



The Sizewell C Project

6.3 Volume 2 Main Development Site Chapter 14 Terrestrial Ecology and Ornithology Appendix 14A7 Ornithology Part 1 of 2

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SIZEWELL C DEVELOPMENT – MAIN DEVELOPMENT SITE: VOLUME 2, CHAPTER 14, APPENDIX 14A7 – ORNITHOLOGY

Documents included within this Appendix group are as follows:

APPENDIX 14A7.1 ORNITHOLOGY

ANNEX 14A7.1 FIGURES (provided separately)

ANNEX 14A7.2 ORNITHOLOGY METHODOLOGY

ANNEX 14A7.3 ORNITHOLOGY SECONDARY DATA

- Annex 14A7.3 Sizewell First Interim Bird Report February 2008
- Annex 14A7.3 Nightjar Survey Report 2010
- Annex 14A7.3 Black Redstart Survey Report 2011
- Annex 14A7.3 Sizewell Second Interim Bird Report
- Annex 14A7.3 Seabird Report 2011-12
- Annex 14A7.3 Sizewell Bittern Report 2008
- Annex 14A7.3 Breeding Bird Survey Report 2010
- Annex 14A7.3 Marsh Harrier and Bittern Survey Report 2011-12
- Annex 14A7.3 Sizewell Little Tern Report 2010
- Annex 14A7.3 Arable Reversion CBC 2012
- Annex 14A7.3 Sizewell Marsh Harrier Report 2008



ANNEX 14A7.4 HYDER ARCADIS REPORTS (included in Part 2)

- Annex 14A7.4 Red-throated Diver Report 2012-13
- Annex 14A7.4 Red-throated Diver Report 2013-14
- Annex 14A7.4 Little tern Report 2013
- Annex 14A7.4 Wintering bird survey Technical Note 2018-19

ANNEX 14A7.5 SPECIES ACCOUNTS- QUALIFYING SPECIES

ANNEX 14A7.6 SPECIES ACCOUNTS- RED AND AMBER LIST SPECIES

NOTE:

Please note that the red line boundary used in figures within this document may have since been amended, and therefore does not reflect the boundaries in respect of which development consent has been sought in this application. However, the amendment to the red line boundary does not have any impact on the findings set out in this document and all other information remains correct.



VOLUME 2, CHAPTER 14: APPENDIX 14A7 – ORNITHOLOGY

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Executive Summary

This appendix describes the ornithological baseline conditions that fall within the Zone of Influence (ZOI) of the Sizewell C power station at the main development site (hereafter referred to as the “proposed development”).

Extensive bird survey work has been carried out by Wood Group (formerly Entec and Amec Foster Wheeler) (Ref. 1.1, Ref. 1.2 and Ref. 1.3) and Arcadis Consulting (UK) Limited (formerly Hyder Consulting, and hereafter referred to as Arcadis) between 2007 and 2019. The surveys included a combination of vantage point surveys and transect-based survey work, and took place across a variety of conditions and timings. These surveys have focussed on the following key areas:

- Establishing to what degree bittern (*Botaurus stellaris*), marsh harrier (*Circus aeruginosus*), hen harrier (*Circus cyaneus*) and wintering wildfowl associated with the Minsmere to Walberswick Heaths and Marshes Special Protection Area (SPA)/Ramsar site forage within and adjacent to the proposed development, in particular establishing detailed information on the intensity of marsh harrier foraging activity, and the number and spatial distribution of wintering wildfowl.
- Establishing the status and distribution of seabird species offshore from the proposed development, in particular, red-throated diver (*Gavia stellata*) associated with the Outer Thames Estuary SPA, and little tern (*Sterna albifrons*), and sandwich tern (*Thalasseus sandvicensis*).
- Establishing the breeding and wintering bird assemblages present within the ZOI.

Further surveys undertaken have also been used to supplement the baseline presented here. To ensure a robust Ecological Impact Assessment (EclA) process, all ornithological features within the ZOI of the proposed development have been assessed to determine whether they would qualify as Important Ecological Features (IEFs), as defined in Chartered Institute of Ecology and Environmental Management (CIEEM) guidelines on EclA (Ref. 1.4). In addition, ornithological features have been assessed in accordance with the standard Environmental Impact Assessment (EIA) methodology used elsewhere within the **Environmental Statement (ES)** (Doc Ref. Book 6).

Based on these criteria, the following ornithological features within the ZOI of the proposed development have been identified as IEFs.

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Important Ecological Feature	Importance (CIEEM Guidelines/ EIA-Specific Assessment Methodology).
Bittern (Schedule 1 species breeding and wintering).	International/High.
Avocet (<i>Recurvirostra avosetta</i>) (Schedule 1 species breeding and wintering).	International/High.
Redshank <i>Tringa totanus</i> (wintering).	International/High.
Shoveler <i>Anas clypeata</i> (breeding and wintering).	International/High.
Gadwall <i>Anas strepera</i> (breeding and wintering).	International/High.
Teal <i>Anas crecca</i> (breeding and wintering).	International/High.
White-fronted goose <i>Anser albifrons</i> (wintering).	International/High.
Marsh harrier <i>Circus aeruginosus</i> (Schedule 1 species breeding).	International/High.
Marsh harrier (Schedule 1 species wintering).	National/High.
Hen harrier (Schedule 1 species wintering).	International/High.
Nightjar <i>Caprimulgus europaeus</i> (breeding).	International/High.
Woodlark <i>Lullula arborea</i> (Schedule 1 species breeding and wintering).	International/High.
Bearded tit <i>Panurus biarmicus</i> (breeding).	International/High.
Red-throated diver (Schedule 1 species wintering).	International/High.
Little tern (Schedule 1 species breeding).	International/High.
Common tern <i>Sterna hirundo</i> (breeding).	International/High.
Sandwich tern (breeding).	International/High.
Kittiwake <i>Rissa tridactyla</i> (breeding).	Regional/Medium.
Lesser black-backed gull <i>Larus fuscus</i> (breeding).	International/High.
Seabird assemblage (breeding) qualifying feature of Alde-Ore SPA (Ref. 1.5 and Ref. 1.6).	International/High.
Waterbird assemblage qualifying feature of Alde-Ore Ramsar site (breeding and wintering) (Ref. 1.7)/SPA (wintering) and SSSI.	International/High.
Waterbird assemblage qualifying feature of Minsmere to Walberswick Heaths and Marshes Ramsar site (Ref. 1.8) (breeding)/assemblage associated with Minsmere to Walberswick Heaths and Marshes SSSI (breeding/wintering) (Ref. 1.9 and Ref. 1.10).	International/High.
Bird assemblage associated with Sandlings Forest SSSI and other component SSSI of the Sandlings SPA.	International/ High.
Stone-curlew <i>Burhinus oediconemus</i> (Schedule 1 species).	Regional/Medium.
Barn owl <i>Tyto alba</i> (Schedule 1 species breeding).	Low/Local.
Kingfisher <i>Alcedo atthis</i> (Schedule 1 species breeding).	County/Medium.
Hobby <i>Falco subbuteo</i> (Schedule 1 species breeding).	County/Medium.

Important Ecological Feature	Importance (CIEEM Guidelines/ EIA-Specific Assessment Methodology).
Peregrine <i>Falco peregrinus</i> (Schedule 1 species).	County/Medium.
Black-redstart <i>Phoenicurus ochruros</i> (Schedule 1 species breeding).	County/Medium.
Cetti's warbler <i>Cettia cetti</i> (Schedule 1 species breeding).	County/Medium.
Bird assemblage associated with Sizewell Marshes SSSI.	National/High.
Birds of nature conservation importance within the site (comprising red and amber listed species (Ref. 1.11), Suffolk Biodiversity Action Plan (BAP) priority species (Ref. 1.12), NERC Act Section 41 species (Ref. 1.13), and non-breeding and/or wintering Schedule 1 species (breeding and Winter) (Ref. 1.14).	County/Medium.

