Norfolk Wildlife Services

Study to assess the capacity of International Sites to accommodate visitor pressure

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Report prepared by Norfolk Wildlife Services Ltd
on behalf of the Greater Norwich Development Partnership, March 2011

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1. Background

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1.1. Norfolk Wildlife Services (NWS) was contacted by Heidi Thompson on behalf of the Greater Norwich Development Partnership (GNDP), in March 2011 with regard to undertaking a study to assess the capacity of International Designated Sites (hereafter referred to as 'International Sites') to accommodate increasing visitor pressure.

1.2. The study was a continuation of work undertaken by NWS in February 2011. The previous study considered the impact of increasing visitor pressure on County Wildlife Sites as a result of growth within the GNDP.

1.3. The contract was managed by Chris Smith, NWS Consultancy Manager. Norfolk Wildlife Services is a member of the Association of Wildlife Trust Consultancies (AWTC) which is also a corporate member of the Institute of Environmental Management and Assessment (IEMA).

1.4. The project brief was given in the specifications contained in an email from Heidi Thompson of 11th March 2011.

1.5. The GNDP is seeking to assess the carrying capacity for visitors of identified International Sites potentially affected by the planned growth within the GNDP. The GNDP is concerned that existing biodiversity assets are protected.

2. Project brief

2.1. Introduction

2.1.1. The need for the work and general background is given in the earlier report (NWS, March 2011). The brief for the second element of the study was to consider International Sites.

2.1.2. The GNDP's Joint Core Strategy (JCS) was subject to a Habitats Regulation Assessment (HRA) in February 2010[1]. This assessment concluded that it was highly unlikely that the JCS policies would have a significant direct or indirect impact on the European and Ramsar designated sites. It also stated that there is uncertainty in relation to potential impacts associated with water resources, water efficiency, growth and tourism resulting from

[1] See http://www.gndp.org.uk/content/wp-content/uploads/downloads/2012/08/PSJCS-5-HRA-Supplementary-Statement-and-Report.pdf

in-combination and cumulative impacts associated with the planned growth within the JCS area and growth in the neighbouring LDF areas (being North Norfolk, Great Yarmouth, Breckland and the Broads), concluding that it is highly unlikely that the JCS policies alone would have significant direct or indirect effects on the European and Ramsar sites provided that identified mitigation was carried out.

2.1.3. The document stated that this uncertainty could be reduced, and any significant effects avoided, through the implementation of green infrastructure developments and the allocation of green space to protect specific natural assets and designated sites.

2.1.4. The brief specifically required three elements:

- An assessment of the carrying capacity for visitors of the specified International Sites potentially affected by the planned growth within the GNDP;
- An assessment of the sites' capacity to accommodate additional visitor pressure through consideration of the sites' sensitive features; and
- The resulting assessment be ground-truthed through dialogue with Site Managers.

2.1.5. The project brief required a specific group of International Sites to be considered. Sites required to be assessed in this study were:

- The Broads SAC
- Broadland Ramsar and SPA
- River Wensum SAC
- Great Yarmouth North Denes SPA
- Winterton Horsey Dunes SAC
- North Norfolk coast SAC, SPA and Ramsar
- Norfolk Valley Fens SAC

2.1.6. The study assessed whether the uncertainty expressed in the HRA (2010) regarding the combination and cumulative effects associated with growth and tourism at International Sites resulting from the planned growth within the GNDP area can be reduced.

2.2. International Sites

2.2.1. A key policy tool for conserving biodiversity in the UK is the designation and management of protected sites - areas of land, inland water and the sea that have special legal protection to conserve important habitats and species.

2.2.2. Some of the sites are of European importance. These are either Special Protection Areas (SPAs) that are designated for their importance for birds (either individual species or assemblages) or Special Areas of Conservation (SACs) that are designated for their habitats. They have been created under the EC Birds Directive (Directive 2009/147/EC) and Habitats Directive (92/43/EEC) respectively. These sites form part of a larger European network called Natura 2000.

2.2.3. In addition, the UK and its Overseas Territories and Crown Dependencies also contribute to global networks of protected sites created under the Ramsar Convention. This convention protects wetlands of international importance.

2.2.4. Within the UK, sites that are of international importance for biodiversity are also protected by law as Sites of Special Scientific Interest (SSSIs). This second tier provides the underpinning statutory protection for all sites. Some of the International Sites are essentially a single SSSI, e.g. North Norfolk Coast SAC, whilst others are made up of a number of

component SSSIs. The Norfolk Valley Fens SAC has 14 component SSSIs and the Broads SAC has 28. Details of the component units of the SACs are given in Appendix 1.

3. Methodology

3.1. Study scope

3.1.1. The scope of the study as set out in the brief is very broad. An in-depth study of this nature could easily become a very substantial body of work with high inputs of time and recourses and, indeed, the questions raised may justify this level of detail and expense.

3.1.2. However, the resources available to undertake the study do not permit this substantive approach. The results presented here are tailored to the existing resources.

Carrying capacity and visitor numbers

3.1.3. The brief refers to 'carrying capacity' of International Sites. There are many definitions of carrying capacity but effectively, the carrying capacity is the point at which a destination or attraction starts experiencing adverse effects as a result of the number of visitors. In this report, the adverse effects would be on the qualifying features of the International Sites i.e. the habitats or species for which the site had been designated under international law.

3.1.4. Trying to calculate the carrying capacity of sites, or components of sites, is a very major undertaking. For a single location it would require, for example, precise and highly detailed information on micro-habitats, soil types, climate, community assemblages, specific species ecology, known responses to human visitors and so forth. Sites and parts of sites would vary considerably in these factors. This is clearly not possible to complete within the timeframe or budget.

3.2. The approach taken

3.2.1. The report relies upon aqualitative consideration of carrying capacity at sites, allowing an assessment the effects of visitor usage at differing sites, but without specifying exact "carrying capacity" figures for each. In this assessment, reference has been made to previous studies where data are available but assumptions have still been necessary. These assumptions are described in the text where made.

3.2.2. Some additional information has been obtained by speaking directly with reserve managers of various organisations who own land within the study area, notably the Norfolk Wildlife Trust (NWT), The Royal Society for the Protection of Birds (RSPB), the Broads Authority (BA) and the National Trust (NT).

3.2.3. The study used available information from both the peer-reviewed and grey literature and information provided by site managers to assess:

- The broad-scale habitat sensitivity of the International Sites; and
- Current visitor numbers and usage.

3.2.4. This allowed an assessment to be made as to whether an International Site was:

- Currently suffering ecological damage from visitors, and was therefore at or exceeding carrying capacity; or
- Whether it was able to take more visitors, and thus had spare capacity.

4. Data collection

4.1. The specific requirements of the study

4.1.1. To fulfill the study brief to determine the visitor capacity of the listed designated International Sites, it was necessary to know for each of the sites:

- The habitats/species at the site, particularly the qualifying features for which it is designated, and to assess their sensitivity to visitor pressure;
- The ecological effects of different types of visitor pressure and how these might operate to affect the qualifying features for which the site is designated;
- The current and potential visitor numbers using the site and an understanding of the behaviour of the visitors at the site; and
- Whether there are site-specific or area-specific visitor management practices that will affect the magnitude of visitor pressure.

