

Habitat Regulation Assessment: Barrow-cum- Denham Neighbourhood Plan

Barrow Parish Council & Denham Parish Council

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Quality information

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1. Introduction

Scope of project

- 1.1 AECOM was appointed by Barrow Parish Council and Denham Parish Council to undertake a Habitats Regulations Assessment (HRA) for the Barrow-cum-Denham draft Regulation 14 Neighbourhood Plan 2019-2040. This is to inform the planning group and local councils of the potential effects of Neighbourhood Plan (NP) development on European Sites and how they are being, or should be, addressed in the draft NP.
- 1.2 The adopted St Edmundsbury Local Plan supporting document: Rural Vision 2031, was subject to HRA in August 2014. The primary conclusions of that HRA were that development within the Rural area of the St Edmundsbury district would not have any adverse effects on the integrity of any of the identified European Sites, either alone or in combination with other development within the district such as the Bury St Edmunds Vision 2031 and Haverhill Vision 2031.
- 1.3 The Rural Vision 2031 allocates three sites for development in Barrow and a total of 179 dwellings over the planning period. Planning permission has been granted for 40 dwellings at Land on the Green and for 80 dwellings at Land west of Barrow Hill. However, this was published based on the situation in April 2012, and at the time of writing this report, 75 dwellings have already been built, are in construction or have received planning permission. The current allocation to Barrow and Denham is between 154 and 238 dwellings including the 75 already in progress. At the time of writing this initial draft of the HRA, the specific locations for these dwellings and the exact quanta has not yet been finalised.
- 1.4 Planning permission has also been granted for 1ha of employment space in Policy RV4 of the Rural Vision 2031 document. However, the same land (as part of a larger parcel) was submitted to Barrow-cum-Denham Parish Council during their Call for Sites for residential development and school expansion. Clause 10.1 of RV4 also includes provision for the Barrow Business Park allocation to be converted to housing if a business park is not viable: *"If it can be demonstrated that employment development on this land and the required infrastructure cannot be viably achieved, some higher value development, which could include residential development, will be considered. The mechanism for determining this will be through the preparation and adoption of a site masterplan..."* This situation must be taken into consideration given the post-COVID state of the UK commercial property market; Therefore, this allocation has been assessed in this report as potential residential development in addition to the rest of the proposed site allocations. In 2019 St Edmundsbury Council merged with Forest Heath District Council to form West Suffolk Council. The Council is currently working on a new Local Plan.
- 1.5 Therefore the objective of this HRA is to identify if any particular site allocation proposed by the Council have the potential to cause an adverse effect on the integrity of European designated sites (Special Areas of Conservation, SACs, Special Protection Areas, SPAs, and Ramsar sites designated under the Ramsar convention), either in isolation or in combination with other plans and projects, and to determine whether site-specific or policy mitigation measures are required.

Legislation

- 1.6 The need for HRA is set out within the Conservation of Habitats & Species Regulations 2017 (as amended) and concerns the protection of European sites. European sites can be defined as actual or proposed/candidate Special Areas of Conservation (SAC) or Special Protection Areas (SPA). It is also Government policy for sites designated under the Convention on Wetlands of International Importance (Ramsar sites) to be treated as having equivalent status to European sites.
- 1.7 The HRA process applies the precautionary principle to protected areas. Plans and projects can only be permitted having ascertained that there will be no adverse effect on the integrity of the site(s) in question. Plans and projects may still be permitted if there are no alternatives to them and there are Imperative Reasons of Overriding Public Interest (IROPI) as to why they should go ahead. In such cases, compensation would be necessary to ensure the overall integrity of the site network.

Conservation of Habitats and Species Regulations 2017 (as amended)

With specific reference to Neighbourhood Plans, Regulation 106(1) states that:

"A qualifying body which submits a proposal for a neighbourhood development plan must provide such information as the competent authority [the Local Planning Authority] may reasonably require for the purpose of the assessment under regulation 105... [which sets out the formal process for determination of 'likely significant effects' and the appropriate assessment]."

Box 1: The legislative basis for HRA

- 1.8 It is therefore important to note that this report has two purposes:
- To assist the Qualifying Body (Barrow Parish Council and Denham Parish Council) in preparing their plan by recommending (where necessary) any adjustments required to protect European sites, thus making it more likely their plan will be deemed compliant with the Conservation of Habitats and Species Regulations 2017 (as amended); and
 - On behalf of the Qualifying Body, to assist the Local Planning Authority (West Suffolk District Council) to discharge their duty under Regulation 105 (in their role as 'plan-making authority' within the meaning of that regulation) and Regulation 106 (in their role as 'competent authority').
- 1.9 As 'competent authority', the legal responsibility for ensuring that a decision of 'likely significant effects' is made, for ensuring an 'appropriate assessment' (where required) is undertaken, and for ensuring Natural England are consulted, falls on the local planning authority. However, they are entitled to request from the Qualifying Body the necessary information on which to base their judgment and that is a key purpose of this report.
- 1.10 Over the years, 'Habitats Regulations Assessment' (HRA) has come into wide currency to describe the overall process set out in the Habitats Regulations, from screening through to identification of IROPI. This has arisen in order to distinguish the overall process from the individual stage of "Appropriate Assessment". Throughout this Report the term HRA is used for the overall process and restricts the use of Appropriate Assessment to the specific stage of that name.

2. Methodology

Introduction

- 2.1 Figure 1 below outlines the stages of HRA according to current Ministry of Housing, Communities and Local Government guidance. The stages are essentially iterative, being revisited as necessary in response to more detailed information, recommendations and any relevant changes to the Plan until no significant adverse effects remain.

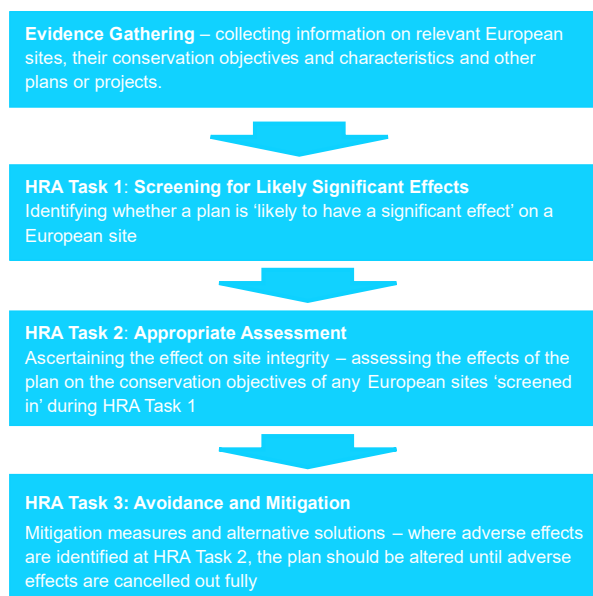


Figure 1: Four Stage Approach to Habitats Regulations Assessment. Source GOV.UK, 2019.

HRA Task 1 – Likely Significant Effects (LSE)

- 2.2 Following evidence gathering, the first stage of any Habitats Regulations Assessment is a Likely Significant Effect (LSE) test - essentially a risk assessment to decide whether the full subsequent stage known as Appropriate Assessment is required. The essential question is:

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

- 2.3 The objective is to 'screen out' those plans and projects that can, without any detailed appraisal, be said to be unlikely to result in significant adverse effects upon European sites, usually because there is no mechanism for an adverse interaction with European sites. This stage is undertaken in Chapter 4 of this report.

HRA Task 2 – Appropriate Assessment (AA)

- 2.4 Where it is determined that a conclusion of 'no likely significant effect' cannot be drawn, the analysis has proceeded to the next stage of HRA known as Appropriate Assessment. Case law has clarified that 'appropriate assessment' is not a technical term. In other words, there are no particular technical analyses,

or level of technical analysis, that are classified by law as belonging to appropriate assessment rather than determination of likely significant effects.

- 2.5 During July 2019 the Ministry of Housing, Communities and Local Government published guidance for Appropriate assessment¹. Paragraph: 001 Reference ID: 65-001-20190722m explains: *'Where the potential for likely significant effects cannot be excluded, a competent authority must make an appropriate assessment of the implications of the plan or project for that site, in view of the site's conservation objectives. The competent authority may agree to the plan or project only after having ruled out adverse effects on the integrity of the habitats site. Where an adverse effect on the site's integrity cannot be ruled out, and where there are no alternative solutions, the plan or project can only proceed if there are imperative reasons of over-riding public interest and if the necessary compensatory measures can be secured'*.
- 2.6 As this analysis follows on from the screening process, there is a clear implication that the analysis will be more detailed than undertaken at the Screening stage and one of the key considerations during appropriate assessment is whether there is available mitigation that would entirely address the potential effect. In practice, the appropriate assessment takes any policies or allocations that could not be dismissed following the high-level screening analysis and analyses the potential for an effect in more detail, with a view to concluding whether there would be an adverse effect on integrity (in other words, disruption of the coherent structure and function of the European site(s)).
- 2.7 A decision by the European Court of Justice² concluded that measures intended to avoid or reduce the harmful effects of a proposed project on a European site may no longer be taken into account by competent authorities at the Likely Significant Effects or 'screening' stage of HRA. The UK is no longer part of the European Union. However, as a precaution, it is assumed for the purposes of this HRA that EU case law regarding Habitat Regulations Assessment will still be considered informative jurisprudence by the UK courts. That ruling has therefore been considered in producing this HRA.
- 2.8 Also, in 2018 the Holohan ruling³ was handed down by the European Court of Justice. Among other provisions paragraph 39 of the ruling states that *'As regards other habitat types or species, which are present on the site, but for which that site has not been listed, and with respect to habitat types and species located outside that site, ... typical habitats or species must be included in the appropriate assessment, if they are necessary to the conservation of the habitat types and species listed for the protected area'* [emphasis added]. This has been taken into account in the HRA process.

HRA Task 3 – Avoidance and Mitigation

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

¹ <https://www.gov.uk/guidance/appropriate-assessment#what-are-the-implications-of-the-people-over-wind-judgment-for-habitats-regulations-assessments> [Accessed: 07/01/2020].

² People Over Wind and Sweetman v Coillte Teoranta (C-323/17)

³ Case C-461/17

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

- 2.12 It is a requirement of the Regulations that the impacts 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.
- 2.13 In considering the potential for combined regional housing development to impact on European sites the primary consideration is the impact of visitor numbers – i.e. recreational pressure and urbanisation.
- 2.14 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 may 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 or policy would otherwise be screened out because its individual contribution is inconsequential.

