

URS



Merseyside
Environmental
Advisory Service

Knowsley Core Strategy

Habitats Regulations Assessment

June 2011

Prepared for
Knowsley Borough Council

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HRA/AA Report June 2011

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1 Introduction

- 1.1 The Habitats Directive applies the precautionary principle to Natura 2000 sites (Special Areas of Conservation, SACs, and Special Protection Areas, SPAs; as a matter of UK Government policy, Ramsar sites¹ are given equivalent status). 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 2010 (**Box 1**). 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.

Box 1. The legislative basis for Appropriate Assessment

Habitats Directive 1992

“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.”

Article 6 (3)

Conservation of Habitats and Species Regulations 2010

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

- 1.2 URS Scott Wilson has been appointed by Knowsley Borough Council (“the Council”) to assist in undertaking a Habitat Regulations Assessment (HRA) of the potential effects of the Local Development Framework (LDF) Core Strategy, on the Natura 2000 network and Ramsar sites.
- 1.3 The LDF will supersede the current Replacement Unitary Development Plan (UDP) which was adopted by Knowsley Council in June 2006. In 2009, the Council saved most of the UDP policies which presently form part of the statutory development plan for Knowsley. Some of these policies will lapse when the Core Strategy is adopted in 2012, whereas others will continue to be saved until subsequent Development Plan Documents are adopted.
- 1.4 This document reports on the HRA Screening and Appropriate Assessment of the Preferred Options of the Core Strategy.

¹ Wetlands of International Importance designated under the Ramsar Convention 1979

- 1.5 Chapter 2 of this report explains the process by which the screening element of the HRA has been carried out. Chapter 3 explores the relevant pathways of impact resulting from the scale of development that will be delivered in Knowsley. Chapter 4 summarises the results of the Likely Significant Effect (screening) exercise while Chapters 5-14 provide the results of the Appropriate Assessment organised on the basis of one chapter per European site, except where multiple sites overlap in a particular geographic area (e.g. Ribble & Alt Estuaries SPA and Ramsar sites). Each chapter begins with a consideration of the interest features and ecological condition of the particular site and environmental process essential to maintain site integrity. An assessment of the Core Strategy in respect of each European site (both in isolation and in combination with other projects and plans) is then carried out. The conclusion of the exercise is then summarised in Chapter 15.

Knowsley Core Strategy

- 1.6 The purpose of the Core Strategy is to set the strategic framework for the growth and development of Knowsley up to 2027 and beyond, forming the central part of the Borough's Local Development Framework (LDF). The LDF will promote, guide and manage the future development of Knowsley and make important choices about how and where new development and regeneration will take place in order to achieve the aspirations set out in Knowsley's Sustainable Community Strategy (2008-2023). The LDF will shape the investment plans of the Council and other public, voluntary and private sector organisations.
- 1.7 The preferred options of the Core Strategy, the subject of this HRA screening, sets out the vision, objective and strategy for development in the Borough, highlighting key issues and opportunities. Whilst some broad locations and distribution of development are identified, the allocation of individual sites will be implemented through the Site Allocations and Development Management Policies DPD.
- 1.8 The key aspects of the Core Strategy that are subject to HRA screening in this report relate to:
- the provision of 7,650 new dwellings (2010-2027) at an annual average of 450 dwellings per annum. (Policy CS1 Spatial Strategy for Knowsley; CS3, Housing Supply, Delivery and Distribution; and CS9-13 Principal Regeneration Areas);
 - the provision of 216.5ha of employment land (2010-2027) (Policy CS4 Economy and Employment Land, CS1 Spatial Strategy for Knowsley; and CS9-13 Principal Regeneration Areas);
 - provision of infrastructure (CS7, Transport Networks) including transport infrastructure (roads, railways, public transport, walking and cycle routes); physical/environmental infrastructure e.g. green infrastructure (CS8); urban greenspace (CS21); sustainable and low carbon development (CS22); and renewable and low carbon infrastructure (CS23);
 - minerals management (CS25); and.
 - waste management (CS26).
- 1.9 It is important to note that the population of Knowsley is projected to increase by a total of 4,100 between 2008 and 2027. The population is also shifting toward an older population with a

projected increase of 8,100 in the over 65s, but a decrease of 4000 in under 65s over the period of this Plan. However, part of the intent of the Core Strategy is to stimulate growth and investment in the Borough which may help to redress the balance and retain and attract a greater number of young people into the Borough.

2 Methodology

Introduction

- 2.1 This section sets out our approach and methodology for undertaking the HRA. Habitat Regulations Assessment itself operates independently from the Planning Policy system, being a legal requirement of a discrete Statutory Instrument. Therefore there is no direct relationship to PPS12 and the 'Test of Soundness'.

A Proportionate Assessment

- 2.2 Project-related HRA often requires bespoke survey work and novel data generation in order to accurately determine the significance of adverse effects, that is, to look beyond the risk of an effect to a justified prediction of the actual likely effect and to the development of avoidance or mitigation measures.
- 2.3 However, the draft CLG guidance² makes it clear that when implementing HRA of land-use plans, the Appropriate Assessment (AA) should be undertaken at a level of detail that is appropriate and proportional to the level of detail provided within the plan itself:

"The comprehensiveness of the [Appropriate] assessment work undertaken should be proportionate to the geographical scope of the option and the nature and extent of any effects identified. An AA need not be done in any more detail, or using more resources, than is useful for its purpose. It would be inappropriate and impracticable to assess the effects [of a strategic land use plan] in the degree of detail that would normally be required for the Environmental Impact Assessment (EIA) of a project."

- 2.4 In other words, there is a tacit acceptance that appropriate assessment can be tiered and that all impacts are not necessarily appropriate for consideration to the same degree of detail at all tiers (**Figure 1**).
- 2.5 For an LDF the level of detail concerning the developments that will be delivered is usually insufficient to make a highly detailed assessment of significance of effects. For example, precise and full determination of the impacts and significant effects of a new settlement will require extensive details concerning the design, including layout of greenspace and type of development to be delivered in particular locations, yet these aspects will not be decided until subsequent stages.
- 2.6 The most robust and defensible approach to the absence of fine grain detail at this level is to make use of the precautionary principle. In other words, the plan is never given the benefit of the doubt; it must be assumed that a policy/measure is likely to have an impact leading to a significant adverse effect upon a European site unless it can be clearly established otherwise.

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

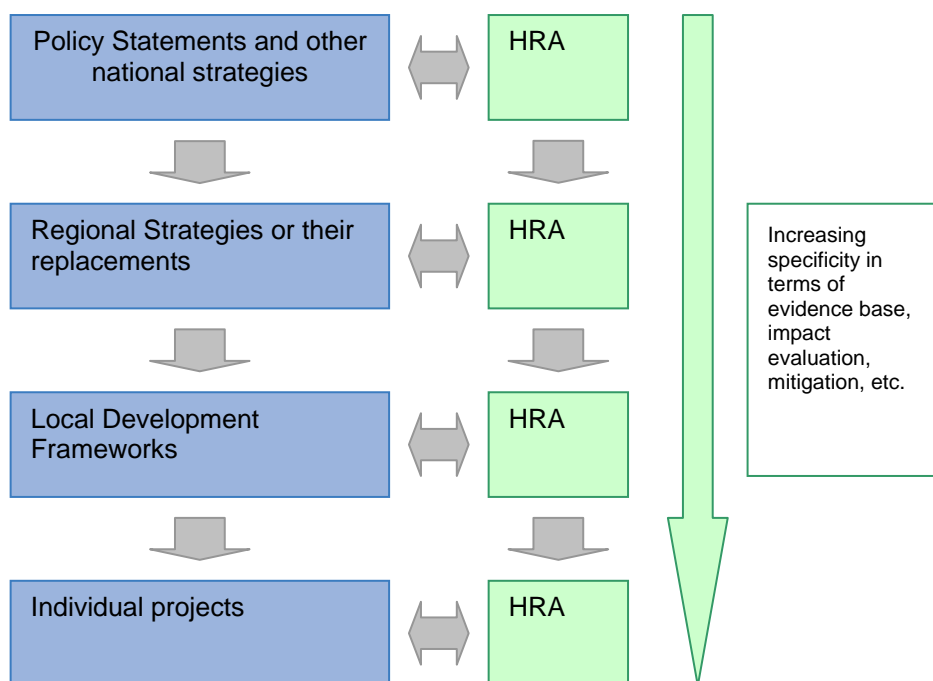


Figure 1: Tiering in HRA of Land Use Plans

The Process of HRA

- 2.7 The HRA is likely to be carried out in the continuing absence of formal UK Government guidance. Communities and Local Government (CLG) released a consultation paper on AA of Plans in 2006³. As yet, no further formal guidance has emerged from CLG. However, Natural England has produced its own informal internal guidance and Countryside Council for Wales has produced guidance for Welsh authorities which is included within Technical Advice Note 5: Nature Conservation and Planning (2009). Although there is no requirement for an HRA to follow either guidance, both have been referred to in producing this final version of the HRA.
- 2.8 **Figure 2** below outlines the stages of HRA according to current draft CLG guidance (which, since it is Central Government and Knowsley is an English authority has been considered to take precedence over other sources of 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.

³ CLG (2006) Planning for the Protection of European Sites, Consultation Paper

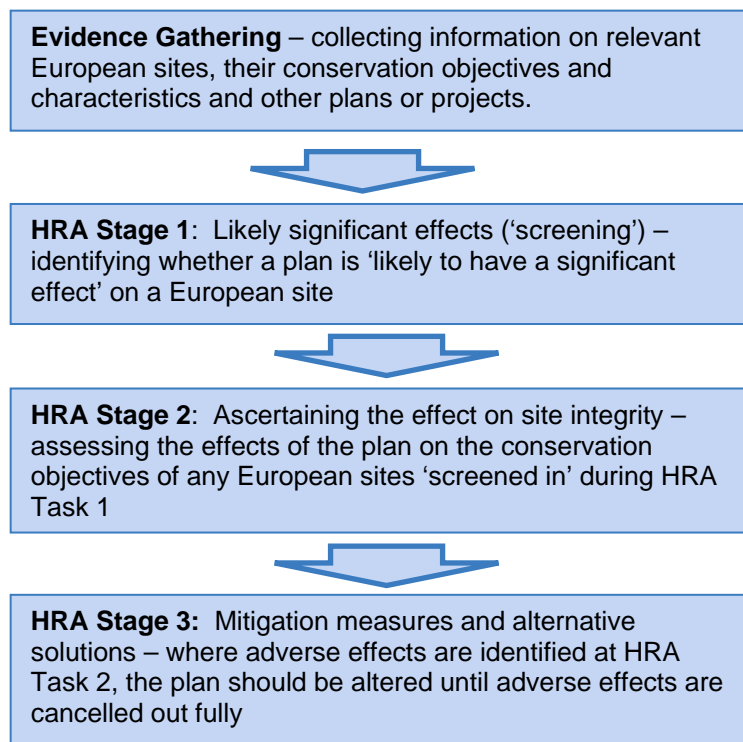


Figure 2: Four-Stage Approach to Habitat Regulations Assessment

2.9 In practice, we and other practitioners have discovered that this broad outline requires some amendment in order to feed into a developing land use plan such as a Core Strategy. The following process has been adopted for carrying out the subsequent stages of the HRA.

Stage Two: Likely Significant Effect Test (Screening)

2.10 The first stage of any Habitat Regulations Assessment is a Likely Significant Effect (LSE) test - essentially a high level 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?"

2.11 The objective is to 'screen out' those plans and projects (or site allocations/policies) 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 or pathway for an adverse interaction with European sites. In addition, European sites may be screened out where there is no mechanism or pathway for an adverse effect from any element of a plan or project.

- 2.12 Habitat Regulations Assessment Screening of the Knowsley Core Strategy Preferred Options Report identified the potential for impacts on a number of European sites as a result of implementation of some of the policies. The Core Strategy was therefore screened in with respect to likely significant effects on the Natura 2000 sites listed in Table 1.

Appropriate Assessment and Mitigation

- 2.13 The steps involved are detailed in Box 2.

Box 2. The steps involved in the Appropriate Assessment exercise undertaken for the Knowsley Core Strategy

1. Explore the reasons for the European designation of these sites (interest features).
2. Explore the environmental conditions required to maintain the integrity of the selected sites and become familiar with the current trends in these environmental processes in addition to the conservation objectives of those sites, which are to maintain in favourable condition the habitats and species for which the sites have been designated'.
3. Gain a full understanding of the plan and its policies and consider each policy within the context of the environmental processes – would the policy lead to an impact on any identified process?
4. Decide if the identified impact will lead to an adverse effect.
5. Identify other plans and projects that might affect these sites in combination with the Plan and decide whether any adverse effects that might not result from the Plan in isolation will do so “in combination”.
6. Develop measures to avoid the effect entirely, or if not possible, to mitigate the impact sufficiently that its effect on the European site is rendered effectively inconsequential.

- 2.14 In evaluating significance, Scott Wilson has relied on its professional judgement as well as stakeholder consultation. The level of detail concerning developments that will be permitted under land use plans is rarely sufficient to make a detailed quantification of adverse effects. Therefore, we have again taken a precautionary approach (in the absence of more precise data) assuming as the default position that if an adverse effect cannot be confidently ruled out, avoidance or mitigation measures must be provided. This is in line with CLG guidance that the level of detail of the assessment, whilst meeting the relevant requirements of the Habitats Regulations, should be ‘appropriate’ to the level of plan or project that it addresses (see Figure 2 for a summary of this ‘tiering’ of assessment).

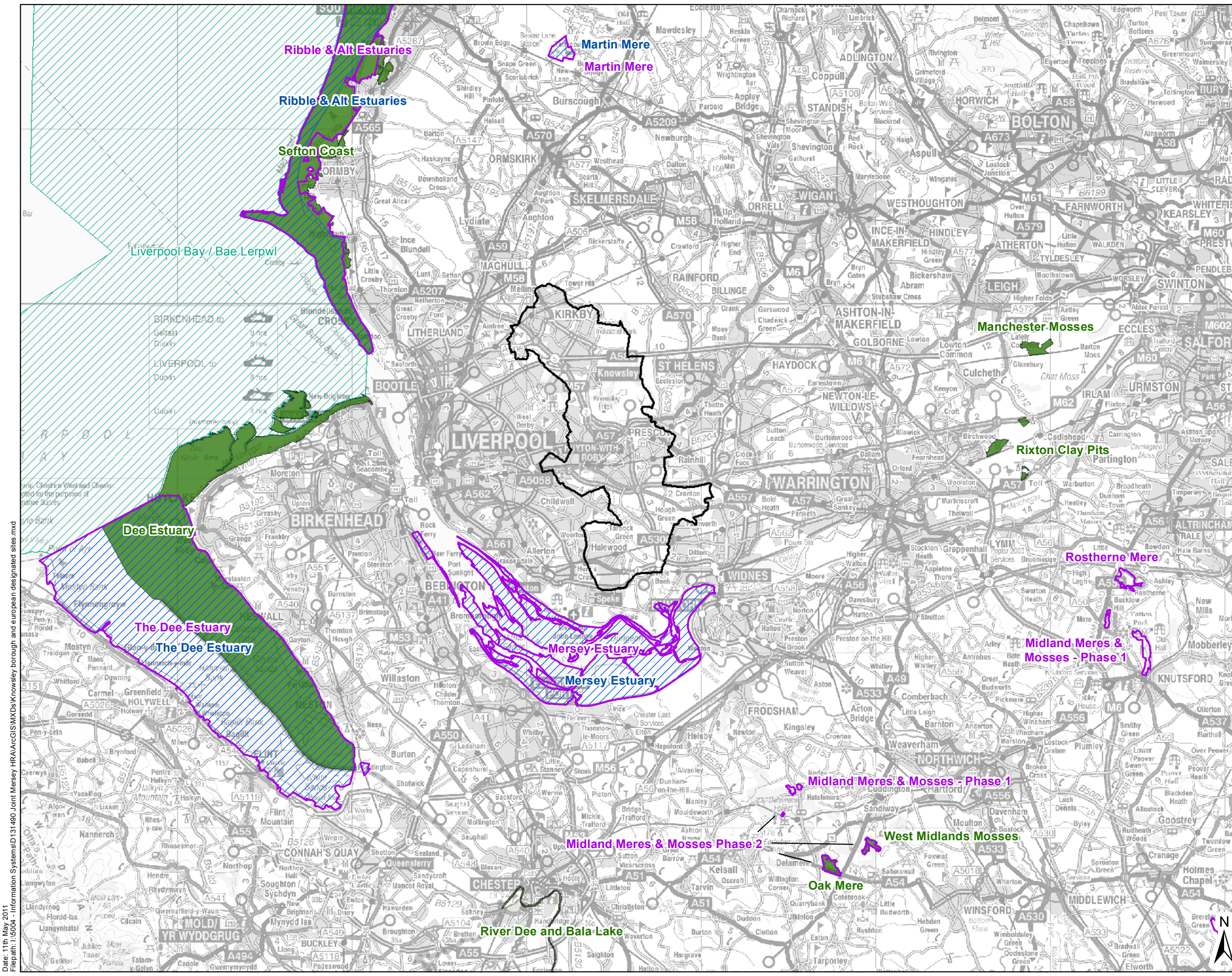
Physical scope of the HRA

- 2.15 The physical scope of the HRA is as shown in Table 1. The location of these European Sites is illustrated in Figure 3.

Table 1: Physical scope of the HRA

European site	Reason for inclusion
Mersey Estuary SPA/Ramsar Site Manchester Mosses SAC	Located approximately 1.6km to the south of the Knowsley Borough Core Strategy Area and with hydraulic connections to it.
River Dee & Bala Lake SAC	Located adjacent to the M62, which is one of the principal routes between Knowsley and Manchester
Sefton Coast SAC	Identified as a source of potable water for Merseyside.
Dee Estuary SAC SPA & Ramsar site and pSPA extension	Located within Merseyside, currently subject to recreational pressures.
Mersey Narrows & North Wirral Foreshore pRamsar and pSPA	Downstream of the River Dee which is identified as a source of potable water for Merseyside.
Ribble & Alt Estuaries SPA and Ramsar site	Located within Merseyside, with hydraulic connections to the Mersey and currently subject to recreational pressures.
Liverpool Bay SPA	Located within Merseyside with hydraulic connections to the Mersey and currently subject to recreational pressures. Also potential water quality pathway through wastewater discharge from River Alt and via the River Mersey.
River Eden SAC	Located immediately adjacent to Merseyside and is therefore a potential water quality pathway through wastewater effluent discharges as well as disturbance.
Martin Mere SPA	Haweswater Lake (to which the River is hydrologically connected) is likely to form part of the future water supply for Merseyside.
	Whilst this is located approximately 12.7km north of Knowsley, any renewable energy policies (e.g. wind turbines), alone or in combination have the potential to affect flight paths of qualifying bird species.

- 2.16 No other pathways to European sites have been identified.
- 2.17 The scoping process also evaluated whether pathways existed to the following European sites but it was concluded that they could be scoped out of consideration:
- **Oak Mere SAC** – Approximately 19km from Borough Boundary. Located immediately adjacent to the A54 and A49, both of which are busy roads connecting Merseyside to Cheshire. However, even though development in Knowsley has the potential to contribute to an increase in traffic on these routes, neither are key routes into or out of Knowsley so any increase is likely to be minimal. No realistic pathway has been identified;
 - **Rixton Claypits SAC** – Approximately 18km to the east of the Borough Boundary, but not close to any major commuting routes into or out of Knowsley. No realistic pathway has been identified;



NOTES

- Knowsley District
- Ramsar
- Special Area of Conservation
- Special Protection Area
- New Marine Special Protection Area

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Revision Details	By	Check	Date	Suffix

Drawing Status: **FINAL**

Job Title: **MERSEYSIDE HRA**

Drawing Title: **KNOWSLEY BOROUGH AND EUROPEAN DESIGNATED SITES**

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Figure Number: **FIGURE 3**

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- **Midland Meres and Mosses Phase 1 & Phase 2 Ramsar site** Located approximately 15km at its closest point to the south-east of the Borough Boundary. Not close to any major routes into or out of Knowsley. No realistic pathway has been identified.
 - **West Midlands Mosses SAC** - Located close to the A49 and approximately 20km from the Borough Boundary. However, the A49 is not a direct link between Knowsley and Cheshire and the site lies more than 200m from the A49 which is outside the core impact zone with regard to local air quality (see Chapter 3 for further discussion of this zone).
- 2.18 Further details regarding the interest features and vulnerabilities of the European sites included within the scope of the HRA are given below.
- 2.19 All baseline data relating to these European Sites presented in subsequent Chapters of this Report is taken from Joint Nature Conservancy Council websites (JNCC) unless otherwise stated. A full reference list of sites used is given in Chapter 17 (References).

The 'in combination' scope

- 2.20 It is a requirement of the Regulations that the impacts and effects of any land use plan being assessed are not considered in isolation but in combination with other plans and projects that may also be affecting the European site(s) in question. In practice, 'in combination assessment' is of greatest importance when the DPD would otherwise be screened out because the individual contribution is inconsequential. It is neither practical nor necessary to assess the 'in combination' effects of the DPD within the context of all other plans and projects within the region. The principal other plans and projects that we are considering (not restricted to the locality of Knowsley) are:

Projects

- Gwynt Y Mor Offshore Windfarm Project - A wind farm of up to 160 turbines over a 79 km² area in Liverpool Bay approximately 13 kilometres off the North Wales coast;
- Liverpool SuperPort – An integrated port, airport, intermodal terminal, freight and commercial network based upon the Port of Liverpool, the Manchester Ship Canal, Liverpool John Lennon Airport and the Mersey Multimodal Gateway (Liverpool City Region);
- Power from the Mersey – project to generate renewable power from the tidal processes in the River Mersey/Mersey Estuary;
- Mersey Gateway Bridge – a six lane crossing between Runcorn and Widnes (currently at pre-construction stage);
- Energy from Waste Plants at Runcorn (Halton Borough Council) and Ince Marshes (Cheshire West & Chester);
- Frodsham Windfarm – 20 turbines to be constructed on a stretch of land between the Manchester Ship Canal and the M56 (Cheshire West & Chester);
- Thornton to Switch Island Link Road (Sefton Borough Council);
- Crosby Water Centre, Seaforth Terminal and possible visitor centres at Formby/Marshside (Sefton Borough Council);

- Wirral Waters & Liverpool Waters – twin projects on either side of the river both involving works to existing docks; and
- Kirkby to Orrell overhead line – wood-pole mounted ‘trident’ 132kV overhead line between substation at Kirkby and Orrell.

Plans

- The Wales Spatial Plan;
- Knowsley’s Sustainable Community Strategy (2008-2023);
- Draft West Cheshire and North East Wales Sub-Regional Spatial Strategy (2007);
- Liverpool City Region Renewable Energy Capacity Study;
- North West England & North Wales Shoreline Management Plan 2;
- Liverpool LDF Core Strategy;
- Cheshire West and Chester LDF Core Strategy;
- Cheshire East LDF Core Strategy;
- Trafford LDF Core Strategy;
- Halton LDF Core Strategy;
- Warrington LDF Core Strategy;
- Sefton LDF Core Strategy;
- Wirral LDF Core Strategy;
- St Helens LDF Core Strategy;
- Flintshire Unitary Development Plan + Proposed Modifications;
- Wrexham Local Development Plan;
- Conwy Local Development Plan;
- Denbighshire Unitary Development Plan + Local Development Plan;
- Mersey Heartlands Growth Point Programme of Delivery (Wirral and Liverpool);
- Joint Merseyside and Halton Waste Development Plan Document (in preparation);
- North West Green Infrastructure Guide;
- Greater Manchester Joint Waste Development Framework;
- Dee Catchment Abstraction Management Strategy;
- Dee Draft River Basin Management Plan;
- North West River Basin Management Plan;
- United Utilities Water Resource Management Plan;
- West Lancashire LDF Core Strategy;

- Great Ormes Head to Formby Point Shoreline Management Plan (under review);
- Formby Point to River Wyre Shoreline Management Plan (under review);
- Wales Transport Plan;
- Halton Local Transport Plan;
- Merseyside Local Transport Plan;
- Cheshire West and Chester Local Transport Plan; and
- Warrington Local Transport Plan.

2.21 When undertaking this part of the assessment it is essential to bear in mind the principal intention behind the legislation, i.e. to ensure that those projects or plans, which in themselves have minor impacts, are not simply dismissed on that basis but are evaluated for any cumulative contribution they may make to an overall significant effect. In practice, in combination assessment is therefore of greatest relevance when the plan would otherwise be screened out because its individual contribution is inconsequential.

2.22 For the purposes of this assessment, we have determined that, due to the nature of the identified impacts, the key other plans and projects relate to the additional housing and commercial/industrial allocations proposed for other Merseyside authorities over the lifetime of the Core Strategy, and other transport priorities, particularly the expansion of Liverpool John Lennon Airport.

Table 2. Housing to be delivered within Merseyside under plans as they stood in July 2010 (housing numbers are subject to change)

<i>Local Authority</i>	<i>Annual housing average</i>	<i>Total housing (from 2003 to 2021 unless stated differently)</i>
Liverpool	1,950	35,100
Knowsley	450	7,650 (between 2010 and 2027)
Halton	500	8,000 (between 2010 and 2026) ⁴
St Helens	570	10,260
Wirral	500	9,000
Sefton	500	9,000 ⁵

2.23 With regard to the specific issue of water resources, the long distance transfer pathways that exist for the supply of water to the Merseyside area and the fact that these same pathways or water sources also supply parts of North Wales, the West Midlands, Manchester, Cumbria and Cheshire, means that development across a much broader area is required for the consideration of water resource impacts 'in combination', as follows:

⁴ 8,000 new homes (net of demolitions) should be provided between 2010 and 2026 at a minimum rate of:

- 400 units per annum for the period 2010/11-2014/15
- 600 units per annum for the period 2015/16-2019/20
- 500 units per annum for the period 2020/21-2025/26

Beyond 2026, development should continue at a minimum rate of 500 units per annum (net gain) unless this is superseded by a change to policy at national level.

⁵ In addition to the 9,000 to be delivered to 2021, the Core Strategy includes a further 2,500 to be delivered by 2026

- North East Wales – specific housing levels to be delivered are not mentioned in the Wales Spatial Plan or its 2008 update but a significant increase is likely;
- Greater Manchester area – 185,800 homes to be delivered across Manchester, Salford, Oldham, Rochdale, Tameside, Stockport, Trafford, Congleton, Macclesfield, Bolton, Bury and Wigan between 2003 and 2021;
- West Midlands – potentially up to 445,600 additional homes across the region until 2026;
- West Cumbria – 11,640 homes to be delivered across Allerdale, Barrow-in-Furness and Copeland between 2003 and 2021;
- Cheshire – 31,800 homes to be delivered across Crewe & Nantwich, Chester, Ellesmere Port & Neston and Vale Royal between 2003 and 2021, over half (17,955) within Cheshire West and Chester.

2.24 It should be noted that, while the broad potential impacts of these other projects and plans will be considered, we do not propose carrying out HRAs on each of these plans – we will however draw upon existing HRAs that have been carried out for surrounding regions and plans.