1. Ornithology

1.1 Purpose of this appendix

1.1.1 This is an appendix to the Sizewell C power station at the main development site (referred to throughout this volume as the “proposed development”) **Environmental Statement (ES) Volume 2, Chapter 14**. This appendix presents a description of ornithological baseline for the proposed development site (hereafter referred to as the “site”) and ZOI. It describes the methodologies employed in carrying out the desk-studies and detailed surveys, provides the results of this work, evaluates each receptor and determines the ornithological features that could potentially be affected.

1.1.2 In addition, an ornithology synthesis report, found in **Appendix 14B2** of this volume, has been produced to provide further detail on the evidence base underpinning the impact assessment included within Chapter 14 of this volume. The reason for this is that a high proportion of the potential ecological impacts arising from the proposed development relate to birds and because birds comprise the majority of the qualifying features of those European sites that are within the ZOI of the proposed development. Therefore, a larger body of evidence has been assembled to underpin both the Ecological Impact Assessment (EclA) and the Habitats Regulation Assessment (HRA).

1.1.3 Cross reference to the Shadow HRA Report has been made throughout this baseline and the EIA, where relevant.

a) Establishing zone of influence, study area and survey area

i. Zone of influence

1.1.4 In establishing an appropriate ZOI for ornithology receptors, reference was made to **Appendix 14A2** of this volume – Designated Sites. Therefore, consideration was given to the cited ornithological interest features (only) of designated sites within the following ZOI:

- European designated sites within 20km radius of the site;
- national statutory designated sites within a 20km radius of the site; and
- non-statutory designated sites within in a 2km radius of the site.

1.1.5 Direct effects on other ornithology receptors (i.e. excluding interest features of designated sites) as a result of the proposed development are likely to be relatively localised. As such, a ZOI encompassing the boundaries of the EDF Energy Estate, which includes the majority of the site, was considered to represent a robust ZOI.

ii. Study area and survey area

1.1.6 The study area for designated sites mirrors the ZOI defined above, whilst desk-study data relating to ornithological receptors (outside of designated sites) was requested from within the site, and a 2km radius.

1.1.7 The survey area was dependent upon the survey type and the species involved; however, the majority of the surveys were carried out within and adjacent to the site. The site boundary is provided in **Figure 14A1.1, Appendix 14A1** of this volume – Introduction to the Ecological Baseline. The survey areas were extended for certain species to provide a robust baseline, these can be found in **Section 2.1, Table 1.2** of this chapter.

1.1.8 Throughout this appendix, references are made to specific locations within the survey area where birds have been recorded, such as Minsmere South Levels. **Table 1.3** and **Table 1.4** in **Annex 14A7.5** of this volume, provides a glossary of terms used to describe the different areas within and adjacent to the survey area.

iii. Structure of this appendix

1.1.9 This appendix has been set out as follows:

- **Section 2** sets out the approach and methodology used for obtaining the desk-study and secondary data, as well as the results of this data acquisition.
- **Section 3** sets out the approach and methodology for the collection of primary data and summarises the results of this work.
- Finally, **Section 4** brings together all this information into a detailed consideration of the baseline conditions for ornithology within the ZOI of the main development and identifies those Important Ecological Features (IEFs) (whether individual species or species assemblages) to be taken forward to be considered and assessed with the EclA.

1.1.10 Due to the volume of ornithological desk-study data and the extent of survey work undertaken by both Wood Group (formerly Entec and Amec Foster Wheeler) and Arcadis Consulting (UK) Limited (formerly Hyder Consulting, and hereafter referred to as Arcadis), a number of additional Annexes have also been produced. The following are provided in this volume of the **ES**.

- **Annex 14A7.1 – Figures** presents figures illustrating survey locations (including vantage points and transects) and the results of the desk-study and survey work. This includes locations of sightings of target species and, where appropriate, additional spatial data for certain target species, such as marsh harrier flight lines.

- **Annex 14A7.2 – Methodology** sets out the detailed bird survey methodologies used during the bird surveys undertaken between 2007 and 2019 by Wood Group and Arcadis. Where full details of the bird survey methodologies have been included within reports already produced for the Sizewell C Project, the full methodology is not repeated, and a summary has been provided. Published reports already produced by Wood Group and Arcadis are included within **Annexes 14A7.3** and **14A7.4** respectively (see below). It should be noted that not all survey work undertaken has been published as standalone reports, in some cases data has been directly presented in the ornithology baseline, but survey methodologies have been included in this annex.
- **Annexes 14A7.3** and **14A7.4** respectively present stand-alone documents (where they have been produced) by Wood Group (secondary data) and Arcadis (primary data). The raw data from the Arcadis surveys carried out since 2014, for which stand-alone reports were not prepared, are presented as species account within **Annexes 14A7.5** and **14A7.6** (see below).

1.1.11 To rationalise the amount of information presented in this appendix, the detailed baseline information has been presented in the form of species accounts. The purpose of the species accounts is to collate all desk-study and field survey data for each bird species together in one location. Each species account includes a description of the desk-study results, and a summary of the secondary and primary survey data. The species accounts are presented across two annexes:

- **Annex 14A7.5** of this volume, provides accounts for qualifying species for one or more of the European designated sites within the ZOI of the site, and other seabird and waterfowl/wader species recorded.
- **Annex 14A7.6** of this volume, provides accounts for species listed on Schedule 1 of the Wildlife and Countryside Act (Ref. 1.14), excluding those already included within **Annex 14A7.5**, as well as accounts for red and amber listed species of Birds of Conservation Concern (BoCC) (Ref. 1.11) and/or species listed on Section 41 of the Natural Environment and Rural Communities (NERC) Act (Ref. 1.13). It also includes a list of other species (i.e. Green List species of BoCC) which have been recorded during both the Wood Group and Arcadis surveys.

b) Desk-Study/Secondary Data

i. Approach and methodology

Desk-study

- 1.1.12 The results of the desk-study undertaken in 2015, and a review of secondary data, were used to identify any data gaps, and guide the scope of the baseline Arcadis ornithological surveys (detailed in section 3). The information requested during the desk-study is described in the following paragraphs.
- 1.1.13 In line with the ZOI, the desk-study included a search for:
- European designated sites (such as Special Protection Areas (SPA) and Ramsar sites within 20km of the site provided in **Figure 14A2.1, Annex 14A2.1** of this volume;
 - national statutory designated sites (such as Sites of Special Scientific Interest (SSSIs), National Nature Reserves (NNRs) and Local Nature Reserves (LNRs)) within 2km of the site provided in **Figure 14A2.2, Annex 14A2.1** in this volume of the **ES**. Searches were undertaken using the Multi Agency Geographic Information for the Countryside (MAGIC) website (Ref. 1.15) as detailed in **Appendix 14A2** of this volume – Designated Sites;
 - non-statutory designated sites (such as County Wildlife Sites (CWSs) within 2km of the site (obtained from Suffolk Biological Information Service (SBIS) provided in **Figure 14A2.3, Annex 14A2.1** of this volume.
- 1.1.14 A review of the Suffolk Birds reports (Ref. 1.16, Ref. 1.17, Ref. 1.18, Ref.1.19, Ref.1.20, Ref.1.21, Ref. 1.22) was also undertaken. These reports were used to obtain contextual information regarding the status of important bird species likely to be present within the ZOI.
- 1.1.15 The Suffolk BAP (Ref. 1.12), Suffolk’s Priority Species and Habitats List (Ref. 1.23), the habitats and species of principal importance for biodiversity included on Schedule 41 of the Natural Environment and Communities (NERC) Act (Ref. 1.13) were also reviewed with reference to the bird assemblage present, or likely to be present, within the ZOI.
- 1.1.16 Several organisations were contacted to obtain information relating to important habitats for birds, and/or records of bird species of nature conservation importance within and surrounding the site. The organisations contacted and the data provided are summarised in **Table 1.1**.