Identifying the qualifying features

4.1.2. The qualifying features for which a site is designated are listed on the *Standard Data Form* for all Natura 2000 sites published by the JNCC. This information was readily available from the JNCC website (jncc.gov.uk).

Assessing habitat sensitivity

4.1.3. Considerable information on the ecological effects of various types of recreational pressure on a broad range of habitats and species, and groups of species, is published in the peer-reviewed literature (e.g. Journal of Applied Ecology, Conservation Biology etc). Other information is available in grey literature.

4.1.4. Likely actions and processes that could be operating as a result of visitor pressure were identified for the qualifying features identified above.

Assessing visitor numbers

4.1.5. Information on visitor numbers and usage is largely not available. For a very few number of International Sites (or parts of these sites), there was some indirect information that has been used to assess visitor numbers. This takes the form, for example, of the number of people buying permits to enter reserves, from car parking data or from counts of people entering visitor centers. For the other (majority) of International Sites, visitor numbers are unknown.

4.1.6. For the sites where data on visitor numbers are lacking, the number of visitors has been estimated based on the likely catchment area for the sites. The catchments vary on a site-by-site basis, with the proximity to urban areas being key. Some sites are inherently more attractive than others, while some provide better opportunities of seeing popular wildlife therefore pulling in visitors from further afield. Key opportunities for specific wildlife watching have been taken into account in the assessments where relevant.

4.1.7. Information used to elucidate catchment areas is usually obtained from visitor surveys although examples of such surveys relating to the study sites are very few indeed.

4.1.8. This study has used the information available from a variety of sources to make the best assessments of current visitor usage as possible. Sources were not necessarily the same for every International Site.

Generalised or local issues?

4.1.9. The scale of the International Sites covered in this study varies and it is recognised that this will affect visitor pressure. For example, Great Yarmouth North Denes SPA is less than 150ha while the North Norfolk Coast SPA is nearly 8000ha. In the latter case, the International Site can not really be considered as a single entity; different parts of it will differ in their appeal, their use, their ease of access, the sensitivity of their habitats etc.

4.1.10. General statements about visitor pressure may not apply throughout the whole of the designated area.

4.1.11. For the larger International Sites in this study, assessments were made on habitat sensitivity and visitor numbers at component or local sites. These assessments were then drawn together to synthesise conclusions for the International Site as a whole.

Other considerations

4.1.12. Various other considerations were taken into account when making the assessments.

4.1.13. For each site, when visitors visit – and therefore the magnitude and severity of visitor pressure - will also be determined by the time of year. For example, more visitors might be expected during the summer and during the August holiday period, whilst certain popular wildlife spectacles occur in winter. The use of sites by residents may be expected to be more similar throughout the year. Visitor behaviour has not been covered in detail in this report but reference has been made to it where considered appropriate in making the site assessments.

4.1.14. Management of visitors may be affected by the differing approaches of the separate land owners and whether local or regional visitor management strategies are in place. Reference has been made to this in the report where necessary.

4.1.15.

5. The Assessment

5.1. The features for which International Sites are designated

5.1.1. The qualifying features for which the International Sites are designated together with key environmental conditions to support site integrity have been determined and are given in Appendix 3.

5.2. Effects of recreational pressure on habitats and species

5.2.1. Recreational pressure has the potential to cause adverse effects on internationally designated sites, for example through trampling, nutrient enrichment and disturbance to wildlife. These are discussed in turn although there is clear overlap in places. Information is drawn from the peer-reviewed literature to explain general principles but a broad review of the subject is outside the scope of this report and only the main references used are given. A list of articles referred to is included in Appendix 3.

Trampling and Nutrient Enrichment

5.2.2. Most types of terrestrial European sites can be affected by trampling, which in turn causes soil compaction and erosion (e.g. Andres-Abellan *et al*., 2005; Kissling *et al.*, 2006) and can affect soil invertebrates (Bonte & Maes, 2008). Different vegetation types have different susceptibility to trampling and damage (Gallett *et al*, 2004). Within the International

Sites of this study, two soil types will be particularly vulnerable; peat soils (of valley fens) are easily compacted and therefore subject to increased erosion and sandy soils (of dunes and coastal sites) are susceptible to heavy erosion on well-used paths particularly near to car parks or access points.

5.2.3. Associated issues from visitor usage on habitats and wildlife can occur through accidental fires (sometimes an issue on dune habitats). Different activities also cause different degrees of damage. For instance, vehicles on un-surfaced tracks will cause more damage than walking. Walkers with dogs have potential to cause greater disturbance to birds and other animals as dogs are less likely to keep to marked footpaths (Randler, 2006). Dogs can also contribute to nutrient enrichment through their fouling. Kite flying and kite surfing can cause disturbances to sensitive species.

5.2.4. In the context of this study, two categories relating to trampling/erosion were considered relevant to the habitats of the International Sites:

- Coastal sites with sandy soils that are sensitive to trampling and associated erosion;
- Inland sites with peaty soils that are sensitive to trampling and associated erosion.

Disturbance of Wildlife

5.2.5. The effects of disturbance on birds (e.g. Robinson & Pollitt, 2002; Rogers et al., 2002; Trulio & Sokale, 2008) and mammals (e.g. Stankowich, 2008) are well documented in the literature. Animals that are disturbed spend more time and therefore energy on responding to disturbance which reduces their time for feeding. This alteration in their energy budget can adversely affect their condition, and ultimately survival, of the wildlife (West *et al*., 2002).

5.2.6. Other factors are important. Displacement of animals from one feeding site to others can increase the pressure on the resources available within the remaining sites, compounding effects (Schummer & Eddlemann, 2003). 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 are to predators. Empirical studies have shown that for some bird species, fewer individuals are present in areas of high disturbance than areas without disturbance and changes in productivity may also occur (Mallord *et al*., 2007a; Carney & Sydeman, 1999).

5.2.7. Some of the International Sites in this study are designated for their breeding birds (e.g. Great Yarmouth North Denes designated for its breeding Little Terns) and the breeding season often coincides with when there are most human visitors. The potential for disturbance for wildlife may be less in winter than in summer, in that there are often smaller numbers of recreational users in that season (Mallord *et al*., 2007b).

5.2.8. However, winter activity can still result in significant disturbance, especially as birds in particular are vulnerable at this time of year due to food shortages. Some of the International Sites in this study are designated for their importance for winter bird flocks (e.g. North Norfolk Coast SPA and Broadland SPA). Some considerable data are available in the literature on the sensitivity of particular winter visitors (wildfowl and waders) to disturbance and the effects this has on their energy budgets and subsequent survival.