Liverpool John Lennon Airport Expansion

2.25 The expansion of Liverpool John Lennon Airport is (currently) an explicit element of national government policy as set out in the White Paper 'The Future of Air Transport' (2003). The Airport lies just to the south-west of the Borough Boundary, so its development will have implications for the borough of Knowsley through a potential increase in traffic/commercial vehicles traversing the borough, and possible future investment opportunities. Due to the location of the airport expansion immediately adjacent to the Mersey Estuary SPA and Ramsar site and the potential for effects on the Mersey Estuary SPA and Ramsar Site, this project is described in more detail below. There is also potential for effects on other European sites such as Mersey Narrows & North Wirral Foreshore pSPA/pRamsar, Ribble & Alt Estuaries SPA/Ramsar and Dee Estuary SAC/SPA/Ramsar site.

2.26 The 'Liverpool John Lennon Airport (LJLA) Masterplan' (November 2007) shows how the Airport intends to respond to the White Papers 'The Future of Air Transport' objectives.

2.27 The proposals for 2015⁶ would involve the construction of new terminal facilities, with additional car-parking, as well as new cargo handling and aircraft maintenance facilities⁷, a mixed-use development and hotel. There would also be an extension to the runway, extension of the northern parallel taxiway and additional apron areas and the Eastern Access Transport Corridor (EATC)⁸ at the end of the period leading up to 2015. The proposals for 2030 incorporate cargo development and a new parallel taxiway, and further apron, terminal and car park areas. There would also be a requirement for an expanded fuel farm facility and a waste water treatment plant to serve the new cargo facilities. None of these expansion proposals actually fall within the boundary of Knowsley.

⁶ Due to the current economic climate some of these proposals may in fact be delivered later than indicated in the 2007 Masterplan

⁷ The World Cargo Centre would require an amendment to Liverpool City Council's Green Belt boundary (subject to a subsequent DPD)

⁸ The Eastern Access Transport Corridor will follow a route approximately 2km in length from Speke Boulevard through Halton's Green Belt towards the Airport's eastern boundary.

- 2.28 LJLA lies immediately adjacent to the Mersey Estuary SPA and Ramsar site. The development of the Masterplan highlighted several potential adverse effects on nature conservation and biodiversity which could directly or indirectly affect the favourable status of Mersey Estuary SPA and Ramsar. These potential effects would include: severance of habitats; bird and animal road deaths; pollution to adjacent habitats by road run-off; disturbance to feeding, roosting and breeding birds and bats due to increased lighting; and changes to the hydrology of the area. Potential indirect effects could include: sourcing and transport of construction materials and possibly disturbance to feeding waterfowl during construction, depending on its timing. The Masterplan also identifies that in the opinion of LJLA all issues should be resolvable such that no significant adverse effects will result. However, since planning permissions have not yet been granted we have taken a precautionary view in this HRA.
- 2.29 Aircraft currently take off or land over the adjacent mudflats. Since these flats are used by a proportion of the passage and wintering waterfowl for which the Estuary is of international importance, there is a potential for an increase in such traffic to affect the integrity of the SPA/Ramsar site.

3 Pathways of Impact

Introduction

- 3.1 In carrying out an HRA it is important to avoid confining oneself to effectively arbitrary boundaries (such as Local Authority boundaries) but to use an understanding of the various ways in which land use plans can impact on European sites to follow the pathways along which development can be connected with European sites, in some cases many kilometres distant. Briefly defined, pathways are routes by which a change in activity associated with a development can lead to an effect upon a European site. It is also important to bear in mind CLG guidance which states that the AA 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.6⁹).
- 3.2 The following indirect pathways of impact are considered relevant to the Habitat Regulations Assessment of the Core Strategy.

Disturbance

- 3.3 Habitat Regulation Assessments of Core Strategies tend to focus on recreational sources of disturbance as a result of new residents or an increasingly ageing population with more leisure time available¹⁰. While this is a key factor, other sources of disturbance associated with an increase in commercial development, road transport adjacent to sensitive sites or increases in shipping and aircraft movement may also result.

Breeding birds

- 3.4 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 feeding¹¹. Disturbance therefore risks increasing energetic output while reducing energetic input, which can adversely affect the 'condition' and ultimately survival of the birds. In addition, displacement of birds from one feeding site to others can increase the pressure on the resources available within the remaining sites, as they have to sustain a greater number of birds¹². Moreover, the more time a breeding bird spends disturbed from its nest, the more its eggs are likely to cool and the more vulnerable they, or any nestlings, are to predators.

⁹ Department for Communities and Local Government. 2006. *Planning for the Protection of European Sites: Appropriate Assessment*. <http://www.communities.gov.uk/index.asp?id=1502244>

¹⁰ The RTPI report 'Planning for an Ageing Population'(2004) which states that '*From being a marginalised group in society, the elderly are now a force to be reckoned with and increasingly seen as a market to be wooed by the leisure and tourist industries. There are more of them and generally they have more time and more money.*' It also states that '*Participation in most physical activities shows a significant decline after the age of 50. The exceptions to this are walking, golf, bowls and sailing, where participation rates hold up well into the 70s*'.

¹¹ Riddington, R. *et al.* 1996. The impact of disturbance on the behaviour and energy budgets of Brent geese. *Bird Study* 43:269-279

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

Wintering birds

- 3.5 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 important 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 through disturbance 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:
- Tuite et al¹³ found that during periods of high recreational activity, bird numbers at Llangorse Lake decreased by 30% as the morning progressed, matching the increase in recreational activity towards midday. During periods of low recreational activity, however, no change in numbers was observed as the morning progressed. In addition, all species were found to spend less time in their 'preferred zones' (the areas of the lake used most in the absence of recreational activity) as recreational intensity increased.
 - Underhill et al¹⁴ 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 & Warrington¹⁵ 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 observed greater recreational activity on surrounding water bodies at weekends relative to week days. However, in this study, recreational activity was not quantified in detail, nor were individual recreational activities evaluated separately.
 - Tuite et al¹⁶ used a large (379 site), long-term (10-year) dataset (September – March species counts) to correlate seasonal changes in wildfowl abundance with the presence of various recreational activities. They found that shoveler was one of the most sensitive species to disturbance. The greatest impact on winter wildfowl numbers was associated with sailing/windsurfing and rowing.
- 3.6 More recent research has established that human activity including recreational activity can be linked to disturbance of wintering waterfowl populations^{17 18}.

¹³ Tuite, C. H., Owen, M. & Paynter, D. 1983. Interaction between wildfowl and recreation at Llangorse Lake and Talybont Reservoir, South Wales. *Wildfowl* 34: 48-63

¹⁴ 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

¹⁵ Evans, D.M. & Warrington, S. 1997. The effects of recreational disturbance on wintering waterbirds on a mature gravel pitlake near London. *International Journal of Environmental Studies* 53: 167-182

¹⁶ 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

¹⁷ Footprint Ecology. 2010. Recreational Disturbance to Birds on the Humber Estuary

¹⁸ Footprint Ecology, Jonathan Cox Associates & Bournemouth University. 2010. Solent disturbance and mitigation project – various reports.

Other activities causing disturbance

- 3.7 Human activity can affect birds either directly (e.g. through causing them to flee) or indirectly (e.g. through damaging their habitat). The most obvious direct effect is that of immediate mortality such as death by shooting, but human activity can also lead to behavioural changes (e.g. alterations in feeding behaviour, avoidance of certain areas *etc.*) and physiological changes (e.g. an increase in heart rate) that, although less noticeable, may ultimately result in major population-level effects by altering the balance between immigration/birth and emigration/death¹⁹.
- 3.8 The degree of impact that varying levels of noise will have on different species of bird is poorly understood except that a number of studies have found that an increase in traffic levels on roads does lead to a reduction in the bird abundance within adjacent hedgerows - Reijnen et al (1995) examined the distribution of 43 passerine species (i.e. 'songbirds'), of which 60% had a lower density closer to the roadside than further away. By controlling vehicle usage they also found that the density generally was lower along busier roads than quieter roads²⁰.
- 3.9 Activities other than recreation may also lead to disturbance of wildlife; for example, noise, vibration and visual disturbance from ports and airports, and potentially disturbance from wind farms. Disturbance and displacement from feeding and areas has been demonstrated with regard to wintering geese²¹, curlew and hen harriers²². Light pollution can also be an issue.
- 3.10 The sensitivity of wildlife to the noise and vibration of roads and aircraft varies greatly from species to species. However road and airport/aircraft noise can cause some wildlife – notably a range of grassland and woodland birds - to avoid areas near them, reducing the density of those animal populations²³. Elsewhere, reduced breeding success has been recorded.
- 3.11 Large structures (e.g. new bridges, offshore and onshore wind turbines), have the potential to alter bird flight paths (e.g. hunting flight paths for raptors, bird migratory paths, regular flight paths between roosting and feeding sites, and foraging routes for bats etc. This may result in a collision risk barrier effect or displacement which could make birds either vulnerable to predation or loss of vital energy stores.
- 3.12 Animals can also be disturbed by the movement of ships. For instance, a DTI study of birds of the North West coast noted that: "Divers and scoters were absent from the mouths of some busier estuaries, notably the Mersey... Both species are known to be susceptible to disturbance from boats, and their relative scarcity in these areas... may in part reflect the volume of boat traffic in these areas"²⁴.
- 3.13 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

¹⁹ Riley, J. 2003. Review of Recreational Disturbance Research on Selected Wildlife in Scotland. Scottish Natural Heritage.

²⁰ Reijnen, R. et al. 1995. The effects of car traffic on breeding bird populations in woodland. III. Reduction of density in relation to the proximity of main roads. *Journal of Applied Ecology* 32: 187-202

²¹ Langston, R.H.W & Pullan, J.D. (2003). Effects of Wind Farms on Birds: Nature and Environment No. 139. Council of Europe.

²² Madders, M. & Whitfield, D.P. 2006. Upland raptors and the assessment of wind farm impacts. *Ibis* 148 (Suppl. 1), 43-56.

²³ Kaseloo, P. A. and K. O. Tyson. 2004. Synthesis of Noise Effects on Wildlife Populations. FHWA Report.

²⁴ DTI (2006). Aerial Surveys of Waterbirds in Strategic Wind Farm Areas: 2004/05 Final Report

duration. Birds are least likely to be disturbed by activities that involve regular, frequent, predictable, quiet patterns of sound or movement or minimal vibration. The further away from the bird population activities are undertaken, the less likely they are to result in disturbance.

- 3.14 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.
- 3.15 The distance at which a species takes flight when approached by a disturbing stimulus is known as the 'tolerance distance' (also called the 'escape flight distance') and differs between species to the same stimulus and within a species to different stimuli. These are given in Table 3, which compiles 'tolerance distances' from across the literature. It is reasonable to assume from this that disturbance is unlikely to be experienced more than a few hundred metres from the birds in question. Tolerance distances are unknown for many birds and simple extrapolation to other species is not advised.

Table 3 - Tolerance distances of 21 water bird species to various forms of recreational disturbance, as described in the literature. All distances are in metres. Single figures are mean distances; when means are not published, ranges are given. ¹ Tydeman (1978), ² Keller (1989), ³ Van der Meer (1985), ⁴ Wolff et al (1982), ⁵ Blankestijn et al (1986).²⁵

Species	Type of disturbance		
	Rowing boats/kayak	Sailing boats	Walking
Little grebe		60 – 100 ¹	
Great crested grebe	50 – 100 ²	20 – 400 ¹	
Mute swan		3 – 30 ¹	
Teal		0 – 400 ¹	
Mallard		10 – 100 ¹	
Shoveler		200 – 400 ¹	
Pochard		60 – 400 ¹	
Tufted duck		60 – 400 ¹	
Goldeneye		100 – 400 ¹	
Smew		0 – 400 ¹	
Moorhen		100 – 400 ¹	
Coot		5 – 50 ¹	

²⁵ Tydeman, C.F. 1978. *Gravel Pits as conservation areas for breeding bird communities*. PhD thesis. Bedford College
Keller, V. 1989. Variations in the response of Great Crested Grebes *Podiceps cristatus* to human disturbance - a sign of adaptation? *Biological Conservation* 49:31-45

Van der Meer, J. 1985. *De verstoring van vogels op de slikken van de Oosterschelde*. Report 85.09 Deltadienst Milieu en Inrichting, Middelburg. 37 pp.

Wolf, W.J., Reijnders, P.J.H. & Smit, C.J. 1982. The effects of recreation on the Wadden Sea ecosystem: many questions but few answers. In: G. Luck & H. Michaelis (Eds.), *Schriftenreihe M.E.L.F., Reihe A: Agnew. Wissensch* 275: 85-107

Blankestijn, S. et al. 1986. *Seizoensverbreding in de recreatie en verstoring van Wulp en Scholkester op hoogwatervluchplaatsen op Terschelling*. Report Projectgroep Wadden, L.H. Wageningen. 261pp.

Species	Type of disturbance		
	Rowing boats/kayak	Sailing boats	Walking
Curlew			211 ³ ; 339 ⁴ ; 213 ⁵
Shelduck			148 ³ ; 250 ⁴
Grey plover			124 ³
Ringed plover			121 ³
Bar-tailed godwit			107 ³ ; 219 ⁴
Brent goose			105 ³
Oystercatcher			85 ³ ; 136 ⁴ ; 82 ⁵
Dunlin			71 ³ ; 163 ²

Mechanical/abrasive damage and nutrient enrichment

3.16 Most types of aquatic or terrestrial wildlife site can be affected by trampling, which in turn causes soil compaction and erosion:

- Wilson & Seney (1994)²⁶ 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)²⁷ conducted experimental off-track trampling in 18 closed forest, dwarf scrub and meadow & grassland communities (each tramped between 0 – 500 times) over five mountain regions in the US. Vegetation cover was assessed two weeks and one year after trampling, and an inverse relationship with trampling intensity was discovered, although this relationship was weaker after one year than two weeks indicating some recovery of the vegetation. Differences in plant morphological characteristics were found to explain more variation in response between different vegetation types than soil and topographic factors. Low-growing, mat-forming grasses regained their cover best after two weeks and were considered most resistant to trampling, while tall forbs (non-woody vascular plants other than grasses, sedges, rushes and ferns) were considered least resistant. Cover of hemicryptophytes and geophytes (plants with buds below the soil surface) was heavily reduced after two weeks, but had recovered well after one year and as such these were considered most resilient to trampling. Chamaephytes (plants with buds above the soil surface) were least resilient to trampling. It was concluded that these would be the least tolerant of a regular cycle of disturbance.

²⁶ 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

²⁷ 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

- Cole (1995c)²⁸ conducted a follow-up study (in 4 vegetation types) in which shoe type (trainers or walking boots) and trampler weight were varied. Although immediate damage was greater with walking boots, there was no significant difference after one year. Heavier trampers caused a greater reduction in vegetation height than lighter trampers, but there was no difference in effect on cover.
- Cole & Spildie (1998)²⁹ 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.

3.17 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 also tend to move in a more erratic manner. Motorcycle scrambling and off-road vehicle use can cause more serious erosion, as well as disturbance to sensitive species. Boats can also cause some mechanical damage to intertidal habitats through grounding.

Loss of supporting habitat

3.18 Land take from within internationally designated sites, except under exceptional circumstances, would not be permitted, but in many cases land beyond the geographical boundary of such sites is also of integral value to the species for which the site is designated. Examples include off-site feeding and roosting areas for birds that are designated features of SPAs and flightlines for protected bat species. Issues may relate to existing permissions that were granted prior to the designation of the site (and relevant species) and which have not yet reached completion, or may relate to altered distribution patterns (or knowledge thereof) regarding species for which European sites have been designated.

Atmospheric pollution

3.19 The main pollutants of concern for European sites are oxides of nitrogen (NO_x), ammonia (NH₃) and sulphur dioxide (SO₂). NO_x can have a directly toxic effect upon vegetation. In addition, greater NO_x or ammonia concentrations within the atmosphere will lead to greater rates of nitrogen deposition to soils. An increase in the deposition of nitrogen from the atmosphere to soils is generally regarded to lead to an increase in soil fertility, which can have a serious deleterious effect on the quality of semi-natural, nitrogen-limited terrestrial habitats.

Table 4. Main sources and effects of air pollutants on habitats and species

Pollutant	Source	Effects on habitats and species
	SO ₂ , NO _x and ammonia all contribute to	Can affect habitats and species through

²⁸ 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.

²⁹ Cole, D.N., Spildie, D.R. 1998. Hiker, horse and llama trampling effects on native vegetation in Montana, USA. Journal of Environmental Management 53: 61-71

Pollutant	Source	Effects on habitats and species
Acid deposition	acid deposition. Although future trends in sulphur emissions and subsequent deposition to terrestrial and aquatic ecosystems will continue to decline, it is likely that increased nitrogen emissions may cancel out any gains produced by reduced sulphur levels.	both wet (acid rain) and dry deposition. Some sites will be more at risk than others depending on soil type, bed rock geology, weathering rate and buffering capacity.
Ammonia (NH ₃)	Ammonia is released following decomposition and volatilisation of animal wastes. It is a naturally occurring trace gas, but levels have increased considerably with expansion in numbers of agricultural livestock. Ammonia reacts with acid pollutants such as the products of SO ₂ and NO _x emissions to produce fine ammonium (NH ₄ ⁺)- containing aerosol which may be transferred much longer distances (can therefore be a significant trans-boundary issue.)	Adverse effects are as a result of nitrogen deposition leading to eutrophication. As emissions mostly occur at ground level in the rural environment and NH ₃ is rapidly deposited, some of the most acute problems of NH ₃ deposition are for small relict nature reserves located in intensive agricultural landscapes.
Nitrogen oxides NO _x	Nitrogen oxides are mostly produced in combustion processes. About one quarter of the UK's emissions are from power stations, one-half from motor vehicles, and the rest from other industrial and domestic combustion processes.	Deposition of nitrogen compounds (nitrates (NO ₃), nitrogen dioxide (NO ₂) and nitric acid (HNO ₃)) can lead to both soil and freshwater acidification. In addition, NO _x can cause eutrophication of soils and water. This alters the species composition of plant communities and can eliminate sensitive species.
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 nitrogen eutrophication, due to its promotion of competitive and invasive species which can respond readily to elevated levels of nitrogen. Nitrogen deposition can also increase the risk of damage from abiotic factors, e.g. drought and frost.
Ozone (O ₃)	A secondary pollutant generated by photochemical reactions from NO _x and volatile organic compounds (VOCs). These are mainly released by the combustion of fossil fuels. The increase in combustion of fossil fuels in the UK has led to a large increase in background ozone concentration, leading to an increased number of days when levels across the region are above 40ppb. Reducing ozone pollution is believed to require action at international level to reduce levels of the precursors that form ozone.	Concentrations of O ₃ above 40 ppb can be toxic to humans and wildlife, and can affect buildings. Increased ozone concentrations may lead to a reduction in growth of agricultural crops, decreased forest production and altered species composition in semi-natural plant communities.
Sulphur Dioxide SO ₂	Main sources of SO ₂ emissions are electricity generation, industry and domestic fuel combustion. May also arise from shipping and increased atmospheric concentrations in busy	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

Pollutant	Source	Effects on habitats and species
	ports. Total SO ₂ emissions have decreased substantially in the UK since the 1980s.	levels of deposition and the buffering capacity of soils.

3.20 Sulphur dioxide emissions are overwhelmingly influenced by the output of power stations and industrial processes that require the combustion of coal and oil, as well (particularly on a local scale) as shipping.

3.21 Ammonia emissions are dominated by agriculture, with some chemical processes also making notable contributions. As such, it is unlikely that material increases in SO₂ or NH₃ emissions will be associated with Local Development Frameworks. NOx emissions, however, are dominated by the output of vehicle exhausts (more than half of all emissions). Within a 'typical' housing development, by far the largest contribution to NOx (92%) will be made by the associated road traffic. Other sources, although relevant, are of minor importance (8%) in comparison³⁰. Emissions of NOx could therefore be reasonably expected to increase as a result of greater vehicle use as an indirect effect of the LDF.

3.22 According to the World Health Organisation, the critical NOx concentration (critical threshold) for the protection of vegetation is 30 µgm⁻³; the threshold for sulphur dioxide is 20 µgm⁻³. In addition, ecological studies have determined 'critical loads'³¹ of atmospheric nitrogen deposition (that is, NOx combined with ammonia NH₃).

3.23 The National Expert Group on Transboundary Air Pollution (2001)³² concluded that:

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

³⁰ 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>

³¹ The critical load is the rate of deposition beyond which research indicates that adverse effects can reasonably be expected to occur

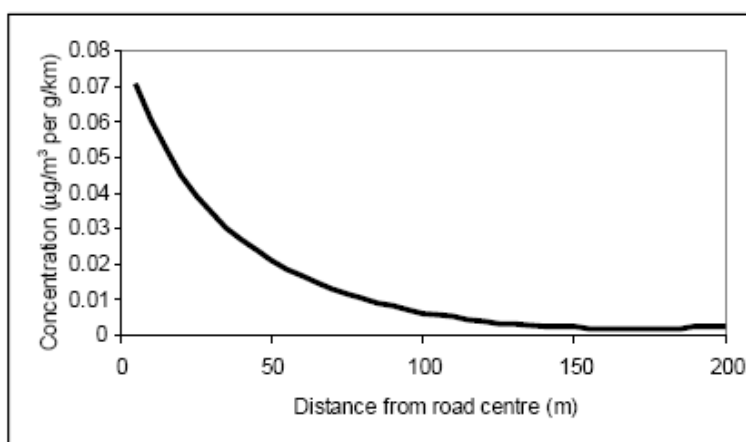
³² National Expert Group on Transboundary Air Pollution (2001) Transboundary Air Pollution: Acidification, Eutrophication and Ground-Level Ozone in the UK.

- 3.24 Grice et al^{33 34} do however suggest that air quality in the UK will improve significantly over the next 15 years due primarily to reduced emissions from road transport and power stations.

Local air pollution

- 3.25 According to the Department of Transport's Transport Analysis Guidance, "*Beyond 200m, the contribution of vehicle emissions from the roadside to local pollution levels is not significant*"³⁵.

Figure 5. Traffic contribution to concentrations of pollutants at different distances from a road (Source: DfT)



- 3.26 This is therefore the distance that has been used throughout this HRA in order to determine whether European sites are likely to be significantly affected by traffic generated by development under the Core Strategy. Such a distance threshold cannot currently be applied to shipping emissions and we must therefore restrict ourselves to assuming that the presence of a pathway indicates a possible issue.

Diffuse air pollution

- 3.27 In addition to the contribution to local air quality issues, development can also contribute cumulatively to an overall change in background air quality across an entire region (although individual developments and plans are – with the exception of large point sources such as power stations – likely to make very small individual contributions). In July 2006, when this issue was raised by Runnymede District Council in the South East, Natural England advised that their Local Development Framework '*can only be concerned with locally emitted and short range locally*

³³ Grice, S., T. Bush, J. Stedman, K. Vincent, A. Kent, J. Targa and M. Hobson (2006) Baseline Projections of Air Quality in the UK for the 2006 Review of the Air Quality Strategy, report to the Department for Environment, Food and Rural Affairs, Welsh Assembly Government, the Scottish Executive and the Department of the Environment for Northern Ireland.

³⁴ Grice, S., J. Stedman, T. Murrells and M. Hobson (2007) Updated Projections of Air Quality in the UK for Base Case and Additional Measures for the Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2007, report to the Department for Environment, Food and Rural Affairs, Welsh Assembly Government, the Scottish Executive and the Department of the Environment for Northern Ireland.

³⁵ www.webtag.org.uk/archive/feb04/pdf/feb04-333.pdf

acting pollutants' ³⁶ as this is the only scale which falls within a local authority remit. This guidance inevitably sets a precedent since (as far as we are aware) it is the only formal guidance that has been issued to a Local Authority from any Natural England office on this issue.

3.28 In the light of this and our own knowledge and experience, it is considered reasonable to conclude that it must be the responsibility of higher-tier plans to set a policy framework for addressing the cumulative diffuse pan-authority air quality impacts, partly because such impacts stem from the overall quantum of development within a region (over which individual districts have little control), and since this issue can only practically be addressed at the highest pan-authority level. Diffuse air quality issues will not therefore be considered further within this HRA except to identify where the Core Strategy incorporates a suite of measures that will lead to an improvement in overall background air quality (or at least ensure that Knowsley's contribution to future negative trends in diffuse air quality is minimal). In this case there are several policies which would serve to protect European sites either directly or through promoting and delivering sustainable travel and development:

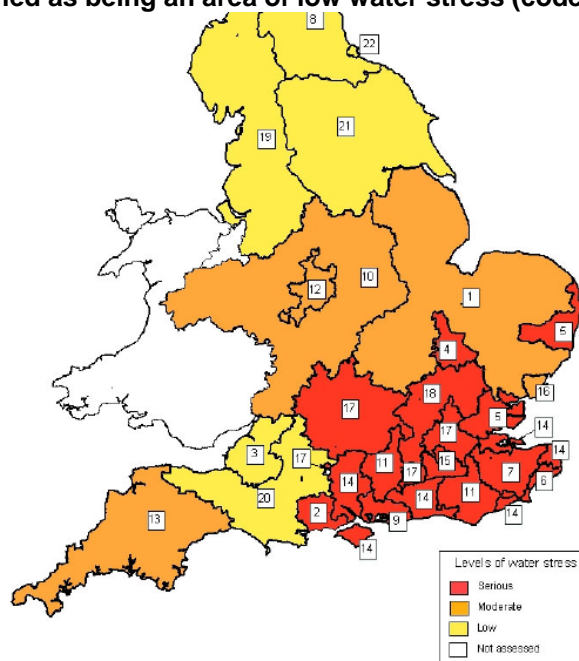
- The spatial strategy for Knowsley has a strong focus on development in urban areas and selects six principal regeneration areas;
- Ensuring all development is well connected and achieves high levels of accessibility including satisfactory access by bus, rail, walking and cycling;
- Requiring the production of Travel Plans and Transport Assessments, in association with major new developments and in accordance with national guidance;
- Adopting parking standards to deter use of the private car;
- To support sustainable transport across the Borough, improvements to the existing network and the introduction of new sustainable routes and facilities will be encouraged including, walking, cycling and public transport;
- Park and ride facilities in appropriate locations; and
- Developing green infrastructure.

Water resources

3.29 The North West is generally an area of low water stress (see Figure 6), as is North Wales, which is a major source of potable water for north-west England.

³⁶ English Nature (16 May 2006) letter to Runnymede Borough Council, 'Conservation (Natural Habitats &c.) Regulations 1994, Runnymede Borough Council Local Development Framework'.

Figure 6. Areas of water stress within England. It can be seen from this map that Merseyside is classified as being an area of low water stress (coded yellow).³⁷



- 3.30 Initial investigation indicates that Knowsley lies within United Utilities' Integrated Resource Zone which serves 6.5 million people in south Cumbria, Lancashire, Greater Manchester, Merseyside and most of Cheshire. The Integrated Zone is supplied with around 1800 MI/d of drinking water, of which about 500 MI/d comes from water sources in Wales, about 600 MI/d comes from sources in Cumbria, and the rest from sources in other parts of North West England. It constitutes a large integrated supply network that enables substantial flexibility in distributing supplies within the zone. The construction of the 'west to east link' will further aid this flexibility and thus break the traditional division in which Greater Manchester received water from Cumbria and Merseyside received water from the River Dee (which lies partly in England and partly in Wales) and from purely Welsh sources (e.g. Lake Vyrnwy).
- 3.31 In exploring water resource issues relating to Welsh European sites for St Helens Council, we determined from United Utilities that approximately 75% of St. Helens potable water supply is currently abstracted from the River Dee, 20% is abstracted from Lake Vyrnwy and only 5% is abstracted from sites in Cumbria. It is likely that similar proportions relate to Knowsley although this is likely to change in the future as a result of the greater flexibility provided by the west-east link. In any case, Cumbrian and Welsh sources will still be involved in one ratio or another in water supply to Knowsley.
- 3.32 The River Dee is a Special Area of Conservation and flows into the Dee Estuary which is also designated as an SAC as well as an SPA (and pSPA extension) and Ramsar site. Four water companies abstract from sources that affect the River Dee including United Utilities (UU), Dee Valley Water, Welsh Water and Severn Trent Water. Excessive abstraction from the Dee could

³⁷ Figure adapted from Environment Agency. 2007. Identifying Areas of Water Stress. <http://publications.environment-agency.gov.uk/pdf/GEHO0107BLUT-e-e.pdf>

therefore result in sufficient drawdown of water to damage the interest features of the River Dee and Bala Lake SAC (through desiccation, fish entrainment (i.e. being swept into intakes) or a deterioration in water quality due to the lower proportion of freshwater to sediment) and in turn reduce freshwater flows into the Dee Estuary to such a degree as to damage the interest features of that site through an increase in salinity. These risks are identified in the Environment Agency's Review of Consents process for these sites.