3. Internationally Designated Sites

Breckland SAC/SPA

Introduction

- 3.1 The area in which this site is located is characterised by a gently undulating plateau underlain by bedrock of Cretaceous Chalk that is largely covered by varying depths of windblown sand. The highly variable soils generally consist of a very sandy free-draining mix of chalk, sand, silt, clay and flints, which show marked pH variation within short distances. This has a profound influence on the natural vegetation and has resulted in mosaics of heather-dominated heathland, acidic grassland and calcareous grassland that are unlike those of any other site. In many places there is a linear or patterned distribution of heath and grassland, arising from fossilised soil patterns that formed under peri-glacial conditions. The climate of the Brecks is markedly less maritime than other parts of England, with relatively hot summers, cold winters and low rainfall. The unique combination of underlying geology, low-fertility soils, soil disturbance, a dry, frost-prone climate and grazing by sheep and rabbits has strongly influenced the natural and cultural evolution of the landscape.

Reasons for SAC designation⁴

- 3.2 Qualifying habitats of European Importance that are supported by the site are:

- Inland dunes with open *Corynephorus* and *Agrostis* grasslands
- Inland dunes with open *Corynephorus* and *Agrostis* grasslands are an extremely rare habitat in the UK and are found in one small part of Breckland in East Anglia, eastern England. This habitat comprises inland dune grassland containing grey hair-grass *Corynephorus canescens*. In the UK the vegetation of this habitat falls within NVC types SD11 *Carex arenaria* – *Cornicularia aculeata* dune community, and SD12 *Carex arenaria* – *Festuca ovina* – *Agrostis capillaris* grassland, where the vegetation includes stands of grey hair-grass in inland situations.
- Natural eutrophic lakes with Magnopotamion or Hydrocharition
- The Breckland meres in Norfolk represent natural eutrophic lakes in the east of England. They are examples of hollows within glacial outwash deposits and are fed by water from the underlying chalk aquifer. Natural fluctuations in groundwater tables mean that these lakes occasionally dry out. The flora is dominated by stonewort – pondweed *Characeae* – *Potamogetonaceae* associations.
- European dry heaths
- The dry acidic heath of Breckland is represented by H1 *Calluna vulgaris* – *Festuca ovina* heath in the SAC series. The sand sedge-dominated *Carex arenaria* sub-community (H1d) is typical of areas of blown sand – a very unusual feature of this location. The highly variable soils of Breckland, with underlying chalk being largely covered with wind-blown sands, have resulted in mosaics of heather-dominated heathland, acidic grassland and calcareous grassland that are unlike those of any other site. In many places there is a linear or patterned distribution of heath and grassland, arising from fossilised soil patterns that formed under peri-glacial conditions.
- Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites)
- Breckland in East Anglia is the most extensive surviving area of the rare grassland type CG7 *Festuca ovina* – *Hieracium pilosella* – *Thymus praecox* grassland. The grassland is rich in rare species typical of dry, winter-cold, continental areas, and is more akin to the grassland types in central Europe than almost any other semi-natural dry grassland found in the UK. The terrain is relatively flat, with few physical variations, but there are mosaics of calcareous grassland and heath/acid grassland, giving rise to patterns of structural variation.

- 3.3 Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site:

⁴ JNCC (2019). Breckland SAC. Available online: <https://sac.jncc.gov.uk/site/UK0019865> [Accessed: 07/08/2020].

- Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae)*
- Alder woodland on floodplains. These forests, characteristic of the floodplains of lowland rivers, are now rare throughout Europe. Alder *Alnus glutinosa* is usually the dominant tree but willows *Salix* species, ash *Fraxinus excelsior*, downy birch *Betula pubescens* or elder *Sambucus nigra* may also be common. This habitat can range from alder stands on the braided channels of fast-flowing rivers, to stands on former peat cuttings along fenland rivers.

3.4 Annex II species present as a qualifying feature, but not a primary reason for site selection:

- Great crested newt *Triturus cristatus*
- The water-bodies in the SAC are confined to key population centres within the Stanford Training Area. These are located in a variety of habitats including the meres and pingos, spring lines and low-lying meadows with natural depressions, whilst others are clearly man made. A programme to restore water bodies on the site has been ongoing for a number of years and has greatly increased the extent of available breeding habitat.

Reason for SPA designation⁵

3.5 The Breckland SPA is located in parts of both Norfolk and Suffolk in the heart of East Anglia. It forms part of The Brecks National Character Area (NCA 85), which has a very particular land use history and a richly distinctive wildlife, which sets it apart from all surrounding landscapes.

3.6 The area consists of a gently undulating plateau underlain by a bedrock of Cretaceous Chalk, which is covered largely by thin deposits of sand and flint of glacial origin. The semi-continental climate, with low rainfall and free-draining soils, has led to the development of dry heath and grassland communities. The complex of soils has led to the creation of intimate mosaics of heather dominated heathland with acid and calcareous grassland rarely found elsewhere. The remnants of the dry heath and grassland that remain within the SPA today support populations of Annex 1 heathland breeding birds, where grazing by sheep and rabbits is sufficiently intensive to create short turf and open ground. The Annex 1 breeding bird species have also adapted to live in arable and forestry habitats, which cover extensive areas of the SPA. The regular, rotational clear-felling of select areas of plantation forest creates suitable breeding habitat for SPA bird species which utilise the early years of re-planted blocks.

3.7 Qualifying individual species listed in Annex I of the Wild Birds Directive that are supported by the site are:

- Stone-curlew *Burhinus oedipnemos* (Breeding)
- When classified, the SPA supported 115 breeding pairs (5 year mean 1994 – 1998) which represented 60.1% of the GB population,
- European nightjar *Caprimulgus europaeus* (Breeding)
- When classified, the SPA supported 415 males breeding (Count as at 1998) which represented 12.2% of the GB population
- Woodlark *Lullula arborea* (Breeding)
- When classified, the SPA supported 430 breeding pairs (Count as at 1997) which represented 28.7% of the GB population.

Current threats and pressures⁶

3.8 The heaths supported by the SAC include the best-preserved systems of inland sand dune vegetation. They include the best preserved systems of inland sand dune vegetation, which is in part characterised by the nationally rare grey hair-grass *Corynephorus canescens*, and sand sedge *Carex arenaria*. The G7 *Festuca ovina* – *Hieracium pilosella* – *Thymus praecox* grassland type is rich in rare species and is more typical of

⁵ JNCC (2001). Breckland SPA designation. Available from: <http://archive.jncc.gov.uk/default.aspx?page=2016> [Accessed: 10/01/20]

⁶ Natural England (2015). *Site Improvement Plan: Breckland (SIP025)*. Available online: <http://publications.naturalengland.org.uk/publication/5075188492271616> [Accessed: 10/08/20]

the steppe vegetation associated with central Europe. Current threats and pressures experienced by the site are:

- Lack of ground disturbance,
- Undergrazing,
- Forestry and woodland management,
- Water pollution,
- Changes in species distributions,
- Stone curlew monitoring and intervention,
- Planning permission: general,
- Monitoring,
- Air pollution,
- Public access,
- Climate changes,
- Changes in species distributions,
- Inappropriate scrub control,
- Inappropriate management practices,
- Habitat fragmentation,
- Inappropriate weed control,
- Inappropriate pest control,
- Changes in species distributions, and
- Inappropriate cutting/ mowing.

SAC Conservation Objectives⁷

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

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

SPA Conservation Objectives⁸

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

- *The extent and distribution of the habitats of the qualifying features*
- *The structure and function of the habitats of the qualifying features*

⁷ Natural England (2015). *European Site Conservation Objectives for Breckland SAC (UK0019865)*. Available online: <http://publications.naturalengland.org.uk/publication/6145904885104640> [Accessed: 10/08/20]

⁸ Natural England (2019). *European Site Conservation Objectives for Breckland SPA (UK9009201)*. Available online: <http://publications.naturalengland.org.uk/publication/4572292419944448> [Accessed: 10/08/20]

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

Rex Graham Reserve SAC

Introduction

- 3.11 Covering approximately 2.67 hectares and situated within the Brecks National Character Area, Rex Graham Reserve comprises a small disused chalk pit, together with surrounding grassland and woodland, which supports a large number of military orchids *Orchis militaris*. Only two other wild populations of this plant are known in the UK and the Rex Graham Reserve population is by far the largest, comprising more than 95% of the current total UK population.

Reasons for designation

- 3.12 Annex I habitats that are a primary reason for selection of this site is:
- Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*)
 - This habitat type comprises dry calcareous grasslands on chalk or limestone soils which contain important orchid assemblages and/or individual populations of rare orchids. Priority status is afforded to examples of this habitat type which meet these criteria.
 - Rex Graham Reserve SAC is a disused chalk pit with developing dry grassland characterised by false oat-grass *Arrhenatherum elatius*. The site has been selected as a SAC as it supports the largest population of military orchid *Orchis militaris* in the UK, comprising more than 95% of the current total population. This wild plant is afforded special protection under the 1981 Wildlife and Countryside Act (as amended) and it is an offence to deliberately pick, collect, cut, uproot or destroy any of these wild plants. It is also an offence for any purpose to possess, sell or exchange such a plant.

Current threats and pressures⁹

- 3.13 Only two other wild populations of Military orchid *Orchis militaris* are known in the UK and the Rex Graham Reserve population is by far the largest, comprising more than 95% of the current total UK population. Current threats and pressures experienced by the site include:
- Changes in species distribution,
 - Air pollution,
 - Habitat fragmentation,
 - Deer,
 - Invasive species, and
 - Public access/ disturbance.

Conservation objectives¹⁰

- 3.14 'Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring;
- *The extent and distribution of qualifying natural habitats*
 - *The structure and function (including typical species) of qualifying natural habitats, and*

⁹ Natural England (2015). *Site Improvement Plan: Rex Graham Reserve (SIP183)*. Available from: <http://publications.naturalengland.org.uk/publication/5988120809963520> [Accessed: 10/08/20]

¹⁰ Natural England (2018). *European Site Conservation Objectives for Rex Graham Reserve SAC (UK0019866)* Available online: <http://publications.naturalengland.org.uk/publication/5320741566283776> [Accessed: 10/08/20]

- *The supporting processes on which qualifying natural habitats*.

Chippenham Fen SAC/Ramsar

Introduction

The Fenland SAC is comprised of three fenland Sites of Special Scientific Interest: Woodwalton Fen, Wicken Fen and Chippenham Fen. Chippenham Fen is a shallow basin located close to the start of the Chippenham River and is surrounded by higher land over chalk. The site is fed both by water emerging in some places from the chalk aquifer, and from the chalk streams to begin nearby. Drainage ditches have been cut throughout and are now used to enable management and to increase water levels during the summer. A rich diversity of fenland and aquatic plants can be found there, including the very rare Cambridge milk parsley (*Selinum carvifolia*), and the site is also known for its impressive invertebrate community. Stands of saw sedge (*Cladium mariscus*) are still managed and cut for thatching.