5.2.9. Disturbing activities are on a continuum. The most disturbing activities are likely to be those that involve irregular, infrequent, unpredictable events or movement. Animals are least likely to be disturbed by activities that involve regular, frequent, predictable, patterns of movement. A good example is the Common Seals *Phoca vituluna* at Blakeney Point. The seals are unmoved by the regular - but not constant - visits by the local boat operators but react to visitors on foot and boats that are unfamiliar.

5.2.10. In the context of this study, five categories relating to wildlife disturbance were considered relevant to the International Sites:

- Coastal sites with bird populations sensitive to disturbance in summer (breeding);
- Coastal sites with bird populations sensitive to disturbance in winter;
- Coastal sites with mammal populations sensitive to disturbance in all seasons;
- Inland sites with bird populations sensitive to disturbance in summer (breeding);
- Inland sites with bird populations sensitive to disturbance in winter.

Other damage

5.2.11. In inland waterways, boat traffic can cause damage through nutrient-enrichment, pollution, disturbance to wildlife and bank erosion from wash (O'Toole *et al*., 2009; Peters & Otis, 2006). Certain key species have been identified as potentially particularly sensitive to boat disturbance and fishing including some species included in qualifying features of International Sites in this study.

5.2.12. In the context of aquatic sites within this study, an additional category was considered relevant:

- Inland sites with species sensitive to boat disturbance and fishing including White-clawed Crayfish *Austropotamobius pallipes*, Otters *Lutra lutra* and freshwater Mussels.

5.3. Identifying how recreational pressure may affect International Sites

5.3.1. For the habitats and species at the International Sites, particularly the qualifying features for which they have been designated, the sensitivity to visitor pressure was assessed. This was done by assessing which sites fell into the categories described above. The assessment is shown in Table 1.

5.3.2. For some, but not all, of the sites in this study, recreational disturbance is listed on the Natura 2000 Standard Data Forms as a factor that potentially can affect site integrity. The sites where this is specifically mentioned are North Norfolk Coast SAC/SPA, Great Yarmouth North Denes SPA and Winterton-Horsey Dunes SAC.

5.3.3. The data forms for the Broadland/Broads International Sites do not refer to recreation specifically as an issue.

5.4. Assessing visitor numbers

5.4.1. As described in the Data Collection Section various surveys and reports were identified where inferences can be drawn on visitor numbers and visitor activities at the International Sites in this study. Relevant information is given in the sections below, but readers are directed to the original documents to see how the data were derived.

Table 1: International Sites where types of recreational disturbance have been assessed as being potentially damaging to their key ecological features in their designations

	Type of disturbance	North Norfolk coast SAC	Norfolk Valley Fens SAC	River Wensum SAC	The Broads SAC	Winterton – Horsey SAC	Broadland SPA	Great Yarmouth North Denes SPA	North Norfolk Coast SPA	Broadland Ramsar	North Norfolk Coast Ramsar
Coastal sites	Coastal Sites Sensitive to Trampling or Erosion from Human Activity	x				x		x	x		x
	Coastal Sites with Bird Populations Sensitive to Disturbance in Summer	x				x		x	x		x
	Coastal Sites with Bird Populations Sensitive to Disturbance in Winter	x				x			x		x
	Coastal Sites with Mammal Populations (Seals) Sensitive to Disturbance in Summer	x							x		x
	Coastal Sites with Mammal Populations (Seals) Sensitive to Disturbance in Winter	x				x			x		x
Inland sites	Inland Sites with Sensitive Bird Populations in Summer				x		x			x	
	Inland Sites with Sensitive Bird Populations in Winter				x		x			x	
	Inland Sites Sensitive to Erosion from Trampling		x	x	x		x	x		x	
	Inland Aquatic Sites with species sensitive to boat disturbance and fishing (Otters, Mussels and White-clawed Crayfish)			x	x		x			x	
	Visitor pressure listed as an issue in the Natura 2000 Standard Data Form	x				x		x	x		

North Norfolk Coast (SAC, SPA and Ramsar)

5.4.2. The information gathered for the North Norfolk Coast (SAC, SPA and Ramsar) is included in Table 2. Some of it is extracted from surveys undertaken by the Norfolk Coast AONB. It should be noted that the boundary of the AONB does not coincide with the International designations; in particular it includes land on the east coast including Horsey-Winterton Dunes SAC.

5.4.3. Numbers of visitors at specific sites within the North Norfolk Coast International Sites are given in Table 3. These data are derived from several sources including car parking tickets and permits to enter nature reserves. Some figures have been provided by reserve managers specifically for this study.

Table 2: Visitor surveys relevant to the International Sites on the North Norfolk Coast

North Norfolk Coast SAC/SPA/Ramsar: Survey information	
From www.norfolkcoastaonb.org.uk:	• The North Norfolk coast catchment is estimated to be 176,000 within 30min drive, 800,000 within 1hr and 2.7million within 2hrs • Approximately 1.8m - 2.1m tourism day trips are made to the Norfolk Coast AONB per annum.
From Norfolk Coast AONB Tourism Benefit and Impacts Analysis (Scott Wilson, 2006). Note: the AONB boundary does not correspond with the boundaries of the International Sites.	• Traffic along the A149 (Morston & Holkham) rises from about 420 movements per day in either direction in January, to about 2,000 movements in either direction in August. • Holkham Reserve is the Nature Reserve considered to be under the greatest pressure through sheer volume alone, with an estimated 750,000 – 1 million visitors per year. • Beach/Shore users cause the most amount of disturbance incidents recorded within the AONB study areas (29%), a high proportion (9 incidents in every 10) of which are observed to cause some form of damage or disturbance to wildlife or habitats. • Just under a quarter of all incidents (23%) relate to aircraft activity, with 95% of these causing damage or disturbance to marine/habitat features. Low flying leisure craft, in particular, have been observed to disturb wader, seal and tern colonies within Blakeney.
Titchwell Marsh and Snettisham Nature Reserves Visitor Survey (unpublished, but data reported in the East of England Regional Assembly's East of England HRH Plan Review, March 2010)	• Results of a survey of 285 visitors between October 2007 and June 2008 • 43% came from Eastern England, 17% East Midlands and 9% Yorkshire and Humberside.
Countryside Agency Leisure Day trip survey 1998	• In 1998, leisure day visits in England involved an average round trip of just under 16 miles. The longest distances were travelled on seaside/coastal trips - 43 miles.

5.4.4. These data for the North Norfolk International Sites are far from comprehensive, but they do allow some general points to be made. It is concluded that:

- There is a very large visitor catchment to the north coast (2.7 million within 2hrs drive);
- There is a very large number of visitors (>2 million day trips p.a.);

- There are key honey-pot sites that attract very large numbers of visitors (e.g. Holkham NNR with up to 1million visitors p.a. and the National Trust car parks at Blakeney and Morston quays);
- There are seasonal differences in visitor numbers, as one would expect, but these are not the same across the whole coast (e.g. less variation at Holkham, Lady Anne's Drive where visitor numbers are high all year than at Blakeney quay car park where visitor numbers are concentrated in the period Easter to September);
- Disturbance to wildlife does occur (e.g. Low flying leisure craft have been observed to disturb wader, seal and tern colonies within Blakeney NNR). Erosion is also an issue (boardwalks have been created over dunes at key points where visitors cross to access the sea e.g. at Burnham Overy and at Blakeney Point).