- 3.33 In the future as a result of the west-east link, Merseyside (including Knowsley) will obtain a much greater proportion of its water supply from Lake District sources. This is likely to involve Haweswater as a principal reservoir. Haweswater is within the catchment of the River Eden SAC and thus we have also included consideration of drawdown and reduced flow impacts on this designated site in this report.

Water quality

- 3.34 The Wastewater Treatment Works (WwTWs) that serve Knowsley discharge either into the Mersey, either within or slightly upstream of the Mersey Estuary SPA/Ramsar site and 23km upstream of Liverpool Bay SPA and Mersey Narrows & North Wirral Foreshore pSPA and pRamsar site; or into the River Alt and ultimately the Ribble and Alt Estuaries SPA/Ramsar via Fazakerley Brook.
- 3.35 Increased amounts of housing or business development can lead to reduced water quality of rivers and estuarine environments. Wastewater and industrial effluent discharges can contribute to increased nutrients on European sites leading to unfavourable conditions. In addition, diffuse pollution, partly from urban run-off, has been identified during an Environment Agency Review of Consents process as being a major factor in causing unfavourable condition of European sites.
- 3.36 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:
- 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; in the freshwater environment, phosphorus is usually a principal cause of eutrophication.
 - Some pesticides, industrial chemicals, and components of wastewater effluent are suspected to interfere with the functioning of the endocrine system, possibly having negative effects on the reproduction and development of aquatic life, and subsequently bird life.
 - Increased discharge of treated wastewater effluent can result both in greater scour (as a result of greater flow volumes) and in high levels of macroalgal growth, which can smother the mudflats of value to SPA birds.

- 3.37 For wastewater treatment works close to capacity, further development may increase the risk of effluent escape into aquatic environments. In many urban areas, wastewater treatment and surface water drainage systems are combined, and therefore a predicted increase in flood and storm events could increase pollution risk.
- 3.38 However, it is also important to note that the situation is not always simple – for sites designated for waterfowl, a STW discharge can actually be a useful source of food and birds will often congregate around the outfall³⁸. In addition, while nutrient enrichment does cause considerable problems on the south coast (particularly in the Solent) due to the abundance of smothering macroalgae that is produced, it is not necessarily a problem in other areas where the macroalgae are broken up by tidal wave action and where colder and more turbid water limit the build-up in the first place. For example, although The Wash in the East of England is hypernutrified the Environment Agency Review of Consents process has identified that this is not leading to adverse effects on the internationally important interest features of the site.
- 3.39 The requirement for a Water Cycle Study was identified in the Liverpool Core Strategy Preferred Options report to assess infrastructure requirements in relation to wastewater. Therefore, water quality impacts are considered to be an issue that requires investigation.

³⁸ Anecdotal observation from the author's work on numerous sewage treatment works around the county (particularly London) and bird surveys undertaken by the author and colleagues on such sites

4 Likely Significant Effects (Screening)

4.1 The Core Strategy was screened in for Appropriate Assessment covering recreational pressures, direct disturbance, deterioration in water quality and air quality. Some Core Strategy policies may act in combination with each other (e.g. Transport Network and Green Infrastructure encouraging recreational use of the Merseyway cycle/footpaths). The following policies are screened in therefore requiring Appropriate Assessment:

- Spatial Strategy for Knowsley CS1;
- Housing Supply, Delivery and Distribution CS3;
- Economy and Employment CS4;
- Transport Networks CS7;
- Green Infrastructure CS8;
- Principal Regeneration Area – North Huyton and Stockbridge Village CS9;
- Principal Regeneration Area – Kirkby Town Centre CS10;
- Principal Regeneration Area – Knowsley Industrial and Business Park CS11;
- Principal Regeneration Area – Tower Hill, Kirkby CS12;
- Principal Regeneration Area – South Prescott CS13;
- Principal Regeneration Area – Prescott Town Centre CS14; and
- Renewable and Low Carbon Infrastructure CS23.

4.2 These policies may interact with other plans and policies which have been identified to have the potential to have similar impacts on the European sites, thus creating an exacerbated ‘in combination’ effect.

4.3 The following policies are screened out therefore not requiring Appropriate Assessment:

- Development Principles CS2;
- Green Belt CS5;
- Town Centres and Retail Strategy CS6
- Delivering Affordable Housing CS15;
- Specialist and Supported Accommodation CS16;
- Housing Sizes and Design Standards CS17;
- Design Quality and Accessibility in New Development CS19;
- Managing the Borough’s Heritage CS20;
- Urban Greenspace CS21;
- Sustainable and Low Carbon Development CS22;

- Managing Flood Risk CS24;
- Management of Mineral Resources CS25 – screened out since the nearest potential area for minerals operations in the borough is over 2.5km from the nearest European site, which is too far for any realistic impact pathway to exist;
- Accommodation for Gypsies and Travellers and Travelling Showpeople CS18 – screened out since it is probable that only a single site with a small number of pitches will be required;
- Waste Management CS26 – screened out on the basis that the Merseyside Joint Waste DPD is being subject to its own Appropriate Assessment; and
- Planning for and Paying for New Infrastructure CS27.

4.4 This is because no pathway has been identified between these policies and European sites. Although Policy CS5 includes allowance for a review of green belt boundaries to meet future development needs, any actual development pressures will be triggered by other policies. Therefore, this Policy has also been screened out.

4.5 The Strategic Objectives detailed in the Core Strategy Preferred Options Report have not been screened in for Appropriate Assessment as they are so broad and each strategic objective will be delivered by a specific policy within the report which has been either screened in or out depending on potential impacts and pathways.

5 Mersey Estuary SPA and Ramsar

Introduction

- 5.1 Figure 3 shows the location of the Mersey Estuary SPA and Ramsar site, highlighting its proximity to the Borough of Knowsley. The Mersey Estuary is a large sheltered estuary that receives drainage from a catchment area of c.5,000km² encompassing the conurbations of Liverpool and Manchester, and including the River Mersey and the River Bollin and their tributaries in Cheshire and Merseyside. The Estuary covers 5023.35ha of saltmarsh and inter-tidal sand and mudflats, with limited areas of brackish marsh, rocky shoreline and boulder clay cliffs, within a rural and industrial environment. The intertidal flats and saltmarshes provide feeding and roosting sites for large and internationally important populations of waterbirds, and during the winter, the site is of major importance for duck and waders. The site is also important during the spring and autumn migration periods, particularly for wader populations moving along the west coast of Britain.

Reasons for Designation

- 5.2 The Mersey Estuary is designated an SPA under Article 4.1³⁹
- Golden plover (*Pluvialis apricaria*): 3,040 individuals (1.2% of GB population)
- 5.3 SPA Article 4.2 - winter:
- Redshank (*Tringa totanus*): 4,993 individuals (2.8% of Eastern Atlantic population)
 - Dunlin (*Calidris alpina*): 48,789 individuals (3.6% of Northern Siberian / Europe / West African population)
 - Pintail (*Anas acuta*): 1,169 individuals (1.9% of NW European population)
 - Shelduck (*Tadorna tadorna*): 6,746 individuals (2.2% of wintering NW European population)
 - Eurasian teal (*Anas crecca*): 11,723 individuals (2.9% of NW European population)
 - Wigeon (*Anas penelope*): 11,886 individuals (4.2% of the GB population) Black-tailed godwit (*Limosa limosa*): 976 individuals (1.6% of the Iceland population)
 - Curlew (*Numenius arquata*): 1,300 individuals (1.1% of the GB population)
 - Grey plover (*Pluvialis squatarola*): 1,010 individuals (2.3% of the GB population)
 - Great crested grebe (*Podiceps cristatus*): 136 individuals (1.4% of the GB population)
 - Lapwing (*Vanellus vanellus*): 10,544 individuals (0.7% of the GB population)
- 5.4 SPA Article 4.2 - on passage:
- Ringed plover (*Charadrius hiaticula*): 505

³⁹ All bird count data in this document is sourced from the SPA Review site accounts as available on the Joint Nature Conservation Committee website www.jncc.gov.uk/page-1412

- 5.5 Ramsar Criterion 6, Internationally important populations of:
- Shelduck
 - Black-tailed godwit (*Limosa limosa*)
 - Redshank
 - Eurasian teal
 - Pintail
 - Dunlin
- 5.6 Ramsar Criterion 5:
- 89,576 waterfowl (5-year peak mean 1998/99-2002/03)
- 5.7 Birdlife (2001) identify the Important Bird Area (IBA) to exceed the area currently designated as a Ramsar site, and recommend the designation expansion. This additional area is termed a 'potential Ramsar' (which precedes the 'proposed' Ramsar (pRamsar) designation). This additional area is not considered in the assessment as objectives and site boundaries are unconfirmed, however its status highlights the nature conservation value of areas of the Mersey outside of the SPA/Ramsar designation.

Historic Trends and Existing Pressures

- 5.8 Water pollution has been an issue in the Mersey Estuary since at least the 18th century, when the Mersey catchment became a prime location for industrial expansion, especially the textile industry (Mersey Basin Campaign, 2004). With this there was an associated growth in bleaching, dyeing, and finishing trades, and paper, heavy chemical and glass industries, which are still in production to this day. All of these industries used the waterways as a means for the disposal of industrial waste, resulting in a legacy of pollutants within the River Mersey and including mercury, pesticides (e.g. DDT), and persistent organic contaminants (e.g. polychlorinated biphenyls (PCBs), pentachlorophenol (PCP)). In addition, there was surface runoff, and the discharge of domestic waste-water and sewage directly into the waterways from a large and growing human population, resulting in gross pollution⁴⁰. The high levels of sewage discharged in to the waterways resulted in low oxygen levels and a major difficulty in improving water quality.
- 5.9 The problem of water pollution in the Mersey Estuary '*was probably at its worst in the 1960's*' and made it the most polluted Estuary in the UK (Mersey Basin Campaign 2004). Major improvements to water quality have been realised since the formation of the Mersey Basin Campaign in 1985, which aimed to '*revitalise the River Mersey and its waterfront*'⁴¹.
- 5.10 The major projects that brought about the improvements to water quality tackled the direct discharges of sewage into the region's waterways. New projects included: primary wastewater works at Sandon Dock which replaced 28 crude wastewater discharges directly into the Mersey

⁴⁰ Langston, W.J., Chesman, B.S. and Burt, G.R. (2006). Characterisation of European Marine Sites. Mersey Estuary SPA. [Online]. *Marine Biological Association of the United Kingdom. Occasional Publications* **18**, 185pp. Available at: www.mba.ac.uk/nmb/publications/occpub/pdf/occ_pub_18.pdf (accessed 15th June 2009).

⁴¹ Ibid

Estuary through the MEPAS scheme (Mersey Estuary Pollution Alleviation Scheme); fine wastewater screening plants on the Wirral peninsula; secondary wastewater treatment and petrochemical effluent treatment plants at Ellesmere Port; secondary wastewater treatment plants at Widnes and Warrington; modification of the Davyhulme wastewater treatment plan in Greater Manchester to treat ammonia (which may kill salmonid species); and later secondary wastewater treatment plants at Birkenhead/Bromborough. Other improvements have been made, including reducing inputs of mercury, lead, cadmium, PCP and chlorinated hydrocarbons into the Estuary.

5.11 However, certain inputs remain⁴², including:

- pesticides and herbicides from agriculture (largely dairy farming) into the upper river system;
- phthalate esters (used as plasticisers, increasing flexibility in plastics) thought to come from wastewater discharges in the upper Mersey;
- hydrocarbon contamination from oil spillage/spills from Tranmere Oil Dock/Terminal, Stanlow (Shell) Oil Refinery and oil tanks along the southern bank of the Estuary, from pipelines that run between these sites along the southern bank of the Estuary, and from oil shipping spills in the Irish Sea;
- PCBs⁴³ from the River Mersey (possibly also dredge spoils); and
- PCBs from contaminated land in the catchment area

5.12 The General Quality Assessment (GQA) scheme, introduced by the National Rivers Authority (NRA), and replaced by the Environment Agency (EA) in 1996, monitors the water quality of rivers and canals throughout England and Wales. It assesses the chemical and biological status, nutrient levels, and aesthetic water quality from permanent sampling stations. The Mersey Basin Campaign (2005) reports on sites in the Mersey catchment that detail low (Grades D, E and F, or 'fair' to 'bad') biological and chemical river water quality; only those within the Mersey catchment are described here. Such sampling sites are particularly concentrated in the area between Knowsley and Manchester, including St. Helens and Wigan, although biological quality is generally poor from Liverpool to Manchester.

5.13 The main current environmental pressures upon the Mersey Estuary SPA and Ramsar site are considered to be:

- disturbance of sediment releasing legacy heavy metal pollution (mercury, lead, cadmium and other poisons) that is bound into the sediment, or other introduction of these metals;
- pollution via rivers and drains by both treated sewerage and untreated runoff containing inorganic chemicals and organic compounds from everyday domestic products, which '*may combine together in ways that make it difficult to predict their ultimate effect of the marine environment. Some may remain indefinitely in the seawater, the seabed, or the flesh, fat and oil of sea creatures*'⁴⁴;

⁴² Ibid

⁴³ Polychlorinated biphenyl are toxic persistent organic pollutants used in industry as dielectric fluids for transformers, capacitors, coolants can bioaccumulate in the sublittoral prey species of the common scoter and bioaccumulate/biomagnify in the fish species

⁴⁴ Langston, W.J., Chesman, B.S. and Burt, G.R. (2006). Characterisation of European Marine Sites. Mersey Estuary SPA. [Online]. *Marine Biological Association of the United Kingdom. Occasional Publications* 18, 185pp. Available at:

- pollution via commercial shipping by chemical pollution and the dumping of litter at sea;
- 'coastal squeeze' and physical loss from land reclamation and coastal flood defences and drainage used in order to develop coastal land, and from sea level rise;
- loss or physical damage of marine benthic habitat directly and indirectly (through changed sedimentation/deposition patterns) as a result of navigational or aggregate dredging;
- disturbance to birds from increased recreational pressure (e.g. boat or other recreational activity) and wildfowling;
- introduction of non-native species; and
- selective removal of species (e.g. bait digging, wildfowl, fishing)⁴⁵

5.14 Although the Mersey Estuary does have a high load of nutrients mainly from diffuse sources, with levels for phosphate and nitrogen decreasing from point sources, recent modelling has shown that due to the natural turbidity of the water, there is only a low risk of excessive algal growth.

Key Potential Pressures from Knowsley

5.15 From the environmental requirements that have been identified above it can be determined that development in Knowsley could theoretically interfere with the environmental requirements and processes on the SPA/Ramsar Site in the following manner:

- excessive recreational pressure resulting from enhanced connectivity across the Mersey and encouraging greater use of Merseyway footpaths/cycle tracks;
- pollution via rivers and drains by both treated wastewater and untreated runoff containing inorganic chemicals and organic compounds from everyday domestic products, which '*may combine together in ways that make it difficult to predict their ultimate effect on the marine environment... Some may remain indefinitely in the seawater, the seabed, or the flesh, fat and oil of sea creatures*';

5.16 The Appropriate Assessment will therefore concentrate on evaluating whether these impacts are likely to occur and what amendments to policy may be required to avoid or minimise them.

Role of other plans and projects

5.17 The following plans and projects are considered to have the potential to act upon the SPA/Ramsar site 'in combination':

Projects

- Liverpool 'SuperPort' – potential impacts due to increased sulphur deposition from shipping, physical disturbance of habitat, mobilisation of contamination, possible disturbance of waterfowl from noise and shipping activity;

www.mba.ac.uk/nmb/publications/occpub/pdf/occ_pub_18.pdf (accessed 15th June 2009).
⁴⁵ Ibid

- Wirral Waters & Liverpool Waters – twin projects on either side of the river both involving works to existing docks, with potential impacts from pollution arising during the construction phase and mobilisation of legacy contamination within sediments.
- Power from the Mersey – potential impacts due to changes in hydrodynamics of river flow and structure, possible restrictions on bird movements, possible direct landtake, possible disturbance of waterfowl during construction;
- Mersey Gateway Project – potential impacts from pollution arising during the construction phase of these projects also possible displacement of birds. Deterioration in local air quality and thus increased nitrogen deposition (from greater cross-river travel, air travel);
- Mersey Port – potential impacts from pollution arising during the construction phase; also disturbance of sediment releasing legacy heavy metal (lead, cadmium, arsenic and other poisons) pollution that is bound into the sediment from greater shipping freight; possible displacement of birds through disturbance;
- Liverpool John Lennon Airport - potential displacement of birds; deterioration in air quality and water quality due to increased air travel;
- Energy from Waste Plants at Runcorn and Ince Marshes – possible air quality impacts through nitrogen and sulphur deposition. However, both of these schemes are consented such that they will introduce mitigation for their own air quality impacts. In practice therefore, no in combination effect should result.

Plans

- Liverpool City Region Renewable Energy Capacity Study – possible impacts on waterfowl flightpaths between the Mersey Estuary and other European sites depending upon the degree of wind power involved and the location of turbines;
- North West England & North Wales Shoreline Management Plan 2 – possible impacts due to the maintenance or enhancement of flood defences could lead to coastal squeeze, changes in sediment release (if previously undefended areas become defended) and direct loss of habitat to flood defence footprint;
- Core Strategies for Liverpool, Cheshire West and Chester, Cheshire East, Trafford, Warrington, Halton, Sefton, Wirral and St Helens and Liverpool and Wirral Waters Development masterplans – possible water quality, air quality and wildfowl disturbance impacts as a result of delivery of 110,000 dwellings and associated commercial development over the next 20 years; and
- Joint Merseyside and Halton Waste Development Plan Document – possible impacts due to water quality, air quality and wildfowl disturbance or chick predation. However, since this DPD is itself subject to a recent HRA it will address its own contribution to any ‘in combination’ effect that may otherwise arise.

Appropriate Assessment

Disturbance of Qualifying Bird Species

Appropriate Assessment

- 5.18 HRA Screening identified pathways whereby policies within the Knowsley Core Strategy have the potential to result in direct disturbance to qualifying bird species of the Mersey Estuary SPA/Ramsar. These pathways are assessed in more detail below, including a discussion of any mitigation already built into the Core Strategy.
- 5.19 The Knowsley Core Strategy sets out (in Policy CS3, 'Housing Supply, Delivery and Distribution') proposals for the delivery of 7,650 new dwellings between 2010 and 2027. It is predicted that the population of the Borough will increase by approximately 4,100 people between 2008 and 2027 (i.e. 2.7%). While a 2.7% increase in residents is small it cannot be considered in isolation but within the context of the approximately 110,000 dwellings to be delivered across Merseyside, Cheshire West and Chester and Cheshire East and the fact that the Borough is predicted to experience an aging population with increasing leisure time such that recreational pressure from the existing population may increase. As such, recreational disturbance impacts from Knowsley cannot be ruled out when considered in combination with the other Merseyside boroughs.
- 5.20 Much like St Helen's, Knowsley's contribution to any effect may be smaller than that of some other boroughs given that there is no direct access to the Mersey Estuary from the Borough, although the southern boundary is within 1.6km. The Trans-Pennine trail follows the SPA for 5.5km from the Runcorn Bridge west to Halebank and, although it then diverts from the estuary at Halebank, another footpath (the Mersey Way) lies adjacent to the estuary from Hale Head for 7km downstream to Liverpool John Lennon Airport⁴⁶. As Knowsley is located so close to the Mersey Estuary, this increases the likelihood that residents will utilise accessible parts of the site. In the absence of clear evidence that Knowsley residents do not currently use these routes for recreation or that recreation in this area does not lead to disturbance we have taken the precautionary approach and concluded that it is possible 'in combination' with development in Liverpool and Halton particularly.
- 5.21 Avoidance of adverse recreational impacts at European sites involves location of new development away from such sites (which is clearly not possible in Knowsley given that respondents to the England Leisure Day Visits⁴⁷ surveys typically travelled 25.5km to visit a coastal site for the day) or for the local authority in question to manage tourism and recreational use of the coastlines in conjunction with other relevant authorities. However, management of access to the coastal areas is not within the remit of Knowsley Borough Council as all the coastal areas are outside the borough boundary. There thus needs to be an appropriate framework to manage recreation.

⁴⁶ The Mersey Way is easily accessible and an enjoyable walk. However it is over some rough terrain so may discourage some walkers (Rosalind King, Merseyside Environmental Advisory Service, personal communication)

⁴⁷ Various. 2006. England Leisure Visits: the Results of the 2005 Survey. Countryside Agency

- 5.22 To achieve this, Knowsley Borough Council needs to work with the other Merseyside Authorities⁴⁸, MEAS, Natural England, Countryside Council for Wales (CCW) and other partners to devise a framework for the delivery of:
- Suitably located Green Infrastructure where this will prove effective (the Mersey Waterfront Regional Park may well be a key element of this if it is accompanied by enhanced access management or wardening, or provides additional greenspace landward of the SPA). While this is unlikely to be effective (or viable) with regard to water-based recreation, it may be possible and effective with regard to dog walking and other non-vehicular activities. Some species for which European sites have been designated are particularly sensitive to dogs, and many dog walkers may be happy to be diverted to other, less sensitive, sites. However the location and type of alternative space must be sufficiently safe and appealing to be effective; and
 - Enhanced access management to the European sites when it becomes necessary, to be informed by the collation of visitor survey data. Examples of measures that may be deployable include temporary footpath/access closures during sensitive periods (e.g. the winter, when wintering birds are a key feature), rerouting of footpaths away from key hotspots for waterfowl, introducing enhanced wardening, introducing improved signage to encourage dogs to be kept on a lead or walked in areas that are away from key waterfowl hotspots or screening of key locations for recreational activity. With regard to the use of watercraft, on some sites this can be achieved through zoning of activities by site managers or the introduction of permitting systems limiting the amount of watercraft using the available space, although it is uncertain at this stage whether that would be feasible in the Mersey Estuary.
- 5.23 Clearly, since they have no direct control of the areas along the Mersey, Knowsley would only be required to provide support to assist with overall delivery, as would St Helen's. There are a number of policies within the Core Strategy which relate to future development, both residential and commercial/employment (CS1, CS3, CS4, CS9-14). Any increase in the population, particularly an ageing population, could result in increased pressure on a number of the surrounding European sites, including the Mersey SPA/Ramsar site, through an increase in the numbers of people visiting these areas for leisure/recreation purposes. Improvements in green infrastructure could exacerbate this problem by encouraging access to these areas, leading to potential impacts on qualifying bird species through direct disturbance, as well as damage to sensitive habitats used for feeding through trampling.
- 5.24 One of the Strategic Objectives of the Core Strategy (SO8) is to *“Support and strengthen the role of Knowsley’s Green Infrastructure (in rural and urban areas), promote biodiversity”* The objective seeks to *“maintain and enhance the most valuable aspects of these areas, including recognising their value to local flora, fauna and geology, and their positive effect on health and wellbeing through leisure and recreational use.”* Policy CS8 ‘Green Infrastructure states that *“Knowsley’s existing Green Infrastructure and its beneficial functions will be protected, managed and enhanced, primarily to: sustain and promote biodiversity.....”* With regard to maintenance and enhancement of existing green infrastructure, the policy states that *“primary focus will be upon: protection, maintenance and improvement of existing and new open space, water courses and biodiversity assets to create a network of strategic green links which function as ecological frameworks promoting unrestricted movement of wildlife; maximising*

⁴⁸ St Helen's has already made a commitment to participating in such an approach and Halton, Liverpool, Sefton and Wirral are all considering similar recommendations.

opportunities to protect, enhance and/or introduce biodiversity into existing areas of Green Infrastructure, through integration ... The policy also states that *“Working in partnership with other districts and relevant bodies, where appropriate, to minimise the impact of development upon Knowsley’s existing biodiversity*” However, there is no specific reference to international nature conservation sites and limiting the potential for recreational pressures on these areas, whether inside or outside the borough boundary. The policy states that new development must be served by Green Infrastructure but the main focus of the policy seems to be upon *“providing access to high quality open space for leisure and recreational purposes”*. However, detailed site allocations will be identified in the Site Allocations and Development Policies DPD, but some amendments to this policy are required and are discussed in the recommendations section.

- 5.25 The main aims of the overall transport strategy (CS7 Transport Networks) include *“support the economy by facilitating efficient movement of people and goods within the Borough and linking to Liverpool City Centre, the Port of Liverpool, Liverpool John Lennon Airport and other destinations in the surrounding area”*; as well as *“ensure people can get to where they need to go by a choice of walking, cycling and public transport”*. The policy also refers to *“enhanced provision of walking and cycling routes as part of the Green Infrastructure network*. Development of pathway networks, depending on their location and whether they connect with sensitive habitats, has the potential to lead to increased disturbance of qualifying bird species of the Mersey Estuary SPA/Ramsar. Suggested wording to ensure this policy does not lead to detrimental impacts on Natura 2000 sites is suggested in recommendations below.
- 5.26 The Core Strategy promotes renewable and low carbon energy within Knowsley (Policy CS23 – Renewable and Low Carbon Infrastructure). Knowsley Industrial Park has been identified as a “Priority Zone” for the production of renewable, low carbon and decentralised energy, although the policy does not refer to the development of specific technologies. However, the supporting text from Policy CS22 (Sustainable and Low Carbon Development) states that *“Preferred Option CS22 does not highlight Energy from Waste (EfW) as a potential solution for decentralised networks within the Borough, or within the “Priority Zone” at Knowsley Industrial and Business Parks. This is because the Joint Waste DPD ... has highlighted an over provision of consented EfW facilities and significant delivery issues surrounding further developments of this type.”* If this is the case there are unlikely to be any potential detrimental impacts on the Mersey Estuary SPA/Ramsar through aerial emissions. However, although not specified within the policy, there is the potential for the development of onshore wind turbines which could affect flightpaths of designated species.
- 5.27 Policy CS23 Renewable and Low Carbon Infrastructure states that the Council will support such proposals provided that they *“do not cause significant harm ... to ... natural resources, biodiversity, geodiversity, water and air quality ...”* Although Priority Zones have been identified for renewable and local carbon infrastructure, potential development of these facilities is not necessarily limited to these areas.
- 5.28 In-combination disturbance impacts may occur through the expansion of the Liverpool John Lennon Airport (LJLA) resulting in disturbance/displacement/collision of qualifying bird species due to airplane movements closer to the SPA/Ramsar designation area which (if unmitigated) could result from airport and ancillary development to the west, south and east of the current

runways and taxiways by 2030⁴⁹. Aircraft currently take off or land over the mudflats adjacent to the Mersey Estuary SPA/Ramsar site, which are used by a proportion of the passage and wintering waterfowl for which the Estuary is of international importance which probably constitutes more than 1% of the total population in the estuary and any impact on them would therefore be significant. However, a suite of ecological surveys were carried out in relation to the airport expansion, and the wintering bird study report produced from the findings of these surveys, concluded that there is unlikely to be an adverse effect on the integrity of the Mersey Estuary SPA/Ramsar through direct land take, or disturbance to feeding or roosting birds. However, it is not clear as to whether this conclusion has been accepted by Natural England and Countryside Council for Wales.