Table 1.1: Summary of additional desk-study information.

Organisation Contacted.	Summary of Data Provided.
Suffolk Biodiversity Information Service (SBIS).	Records of legally protected bird species and species of conservation concern within 2km of the site (Ref 1.22).
EDF Energy (NGL).	Annual land management reviews produced by NGL in collaboration with Suffolk Wildlife Trust (SWT) in relation to conservation management of habitat within the EDF Energy Estate (Ref. 1.24, Ref. 1.25, Ref. 1.26, Ref. 1.27, Ref. 1.28, Ref. 1.29, Ref. 1.30, Ref. 1.31, Ref. 1.32, Ref. 1.33, Ref. 1.34, Ref. 1.35, Ref. 1.36, Ref. 1.37 and Ref. 1.38). Include results of Winter bird surveys, breeding bird surveys, farmland Winter bird counts, British Trust for Ornithology Wetland Bird Surveys and bird ringing results. In addition, SWT provided British Trust for Ornithology Wetland Bird Survey count data for the EDF Energy Estate.
Royal Society for the Protection of Birds (RSPB).	Information linked to the RSPB Minsmere Reserve, and monitoring undertaken by the RSPB in the surrounding area (Ref. 1.39). In addition, the RSPB provided bittern (<i>Botaurus stellaris</i>) (Ref. 1.40) and marsh harrier (<i>Circus aeruginosus</i>) (Ref. 1.41) nesting location data, which is confidential and has not been reproduced in this baseline. The RSPB also provided 2019 breeding data.
Wildfowl and Wetlands Trust (WWT).	Red-throated diver (<i>Gavia stellata</i>) information (gathered from aerial and boat-based surveys) (Ref. 1.42).
Joint Nature Conservation Committee (JNCC).	Red-throated diver information (gathered from aerial and boat-based surveys) (Ref. 1.43).
British Trust for Ornithology	Wetland Bird Survey data for two count areas (Minsmere offshore (i.e. away from the edge of the coast) (Ref. 1.44)), and Minsmere (not including sea (i.e. land-based count area) (Ref. 1.45)). Figure 14A7.2 shows the British Trust for Ornithology Wetland Bird Survey count zones.
Suffolk Little Tern Group.	Detailed information about the location of nesting colonies within Suffolk, and the timing of nesting at each location during the period from 2004 to 2013 (Ref. 1.46).
National Trust (NT).	The NT warden at Orford Ness was contacted regarding breeding little tern along the shingle spit south of Aldeburgh.

1.1.17 In addition, a detailed review of the specific literature reviews were carried out to ascertain how certain bird species may be affected by the scheme, for example by noise disturbance or an increase in recreational pressure. The results of the scientific literature review and how this has influenced and informed the assessment process has been detailed in the **Ornithology Synthesis Report** provided in **Appendix 14B2** of this volume.

ii. Secondary data

- 1.1.18 **Table 1.2** summarises the ornithological surveys carried out by Wood Group between 2007 and 2012 (Ref. 1.1, Ref. 1.2, Ref. 1.3). For these surveys the term survey area refers to the EDF Energy Estate monitoring area covering approximately 9km² (see **Figure 14A7.1**).
- 1.1.19 **Annex 14A7.2** provides more detailed survey methodologies. Further comprehensive information such as survey dates, times and weather conditions etc. and a full description of the Wood Group survey areas for each survey is presented in the stand-alone reports found in **Annex 14A7.3**.

Table 1.2: Summary of Wood Group surveys (2007 to 2012).

Survey	Dates	Survey Aims.	Survey Area.	Survey Techniques Used.
Intertidal and inshore marine surveys.	April 2007 to August 2008.	To assess the distribution and abundance of seabirds and waders within close proximity to the site.	The survey area encompassed Sizewell beach, refer to Figure 14A7_03 , Annex 14A7.3	Surveys from two Vantage Point (VPs), 45 minutes each visit.
Seabird surveys.	March 2011 to April 2012.	To assess the distribution and abundance of seabirds along the coast, and within proximity of the site.	The survey area encompassed the coastline between the site and Orford Ness (to the south), refer to Figure 14A7_03 , Annex 14A7.3 Report 14A7.3_S-IN058 .	Surveys from 12 VPs along the coast, 45 minutes each visit.
Little tern (<i>Sterna albifrons</i>) colony surveys.	Mid-May to early August 2010 and mid-May to early August 2011.	To assess the location of little tern breeding colonies in relation to the site and to ascertain if little tern forage in the vicinity of the site.	The survey area comprised Sizewell beach to south of the existing power station complex, refer to Figure 14A7_04 Annex 14A7.3 , Report 14A7.3_S-IN055 .	Surveys of tern activity in the vicinity of three tern breeding colonies. Surveys from six VPs in 2010. Surveys from two VPs in 2011.

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Survey	Dates	Survey Aims.	Survey Area.	Survey Techniques Used.
Bittern, marsh harrier and hen harrier (<i>Circus cyaneus</i>) surveys.	May to August 2008, April 2011 to March 2012.	To understand the distribution of bittern, marsh harrier and hen harrier with Sizewell Marshes SSSI, Minsmere South Levels and arable habitat within the Wood Group survey area.	The survey area included Sizewell marshes SSSI, Sizewell Belts, the arable habitat adjacent to Upper Abby Farm and Minsmere South Levels. Refer to Figure 14A7_06 Annex 14A7.3, Report 14A7.3_S-IN049 and Annex 14A7.3, Report 14A7.3_S-IN056.	Six-hour VPs undertaken three times per month for bittern from two VPs overlooking the northern section of the Wood Group survey area (May 2008–August 2008). Six-hour complementary VP surveys undertaken three times per month for marsh harrier (May–July 2008). Transect surveys were carried out within the Wood Group survey area (where accessible). VP surveys were also undertaken (six-hour VPs once a month) covering the north and eastern sections of the Wood Group survey area (April 2010 to March 2012).
Nightjar (<i>Caprimulgus europaeus</i>) surveys.	2007 and 2010.	To assess if breeding nightjar were present within the Wood Group survey area.	The survey area encompassed Goose Hill, Kenton Hills and Broom Covert, refer to Figure 2.4 of the ES, Annex 14A7.3, Report 14A7.3.	Nocturnal transect surveys undertaken within areas of young plantation in July 2007 and 2010.
Breeding bird surveys.	April to July 2007, March to June 2010.	To ascertain the diversity and abundance of breeding bird species within the Wood Group survey area.	The survey area comprised the EDF Energy Estate, refer to Figure 14A7_10 Annex 14A7.3, Report 14A7.3.	Four breeding bird transect survey visits undertaken to map breeding bird assemblage.

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Survey	Dates	Survey Aims.	Survey Area.	Survey Techniques Used.
Dabbling duck surveys.	April to June 2007.	To ascertain the diversity and abundance of breeding ducks within the Wood Group survey area.	The survey area encompassed Sizewell Marshes SSSI, Sizewell Belts and Rookyard Wood, refer to Annex 14A7.3, Report 14A7.3.	Three transect survey visits to map breeding dabbling duck assemblage.
Hobby (<i>Falco subbuteo</i>) surveys.	April, May and August 2007.	To locate breeding hobby within the Wood Group survey area, and to estimate the number of breeding pairs.	The survey area included suitable habitat within the EDF Energy Estate, refer to Annex 14A7.3, Report 14A7.3.	Surveys to identify potential locations of hobby nest structures. A series of VP surveys were also carried out to establish hobby presence.
Black redstart (<i>Phoenicurus ochruros</i>) surveys.	April and July 2011.	To assess the number and location of breeding black redstarts within the existing Sizewell station complex.	The survey area included suitable nesting structures within the Sizewell power station complex, refer to Figure 14A7_08 Annex 14A7.3, Report 14A7.3_S-IN051.	Four visits to determine presence of black redstart, and identify any nesting locations.
Walkover wintering bird surveys.	September and November 2007, and January and March 2008.	To ascertain the diversity and abundance of bird species within the Wood Group survey area during the Winter.	The survey area encompassed suitable habitat within the EDF Energy Estate, refer to Figure 14A7_12 Annex 14A7.3, Report 14A7.3_S-IN054.	Transect surveys within the Wood Group survey area.

c) Results

i. Desk-study

Statutory designated sites

1.1.20 In line with the HRA Screening Report, there are four SPAs, two Ramsar sites and one MCZ with ornithological interest features within 20km of the site. Benacre to Easton Bavents SPA has been scoped out and no further reference to it will be made within this appendix found in **Appendix 14A2** of this volume.