Reasons for SAC designation

Annex I habitats that are a primary reason for selection of this site:

- Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinia caerulea*)
 - Fenland contains, particularly at Chippenham Fen, one of the most extensive examples of the tall herb-rich East Anglian type of M24 *Molinia caerulea* – *Cirsium dissectum* fen-meadow. It is important for the conservation of the geographical and ecological range of the habitat type, as this type of fen-meadow is rare and ecologically distinctive in East Anglia.
- Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* * Priority feature
 - The individual sites within Fenland cSAC each hold large areas of calcareous fens, with a long and well-documented history of regular management. There is a full range from species-poor *Cladium*-dominated fen to species-rich fen with a lower proportion of *Cladium* and containing such species as black bog-rush *Schoenus nigricans*, tormentil *Potentilla erecta* and meadow thistle *Cirsium dissectum*. There are good transitions to purple moor-grass *Molinia caerulea* and rush pastures, all set within a mosaic of reedbeds and wet pastures.

Reasons for Ramsar designation

- Ramsar criterion 1: A spring-fed calcareous basin mire with a long history of management, which is partly reflected in the diversity of present-day vegetation.
- Ramsar criterion 2: The invertebrate fauna is very rich, partly due to its transitional position between Fenland and Breckland. The species list is very long, including many rare and scarce invertebrates characteristic of ancient fenland sites in Britain.
- Ramsar 3: The site supports diverse vegetation types, rare and scarce plants. The site is the stronghold of Cambridge milk parsley *Selinum carvifolia*.

Current threats and pressures

The current threats and pressures experienced by the Chippenham Fen SAC/Ramsar are:

- Water pollution,
- Hydrological changes,
- Water pollution, and
- Air pollution: impact of nitrogen deposition.

Conservation objectives

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

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

4. Test of Likely Significant Effects

Background to Barrow and Denham Parishes

- 4.1 Barrow and Denham are located within the District of West Suffolk. This district was formed in April 2019 from the merger of the former District Council of Forest Heath and the St Edmundsbury Borough Council.
- 4.2 Barrow and Denham are small, rural parishes located between Bury St. Edmunds and Newmarket in Suffolk. The 2011 Census recorded 1,677 usual residents, 715 total dwellings and 695 households in Barrow and 171 usual residents, 68 total dwellings and 68 households in Denham. The wider landscape of Barrow and Denham villages is predominantly arable and pasture farmland, and small patches of woodland including ancient woodland and wood pasture/ parkland.

Physical scope of the HRA

- 4.1 The European Sites that are described Section 3 are located within 10km of the Barrow-cum-Denham Neighbourhood Plan area: Breckland SPA (directly, N), Breckland SAC (6km, N), Rex Graham Reserve SAC (8.5km, N) and Chippenham Fen SAC/Ramsar (9.7km, NW).
- 4.2 Based upon Natural England Site Improvement Plans, there are several impact pathways that require consideration regarding increased development within the Barrow-cum-Denham Parish and said European Sites. These are:
- Urbanisation;
 - Recreational pressure;
 - Habitat fragmentation;
 - Air quality;
 - Water quality (surface water runoff);
 - Water quality (discharge of treated sewage effluent); and
 - Hydrological changes, including water abstraction.
- 4.3 Table 1 describes these environmental impact pathways. The consideration of Neighbourhood Plan policies (the Test of Likely Significant Effects) is then documented in Table 2.

Table 1. Description of potential impact pathways from increased development to European Sites.

Impact pathway	Discussion
Water quality (surface water runoff)	<p>Increased residential development within Barrow and/or Denham villages could lead to the loss of previously undeveloped land and increased surface water runoff to nearby European Sites. Breckland SPA/SAC is located directly north of the parish boundary and is connected by Cavenham Stream running north through the European Site to join the River Lark. There is a risk that inappropriate drainage design may lead to increased surface water runoff from new development. Chippenham SAC/Ramsar is located over 9km from the parish boundary. Breckland SAC is located 6km north of the parish boundary and Rex Graham Reserve SAC is located 8.5km N of the parish boundary. These distances are considered too great a distance to be impacted by issues of surface water runoff from increased development in the Parish.</p> <p>The Rural Vision 2031 also notes that <i>"The heavy soils in and around Barrow make the area susceptible to surface water flooding, demonstrated by the number of ponds around the village. This will need to be considered when future sites are developed but is an obstacle that can be overcome."</i>¹¹</p>
Water quality (discharge of treated sewage effluent)	<p>Increased housing development at Barrow-cum-Denham could lead to increased sewage production. Therefore, it is necessary to consider any risk that increased sewage could degrade the water quality (i.e. through increased phosphorus discharge) of European Sites, in the absence of environmental mitigation and adequate wastewater treatment works.</p> <p>It has been noted that Barrow WwTW has very little headroom available to accommodate increased residential development in Barrow-cum-Denham. This will need to be addressed. The Rural Vision 2031 states <i>"Therefore there will be a need for additional water infrastructure and or treatment upgrades to support new development in the village."</i></p>
Hydrological changes, including water abstraction	<p>The Chippenham Fen SAC/Ramsar supports chalk aquifer and chalk stream fed fens that are susceptible to changes in water table fluctuations. Impacts could occur from increased water abstraction for public water supply¹²</p>
Air quality	<p>Increased residential development within Barrow-cum-Denham would likely lead to a greater number of vehicles within the parish. As such, increased air pollution could arise relative to a situation of no growth. Pollutants released from vehicles may be carried directly by wind currents and deposited to the Breckland SAC/SPA and Rex Graham Reserve SAC or pollutants may become soluble and taken up during evaporation and deposited to said sites during precipitation. Guidance from the Institute of Air Quality Management and Highways England both set an impact zone of 200m from the roadside for potential significant air quality effects to vegetation from main road traffic.</p>
Habitat fragmentation and loss of functionally linked land	<p>Simply described, habitat fragmentation is the division of an expanse of habitat into smaller, individual patches that are isolated from each other by the removal of the original habitat¹³. Breckland SAC/SPA supports a diversity of habitats that are the primary reason for the sites' selection. One such habitat includes inland dunes that supports rare species including grey hair-grass <i>Corynephorus canescens</i> and sand sedge <i>Carex arenaria</i>; with limited dispersal capabilities. In addition, heathland (also supported by Breckland SAC/SPA) is arguably one of the most severely fragmented habitats in the world with heathland cover decreased by 85% over the past 150 years as a result of</p>

¹¹ West Suffolk District Council, Rural Vision 2031, available at: https://www.westsuffolk.gov.uk/planning/Planning_Policies/local_plans/upload/Rural-vision-2015v5-hi-res-compressed.pdf [accessed 26/01/2021]

¹² Labadz, J., Allott, T., Evans, M., Butcher, D., Billett, M., Stainer, S., Yallop, A., Jones, P., Innerdale, M., Harmon, N. and Maher, K., 2010. Peatland Hydrology: Draft Scientific Review to IUCN Peatland Programme Commission of Inquiry on Peatlands.

¹³ Wilcove, D.S., McLellan, C.H. and Dobson, A.P., 1986. Habitat fragmentation in the temperate zone. *Conservation biology*, 6, pp.237-256.

	<p>agriculture and development¹⁴. The loss of heathland has had population consequences to the species that are supported by this habitat (including nightjar and woodlark)¹⁵. Given that Breckland SAC/SPA is located directly north of Barrow-cum-Denham and supporting habitat (i.e. not within designated boundaries) is found within the parish boundary there is a risk that increased development could fragment these habitats, either through direct loss or providing barriers to movement (i.e. impacting protected species). The stone curlew populations of the SPA have been extensively studied over the past 10 years and it is clear they make considerable use of areas of habitat outside the SPA boundary (suitable farmland or acid grassland).</p>
Recreational pressure	<p>Increased development within Barrow-cum-Denham could lead to higher numbers of visitors to European Sites, particularly those within relatively easy recreational access. For example, the nature, scale, timing and duration of some human activities can result in the disturbance of birds at a level that may substantially affect their behaviour, and consequently affect the long-term viability of the population. It is long standing knowledge that the European Sites located in Suffolk are attractive to visitors on a county, national and in some cases international level. Increased visitors can have direct and indirect for a European Site that could prevent said site achieving its conservation objectives. European Sites impacted by recreational pressure are Breckland SAC/SPA and Rex Graham Reserve SAC.</p> <p>Rex Graham Reserve SAC is located within Thetford Forest east of Mildenhall. It is a disused chalk pit and its main interest is the population of Military Orchids. The Site Improvement Plan lists Public Access/Disturbance as a vulnerability for the site. The site is managed by The Suffolk Trust for Nature Conservation and to maintain suitable conditions for the military orchid public access must be strictly controlled. In addition, there is rabbit and deer-proof fencing around the pit¹⁶. As public access is so strictly controlled, an increase in recreational pressure is unlikely to cause a likely significant effect upon the SAC. Additionally, Chippenham Fen SAC/Ramsar is not identified by Natural England to be impacted by recreational pressure. Therefore, these two SACs are screened out at this stage.</p>
Urbanisation	<p>Increased urbanisation could lead to likely significant effects to European Sites¹⁷. For example, development within 400m of an SPA could increase cat predation to ground nesting birds and chicks reducing breeding success¹⁸ of Annex II species, increase the occurrence of wildfire and have profound edge effects and habitat fragmentation. Of relevance to Barrow-cum-Denham is the potential impact of increased housing in close proximity to the Brecklands SAC/SPA. Of particular note is the fact that the stone curlew population of Breckland SPA have been shown to be that highly disturbance sensitive not just to recreation (dealt with above) but to the simple proximity of human habitation.</p>

¹⁴ English Nature (2002). *Lowland heathland a cultural and endangered landscape*. Northminster House: Peterborough

¹⁵ Liley, D. and Clarke, R.T., 2003. The impact of urban development and human disturbance on the numbers of nightjar *Caprimulgus europaeus* on heathlands in Dorset, England. *Biological Conservation*, 114(2), pp.219-230.

¹⁶ ³⁷ <https://designatedsites.naturalengland.org.uk/PDFsForWeb/Citation/1002531.pdf> [accessed 26/01/21]

¹⁷ Chace, J.F. and Walsh, J.J., 2006. Urban effects on native avifauna: a review. *Landscape and urban planning*, 74(1), pp.46-69.

¹⁸ Marzluff, J.M., 2001. Worldwide urbanization and its effects on birds. In *Avian ecology and conservation in an urbanizing world* (pp. 19-47). Springer, Boston, MA.

Table 2. Screening assessment (likely significant effect) of the Barrow-cum-Denham NP.

