Estuaries and Marshes SPA and Ramsar Site

Introduction

The Thames Estuaries and Marshes comprise intertidal mudflats visible at low tide, saltmarsh and complex channel systems across a 4802.5ha area along the outer Thames Estuary. In addition, a series of disused quarry pits have been transformed to create an extensive series of ponds and lakes at Cliffe Pools. Levees and seawalls bound most intertidal areas, occasionally featuring small beaches. These coastal wetland features support internationally important numbers of wintering avocet, dunlin, grey plover, knot, redshank and hen harriers, and summer populations of black tailed godwit and ringed plover. In addition to the ornithological interest, the site also qualifies as a Ramsar site on account of the saltmarsh and grazing marsh supporting diverse and internationally important assemblages of wetland plants and invertebrates.

The Thames Estuaries and Marshes SPA/Ramsar consists of two Sites of Special Scientific Interest, Mucking Flats and Marshes SSSI, and South Thame Estuary and Marshes SSSI. Of these Sites, only Mucking Flats and Marshes SSSI is located in Essex, whereas South Thames Estuary and Marshes SSSI is located across the Thames in northern Kent.

Reasons for Designation

The Thames Estuaries and Marshes site is designated as an SPA⁵⁴: for its Birds Directive Annex I and Ramsar site under criterion 6⁵⁵ for species that over-winter and over-summer. Over-summering species include:

- Ringed plover *Charadrius hiaticula*;
- Black-tailed godwit *Limosa canutus islandica*.

Over-wintering species include:

- Grey plover, *Pluvialis squatarola*;
- Red knot, *Calidris canutus islandica*;
- Dunlin, *Calidris alpina alpina*;
- Common redshank, *Tringa tetanus tetanus*.

In addition, the site qualifies as a Ramsar under criterion 2⁵⁵, by supporting the endangered least lettuce *Lactuca saligna* and at least 14 nationally scarce plants of wetland habitats, including bulbous foxtail *Alopecurus bulbosus*.

Current Pressures and Threats⁵⁶

- Coastal squeeze
- Public access/disturbance
- Invasive species
- Changes in species distribution
- Fisheries: commercial marine and estuarine
- Vehicles: illicit
- Air pollution: risk of atmospheric nitrogen

Conservation Objectives⁵⁷

With regard to the SPA and the individual species and/or assemblage of species for which the site has been classified (the 'Qualifying Features'), and subject to natural change;

⁵⁴ <http://jncc.defra.gov.uk/page-2042> [accessed 18/01/2018]

⁵⁵ <http://jncc.defra.gov.uk/pdf/RIS/UK11069.pdf> [accessed 18/01/2018]

⁵⁶ <http://publications.naturalengland.org.uk/publication/6270737467834368> [accessed 18/01/2018]

⁵⁷ <http://publications.naturalengland.org.uk/file/5268280864407552> [accessed 18/01/2018]

Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring;

- The extent and distribution of the habitats of the qualifying features
- The structure and function of the habitats of the qualifying features
- The supporting processes on which the habitats of the qualifying features rely
- The population of each of the qualifying features, and,
- The distribution of the qualifying features within the site.

Essex Estuaries SAC

Introduction

The SAC comprises a large estuarine site along the Essex coastline of largely undeveloped coastal plain estuaries with associated open coast mudflats and sandbank and encompasses the Colne, Blackwater, Crouch and Roach estuaries. The Essex Estuaries SAC supports a diverse range of marine and estuarine sediment communities which in turn support diverse and unusual marine communities. The site is designated for the presence of several European designated priority habitats, including Atlantic salt meadows⁵⁸.

This SAC overlaps with several protected areas, including Blackwater Estuary Ramsar/SPA, Colne Estuary Ramsar/SPA, Crouch and Roach Estuaries Ramsar/SPA, Dengie Ramsar/SPA, Foulness Ramsar/SPA and Outer Thames SPA. In addition, the SAC consists of the following seven SSSIs:

- Blackwater Estuary SSSI
- Colne Estuary SSSI
- Crouch and Roach Estuary SSSI
- Dengie SSSI
- Foulness SSSI
- The Cliff, Burnham-On-Crouch SSSI
- Upper Colne Marshes SSSI

Reasons for Designation⁵⁸

Essex Estuaries qualifies as a SAC through its habitats, containing the Habitats Directive Annex I habitat:

- Estuaries – an extensive, continuous area of estuarine habitat;
- Mudflats and sandflats not covered by seawater at low tide;
- Salicornia and other annuals colonizing mud and sand;
- Spartina swards;
- Atlantic salt meadows; and,
- Mediterranean and thermo-Atlantic halophilous scrubs.