1.1.21 Full details of the statutory designated sites are provided in **Appendix 14A2 – Designated Sites** and summarised in **Table 1.3** and **Table 1.4**. The locations of these sites are shown on **Figure 14A2.1, Appendix 14A2** of this volume.

Table 1.3: Summary of statutory designated sites of International/European importance with ornithological interest features.

Designated Site/Distance from Site.	Designated Interest Feature.
<p>Minsmere to Walberswick Heaths and Marshes SPA (Ref. 1.47).</p> <p>This designated site is split into a number of sections. The majority of the site is approximately 1km to the north (i.e. north of Minsmere New Cut), however, a small area lies directly adjacent to the northern boundary of the site.</p>	<p><u>Article 4.1 of the Directive</u></p> <p>This site qualifies as an SPA under Article 4.1 of the Directive by supporting breeding populations of European importance of the following species listed on Annex I of the Directive:</p> <p>Avocet, (<i>Recurvirostra avosetta</i>), 91 pairs, representing at least 15.4% of the breeding population in Great Britain (RSBP 1996);</p> <p>Bittern, seven pairs, representing at least 35.0% of the breeding population in Great Britain (five-year mean, 1993–1997);</p> <p>Little tern, 28 pairs, representing at least 1.2% of the breeding population in Great Britain (five-year mean, 1992–1996); marsh harrier, 16 pairs, representing at least 10.0% of the breeding population in Great Britain (five-year mean, 1993–1997);</p> <p>Nightjar, 24 pairs, representing at least 0.7% of the breeding population in Great Britain (count, as at 1990); and</p> <p>This site qualifies as an SPA under Article 4.1 of the Directive by supporting wintering populations of European importance of the following species listed on Annex I of the Directive:</p> <p>Hen harrier, 15 individuals, representing at least 2.0% of the wintering population in Great Britain (five-year peak mean, 1985/6–1989/90).</p> <p><u>Article 4.2 of the Directive</u></p> <p>This site qualifies as an SPA under Article 4.2 of the Directive (79/409/EEC) by supporting breeding populations of European importance of the following species listed on Annex I of the Directive:</p> <p>Shoveler (<i>Anas clypeata</i>), 23 pairs, 2.3% of the population in the United Kingdom (UK) (count as at 1990); and</p> <p>Teal (<i>Anas crecca</i>), 73 pairs, 4.9% of population in the UK (count as of 1990).</p> <p>This site qualifies as an SPA under Article 4.2 of the Directive (79/409/EEC) by supporting wintering populations of European importance of the following species listed on Annex I of the Directive:</p> <p>Shoveler, 98 birds, 1% of the population in the UK, five-year mean peak 1991/92–1995/96;</p> <p>Gadwall (<i>Anas strepera</i>), 93 birds, 1.1% of the population in the UK, five-year mean peak 1991/92–1995/96; and</p> <p>White fronted goose (<i>Anser albifrons</i>), 67 birds, 1.1% of the</p>

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Designated Site/Distance from Site.	Designated Interest Feature.
	population in the UK, five-year peak mean 1991/92–1995/96.
<p>Minsmere to Walberswick Ramsar site. (Ref. 1.8 and Ref. 1.10).</p> <p>This designated site is split into a number of sections. The majority of the site is approximately 1km to the north (i.e. north of Minsmere New Cut); however, a small area lies directly adjacent to the northern boundary of the site.</p>	<p>The site fulfils the following Ramsar criteria as justification for its selection:</p> <p><i>Ramsar criterion 2</i></p> <p>Designated for its important assemblage of rare breeding birds associated with marsh land and reedbed including bittern, gadwall, teal, shoveler, marsh harrier, avocet and bearded tit (<i>Panurus biarmicus</i>).</p>
<p>Outer Thames SPA (Ref. 1.48)</p> <p>The proposed marine infrastructure associated with the site lies within this SPA.</p>	<p><u>Article 4.1 of the Directive</u></p> <p>This site qualifies under Article 4.1 of the Directive by supporting wintering populations of European importance of the following species listed on Annex I of the Directive:</p> <p>38% of the red-throated diver population in Great Britain (peak mean over the period 1989–2006/07).</p> <p>This site qualifies under Article 4.1 of the Directive by supporting breeding populations of European importance of the following species listed on Annex I of the Directive:</p> <p>19.64% of the little tern population in Great Britain (2011–2015).</p> <p>2.66% of the common tern (<i>Sterna hirundo</i>) population in Great Britain (2011–2015).</p>
<p>Sandlings SPA (Ref. 1.49)</p> <p><1km.</p>	<p><u>Article 4.1 of the Directive</u></p> <p>The site qualifies as an SPA under Article 4.1 of the Directive by supporting breeding populations of European importance of the following species listed on Annex I of the Directive:</p> <p>Nightjar, 109 pairs, representing at least 3.2% of the breeding population in Great Britain (count as at 1992); and</p> <p>Woodlark, 154 pairs, representing at least 10.3% of the breeding population in Great Britain (count as at 1997).</p>
<p>Alde-Ore Estuary SPA (Ref. 1.5 and Ref. 1.6).</p> <p>5km.</p>	<p><u>Article 4.1 of the Directive</u></p> <p>This site qualifies as an SPA under Article 4.1 of the Directive by supporting breeding populations of populations of European importance of the following species listed on Annex I of the Directive:</p> <p>Avocet, 104 pairs, representing at least 17.6% of the breeding population in the UK (five-year mean, 1990–1994);</p> <p>Little tern, 48 pairs, representing at least 2.0% of the breeding population in the UK (five-year mean, 1993/4, 1996/8);</p> <p>Marsh harrier, 3 pairs, representing at least 1.9% of the breeding population in the UK (five-year mean, 1993–1997);</p>

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Designated Site/Distance from Site.	Designated Interest Feature.
	<p>and</p> <p>Sandwich tern (<i>Sterna sandvicensis</i>), 169 pairs, representing at least 1.2% of the breeding population in the UK (five-year mean 1991–1995).</p> <p>This site qualifies as an SPA under Article 4.1 of the Directive by supporting wintering populations of populations of European importance of the following species listed on Annex I of the Directive:</p> <p>Avocet, 766 individuals, representing at least 60.3% of the wintering population in the UK (five-year peak mean 1991/2–1995/6).</p> <p>Ruff (<i>Philomachus pugnax</i>), 0.4% of the GB population (five-year peak mean 1991/92–1995/96).</p> <p>Lesser black-backed gull (<i>Larus fuscus</i>), 21,700 pairs representing at least 17.5% of the breeding Western Europe/Mediterranean/Western Africa population (count as at 1998).</p> <p>Redshank (<i>Tringa totanus</i>), 1,919 individuals, representing at least 1.3% of the wintering Eastern Atlantic population (five-year peak mean, 1991/2–1995/6).</p>
<p>Alde-Ore Estuary Ramsar (Ref. 1.7) 5km.</p>	<p>The site fulfils the following Ramsar criteria as justification for its selection:</p> <p><i>Ramsar Criterion 3</i></p> <p>Supports a notable assemblage of breeding and wintering wetland birds.</p> <p><i>Ramsar Criterion 6</i></p> <p>Supports a number of species/populations occurring at levels of international importance. This includes lesser black-backed gull during the breeding season, and avocet and common redshank during the Winter.</p>
<p>Orford Inshore (Marine Conservation Zone) (Ref. 1.50).</p>	<p>National; designation (under Marine and Coastal Access Act). Environmentally important due to the presence of habitats which are composed of subtidal mixed sediments. The provides an important habitat for foraging seabirds.</p>

Table 1.4: Summary of statutory designated sites of national importance with ornithological interest features.