Table 3: Visitor numbers at key component sites of the North Norfolk Coast International Sites

North Norfolk Coast SAC/SPA/Ramsar: Visitor numbers			
Component Sites	*Visitor numbers*	*Year of data collection*	*Source/ references*
Blakeney Quay car park	140,000	2009	National Trust, from car parking permits issued
Morston Quay car park	140,000	2009	National Trust, from car parking permits issued
Cley Marshes visitor centre	100,000	2010	NWT data collected by automatic visitor counters, 2010
Cley Marshes reserve	30,000	2010	NWT data from permits issued (members & non-members)
Lady Anne's Drive, Holkham	110,000	unknown	Reported in East of England HRA Plan Review, March 2010
Snettisham beach car park	41,000	unknown	Reported in East of England HRA Plan Review, March 2010
Holme Dunes NWT Reserve	20,000	2009	NWT data from permits issued (members & non-members)
Holme Dunes NWT beach/reserve	100,000	2010	NWT data from counts and extrapolation
Titchwell Marsh RSPB visitor centre	150,000	2008/09	Reported in East of England Plan Review, March 2010

The Broads SAC, Broadland SPA and Ramsar

5.4.5. Similar data-mining has been undertaken for the Broads/Broadland International Sites. Data from surveys and reports are summarised in Table 4 and visitor number estimations are summarised in Table 5.

Table 4: Visitor survey information relevant to the Broads/Broadland International Sites

Broadland SPA/Ramsar, The Broads SAC: Survey information	
From visitor survey undertaken by the Broads Authority in August- September 2005: 898 respondents	*Day visitors:* • Of people visiting the area for the day, 45% were land-based • 7% of day-visitors were water-based • 88% of day visitors were from the East of England, i.e. 12% of visitors travelled from outside the counties of Norfolk, Suffolk, Cambridge and Essex for a day visit
	Activities: • Most frequent activity for a visit was walking (defined as under one hour) • 69% of visitors had done this, rising to 80% with the inclusion of those planning to do the activity during their current visit • 13% had (knowingly) visited a nature reserve • 16% of all parties had a dog with them, rising to 21% on boats
Broads Authority: numbers of licenced boats in 2010	• 936 Hire Cabin-boats • 1,241 total of all Hire boats (cabin-boats and day boats)
RSPB Strumpshaw 2008- visitor survey unknown no of respondents	• 67% of visitors to the reserve were from within 15miles
NWT Hickling NNR unpublished data	• Surveys and counts undertaken in 2008/09 indicated that only around one-fifth of land-based visitors to the NNR complex used the visitor centre, the car park, the water or land-based trails • Other visitors walked on the Weaver's Way footpath, or used the Stubb Mill Watch-point for which no permits are required. Boat use on the Broad was not monitored.

Table 5: Visitor numbers at key component sites of the Broads/Broadland International Sites

Broadland SPA/Ramsar, The Broads SAC: Visitor numbers			
General & Local sites	*Visitor numbers*	*Year of data collection*	*Source*
Total number of visitors to the Broads (day visitors, holiday visitors & boat users)	7 million	2010	Broads Authority estimation (provided March 2011)
NWT Ranworth Visitor Centre (there is no pedestrian access to reserve)	45,000	2009	NWT data collected by counts to visitor centre with extrapolation
NWT Hickling NNR Visitor Centre and trails	20,000	2009	NWT data, from permits issued
NWT Hickling NNR including Stubb Mill Raptor Watch-point & Weavers Way Footpath	100,000	2007/08	NWT data based on timed counts and extrapolation
RSPB Strumpshaw Fen	20-25,000	2008	RSPB data, from permits issued

5.4.6. Once again, these data for the Broads International Sites are far from comprehensive, but they also allow some general conclusions to be made:

- The International Sites receive very large numbers of visitors (the region has 7million tourist visits p.a.)
- Day visitors are coming from a wide catchment (e.g. 12% from outside the eastern counties);
- Boat use is high and the potential for effects on wildlife from associated activities are large;
- The majority of visitors take short walks in the area and therefore there is potential for land-based disturbance, however the number of visitors to Key Nature Reserves (NWT Hickling NNR, NWT Ranworth, RSPB Strumpshaw) are moderate.

Great Yarmouth North Denes SPA

5.4.7. Little information was found regarding visitor numbers to this International Site. The results of a survey undertaken at Great Yarmouth North Denes SPA on 31st January, 2009 (reported in the East of England HRA Plan Review, March 2010) recorded:

- 16 walkers along the northern shore away from Great Yarmouth.
- 13 walkers along the northern shore towards Great Yarmouth.
- 28 walkers along the southern shore away from Great Yarmouth.
- 20 walkers along the southern shore towards Great Yarmouth.

5.4.8. The study concluded that the low levels of use in winter were unlikely to have an effect on wintering birds but it should be noted that the qualifying feature of the SPA is breeding Little Terns *Sterna albifrons*.

5.4.9. The Little Tern population at North Denes (±SD) between 1986 and 2005 was 181.1 (±70.6) pairs (data from a variety of sources, largely Natural England and RSPB). This represents approximately 10% of the UK population. The mean number of chicks per pair (data for the years 1995- 2003 only) was 0.7, range 0.0 (1998) – 1.6 (1996). Numbers are known to be affected by high tides washing out nests and productivity from predation, often by Kestrels (Medeiros *et al*., 2007).

5.4.10. The effects of humans on Little Tern populations is known to have the potential to be damaging (Gill, 2005); the population at North Denes was virtually destroyed by vandals in 2002 (OSPAR, 2006). A report undertaken by consultants on breeding Little Terns at North Denes (Footprint Ecology, 2008) concluded that the SPA was clearly currently vulnerable to disturbance and this could increase as a consequence of planned growth in the area of Great Yarmouth.

5.4.11. The effect of disturbance to Little Terns has been identified as a research priority in a national review of research relating to access and birds (Liley & Slater, 2007 in Footprint Ecology, 2008).

Winterton–Horsey Dunes SAC

5.4.12. Local residents and tourists use the long sandy beach for walking and bathing, predominantly in the summer season of June to August. Areas of high use are located where the beach is accessible by road. Access to the beach in the general area is provided by “Gaps”, at which roads or tracks cross the dunes including Sea Palling Gap, Waxham, Horsey and Winterton. There are footpaths along some sections of the top of the dune ridge

including a public footpath between Horsey and Bramble Hill. In addition to land-based activities, the coastline itself provides a valued resource for water-based recreation and attracts a diverse range of activities including jet-skiing, motor cruising, angling and bird-watching (OSPAR, 2006).