Recommendation for amendments to policy

- 5.29 As a result of the assessment, we recommend the following amendments to policy.
- 5.30 Although the wording of Policy CS8 (Green Infrastructure) does refer to “*sustaining and promoting biodiversity as one of the beneficial functions of Green Infrastructure and minimising the impact of development upon Knowsley’s existing biodiversity and geological assets*” It does not acknowledge that the provision of Green Infrastructure within the borough, if linking to internationally important sites outside the borough, has the potential to result in disturbance to designated features within Natura 2000 sites.
- 5.31 Where the policy states “*Working in partnership with other districts and relevant bodies, where appropriate, to minimise the impact of development upon Knowsley’s existing biodiversity and geological assets*”, this wording should be amended to include reference to biodiversity in the surrounding area. Suggested wording is “*Working in partnership with other districts and relevant bodies, where appropriate, to minimise the impact of development upon Knowsley’s existing biodiversity and geological assets, as well as sustaining the protection afforded to internationally important sites for biodiversity outside of the Borough.*” The supporting text could add the clarification that this should be “*by managing recreational impacts and encouraging the use of the wider green infrastructure network which is less sensitive to recreational pressure*”.
- 5.32 Any strategy that follows on from such a policy commitment will clearly need to be led by those authorities that actually border the Mersey Estuary. The delivery of enhanced access management and Green Infrastructure will need to be phased alongside delivery of housing. The contribution of each authority should be based upon their contribution to recreational activity in each site or (where this information is not yet available) their relative populations and proximity to the site.
- 5.33 A further amendment to Policy CS8 is required in relation to the approach to green infrastructure and new development. Although it states “*New development must be served by Green Infrastructure to meet the needs of residents in a manner which will:provide access to high quality open spaces for leisure and recreational purposes.*”, the supporting text could add the clarification that this should “*not have a detrimental impact on important sites/species of nature conservation interest within the borough or the surrounding area, through increased disturbance.*”

⁴⁹ Although only the runway/taxiway extension to the east of the existing runway and the EATC lie within Halton, it is in line with the requirements of the Habitats Directive to consider all the masterplan proposals as a package

- 5.34 For the Mersey Estuary an appropriate detailed framework that encompasses the management of recreation may exist, or come to exist in the near future, through a European Marine Site Management Scheme, which, if it follows the pattern of other EMS Management Schemes would include recreation/access management within its remit. If this does prove to be the case then the commitment given in the Green Infrastructure policy cited above could be explicitly linked to a commitment to support and participate (financially as required) to this Management Scheme, in conjunction with the other Merseyside authorities and stakeholders.
- 5.35 It is also recommended that the Core Strategy should include a clear statement that it will *'not support schemes that will lead to adverse effects on internationally important wildlife sites, either alone or in combination with other projects and plans. Any scheme that would be likely to have a significant effect on a European site, either alone or in combination with other plans or projects, will be subject to an assessment under Part 6 of the Habitat Regulations at project application stage. If it cannot be ascertained that there would be no adverse effects on site integrity the project will have to be refused or pass the tests of Regulation 61 and 62, in which case any necessary compensatory measures will need to be secured in accordance with Regulation 66'*. This would be in line with the example provided on page 39 of the Natural England internal guidance on HRA⁵⁰
- 5.36 If the above recommendations to manage access are implemented, it is concluded that there will be no adverse effect on the integrity of the Mersey Estuary SPA/Ramsar through direct disturbance as a result of any of the policies proposed within the Knowsley Core Strategy.

Loss of Supporting Habitat

Appropriate Assessment

- 5.37 HRA Screening identified the potential for development arising from the Core Strategy to result in loss of supporting semi natural habitat. The loss of such supporting habitat may affect qualifying bird species e.g. wading birds can roost and seek shelter on former industrial land inland from the Mersey Estuary.
- 5.38 Work has been undertaken to establish the location of a number of important supporting habitat sites for qualifying bird species within Merseyside⁵¹. This included an assessment of sites both within and adjacent to the SPA/Ramsar designation. It has been established that Hale and its associated mudflats and sand bars have been identified as the most important site surveyed on the north shore of the Mersey. Locally important numbers of feeding, roosting and loafing Common Shelduck and Dunlin were recorded at this site. Furthermore limited evidence from ad hoc sources suggests land at Ditton on the north bank of the estuary and possibly at Shell Green can also perform this function. Although the southern boundary of the borough is 2km from the SPA/Ramsar site this does not render it impossible that high-tide roosts of significance will be present.

⁵⁰ Tyldesley D. 2009. The Habitats Regulations Assessment of Local Development Documents. Unpublished internal report for Natural England

⁵¹ RSK (2010) Mersey Feasibility Study Winter Bird Report

Recommendations for amendment to policy

- 5.39 In view of the fact that there may be key areas of supporting habitat within the borough which have not been surveyed or identified, the potential for loss of supporting habitat as a result of the Core Strategy does remain. The following recommendations are therefore made.
- 5.40 In order to inform the development of the Site Allocations and Development Management DPD and subsequent Green Belt review it will be necessary to undertake an exercise to identify areas outside of the SPA/Ramsar designation that serve as important supporting habitat for qualifying bird species. The Site Allocations DPD should include appropriate mechanisms in place to ensure the loss of such sites is adequately assessed and mitigated as part of planning applications. If supporting habitat were to be lost to any development, then the applicant would need to determine (a) how significant it was (i.e. whether it was used by more than 1% of the population of qualifying bird species and (b) to provide alternative habitat to replace it in a location that was a similar distance from the Estuary.

Deterioration in Water Quality

Appropriate Assessment

- 5.41 HRA Screening identified policies within the Knowsley Core Strategy that have theoretical pathways of impacts relating to the water quality of the Mersey Estuary SPA/Ramsar. These relate to two areas which are discussed in turn below:
- waste water discharge (domestic and industrial); and
 - water abstraction (industrial).
- 5.42 The Knowsley Core Strategy, through the provision of housing, employment and other mixed-use development (and associated waste water discharge) has the potential to result in a deterioration of water quality in the Mersey Estuary SPA/Ramsar.
- 5.43 A study carried out in 1999⁵² serves as a useful indication of the location and size of waste water treatment work inputs to the Mersey Estuary. Whilst slightly dated now this study illustrates the extent of water quality pressures on the Mersey within the context of other similar sites in the UK. The study shows major trade and wastewater effluent to be discharged throughout the Mersey Estuary with significant inputs including from Widnes, Runcorn within Halton. Estimated inputs from trade effluent at that time (~650,000 m³/day) represent just over half the amount of sewage effluent (~1,200,00 m³/day). This is significantly greater than the neighbouring Dee Estuary which had estimated trade effluents at ~50,000 m³/day and sewage effluents at ~62,000 m³/day. There are few other European Marine Sites which have such a high level of discharge, only the Thames and Solent in Southampton. No data on contaminants in discharges is currently available. Water quality issues are clearly a major vulnerability currently being experienced by Mersey Estuary SPA/Ramsar. It should be noted that since this study the Mersey basin clean-up campaign has improved this baseline (described in greater detail below).

⁵² Allen, Y. T., Hurrell, V., Reed J., and Mathiessen P. (2000) Endocrine Disruptors and European Marine Sites in England. Centre for Environment Fisheries and Aquaculture Science (CEFAS). Contract C01042 for English Nature. 159pp

- 5.44 The Environment Agency is understood to have conducted its own review of sources in relation to the requirements of HRA. According to Langston *et al*⁵³ following a review of the Environment Agency Review of Consents for 3,886 permitted water discharges, all of these were 'screened in' as part of the Stage 1 HRA, and of these 919 were taken through from Stage 2 to Stage 3 Appropriate Assessment. This included:
- those discharges responsible for discharging the top 90% of the nutrient/BOD/ammonia load entering the Mersey Estuary;
 - those discharges discharging directly into the Mersey Estuary;
 - those discharges authorised to discharge a List 1 and/or List 2 Dangerous substance that has been found to be either exceeding or at risk of exceeding the Environmental Quality Standard in the Mersey Estuary;
 - all IPC/IPPPC water discharges not already considered under the Directive.
- 5.45 Of the 919 discharges requiring an AA only around 380 are continuous discharges. The remainder largely represent intermittent discharges (storm sewage overflows / emergency discharges from pumping stations).
- 5.46 It should be noted that the Mersey Basin clean-up campaign has produced substantial improvements over the last 25 years. The Mersey is now reported to support a wide range of fish species, including migratory fish, and there has been an increase in numbers of other animals returning to the estuary including reported sightings of porpoises, grey seals and octopus. Langston *et al*⁵⁴ conclude that in the absence of specific information on individual discharges, there is insufficient evidence to justify further expensive remedial action on particular sources. However, there is sufficient uncertainty to justify a more targeted and detailed programme of research and surveillance to measure actual biological impacts at a variety of levels (e.g. biochemistry, bioaccumulation, biomarkers and community structure) at sites within the European Marine Sites and near priority discharges. If results indicate deleterious effects, which can be attributed to known causes then the case for remedial action against key sources (which may include multiple inputs) would be placed on a stronger scientifically sound basis. At the very least such a program would provide a benchmark for assessing future changes in the condition of the site and likely contributions from water quality.
- 5.47 These studies illustrate that combined pollution pressure from run off and waste water discharges throughout the Mersey catchment (including the upper reaches outside of Merseyside) has been a significant historic pressure. Whilst this situation has improved significantly, the potential still exists for surface water run off and waste discharges to adversely affect the qualifying features of the Mersey SPA/Ramsar. It would be disproportionate to suggest Knowsley Core Strategy has the potential to significantly lead to a deterioration in the water quality of the Mersey Estuary above the existing baseline. However it is reasonable to identify the potential for an *in-combination* effect of the Knowsley Core Strategy (above the existing baseline) on the water quality pressures. The relevant policies within the Core Strategy are CS1, CS3, CS4 and CS9-14, which cover the location, scale and type of future development. Other policies that are likely to contribute equally to this in-combination effect are those contained within the Halton Core

⁵⁴ Langston, W.J., Chesman, B.S. and Burt, G.R. (2006). (The Marine Biological Association (2006)) *Characterisation of European Marine Site: the Mersey Estuary Special Protection Area*, Marine Biological Association Occasional Publication No18.

Strategy, in particular policies for the waterfront revitalisation at South Widnes (CS5, CS9) and the development of West Runcorn (CS10), as well policies within Liverpool, Wirral and Warrington Core Strategies.

- 5.48 Further in-combination effects on water quality of the Mersey Estuary SPA/Ramsar site may result from dock and port development, such as the proposed Mersey Gateway Port, and greater use of freight by shipping. Development of ports and docks has the potential to disturb substrates/ circulate synthetic chemical pollutants and heavy metals all of which could result in potential harm to benthic communities, aquatic invertebrates and habitats required by qualifying bird species. Furthermore greater shipping freight has the potential for pollution through fuel emissions/ accidental spillage (described above in relation to waste water discharge/run-off above).

Recommendations for amendment to policy

- 5.49 It should be noted that the majority of the processes that could result in a deterioration of water quality (waste water discharges, surface water runoff and pollution from construction activities) are either regulated through statutory requirements or can be mitigated through standard construction techniques and environmental good practice. These impacts are therefore unlikely. Furthermore it should be noted that Policy CS2 (Development Principles) states that the most efficient use will be made of “*available resources and infrastructure by prioritising locations consistent with the spatial strategy, which do not require major investment in new infrastructure including... water supply and sewerage or where this is unavoidable, incorporate appropriate development phasing and delivery assistance; and to support prudent and efficient management of natural and man-made resources*”. One of the Development Principles detailed is to “*recognise environmental limits, protect and enhance environmental assets, enhance local character and promote quality of place by... maintaining or enhancing the quantity and quality of biodiversity and habitats; and ensuring no negative impact upon flood risk, air quality, water quality, and quality, soil quality and noise or vibration levels*”.
- 5.50 Avoiding an adverse effect is largely in the hands of the water companies (through their investment in future sewage treatment infrastructure) and Environment Agency (through their role in consenting effluent discharges). However, local authorities can also contribute through ensuring that sufficient wastewater treatment infrastructure is in place prior to development being delivered through the Core Strategy. In the case of Knowsley, this is alluded to in the supporting text for Policy CS27 (Planning for and Paying for New Infrastructure): “*Infrastructure planning should also include consideration of funding and phasing of infrastructure delivery, together with contingency planning where appropriate.*”
- 5.51 However, it is considered that this allusion needs to be slightly expanded upon in order to provide a firm commitment with regard to the linking of housing delivery to delivery of necessary infrastructure that will ensure that an adverse effect on European sites is avoided. Ideally, the supporting text for the Core Strategy should make specific reference to the fact that the delivery of development will be phased in order to ensure that it only takes place once any new water treatment infrastructure or appropriate retro-fitted technology (e.g. phosphorus stripping) necessary to service the development while avoiding an adverse effect on European sites is in place. The Core Strategy should also make it clear that this need will be determined and delivered through interaction with other authorities including United Utilities and the Environment Agency.

- 5.52 It is concluded that, with the recommended addition to the supporting text for policy CS27 (Planning for and Paying for New Infrastructure), the Knowsley Core Strategy is unlikely to result in significant adverse impacts on qualifying features of the Mersey Estuary SPA/Ramsar through waste water discharge.

Deteriorating Air Quality

Appropriate Assessment

- 5.53 The Core Strategy identifies policies that have the potential to contribute to a rise in atmospheric nitrogen deposition in the Mersey Estuary SPA/Ramsar. This includes policies that:
- may result in an increase in car use notably as a consequence of housing and business development, (e.g. CS3, CS4);
 - CS7 Transport networks. The main aims of the overall transport strategy include “*support the economy by facilitating efficient movement of people and goods within the Borough and linking to Liverpool City Centre, the Port of Liverpool, Liverpool John Lennon Airport and other destinations in the surrounding area*”;
 - CS23 (Renewable and Low Carbon Infrastructure). Knowsley Business Park and Industrial Park has been identified as a “Priority Zone” for renewable and low carbon infrastructure. Although no specific technologies have been identified, there is the potential for impacts on air quality;
 - ‘in-combination’ effects on air quality are likely through a number of proposed projects including the expansion of Liverpool John Lennon Airport; The Mersey Gateway Project and the expansion of the Mersey Gateway Port, which have the potential to result in a rise in nitrogen and sulphur deposition.
- 5.54 Policy CS23 does include text stating that “*the Council will support such proposals provided that they “do not cause significant harm ...to...natural resources, biodiversity, geodiversity, water and air quality ...”* Any proposed sites will also be subject to further HRA through the Site Allocation and Development DPD. It is therefore considered that the wording in this policy is sufficient to avoid significant effects on the Mersey Estuary SPA/Ramsar.
- 5.55 With regards to eutrophication as a result of atmospheric nitrogen deposition, the nearest significant road in the borough is the A561 located approximately 2km inland from the SPA/Ramsar site. Since nitrogen emissions from vehicle exhausts generally fall to background concentrations by 200m from the centreline of the road, it is considered that there is no realistic impact pathway associated with development in Knowsley.

Conclusion

- 5.56 The Appropriate Assessment has concluded that with the incorporation of the measures listed above, the draft publication Knowsley Core Strategy would include an adequate policy framework to enable the delivery of measures to avoid or adequately mitigate an adverse effect on the integrity of the Mersey Estuary SPA/Ramsar site.

6 Mersey Narrows & North Wirral Foreshore pSPA / pRamsar site

Introduction

- 6.1 The Mersey Narrows and North Wirral Foreshore pSPA and pRamsar site is approximately 2,078ha, located at the mouths of the Mersey and Dee estuaries. The site comprises intertidal habitats at Egremont foreshore (feeding habitat for waders at low tide), man-made lagoons at Seaforth Nature Reserve (high tide roost and nesting site for terns) and the extensive intertidal flats at North Wirral Foreshore (supports large numbers of feeding waders at low tide and also includes important high-tide roost sites). The most notable feature of the site is the exceptionally high density of wintering Turnstone. The Mersey Narrows and North Wirral Foreshore has clear links in terms of bird movements with the nearby Dee Estuary SPA and Ramsar site, Ribble and Alt Estuaries SPA and Ramsar site, and (to a lesser extent) the Mersey Estuary SPA and Ramsar site (Wirral MBC, 2001).

Reasons for Designation

- 6.2 The Mersey Narrows and North Wirral Foreshore pSPA and pRamsar site is proposed on the grounds of its feeding and roosting habitat for non-breeding wading birds, and as a breeding site for terns (Wirral MBC, 2001). The Birds Directive Annex I species (qualifying the site under Article 4.1), which can be found in any season, are:
- Common Tern *Sterna hirundo*: 124 pairs breeding = 1.0% of the GB population; and
 - Bar-tailed Godwit *Limosa lapponica*: 537 individuals wintering = 1.0% of the GB population.
- 6.3 The site also qualifies under Article 4.2 of the Birds Directive, as it is used regularly by 1% or more of the biogeographical populations of the following migratory species:
- Knot *Calidris canutus*: 10,661 individuals = 3.0% of NW European, NE Canadian, Greenland & Icelandic populations;
 - Redshank *Tringa totanus*: 1,606 individuals = 1.1% Eastern Atlantic population; and
 - Turnstone *Arenaria interpres*: 1,593, individuals = 2.3% Western Palearctic population.
- 6.4 Additionally, in qualifying under Article 4.2 of the Birds Directive, the site regularly supports over 20,000 individuals of a wider range of species, including dunlin, knot *Calidris canutus*, grey plover *Pluvialis squatarola*, oystercatcher *Haematopus ostralegus* and cormorant *Phalacrocorax carbo*.
- 6.5 The site qualifies under the Ramsar Convention under Criterion 5, regularly supporting over 20,000 waterbirds (non-breeding season, 28,841 individual waterbirds), and Criterion 6, regularly supporting 1% of the species or subspecies of waterbird in any season listed above.

Historic Trends and Current Pressures

- 6.6 Due to its location at the mouth of the Mersey Estuary and in the Liverpool Bay, this site has been subject to the same changes as described for the Mersey Estuary SPA and Ramsar site, in particular water quality improvements since the 1960s (especially since 1985), and increases in agricultural effluent pollution during this same period.
- 6.7 Some of the main current (as opposed to future) environmental pressures relevant to the nature conservation objectives of the Mersey Narrows and North Wirral Foreshore pSPA / pRamsar site are:
- disturbance of sediment releasing legacy heavy metal pollution (lead, cadmium, arsenic and other poisons) that is bound into the sediment;
 - pollution via rivers and drains by both treated sewerage and untreated runoff containing inorganic chemicals and organic compounds from everyday domestic products, which '*may combine together in ways that make it difficult to predict their ultimate effect of the marine environment... Some may remain indefinitely in the seawater, the seabed, or the flesh, fat and oil of sea creatures*';
 - pollution via commercial shipping by chemical or noise pollution and the dumping of litter at sea;
 - damage of marine benthic habitat directly from fishing methods;
 - damage of marine benthic habitat along the North Wirral Foreshore directly or indirectly from aggregate extraction, particularly anywhere that dredging may be altering erosion/deposition patterns;
 - 'coastal squeeze' (a type of coastal habitat loss) from land reclamation and coastal flood defences and drainage used in order to farm or develop coastal land, and from sea level rise;
 - loss or damage of marine benthic habitat directly and indirectly (through changed sedimentation/deposition patterns) as a result of navigational dredging in order to accommodate large vessels – e.g. into the ports of Liverpool;
 - harm to wildlife (especially birds) or habitat loss due to increasing proposals/demand for offshore wind turbines; and
 - pollution, direct kills, litter, disturbance or loss of habitat as a result of water-based recreation or other recreation activity and related development along the foreshore (Wildlife Trust, 2006);
 - introduction of non-native species and translocation; and
 - selective removal of species (e.g. bait digging, wildfowl, fishing) (Wildlife Trust, 2006 and Marine Biological Association, 2006).
- 6.8 The Mersey Estuary does have a high load of nutrients mainly from diffuse sources, with levels for phosphate and nitrogen decreasing from point sources. However, recent modelling has shown that due to the natural turbidity of the water, there is only a low risk of excessive algal growth. Given the close hydrological linkage between the Mersey Estuary and the North Wirral Foreshore, this is likely to hold true for this pSPA/pRamsar site.

Key potential pressures from Knowsley

- 6.9 From the environmental requirements that have been identified above it can be determined that development in Knowsley could theoretically interfere with the environmental requirements and processes on the pSPA/pRamsar Site in the following manner:
- water quality from one or more of the following pathways to the River Mersey: discharge of treated wastewater effluent into the Mersey;
 - pollution, direct kills, litter, disturbance or loss of habitat as a result of water-based recreation or other recreation activity associated with an increase in the population and increased leisure time associated with the ageing existing population.
- 6.10 The Appropriate Assessment will therefore concentrate on evaluating whether these impacts are likely to occur and what amendments to policy may be required to avoid or minimise them. Local air quality issues arising from the Core Strategy are scoped out of consideration since the site is physically separated from Knowsley.

Role of other plans and projects

- 6.11 In addition, the following plans and projects are considered to have the potential to act upon the pSPA/pRamsar site 'in combination':

Projects

- Wirral Waters & Liverpool Waters – twin projects on either side of the river both involving works to existing docks, with potential impacts from pollution arising during the construction phase and mobilisation of legacy contamination within sediments;
- Power from the Mersey – potential impacts due to changes in hydrodynamics of river flow and structure, possible restrictions on bird movements, possible direct landtake, possible disturbance of waterfowl during construction;
- Mersey Gateway Project – potential impacts from pollution arising during the construction phase of these projects, also possible displacement of birds. Deterioration in local air quality and thus increased nitrogen deposition (from greater cross-river travel, air travel);
- Mersey Port – potential impacts from pollution arising during the construction phase; also disturbance of sediment releasing legacy heavy metal (lead, cadmium, arsenic and other poisons) pollution that is bound into the sediment from greater shipping freight; possible displacement of birds through disturbance;
- Liverpool John Lennon Airport - potential displacement of birds; deterioration in air quality and water quality due to increased air travel; and
- Energy from Waste Plants at Runcorn and Ince Marshes – possible air quality impacts through nitrogen and sulphur deposition. However, both of these schemes are consented such that they will introduce mitigation for their own air quality impacts. In practice therefore, no in combination effect should result.

Plans

- Liverpool City Region Renewable Energy Capacity Study – possible impacts on waterfowl flightpaths between the Mersey Estuary and other European sites depending upon the degree of wind power involved and the location of turbines;
- North West England & North Wales Shoreline Management Plan 2 – possible impacts due to the maintenance or enhancement of flood defences could lead to coastal squeeze, changes in sediment release (if previously undefended areas become defended) and direct loss of habitat to flood defence footprint;
- Core Strategies for Liverpool, Cheshire West and Chester, Cheshire East, Trafford, Warrington, Halton, Sefton, Wirral and St Helens and Liverpool – possible water quality, air quality and wildfowl disturbance impacts as a result of delivery of 110,000 dwellings and associated commercial development over the next 20 years; and
- Joint Merseyside and Halton Waste Development Plan Document – possible impacts due to water quality, air quality and wildfowl disturbance or chick predation. However, since this DPD is itself subject to a recent HRA it will address its own contribution to any ‘in combination’ effect that may otherwise arise.
- Liverpool SuperPort – potential impacts due to increased sulphur deposition from shipping, physical disturbance of habitat, mobilisation of contamination, possible disturbance of waterfowl from noise and shipping activity;
- Mersey Gateway Port – potential impacts on water quality from increase in commercial shipping. Also loss or damage of marine benthic habitat directly and indirectly (through changed sedimentation/deposition patterns) as a result of navigational dredging in order to accommodate large vessels into the port;
- Energy from Waste Plants at Runcorn and Ince Marshes – possible air quality impacts through nitrogen and sulphur deposition. However, both of these schemes are consented such that they will introduce mitigation for their own air quality impacts. In practice therefore, no in combination effect should result; and
- Frodsham Windfarm - possible impacts on waterfowl flightpaths between the North Wirral Foreshore and other European sites. Although the assessments undertaken for the planning application indicate that these issues are resolvable, planning permission is yet to be granted so we have taken the precautionary view.

Appropriate Assessment

Water Quality Deterioration

Appropriate Assessment

- 6.12 The Mersey Narrows and North Wirral Foreshore pSPA/pRamsar includes the mouth of the Mersey Estuary (principally Egremont Foreshore on the south bank, and Seaforth on the north bank) as well as the North Wirral Foreshore itself. Egremont Foreshore and Seaforth are separated by approximately 2km, but are considered to be an integral site on the basis of the constant interchange of bird populations. These areas of the Mersey Narrows and North Wirral

Foreshore pSPA/pRamsar are susceptible to changes in water quality in the Mersey Estuary arising from:

- Recreational pressure and disturbance; and
- wastewater discharge (domestic and industrial).

- 6.13 Chapter 5 has already provided an Appropriate Assessment of these identified pathways from the Knowsley Core Strategy to the Mersey Estuary. These potential adverse effects would also be relevant to Mersey Narrows and North Wirral Foreshore pSPA/pRamsar site (particularly Egremont Foreshore and Seaforth nature reserve at its mouth) due to the hydraulic connections along the Mersey Estuary.
- 6.14 A recent study has been undertaken to establish the ecological value and functionality of key points along the Mersey Estuary, which included these two sites within the Mersey Narrows⁵⁵ described below.
- 6.15 The area around Seaforth Nature reserve was identified as particularly important as a high tide roost site, particularly during high spring tides when rocky shores and man-made structures closer to the feeding areas are submerged and not available as roosting sites. Important for wildfowl and some wading bird species. The Marine Lakes is a sheltered roosting location that regularly supported a diverse assemblage of mixed duck species; notably diving ducks. Numbers of dabbling ducks; Eurasian Teal and to a lesser extent Common Shelduck were high in comparison to other sites surveyed but again these records were mostly of birds on the Seaforth site. The site is adjacent to the Seaforth LNR and most of the wading species recorded at Crosby were of birds on this site. Black-tailed Godwits regularly used this site but were recorded almost exclusively on the Seaforth site. The foreshore areas were used by feeding shorebirds including locally significant numbers of Eurasian Oystercatcher, Sanderling and Ringed Plover. The foreshore areas at Crosby were subject to the greatest level of activity of Eurasian Oystercatcher of all sites surveyed. These birds transferred regularly with the site at New Brighton. The exposed sandy beaches were used regularly by this species as a feeding site with birds roosting near the Marine Lakes or on the Seaforth site. Bar-tailed Godwits were recorded sporadically at this site.
- 6.16 The North Wirral Foreshore and New Brighton area (around Egremont Foreshore) are widely recognised as being of conservation importance for many species of wading bird, particularly feeding at low tide on the barnacle beds and groynes. The foreshore area consists of large expanses of exposed sandy beach at low tide and it is in these areas that the highest activity of Eurasian Oystercatcher was recorded. This species occurred in locally significant numbers roosting on the breakwaters and surrounding structures at high tide. There is a high transference of birds between Egremont Foreshore and Crosby. This site is well known as a regular wintering site for Purple Sandpipers. These birds used the rocky areas, groynes and shore defences for both feeding and roosting and were closely associated with larger flocks (several thousands) of Ruddy Turnstone which also congregate on the Marine Lake area as a high tide roost; as well as feeding on the tide line. Eurasian Oystercatchers were also noted using the high tide roost on the Marine Lake as this area was relatively undisturbed.
- 6.17 It is therefore possible that any changes in water quality and resultant effects on crustaceans, worms or other food source, has the potential to affect these qualifying bird species within the

⁵⁵ RSK (2010) Mersey Feasibility Study Winter Bird Report

Egremont Foreshore and Seaforth Nature Reserve areas. It should be noted, however, that any deterioration in water quality arising from Knowsley Core Strategy only arises when considered *in combination* with the Liverpool, Wirral and Halton Core Strategies within Merseyside, as well as the Warrington Core Strategy in Cheshire.