Policy	European Sites and Proximity to Policy Area	Brief summary	Screening outcome
Policy 1: General approach to development	N/A	Policy describes requirements for developments to be in full compliance with national, local plan and neighbourhood plan policies.	No likely Significant Effect. Screened out. This is a development management policy and does not specifically allocate sites for development. Therefore, no impact pathways exist to European Sites.
Policy 2: Housing	N/A	Policy describes that housing development will be limited and restricted to affordable housing.	No likely Significant Effect. Screened out. This is a development management policy and does not specifically allocate sites for development. Therefore, no impact pathways exist to European Sites.
Policy 3: Housing allocation site x	TBC	TBC	Likely Significant Effect. Screened in. This policy allocates X houses at X site.
Policy 4: Housing allocation site y	TBC	TBC	Likely Significant Effect. Screened in. This policy allocates X houses at X site.
Policy 5: Working from home	N/A	Policy describes measures to encourage working from home.	No likely Significant Effect. Screened out. This is a development management policy and does not specifically allocate sites for development. Therefore, no impact pathways exist to European Sites.
Policy 6: Tourism-related development	N/A	Policy describes limitations of tourism development within the parish.	No likely Significant Effect. Screened out. This is a development management policy and does not specifically allocate sites for development. Therefore, no impact pathways exist to European Sites.
Policy 7: Community facilities and infrastructure	N/A	Policy describes design requirements of community facilities including but not limited to the transport network and local green spaces	No likely Significant Effect. Screened out. This is a development management policy and does not specifically allocate sites for development. Therefore, no impact pathways exist to European Sites.
Policy 8: The natural environment	N/A	Policy states that new development will need to aim to increase biodiversity, protect those species which require it and reduce traffic	No likely Significant Effect. Screened out. This is a development management policy and does not specifically allocate sites for development. Therefore, no impact pathways exist to European Sites.
Policy 9: The historic environment	N/A	Policy describes that new development which aims to conserve the natural landscape or specific assets will be favoured.	No likely Significant Effect. Screened out. This is a development management policy and does not specifically allocate sites for development. Therefore, no impact pathways exist to European Sites.
Policy 10: Design Requirements	N/A	Policy describes the design requirements for new developments.	No likely Significant Effect. Screened out. This is a development management policy and does not specifically allocate sites for development. Therefore, no impact pathways exist to European Sites.

5. The ‘in Combination’ Scope

- 5.1 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 internationally designated site(s) in question.
- 5.2 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. The overall approach is to exclude the risk of there being unassessed likely significant effects in accordance with the precautionary principle. This was first established in the seminal Waddenzee¹⁹ case.
- 5.3 For the purposes of this assessment, we have determined that, due to the nature of the identified impacts, the key other plans and projects with potential for in combination likely significant effects are those schemes that have the following impact pathways: urbanisation, habitat Fragmentation, recreational pressure, air quality impacts, water quality impacts, hydrological changes. The following plans have been assessed for their in-combination impact to interact with the Barrow-cum-Denham Neighbourhood Plan:
- Forest Heath District Council Local Plan
 - Haverhill Vision 2031
 - Bury St Edmunds Vision 2031
 - Anglian Water – Water Resources Management Plan
 - Breckland District Council Local Plan
 - Forest Heath Core Strategy
 - St Edmundsbury Core Strategy
 - Emerging West Suffolk Local Plan
- 5.4 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 full HRA on each of these plans – we will however draw upon existing HRA that have been carried out for surrounding regions and plans.

¹⁹ Waddenzee case (Case C-127/02, [2004] ECR-I 7405)

6. Appropriate Assessment

- 6.1 The law does not prescribe how an appropriate assessment should be undertaken or presented but the appropriate assessment must consider all impact pathways that have been screened in, whether they are due to policies alone or to impact pathways that arise in combination with other projects and plans. That analysis is the purpose of this section. The law does not require the 'alone' and 'in combination' effects to be examined separately provided all effects are discussed.
- 6.2 By virtue of the small amount of growth the BCDNP specifies for Barrow-cum-Denham, the main impact pathways of concern to this HRA (water quality, air quality, recreational pressure, urbanisation, habitat fragmentation/impacts on functionally-linked land and hydrological changes including water abstraction) are inherently 'in combination' with neighbouring plans and projects. However, for completeness, potential impacts of the ~~XX~~ net residential dwellings allocated within Barrow-cum-Denham Neighbourhood Plan area in isolation are also assessed.
- 6.3 The HRA screening exercise undertaken in Table 2 indicates two potential NP policies (Policy 3 & Policy 4) that will encompass a proportion of the 12 potential site allocations that were taken forward from the Call for Sites. These may have likely significant effects on the European Sites due to urbanisation, recreational pressure, air quality, water quality, habitat fragmentation and hydrological changes (including water abstraction). At the screening stage, the following potential housing allocations were screened in and require further assessment:
- BD1
 - BD2
 - BD3
 - BD4
 - BD5
 - BD6
 - BD7
 - BD8
 - BD9
 - BD10
 - BD11
 - BD12

Commented [RJD(1)]: To be updated once plan more advanced

Urbanisation

- 6.4 Urbanisation is essentially the encroaching of settlements onto open space to such an extent that there is a regular background level of impact (whether recreational activity, cat predation, fly tipping or garden waste and other activities) due to the close proximity of large amounts of housing. This can have a negative effect on wildlife causing retreat further into the body of a habitat; it can also impact breeding success and result in habitat fragmentation and changes in plant communities¹².
- 6.5 For example, in the area around the Thames Basin Heaths SPA there is a prohibition on delivery of net new residential development within 400m of the SPA because of the large amount of housing that might otherwise be delivered due to the urban nature of those heaths. This is largely due to the extreme difficulty that exists in mitigating the effects of large amounts of housing on the nightjar and woodlark populations of the SPA at such close distances.
- 6.6 The most urbanisation-sensitive species for which Breckland SPA is designated is the stone curlew. Research has shown that the presence of new development up to 1500m from stone curlew nests can

depress nesting success.^{20 21} As a result of this research the HRA of the St Edmundsbury Rural Vision 2031 states *"The Core Strategy includes the following avoidance and mitigation measures to ensure that the Core Strategy is not likely to have a significant effect on the interest features of the SPA;*

- *The identification of a 1,500m buffer zone from the edge of those parts of the SPA that support or are capable of supporting stone curlews*
- *The identification of a 400m buffer zone from the edge of those parts of the SPA that support or are capable of supporting nightjar or woodlark."*²²

6.7 At the closest distance (10m) to the Breckland SPA boundary, Barrow-cum-Denham Neighbourhood Plan area is well within both buffer zones as specified in the St Edmundsbury Core Strategy²³. However, none of the proposed housing allocations are situated within either buffer zone (the closest – BD4 – is located 1.98km south west of the SPA). Future unallocated windfall is a possibility but development in Barrow-cum-Denham must comply with Core Strategy Policy CS2 (or any West Suffolk Local Plan policy that ultimately replaces it) which states:

6.8 *"Only development that will not adversely affect the integrity of the SPA will be permitted. In applying this policy a buffer zone has been defined that extends 1,500m from the edge of those parts of the SPA that support or are capable of supporting stone curlews, within which:-*

a) Permission may be granted for the re-use of existing buildings and for development which will be completely masked from the SPA by existing development; alternatively

b) Permission may be granted for other development not mentioned in sub paragraph (a) provided it is demonstrated by an appropriate assessment that the development will not adversely affect the integrity of the SPA.

6.9 *A further 1,500m buffer zone has been defined which extends around those areas (shown on the Proposals Map) outside of the SPA which have supported 5 or more nesting attempts by stone curlew since 1995 and as such act as supporting stone curlew habitat, within which permission may be granted in accordance with a) and b) above. Additionally within this zone, where it can be shown that proposals to mitigate the effects of development would avoid or overcome an adverse impact on the integrity of the SPA or qualifying features, planning permission may be granted provided the Local Planning Authority is satisfied that those proposals will be implemented. In these areas development may also be acceptable providing alternative land outside the SPA can be secured to mitigate any potential effects."*

6.10 Therefore, the conclusion can be made that the Barrow-cum-Denham NP complies with both Rural Vision 2031 and the overarching Core Strategy for St Edmundsbury and will comply with any replacement policy in the West Suffolk Local Plan that maintains the 1.5km zone. **Therefore, no adverse effects of urbanisation on the integrity of Breckland SPA are anticipated as a result of increased residential development in Barrow-cum-Denham Neighbourhood Plan area.**

²⁰ Sharp, J., Clarke, R. T., Liley, D. & Green, R. E. (2008). The effect of housing development and roads on the distribution of stone curlews in the Brecks. Unpublished report, Footprint Ecology, Wareham, Dorset.

²¹ Clarke, R., & Liley, D. (2013). Further assessments of the relationship between buildings and stone curlew distribution. Unpublished report by Footprint Ecology for Breckland Council

²² https://www.westsuffolk.gov.uk/planning/Planning_Policies/local_plans/upload/W11225-St-Eds-Rural-Vision-HRA-screening-August-2014-final-issue.pdf [accessed 26/01/21]

²³ https://www.westsuffolk.gov.uk/planning/Planning_Policies/local_plans/upload/Core-Strategy-December-2010.pdf [accessed 26/01/21]

Habitat Fragmentation and Loss of Functionally-Linked Land

Background

- 6.11 As described in Table 1, habitat fragmentation is the division of larger habitats into smaller patches and/or the loss of supporting habitat (otherwise referred to as a functional linkage in relation to European Sites) as a consequence of development^{24 25 26}.
- 6.12 The decline in heathland habitat and increased fragmentation has contributed to a decline in nightjar and woodlark numbers throughout the UK²⁷ (i.e. Annex II species supported by Breckland SPA). Populations of each species are now largely confined to fragmented heathland habitat and from this, issues of: population bottlenecks²⁸, reduced reproductive success²⁹ and high mortality rate, due to lack of available resources, can all contribute to a decline or, in severe cases, extinction of populations within a particular habitat patch. For example, Bright et al (2007)³⁰ observed that nightjar, occupied patches that were significantly larger in size when compared to unoccupied patches. They also observed a positive correlation between nightjar occupation with heathland patches that were within closer proximity (i.e. less fragmented), Figure 5 shows these findings.

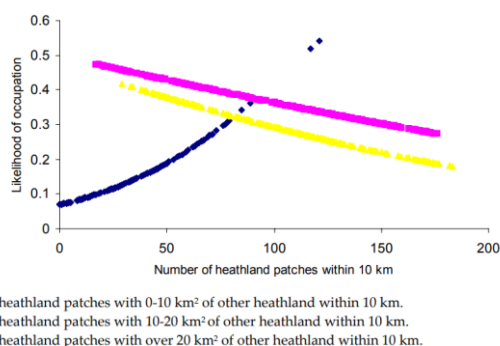


Figure 2 Bright et al (2007): Likelihood of a heathland patch being occupied in relation to the area of heathland.