5.4.13. The Little Tern population at Winterton–Horsey Dunes SAC between 1989 and 2006 was 36.6 pairs, range 0 (1998) – 225 (2003). The mean number of chicks per pair (data for the years 95-97, 99, 2003-2005) was 1.0, range 0.3 in 1996 to 2.2 in 1999 (data derived from various sources for different time periods).

5.4.14. Post 2000, Grey Seals *Halichoerus grypus* have established a breeding population in the Winterton-Horsey SAC with over a hundred pups being born each year since 2005 (OSPAR, 2006). Grey Seal pups are present on parts of the beach between November and February and are unable to swim for the first 3-4 weeks of their lives, making them highly vulnerable to disturbance during this period.

Other International Study Sites

5.4.15. Data from surveys or existing up-to-date reports for the other International Sites, Norfolk Valley Fens SAC and the River Wensum SAC was found to be very limited.

5.4.16. For these sites an alternative approach was taken. The component SSSIs were assessed for their current access arrangements and the sensitivity of their habitats. This is shown in Table 6.

5.4.17. It is presumed that most of the component SSSIs are likely only used by local people from very nearby, usually just villages. They are generally very sensitive habitats (Table 6). Most do not have car parks and do not attract visitors from further afield. The exceptions to this are:

- Buxton Heath SSSI (Valley Fens SAC) – attracts visitors from a little further afield; has a larger car park than most other of the component SSSIs;
- Holt Lowes SSSI (Valley Fens SAC) – visitors to the adjacent Holt Country Park (with Visitor Centre, car park and toilets) spill out onto this reserve; it is known for specialist wildlife (Adder *Vipera berus*, the dragonfly *Orthetrum coerrulescens*);
- Sheringham & Beeston Regis Common SSSI (Valley Fens SAC) – closer to a large centre of population than many of the component SSSIs (the town of Sheringham) and therefore likely to be more heavily used; the area is known for its orchid populations (especially *Epipactis palustris*) and invertebrate populations;
- Thompson Water, Carr and Common SSSI (Valley Fens SAC) – includes NWT Thompson Common Reserve with car park, specialist habitats and wildlife (especially the Scarce Emerald Dragonfly *Lestes dryas*); there is also a well-advertised Pingo Trail.

5.4.18. It is recommended that data on visitor usage should be collected to clarify assumptions, in particular:

- Visitor usage of the Wensum SAC – no data was found on visitor numbers; the recreational activities at this site are unknown; Visitor surveys are recommended
- Visitor usage of the individual component SSSI of the Valley Fens – it is believed that some receive higher numbers of visitors than others and receive visitors from further afield (e.g. Buxton Heath, Holt Lowes); data collection is a priority where component sites are near to future residential development; visitor surveys are recommended

5.5. Managing Visitors at International Designated sites

5.5.1. For some of the International Sites there is zoning of visitor usage. This is official in some areas (e.g. North Norfolk) and unofficial, but occurring as a result of circumstances, in others (the Broads).

Visitor Zoning in North Norfolk

5.5.2. It was suggested by some site managers spoken to as part of this study, that the numbers of visitors at certain sites in north Norfolk was causing detriment to qualifying habitats. Lady Anne's Drive at Holkham was given as an example. The view of other site managers, however, was that this took pressure off other very sensitive areas and concentrated visitors here and was therefore beneficial to the International Site as a whole. Management zoning of visitors is accepted policy in the North Norfolk AONB.

5.5.3. The Norfolk Coast Partnership adopted a Visitor Management Strategy in the Norfolk Coast AONB in 1995. A key outcome of the Visitor Management Strategy was a management-zoning system, whereby the AONB was divided into zones according to varying degrees of habitat sensitivity and visitor pressures. The zones within the strategy are summarised in Table 7.

5.5.4. Although based on the AONB boundaries, rather than the International Site boundary, the strategy draws visitors away from the sensitive coastal areas by not promoting certain sites and by reducing car parking in these areas. Furthermore, visitors are encouraged to use countryside sites away from the coast for example Holt Country Park and Pretty Corner Woods, Sheringham both owned by North Norfolk District Council and the countryside properties of the National Trust at Felbrigg, Sheringham Park and Blickling.

5.5.5. Various land-owning bodies at the North Norfolk Coast continue to invest in visitor facilities and are clearly promoting 'natural' sites. For example the RSPB has invested heavily in new state-of-the-art bird hides at Titchwell and NWT Cley is continuing to expand its visitor centre and car parks, with future work planned.

5.5.6. The effect of land owners expanding capacity at these sites will be to:

- Have the infrastructure in place to cope with increasingly large numbers of visitors;
- Concentrate visitors in to certain sites to protect other, more sensitive, sites.

Table 6: The assessment of component SSSIs of the Valley Fens SAC, with the River Wensum SAC with regards to public access arrangements. The assessment of the sensitivity of the habitats is as described in the Report by NWS on County Wildlife Sites (March 2011) using a Traffic Light approach.

International Designation	Component SSSI	Habitats present	Sensitivity (Red, Amber, Green)	Current access arrangements	Notes
Valley Fens SAC	Badley Moor, Dereham	valley fen, grassland	Red		Local use only. No car parking
	Booton Common	valley fen, wet grassland	Red	Open Country under Crow Act	Local use only. No car parking
	Buxton Heath	valley mire	Red	Open Country under Crow Act	Small car park (<15 vehicles), local use & a little further afield
	Coston Fen, Runhall	valley fen	Red		Local use only.
	East Walton Common & Adcock's Common	grassland, fen	Amber	Public footpath	Local use only.
	Florodon Common	valley fen	Red		Local use only.
	Foulden Common	valley fen	Red		Local use only.
	Great Cressingham Fen	valley fen	Red		Local use only.
	Holt Lowes	heathland, valley fen	Red	Open Country under Crow Act	Access through Holt Country park. Local use and somewhat further afield
	Potter & Scarning Fen	valley fen	Red		local use
	Sheringham & Beeston Regis Common	heathland, fen	Red	Public footpaths	Small car Park, local use and a little further afield; close to town of Sheringham
	South Repps Common	grassland, fen	Red	Public footpaths; boardwalk	local use only
	Swangey Fen, Attleborough	fen	Red		
	Thompson Water, Carr and Common	fen, grassland, woodland, open water	Red	Not registered common, no public footpaths	NWT Thompson Common; access by permissive path, Pingo Trail advertised
River Wensum SAC	River Wensum	river	Amber		Unknown

Table 7: Management zones in the Norfolk Coast partnership's Visitor Management Strategy, 1995