Current Pressures and Threats⁵⁹

- Coastal squeeze
- Public access/disturbance

⁵⁸ <http://jncc.defra.gov.uk/protectedsites/sacselection/sac.asp?EUCode=UK0013690> [accessed 18/01/2018]

⁵⁹ <http://publications.naturalengland.org.uk/publication/5459956190937088> [accessed 08/01/2018]

- Invasive species
- Changes in species distribution
- Fisheries: commercial marine and estuarine
- Vehicles: illicit
- Air pollution: risk of atmospheric nitrogen deposition
- General planning permission

Conservation Objectives⁶⁰

With regard to the SAC and the natural habitats and/or species for which the site has been designated (the 'Qualifying Features'), and subject to natural change;

Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring;

- The extent and distribution of qualifying natural habitats
- The structure and function (including typical species) of qualifying natural habitats, and
- The supporting processes on which qualifying natural habitats rely

Crouch and Roach SPA and Ramsar Site

Introduction

The Crouch and Roach Estuaries is located on the Essex south coast spanning across 1735.58ha. The estuaries partly form from the River Crouch which is predominantly located between two ridges of London Clay and partly from the River Roach, which is set between areas of brick earth and loams. Coastal squeezing of the intertidal zone has left a narrow strip of tidal mud, which is used by significant bird numbers. The site is of importance for wintering waterbirds, such as the dark-bellied Brent goose *Branta b. bernicla*⁶¹.

The Crouch and Roach Estuaries SPA/Ramsar consists of a single Sites of Special Scientific Interest, Crouch and Roach Estuaries SSSI.

Reasons for Designation

The Crouch and Roach site is designated as an SPA⁶¹: for its Birds Directive Annex I and Ramsar site under criterion 6⁶² for species that over-winter. This designation is provided for the presence of an internationally important population of dark-bellied Brent goose *Branta bernicla bernicla* (1% of total wintering Western European population).

In addition, the site qualifies as a Ramsar under criterion 2⁶³, by supporting the vulnerable, endangered and at least 13 nationally scarce plants of wetland habitats, including slender hare's ear *Bupleurum tenuissimum*. Several important invertebrate species are also present on site, including scarce emerald damselfly *Lestes dryas* and the large horsefly *Hybomitra expollicata*.

Current Pressures and Threats⁶⁴

- Coastal squeeze
- Public access/disturbance
- Invasive species

⁶¹ <http://jncc.defra.gov.uk/default.aspx?page=2019> [accessed 18/01/2017]

⁶³ <http://jncc.defra.gov.uk/pdf/RIS/UK11058.pdf> [accessed 18/01/2017]

⁶⁴ <http://publications.naturalengland.org.uk/publication/6270737467834368> [accessed 18/01/2018]

- Changes in species distribution
- Fisheries: commercial marine and estuarine
- Vehicles: illicit
- Air pollution: risk of atmospheric nitrogen

Conservation Objectives⁶⁵

With regard to the SPA and the individual species and/or assemblage of species for which the site has been classified (the 'Qualifying Features'), and subject to natural change;

Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring;

- The extent and distribution of the habitats of the qualifying features
- The structure and function of the habitats of the qualifying features
- The supporting processes on which the habitats of the qualifying features rely
- The population of each of the qualifying features, and,
- The distribution of the qualifying features within the site.

Benfleet and Southend Marshes SPA and Ramsar Site

Introduction

The Benfleet and Southampton Marshes are located on the north shore of the Outer Thames Estuary in Essex. The site covers a 2251.31ha area comprising an extensive series of saltmarshes, cockle shell banks, mudflats and grassland that support a diverse flora and fauna. The productive mudflats, cockle shell banks and saltmarsh communities provide a wide range of feeding and roosting opportunities for internationally important numbers of wintering wildfowl and waders, such as the over-wintering population of dark-bellied Brent geese⁶⁶.

The Benfleet and Southend Marshes SPA/Ramsar consist of a single Site of Special Scientific Interest, Benfleet and Southend Marshes SSSI.

Reasons for Designation

The Thames Estuaries and Marshes site is designated as an SPA⁶⁸, for its Birds Directive Annex I and Ramsar site under criterion 6⁶⁷ for on passage and over-wintering species. On passage species include:

- Ringed plover *Charadrius hiaticula*;

Over-wintering species include:

- Dark-bellied Brent goose *Branta bernicla bernicla*
- Grey plover *Pluvialis squatarola*
- Knot *Calidris canutus*

Current Pressures and Threats⁶⁸

- Coastal squeeze

⁶⁵ [file:///C:/Users/Ashley.Welch.NA/Downloads/UK9009244-Crouch-and-Roach-Estuaries-\(Mid-Essex-Coast-Phase-3\)-SPA-V2.pdf](file:///C:/Users/Ashley.Welch.NA/Downloads/UK9009244-Crouch-and-Roach-Estuaries-(Mid-Essex-Coast-Phase-3)-SPA-V2.pdf) [accessed 18/01/2018]