- 6.13 Natural England's definition of functional linkage is: 'functional linkage' refers to the role or 'function' that land or sea beyond the boundary of a European site might fulfil in terms of supporting the populations for which the site was designated or classified. Such an area of land or sea is therefore 'linked' to the site in question because it provides a (potentially important) role in maintaining or restoring a protected population at favourable conservation status. Whilst areas beyond a site boundary might serve a function in respect of a designated habitat type, for example by being linked hydrologically to the qualifying habitat, in the context of this report 'functional linkage' refers only to land or sea which is linked to a qualifying species (whether

²⁴ Bright, P.W., 1993. Habitat fragmentation-problems and predictions for British mammals. *Mammal Review*, 23(3-4), pp.101-111.

²⁵ Mullu, D., (2016) A Review on the Effect of Habitat Fragmentation on Ecosystem. *Journal of Natural Sciences Research*, 6.

²⁶ Natural England (2012). Improvement programme for England's Natura 2000 sites (IPENS). Available online: <https://www.gov.uk/government/publications/improvement-programme-for-englands-natura-2000-sites-ipens> [Accessed: 16/01/20]

²⁷ Langston, R.H.W., Wotton, S.R., Conway, G.J., Wright, L.J., Mallord, J.W., Currie, F.A., Drewitt, A.L., Grice, P.V., Hoccom, D.G. and Symes, N., 2007. Nightjar *Caprimulgus europaeus* and Woodlark *Lullula arborea*-recovering species in Britain? *Ibis*, 149, pp.250-260.

²⁸ Broquet, T., Angelone, S., Jaquiere, J., Joly, P., LENA, J.P., Lengagne, T., Plenet, S., Luquet, E. and Perrin, N., 2010. Genetic bottlenecks driven by population disconnection. *Conservation Biology*, 24(6), pp.1596-1605.

²⁹ Bright, J.A., Langston, R. and Bierman, S., 2007. *Habitat associations of nightjar *Caprimulgus europaeus* breeding on heathland in England*. RSPB.

³⁰ Bright, J.A., Langston, R. and Bierman, S., 2007. *Habitat associations of nightjar *Caprimulgus europaeus* breeding on heathland in England*. RSPB.

an Annex II species for which a SAC has been designated, or a bird species for which a SPA has been classified)³¹.

- 6.14 As previously described, parts of Barrow-cum-Denham Neighbourhood Plan area lie within the functional linkage zone of the Breckland SPA due to the presence of supporting habitat, within the parish. Stone curlew breed on short acid grassland, as well as on arable land but in the Breckland SPA nest primarily within arable (vegetable) fields. It is known that a significant proportion of the Breckland SPA population of stone curlew nest in arable land outside the SPA boundaries. The land outside of the SPA which supports the SPA population of stone curlew e.g. nesting/roosting can be defined as 'functionally linked land' and must be taken into consideration when assessing if an adverse impact will occur upon to the SPA. Loss and disturbance of functionally linked land which is the direct removal of land utilised by this species, through development or where development causes disturbance of a level which causes avoidance of land, will reduce the area of land available to the SPA population for breeding, not only via direct land take but also through increased competition in the areas remaining and then through greater urbanisation effects, e.g. the increased disturbance of adjacent suitable functionally linked land.
- 6.15 As such, in both the Forest Heath Core Strategy and the St Edmundsbury Core Strategy buffer zones were devised in order to allow assessment of the impact through loss of functionally linked land. In addition to the 1,500m buffer outside of the SPA boundary, established for disturbance issues to the population within the SPA (see Paragraph 3.6) a 1,500m buffer around any 1 km grid square with equal to or greater than five stone curlew nesting attempts since 1995 which were associated with the Breckland SPA population (e.g. within 3 km of the SPA boundary) was established in order to capture additional functionally linked land outside of the SPA. These buffers were reviewed in 2016 using nesting attempt data from between 2011 and 2015. Therefore, any suitable land within 1,500m of the SPA **or** within 1,500m of a 1km grid square with five or more stone curlew breeding attempts is classified as functionally linked land and development within this buffer zone could lead to an adverse impact upon the integrity of the SPA.

Discussion

- 6.16 Forest Heath District Council commissioned a document to summarise the buffer zones relating to stone curlews in the Breckland SPA to support its Core Strategy Single Issue Review and Site Allocations Local Plan³². This document provides a detailed study of potential fragmentation impacts relating to the loss of functionally linked land outside of the SPA boundary for stone curlew. This analysis provides three buffer zones that apply to the SPA and are of relevance to Barrow-cum-Denham (refer to Figure 3):

- **Primary buffer – 1,500m from SPA boundary,**
- **Secondary buffer – 1,500m from primary buffer, and**
- **Additional habitat – 1km cells.**

³¹ Chapman, C. & Tyldesley, D. 2016. Functional linkage: How areas that are functionally linked to European sites have been considered when they may be affected by plans and projects - a review of authoritative decisions. Natural England Commissioned Reports, Number 207.

³² https://www.westsuffolk.gov.uk/planning/Planning_Policies/upload/Stone-Curlew-Buffers-in-the-Brecks-document-210716.pdf

Map 1: Stone Curlew buffers

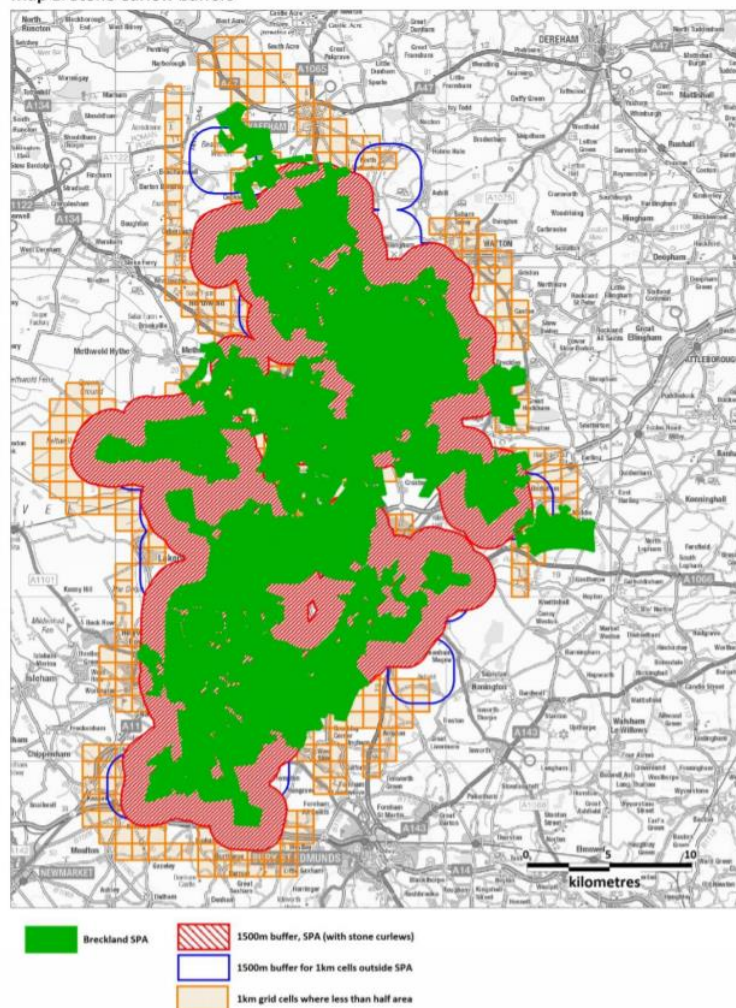


Figure 3. Stone Curlew buffer zones (Map extracted from Stone Curlews Buffers for the Brecks document published by Footprint Ecology in July 2016)

- 6.17 Parts of Barrow-cum-Denham Neighbourhood Plan area lie within the additional orange cell 1km squares that identify areas of potential supporting habitat as shown in Figure 3. The Stone Curlew Buffers in the Brecks document specifies that '*orange cells are ones where there are data gaps and additional data checks, or survey data, may be required to check for use by Stone Curlews*'. Stone curlews are strongly associated with short semi-natural grassland, heaths and spring-sown arable fields that provide suitable nesting habitat³³. Considering that Barrow and Denham are rural villages surrounded by agricultural fields there is reason to believe that the parish could support suitable habitat for foraging and/or nesting stone curlew.

³³ Green, R.E., Tyler, G.A. and Bowden, C.G.R., 2000. Habitat selection, ranging behaviour and diet of the stone curlew (*Burhinus oedionemus*) in southern England. *Journal of Zoology*, 250(2), pp.161-183.

- 6.18 At the screening stage no allocation sites were identified to lie within 1,500m of the SPA or within the blue '1500m buffer from 1km cells outside the SPA' on the above figure. However, all of the site allocations proposed by the Council from the 'Call for Sites', apart from BD8, lie at least partially within the 1km orange grid cells which indicates that the habitat is suitable for stone curlew but insufficient data exists on stone curlew presence to establish if this constitutes functionally-linked habitat. As such there is a potential risk to stone curlews from these development allocations, subject to the results of survey.
- 6.19 Allocation BD8 lies further than 3km from the SPA boundary and outside any identified 1km cells. Therefore, this allocation is not expected to impact either stone curlew risk areas or the Breckland SPA in general with respect to habitat fragmentation.
- 6.20 Given that parts of Barrow-cum-Denham Neighbourhood Plan area have been identified to potentially support suitable habitat for stone curlew, and that the SPA supports over 70% of the breeding population of the species, it is very important that development is sensitive to this protected species^{23 24}.
- 6.21 Therefore, it is concluded that in the absence of data to prove the use or otherwise of these sites by stone curlew, a project level ecological assessment for each site except site BD8 should be undertaken to support a planning application. This assessment should include:
- **Reference to historical stone curlew species records, if available, pertaining to the grid cell(s) in which a proposal is located. (Policy supporting text: historical records may be obtained from the RSPB and/or Norfolk Biodiversity Information Service (local Biological Recording Centre);**
 - **Since the Stone Curlew Buffers for the Brecks document identifies that existing records are likely to be incomplete the application should also be accompanied by the results of a site-specific stone curlew survey undertaken over a period from early April to mid-August, undertaken with appropriate sensitivity to species disturbance. This may require 3 years of survey; and**
 - **Where stone curlews are identified on a site, the proposals shall include a site-specific Habitats Regulations Assessment that includes proposed mitigation measures. Proposals lacking acceptable mitigation measures, where such are required, will not be permitted'.**
- 6.22 Regarding the other qualifying species of the Breckland SPA, none of the proposed site allocations fall within the accepted 400m buffer zone of the SPA which protects species such as nightjar or woodlark, nor do they involve loss of heathland, acid grassland or rotationally-managed plantation which would render them suitable nesting habitat for these species. Therefore, it can be concluded that the development allocations will have no adverse effect on these species within the Breckland SPA.
- 6.23 **If the above requirements are included within the emerging NP, it can be concluded that the BCDNP will not result in adverse effects on the integrity of the Breckland SPA regarding habitat fragmentation.**

Recreational pressure

Introduction

- 6.24 There is growing concern over the cumulative impacts of recreation on key nature conservation sites in the UK, as most sites must fulfil conservation objectives while also providing recreational opportunity. Various research reports have provided compelling links between changes in housing and access levels and impacts on European protected sites^{34 35}. This applies to any habitat, but the additional recreational pressure from housing growth on destinations with water features is likely to be especially strong and some of the qualifying waterfowl are known to be susceptible to disturbance. Different European sites are subject to different types of recreational pressures and have different vulnerabilities. Studies across a range of species

³⁴ Liley D., Clarke R.T., Mallord J.W., Bullock J.M. 2006a. The effect of urban development and human disturbance on the distribution and abundance of nightjars on the Thames Basin and Dorset Heaths. Natural England / Footprint Ecology.