Management Zone	*Examples of Areas included*	*Features*
Red Zone	Holme Dunes, Holkham Dunes, Blakeney Point and Winterton Dunes	These are defined as the most fragile wildlife habitats in the AONB, and yet are under considerable visitor pressure. The strategy denotes a strict management technique of not promoting to visitors, and the reduction of parking
Dark Orange Zone	Coastal stretches of the East and West AONB outliers; and the majority of the Heritage Coast between Holme and Weybourne	These still contain fragile habitats, but are regarded as slightly less susceptible to visitor pressures. The potential for visitor activity will not be promoted, although any attention that is received is to be redirected to the Hatched Orange Zone.
Hatched Orange Zone	This zone includes selected Nature Reserves and rural beaches	This zone denotes that, although sensitive to visitor use, these areas are better able to absorb visitors. The purpose of these areas is to draw usage away from both Red and Orange zones, although the emphasis is on the pursuit of activities that compliment the nature conservation characteristics
Light Orange Zone	This includes most of the Eastern Outlier and the Western AONB outlier that borders the Dark Orange Zone.	This is an intermediate area with visually sensitive open landscapes, but lying adjacent to fragile wildlife habitats. These areas are carefully promoted, but also managed to ensure that activity does not spill over into more sensitive locations.
Light Green Zone	Largely this zone is between Ringstead and Holt bordering the Light Orange Zone and the south AONB boundary	This is a more robust area within the AONB, with its sensitivity level mainly due to its proximity to the Heritage Coast. As such, the area is to be promoted for its soft recreational activities (walking, cycling, horse-riding, etc) to draw attention away from the more sensitive coastal areas.
Dark Green Zone	The Dark Green Zone covers the majority of the hinterland areas, including the area between Holt/Upper Sheringham and Paston.	This zone denotes the most robust areas, and is highlighted as a priority for visitor activity. Yet the majority of this area has fewer visitor pressures.

Visitor Zoning in the Broads

5.5.7. According to site managers, a zoning system operates in the Broads area, at least in terms of land-based recreation, but on an unofficial basis. Some sites are actively promoted with visitor facilities such as car parks, toilets, bird hides, nature/walking trails and visitor centres. These enable visitors to enjoy the wildlife of the region in a managed way. Examples of promoted sites include:

- Hickling NNR (NWT)
- Strumpshaw Fen (RSPB)
- How Hill (Broads Authority)
- Ranworth floating visitor centre (NWT)
- Horsey Estate (National Trust)

5.5.8. Other sites offer limited access but are not promoted and do not have visitor facilities. Generally they have very small (or no) car parks and no visitor centres or toilets, although

they may have low-key way-marked nature trails. Example sites include NWT Upton Fen, NWT Alderfen Broad and parts of the Ant & Bure Marshes.

5.5.9. Other areas within the International Site have no public access, either being privately owned (e.g. parts of the Ant and Bure Marshes) or deliberately restricted so as not to adversely affect wildlife (e.g. RSPB Sutton Fen).

Wardening

5.5.10. Some wardening of key wildlife areas within the International Sites is undertaken by conservation bodies and volunteers to reduce disturbance to qualifying features, particularly breeding birds and mammals. For example in summer, breeding tern colonies are fenced-off and wardened at Blakeney Point NNR (National Trust) and Great Yarmouth North Denes. In winter, the breeding Grey Seals at Horsey-Winterton are wardened by volunteers managed by Natural England and the Broads Authority.

6. Analysis

6.1. General assessment

6.1.1. The work undertaken for this report allows some initial conclusions on the consideration of visitor pressure on International Sites as a result of the growth within the GNDP area.

6.1.2. From the data, the existing visitor numbers at the International Sites can be assessed (Table 8). For many of the sites, it is presumed that visitors are from the wider region and from further afield. The exceptions to this are the Norfolk Valley Fens SAC and the River Wensum SAC where it is presumed visitors tend to be just local.

6.1.3. Whilst a number of assumptions have been made in making the assessment for the study due to deficiencies in data, in particular to actual numbers of visitors using International Sites (and components of them), the distances people travel to visit International Sites and visitor behaviour throughout the year, the general principles are considered robust.

6.1.4. It is recommended that the uncertainty inherent in the assessments in this study could be reduced by:

- A more extensive search for relevant studies;
- Collection of additional data (refer to Paragraph 5.4.18);
- Long-term monitoring of habitats at key sites and long-term monitoring of visitor numbers to allow analysis to identify change and enable the testing of a relationship between visitor numbers and habitat change.

6.2. General or localised visitor pressure?

6.2.1. Some individual component SSSIs and local parts of International Sites experience very high numbers of visitors. There are several of these honey-pot sites at the coast and in the Broads. However, visitor pressure varies in intensity across these sites and there are areas where visitor pressure is likely to be considerably less. It is presumed, for example, in the Broads SAC that 4 or 5 of the 28 component SSSIs receive the majority of the land-based visitor pressure. It follows that any adverse effects from land-based recreation will probably therefore be concentrated in these locations.

6.2.2. Various strategies operate to limit the effects of visitor pressure. Managers of individual component sites provide facilities to control usage and provide wardens to protect qualifying features at key times. On a wider scale, zoning of visitor usage operates which

promotes sites where the effects of visitor pressure are less, either due to their inherently less sensitive habitats or by active visitor management, whilst restricting access to other sites.

Table 8: Assessment of current visitor numbers at International Sites

HIGH visitor numbers	***MEDIUM or LOW visitor numbers***
With visitors from the wider region	*Local visitors only*
• North Norfolk Coast SAC – *parts of site* • The Broads SAC – *parts of site* • Winterton - Horsey SAC • Broadland SPA & Ramsar – *parts of site* • North Norfolk Coast SPA & Ramsar – *parts of site* • Great Yarmouth North Denes SPA	• Norfolk Valley Fens SAC • River Wensum SAC

6.3. Final assessments

6.3.1. The GNDP's Joint Core Strategy (JCS) was subject to a Habitats Regulation Assessment in February 2010 which stated that uncertainty remained regarding the potential impacts of in-combination and cumulative effects associated with growth and tourism on European and Ramsar designated sites resulting from the planned growth within the GNDP area and neighbouring areas, but concluded that it is highly unlikely that JCS policies alone would have significant direct or indirect effects on the European and Ramsar sites provided that mitigation took place. It indicated that uncertainty could be reduced through the implementation of green infrastructure developments and the allocation of green space to protect specific natural assets and designated sites.

6.3.2. The visitor survey data indicates that people living in new developments within the GNDP area will be in the catchment of all the International Sites. If they venture into the countryside, they are probably likely to visit the well-known honey-pot sites in the Broads and North Norfolk International Sites, or individual component units of the other International Sites, but only if they live very near to them.

6.3.3. The view of some site managers (but not all) was that some parts of the International Sites, such as certain honey-pot locations at the North Norfolk Coast and Great Yarmouth North Denes SAC, have such significant visitor pressure currently that they are already at or exceeding their carrying capacity (see paragraph 5.5.2 above). This implies that they will suffer damage to their qualifying features from any additional visitor use, whether it is associated with development from within the GNDP area or elsewhere.

6.3.4. However, from speaking with site managers, it appears that certain sub-units in various ownerships have recently invested in visitor management facilities and continue to promote additional highly-managed access. This has happened both in the Broads and North Norfolk International Sites.