⁶⁶ <http://jncc.defra.gov.uk/page-2014-theme=default> [accessed 19/01/2018]

⁶⁷ <http://jncc.defra.gov.uk/pdf/RIS/UK11006.pdf> [accessed 18/01/2018]

⁶⁸ <http://publications.naturalengland.org.uk/publication/6270737467834368> [accessed 18/01/2018]

- Public access/disturbance
- Invasive species
- Changes in species distribution
- Fisheries: commercial marine and estuarine
- Vehicles: illicit
- Air pollution: risk of atmospheric nitrogen

Conservation Objectives⁶⁹

With regard to the SPA and the individual species and/or assemblage of species for which the site has been classified (the 'Qualifying Features'), and subject to natural change;

Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring;

- The extent and distribution of the habitats of the qualifying features
- The structure and function of the habitats of the qualifying features
- The supporting processes on which the habitats of the qualifying features rely
- The population of each of the qualifying features, and,
- The distribution of the qualifying features within the site.

Blackwater Estuary SPA and Ramsar Site

Introduction

Blackwater Estuary is the largest estuary in Essex covering a 4395.15ha area along the Essex coastline. The estuary comprises mudflats fringed by saltmarsh on the upper shores, and shingle, shell banks and offshore islands featuring on the tidal flats. In addition, the surrounding contains terrestrial habitat of high conservation importance including the sea wall, ancient grazing marsh, fleet and ditch systems, and semi-improved grassland. The diversity of estuarine habitats results in the sites being of importance for a range of overwintering waterbirds⁷⁰. The site is also important during the summer for breeding terns. In addition to the ornithological interest, the site also qualifies as a Ramsar site on account of it supporting 7% of Britain's saltmarshes. The saltmarsh also supports diverse and internationally important assemblages of wetland plants and invertebrates, including the endangered water beetle *Paracymus aeneus*, and vulnerable damselfly *Lestes dryas*⁷¹.

The Thames Estuaries and Marshes SPA/Ramsar consist of a single Site of Special Scientific Interest, Blackwater Estuary SSSI.

Reasons for Designation

The Blackwater Estuary site is designated as an SPA⁷²; for its Birds Directive Annex I and Ramsar site under criterion 6⁷³ summer breeding, on passage, and over-wintering species. Summer breeding species include:

- Little tern *Sterna albifrons*

On passage species include:

- Ringed plover *Charadrius hiaticula*

Over-wintering species include:

⁶⁹ <file:///C:/Users/Ashley.Welch.NA/Downloads/UK9009171-Benfleet-and-Southend-Marshes-SPA-V2.pdf> [accessed 18/01/2018]

⁷⁰ <http://jncc.defra.gov.uk/default.aspx?page=2020> [accessed 19/01/2018]

⁷¹ <http://jncc.defra.gov.uk/pdf/RIS/UK11007.pdf> [accessed 19/01/2018]

- Avocet *Recurvirostra avosetta*
- Golden plover *Pluvialis apricaria*
- Hen harrier *Circus cyaneus*
- Ruff *Philomachus pugnax*
- Black-tailed godwit *Limosa limosa islandica*
- Dark bellied Brent goose *Branta bernicla bernicla*
- Grey plover, *Pluvialis squatarola*;
- Dunlin, *Calidris alpinae alpinae*;
- Common redshank, *Tringa tetanus totanus*.
- Shelduck *Tadorna tadorna*

In addition, the site qualifies as a Ramsar under criterion 2⁷³, by supporting at least 16 British Red Data Book invertebrate species, including the endangered water beetle *Paracymus aeneus*, vulnerable damselfly *Lestes dryas*, the fly species *Aedes flavesrens*, *Erioptera bivittata*, *Hybomitra expollicata* and the spiders *Heliophanus auratus* and *Trichopterna cito*.

Current Pressures and Threats⁷²

- Coastal squeeze
- Public access/disturbance
- Invasive species
- Changes in species distribution
- Fisheries: commercial marine and estuarine
- Vehicles: illicit
- Air pollution: risk of atmospheric nitrogen

Conservation Objectives⁷³

With regard to the SPA and the individual species and/or assemblage of species for which the site has been classified (the 'Qualifying Features'), and subject to natural change;

Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring;

- The extent and distribution of the habitats of the qualifying features
- The structure and function of the habitats of the qualifying features
- The supporting processes on which the habitats of the qualifying features rely
- The population of each of the qualifying features, and,
- The distribution of the qualifying features within the site.

⁷² <http://publications.naturalengland.org.uk/publication/6270737467834368> [accessed 18/01/2018]

⁷³ <http://publications.naturalengland.org.uk/publication/4888693533835264> [accessed 18/01/2018]

Appendix B Figures

Figure A1: Locations of Internationally Designated Sites and Site Allocations