³⁵ Liley D., Clarke R.T., Underhill-Day J., Tyldesley D.T. 2006b. Evidence to support the appropriate Assessment of development plans and projects in south-east Dorset. Footprint Ecology / Dorset County Council.

have shown that the effects from recreation can be complex. HRAs of Plans tend to focus on recreational sources of disturbance as a result of new residents³⁶.

- 6.25 Human activity can affect organisms directly (e.g. loss of habitat or by causing species to flee) and indirectly (e.g. by damaging their habitat or reducing their fitness in less obvious ways e.g. stress). The most obvious direct effect is the loss of habitat as a result of increased visitors to a site (i.e. trampling). But human activity can also lead to much subtler behavioural (e.g. alterations in feeding behaviour, avoidance of certain areas and use of sub optimal areas etc.) and physiological changes to species (e.g. an increase in heart rate). While these are less noticeable, they might result in major population-level changes by altering the balance between immigration/birth and emigration/death³⁷.
- 6.26 At the screening stage (Table 2) three European Sites were identified that could be impacted by recreational pressure. These were the Breckland SAC/SPA and Rex Graham Reserve SAC.

Breckland SPA/SAC

Background

- 6.27 Impacts of recreational pressure for Breckland SPA would likely be through more indirect means such as disturbance of species. For example, the impact of bird disturbance has been particularly well studied. Much research concern stems from the fact that birds expend energy unnecessarily when disturbed and the time they spend responding to humans is time that is not spent feeding³⁸. Disturbance therefore risks increasing energy expenditure of birds while reducing their energy intake, which can adversely affect their 'condition' and ultimately their survival. Additionally, displacement of birds from one feeding site to others can increase the pressure on the resources available within the remaining sites, as they then must sustain a greater number of birds³⁹. 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. Recreational effects on ground-nesting birds are particularly severe, with many studies concluding that urban sites support lower densities of key species, such as nightjar^{40 41}.
- 6.28 Evidence in the literature suggests that the magnitude of disturbance clearly differs between different types of recreational activities. For example, dog walking leads to a significantly higher reduction in bird diversity and abundance than hiking⁴². Scientific evidence also suggests that key disturbance parameters, such as areas of influence and flush distance, are significantly greater for dog walkers than hikers⁴³. A UK meta-analysis suggests that important spatial (e.g. the area of a site potentially influenced) and temporal (e.g. how often or long an activity is carried out) parameters differ between recreational activities, suggesting that activity type is a factor that should be taken into account in HRAs⁴⁴.
- 6.29 The St Edmundsbury Rural Vision 2031 HRA concludes no adverse effects on the integrity on the Breckland SPA or SAC as a result of recreational pressure from development within the rural areas of St Edmundsbury. However, this does not account for the full quanta which are considered in the BCDNP. Therefore, the effects of recreational pressure resulting from the remaining XX dwellings proposed in the NP must be appropriately assessed in isolation and in combination with those already covered in the Rural Vision 2031.

³⁶ The RTP1 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'.

³⁷ Riley, J. 2003. Review of Recreational Disturbance Research on Selected Wildlife in Scotland. Scottish Natural Heritage.

³⁸ Riddington, R. et al. 1996. The impact of disturbance on the behaviour and energy budgets of Brent geese. *Bird Study* 43:269-279

³⁹ Gill, J.A., Sutherland, W.J. & Norris, K. 1998. The consequences of human disturbance for estuarine birds. *RSPB Conservation Review* 12: 67-72

⁴⁰ Clarke R.T., Liley D., Sharp J.M., Green R.E. 2013. Building development and roads: Implications for the distribution of stone curlews across the Brecks. *PLOS ONE*. doi:10.1371/journal.pone.0072984.

⁴¹ Liley D., Clarke R.T. 2003. The impact of urban development and human disturbance on the numbers of nightjar *Caprimulgus europaeus* on heathlands in Dorset, England. *Biological Conservation* 114: 219-230.

⁴² Banks P.B., Bryant J.Y. 2007. Four-legged friend or foe? Dog walking displaces native birds from natural areas. *Biology Letters* 3: 14pp.

⁴³ Miller S.G., Knight R.L., Miller C.K. 2001. Wildlife responses to pedestrians and dogs. 29: 124-132.

⁴⁴ Weitowitz D., Panter C., Hoskin R., Liley D. The spatio-temporal footprint of key recreation activities in European protected sites. Manuscript in preparation.

- 6.30 Breckland SPA is a site where visitor surveys have been undertaken. These surveys were undertaken by Footprint Ecology (2010)⁴⁵ commissioned by Forest Heath District and St. Edmundsbury Borough Councils. With regards to current visitor pressure; the Footprint Ecology Visitor Survey found that the majority of visitors are local residents (87%) living within a 10km radius (of the survey location) and these visitors used the forest at least weekly as their local green space. The survey also highlighted that 91% of all visitors arrived by car and that dog walking was the most popular activity. The 10km distance was recorded between home postcode and survey location. However, these survey locations were often some distance into the SPA itself; analysing the data further visitor numbers to Breckland Forest (the relevant SPA parcel being designated for nightjar and woodlark) declined at around 7.5km from the actual SPA boundary. Therefore, it has been determined by West Suffolk Council that any development within 7.5km of SSSI units within the SPA that contain heathland or rotationally managed forestry, could cause an impact on nightjar and woodlark, in-combination with all other development within 7.5km of the SPA.

Discussion

- 6.31 All of the proposed housing sites allocated by the BCDNP (BD1 – BD12) are within 7.5km of the Breckland SPA. Therefore, it is entirely possible that residential development at Barrow-cum-Denham Neighbourhood Plan area will lead to increased visitors to the Breckland SPA both alone and more significantly when considered in-combination with growth across the district and surrounding districts.
- 6.32 The adopted Core Strategy for St Edmundsbury provides policy CS2 which applies to Barrow-cum-Denham and states *"identifying, protecting and conserving: a network of designated sites including the Breckland Special Protection Area (SPA)* and other sites of national and local importance; Biodiversity Action Plan (BAP) habitat and species; wildlife or green corridors, ecological networks; and other green spaces will be identified, protected and habitats created as appropriate;"*
- 6.33 The Core Strategy also states: *The Council considers that a baseline visitor survey and study regarding visitor impact to the SPA is a broader piece of work which it is willing to undertake in coordination with other neighbouring authorities. Such a study would be beneficial to the Council, to improve understanding of the issues of recreational impact, to supplement the Local Development Framework evidence base on this issue, and to identify additional mitigation measures which may further reduce the likelihood of significant effects to the SPA. The Council is therefore willing to engage, as appropriate, in work to assess recreational disturbance impacts to Breckland SPA in support of any initiatives promoted through the review of the RSS."*
- 6.34 The key points to consider from the visitor survey for Breckland SPA are as follows⁴⁶:
- The majority of visitors surveyed had travelled by car to the SPA indicating that the provision of car parks in the SPA is of paramount importance in determining where the majority of visitors are likely to congregate within the SPA. The closest car park within the SPA to the Parish boundary is located 5.5km northeast at West Stow Country Park. The Rural Vision 2031 HRA states *"The land within which SPA bird species nest at West Stow Heath is managed within West Stow Country Park to minimise visitor impact, and no other SPA species are present."*
 - The majority of visitors (87%) had travelled from home and were local to the general area. The local residents interviewed tended to visit frequently (i.e. at least weekly or daily) and throughout the year (47% indicated that visitation patterns were not influenced by seasonality). Slightly higher visitor numbers were recorded at weekends, but this was not consistent across all sites. This shows that people were using the SPA as their local green space for convenience.
 - Arable land is present within the SPA, accessible by public rights of way (PROWs). Arable land can be used by stone curlews for nesting purposes. However, recreation is limited on arable land and the PROWs providing access within the SPA are poorly connected to car parking. Therefore, the majority of visitors would be unlikely to access the arable land given that visits to the SPA are typically short, with 79% of visitors spending two hours or less at the site.
- 6.35 Clearly the small amount of development planned for Barrow-cum-Denham Neighbourhood Plan area will not in itself result in an adverse effect on the integrity of the SPA through recreational pressure. However, the in-combination effects of development across St Edmundsbury, Forest Heath and Breckland District must also be considered in this HRA. The West Suffolk Local Plan is currently being developed and will replace both the St Edmundsbury Core Strategy and the Forest Heath Core Strategy. However, of particular

⁴⁵ Fearnley, H., Liley, D. and Cruickshanks, K. (2010). Visitor survey from results Breckland SPA. Footprint Ecology.

⁴⁶ https://www.westsuffolk.gov.uk/planning/Planning_Policies/local_plans/upload/Visitor-Survey-Results-from-Breckland-SPA.pdf

note regarding this Neighbourhood Plan is the fact that the St Edmundsbury Rural Vision 2031 HRA concluded no adverse effects on the integrity on the Breckland SPA or SAC as a result of recreational pressure from development within the rural areas of St Edmundsbury. While the total quantum of growth now expected in Barrow and Denham was not included in that analysis the small amount involved makes it very unlikely that it would materially alter the conclusions.

6.36 it is understood that Breckland Council is in the process of establishing an advisory group for the Breckland SPA that will provide mitigation and monitoring programs and West Suffolk Council will participate in that group as necessary. Following that work, it is possible that financial contributions will be sought from new housing development by the Breckland District Council and West Suffolk Council to deliver mitigation measures such as:

- SANG (Suitable Alternative Natural Greenspace) - The provision of alternative recreational land to attract new residents away from the European Sites in question;
- SAMM (Strategic Access Management and Monitoring); and/ or
- A bespoke solution to provide adequate mitigation measures to avoid any potential adverse effects.

6.37 Given the small amount of development expected in the Neighbourhood Plan, it is most likely that applications for sites allocated within the plan will need to financially contribute to a strategic mitigation solution rather than provide their own on-site mitigation. BCDNP also provides Policy 6: Tourism Related Development and Policy 7: Community Facilities & Infrastructure, the first of which describes the limited nature of development which would encourage tourism to the area and the second of which highlights the importance of the existing open space and community facilities which would provide alternatives to residents looking to utilise the SPA as their local green space.