Recommendations for amendment to policy

- 6.18 The recommendations given in Chapter 5 for addressing water quality impacts with regard to the Mersey Estuary SPA/Ramsar site would also serve for Mersey Narrows & North Wirral Foreshore pSPA/pRamsar site.

Disturbance

Appropriate Assessment

- 6.19 Several online sources^{56 57} suggest that the North Wirral Foreshore is both easily accessible and well used by dog walkers. These sources also suggest water based recreation (e.g. jet skies) to be potentially damaging. Additionally, the North Wirral Foreshore is used for bait digging⁵⁸. Recreational pressures are therefore a legitimate concern.
- 6.20 General increased housing development within Knowsley, coupled with policies seeking to enhance connectivity and accessibility between Knowsley and other Merseyside Boroughs has the potential to increase the existing recreational pressures on Mersey Narrows and North Wirral Foreshore pSPA/pRamsar site. The North Wirral Foreshore is approximately 18km from the nearest urban areas of Knowsley by road, which is within the 25.5km that the England Leisure Day Visits Survey indicates that people typically travel to visit the coast for the day. These policies include the provision of transport networks (CS7) and Green Infrastructure (CS8). From a sustainability perspective, such policies are beneficial and it would be inappropriate for the Core Strategy to reduce connectivity and accessibility between the Merseyside Boroughs in an attempt to reduce visitors to these sites. However, access and management of these areas can be managed to limit potential impacts from disturbance as part of a joint agreement between neighbouring councils.
- 6.21 In-combination disturbance effects on qualifying bird species are likely to occur in relation to the expansion of Liverpool John Lennon Airport (LJLA) due to an increase in airplanes taxiing which could create disturbance issues for birds using the SPA/Ramsar. Initial drafts of the airport Masterplan refer to increased lighting as a result of the airport expansion, and note that birds and bats may be affected (Peel Airports, 2006), although subsequent drafts (i.e. the final 2007 Masterplan) indicate that these issues would in the opinion of LJLA be resolvable. However, it is not as yet clear as to whether Natural England and Countryside Council for Wales universally accept these conclusions. Any increase in illumination is unlikely to affect a site so far from the airport, particularly since use of the SPA by waterfowl remains high despite the north bank of the Mersey generally being a brightly lit environment.

⁵⁶ <http://friendsofnorthwirralcoastalpark.co.uk/>

⁵⁷ <http://www.wirralglobe.co.uk/news/1732173.0/>

⁵⁸ Natural England, Countryside Council for Wales and Welsh Assembly Government (January 2010) 'The Dee Estuary European Marine Site'

Recommendations for amendment to policy

- 6.22 The recommendations given in Chapter 5 for addressing recreational pressure and disturbance of qualifying bird species with regard to the Mersey Estuary SPA/Ramsar site would also serve for Mersey Narrows & North Wirral Foreshore pSPA/pRamsar site.

Renewable Energy

Appropriate Assessment

- 6.23 The Core Strategy promotes sustainable, renewable and low carbon energy within Knowsley (Policies CS22 and CS23). Although the policy does not specify which technologies are likely to be developed, Knowsley Business and Industrial Parks are identified as a "Priority Zone" for the development of renewable and low carbon infrastructure. If this were to include wind turbine construction, a pathway exists for the construction of onshore turbines to disrupt flight paths and displace qualifying bird species. Disturbance issues associated with maintenance activities were also identified. There is therefore the potential for a significant impact through the development of wind turbines, depending on their size, number and location. However, Policy CS23 states that the Council will support such proposals provided that they "*do not cause significant harm ... to... natural resources, biodiversity, geodiversity, water and air quality*". Moreover, since any such development will be dealt with in a Site Allocations and Development Control Policies DPD, it is considered that the wording in this policy, together with the requirement for an HRA on the Site Allocations and Development Control Policies DPD, there is sufficient protection to avoid adverse effects on European sites, and designated features of interest, through potential development of renewable and low carbon infrastructure.

Conclusion

- 6.24 The Appropriate Assessment has concluded that with the incorporation of the measures listed above with regard to disturbance and water quality, the Knowsley Core Strategy Preferred Options would include an adequate policy framework to enable the delivery of measures to avoid or adequately mitigate an adverse effect on the integrity of the Mersey Narrows & North Wirral Foreshore pSPA/pRamsar site.

7 Sefton Coast SAC

Introduction

- 7.1 Located to the north of Liverpool, the Sefton Coast SAC (approximately 4,560ha) consists of a mosaic of sand dune communities comprising a range of ages from embryonic (i.e. dune formation) to more established communities. A number of other habitats are also present, including lagoons, estuaries and riverine environments, but also scrub, heath and coniferous woodland.

Reasons for Designation

- 7.2 The Sefton Coast qualifies as an SAC for both habitats and species. Firstly, the site contains the Habitats Directive Annex I habitats of:

- embryonic shifting sand dunes: considered rare, as its total extent in the United Kingdom is estimated to be less than 1,000 hectares – the Sefton Coast SAC is considered to be one of the best areas in the United Kingdom;
- shifting dunes along the shoreline with marram *Ammophila arenaria* (“white dunes”): the Sefton Coast SAC is considered to be one of the best areas in the United Kingdom;
- fixed dunes with herbaceous vegetation (“grey dunes”): the Sefton Coast SAC is considered to be one of the best areas in the United Kingdom;
- dunes with creeping willow *Salix repens ssp. argentea (Salicion arenariae)*: considered rare, as its total extent in the United Kingdom is estimated to be less than 1,000 hectares – the Sefton Coast SAC is considered to support a significant presence of the species;
- humid dune slacks: the Sefton Coast SAC is considered to be one of the best areas in the United Kingdom; and
- Atlantic decalcified fixed dunes (*Calluno-Ulicetea*): considered rare, as its total extent in the United Kingdom is estimated to be less than 1,000 hectares – the Sefton Coast SAC is considered to support a significant presence.

- 7.3 Secondly, the site contains the Habitats Directive Annex II species petalwort *Petalophyllum ralfsii*, for which it is one of the best areas in the United Kingdom, and great-crested newt *Triturus cristatus*, for which the area is considered to support a significant presence.

Historic Trends and Current Pressures

- 7.4 The dune habitats of the Sefton Coast SAC are dependent upon natural erosive processes. Various human activities that interrupt natural sedimentation and deposition patterns within the Liverpool Bay have had an effect on the wildlife value of these dunes and their existence. Since as early as the 18th century, ‘dredging, river training and coastline hardening have imposed a pattern of accretion and erosion on the shoreline where previous conditions were much more variable’ (Liverpool Hope University College, 2006). More recently, the dunes have been partially

stabilised through maintaining their natural vegetation, the planting of pine trees, and artificial sea defences for protecting the developed shorelines. Another compounding influence is that the inland lakes and mosses behind the belt of coastal dunes have been drained and claimed for agricultural production (Liverpool Hope University College, 2006).

7.5 The environmental requirements of the Sefton Coast SAC are mainly:

- the need to reduce the fragmentation of habitats, and the impact of fragmentation, to provide stepping stones for the movement of species;
- the need to counter negative changes to low-nutrient habitats resulting from atmospheric nutrient deposition;
- the need to manage the continuing coastal erosion at Formby Point which leads to a squeeze on habitats. This management would not constitute formal defences as these would in themselves harm the dune ecosystem, but the management of pine plantations preventing dune roll-back. The dunes require sufficient space such that natural processes can maintain the important habitats through roll-back;
- the need to consider the potential impact of climate change on shorelines, wetlands and dunes;
- the need to manage abstraction from the underlying aquifer for sources such as golf courses. The aquifer is critical to some features of the site, such as the humid dune slacks and the great crested newts;
- to manage recreational pressures and direct disturbance to qualifying habitats;
- the need to develop and maintain management practices which sustain the conservation value of the area; and
- the need to avoid loss of great-crested newt habitat, and habitats being further fragmented by distance or barriers.

Key potential pressures from Knowsley

7.6 From the environmental requirements that have been identified above it can be determined that development in Knowsley could theoretically interfere with the environmental requirements and processes on the SAC in the following manner:

- Excessive recreational pressure; and
- Deteriorating water quality through discharge of wastewater into the Sefton Coast SAC via the River Alt.

7.7 The Appropriate Assessment will therefore concentrate on evaluating whether these impacts are likely to occur and what amendments to policy may be required to avoid or minimise them.

Role of other plans and projects

Projects

- Liverpool SuperPort – potential impacts due to increased sulphur deposition from shipping, physical disturbance of habitat, mobilisation of contamination, possible disturbance of waterfowl from noise and shipping activity;
- Potential in-combination effects resulting in deteriorating air quality as a result of increased deposition of SO₂/NO_x through increased aircraft movements from the expansion of Liverpool John Lennon Airport.

Plans

- North West England & North Wales Shoreline Management Plan 2 – possible impacts due to the maintenance or enhancement of flood defences could lead to coastal squeeze, changes in sediment release (if previously undefended areas become defended) and direct loss of habitat to flood defence footprint;
- Core Strategies for Liverpool, West Lancashire, Halton, Sefton, Wirral and St Helens, the Mersey Heartlands Growth Point Programme of Delivery (Wirral and Liverpool) and Liverpool – possible water quality, air quality and wildfowl disturbance impacts as a result of delivery of 90,000 dwellings and associated commercial development over the next 20 years; and
- Joint Merseyside and Halton Waste Development Plan Document – possible impacts due to water quality, air quality and wildfowl disturbance or chick predation. However, since this DPD is itself subject to a recent HRA it will address its own contribution to any ‘in combination’ effect that may otherwise arise.

Appropriate Assessment

Recreational trampling

Appropriate Assessment

- 7.8 Sand dunes are vulnerable to recreational trampling in that excessive physical disturbance can retard or set back the dune development process and lead to a reduction in habitat diversity. However, at the same time some recreational trampling is beneficial in that it ensures that the dune vegetation does not all succeed to the same late stage of development and thereby actually helps to preserve diversity.
- 7.9 A recent study on the recreational users of Sefton’s Natural Coast⁵⁹ estimated half of the recreational users to be ‘local residents’ (i.e. residents within the Borough of Sefton). With respect to reasons for visiting the coast over half of the respondents’ main reason was either dog walking/walking/fresh air or visiting the coast. Nature based attractions including visiting the squirrels, bird watching, fishing accounted for approximately 20% of the visitors. The majority of visitors were focused on Formby and Crosby.

⁵⁹ England’s North West Research Service for Economic Development and Tourism (May 2009) Sefton’s Natural Coast Local Users of the Coast (Version 2)

- 7.10 Unfortunately the study did not explore where the remaining 50% of visitors (i.e. not local residents from Sefton) came from. However, respondents to the England Leisure Day Visits Survey indicated that they typically travelled 25.5km to visit the coast for the day. The nearest access point to the Sefton Coast SAC is located approximately 12.4km from the main urban areas of Knowsley, if one follows transport routes. It is therefore likely that Knowsley residents could represent a significant proportion of visitors to the Sefton Coast SAC. It is therefore concluded that adverse effects may occur in combination with an ageing population (with more leisure time) across Merseyside and particularly within Sefton and Liverpool.
- 7.11 Policies contained within the Knowsley Core Strategy relate to a greater connectivity and accessibility from Knowsley to other Merseyside Boroughs as well as the delivery of over 7000 new dwellings. These policies include the provision of transport networks (CS7) and green infrastructure (CS8).
- 7.12 Although policy CS8 (Green Infrastructure) does refer to “*sustaining and promoting biodiversity as one of the beneficial functions of Green Infrastructure and minimising the impact of development upon Knowsley’s existing biodiversity and geological assets*”. It does not acknowledge that the provision of Green Infrastructure within the borough, if linking to internationally important sites outside the borough, has the potential to result in disturbance to designated features within Natura 2000 sites. In referring to the requirement of Green Infrastructure in new development, it makes no reference to biodiversity at all, focusing on leisure and recreation. Where the policy states “*Working in partnership with other districts and relevant bodies, where appropriate, to minimise the impact of development upon Knowsley’s existing biodiversity and geological assets*”, this wording should be amended to include reference to biodiversity in the surrounding area. Suggested wording is “*Working in partnership with other districts and relevant bodies, where appropriate, to minimise the impact of development upon Knowsley’s existing biodiversity and geological assets, as well as sustaining the protection afforded to internationally important sites for biodiversity outside of the Borough.*” The supporting text could add the clarification that this should be “*by managing recreational impacts and encouraging the use of the wider green infrastructure network which is less sensitive to recreational pressure*’.
- 7.13 A further amendment to Policy CS8 is required in relation to the approach to green infrastructure and new development. Although it states “*New development must be served by Green Infrastructure to meet the needs of residents in a manner which will:provide access to high quality open spaces for leisure and recreational purposes.*”, the supporting text could add the clarification that this should “*not have a detrimental impact on important sites/species of nature conservation interest within the borough or the surrounding area, through increased disturbance.*”
- 7.14 For the Sefton Coast the most logical response Knowsley could make would be a Core Strategy commitment to assist in the future delivery of the requirements of the Beach Management Plan (specifically as it relates to recreation management) commensurate with the contribution of visitors to the site that arise from Knowsley. If this recommendation is implemented, it is concluded that there will be no adverse effect on the integrity of the Sefton Coast SAC through direct disturbance as a result of any of the policies proposed within the Core Strategy.
- 7.15 It is also recommended that the Core Strategy should include a clear statement that it will ‘*not support schemes that will lead to adverse effects on internationally important wildlife sites, either alone or in combination with other projects and plans. Any scheme that would be likely to have a significant effect on a European site, either alone or in combination with other plans or projects,*

will be subject to an assessment under Part 6 of the Habitat Regulations at project application stage. If it cannot be ascertained that there would be no adverse effects on site integrity the project will have to be refused or pass the tests of Regulation 61 and 62, in which case any necessary compensatory measures will need to be secured in accordance with Regulation 66'. This would be in line with the example provided on page 39 of the Natural England internal guidance on HRA.⁶⁰

Air quality

Appropriate Assessment

- 7.16 The only potential impacts on Sefton Coast SAC through a deterioration in air quality resulting from policies contained within Knowsley Core Strategy would relate to an increase in visitors, hence increased traffic levels; or development of renewable energy technologies which would result in aerial emissions. However, no Energy from Waste facilities are proposed for Knowsley and the Joint Waste DPD has highlighted an over provision of consented EfW facilities and significant delivery issues surrounding further developments of this type, so this is not likely to be an issue. The Sefton Coast SAC does not lie within 200m of a major arterial route for traffic travelling from Knowsley to (or through) Sefton and therefore, increased road traffic is not considered an issue.
- 7.17 In combination effects on air quality through the expansion of Liverpool John Lennon airport are likely to be the greatest contributor to any increase in nitrogen or sulphur deposition. With regards to eutrophication as a result of atmospheric nitrogen deposition, sand dune succession and petalwort are both vulnerable to excessive nitrogen inputs in that this can increase the development of vegetation and both out-compete petalwort and more rapidly advance sand dune succession to a point of excessive scrub development. However, development of the airport will require its own HRA at the project level so this issue would be addressed at that time, and cannot be dealt with through policies within the Knowsley Core Strategy.

Conclusion

- 7.18 Provided that the above amendments to policy are incorporated, the Appropriate Assessment has concluded that the Knowsley Core Strategy Preferred Options will not have an adverse effect on the integrity of the Sefton Coast SAC.

⁶⁰ Tyldesley D. 2009. The Habitats Regulations Assessment of Local Development Documents. Unpublished internal report for Natural England

8 Ribble and Alt Estuaries SPA / Ramsar site

Introduction

- 8.1 The Ribble and Alt Estuaries SPA and Ramsar site is approximately 12,360ha, and consists of extensive sand- and mud-flats and, particularly in the Ribble Estuary, large areas of saltmarsh. There are also areas of coastal grazing marsh located behind the sea embankments. The saltmarshes, coastal grazing marshes intertidal sand- and mud-flats all support high densities of grazing wildfowl and are used as high-tide roosts. Important populations of waterbirds occur in winter, including swans, geese, ducks and waders. The highest densities of feeding birds are on the muddier substrates of the Ribble.
- 8.2 The SPA is also of major importance during the spring and autumn migration periods, especially for wader populations moving along the west coast of Britain. The larger expanses of saltmarsh and areas of coastal grazing marsh support breeding birds during the summer, including large concentrations of gulls and terns. These seabirds feed both offshore and inland, outside of the SPA. Several species of waterbird (notably pink-footed goose) utilise feeding areas on agricultural land outside of the SPA boundary. There is considerable interchange in the movements of wintering birds between this site and Morecambe Bay, the Mersey Estuary, the Dee Estuary and Martin Mere.

Reasons for Designation

- 8.3 The Ribble and Alt Estuaries site is designated as an SPA for its Birds Directive Annex I species, both breeding and over-wintering, and these are:
- 8.4 During the breeding season:
- common tern *Sterna hirundo*: 182 pairs = 1.5% of the breeding population in Great Britain;
 - ruff *Philomachus pugnax*: 1 pair = 9.1% of the breeding population in Great Britain;
- 8.5 Over winter:
- bar-tailed godwit *Limosa lapponica*: 18,958 individuals = 35.8% of the population in Great Britain;
 - Bewick's swan *Cygnus columbianus ssp. bewickii*: 229 individuals = 3.3% of the population in Great Britain;
 - golden plover *Pluvialis apricaria*: 4,277 individuals = 1.7% of the population in Great Britain
 - whooper swan *Cygnus cygnus*: 159 individuals = 2.9% of the population in Great Britain.
- 8.6 It also meets the criteria for SPA designation under Article 2 of the Birds Directive, supporting internationally important populations of lesser black-backed gull *Larus fuscus*, ringed plover *Charadrius hiaticula*, sanderling *Calidris alba*, black-tailed godwit *Limosa limosa ssp. limosa*, dunlin *Calidris alpina alpina*, grey plover *Pluvialis squatarola*, knot *Calidris canutus*, oystercatcher *Haematopus ostralegus*, pink-footed goose *Anser brachyrhynchus*, pintail *Anas*

acuta, redshank *Tringa totanus*, sanderling *Calidris alba*, shelduck *Tadorna tadorna*, teal *Anas crecca* and wigeon *Anas penelope*. It also qualifies by regularly supporting up to 29,236 individual seabirds, and, over winter, 301,449 individual waterfowl.

- 8.7 It is additionally designated as a Ramsar site in accordance with Criterion 5 (UN, 2005) for supporting up to 89,576 waterfowl (5-year peak mean 1998/99 – 2002/03), and in accordance with Criterion 6 for supporting internationally important populations of common shelduck *Tadorna tadorna*, black-tailed godwit *Limosa limosa ssp. limosa*, redshank *Tringa totanus*, Eurasian teal *Anas crecca*, northern pintail *Anas acuta* and dunlin *Calidris alpina alpina*.
- 8.8 The Ribble and Alt Estuaries also qualifies as a Ramsar as it meets criterion 2 by supporting over 40% of the UK population of Natterjack toad. The Natterjack Toad occurs on the Sefton Coast in seaward dunes between Southport and Hightown. In 2000 it was present on 13 sites (three of which are reintroductions). The breeding population is estimated at just over 1000 females.
- 8.9 The largest populations are on Ainsdale Sand Dunes NNR and Ainsdale and Birkdale Sandhills LNR. Natterjacks are absent from much of the dune coast and some breeding sites are relatively isolated (North Merseyside Biodiversity Action Plan, undated).

Historic Trends and Current Pressures

- 8.10 As an estuarine site linked with the Liverpool Bay, this site has been subject to the same changes as described for the Liverpool Bay SPA but additionally its own unique pressures (some similar to those experienced in the Mersey Estuary). The estuaries were largely undisturbed until the 19th century, at which point there was extensive modification and dredging of the river channel for the Port of Preston, as well as landfill and drainage along the shoreline in order to increase agricultural usage of the land. The Ribble Estuary has over the past century experienced ‘a general pattern of sediment accretion in the inner Estuary and erosion in outer areas,’ but the estuary has begun ‘to revert to its natural state... since maintenance of the Ribble Channel for shipping ceased in 1980. There have been dramatic changes in the course of channels in the outer Estuary, and these are expected to continue. Anticipated climatic and sea level changes are likely to exaggerate existing patterns of erosion and accretion, although sea level rise is not expected to cause significant loss of intertidal land in the Ribble⁶¹.
- 8.11 The Ribble and Alt Estuaries are among ‘the most popular holiday destinations in Britain’, with Blackpool as the largest resort and Southport increasing in visitors. Leisure activities include ‘watersports such as sailing and windsurfing; fishing and shooting; bird watching; land yachting; and generally relaxing at the coast... enjoyed by both local people and visitors⁶².
- 8.12 Some of the main environmental pressures relevant to the nature conservation objectives of the Ribble and Alt Estuaries SPA / Ramsar site are:
- loss or damage of habitat as a result of increasing off-shore exploration and production activity associated with oil and natural gas;

⁶¹ (Ribble Estuary Strategy Steering Group, 1997, p.15).

⁶² (Ribble Estuary Strategy Steering Group, 1997, p.10).

- over-grazing of the saltmarshes by cattle-farming;
- heavy metal pollution (lead, cadmium, arsenic and other poisons) from either industry or disturbance of sediment (legacy pollution bound into the sediment);
- pollution via rivers by agricultural effluent flowing off fields, 'leading to increased fertility of inshore waters and associated algal blooms and de-oxygenation of seawater, particularly in enclosed bays and estuaries';
- pollution via rivers and drains by both treated sewerage and untreated runoff containing inorganic chemicals and organic compounds from everyday domestic products, which 'may combine together in ways that make it difficult to predict their ultimate effect of the marine environment... Some may remain indefinitely in the seawater, the seabed, or the flesh, fat and oil of sea creatures';
- damage of marine benthic habitat directly from fishing methods;
- damage of marine benthic habitat directly or indirectly from aggregate extraction;
- 'coastal squeeze' (a type of coastal habitat loss) from land reclamation and coastal flood defences and drainage used in order to farm or develop coastal land, and from sea level rise;
- harm to wildlife (especially birds) or habitat loss due to increasing proposals/demand for offshore wind turbines;
- pollution, direct kills, litter, disturbance or loss of habitat as a result of water-based recreation or other recreation activity and related development along the foreshore⁶³ ;
- disturbance to birds from aircraft, both from Blackpool Airport and from a private testing station;
- introduction of non-native species and translocation;
- selective removal of species (e.g. bait digging, wildfowl, fishing) (Wildlife Trust, 2006 and Ribble Estuary Strategy Steering Group, 1997);
- interruption of dune accretion processes leading to over-stabilisation of dunes;
- the spread of rank grasses and scrub, partly caused by a decline in rabbit-grazing, further reducing suitable habitat;
- losses to development, forestry and recreational uses have reduced the area of available habitat;
- fragmentation of habitat has led to isolation of populations;
- creation of permanent water bodies in the dunes has encouraged populations of invertebrates which prey on Natterjack tadpoles and, most seriously, of common toads which both predate and suppress the development of Natterjack tadpoles;
- gassing of rabbits, especially on golf courses, can kill Natterjacks using burrows and removes a valuable grazing animal;

⁶³ Wildlife Trust (2006) – The Wildlife Trust For Lancashire, Manchester And North Merseyside (2006). *Uses and abuses*. [Online]. Available at: <http://www.lancswt.org.uk/Learning%20&%20Discovery/theirishsea/usesandabuses.htm> (accessed 15th June 2009).

- collecting and disturbance of spawn and tadpoles can reduce metamorphic success;
- inappropriate management can cause the loss of low vegetation structure and open ground used by Natterjacks for foraging; and
- water abstraction, conifers and scrub lower the water table locally and reduces the number of pools in which Natterjack tadpoles can develop to maturity.

8.13 There is both formal and informal recreation along the Sefton Coast and intensity varies with season, event and attraction. Recreation is much more informal within the Ribble Estuary itself.

Key potential pressures from Knowsley

8.14 From the environmental requirements that have been identified above it can be determined that development in Knowsley could theoretically interfere with the environmental requirements and processes on the pSPA/pRamsar site in the following manner:

- water quality from discharge of wastewater into the River Alt which flows into the Estuary; or from the following pathways to the River Mersey (with hydraulic connections to this pSPA and pRamsar): discharge of treated wastewater into the Mersey; untreated runoff containing inorganic and organic compounds;
- pollution, direct kills, litter, disturbance or loss of habitat as a result of water-based recreation or other recreation activity (as a result of an increasing population or increased leisure time associated with the ageing of the existing population) and related development along the foreshore (Wildlife Trust, 2006).

8.15 The Appropriate Assessment will therefore concentrate on evaluating whether these impacts are likely to occur and what amendments to policy may be required to avoid or minimise them. Local air quality issues arising from the Core Strategy are scoped out of consideration since the site is physically separated from Knowsley.

Role of other plans and projects

8.16 It was considered that the following projects and plans could act 'in combination' with the Core Strategy:

Projects

- Liverpool John Lennon Airport expansion - deteriorating air quality as a result of increased deposition of SO₂/NO_x through increased aircraft, shipping or vehicle movements.
- Liverpool SuperPort – potential impacts due to increased sulphur deposition from shipping, physical disturbance of habitat, mobilisation of contamination, possible disturbance of waterfowl from noise and shipping activity; and
- Mersey Gateway Port (Runcorn) – potential impacts on water quality from increase in commercial shipping.

Plans

- Liverpool City Region Renewable Energy Capacity Study – possible impacts on waterfowl flightpaths between the Ribble & Alt Estuaries SPA and other European sites depending upon the degree of wind power involved and the location of turbines;
- North West England & North Wales Shoreline Management Plan 2 – possible impacts due to the maintenance or enhancement of flood defences could lead to coastal squeeze, changes in sediment release (if previously undefended areas become defended) and direct loss of habitat to flood defence footprint;
- Core Strategies for Liverpool, West Lancashire, Halton, Sefton, Wirral and St Helens, the Mersey Heartlands Growth Point Programme of Delivery (Wirral and Liverpool) and Liverpool and Wirral Waters Development masterplans – possible water quality, air quality and wildfowl disturbance impacts as a result of delivery of 90,000 dwellings and associated commercial development over the next 20 years; and
- Merseyside Joint Waste Development Plan Document – possible impacts due to water quality, air quality and wildfowl disturbance or chick predation. However, since this DPD is itself subject to a recent HRA it will address its own contribution to any ‘in combination’ effect that may otherwise arise.