6.3.5. The zoning of use in the Broads and North Norfolk International Sites indicates that growth within the GNDP area may not adversely affect these International Sites as visitor recreational capacity appears to be available at key sites and visitor usage highly managed.

However, for Winterton - Horsey SAC and Great Yarmouth North Denes SAC it is presumed that existing visitor pressure may be damaging at peak periods.

6.3.6. It is presumed that current visitor usage of the Wensum SAC and the Valley Fens SAC is limited and not causing any significant adverse effects. It is believed that the component SSSIs are used only by local residents from the immediate vicinity. These sites all have habitats sensitive to visitor pressure and further promotion of the sites is not recommended.

6.4. Summary of the assessment for International Sites

6.4.1. The overall effects on the International Sites from growth within the GNDP are summarised in Table 9. It should however be stressed that these assessments are made with the limited data available and with the presumptions noted in the section above. However the general principles are considered robust.

Table 9: Overall assessment of the possible effects of growth within the GNDP area on International Sites; refer to the text for where assumptions have been made

International Site	***Assessment of effect from growth within the GNDP area based on data available***	***Reason***
North Norfolk Coast SAC; North Norfolk Coast SPA & Ramsar	Some local sites that are under existing pressure may have added visitors with potential adverse effects on qualifying features	Key honey-pot s sites attract high visitor numbers with the potential for negative effects. However, zoning and promoting of certain sites within the area should result in controlled visitor management; Owning bodies of key sites continue to promote visitor use and are investing to continue to do so.
The Broads SAC; Broadland SPA & Ramsar	No negative effect overall but certain honey-pot sites may suffer additional usage with potential adverse effects on qualifying features	Key honey-pot s sites attract high visitor numbers with the potential for negative effects. However, zoning and promoting of certain sites should result in controlled visitor management; key sites appear to have spare capacity and continue to promote visitor use
Winterton - Horsey SAC	Possible negative effect; any additional usage may have adverse effects on qualifying features	Site already very heavily used at peak periods; habitats susceptible to damage from trampling and qualifying features susceptible to disturbance
Great Yarmouth North Denes SPA	Possible negative effect; any additional usage may have adverse effects on qualifying features	Site already very heavily used at peak periods; habitats susceptible to damage from trampling and qualifying features susceptible to disturbance
Norfolk Valley Fens SAC	Possible negative effect; significant increase in usage may have adverse effects on qualifying features	Sites are used by local people from very nearby; habitats susceptible to damage from trampling; significant increase in visitor numbers may be detrimental
River Wensum SAC	Unknown	Information is not available to make a judgement for this site

7. Summary

7.1. Norfolk Wildlife Services undertook a study to assess the carrying capacity for visitors of identified International Sites potentially affected by the planned growth within the GNDP.

7.2. The study used available information from both the peer-reviewed and grey literature and information provided by site managers to assess the broad-scale habitat sensitivity of the International Sites and current visitor numbers and usage. This allowed an assessment to be made as to whether an International Site was currently suffering ecological damage from visitors, and was therefore at or exceeding carrying capacity, or whether it was able to take more visitors.

7.3. The study relies on a number of assumptions being made, these relating to shortages in, and the fragmented nature of, the data available, and the difficulty of defining quantitatively the 'carrying capacity' at each site.

7.4. For the larger International Sites assessments on the visitor pressure were made for individual component or local sites. These assessments were then drawn together to synthesise conclusions for the International Site as a whole. For the Norfolk Valley Fens SAC and the River Wensum SAC data were very limited. For these sites, the component SSSIs were assessed for their current access arrangements and the sensitivity of their habitats.

7.5. The study indicated that individual sites within the North Norfolk SAC/SPA/Ramsar may currently be at carrying capacity in terms of visitor usage. The same may be true at honey-pot sites within the Broads International Sites and at Winterton - Horsey SAC and Great Yarmouth North Denes SAC. The other International Sites have sensitive habitats but visitor pressure was assessed as low to medium.

7.6. People living in new developments within the GNDP area will be in the catchment of all the International Sites. If they venture into the countryside, they will probably visit the well-known honey-pot sites in the Broads and North Norfolk International Sites or individual component units of the other International Sites - but only if they live very near to them. In addition, visitors will also likely arise from growth elsewhere.

7.7. The zoning of use in the Broads and North Norfolk International Sites indicates that growth within the GNDP area may not cause adverse effects on these International Sites as there is visitor capacity at key sites and visitor usage is highly managed. However, for Winterton - Horsey SAC and Great Yarmouth North Denes SAC it is presumed that existing visitor pressure may be damaging at peak periods.

7.8. It is presumed that current visitor usage of the Wensum SAC and the Valley Fens SAC is limited and not causing any significant adverse effects. It is believed that the component SSSIs are used only by local residents from the immediate vicinity. These sites all have habitats sensitive to visitor pressure and further promotion of the sites is not recommended.

7.9.

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Appendix 1: Component SSSI units of SACs

Component SSSIs of the Broads SAC	Component SSSIs of the Norfolk Valley Fens SAC
Alderfen Broad	Badley Moor, Dereham
Ant & Bure Marshes	Booton Common
Barnby Broad & Marshes	Buxton Heath
Broad Fen, Dilham	Coston Fen, Runhall
Bure Broads & Marshes	East Walton Common & Adcock's Common
Burgh Common & Muckfleet	Florodon Common
Calthorpe Broad	Foulden Common
Cantly Marshes	Great Cressingham Fen
Crostwick Marshes	Holt Lowes
Damgate Marshes, Acle	Potter & Scarning Fen
Decoy Carr, Acle	Sheringham & Beeston Regis Common
Duncan's Marsh, Claxton	South Repps Common
Geldeston Meadows	Swangey Fen, Attleborough
Hall Farm Fen, Hemsby	Thompson Water, Carr and Common
Halvergate Marshes	
Hardley Flood	
Limpenhoe Meadows	
Ludham to Potter Heigham Marshes	
Poplar Farm Meadows, Langley	
Priory Meadows, Hickling	
Shallom Dyke Marshes, Thurne	
Smallburgh Fen	
Sprat's Water & Marshes, Carlton Colville	
Stanley & Alder Carrrs, Aldeby	
Trinity Broads	
Upper Thurne Broads & Marshes	
Upton Broad & Marshes	
Yare Broads & Marshes	

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Appendix 2: Further studies on the effects of visitor pressure

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APPENDIX 3: International Sites and their qualifying features