6.38 **It is recommended that Policy 7 is updated to include a requirement for applicants for net new housing within the parish to contribute to any Breckland SPA mitigation strategy that may be devised by West Suffolk Council as part of its Local Plan work.**

Air Quality

Introduction

6.39 Residential development within Barrow-cum-Denham Neighbourhood Plan area could decrease air quality through increased emissions from vehicle exhausts. There are two measures of relevance regarding air quality impacts from vehicle exhausts. The first is the concentration of oxides of nitrogen (known as NO_x) in the atmosphere. In extreme cases NO_x can be directly toxic to vegetation but its main importance is as a source of nitrogen, which is then deposited on adjacent habitats. The guideline atmospheric concentration advocated by Government for the protection of vegetation is 30 micrograms per cubic metre (µg m⁻³), known as the Critical Level, as this concentration relates to the growth effects of nitrogen derived from NO_x on vegetation.

6.40 The second important metric is a measure of the rate of the resulting nitrogen deposition. The addition of nitrogen is a form of fertilization, which can have a negative effect on woodlands and other habitats over time by encouraging more competitive plant species that can force out the less competitive species that are more characteristic. Unlike NO_x in atmosphere, the nitrogen deposition rate below which we are confident effects would not arise is different for each habitat. The rate (known as the Critical Load) is provided on the UK Air Pollution Information System (APIS) website (www.apis.ac.uk) and is expressed as a quantity (kilograms) of nitrogen over a given area (hectare) per year (kgNha⁻¹yr⁻¹).

6.41 Emissions of NO_x and resulting deposition can have community level impacts to habitats and European Sites. Habitats that are particularly sensitive to elevated nitrogen levels include heathlands⁴⁷ and sand dunes⁴⁸. Supported communities that make up sand dunes are particularly sensitive to nitrogen

⁴⁷ Aerts, R., Berendse, F., de Caluwe, H. and Schmitz, M., 1990. Competition in heathland along an experimental gradient of nutrient availability. *Oikos*, 57(3), pp.310-318.

⁴⁸ Jones, M.L.M., Wallace, H.L., Norris, D., Brittain, S.A., Hara, S., Jones, R.E., Rhind, P.M., Reynolds, B.R. and Emmett, B.A., 2004. Changes in vegetation and soil characteristics in coastal sand dunes along a gradient of atmospheric nitrogen deposition. *Plant Biology*, 6(05), pp.598-605.

deposition⁴⁹. Dune ecosystems are dynamic in their environmental condition and state; this has allowed the colonisation of specialist species that make up the dune community. Nitrogen is a factor currently contributing to the stabilisation of dune ecosystems. Field *et al* (2014)⁵⁰ observed for dune systems that species richness declined by 36% when 17kg/ha/yr was deposited. The protection of this habitat from nitrogen degradation is therefore important.

6.42 The routes that nitrogen deposition impacts habitats and vegetation as described above are through environmental changes, toxicity and the movement of nitrogen through trophic levels. Another route of effect is through nitrogen acidification. A study undertaken by Maskell *et al* (2010)⁵¹ observed that with increasing acid deposition from NOx there was a decrease in species richness within heathland. Acid deposition can have serious impacts to the health of soil structure and the microbial communities found here. These species carry out a natural decaying process known as nitrification (converting ammonium to nitrate) that generates acidity. However, when in combination with acid deposition from NOx pollution the soil pH may become too acidic for specialised plant communities to survive and result in a net decrease in biodiversity⁵². Acidification tends to be more of an issue for acid substrates, which have poor buffering capacity (i.e. heathland), than neutral or calcareous substrates.

6.43 Air quality impacts of development plans are most appropriately tackled at the Local Plan level. Impacts of air quality to European Sites within West Suffolk District were assessed at a high level (not including modelling at this stage in the process) in 2020 for the emerging West Suffolk District Local Plan HRA⁵³. These findings were as follows:

- *"Chippenham Fen Ramsar (part of Fenland SAC) is situated less than 1km outside of the district north east of Newmarket. The site is not within 200m of any significant A road. An 80 m section of the Ramsar is located immediately adjacent to Palace Road a rural access road west of Chippenham village. However, the habitat within 200m of this road is semi-improved grassland and not a designated feature of the Ramsar/SAC.*
- *Rex Graham Reserve SAC is within 200m of the A11 between Mildenhall and Thetford. The designated habitat of the site, calcareous grassland is located within 200m of the road, although there is a buffer of deciduous woodland between the grassland and the road and calcareous grassland is a moderately nitrogen rich habitat with a nitrogen critical load range of 15 – 25 kgN/ha/yr. Nonetheless, the habitat is not insensitive to nitrogen deposition and therefore effects of District growth on traffic flows along the A11 will be investigated further for the Preferred Options HRA through traffic and air quality modelling.*
- *Breckland SAC and SPA are within 200m of a number of major A roads including the A11 between Mildenhall and Thetford and the A1065 between Mildenhall and Brandon. The SPA is also bisected by several B roads including but not limited to the B1106 north-south from Brandon to Brockley Corner and SAC and SPA are bisected by the B1112 between Icklingham and Eriswell and the A1101 between Lackford and Mildenhall. Habitats and species within the SAC and SPA that have been highlighted as potentially vulnerable include stone curlew (when nesting in grassland rather than arable land), woodlark (when nesting in heathland, but less so when nesting in rotational forestry), open grassland with grey-hair grass and common bent grass of inland dunes, European dry heaths, dry grassland and scrublands on chalk or limestone (important orchid sites). There are areas of European dry heathland and calcareous grassland within 200m of these major roads. Therefore, the effects of District growth on traffic flows within the Breckland SAC and SPA will be investigated further for the Preferred Options HRA."*

6.44 A zone of 10km is typically used to screen in European sites vulnerable to reductions in air quality. This is based on the average UK car journey being approximately 10.6km.⁵⁴ Although Rex Graham Reserve SAC

⁴⁹ Plassmann, K., Edwards-Jones, G. and Jones, M.L.M., 2009. The effects of low levels of nitrogen deposition and grazing on dune grassland. *Science of the total environment*, 407(4), pp.1391-1404.

⁵⁰ Field, C.D., Dise, N.B., Payne, R.J., Britton, A.J., Emmett, B.A., Helliwell, R.C., Hughes, S., Jones, L., Lees, S., Leake, J.R. and Leith, I.D., 2014. The role of nitrogen deposition in widespread plant community change across semi-natural habitats. *Ecosystems*, 17(5), pp.864-877.

⁵¹ Maskell, L.C., Smart, S.M., Bullock, J.M., Thompson, K.E.N. and Stevens, C.J., (2010). Nitrogen deposition causes widespread loss of species richness in British habitats. *Global Change Biology*, 16(2), pp.671-679.

⁵² Defra (2007) Acid Deposition Processes. Nobel House: London.

⁵³ West S

⁵⁴ GOV.UK (2019). Average number of trips made and distance travelled. <https://www.gov.uk/government/statistical-data-sets/nts01-average-number-of-trips-made-and-distance-travelled>, accessed 13/03/2020

is within 200m of the A11 east of Mildenhall and lies only just over 10km from the potential development sites in Barrow-cum Denham Neighbourhood Plan area, this road does not provide an efficient route between Mildenhall and the potential development sites at Barrow and Denham. The A1101 is a more likely route and runs within 200m of Breckland SAC (Cavenham to Icklingham Heaths) within 10km of the potential development sites in the parish. Therefore, the A1101 and Breckland SAC is the focus of this HRA.

6.45 It is generally considered that impacts arising from nitrogen deposition through emissions would need to occur on SAC/SPA habitat that supports designated habitats and features. Given that many of the roads noted above pass through the Breckland SAC nitrogen could be directly deposited onto designated habitats. That said, based on freely available aerial imagery, the majority of habitat located within 200m of each of the identified roads are road verges, plantation woodland, arable fields, amenity grassland and/or residential areas. Therefore, the following assessment applies to the Breckland SAC/SPA:

- Where plantation is within 200m of the road, forestry management practices necessary to keep the plantation suitable for nightjar and woodlark will have the dominant effect on forest clearing structure compared to the relatively subtle effects that may arise from atmospheric deposition;
- Where arable land is within 200m of the road, this is already a nitrogen rich habitat and its suitability for stone curlew is dependent on management; and
- Road verges and residential areas are not considered suitable habitat for stone curlew, woodlark or nightjar due to lack of foraging habitat and disturbance.

6.46 Therefore, an issue is only likely to arise when major roads lie within 200m of habitats for which the Breckland SAC is designated. Where the A1101 runs directly adjacent to the Breckland SAC, this area is covered by acid grassland according to habitat mapping on the www.magic.gov.uk website and the Natural England condition assessment for the relevant SSSI management units (Units 2 and 4). Acid grassland is not a habitat for which Breckland SAC is designated. Therefore, the small quantum of development expected to be allocated for Barrow-cum-Denham Neighbourhood Plan area is not predicted to have a material impact on this habitat as a result of any increased traffic along the A1101.

6.47 Air quality is addressed in the St Edmundsbury Core Strategy under section E of policy CS2: Sustainable Development, stating *"conserving and, wherever possible, enhancing other natural resources including, air quality and the quality and local distinctiveness of soils;"*

6.48 The NP also includes in Policy 7: Community Facilities and Infrastructure, a clause regarding transport and the local road network which states *"Proposals to improve the availability of public transport to the local community will be activity encouraged and supported. Other proposals to improve the mobility of residents will be equally encouraged and supported particularly where these would also present clear environmental benefits. This could include the provision of a car club or of a community-led public transport scheme. Preference will be shown to any such proposals which incorporate electric vehicles and/or bicycles for hire. Proposals to reduce the impact of traffic through the village will be encouraged and proposals to reduce speeding traffic will be particularly welcome."*

6.49 **The HRA for the Initial options assessment of the emerging West Suffolk District Local Plan identifies the need for further assessment of air quality in the next iteration of that HRA at the Preferred Options Stage. The BCDNP policy framework may need to be updated to reflect the conclusions of the emerging Local Plan HRA with regards to air quality.**

Water quality: surface water runoff

Introduction

6.50 Considering that the Parish boundary is within 10m of the Breckland SPA boundary, there is a risk that inappropriate conversion of land to hardstanding and poor drainage could lead to contaminated runoff causing an excessive build-up of nutrients within the site. Additionally, St Edmundsbury Rural Vision 2031 states *"The heavy soils in and around Barrow make the area susceptible to surface water flooding, demonstrated by the number of ponds around the village. This will need to be considered when future sites are developed but is an obstacle that can be overcome."*