Designated Site.	Distance from the Site (km).	Description
Sizewell Marshes SSSI (Ref. 1.51).	Partially within the site.	This site comprises a large area of lowland, unimproved wet meadow. The SSSI supports a breeding bird assemblage of species that are typical of wet grassland and associated habitats, the citation lists shoveler, gadwall, teal, snipe (<i>Gallinago gallinago</i>), redshank and lapwing as occurring. However, evidence from SWT and Natural England suggest that the breeding wader component (snipe, redshank and lapwing) have declined and are no longer present.
Minsmere to Walberswick Heaths and Marshes SSSI (Ref. 1.9).	0.1km	Comprises a complex series of habitats, notably mudflats, shingle beach, reedbeds, heathland and grazing marsh. The tidal mudflats form sheltered feeding grounds for wildfowl and shorebirds, notably wigeon, shelduck, redshank and dunlin. Also covered by the Minsmere to Walberswick Heaths and Marshes SPA/Ramsar site.
Leiston to Aldeburgh SSSI (Ref. 1.52).	0.3km	Comprises a rich mosaic of habitats including acid grassland, heath, scrub, woodland, fen, open water and vegetated shingle. The variety of habitats support a diverse and abundant community of breeding and overwintering birds. Forms part of the Sandlings SPA.
Alde-Ore Estuary SSSI (Ref. 1.53).	5km	Comprises shingle, cliffs, coastal formations and estuarine features including mudflats, saltmarsh, vegetated shingle and coastal lagoons. These features support a diverse breeding and overwintering bird assemblage. Also covered by the Alde-Ore Estuary SPA/Ramsar site.
Sandlings Forest SSSI (Ref. 1.54).	17.8km	This site is notified for its coniferous woodland. The notified biological features of the site are: aggregations of breeding birds – nightjar and woodlark. Forms part of the Sandlings SPA.
Snape Warren SSSI (Ref. 1.55).	8.2km	This site is notified for its heathland habitat which supports a breeding population of nightjar.

Non-statutory designated sites

1.1.22 There are three non-statutory CWSs located within 2km of the site for which ornithology is cited as an interest feature. These sites are summarised in **Table 1.5** and locations are shown on **Figure 14A2.3**. Full details of all CWSs are provided in **Appendix 14A2** of this volume.

Table 1.5: Non-statutory designated sites with ornithological interest features within 2km of the site.

Site	Distance from the Site (km).	Description
Sizewell Levels and Associated Areas CWS (Ref. 1.56).	Part of this area lies within the site.	This CWS supports swans, teal, mallard (<i>Anas platyrhynchos</i>) and moorhen (<i>Gallinula chloropus</i>). Also of ornithological importance are the plantations situated to the north of Sizewell Belts; Goose Hill, Nursery Covert and Kenton Hills. The areas support breeding populations of a number of nationally rare birds which are specially protected (Schedule 1 of Wildlife and Countryside Act (Ref. 1.14)). Good numbers of migrant birds also frequent the area.
Sizewell Rigs CWS (Ref 1.57).	Adjacent to the site.	These offshore structures support a breeding colony of kittiwake (<i>Rissa tridactyla</i>).
Dower House CWS (Ref. 1.58).	0.6km	This CWS provides scrub habitat and is used by a variety of bird species moving through on migration.

Bird records

1.1.23 The desk-study identified a large quantity of bird records. Full details of the bird records are provided in **Annex 14A7.5** and **Annex 14A7.6**.

ii. **Secondary data**

1.1.24 The detailed findings of the Wood Group surveys are presented as part of the species accounts within **Annex 14A7.5** and **Annex 14A7.6**. The stand-alone Wood Group survey reports are presented in **Annex 14A7.3**. **Table 1.6** provides a summary of the results.

Table 1.6: Wood Group survey results summary.

Survey	Result
Intertidal and onshore marine surveys (April 2007 to August 2008).	Four tern species were recorded foraging within the area offshore (common tern, little tern, sandwich tern and arctic tern (<i>Sterna paradisaea</i>)). Common tern, little tern and sandwich tern were observed foraging adjacent to the power station, while arctic tern was only recorded flying through. Gull species, in particular black-headed gull and herring gull were also recorded foraging adjacent to the power station. A variety of waterfowl and wading species were observed throughout the survey period commuting along the coast adjacent to the site. Red-throated diver, and other seabirds were also regularly observed offshore of the site.
Seabird surveys (March 2011 to April 2012).	Similar suite of species to those recorded during the intertidal and inshore marine surveys. Tern and gull species were again observed foraging adjacent to the power station and small numbers of waterfowl and waders were also recorded commuting along the coast. A more diverse range of species were

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Survey	Result
	recorded at the Dunwich and Orford Ness viewpoints.
Little tern colony surveys (2010 and 2011).	The surveys indicated that the little tern foraging activity was concentrated close inshore, in the vicinity of where breeding colonies are established (i.e. RSPB Minsmere Reserve Beach and Dingle Beach). However, no successful breeding was observed (i.e. no young, or fledged birds were seen) at these sites in 2010 or 2011. The last known successful colonies were established at these sites in 2008 (until Little Terns bred successfully at Minsmere RSPB reserve (scrape) in 2019).
Bittern, marsh harrier and hen harrier surveys (May to August 2008, April 2011 to March 2012).	The surveys identified that bittern and marsh harrier do not breed within the site (until marsh harriers established a territory at Aldhurst Farm in 2019). However, both species have been recorded foraging within the survey area. Bittern was regularly recorded within Minsmere South Levels and occasionally at the northern end of the survey area (during both the breeding and wintering season). Marsh harrier was observed foraging across the entire survey area, with the most frequent sightings within Minsmere South Levels. Hen harrier was infrequently observed within the survey area during the Winter.
Nightjar surveys (2007 and 2010).	No evidence of nightjar was recorded within the survey area.
Breeding bird surveys (2007 and 2010).	The surveys confirmed that the survey area supported a diverse assemblage of breeding birds. 69 breeding bird species were recorded in 2007, and 58 species in 2010.
Dabbling duck surveys (April to June 2007).	The surveys identified a range of duck species using the habitats within the survey area, of which three (mallard, gadwall and mute swan (<i>Cygnus olor</i>)) were confirmed as breeding.
Hobby surveys (2007).	Two hobby territories were recorded during the 2007 breeding season.
Black redstart surveys (2011).	Between two and three black redstart territories were recorded within the existing Sizewell A and B power stations during the 2011 breeding season.
Walkover wintering bird surveys (2007 and 2008).	The survey area supported a diverse assemblage of species (including bittern; waterfowl species such as mallard, tufted duck (<i>Aythya fuligula</i>), Canada goose (<i>Branta canadensis</i>) and teal; waders such as snipe; passage waders such as greenshank (<i>Tringa nebularia</i>); and raptors such as buzzard (<i>Buteo buteo</i>), marsh harrier, merlin (<i>Falco columbarius</i>) and goshawk (<i>Accipiter gentilis</i>). In addition, the following passerines were recorded on occasion, during passage: tree pipit (<i>Anthus trivialis</i>), yellow wagtail (<i>Motacilla flava</i>), ring ouzel (<i>Turdus torquatus</i>), wood warbler (<i>Phylloscopus sibilatrix</i>), wheatear (<i>Oenanthe oenanthe</i>) and whinchat (<i>Saxicola rubetra</i>).