Appropriate Assessment

Disturbance

Appropriate Assessment

- 8.17 Although the coast that lies adjacent to the Ribble & Alt Estuaries SPA/Ramsar site draws tourists from across the county due to the proximity of Blackpool in particular, these tourist activities are focussed upon the Ribble Estuary which is the furthest part of the SPA/Ramsar site from Knowsley. With regard to visitors from Merseyside the southern part of the site (i.e. that largely contiguous with the Sefton Coast SAC) is of greater relevance.
- 8.18 As the southern part of the Ribble and Alt Estuary SPA/Ramsar largely falls within the same geographical area as Sefton Coast SAC, the recreational pressures described for Sefton Coast SAC (above) are largely applicable to this site. One key difference is that recreational pressures in the Ribble and Alt Estuary SPA/Ramsar related more to the bird interest and some species for which the site is designated (e.g. nesting terns) may be subject to different recreational disturbance in the fact that they use slightly different habitats than the SAC was designated for (i.e. sandflats and intertidal mudflats rather than coastal dunes). Furthermore since most of the interest of the SPA is in its wintering birds, the risk of recreational disturbance may be lower since there will be less recreational activity in winter. Natterjack toads however are qualifying Ramsar species, and would be more sensitive to disturbance during the spring/summer months when toadlets leave breeding ponds (the breeding ponds are generally fenced off/protected but toadlets leaving these ponds would be more subject to disturbance).
- 8.19 The nearest access point to the Sefton Coast (and thus the Ribble & Alt Estuaries SPA/Ramsar site) is located approximately 12.4km from the main urban areas of Knowsley if one follows transport routes. The urban areas of Knowsley are therefore well within the typical distance

people could be expected to travel to visit the coast for the day. It is therefore likely that Knowsley residents could represent a significant proportion of visitors to Ribble and Alt Estuaries SPA/Ramsar. It is therefore concluded that adverse effects may occur in combination with an ageing population (with more leisure time) across Merseyside and particularly within Sefton and Liverpool.

- 8.20 Policies contained within the Knowsley Core Strategy relate to a greater connectivity and accessibility from Knowsley to other Merseyside Boroughs as well as the delivery of over 7000 new dwellings. These policies include the provision of transport networks (CS7) and green infrastructure (CS8).
- 8.21 Policy CS8 'Green Infrastructure states that "*Working in partnership with other districts and relevant bodies, where appropriate, to minimise the impact of development upon Knowsley's existing biodiversity*" However, there is no specific reference to important nature conservation sites and limiting the potential for recreational pressures on these areas, whether inside or outside the borough boundary. The policy states that new development must be served by Green Infrastructure but the main focus of the policy seems to be upon "*providing access to high quality open space for leisure and recreational purposes*". However, detailed site allocations will be identified in the Site Allocations and Development Policies DPD, but some amendments to this policy are required and are discussed in the recommendations section.
- 8.22 It is worth noting that there is a significant pink-footed goose (*Anser brachyrhynchus*) roost on Simonswood Moss, which lies adjacent to the industrial area of Kirkby in the north-east of the borough of Knowsley⁶⁴. Pink footed geese are a qualifying feature of Martin Mere SPA and Ribble and Alt Estuaries SPA, and the population on Simonswood Moss is known to commute between this area and Martin Mere and Ormskirk. This roost has become more important in recent years and appears to be increasing in size with counts of up to 7000 birds. It is one of the larger regular roosts in the area and is used consistently throughout the winter period, with peak activity in December/January.
- 8.23 The presence of this roost will need to be taken into consideration when specific proposals for renewable energy are put forward for the Knowsley Industrial Park area. However, Policy CS23 Renewable and Low Carbon Infrastructure states that the Council will support such proposals provided that they "*do not cause significant harm ... to ... natural resources, biodiversity, geodiversity, water and air quality ...*" Since any such development will be dealt with in a Site Allocations and Development Policies DPD, it is considered that the wording in this policy, together with the requirement for an HRA on the Site Allocations and Development Policies DPD, provides sufficient protection to avoid adverse effects on European sites, and designated features of interest, through potential development of renewable and low carbon infrastructure.

Recommendation for amendments to policy

- 8.24 As a result of the assessment, we recommend the following amendments to policy.
- 8.25 Although policy CS8 (Green Infrastructure) does refer to "*sustaining and promoting biodiversity as one of the beneficial functions of Green Infrastructure and minimising the impact of development upon Knowsley's existing biodiversity and geological assets*". It does not acknowledge that the provision of Green Infrastructure within the borough, if linking to internationally important sites

⁶⁴ Baseline Survey Regarding Pink-Footed Goose, Kirkby to Orrell 132kV Wood Pole Overhead Line (TEP 2010)

outside the borough, has the potential to result in disturbance to designated features within Natura 2000 sites. In referring to the requirement of Green Infrastructure in new development, it makes no reference to biodiversity at all, focusing on leisure and recreation. Where the policy states *“Working in partnership with other districts and relevant bodies, where appropriate, to minimise the impact of development upon Knowsley’s existing biodiversity and geological assets”*, this wording should be amended to include reference to biodiversity in the surrounding area. Suggested wording is *“Working in partnership with other districts and relevant bodies, where appropriate, to minimise the impact of development upon Knowsley’s existing biodiversity and geological assets”, as well as sustaining the protection afforded to internationally important sites for biodiversity outside of the Borough.”* The supporting text could add the clarification that this should be *“by managing recreational impacts and encouraging the use of the wider green infrastructure network which is less sensitive to recreational pressure’*.

- 8.26 A further amendment to Policy CS8 is required in relation to the approach to green infrastructure and new development. Although it states *“New development must be served by Green Infrastructure to meet the needs of residents in a manner which will:provide access to high quality open spaces for leisure and recreational purposes.”*, the supporting text could add the clarification that this should *“not have a detrimental impact on important sites/species of nature conservation interest within the borough or the surrounding area, through increased disturbance.”*
- 8.27 For the Sefton Coast portion of the Ribble & Alt Estuaries SPA/Ramsar site, the most logical response Knowsley could make would be a Core Strategy commitment to assist in the future delivery of the requirements of the Sefton Coast Management Plan (specifically as it relates to recreation management) commensurate with the contribution of visitors to the site that arise from Knowsley. If this recommendation is implemented, it is concluded that there will be no adverse effect on the integrity of the Ribble & Alt Estuaries SPA through direct disturbance as a result of any of the policies proposed within the Core Strategy.
- 8.28 It is also recommended that the Core Strategy should include a clear statement that it will *‘not support schemes that will lead to adverse effects on internationally important wildlife sites, either alone or in combination with other projects and plans. Any scheme that would be likely to have a significant effect on a European site, either alone or in combination with other plans or projects, will be subject to an assessment under Part 6 of the Habitat Regulations at project application stage. If it cannot be ascertained that there would be no adverse effects on site integrity the project will have to be refused or pass the tests of Regulation 61 and 62, in which case any necessary compensatory measures will need to be secured in accordance with Regulation 66’*. This would be in line with the example provided on page 39 of the Natural England internal guidance on HRA.⁶⁵

Loss of Supporting Habitat

Appropriate Assessment

- 8.29 HRA Screening identified the potential for development arising from the Core Strategy to result in loss of supporting semi natural habitat. The loss of such supporting habitat may affect qualifying bird species e.g. wading birds can roost and seek shelter on former industrial land inland from the SPA. As mentioned above, there is an already known important high-tide roost for pink-footed

⁶⁵ Tyldesley D. 2009. The Habitats Regulations Assessment of Local Development Documents. Unpublished internal report for Natural England

geese at Simonswood Moss. Merseyside Environmental Advisory Service have also identified land parcel K004 in the Green Belt Study (to the east of Knowsley Industrial Estate, off Coopers lane, close to the boundary with West Lancashire) as being linked to the Ribble and Alt Estuaries SPA and Ramsar site, due to the presence of an internationally important population of Pink-Footed Geese. Parcel K004 is in close proximity to a broad location identified in the Core Strategy as a development location, it will therefore be essential when developing site allocations for the area that these roosts are taken into consideration.

Recommendations for amendment to policy

- 8.30 In view of the fact that there may be key areas of supporting habitat within the borough which have not been surveyed or identified, the potential for loss of supporting habitat as a result of the Core Strategy does remain. The following recommendations are therefore made.
- 8.31 In order to inform the development of the Site Allocations and Development Management DPD and subsequent Green Belt review it will be necessary to undertake an exercise to identify areas outside of the SPA/Ramsar designation that serve as important supporting habitat for qualifying bird species. The Site Allocations DPD should include appropriate mechanisms in place to ensure the loss of such sites is adequately assessed and mitigated as part of planning applications. If supporting habitat were to be lost to any development, then the applicant would need to determine (a) how significant it was i.e. whether it was used by more than 1% of the population of qualifying bird species and (b) to provide alternative habitat to replace it in a location that was approximately a similar distance from the Estuary.

Air quality

Appropriate Assessment

- 8.32 The only potential impacts on Ribble and Alt Estuaries pSPA/pRamsar through a deterioration in air quality resulting from policies contained within Knowsley Core Strategy would relate to an increase in visitors, hence increased traffic levels; or development of renewable energy technologies which would result in aerial emissions. However, no Energy from Waste facilities are proposed for Knowsley and the Joint Waste DPD has highlighted an over provision of consented EfW facilities and significant delivery issues surrounding further developments of this type, so this is not likely to be an issue. Ribble and Alt Estuaries pSPA/pRamsar does not lie within 200m of a major arterial route for traffic travelling from Knowsley to (or through) the site and therefore, increased road traffic is not considered an issue.
- 8.33 In combination effects on air quality through the expansion of Liverpool John Lennon airport are likely to be the greatest contributor to any increase in nitrogen or sulphur deposition. The site Relevant Critical Load for each bird for which the SPA was designated seems to indicate that they are not considered likely to be affected by high sulphur deposition. It should also be noted that APIS concludes the effects may be positive for most birds because nitrogen enrichment potentially means more prey species. The only SPA species for which nitrogen deposition is identified on APIS as being potentially negative are black-tailed godwit *Limosa limosa* and curlew *Numenius arquata* (if nitrogen deposition increases the sward height of their grassland foraging grounds). However, sward height is much more strongly influenced by other factors than atmospheric nitrogen deposition such as cut height & frequency and conventional fertilisation and development of the airport will require its own HRA at the project level so this issue would be

addressed at that time, and cannot be dealt with through policies within the Knowsley Core Strategy.

Water Quality Deterioration

Appropriate Assessment

- 8.34 Deterioration in water quality is a key environmental pressure being experienced in The Ribble and Alt Estuary SPA/Ramsar, namely through heavy metal pollution from industry and sediment disturbance, pollution via rivers from agricultural effluent, and pollution via rivers and drains by both treated sewerage and untreated runoff containing inorganic chemicals and organic compounds from everyday domestic products.
- 8.35 The wastewater treatment works at Fazakerley, which takes wastewater from Knowsley Business Park, discharges into Fazakerley Brook and ultimately into the River Alt and the Alt Estuary. Development in this area could therefore result in a deterioration of water quality in the Ribble and Alt Estuary SPA/Ramsar. Similarly, hydraulic connections were identified between the Ribble and Alt Estuary SPA/Ramsar and the Mersey Estuary. Chapter 5 provides an Appropriate Assessment of these identified pathways from the Knowsley Core Strategy to the Mersey Estuary. These potentially significant effects could be relevant on the Ribble and Alt SPA/Ramsar due to the hydraulic connections. These changes could arise from:
- waste water discharge (domestic and industrial) and surface water runoff.
- 8.36 It is worth considering at this point that the majority of water quality pressures being experienced by the SPA/Ramsar are likely to arise from the River Ribble and the River Alt as well as the River Mersey. However, as wastewater treatment works discharge into both rivers, in-combination contributions to the water quality of the Mersey should be considered and mitigated appropriately.

Recommendations for amendment to policy

- 8.37 The recommendations given in Chapter 5 for addressing water quality with regard to the Mersey Estuary SPA/Ramsar site would also serve for Mersey Narrows & North Wirral Foreshore pSPA/pRamsar site, regardless of whether the input of wastewater is from the Mersey or the River Alt.

Conclusion

- 8.38 The Appropriate Assessment has concluded that with the incorporation of the measures listed above, the Knowsley Core Strategy Preferred Options would include an adequate policy framework to enable the delivery of measures to avoid or adequately mitigate an adverse effect on the integrity of the Ribble & Alt Estuaries SPA/pRamsar site.

9 Liverpool Bay SPA

Introduction

9.1 The Liverpool Bay SPA site is an approximately 198,000ha maritime site located in the Irish Sea, straddling the English and Welsh borders. The site has exposed mudflats and sandbanks in places, although the site extends up to approximately 20km from the shoreline and thus most of the area of the SPA site is relatively shallow water up to 20m deep. It is contiguous with a number of other European sites, including the Ribble and Alt Estuaries SPA and Ramsar site, Mersey Narrows and North Wirral Foreshore pSPA and pRamsar site, and Mersey Estuary SPA and Ramsar site.

Reasons for Designation

9.2 Liverpool Bay SPA was designated from a pSPA to SPA in July 2010. Liverpool Bay has been identified by Natural England and Countryside Council for Wales as qualifying for SPA status under the following Stage 1 guidelines:

- Liverpool Bay regularly supports over 1% of the GB population of one species listed on Annex I of the EC Directive on the Conservation of Wild Birds (79/409/EEC): red-throated diver (*Gavia stellata*). The mean peak count of overwintering red-throated divers within the pSPA boundary over the period 2001/02 – 2005/06 was 922 individuals: or 5.4% of GB's total estimated overwintering population.
- Liverpool Bay regularly supports more than 1% of the biogeographical population of one regularly occurring migratory species: common scoter (*Melanitta nigra*). The mean peak overwintering common scoter population of 54,675 individuals between 2001/02 – 2005/06 is an estimated 58% of the GB population.
- The site also supports more than 20,000 waterbirds in the non-breeding season with a mean peak average over 2001/02 – 2005/06 of at least 55,597, with at least 80,346 in winter 2001/02.

9.3 In 2004, a study team of the Joint Nature Conservation Committee (JNCC) (referred to in citation as 'Webb et al.')

produced two reports on a potential Liverpool Bay SPA, the first on the recommendation for designation, and the second on boundary options. The report also mentions its potential qualification as a Ramsar site due to the large numbers of waterfowl supported (Criterion 5 regarding Article 2 of the Ramsar Convention).

9.4 Other species that might be judged for inclusion:

- great-crested grebe *Podiceps cristatus*,
- common eider *Somateria mollissima*,
- red-breasted merganser *Mergus serrator*, and
- little gull *Larus minutus* (Webb et al., 2004b);

Historic Trends and Current Pressures

- 9.5 With the proposed site encompassing approximately 198,000 hectares and a range of estuarine and maritime habitat, the Liverpool Bay SPA is subject to a wide range of pressures of varying spatial scope and human activity. Perhaps the most direct way to establish the proposed site's recent changes in health / ecological status is through the changing environmental pressures upon the Irish Sea.
- 9.6 The industrial revolution of the 19th century led to the Irish Sea being used to dispose liquid waste, including sewage and unwanted by-products of industrial processes (including mining, manufacturing, nuclear waste reprocessing and energy generation). This improved in the latter half of the 20th century, and sewage and other waste are no longer dumped offshore in an uncontrolled manner. While Liverpool Bay is hypernutrified, there is no evidence of harmful algal blooms or de-oxygenation of seawater (Environment Agency, pers. comm.).
- 9.7 Some of the main existing environmental pressures on the Irish Sea relevant to the nature conservation objectives of the Liverpool Bay SPA are:
- disturbance of sediment releasing legacy heavy metal pollution (lead, cadmium, arsenic and other poisons) that is bound into the sediment;
 - pollution via rivers and drains by both treated sewerage and untreated runoff containing inorganic chemicals and organic compounds from everyday domestic products, which '*may combine together in ways that make it difficult to predict their ultimate effect of the marine environment... Some may remain indefinitely in the seawater, the seabed, or the flesh, fat and oil of sea creatures*';
 - pollution via commercial shipping by chemical or noise pollution and the dumping of litter at sea;
 - damage of marine benthic habitat directly from fishing methods;
 - damage of marine benthic habitat directly or indirectly from aggregate extraction;
 - 'coastal squeeze' (a type of coastal habitat loss) from land reclamation and coastal flood defences and drainage used in order to farm or develop coastal land, and from erosion and sea level rise;
 - loss or damage of marine benthic habitat directly and indirectly (through changed sedimentation/deposition patterns) as a result of navigational dredging in order to accommodate large vessels – e.g. into the ports of Liverpool;
 - harm to wildlife (especially birds) or habitat loss due to increasing proposals/demand for offshore wind turbines; and
 - pollution, direct kills, litter or loss of habitat as a result of water-based recreation and related development along the foreshore.

Key Pressures from Knowsley

9.8 From the environmental requirements that have been identified above it can be determined that development in Knowsley could theoretically interfere with the environmental requirements and processes on the SPA in the following manner:

- water quality from one or more of the following pathways to the River Mersey: discharge of treated wastewater into the Mersey); untreated runoff containing inorganic and organic compounds, as well as wastewater discharge into the River Alt; and
- pollution, direct kills, litter, disturbance or loss of habitat as a result of water-based recreation or other recreation activity along the foreshore.

9.9 The Appropriate Assessment will therefore concentrate on evaluating whether these impacts are likely to occur and what amendments to policy may be required to avoid or minimise them. Local air quality issues arising from the Core Strategy are scoped out of consideration since the site is physically separated from Knowsley.

Role of other projects and plans

9.10 It is considered that the following additional plans and projects could act 'in combination' on the SPA/pRamsar:

Projects

- Gwynt Y Mor Offshore Windfarm Project - possible impacts on waterfowl flightpaths within Liverpool Bay;
- Liverpool John Lennon Airport - potential displacement of birds; deterioration in air quality and water quality due to increased air travel;
- Liverpool SuperPort – potential impacts due to increased sulphur deposition from shipping, physical disturbance of habitat, mobilisation of contamination, possible disturbance of waterfowl from noise and shipping activity;
- Energy from Waste Plants at Runcorn and Ince Marshes – possible air quality impacts through nitrogen and sulphur deposition. However, both of these schemes are consented such that they will introduce mitigation for their own air quality impacts. In practice therefore, no in combination effect should result and
- Mersey Gateway Port (Runcorn) – potential impacts on water quality from increase in commercial shipping; and potential loss or damage of marine benthic habitat directly and indirectly (through changed sedimentation/deposition patterns) as a result of navigational dredging in order to accommodate large vessels.

Plans

- Liverpool City Region Renewable Energy Capacity Study – possible impacts on waterfowl flightpaths between the Mersey Estuary and other European sites depending upon the degree of wind power involved and the location of turbines;

- North West England & North Wales Shoreline Management Plan 2 – possible impacts due to the maintenance or enhancement of flood defences could lead to coastal squeeze, changes in sediment release (if previously undefended areas become defended) and direct loss of habitat to flood defence footprint;
- Core Strategies for Flintshire, Denbighshire, Conwy, Wrexham, Liverpool, Cheshire West and Chester, Warrington, Cheshire East, Trafford, Halton, Sefton, Wirral and St Helens, the Mersey Heartlands Growth Point Programme of Delivery (Wirral and Liverpool) and Liverpool – possible water quality, air quality and wildfowl disturbance impacts as a result of delivery of over 110,000 dwellings and associated commercial development over the next 20 years.
- Joint Merseyside and Halton Joint Waste Development Plan Document – possible impacts due to water quality, air quality and wildfowl disturbance or chick predation. However, since this DPD is itself subject to a recent HRA it will address its own contribution to any ‘in combination’ effect that may otherwise arise; and
- Potential nuclear power development at Wylfa in Anglesey as set out in National Policy Statement for Nuclear Power Generation EN6. The Appraisal of Sustainability site report⁶⁶ has identified that significant strategic effects on Liverpool Bay SPA cannot be ruled out as a result of the high-level HRA undertaken for the NPS through some or all of the potential impacts on water resources and quality, habitat (and species) loss and fragmentation/ coastal squeeze, disturbance (noise, light and visual), and air quality.

Appropriate Assessment

Water Quality Deterioration

Appropriate Assessment

- 9.11 Liverpool Bay SPA extends over the Mouth of the Mersey and Alt Estuaries. It is therefore susceptible to changes in water quality within the Mersey Estuary arising from:
- waste water discharge (domestic and industrial) and surface water runoff.
- 9.12 Chapter 5 provides an Appropriate Assessment of these identified pathways from the Knowsley Core Strategy to the Mersey Estuary. These potentially significant effects could also be relevant to Liverpool Bay SPA due to the hydraulic connections.
- 9.13 The Natural England Draft Conservation Objectives and Advice on Operation⁶⁷ provide more detail on the risk that the pollutants pose to the qualifying features of interest at the Liverpool Bay SPA.
- 9.14 With respect to waste water discharge, non-toxic contamination through nutrient loading, organic loading and changes to the thermal regime could impact on prey species and distribution. The sensitivity of the prey species of both red-throated diver and common scoter to non-toxic contamination is considered moderate. As benthic feeders, common scoter are closely associated with the availability and condition of their shallow sandbank habitat. As such they are

⁶⁶ Appraisal of Sustainability: site report for Wylfa, October 2010

⁶⁷ Natural England and Countryside Council for Wales (September 2009) *Liverpool Bay / Bae Lerpwl pSPA Conservation Objectives from Natural England and CCW, September 2009* http://www.naturalengland.org.uk/Images/LivBay-consobj_tcm6-15189.pdf

considered highly sensitive to its physical loss and smothering and any adverse impact on benthic communities.

- 9.15 PCBs are toxic persistent organic pollutants used in industry as dielectric fluids for transformers, capacitors, and coolants. They can bioaccumulate in the sublittoral prey species of the common scoter and bioaccumulate/ biomagnify in the fish species of the red-throated diver. If marine pollution were to occur there is the potential for exposure to PCBs to change. Hotspots of PCBs include industrial estuaries and sandy environments offshore, but as PCBs are currently banned, exposure can be considered low. However disturbance of sediments through shipping, dock/port expansion and navigational dredging may release such hotspots of PCBs, however none of these activities are covered by the Knowsley Core Strategy.

Recommendations for amendment to policy

- 9.16 The recommendations given in Chapter 5 for addressing water quality related impacts with regard to the Mersey Estuary SPA/Ramsar site would also serve for Liverpool Bay SPA.

Recreational Activities

Appropriate Assessment

- 9.17 Recreational disturbance arising from fishing, boating, visual impacts and noise are highlighted as pressures on the qualifying features of Liverpool Bay SPA⁶⁸. North Wirral Foreshore SPA/pRamsar, Sefton Coast SAC and Ribble and Alt Estuaries SPA Ramsar are all subject to recreational pressure, and due to their close proximity to Liverpool Bay SPA, these same pressures are likely to be relevant. Red-throated diver winter inshore in water 0-20m deep (having one of their key concentrations off the north Wirral foreshore) and as such is likely to be particularly exposed to the impacts of water-borne recreation which largely takes place close to the shore.
- 9.18 Most of Liverpool Bay SPA is sufficiently far from the coast that coastal water-borne recreation (e.g. windsurfing, personal watercraft, water-skiing etc.) will constitute a small source of disturbance in comparison to conventional shipping. However, there is a margin of the site which abuts and is integrally linked with the North Wirral Foreshore and the Sefton Coast. As such, water-borne recreation around either coast will potentially affect not only the interest features of the Mersey Narrows & North Wirral Foreshore pSPA/pRamsar site and Ribble & Alt Estuaries SPA/Ramsar site but also Liverpool Bay SPA.

Renewable Energy

Appropriate Assessment

- 9.19 The Core Strategy promotes sustainable, renewable and low carbon energy within Knowsley (Policies CS22 and CS23). Although the policy does not specify which technologies are likely to be developed, Knowsley Business and Industrial Parks are identified as a "Priority Zone" for the development of renewable and low carbon infrastructure. If this were to include wind turbine construction, a pathway exists for the construction of onshore turbines to disrupt flight paths and displace qualifying bird species. In-combination with other windfarm projects in the Merseyside

⁶⁸ Natural England and Countryside Council for Wales (September 2009) *Liverpool Bay / Bae Lerpwl pSPA Conservation Objectives from Natural England and CCW, September 2009* http://www.naturalengland.org.uk/Images/LivBay-consobj_tcm6-15189.pdf

area and Liverpool Bay, there is the potential for displacement/impacts on qualifying bird species. However, as Policy CS23 states that the Council will support such proposals provided that they “do not cause significant harm ... to... natural resources, biodiversity, geodiversity, water and air quality” and as any such development will be dealt with in a Site Allocations and Development Policies DPD, it is considered that the wording in this policy, together with the requirement for an HRA on the Site Allocations and Development Policies DPD, provides sufficient protection to avoid adverse effects on European sites, and designated features of interest, through potential development of renewable and low carbon infrastructure.

Conclusion

- 9.20 The Appropriate Assessment has concluded that with the incorporation of the measures listed above, the Knowsley Core Strategy Preferred Options would include an adequate policy framework to enable the delivery of measures to avoid or adequately mitigate an adverse effect on the integrity of Liverpool Bay SPA.

10 The Dee Estuary SAC, SPA & Ramsar site, pSPA Extension

- 10.1 The Dee Estuary SPA, Ramsar and SAC is located approximately 18km south-west of Knowsley Borough. An extension to the Dee Estuary forms a proposed SPA⁶⁹. The Dee is a large funnel-shaped sheltered estuary and is one of the top five estuaries in the UK for wintering and passage waterfowl populations. The Dee Estuary site covers over 13,000ha and is the largest macro-tidal coastal plain Estuary between the larger Severn Estuary and the Solway Firth. The Dee Estuary is hyper-tidal with a mean spring tidal range of 7.7m at the mouth. The site has extensive areas of intertidal sand-flats, mud-flats and saltmarsh. In areas where agricultural use has not occurred, the saltmarshes grade into transitional brackish and swamp vegetation on the upper shore. The site also supports three sandstone islands (the Hilbre islands) which have important cliff vegetation and maritime heathland and grassland. The two sides of the Estuary show a marked difference between the industrialised usage of the Welsh coastal belt and the residential and recreational English side.
- 10.2 The Dee Estuary supports internationally important numbers of waterfowl and waders. The estuary is an accreting system and the extent of saltmarsh continues to expand as the estuary seeks to achieve a new equilibrium situation following large-scale historical land-claim at the head of the estuary which commenced in the 1730s. Nevertheless, the estuary still supports extensive areas of intertidal sand and mudflats as well as saltmarsh. Where land-claim has not occurred, the saltmarshes grade into transitional brackish and freshwater swamp vegetation, on the upper shore. The site includes the three sandstone islands of Hilbre with their important cliff vegetation and maritime heathland/grassland. The site also includes an assemblage of nationally scarce plants and the sandhill rustic moth *Luperina nickerlii gueneei*, a British Red Data Book species. The two shorelines of the estuary show a marked contrast between the industrialised usage of the coastal belt in Wales and residential and recreational usage in England.