- 6.51 The quality of the water that feeds European Sites is an important determinant of the nature of their habitats and the species they support⁵⁵. Rivers, streams and aquatic environments supported/that are fed by these sites can be affected by pollution from road run-off such as oil/ vehicle chemicals, and in the winter increased salt from de-icing the roads and pollution incident(s).
- 6.52 Within areas of excavation (i.e. construction activities) there is a potential for increased risk to groundwater resources from any spills/ leaks of fuel, oil and/or sediment.
- 6.53 Poor water quality can have a range of environmental impacts. At high levels, toxic chemicals and metals can result in the immediate death of aquatic life. At lower levels, detrimental effects can also be experienced, including increased vulnerability to disease and changes in wildlife behaviour⁵⁶.
- 6.54 The impacts of poor water quality entering European Sites can have far-reaching consequences similar to air quality. For example:
- 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^{57 58}.
 - Some pesticides, industrial chemicals, and components of sewage effluent are suspected to interfere with the functioning of the endocrine system, possibly having negative effects on the reproduction and development of aquatic life.
- 6.55 The Breckland SPA/SAC supports the habitat 'Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition*'. In the UK, natural eutrophic lakes typically contain aquatic macrophyte communities dominated by pondweeds *Potamogeton* spp., spiked water-milfoil *Myriophyllum spicatum*, yellow water-lily *Nuphar lutea*, and occasionally by associations of stoneworts *Chara* spp. Except in the most northerly areas, many eutrophic lakes are fringed by reedmace – common reed *Scirpo* – *Phragmitetum* associations.
- 6.56 Naturally this habitat type is higher in nutrient levels (i.e. nitrogen) when compared to other lake habitats; resulting in a higher natural productivity and are typically species-rich. However, many such lakes have been damaged by over-enrichment with nutrients, resulting in hypertrophic conditions and a net reduction in species-richness⁵⁹. Natural England's site improvement plan for Breckland SAC/SPA highlights that water pollution is a current threat to the integrity of the site. Nutrient enriched water and/or contaminated water may leach into the SAC and degrade habitats.

Background

- 6.57 Cavenham Stream runs through the Barrow-cum-Denham Neighbourhood Plan area and extends north into the Breckland SPA. According to the Environment Agency, this river is categorised as Flood Zone 3 meaning it has 1% or greater annual probability of flooding. This river joins the river Lark which then extends through the Breckland SAC meaning they are hydrologically connected and the movement of contaminated water through this system could occur in-combination with surrounding parishes during times of flooding.
- 6.58 The interest features of the Breckland SPA are not listed as vulnerable to water pollution effects within the Site Improvement Plan indicating its interest features are not water quality dependent.
- 6.59 West Suffolk Council published a revised flood risk management strategy following the water cycle study conducted by the Forest Heath District Council and St Edmundsbury Council in 2009 which identified the aforementioned surface water pathway between Barrow or Denham and Breckland SAC and SPA.

⁵⁵ Johnson, W.W. and Finley, M.T., 1980. *Handbook of acute toxicity of chemicals to fish and aquatic invertebrates: Summaries of toxicity tests conducted at Columbia National Fisheries Research Laboratory, 1965-78* (No. 137). US Fish and Wildlife Service.

⁵⁶ Poulin, R., 1992. Toxic pollution and parasitism in freshwater fish. *Parasitology Today*, 8(2), pp.58-61.

⁵⁷ Rabalais, N.N., 2002. Nitrogen in aquatic ecosystems. *AMBIO: A Journal of the Human Environment*, 31(2), pp.102-113.

⁵⁸ Howarth, R.W. and Marino, R., 2006. Nitrogen as the limiting nutrient for eutrophication in coastal marine ecosystems: evolving views over three decades. *Limnology and Oceanography*, 51(1part2), pp.364-376.

⁵⁹ JNCC (2019). 3150 Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition*-type vegetation. Available online: <https://sac.jncc.gov.uk/habitat/H3150/> [Accessed: 15/01/20].

- 6.60 Considering the above, it is evident from review of Breckland SAC Site Improvement Plan, scientific research and previous HRA/WCS (Water Cycle Study) that surface water runoff is a potential issue for European Sites within the zone of influence for surface water runoff from Barrow-cum-Denham Neighbourhood Plan area. Preventing further surface water runoff and flood risk within the parish can be mitigated using high quality drainage design that prevents surface water entering environmentally sensitive areas. This is mentioned in the Suffolk Flood Risk Management Strategy which encourages the use of SuDS features in new development⁶⁰. The Strategy document highlights the responsibility of Local Authorities to take an active role in ensuring that flood risk is not exacerbated due to new development. Therefore it is necessary for Barrow-cum-Denham Neighbourhood Plan to reflect this in the NP policy framework.
- 6.61 **It is recommended that the BCDNP includes a policy which specifies how new development in the parish is to comply with the flood risk management strategy for the district to ensure no adverse effects on the integrity of the Breckland SAC/SPA as a result of surface water runoff and water pollution caused by an increase in development within the parish. This can include but is not limited to:**
- **Use of effective SuDS features,**
 - **Landscaping to limit sediment runoff from development**
 - **Measures to save water**

Water Quality: discharge of treated sewage effluent

- 6.62 It has been noted that Barrow WwTW has very little headroom available to accommodate increased residential development in Barrow-cum-Denham Neighbourhood Plan area. The St Edmundsbury Rural Vision 2031 states *"Therefore there will be a need for additional water infrastructure and or treatment upgrades to support new development in the village."*
- 6.63 The Core Strategy for St Edmundsbury states that the allocation of 144+ new buildings will require an upgrade in waste water infrastructure. This could include:
- Necessary infrastructure improvements provided by lead agencies
 - Expansion/upgrading of existing facilities and/or provision of new facilities
 - Developer contribution sought on application basis
- 6.64 The Forest Heath District Council & St Edmundsbury SFRA and water cycle study also highlights the limited capacity of the WwTWs serving Barrow and Denham. This study was published in 2009 and at this time, the allocations predicted for Barrow were approximately 31 dwellings which is far lower than the current allocation for the parish. The study specifically states that development in the south or south east of Barrow would be preferable to that in the north or west which would be further away from the WwTW and would require network upgrades. Additionally, the study states *"Cavenham Stream FZ 2/3 may partially constrain development to the far east, and the Denham to Kentford watercourse may affect development to the west – Recommend avoiding develop in these areas"*
- 6.65 Considering this, the allocations proposed by the council do not all comply with the recommendations given by the WCS. Of those proposed, allocations BD6, BD8, BD9, BG10, BD11 and BD12 are preferable based on their locations within the Parish. The locations of these allocations would be likely to put the least strain on the WwTW in the parish as identified in the WCS.
- 6.66 **Beyond the infrastructure point, it is recommended that a requirement is added to the Neighbourhood Plan that the allocated sites will be supported provided the relevant water company can confirm that adequate headroom or increased treatment capacity is available in the in Barrow WwTW.**

⁶⁰ <https://democracy.westsuffolk.gov.uk/documents/s13977/CAB.FH.16.020%20Appendix%20-%20Revised%20Suffolk%20Flood%20Risk%20Management%20Strategy%20SFRMS.pdf> [accessed 26/01/21]

Hydrological changes, including water abstraction for public water supply

- 6.67 Water abstraction reduces flow in rivers and streams, lowers groundwater levels and potentially depletes aquifers. Impacts potentially occur where the interest features are aquatic or depend on water. However, the issue of water abstraction is better served at LP level in collaboration with water companies and the Environment Agency.
- 6.68 The Environment Agency catchment explorer tool demonstrates that Chippenham Fen SAC is outside the surface water catchment for the Lark catchment area which contains Barrow-cum-Denham Neighbourhood Plan area, indicating that there is no hydrological connectivity between the parish and the Chippenham Fen SAC.
- 6.69 The Habitats Regulations Assessment undertaken for the Anglian Water Draft Water Resources Management Plan (WRMP) (December 2019) concluded that because the qualifying features of the Breckland SPA are not listed as sensitive to changes in water levels and flow, that there would be no adverse effects on the integrity of the Breckland SPA as a result of the delivery of the WRMP.
- 6.70 Since the purpose of the WRMP is to set out how the water company intends to meet public water supply requirements up to 2045 it covers the period of the West Suffolk District Local Plan and the Barrow-cum-Denham NP.
- 6.71 **Therefore, adverse effects from hydrological changes including water abstraction for public water supply, on the integrity of the European sites of relevance to Barrow-cum-Denham Neighbourhood Plan area can be reasonable dismissed.**

7. Conclusions

- 7.1 This assessment undertook both Screening and Appropriate Assessment of the policies and the proposed allocations resulting from the Parish's Call for Sites.
- 7.2 The international designated sites considered within the Appropriate Assessment for impact pathways that could not be screened out at the screening stage were:
- Breckland SAC, SPA
 - Chippenham Fen SAC
 - Rex Graham Reserve SAC
- 7.3 Impact pathways considered during the screening were: urbanisation, habitat fragmentation/ loss of functionally linked land, recreational pressure, water quality, water quantity, level and flow and air pollution.
- 7.4 Twelve potential Site Allocations (BD1 – BD12) to provide net new residential development were subject to Appropriate Assessment as they were located within the accepted zones of influence of the aforementioned international sites and could result in adverse effects on the integrity of an international site in combination with other projects and plans.
- 7.5 Following Appropriate Assessment, a number of recommendations were made to improve the policy framework provided in the Barrow-cum-Denham Neighbourhood Plan. These are as follows:
- **It is recommended that Policy 7 is updated to include a requirement for applicants for net new housing within the parish to contribute to any Breckland SPA mitigation strategy that may be devised by West Suffolk Council as part of its Local Plan work.**
 - **The HRA for the Initial options assessment of the emerging West Suffolk District Local Plan identifies the need for further assessment of air quality in the next iteration of that HRA at the Preferred Options Stage. The BCDNP policy framework may need to be updated to reflect the conclusions of the emerging Local Plan HRA with regards to air quality.**
 - **It is recommended that the BCDNP includes a policy which specifies how new development in the parish is to comply with the flood risk management strategy for the district to ensure no adverse effects on the integrity of the Breckland SAC/SPA as a result of surface water runoff and water pollution caused by an increase in development within the parish. This can include but is not limited to:**
 - **Use of effective SuDS features,**
 - **Landscaping to limit sediment runoff from development**
 - **Measures to save water**
 - **Beyond the infrastructure point, it is recommended that a requirement is added to the Neighbourhood Plan that the allocated sites will be supported provided the relevant water company can confirm that adequate headroom or increased treatment capacity is available in the in Barrow WwTW.**
- 7.6 It is concluded that subject to recommendations made in this assessment, the Barrow-cum-Denham Neighbourhood Plan will contain sufficient policy framework to ensure no adverse effects on the integrity of international designated sites will occur in isolation or in combination with other projects and plans.