1.2 Field Surveys – Primary Data

a) Approach

1.2.1 Following on from the work undertaken by Wood Group, Arcadis carried out further ornithological surveys between 2013 and 2019 to update the previous surveys and fill any gaps identified.

1.2.2 The survey areas over which each of the Arcadis ornithology surveys took place was dependent upon the survey type and the species involved. The scope of the surveys was developed in consultation with the statutory and non-statutory consultees following a gap analysis of the available data. The survey area for each of the surveys undertaken is presented in **Table 1.7**.

b) **Methods**

1.2.3 For the full methodology of all Arcadis ornithology surveys, please refer to **Annex 14A7.2. Table 1.7** provides a summary of these methodologies. Survey locations are shown on **Figures 14A7.3 to 14A7.12**.

Table 1.7: Arcadis surveys (2013 to 2019).

Survey	Dates	Aims of Survey.	Survey Area.	Survey Techniques Used.
Red-throated diver surveys.	October 2012 to March 2013, 2013/2014 and 2014/2015.	To ascertain the presence, abundance and distribution of red-throated divers along the coastline (up to 2km offshore), including the coastline within the site.	Dunwich (north of the site) to Orford Ness (south of the site). Refer to Figure 14A7.3 .	Survey from 15 VP locations positioned along the coast from Surveys undertaken twice per month.
Little tern and sandwich tern surveys.	Late April to September 2013.	To ascertain the presence, abundance and distribution of little tern and sandwich tern along the coastline, including the coastline within the site. Common tern were also recorded incidentally.	Dunwich (north of the site) to Orford Ness (south of the site). Refer to Figure 14A7.4 .	Survey from 15 VP locations positioned along the coast from Dunwich (north of the site) to Orford Ness (south of the site). Surveys undertaken twice per month.

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Survey	Dates	Aims of Survey.	Survey Area.	Survey Techniques Used.
Cormorant (<i>Phalacrocorax carbo</i>) surveys ¹ .	November 2014 to March 2015.	To ascertain the presence, abundance and distribution of cormorants along the coastline, including the area within the site. In addition, counts of roosting birds using the rigs associated with the Sizewell A power station.	Dunwich (north of the site) to Orford Ness (south of the site). Rigs associated with Sizewell A power station. Refer to Figure 14A7.3 .	Survey from 15 VP locations positioned along the coast from Dunwich (north of the site) to Orford Ness (south of the site). Surveys undertaken once per month. Dusk and dawn surveys of the rigs associated with the Sizewell A power station undertaken once per month.
Waterfowl point count surveys.	November 2014 to March 2015.	To ascertain the presence, abundance and distribution of waterfowl within the survey area during the non-breeding season.	Sizewell Marshes SSSI and Minsmere South Levels. Refer to Figure 14A7.5 .	Areas containing ditches within the survey area were surveyed for waterfowl once per month. A series of VPs were used to survey Minsmere to Walberswick Heaths and Marshes SSSI to reduce surveyor disturbance in this area.
Bittern, marsh harrier and hen harrier surveys.	May 2014 to September 2014, October 2014 to March 2015, and April 2015 to September 2016.	To understand the distribution and levels of foraging activity of bittern, marsh harrier and hen harrier within Sizewell Marshes SSSI, Minsmere South Levels and arable habitat within the survey area.	Arable habitat within the EDF Energy Estate, Minsmere South Levels and Sizewell Marshes SSSI. Refer to Figure 14A7.6 .	A series of VP surveys were undertaken at six locations for six hours per month (with the exception of VP3 within Minsmere to Walberswick Heaths and Marshes SSSI, which was surveyed for 12 hours per month). These locations were spread across the survey area.

¹ It should be noted that surveys specifically focussing on cormorant were undertaken by Arcadis as, at the time, cormorant was being considered as a potential qualifying species for the proposed extension to the Outer Thames Estuary SPA. However, the eventual extension criteria did not include this species. However, other species were also recorded during these surveys, including tern species.

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Survey	Dates	Aims of Survey.	Survey Area.	Survey Techniques Used.
Arable marsh harrier surveys.	April 2015 to August 2015. April to September 2016.	To gain a greater understanding the distribution of foraging marsh harrier across arable and acid grassland habitat within the EDF Energy Estate.	Arable habitat within the EDF Energy Estate. Refer to Figure 14A7.7.	A series of VP surveys were undertaken at five locations within the arable and acid grassland fields to the north-east of the survey area, for six hours per month.
Black redstart foraging surveys.	April to June 2015.	To determine whether black redstart utilise the habitat within and adjacent to the main platform as a foraging resource.	Sizewell beach and the Platform area. Refer to Figure 14A7.8.	Two separate transects were carried out. The first covered the coast adjacent to the site. The second covered the area to the north of Sizewell B power station (including the site of the main platform). Surveys were undertaken on six occasions at a variety of times (dawn, dusk, mid-morning and afternoon).
Barn owl foraging surveys.	April to May 2015.	To ascertain the presence, abundance and distribution of barn owl within the survey area during the breeding season.	Arable habitat adjacent to Upper Abby farm. Refer to Figure 14A7.9.	Four transect surveys were carried out across the arable fields to the north-east of the survey area, and were surveyed twice per month, once at dusk and once at dawn.
Nightjar surveys.	May and June 2014.	To assess whether breeding nightjar are present within the survey area.	Woodland habitat in Kenton Hills and Goose Hill. Refer to Figure 14A7.10	Nocturnal transect surveys were walked through, and around suitable habitat within Kenton Hills and Goose Hill.

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Survey	Dates	Aims of Survey.	Survey Area.	Survey Techniques Used.
Breeding bird surveys.	April to July 2014, and April to May 2015.	To ascertain the diversity and abundance of breeding bird species within the survey area.	Arable habitat adjacent to Upper Abby farm, Goose Hill, Kenton Hills Sizewell beach, Coronation wood and the main platform. Refer to Figure 14A7.11 .	Transect surveys were carried out once per month, and all bird species present were recorded.
Wintering bird surveys.	November 2014 to March 2015.	To ascertain the diversity and abundance of bird species within the survey area during the Winter.	Arable habitat adjacent to Upper Abby farm, Goose Hill, Kenton Hills Sizewell beach, Coronation wood and the main platform. Refer to Figure 14A7.12 .	Transect surveys were carried out once per month, and all bird species present were recorded.
Wintering wetland bird survey.	December 2018 to February 2019.	To provide spatial data regarding the numbers and distribution of wintering wetland birds.	Ditch network within Sizewell Marshes SSSI and Minsmere South Levels.	Transect survey carried out once per month. Target species wetland bird species, including species of swans, geese, ducks, grebes, rails, waders and herons. Any marsh harrier observed during any surveys were also noted.
Marsh harrier survey.	December 2018 to February 2019.	To determine if marsh harrier utilise the areas of newly created receptor habitat for foraging and to determine the wintering bird assemblage within both areas.	Aldhurst Farm and southern reptile receptor areas comprising Studio and Lover's Lane.	Informal walkover and vantage point survey carried out once per month. Any marsh harrier flights were recorded onto maps and the activity noted. In addition, wetland bird species using the wetland area at Aldhurst Farm and other bird species of note using both areas were also recorded.

c) Results

1.2.4 At least 180 bird species have been recorded during the bird surveys undertaken by Arcadis between 2013 and 2019. **Table 1.8** provides a brief summary of the results from each of the different surveys carried out to date. Full details of the survey results are presented in the form of individual species accounts within **Annex 14A7.5** and **Annex 14A7.6** of this volume.

Table 1.8: Arcadis survey results summary.