Reasons for Designation

- 10.3 The Dee Estuary qualifies as an SAC for both habitats and species. Firstly, the site contains the following Habitats Directive Annex I habitats:
- Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitriche-Batrachion* vegetation;
 - Mudflats and sandflats not covered by seawater at low tide;
 - *Salicornia* and other annuals colonising mud and sand - The Dee Estuary is representative of pioneer glasswort *Salicornia spp.* saltmarsh in the north-west of the UK. *Salicornia spp.* saltmarsh forms extensive stands in the Dee, especially on the more sandy muds where there is reduced tidal scour. It mainly occurs on the seaward fringes as a pioneer community, and moving landwards usually forms a transition to common saltmarsh-grass *Puccinellia maritima* saltmarsh (SM10). There is also a low frequency of *Salicornia spp.* extending well inland.

⁶⁹ Barbara McCarthy, Natural England (2009), *Pers. comms*, Telephone call 5th June 2009

Associated species often include annual sea-blite *Suaeda maritima* and hybrid scurvy grass *Cochlearia x hollandica*.

- Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) - The Dee Estuary is representative of H1330 Atlantic salt meadows in the north-west of the UK. It forms the most extensive type of saltmarsh in the Dee, and since the 1980s it has probably displaced very large quantities of the non-native common cord-grass *Spartina anglica*. The high accretion rates found in the estuary are likely to favour further development of this type of vegetation. The saltmarsh is regularly inundated by the sea; characteristic salt-tolerant perennial flowering plant species include common saltmarsh-grass *Puccinellia maritima*, sea aster *Aster tripolium*, and sea arrowgrass *Triglochin maritima*. In a few areas there are unusual transitions to wet woodland habitats.

10.4 Secondly, the site contains the following Habitats Directive Annex II habitats and species:

- Estuaries
- Annual vegetation of drift lines
- Vegetated sea cliffs of the Atlantic and Baltic coasts
- Embryonic shifting dunes
- Shifting dunes along the shoreline with *Ammophila arenaria* (`white dunes`)
- Fixed dunes with herbaceous vegetation (`grey dunes`)
- Humid dune slacks
- Sea lamprey *Petromyzon marinus*
- River lamprey *Lampetra fluviatilis*
- Petalwort *Petalophyllum ralfsii*

10.5 The Dee Estuary also qualifies as a SPA supporting:

During the breeding season:

- Common Tern *Sterna hirundo*, 277 pairs representing at least 2.3% of the breeding population in Great Britain (5 year mean 1991-95)
- Little Tern *Sterna albifrons*, 56 pairs representing at least 2.3% of the breeding population in Great Britain (RSPB, 5 year mean 1991-95)

On passage:

- Sandwich Tern *Sterna sandvicensis*, 818 individuals representing at least 5.8% of the population in Great Britain (5 year mean 1991-95)
- Redshank *Tringa totanus*, 8,451 individuals representing at least 4.8% of the Eastern Atlantic - wintering population (5 year peak mean 1991/2 - 1995/6)

Over winter:

- Bar-tailed Godwit *Limosa lapponica*, 1,013 individuals representing at least 1.9% of the wintering population in Great Britain (5 year peak mean 1991/2 - 1995/6).

10.6 The site also qualifies under Article 4.2 of the Directive (79/409/EEC) by supporting populations of European importance of the following migratory species:

- Black-tailed Godwit *Limosa limosa islandica*, 1,739 individuals representing at least 2.5% of the wintering Iceland - breeding population (5 year peak mean 1991/2 - 1995/6)
- Curlew *Numenius arquata*, 4,028 individuals representing at least 1.2% of the wintering Europe - breeding population (5 year peak mean 1991/2 - 1995/6)
- Dunlin *Calidris alpina alpina*, 22,479 individuals representing at least 1.6% of the wintering Northern Siberia/Europe/Western Africa population (5 year peak mean 1991/2 - 1995/6)
- Grey Plover *Pluvialis squatarola*, 2,193 individuals representing at least 1.5% of the wintering Eastern Atlantic - wintering population (5 year peak mean 1991/2 - 1995/6)
- Knot *Calidris canutus*, 21,553 individuals representing at least 6.2% of the wintering Northeastern Canada/Greenland/Iceland/Northwestern Europe population (5 year peak mean 1991/2 - 1995/6)
- Oystercatcher *Haematopus ostralegus*, 28,434 individuals representing at least 3.2% of the wintering Europe & Northern/Western Africa population (5 year peak mean 1991/2 - 1995/6)
- Pintail *Anas acuta*, 6,498 individuals representing at least 10.8% of the wintering Northwestern Europe population (5 year peak mean 1991/2 - 1995/6)
- Redshank *Tringa totanus*, 6,382 individuals representing at least 4.3% of the wintering Eastern Atlantic - wintering population (5 year peak mean 1991/2 - 1995/6)
- Shelduck *Tadorna tadorna*, 6,827 individuals representing at least 2.3% of the wintering Northwestern Europe population (5 year peak mean 1991/2 - 1995/6)
- Teal *Anas crecca*, 5,918 individuals representing at least 1.5% of the wintering Northwestern Europe population (5 year peak mean 1991/2 - 1995/6)

10.7 The Dee Estuary is also designated as an SPA for regularly supporting 130,408 individual waterfowl (5 year peak mean 1991/2 - 1995/6)⁷⁰.

10.8 In addition to the SPA designation the Dee Estuary is also designated as a Ramsar site by meeting Ramsar criteria 1, 5 and 6 as follows:

- Extensive intertidal mud and sand flats (20 km by 9 km) with large expanses of saltmarsh towards the head of the estuary.
- Supporting an overall bird assemblage of international importance; and
- Supporting the following species at levels of international importance: shelduck, oystercatcher, curlew, redshank, teal, pintail, grey plover, red knot, dunlin, bar-tailed godwit, black-tailed godwit and turnstone

⁷⁰ The Ramsar citation sheet identifies the waterfowl population as 74,230 using slightly more recent data (5 year peak mean 1998/99-2002/2003). However, this is still more than the 20,000 needed for consideration as being internationally important.

10.9 The historic trends and current pressures on the site are summarised below.

Historic Trends and Current Pressures

10.10 The majority of the site is in the ownership and sympathetic management of public bodies and voluntary conservation organisations. Unlike most western estuaries, sizeable areas of saltmarsh in the Dee remain ungrazed and therefore plant species that are susceptible to grazing are widespread. This distinctive flora would therefore be sensitive to an increase in grazing pressure. The intertidal and subtidal habitats of the estuary are broadly subject to natural successional change, although shellfisheries and dredging are a current concern. Threats to the estuary's conservation come from its industrialised shorelines on the Welsh side and the impact of adjacent historic industrial use. These include land contamination from chemical and steel manufacture and localised water quality problems. Remediation works are being undertaken. Contemporary issues relate to dock development and navigational dredging, coastal defence works and their impact on coastal process, regulation of shellfisheries, and the recreational use of sand dunes and saltmarshes.

10.11 The environmental pressures upon the Dee Estuary SAC, SPA & Ramsar site are mainly:

- overgrazing of ungrazed/little grazed saltmarsh;
- certain recreational activities in sensitive areas at sensitive times such as shellfishing (in terms of loss of material from the food chain) and dog walking (in terms of disturbance of waterfowl);
- water quality threats from ex-industrial usage and agriculture;
- physical loss and alteration of coastal processes due to navigational dredging;
- 'coastal squeeze' from land reclamation and coastal flood defences and drainage used in order to develop coastal land, and from sea level rise;
- introduction of non-native species; and
- risk of excessive abstraction resulting in a decrease in freshwater flows into the estuary, reducing drinking and bathing habitat for birds and increasing the salinity in localised areas.

Key potential pressures from Knowsley

10.12 From the environmental requirements that have been identified above it can be determined that development in Knowsley could theoretically interfere with the environmental requirements and processes on the SAC/SPA/Ramsar Site in the following manner:

- Damaging levels of abstraction to supply housing in Knowsley when considered in combination with development elsewhere in United Utilities Integrated Resource Zone and development outside the zone that will receive water from the same sources (e.g. abstraction from the River Dee in relation to development in North Wales).
- Increased recreational pressure when considered 'in combination' with the additional dwellings to be delivered throughout Cheshire, Merseyside and North Wales over the same time period, coupled with possible disturbance due to Liverpool Airport and the Peel 'SuperPort' projects.

- 10.13 The Appropriate Assessment will therefore concentrate on evaluating whether these impacts are likely to occur and what amendments to policy may be required to avoid or minimise them.

Appropriate Assessment

Disturbance

Appropriate Assessment

- 10.14 The Dee Estuary is located approximately 41.5km from Knowsley borough boundary (distance measured by roads). The England Leisure Day Visits surveys indicate that respondents typically travelled 25.5km to visit the coast (not including 'seaside') for the day. It is therefore concluded that residents of Knowsley are more likely to visit closer estuaries so there are no policies within the Knowsley Core Strategy Preferred Options that are likely to lead to significant effects on the Dee Estuary SPA/Ramsar/SAC as a result of recreational pressure.
- 10.15 It is conceivable that an increase in flights from Liverpool John Lennon Airport may result in 'in-combination' effects from increased disturbance of SPA waterfowl (both from aircraft noise and lighting) given that aircraft taking off from the airport routinely cross the Dee Estuary as well as the Mersey. However expansion of the airport does not form part of any policies within Knowsley Core Strategy and this issue would be dealt with under the relevant Core Strategy and/or project level HRA. It is therefore considered that no amendments are required to policies within the Knowsley Core Strategy to avoid significant impacts on the Dee Estuary through disturbance issues.

Water quality

Appropriate Assessment

- 10.16 The Dee Estuary SAC designation covers not only the actual Dee Estuary but also overlaps with the North Wirral Foreshore section of Mersey Narrows and North Wirral Foreshore pSPA/pRamsar site. There are therefore similar possible water quality impacts on the SAC as there are on the Mersey Narrows and North Wirral Foreshore pSPA/pRamsar site (see Chapter 6). It is therefore possible that any changes in water quality could affect SAC qualifying features. It should be noted, however that any deterioration in water quality arising from Knowsley Core Strategy, particularly when considered in combination with the Halton and Wirral Core Strategies within Merseyside, as well as the Warrington and Cheshire West & Chester Core Strategies in Cheshire would be minimal.

Recommendations for amendment to policy

- 10.17 The recommendations given in Chapter 5 for addressing water quality with regard to the Mersey Estuary SPA/Ramsar site would also serve for Dee Estuary SAC/SPA/pRamsar site.

Water resources

Appropriate Assessment

- 10.18 The adopted United Utilities Water Resource Management Plan (September 2009) indicates that the water available for use in the Integrated Resource Zone is expected to reduce by 24.8 Ml/d

between 2009/10 and 2014/15. Without water efficiency measures or new resources the initial supply demand balance for the Integrated Resource Zone is calculated to be in deficit by 8 MI/day by 2024/25.

10.19 However, from reading the Water Resource Management Plan it does appear that abstraction from the Dee or any other European sites beyond the current licensed volumes is not part of United Utilities' intended future supply strategy⁷¹, which rather depends on a mixture of demand management and increased abstraction from groundwater as follows:

- Construction of a bi-directional pipeline, known as the "West-to-East Link", between Merseyside and North Manchester. It is due to be in operation by 2012. This will help United Utilities maintain adequate supplies to Greater Manchester and Merseyside if there is a need to temporarily reduce supply from a major reservoir, for example due to maintenance work or drought conditions;
- Maintain current leakage levels;
- Help customers save 9 MI/d by 2014/15 (increasing later on to 12 MI/d), through a base service water efficiency programme;
- Achieve a water demand reduction of 10 MI/d in a dry year by 2014/15 (increasing to 22 MI/d by 2034/35) as a result of the expected scale of voluntary metering of households; and
- Non-household customers in the Integrated Zone are expected to reduce water demand by 87 MI/d by 2014/15 (141 MI/d by 2034/35) due to the effects of the economic downturn and as part of their continuing water efficiency programmes.

10.20 United Utilities enhanced plans identified as part of their economic programme to maintain adequate supply-demand balances are:

- Further reducing leakage by 23 MI/d by 2034/35;
- A programme of economic water efficiency measures to save 4 MI/d by 2034/35; and
- Implementing water source enhancements of 48 MI/d by 2034/35⁷².

Conclusion

10.21 It is concluded that since no increased abstraction from European sites will be required in order to service new development in Knowsley (or elsewhere within the Integrated Supply Zone) that significant effects on the Dee Estuary SAC, SPA or Ramsar site can be screened out as unlikely. Risk of abstraction at inappropriate times of the year (such as periods of low flow) will be prevented by the Environment Agency's licensing regime and Review of Consents process.

⁷¹ Mark Smith of United Utilities North & Central Area Water Asset Management Team confirmed in a personal communication on 27/07/09 that abstraction from the Dee will not exceed the current licensed volume. The current licensed volume was subject to the Environment Agency's Review of Consents process and no reductions were considered necessary. It can therefore be concluded that no adverse effects on the integrity of the River Dee (either alone or 'in combination') will result from the United Utilities abstraction

⁷² Widnes groundwater (22.7 MI/d), Southport groundwater (22.5 MI/d) and Oldham groundwater (2.5 MI/d)

- 10.22 It is also concluded that, since Knowsley is located sufficiently far from the Dee Estuary that any change in either the size of its population or demographic makeup is unlikely to lead to a significant effect on the Dee Estuary SAC/SPA/Ramsar site as a result of recreational pressure, as only a small proportion of Knowsley residents may visit the Dee Estuary on occasion, their contribution, when considered within the context of the other authorities that lie closer to the Estuary, is likely to be effectively inconsequential.

11 Manchester Mosses SAC

Introduction

- 11.1 Figure 3 shows the location of Manchester Mosses SAC, located approximately 16km from Knowsley Borough's eastern boundary at its closest point.
- 11.2 Manchester Mosses SAC comprises Astley and Bedford Mosses, Holcroft Moss and Risley Moss, totalling approximately 173ha. The site is significant for mossland that '*formerly covered a very large part of low-lying Greater Manchester, Merseyside and southern Lancashire, and provided a severe obstacle to industrial and agricultural expansion*'. These sites are examples that have survived as degraded raised bog on the Mersey floodplain, with their surfaces elevated above surrounding land due to shrinkage of the surrounding tilled land, and '*all except Holcroft Moss have been cut for peat at some time in the past*'.

Reasons for Designation

- 11.3 Manchester Mosses SAC is designated for its Habitats Directive Annex I habitat of '*degraded raised bogs still capable of natural regeneration*' (EC, 1992).

Historic Trends and Current Pressures

- 11.4 As discussed above, the Manchester Mosses SAC is a direct result of historical loss of mossland (i.e. bog) habitat due to drainage for agriculture and built development. Mossland is reported to have been a significant obstacle to industrialisation of the area around Manchester, and its drainage and landfilling was intensified during the 19th and 20th centuries. However, recent rehabilitation management over the past 15-20 years has increased peat-producing *Sphagnum* species.
- 11.5 Laxen and Wilson (2002) suggests that NO₂ emissions from motorways essentially reach background levels within 200m of the roadside. Air pollution at many European sites is already believed to be having an adverse effect. Tables 5 and 6 show the degree to which Manchester Mosses SAC is affected by atmospheric nitrogen deposition (data downloaded from APIS on 28/04/10).

Table 5: Atmospheric nitrogen deposition compared with critical load at Holcroft Moss*

Site	Grid reference	Habitat	Minimum critical Load / Kg N/ha/year	Nitrogen Deposition/ Kg N/ha/ year	Exceedance	Is atmospheric nitrogen deposition currently a problem?
Manchester Mosses SAC (Holcroft Moss)	SJ683928	Raised and blanket bogs	5	23.5	Current deposition is more than four times the minimum critical load.	Yes

Source: Based on information provided by the UK Air Pollution Information System (www.apis.ac.uk). Data downloaded from APIS on 28/04/10

* the closest part of Manchester Mosses SAC to the M62

Table 6: Atmospheric sulphur dioxide concentrations compared with critical load at Holcroft Moss

Site	Grid reference	Habitat	Critical Level / $\mu\text{g}/\text{m}^3$	SO ₂ Concentration / $\mu\text{g}/\text{m}^3$	Exceedance	Is sulphur dioxide currently a problem?
Manchester Mosses SAC (Holcroft Moss)	SJ683928	Raised and blanket bogs	20	0.8	Current concentration is 25% of the critical level.	No

Source: Based on information provided by the UK Air Pollution Information System (www.apis.ac.uk). Data downloaded from APIS on 28/04/10

11.6 Nevertheless, it is clear from Table 6 that nitrogen deposition is already a problem within Manchester Mosses SAC and it is not unreasonable to attribute this to the proximity of Holcroft Moss to the M62. Indeed, Environment Agency modelling data used for the Manchester Mosses SAC Review of Consents suggest that 40% of the nitrogen deposited on this site arises from road transport. In contrast, the site is not suffering from sulphur dioxide deposition, presumably because road traffic contributes very little to atmospheric concentrations of sulphur dioxide.

11.7 The environmental pressures upon the mossland habitat for which this site is designated are mainly:

- atmospheric nitrogen deposition from road traffic;
- increased agricultural drainage in the surrounding land, which causes the habitat to dry out and begin succession towards scrubland and woodland (including drainage of peat that gradually increases a downward gradient away from the mosslands);
- changes to the maintenance regime of nearby agricultural drainage, which can cause either drying out through unsympathetic dredging, or waterlogging through complete lack of dredging;
- increased water abstraction for irrigation, which can contribute towards the drying out of mossland habitat through reduced flows and/or a lowered water table;
- afforestation as a result of natural succession;
- fly-tipping;
- loss of neighbouring mossland habitat as a result of agricultural drainage or drainage and landfill for development;
- loss of neighbouring peat and mossland habitat as a result of peat harvesting, both legally and illegally;
- damage to mossland habitat due to increased recreational pressure (e.g. paintball); and
- loss of *Sphagnum* species as a result of drying out and increased air pollution.

Key potential pressures from Knowsley

- 11.8 From the environmental requirements that have been identified above it can be determined that development in Knowsley could theoretically interfere with the environmental requirements and processes on the SAC in the following manner:
- Cumulative 'in combination' deterioration in local air quality (when considered alongside other authorities alongside the M62 that will be delivering new housing over the same period); and thus increased nitrogen deposition since the M62 is one of the major routes between eastern Merseyside (north of the river) and Greater Manchester.
- 11.9 The Appropriate Assessment will therefore concentrate on evaluating whether these impacts are likely to occur and what amendments to policy may be required to avoid or minimise them.

Appropriate Assessment

- 11.10 Parts of the Borough of Knowsley lie between Junctions 5 and 7 of the M62, which is approximately 18km west of Manchester Mosses SAC. It is possible that development in Knowsley (e.g. commercial development (CS4), new housing (CS3) and transport networks (CS7) has the potential to result in an increase in vehicle movements using the M62, and therefore contribute to an increase in atmospheric nitrogen deposition into the SAC given the importance of the M62 as a route between Merseyside and Greater Manchester. It would be more appropriate to consider these likely significant effects as an 'in combination effect' with other plans and projects that may contribute to greater vehicle traffic on the M62.
- 11.11 Under Core Strategy plans as they stand (2011), approximately 80,460 new dwellings and at least 1,440 ha of commercial development will be delivered across the Merseyside area over the next 20 years (including the 7,000 dwellings to be delivered in Knowsley). Given the key role of the M62 as one of the major entry/exit routes to Merseyside from the Midlands and the North, it is reasonable to assume that a significant cumulative 'in combination' air quality effect as a result of the cumulative increase in vehicle emissions is not unlikely.
- 11.12 There are several policies which would serve to protect the SAC either directly or through promoting and delivering sustainable travel and development:
- The spatial strategy for Knowsley has a strong focus on development in urban areas and selects six principal regeneration areas;
 - Ensuring all development is well connected and achieves high levels of accessibility including satisfactory access by bus, rail, walking and cycling;
 - Requiring the production of Travel Plans and Transport Assessments, in association with major new developments and in accordance with national guidance;
 - Adopting parking standards to deter use of the private car;
 - To support sustainable transport across the Borough, improvements to the existing network and the introduction of new sustainable routes and facilities will be encouraged including, walking, cycling and public transport;
 - Park and ride facilities in appropriate locations; and

- Developing green infrastructure.

11.13 Based on this information it is concluded that the Knowsley Core Strategy Preferred Options does provide a system of measures to minimise the contribution to any increase in nitrogen deposition within Manchester Mosses SAC.

Conclusion

11.14 The provision of these policies demonstrates that the Core Strategy does already include proportionate measures to minimise its contribution to vehicle movements on the M62 and therefore contains an adequate policy framework to enable Knowsley to reduce its atmospheric nitrogen deposition on Manchester Mosses SAC through development of the Core Strategy to a level that is effectively inconsequential.

12 River Dee and Bala Lake SAC

Reasons for Designation

12.1 The River Dee and Bala Lake qualifies as an SAC for both habitats and species. Firstly, the site contains the following Habitats Directive Annex I habitats:

- Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation

12.2 Secondly, the site contains the following Habitats Directive Annex II species:

- Atlantic salmon *Salmo salar*
- Floating water-plantain *Luronium natans*
- Sea lamprey *Petromyzon marinus*
- Brook lamprey *Lampetra planeri*
- River lamprey *Lampetra fluviatilis*
- Bullhead *Cottus gobio*
- Otter *Lutra lutra*

12.3 The historic trends and current pressures on the site are summarised below.

Historic Trends and Current Pressures

12.4 The habitats and species for which the site is designated are dependent on the maintenance of good water quality and suitable flow conditions. Fish species require suitable in-stream habitat and an unobstructed migration route. Otters also require suitable terrestrial habitat to provide cover and adequate populations of prey species. The site and its features have been historically threatened by practices which had an adverse effect on the quality, quantity and pattern of water flows, such as inappropriate flow regulation, excessive abstraction, deteriorating water quality from direct and diffuse pollution, eutrophication and siltation. Degradation of riparian habitats due to engineering works, agricultural practices and invasive plant species have also had localised adverse effects in the past. The Atlantic salmon population has been threatened by excessive exploitation by high sea, estuarine and recreational fisheries. Introduction of non-indigenous species has also been a risk to both fish and plant species.

12.5 The environmental pressures upon the River Dee & Bala Lake SAC are mainly:

- Deterioration in water quality and changes in flow rates due to ex-industrial runoff, discharge of treated sewage effluent (which contains elevated nitrates) and agricultural runoff;
- Risk of excessive abstraction resulting in a decrease in freshwater flows and an increase in sediment loading of water such that dehydration of interest features may occur (refer to the Environment Agency Review Consents for this site);

- Overfishing of Atlantic salmon; and
- Introduction of invasive species.

Key potential pressures from Knowsley

- 12.6 From the environmental requirements that have been identified above it can be determined that development in Knowsley could theoretically interfere with the environmental requirements and processes on the SAC in the following manner:
- Damaging levels of abstraction to supply housing in Knowsley when considered in combination with development elsewhere in United Utilities Integrated Resource Zone and development outside the zone that will receive water from the same sources (e.g. abstraction from the River Dee in relation to development in North Wales).
- 12.7 The HRA will therefore concentrate on evaluating whether these impacts are likely to occur and what amendments to policy may be required to avoid or minimise them.

Likely Significant Effects of the Core Strategy (in combination)

- 12.8 Due to the integrated nature of water supply across Greater Manchester and Merseyside it is not possible or necessary to consider the impacts of the Knowsley Core Strategy in isolation since the situation does not arise; all impacts will be 'in combination'. These are described in the table below, against each potential impact.

Aspect of the Core Strategy	Water resource issues
<p>Delivery of 7,650 new dwellings across Knowsley (2010-2027)</p> <p>Economic development – 216.5 hectares of land will be made available (2010-2027) from a variety of sources for employment purposes (Policy CS4), and existing economic development enhanced. Development focus within 'Principal Regeneration Areas' (CS9-CS14)</p>	<p>The adopted United Utilities Water Resource Management Plan (September 2009) indicates that the water available for use in the Integrated Resource Zone is expected to reduce by 24.8 MI/d between 2009/10 and 2014/15. Without water efficiency measures or new resources the initial supply demand balance for the Integrated Resource Zone is calculated to be in deficit by 8 MI/day by 2024/25.</p> <p>However, from reading the Water Resource Management Plan it does appear that abstraction from the Dee or any other European sites beyond the current licensed volumes is not part of United Utilities' intended future supply strategy⁷³, which rather depends on a mixture of demand management and increased abstraction from groundwater as follows:</p> <ol style="list-style-type: none"> 1. Construction of a bi-directional pipeline, known as the "West-to-East Link", between Merseyside and North Manchester. It is due to be in operation by 2012. This

⁷³ Mark Smith of United Utilities North & Central Area Water Asset Management Team confirmed in a personal communication on 27/07/09 that abstraction from the Dee will not exceed the current licensed volume. The current licensed volume was subject to the Environment Agency's Review of Consents process and no reductions were considered necessary. It can therefore be concluded that no adverse effects on the River Dee (either alone or 'in combination') will result from the United Utilities abstraction.

Aspect of the Core Strategy

Water resource issues

will help United Utilities maintain adequate supplies to Greater Manchester and Merseyside if there is a need to temporarily reduce supply from a major reservoir, for example due to maintenance work or drought conditions.

2. Maintain current leakage levels.
3. Help customers save 9 MI/d by 2014/15 (increasing later on to 12 MI/d), through a base service water efficiency programme.
4. Achieve a water demand reduction of 10 MI/d in a dry year by 2014/15 (increasing to 22 MI/d by 2034/35) as a result of the expected scale of voluntary metering of households.
5. Non-household customers in the Integrated Zone are expected to reduce water demand by 87 MI/d by 2014/15 (141 MI/d by 2034/35) due to the effects of the economic downturn and as part of their continuing water efficiency programmes.

United Utilities enhanced plans identified as part of their economic programme to maintain adequate supply-demand balances are:

1. Further reducing leakage by 23 MI/d by 2034/35.
2. A programme of economic water efficiency measures to save 4 MI/d by 2034/35.
3. Implementing water source enhancements of 48 MI/d by 2034/35⁷⁴

Conclusion

- 12.9 It is concluded that since no increased abstraction from European sites will be required in order to service new development in Knowsley (or elsewhere within the Integrated Supply Zone) that significant effects on the River Dee & Bala Lake SAC can be screened out as unlikely. Risk of abstraction at inappropriate times of the year (such as periods of low flow) will be prevented by the Environment Agency's licensing regime and Review of Consents process.

⁷⁴ Widnes groundwater (22.7 MI/d), Southport groundwater (22.5 MI/d) and Oldham groundwater (2.5 MI/d)

13 River Eden SAC

Reasons for Designation

13.1 The River Eden in the Lake District qualifies as an SAC for both habitats and species. Firstly, the site contains the following Habitats Directive Annex I habitats:

- Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or of the *Isoëto-Nanojuncetea*
- Watercourses of plain to montane levels with the *Ranunculion fluitantis* and *Callitriche-Batrachion* vegetation
- Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae)

13.2 Secondly, the site contains the following Habitats Directive Annex II species:

- White-clawed crayfish *Austropotamobius pallipes*
- Sea lamprey *Petromyzon marinus*
- Brook lamprey *Lampetra planeri*
- River lamprey *Lampetra fluviatilis*
- Atlantic salmon *Salmo salar*
- Bullhead *Cottus gobio*
- Otter *Lutra lutra*

13.3 The historic trends and current pressures on the site are summarised below.

Historic Trends and Current Pressures

13.4 The maintenance of breeding and nursery areas for the species on this site depends on the habitat quality of streams and their margins. Many of the streams within the site suffer from overgrazing of riverbanks and nutrient run-off. This is being addressed by a number of measures, including a conservation strategy with actions to address river quality issues, and a partnership approach to funding habitat improvements. The water-crowfoot communities as well as the species are sensitive to water quality, particularly eutrophication.