Special Areas of Conservation			
Name	**Area (ha)**	**Qualifying Features**	**Key environmental conditions to support site integrity**
Norfolk Valley Fens	616.21	• Wet heathland and cross-leaved heath • Dry heath • Dry grassland and scrubland on chalk or limestone • Purple moor-grass meadows • Calcium-rich fen dominated by great fen sedge (saw sedge). • Alder woodland and floodplains • Narrow-mouthed whorl snail • Desmoulin's whorl snail	• High water table. • Calcareous, base-rich water supply • Minimal air pollution. • Absence of nutrient enrichment
North Norfolk Coast	3207.37	• Lagoons • Coastal shingle vegetation outside the reach of waves • Mediterranean saltmarsh shrub • Shifting dunes • Dune grassland • Shifting dune with marram • Humid dune slack • Otter • Petalwort	• Sufficient space between the site and development to allow for managed retreat of intertidal habitats and avoid coastal squeeze. • Managed levels of recreation • No dredging or land-claim of coastal habitats. • High enough water table for dune slacks (and especially petalwort) • Appropriate grazing to maintain necessary vegetation structure, • Avoidance of trampling or other activities causing erosion on dunes • No increase in organic matter in sediments • Presence of exposed beach plain at low tide to supply sand and organic matter to embryonic dunes) • Control of invasive and/or non-native species (e.g. sea buckthorn, poplars and pines).
River Wensum Norfolk	381.74	• Rivers with floating vegetation often dominated by watercrowfoot • White-clawed (or Atlantic stream) Crayfish • Bullhead • Brook lamprey • Desmoulin's whorl snail	• Maintenance of flow velocities - low flows interact with nutrient inputs from point sources to produce localised increases in filamentous algae and nutrient-tolerant macrophytes at the expense of Ranunculus. • Low levels of siltation • Minimal turbidity • Unpolluted water and low nutrient inputs. • Absence of non-native specie
The Broads	5865.6	• Calcium-rich, nutrient-poor, lakes, lochs and pools • Naturally nutrient-rich lakes or lochs which are often dominated by pondweed • Very wet mires often identified by an unstable 'quaking' surface • Calcium-rich fen dominated by great fen sedge (saw sedge). • Calcium-rich springwater-fed fens • Alder woodland on floodplains • Purple moor-grass meadows • Desmoulin's whorl snail • Anisus vorticulus Little whirlpool Ramshorn snail (as of March 2011) • Fen orchid • Otter	• Avoidance of saline intrusion • Maintenance of sufficiently high water table • Unpolluted water • Absence of direct nutrient enrichment • Managed recreational access • Calcareous, base-rich water supply • Carefully balanced hydrological regime to maintain mires and pools. • Minimal air pollution (nitrogen deposition can cause compositional changes over time).
Winterton – Horsey	425.94	• Coastal dune heathland • Humid dune slacks • Shifting dunes • Shifting dunes with marram	• Sufficient space between the site and development to allow for managed retreat of intertidal habitats and avoid coastal squeeze. • Unpolluted water. • Absence of nutrient enrichment. • High enough water table for dune slacks • No increase in organic matter in sediments • Presence of exposed beach plain at low tide to supply sand and organic matter to embyonic dunes. • Control of invasive and/or non-native species (e.g. sea buckthorn, poplars and pines).

Special Protection Areas			
Broadland	5462.4	Populations of European importance of the following species *Breeding:* Bittern Marsh harrier *Overwinter:* Bewick's swan Bittern Hen harrier Ruff Whooper swan Gadwall Pink-footed goose Shoveler The site also supports a bird assemblage of international importance over winter	• Minimal recreational disturbance • Maintenance of grazing regime • Maintenance of water supply • Absence of nutrient enrichment • Unpolluted water • Lack of disturbance during winter months (October to March) • Area of open water. • Area of shallow water (<30cm) for feeding. • Presence and abundance of aquatic plant food (e.g. sweet-grass and pondweeds). • Presence and abundance of aquatic invertebrate food. • Adjacent grassland nearby • Managed water levels (e.g. for bittern) • Appropriate hydrology of wet grasslands (for waders)
Great Yarmouth North Denes	149.19	Populations of European importance of the following species *Breeding:* Little tern	• Minimal disturbance • Sufficient space between the site and development to allow for managed retreat of intertidal habitats and avoid coastal squeeze. • Unpolluted water. • Maintenance of uninterrupted views • Open space for nesting terns
North Norfolk Coast	7886.79	Populations of European importance of the following species *Breeding:* Avocet Bittern Common tern Little tern Marsh harrier Mediterranean gull (listed only in SPA Review, 2001 Roseate tern (listed only in SPA Review, 2001) Sandwich tern Redshank (listed only in SPA Review, 2001) Ringed plover (listed only in SPA Review, 2001) *Over winter:* Avocet Bar-tailed godwit (listed only in SPA Review, 2001) Bittern Golden plover (listed only in SPA Review, 2001) Hen harrier (listed only in SPA Review, 2001) Ruff (listed only in SPA Review, 2001) Dark-bellied Brent goose Knot Pink-footed goose Pintail (listed only in SPA Review, 2001) Redshank Wigeon *On passage:* Ringed plover The site also supports a bird assemblage of international importance over winter	• Minimal disturbance • Maintenance of grazing / mowing regimes • Freshwater inputs are of value for providing a localised increase in prey biomass for certain bird species, specific microclimatic conditions and are used for preening and drinking. • Sufficient space between the site and development to allow for managed retreat of intertidal habitats and avoid coastal squeeze. • Unpolluted water. • Absence of nutrient enrichment. • Absence of non-native species and control of cord grass encroachment. • Balance of saline and non-saline conditions • Short grasslands surrounding the site are essential to maintaining interest features as they are now the key foraging resource for dark-bellied Brent goose • Control of bait digging, dredging and fishing • Maintenance of uninterrupted views • Maintain hydrology of wet grassland (for waders). • Maintenance of natural sedimentation patterns

Ramsar Sites			
Broadland	5488.61	The site supports a number of rare species and habitats within the biogeographical zone context. The site supports internationally important populations of tundra swan, wigeon, gadwall and northern shoveler.	• Unpolluted water. • Absence of nutrient enrichment. • Control of non-native species (e.g. pennywort and crassula). • Maintenance of appropriate hydrological regime. • Low recreational disturbance
North Norfolk Coast	7862.39	The site is a particularly good example of a marshland coast with intertidal sand and mud, saltmarshes, shingle banks and sand dunes The site supports at least three British Red Data Book and nine nationally scarce vascular plants, one British Red Data Book lichen and 38 British Red Data Book Invertebrates The site supports internationally important assemblages of wintering birds The site supports internationally significant numbers of sandwich tern, common tern, and little tern (breeding), knot (passage), and pink-footed goose, dark-bellied brent goose, wigeon and northern pintail (winter).	• Minimal recreational disturbance • Maintenance of grazing / mowing regimes • Freshwater inputs are of value for providing a localised increase in prey biomass for certain bird species, specific microclimatic conditions and are used for preening and drinking • Sufficient space between the site and development to allow for managed retreat of intertidal habitats and avoid costal squeeze • Absence of nutrient enrichment. • Absence of non-native species. • Balance of saline and non-saline conditions • Short grasslands surrounding the site are essential to maintaining interest features as they are now the key foraging resource for dark-bellied Brent goose • Control of bait digging, dredging and fishing • Maintenance of uninterrupted views • Maintain hydrology of wet grassland (for waders). • Maintenance of natural sedimentation patterns