Survey	Result
Red-throated diver surveys.	Red-throated diver was present along the entire coastline from Dunwich to Orfordness. However, the greatest numbers were recorded to the north (Dunwich) and south (Orford Ness) of the site.
Little tern and sandwich tern surveys.	The surveys identified that little tern forage occasionally offshore of the site. The majority of the birds were recorded during the passage period and are therefore likely to constitute birds moving through during migration. There were no little tern colonies present in the vicinity of the site during the 2013 survey period. Given that little terns tend to forage close to their breeding colonies, the lack of sightings of this species is likely to be related to the lack of breeding colonies in close proximity. Sandwich tern was frequently observed foraging adjacent to the power station. Although there were no sandwich tern colonies present in the vicinity of the site during the 2013 survey period, this species is known to travel further than little tern from their breeding colony to forage. Breeding colonies in Suffolk are rare but have been recorded at RSPB Minsmere Reserve and Havergate Island in 2009.
Cormorant surveys.	Cormorant roost on the rigs associated with the Sizewell A and B power stations and are present (foraging and commuting) along the entire coastline between Dunwich and Orford Ness.
Waterfowl point count surveys.	The surveys identified Minsmere South Levels (part of the Minsmere to Walberswick Heaths and Marshes SSSI) and Sizewell Marshes SSSI as important locations within the survey area for waterfowl. A diverse range of species was recorded within the coastal grazing marsh, reedbed, and ditches/open water habitats within this area, including pintail (<i>Anas acuta</i>), shelduck, wigeon, barnacle goose (<i>Branta leucopsis</i>), brent goose (<i>Branta bernicla</i>) and greylag goose (<i>Anser anser</i>).
Wintering wetland bird surveys.	The surveys identified a range of waterbirds utilising Minsmere South Levels and Sizewell Marshes SSSI throughout the Winter (species recorded included ducks (such as gadwall, mallard and teal) and waders).

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Survey	Result
Bittern, marsh harrier and hen harrier surveys.	<p>Bittern was recorded foraging within Minsmere South Levels and are occasionally observed foraging on Sizewell Marshes SSSI, mainly during the Winter months. Refer to Figure 14A7.13.</p> <p>The surveys confirmed that marsh harriers do not breed within the site, but use the Minsmere South Levels, Sizewell Marshes SSSI and the arable fields within the survey area, as a foraging resource. Significantly more foraging activity was recorded over the Minsmere South Levels compared to Sizewell Marshes SSSI.</p> <p>Hen harrier was recorded occasionally during the Winter period, but no Winter roosting sites were identified within the survey area. Refer to Figure 14A7.14.</p>
Black redstart surveys.	<p>The surveys confirmed that this species was breeding within the survey area. Between two and three pairs were present within the existing Sizewell power station complex, a similar number to that identified by Wood Group. Black redstart was also recorded using the sand dunes on Sizewell beach as a foraging resource.</p>
Barn owl surveys.	<p>Barn owl was confirmed to be breeding at Lower and Upper Abbey (two pairs), and one breeding pair within Sizewell Marshes SSSI. Barn owl was recorded foraging within the rough marshy grassland and reedbeds of Sizewell Marshes SSSI, and the marshy grassland to the north of the site directly adjacent to RSPB Minsmere Reserve. The arable fields near Upper Abbey Farm were less frequently used by foraging barn owls.</p>
Nightjar surveys.	<p>No evidence of nightjars was recorded within the suboptimal breeding habitats in the survey area, and it is considered unlikely that they are breeding within the survey area.</p>
Breeding bird surveys.	<p>The survey area supported a diverse breeding bird population. A total of 67 bird species were recorded breeding during the surveys, of which 15 were red listed BoCC (Ref. 1.11) and/or NERC Act (Ref. 1.13) Section 41 species. These comprised grey partridge (<i>Perdix perdix</i>), turtle dove (<i>Streptopelia turtur</i>), cuckoo (<i>Cuculus canorus</i>), marsh tit (<i>Parus palustris</i>), skylark (<i>Alauda arvensis</i>), wood warbler, starling (<i>Sturnus vulgaris</i>), song thrush (<i>Turdus philomelos</i>), spotted flycatcher (<i>Muscicapa striata</i>), house sparrow (<i>Passer domesticus</i>), yellow wagtail, linnet (<i>Carduelis cannabina</i>), and yellowhammer (<i>Emberiza citrinella</i>).</p>
Wintering bird surveys.	<p>The survey area supported a diverse wintering bird population. A total of 63 bird species were recorded during the wintering surveys, of which eleven were BoCC red listed species (Ref 1.11) and/or NERC Act (Ref. 1.13) Section 41 species comprising marsh tit, skylark, starling, song thrush, house sparrow, tree sparrow (<i>Passer montanus</i>), , linnet, lesser redpoll (<i>Carduelis cabaret</i>) and yellowhammer.</p>

1.2.5 The results of the breeding and wintering bird transect surveys are shown in **Figures 14A7.15 – 14A7.31**, which include red listed and NERC species.

1.3 Baseline Conditions – Ornithological Features and their Importance

a) Assessment methodology

1.3.1 This section describes the ornithology baseline and assesses the ecological value of each of the ornithological features identified. This assessment is then used, in conjunction with a description of the extent and magnitude of the predicted impacts of the scheme, to carry out the detailed EclA presented in **Volume 2, Chapter 14** of the **ES**.

1.3.2 To comply with both the Chartered Institute of Ecology and Environmental Management (CIEEM) Guidelines for EclA (Ref. 1.4) and with the standard Environmental Impact Assessment (EIA methodology used elsewhere within the **ES**, both methodologies have been used to evaluate the receptors. Full details of both assessment methodologies are presented in **Volume 1, Chapter 6** of the **ES** and **Appendix 14A1** – Introduction to the Ecological Baseline.

b) Description and assessment of ornithological features

1.3.3 The designated sites described in **Section 2.2** of this chapter, have been considered in their own right within **Appendix 14A2** of this volume and have not been assessed as separate IEFs in this appendix. Instead, the ornithological interest of these designated sites are used to help determine the importance of the bird species/assemblages within the ZOI of the site defined in **Section 1.3** of this chapter.

1.3.4 Under the CIEEM guidelines (Ref. 1.4), bird species and species assemblages species considered sufficiently important (in nature conservation terms) to be a material consideration in the planning decision, as well as legally protected and/or controlled species for which there is a potential for a breach of their respective legislation as a result of the Sizewell C Project, are considered to be IEFs. These are the features that will be the focus of the EclA. However, those IEFs that qualify purely on the basis of legislative considerations will be addressed separately in the EclA from those that are of material concern, with the latter being assessed in greater detail. Thus, given that all wild bird nests are protected whilst building or when occupied and Schedule 1 birds are awarded further protection which includes an offence to deliberately disturb nesting birds or dependant young, then measures will be required to mitigate any impacts associated with nesting birds. However, this does not mean that it will be necessary to assess all bird species as IEFs through the EclA process. In some cases, individual species will qualify as IEFs, whilst in other cases an assemblage of species will qualify as an IEF.