13.5 Practices associated with sheep-dipping pose a potential threat at this site, and are currently under investigation. Much of the alluvial forest cover is fragmented and/or in poor condition. It is hoped to address this through management agreements or Woodland Grant Schemes with individual owners.

13.6 The habitats and species for which the site is designated are dependent on the maintenance of good water quality and suitable flow conditions. Fish species require suitable in-stream habitat and an unobstructed migration route. Otters also require suitable terrestrial habitat to provide

cover and adequate populations of prey species. The site and its features have been historically threatened by practices which had an adverse effect on the quality, quantity and pattern of water flows, such as inappropriate flow regulation, excessive abstraction, deteriorating water quality from direct and diffuse pollution, eutrophication and siltation. Degradation of riparian habitats due to engineering works, agricultural practices and invasive plant species have also had localised adverse effects in the past. The Atlantic salmon population has been threatened by excessive exploitation by high sea, estuarine and recreational fisheries. Introduction of non-indigenous species has also been a risk to both fish and plant species.

13.7 The environmental pressures upon the River Eden SAC are mainly:

- Deterioration in water quality and changes in flow rates due to agricultural runoff and discharge of treated sewage effluent (which contains elevated nitrates);
- Risk of excessive abstraction resulting in a decrease in freshwater flows and an increase in sediment loading of water such that dehydration of interest features may occur;
- Overfishing; and
- Introduction of invasive species.

Key potential pressures from Knowsley

13.8 Traditionally, the water supply for Merseyside comes from the River Dee and Welsh sources, while that for Greater Manchester comes from the Lake District (particularly Haweswater which is within the catchment of the River Eden). The new west-east link main will enable greater flexibility of supply such that there will no longer be a strong split between water sources.

13.9 From the environmental requirements that have been identified above it can be determined that development in Knowsley could theoretically interfere with the environmental requirements and processes on the SAC in the following manner:

- Damaging levels of abstraction to supply housing in Knowsley when considered in combination with development elsewhere in United Utilities Integrated Resource Zone and development outside the zone that will receive water from the same sources (e.g. abstraction from Haweswater in relation to development in Cumbria).

13.10 The HRA will therefore concentrate on evaluating whether these impacts are likely to occur and what amendments to policy may be required to avoid or minimise them.

Likely Significant Effects of the Core Strategy (in combination)

13.11 Due to the integrated nature of water supply across Greater Manchester and Merseyside it is not possible or necessary to consider the impacts of the Knowsley Core Strategy in isolation since the situation does not arise; all impacts will be 'in combination'. These are described in the table below, against each potential impact.

Aspect of the Core Strategy	Water resource issues
<p>Delivery of 7,650 new dwellings across Halton (2010-2027)</p> <p>Economic development – 216.5 hectares of land will be made available (2010-2027) from a variety of sources for employment purposes (Policy CS4), and existing economic development enhanced. Development focus within ‘Principal Regeneration Areas’ (CS9-CS14)</p>	<p>The most recent draft United Utilities Water Resource Management Plan (January 2009) indicates that the water available for use in the Integrated Resource Zone is expected to reduce by 24.8 Ml/d between 2009/10 and 2014/15. Without water efficiency measures or new resources the initial supply demand balance for the Integrated Resource Zone is calculated to be in deficit by 8 Ml/day by 2024/25.</p> <p>However, it has been confirmed by United Utilities that one of the main reasons for the existence of the new west-east link is in response to expected reductions in the licensed abstractions from Haweswater and other Lake District sources resulting from the Environment Agency’s Review of Consents process. As such, abstraction from these sources is already being revised to ensure no adverse effect on the River Eden SAC or other sensitive sites in the Lake District.</p>

Conclusion

- 13.12 It is concluded that since no increased abstraction from the River Eden SAC will be required in order to service new development in Knowsley (or elsewhere within the Integrated Supply Zone) significant effects can be screened out as unlikely.

14 Martin Mere SPA and Ramsar

Introduction

- 14.1 Martin Mere SPA and Ramsar site (119.89 ha) is located north of Ormskirk in West Lancashire, north west England, approximately 13km north of the Borough of Knowsley. The outstanding importance of Martin Mere is as a refuge for its large and diverse wintering, passage and breeding bird community.
- 14.2 It occupies part of a former lake and mire that extended over some 1,300 ha of the Lancashire Coastal Plain during the 17th century. In 1972 the Wildfowl and Wetlands Trust purchased 147 hectares of the former Holcrofts Farm, consisting mainly of rough damp pasture, with the primary aim of providing grazing and roosting opportunities for wildfowl. Since acquisition the rough grazed pastures have been transformed by means of positive management into a wildfowl refuge of international importance. Areas of open water with associated muddy margins have been created, whilst maintaining seasonally flooded marsh and reed swamp habitats via water level control. In September 2002, an additional 63 hectares of land were purchased on the southern most part of the refuge at Woodend Farm, with the aid of the Heritage Lottery Fund, to restore arable land to a variety of wetland habitats including seasonally flooded grassland, reedbed, wet woodland and open water habitats.
- 14.3 The complex now comprises open water, seasonally flooded marsh and damp, neutral hay meadows overlying deep peat. It includes a wildfowl refuge of international importance, with a large and diverse wintering, passage and breeding bird community. In particular, there are significant wintering populations of Bewick's swan (*Cygnus columbianus bewickii*) and whooper swan (*Cygnus Cygnus*), pink-footed goose (*Anser brachyrhynchus*) and pintail (*Anas acuta*). There is considerable movement of wintering birds between this site and the nearby Ribble and Alt Estuaries SPA. Significant numbers of the wintering pink footed geese that use this site are also known to use habitats in Simonswood Moss, which lies just outside Knowsley borough boundary to the east, adjacent to Knowsley Business and Industrial Parks.

Reasons for Designation

- 14.4 This site qualifies for SPA under Article 4.1 of the Directive (79/409/EEC) by supporting populations of European importance of the following over wintering birds listed on Annex I of the Directive:
- Bewick's swan, 449 individuals representing at least 6.4% of the wintering population in Great Britain (5 year peak mean 1991/2 - 1995/6);
 - whooper swan 621 individuals representing at least 11.3% of the wintering population in Great Britain (5 year peak mean 1991/2 - 1995/6).
- 14.5 This site also qualifies under Article 4.2 of the Directive (79/409/EEC) by supporting populations of European importance of the following over wintering migratory species:
- pink-footed goose, 25,779 individuals representing at least 11.5% of the wintering Eastern Greenland/Iceland/UK population (5 year peak mean 1991/2 - 1995/6);

- pintail 978 individuals representing at least 1.6% of the wintering North western Europe population (5 year peak mean 1991/2 - 1995/6).

14.6 The assemblage of birds present makes the site a wetland of international importance. The area qualifies under Article 4.2 of the Directive (79/409/EEC) by regularly supporting at least 20,000 waterfowl. Over winter, the area regularly supports 46,196 individual waterfowl (5 year peak mean 1991/2 - 1995/6) including: pochard (*Aythya farina*), mallard (*Anas platyrhynchos*), teal (*Anas crecca*), wigeon (*Anas penelope*), pintail, pink-footed goose (*Anser brachyrhynchus*), whooper swan, and Bewick's swan.

14.7 It is additionally designated as a Ramsar site in accordance with Criterion 5 (UN, 2005) for supporting up to 25,306 waterfowl (5-year peak mean 1998/99 – 2002/03) in winter, and in accordance with Criterion 6 for supporting internationally important populations of pink-footed goose *Anser brachyrhynchus*, Bewick's swan *Cygnus columbianus* ssp. *bewickii*, whooper swan *Cygnus cygnus*, Eurasian wigeon *Anas penelope* and northern pintail *Anas acuta*.

Historic Trends and Existing Pressures

14.8 Since the site's designation as a Wetland of International Importance under the Ramsar Convention and as a Special Protection Area in 1985 there has been a gradual increase in the usage of the mere by certain species of wildfowl and wading birds as a direct consequence of positive management. The site is geared towards attracting visitors, with a number of hides from which the Mere and its birds may be viewed. In addition to the wild species for which it is designated, the site holds a collection of about 1,500 captive birds of 125 species from around the world, as well as a number of other visitor attractions. This is because the site is a Wildfowl and Wetlands Trust reserve.

14.9 The environmental pressures experienced by Martin Mere in terms of its bird community are likely to be those common to all reedbed habitat. The refuge is vulnerable to the following:

- direct loss of characteristic species as a result of nutrient enrichment from agricultural fertilisers and run-off;
- loss of reedbed due to weakening of stems through poor growth conditions;
- natural succession to woodland through lack of active management;
- changes in farming practice. grazing management is largely dependent upon cattle from surrounding farms;
- reduced water level by surface and ground water abstractions or agricultural drainage, which causes the habitat to dry out and begin succession towards 'alder/willow carr woodland, hastening the overall process of succession towards broadleaved woodland' (Lancashire BAP);
- removal of reeds and other vegetation from whole stretches of watercourses (e.g. neighbouring the site) through routine management of ditches and riverbanks (in some instances);
- erosion of reedbeds due to increased recreational use of waterbodies and waterways (notably canals);

- habitat loss or degradation due to the isolation of reedbeds as a result of losses elsewhere, in turn due to the above or other factors (Lancashire BAP).

14.10 In addition, the following pressures have been documented :

- invasive plant species: Regular herbicide control of trifid burr marigold is necessary in order to prevent this plant from invading lake/scrape margins to the detriment of bird populations;
- water borne diseases that could affect wildfowl: water levels on the Mere are controlled to maintain optimum levels throughout the winter period, then lowered progressively in summer to expose marginal mud and the underlying damp pastures and maintain a mosaic of shallow pools. Ditches are regularly cut and dredged and all areas of pasture are positively managed under a Countryside Stewardship Scheme. Nutrients brought in with the water supply from the surrounding arable farmland and inadequate sewage treatment adds considerably to the large deposits of guano from wintering waterfowl. This results in the refuge being highly eutrophic with extremely poor water quality conditions and creates the possible risk of water borne diseases which could affect waterfowl, although no such outbreaks have been recorded. The Wildlife Trust has started to address this issue with the creation of reedbed water filtration systems and a series of settlement lagoons helps to reduce suspended solids of effluent water arising from waterfowl areas;
- due to the eutrophication (described above) Martin Mere is also experiencing water quality issues.

Key Pressures from Knowsley

- 14.11 The only potential pathway in which development within Knowsley could lead to effects on Martin Mere SPA and Ramsar site is through development of wind turbines, depending on the location of the turbines and flight paths of qualifying bird species at Martin Mere, or other development within Kirkby, which may result in disturbance to an important pink footed goose population which is known to use habitats within Simonswood Moss adjacent to this area.
- 14.12 There is also a potential pathway for loss of supporting habitat relating to the bird interest of this SPA, particularly the pink-footed geese.

Appropriate Assessment

Wind turbines

- 14.13 Knowsley is located approximately 13km south of Martin Mere SPA and Ramsar site. It is possible that the construction of wind turbines (both onshore and offshore) within Merseyside has the potential to displace the flight path of qualifying bird species, depending on their location. It would be more appropriate to consider these effects as an 'in combination effect' with other policies that may contribute to the construction of wind turbines in the region.
- 14.14 The Core Strategy promotes sustainable, renewable and low carbon energy within Knowsley (Policies CS22 and CS23). Although the policy does not specify which technologies are likely to be developed, Knowsley Business and Industrial Parks are identified as a "Priority Zone" for the development of renewable and low carbon infrastructure. If this were to include wind turbine

construction, a pathway exists for the construction of onshore turbines to disrupt flight paths and displace qualifying bird species. As detailed in Chapter 8, a significant population of wintering pink footed geese, which is a qualifying species for Martin Mere SPA, are known to utilise areas within St Helens adjacent to Kirkby in Knowsley and to move between these two areas in addition to land near Knowsley Industrial Estate. There is therefore the potential for a significant impact through the development of wind turbines, particularly bearing in mind other wind farms proposed within the Merseyside area. However, as Policy CS23 states that the Council will support such proposals provided that they “do not cause significant harm ... to... natural resources, biodiversity, geodiversity, water and air quality” and as any such development will be dealt with in a Site Allocations and Development Policies DPD, it is considered that the wording in this policy, together with the requirement for an HRA on the Site Allocations and Development Policies DPD, provides sufficient protection to avoid adverse effects on European sites, and designated features of interest, through potential development of renewable and low carbon infrastructure.

Loss of Supporting Habitat

- 14.15 Work has been undertaken to establish the location of a number of important supporting habitat sites for qualifying bird species within Merseyside⁷⁵. It has been established that Hale and its associated mudflats and sand bars have been identified as the most important site surveyed on the north shore of the Mersey. Locally important numbers of feeding, roosting and loafing Common Shelduck and Dunlin were recorded at this site. Furthermore limited evidence from ad hoc sources suggests land at Ditton on the north bank of the estuary and possibly at Shell Green can also perform this function. Although the borough itself is 13km from the SPA/Ramsar site this does not render it impossible that high-tide roosts of significance will be present in Knowsley.

Recommendations for amendment to policy

- 14.16 In view of the fact that there may be key areas of supporting habitat within the borough which have not been surveyed or identified, the potential for loss of supporting habitat as a result of the Core Strategy does remain. The following recommendations are therefore made.
- 14.17 In order to inform the development of the Site Allocations and Development Management DPD and subsequent Green Belt review it will be necessary to undertake an exercise to identify areas within the borough that serve as important supporting habitat for qualifying bird species, particularly pink-footed goose. The Site Allocations DPD should include appropriate mechanisms in place to ensure the loss of such sites is adequately assessed and mitigated as part of planning applications. If supporting habitat were to be lost to any development, then the applicant would need to determine (a) how significant it was (i.e. whether it was used by more than 1% of the population of qualifying bird species and (b) to provide alternative habitat to replace it in a location that was approximately a similar distance from the SPA.

Other Projects and Plans

- 14.18 The Liverpool City Region Renewable Energy Capacity Study identifies the location of ‘Wind Priority Zones’. It is reasonable to assume that a significant cumulative ‘in combination’ disturbance to qualifying bird species may arise, depending on the findings of this study and subsequent policy.

⁷⁵ RSK (2010) Mersey Feasibility Study Winter Bird Report

Conclusion

- 14.18.1 The Appropriate Assessment has concluded that with the incorporation of the measures listed above, the Knowsley Core Strategy Preferred Options would include an adequate policy framework to enable the delivery of measures to avoid or adequately mitigate an adverse effect on the integrity of Martin Mere SPA/Ramsar.

15 Summary of Appropriate Assessment

- 15.1 Although the Core Strategy was screened for likely significant effects upon River Dee & Bala Lake SAC, River Eden SAC and Oak Mere SAC it was ultimately concluded that the Core Strategy was unlikely to lead to significant effects on these sites, even when considered in combination with other projects and plans.
- 15.2 The Core Strategy was screened in for Appropriate Assessment relating to likely significant effects 'in combination' with other projects and plans upon the following European sites: Mersey Estuary SPA/Ramsar Site, Liverpool Bay SPA, Mersey Narrows & North Wirral Foreshore pSPA/pRamsar, Dee Estuary SAC/SPA & Ramsar site, Sefton Coast SAC, Ribble & Alt SPA/Ramsar and Manchester Mosses SAC.
- 15.3 The Appropriate Assessment identified the following impact pathways from the Knowsley Core Strategy to these European Sites, particularly when considered 'in combination' with other projects and plans:
- Mersey Estuary SPA/Ramsar Site, Ribble & Alt Estuaries SPA/Ramsar - Disturbance to qualifying bird species (from recreational pressure and other sources), deterioration in water quality and loss of supporting habitat.
 - Liverpool Bay SPA, Mersey Narrows & North Wirral Foreshore pSPA/pRamsar - Disturbance to qualifying bird species (from recreational pressure and other sources), water quality effects 'in combination'.
 - Sefton Coast SAC and Ribble & Alt Estuaries SPA/Ramsar – recreational impacts and 'in-combination' air quality impacts from Liverpool John Lennon Airport.
 - Dee Estuary - in-combination' air quality impacts from Liverpool John Lennon Airport
 - Martin Mere SPA – potential loss of supporting habitat.
- 15.4 In some cases, additional policy wording has been proposed to ensure compliance with the Habitats Directive. This relates to the following policies:
- Development Principles (CS2);
 - Transport Network (CS7);
 - Green Infrastructure (CS8)
 - Renewable and Low Carbon Energy (CS23)
- 15.5 Recommendations for amendments to policy to enable the delivery of measures to avoid or adequately mitigate the adverse effects are set out below.

Disturbance

- 15.6 To ensure that Policy CS8 Green Infrastructure better complies with the Habitats Directive, additional text is proposed: *Where the policy states "Working in partnership with other districts and relevant bodies, where appropriate, to minimise the impact of development upon Knowsley's*

existing biodiversity and geological assets”, this wording should be amended to include reference to biodiversity in the surrounding area. Suggested wording (which could go in supporting text and be cross-referenced in policy) is “Working in partnership with other districts and relevant bodies, where appropriate, to minimise the impact of development upon Knowsley’s existing biodiversity and geological assets”, as well as sustaining the protection afforded to internationally important sites for biodiversity outside of the Borough.” The supporting text could add the clarification that this should be “by managing recreational impacts and encouraging the use of the wider green infrastructure network which is less sensitive to recreational pressure’.

- 15.7 A further amendment to Policy CS8 is required in relation to the approach to green infrastructure and new development. Although it states “*New development must be served by Green Infrastructure to meet the needs of residents in a manner which will:provide access to high quality open spaces for leisure and recreational purposes.*”, the supporting text could add the clarification that this should “*not have a detrimental impact on important sites/species of nature conservation interest within the borough or the surrounding area, through increased disturbance.*”
- 15.8 With regard to Sefton Coast SAC and the Sefton portion of the Ribble & Alt Estuaries SPA/Ramsar site the most logical response Knowsley could make would be a Core Strategy commitment to assist in the future delivery of the requirements of the Beach Management Plan and Sefton Management Plan (specifically as they relate to recreation management) commensurate with the contribution of visitors to the site that arise from Knowsley. If this recommendation is implemented, it is concluded that there will be no adverse effect on the integrity of the Sefton Coast SAC through direct disturbance as a result of any of the policies proposed within the Core Strategy.
- 15.9 The Core Strategy should also include a clear statement that it will ‘*not support schemes that will lead to adverse effects on internationally important wildlife sites, either alone or in combination with other projects and plans. Any scheme that would be likely to have a significant effect on a European site, either alone or in combination with other plans or projects, will be subject to an assessment under Part 6 of the Habitat Regulations at project application stage. If it cannot be ascertained that there would be no adverse effects on site integrity the project will have to be refused or pass the tests of Regulation 61 and 62, in which case any necessary compensatory measures will need to be secured in accordance with Regulation 66’.* This would be in line with the example provided on page 39 of the Natural England internal guidance on HRA⁷⁶
- 15.10 If the above recommendations to manage access are implemented, it is concluded that there will be no adverse effect on the integrity of the surrounding Nature 2000 sites through direct disturbance as a result of any of the policies proposed within the Knowsley Core Strategy.

Loss of supporting habitat

- 15.11 In order to inform the development of the Site Allocations and Development Management DPD and subsequent Green Belt review it will be necessary to undertake an exercise to identify areas within the borough that serve as important supporting habitat for qualifying bird species of Mersey Estuary SPA/Ramsar site, Ribble & Alt Estuaries SPA & Ramsar site and Martin Mere SPA, particularly pink-footed goose. The Site Allocations DPD should include appropriate mechanisms

⁷⁶ Tyldesley D. 2009. The Habitats Regulations Assessment of Local Development Documents. Unpublished internal report for Natural England

in place to ensure the loss of such sites is adequately assessed and mitigated as part of planning applications. If supporting habitat were to be lost to any development, then the applicant would need to determine (a) how significant it was (i.e. whether it was used by more than 1% of the population of qualifying bird species and (b) to provide alternative habitat to replace it in a location that was approximately a similar distance from the SPA.

Water Quality

- 15.12 Policy CS2 (Development Principles) states that the most efficient use will be made of “*available resources and infrastructure by prioritising locations consistent with the spatial strategy, which do not require major investment in new infrastructure including water supply and sewerage or where this is unavoidable, incorporate appropriate development phasing and delivery assistance; and to support prudent and efficient management of natural and man-made resources*”. Avoiding an adverse effect is largely in the hands of the water companies (through their investment in future sewage treatment infrastructure) and Environment Agency (through their role in consenting effluent discharges). However, local authorities can also contribute through ensuring that sufficient wastewater treatment infrastructure is in place prior to development being delivered through the Core Strategy. In the case of Knowsley, this is alluded to in the supporting text for Policy CS27 (Planning for and Paying for New Infrastructure): “*Infrastructure planning should also include consideration of funding and phasing of infrastructure delivery, together with contingency planning where appropriate.*”
- 15.13 However, it is considered that this allusion needs to be slightly expanded upon in order to provide a firm commitment with regard to the linking of housing delivery to delivery of necessary infrastructure that will ensure that an adverse effect on European sites is avoided. A policy in the Core Strategy will need to make specific reference to the fact that the delivery of development will be phased in order to ensure that it only takes place once any new water treatment infrastructure or appropriate retro-fitted technology (e.g. nitrate stripping) necessary to service the development while avoiding an adverse effect on European sites is in place. The Core Strategy should also make it clear that this need will be determined and delivered through interaction with other authorities including United Utilities and the Environment Agency.

References

Department of Transport (2004). *Transport Analysis Guidance: Regional Air Pollution*.
http://www.webtag.org.uk/webdocuments/3_Expert/3_Environment_Objective/3.3.4.htm

EC, 1979 – European Council (1979). *Council Directive of 2 April 1979 on the conservation of wild birds (79/409/EEC)*.
http://europa.eu.int/eur-lex/en/consleg/pdf/1979/en_1979L0409_do_001.pdf

EC, 1992 – European Council (1992). *Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora*.
http://ec.europa.eu/environment/nature/nature_conservation/eu_nature_legislation/habitats_directive/index_en.htm

European Commission (2001). *Assessment of plans and projects significantly affecting Natura 2000 sites*.
http://europa.eu.int/comm/environment/nature/nature_conservation/eu_nature_legislation/specific_articles/art6/pdf/natura_2000_assess_en.pdf

JNCC (2001) - Joint Nature Conservation Committee (2001). *Mersey Estuary SPA*. [online] Available from:
<http://www.jncc.gov.uk/default.aspx?page=1986> (Accessed on 15th June 2009)

JNCC, 2006a – Joint Nature Conservation Committee (2006d). *Manchester Mosses*.
<http://www.jncc.gov.uk/protectedsites/SACselection/SAC.asp?EUCode=UK0030200>

JNCC (2006b) – Joint Nature Conservation Committee (2006f). *Oak Mere SAC*. (Version 2.1) [Online]. (Updated 17th May 2006). Available from:
<http://www.jncc.gov.uk/protectedsites/sacselection/n2kforms/UK0012970.pdf> (accessed 15th June 2009).

JNCC (2006c) – Joint Nature Conservation Committee (2006f). *River Dee and Bala Lake SAC*. (Version 2.1) [Online]. (Updated 17th May 2006). Available from:
<http://www.jncc.gov.uk/protectedsites/sacselection/sac.asp?EUCode=UK0030252> (accessed 15th June 2009).

JNCC (2006d) – Joint Nature Conservation Committee (2006g). *Rixton Clay Pits SAC*. (Version 2.1) [Online]. (Updated 17th May 2006). Available from:
<http://www.jncc.gov.uk/ProtectedSites/SACselection/n2kforms/UK0030265.pdf> (accessed 15th June 2009).

JNCC (2006e) – Joint Nature Conservation Committee (2006h). *West Midland Mosses SAC*. (Version 2.1) [Online]. (Updated 17th May 2006). Available from:
<http://www.jncc.gov.uk/protectedsites/sacselection/sac.asp?EUCode=UK0013595> (accessed 15th June 2009).

JNCC (2008f) – Joint Nature Conservation Committee. *Ramsar Information Sheet UK11041: Mersey Estuary*. (Version 3.0) [Online] Available from: <http://www.jncc.gov.uk/pdf/RIS/UK11041.pdf> (accessed 15th June 2009).

JNCC (2008g) – Joint Nature Conservation Committee. *Ramsar Information Sheet UK11043: Midland Meres and Mosses*. (Version 3.0) [Online] Available from: <http://www.jncc.gov.uk/pdf/RIS/UK11043.pdf> (accessed 15th June 2009).

Langston, W.J., Chesman, B.S. and Burt, G.R. (2006). Characterisation of European Marine Sites. Mersey Estuary SPA. [Online]. *Marine Biological Association of the United Kingdom. Occasional Publications 18*, 185pp. Available at
: www.mba.ac.uk/hmbl/publications/occpub/pdf/occ_pub_18.pdf (accessed 15th June 2009).

Liverpool Hope University College (2006). *The Sands of Time Website and A History of Coastal Change*.
<http://www.sandsoftime.hope.ac.uk/index.htm> and <http://www.sandsoftime.hope.ac.uk/change/history.htm>

The Marine Biological Association (2006). *Site Characterisation of European Marine Sites: The Mersey Estuary SPA*. www.mba.ac.uk/nmbi/publications/occpub/pdf/occ_pub_18.pdf

Marine Board, Commission on Engineering and Technical Systems, National Research Council (1985), *Dredging Coastal Ports: An Assessment of the Issues*. (Washington, D.C.: National Academy Press)

Mersey Basin Campaign (2004). *River Mersey*. [Online]. Available at: www.merseybasin.org.uk/information.asp?page=1&pagesize=5&confirmed=1&id=0&docid=57 (accessed 15th June 2009).

North Merseyside Biodiversity Action Plan (undated). <http://www.merseysidebiodiversity.org.uk/>

OECD (ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT (1997)
The Environmental Effects of Freight available from
<http://www.oecd.org/dataoecd/14/3/2386636.pdf> (Accessed June 2010)

Ribble Estuary Strategy Steering Group (1997). *Ribble Estuary Strategy*. <http://www.ribble-estuary.co.uk/pdf/Ribble%20Estuary%20Strategy.pdf>

Scott Wilson (2009) *Habitat Regulations Assessment (HRA) Screening (Stage 1) of Halton Borough Council Core Strategy Preferred Options* (August 2009)

Sefton Coast Partnership (2004). *Human impacts on coastal process*. http://www.seftoncoast.org.uk/shore_human.html

Webb *et al.*, 2004a – Webb A., McSorley C..A., Dean B. J., Reid J. B., Cranswick P. A., Smith L. and Hall C. (2004a). *An assessment of the numbers and distributions of inshore aggregations of waterbirds using Liverpool Bay during the non-breeding season in support of possible SPA identification: JNCC Report No. 373*. <http://www.jncc.gov.uk/page-3810>

Webb *et al.*, 2004b – Webb A., McSorley C..A., Dean B. J. and Reid J. B. (2004b). *Recommendations for the selection of, and boundary options for, an SPA in Liverpool Bay*. <http://www.jncc.gov.uk/default.aspx?page=3815>

Wirral MBC, 2001 – Wirral Metropolitan Borough Council (2001). *Consultations on proposed designation of North Wirral Foreshore SSSI and Mersey Narrows SSSI as a potential Special Protection Area and proposed Ramsar site*. http://www.wirral.gov.uk/minute/public/envped011029rep02_3275.pdf