- 1.3.5 It should be noted that the figures used to determine the qualifying features of the SPAs and Ramsar sites are, in some cases, up to 25 years old. There have been **significant** changes in the populations of some bird species over this time period, particularly in respect of populations that overwinter in the UK. Therefore, the justification for selecting IEFs includes consideration of the current status of the species since designation to provide a more up to date baseline.
- 1.3.6 Based on the information set out in this appendix and the species accounts presented within **Annexes 14A7.5** and **14A7.6** of this volume, 32 ornithological features of the site and its surrounding areas have been identified as IEFs.
- i. **Feature: Bittern (breeding and wintering)**
- Description**
- 1.3.7 The results of the desk-study revealed that bittern is a qualifying feature of two designated sites within 20km of the site; Minsmere to Walberswick Heaths and Marshes Ramsar site, and Minsmere to Walberswick Heaths and Marshes SPA. Bittern is also listed as a qualifying feature of Minsmere to Walberswick Heaths and Marshes Heaths and Marshes SSSI and Leiston to Aldeburgh SSSI. The species is also afforded protection under Schedule 1 of the Wildlife and Countryside Act (Ref. 1.14).
- 1.3.8 Bittern are known to breed within RSPB Minsmere Reserve (part of the wider Minsmere to Walberswick Heaths and Marshes SPA/Ramsar site/SSSI) (Ref. 1.40), which lies directly adjacent to the northern boundary of the survey area. Between four and eight bittern nests were recorded at RSPB Minsmere Reserve each year between 2009 and 2019 (RSPB (2019), *pers. comms*). Within the wider landscape, records for bittern were also provided for locations to the south of the site, in areas such as Leiston, Thorpeness, Aldringham Common (Ref. 1.59) and RSPB North Warren Reserve (32 records provided by the RSPB (Ref. 1.39)).
- 1.3.9 In 2017, RSPB Minsmere Reserve held the largest number of booming males in the county with 12 being noted in surveys and eight nests were confirmed to be active (Ref. 1.21). In 2018, nine booming males and eight nests were reported at RSPB Minsmere Reserve (Ref. 1.22).
- 1.3.10 Suffolk is a strong-hold for bittern, with between 71% and 47% of occupied bittern breeding sites in the UK between 2005 and 2012, respectively, located in the county (Ref. 1.12). The current UK breeding population is estimated to be 106 males (Ref. 1.60). The bittern breeding within RSPB Minsmere Reserve (up to eight pairs) therefore represents approximately 7.5% of the UK breeding population.

1.3.11 Extensive surveys carried out by Wood Group and Arcadis confirm that bitterns do not breed within the site itself. However, birds from RSPB Minsmere Reserve have been recorded foraging within the ZOI. During surveys undertaken by Wood Group, all bittern flights were observed within Minsmere South Levels with the exception of one, where a bittern was observed flying into Sizewell Marshes SSSI provided in **Report 14A7.3.4, Annex 14A7.3** of this volume. During Arcadis surveys, bittern was recorded in the northern part of the EDF Energy Estate and in Sizewell Marshes SSSI on one occasion, but were mostly observed flying from RSPB Minsmere Reserve to the Minsmere South Levels or vice versa. It was concluded that breeding bittern within the RSPB Minsmere Reserve (i.e. north of the Minsmere New Cut) are using the Minsmere South Levels as a feeding resource as part of their wider foraging range.

Assessment

1.3.12 Given that bittern is afforded protection under Schedule 1 of the Wildlife and Countryside Act (Ref. 1.14); is a qualifying feature (breeding and wintering) of two nearby European Sites and two SSSIs; is a Suffolk BAP priority species (Ref. 1.12), an amber listed BoCC (Ref. 1.11), and a NERC Act (Ref. 1.13) Section 41 species; is rare across the UK but a key feature of the neighbouring Minsmere to Walberswick Heaths and Marshes SPA and an especially key species for Suffolk; and is known to nest at Minsmere and forage within the South Minsmere Levels and overwinter within Sizewell Marshes SSSI; then the population of this species located within the Minsmere to Walberswick Heaths and Marshes SPA/Ramsar site, and also those birds foraging within Minsmere South Levels during the breeding season would be:

- an IEF at the international level under the CIEEM guidelines (Ref. 1.4); and
- of high importance under the EIA-specific methodology.

1.3.13 Bittern also Winter within Sizewell Marshes SSSI and Minsmere South Levels. The wintering population could include birds from the breeding population of the Minsmere to Walberswick Heaths and Marshes Heaths and Marshes SPA/Ramsar site/SSSI, as well as birds from the wider UK wintering population. This therefore makes it difficult to assign a specific value to the wintering population; however, potential impacts on wintering bittern within the ZOI have been included within the detailed impact assessment of the internationally important breeding population.

ii. Feature: Avocet (breeding and wintering)**Description**

- 1.3.14 The results of the desk-study identified that avocet is a qualifying feature of several designated sites during the breeding season; namely, Minsmere to Walberswick Heaths and Marshes SPA, Alde-Ore Estuary SPA, and Alde-Ore Estuary SSSI. Avocet is also a notable wintering species within the Minsmere to Walberswick Heaths and Marshes Ramsar site which supports 329 individuals, representing an average of 9.6% of the UK population (five-year peak mean, 1998/9–2002/3). Avocet is afforded protection under Schedule 1 of the Wildlife and Countryside Act (Ref. 1.14) and is an amber listed BoCC species (Ref. 1.11)
- 1.3.15 Avocet are known to breed at RSPB Minsmere Reserve to the north of the site. Avocet have also been reported as breeding at Walberswick (approximately 10km north of the site) and at RSPB North Warren Reserve (approximately 5km south of the site). Records of wintering or passage avocet have been provided for Minsmere to Walberswick, RSPB Minsmere Reserve and the Alde-Ore Estuary. Avocet have also been recorded at Thorpeness, Aldringham Walks, Thorpeness Golf Course and Sizewell. The British Trust for Ornithology reported a five-year Winter mean of peak count of 139 birds (in Winter 2008/09), with the highest numbers being recorded during the passage period.
- 1.3.16 Based on more recent Wetland Bird Survey data, a five-year peak mean wintering population of 122 birds 2010/11–2014/15 with a peak of 136 in 2011/12 was recorded at Minsmere (Ref. 1.45). The wintering population at Minsmere appears to be relatively stable, although numbers have decreased since 2000–2005 when closer to 180 wintering birds were present on average. The Blyth Estuary supports significantly greater numbers of wintering avocet with a five-year mean peak of 613 birds for the period 2010/11–14/15. Dingle Marshes and Walberswick support only a few wintering avocet.
- 1.3.17 The current UK breeding population is estimated to be 1,500 pairs (Ref. 1.61). The avocet breeding population closest to the site, within Minsmere to Walberswick Heaths and Marshes SPA (up to 91 pairs), represents 6% of the UK breeding population.
- 1.3.18 Avocet was not recorded breeding within the survey areas during the Wood Group and Arcadis surveys. The only observations of avocet were of birds commuting along the coast. The birds were recorded during both the breeding and wintering period.

Assessment

1.3.19 Given that avocet is afforded protection under Schedule 1 of the Wildlife and Countryside Act (Ref. 1.14); is a breeding and wintering qualifying feature of several nearby European Sites and nationally designated sites; and is an amber listed BoCC (Ref. 1.11); then the population of this species located within Minsmere to Walberswick Heaths and Marshes SPA/Ramsar site, and Alde-Ore Estuary SPA would be:

- an IEF at the international level under the CIEEM guidelines (Ref. 1.4); and
- of high importance under the EIA-specific methodology.

iii. Feature: Redshank (breeding and wintering)

Description

1.3.20 The results of the desk-study identified that redshank is a qualifying feature of the Alde-Ore Estuary SPA. Redshank is also listed as a qualifying feature of the Alde-Ore Estuary SSSI and the Minsmere to Walberswick Heaths and Marshes SSSI. There are historical records of breeding redshank for Sizewell Marshes SSSI; however, it is not thought that they are currently breeding at this site. Redshank is an amber listed BoCC (Ref. 1.11).

1.3.21 The RSPB Minsmere Reserve is not typical habitat for wintering redshank, with only a relatively small number of birds being present on the scrapes during the Winter. The five-year peak mean wintering population for 2010/11–2014/15 is 24 birds (based on recent Wetland Bird Survey data). The 2018 Suffolk Bird Report (Ref. 1.15) stated that 31 breeding pairs were recorded at RSPB Minsmere Reserve. The intertidal mudflats of the Blyth Estuary support much larger numbers of redshank with a five-year mean peak population of 972 birds. Small numbers of redshank (five-year mean peak of 20 birds) occur elsewhere within the wider Minsmere to Walberswick Heaths and Marshes SPA/Ramsar site/SSSI at Dingle Marshes and Walberswick.

1.3.22 Redshank was observed in low numbers during both the Wood Group and Arcadis surveys. The majority of birds were recorded commuting along the coast adjacent to the site during the Winter period (a peak count of six birds were recorded). A small number of birds was recorded within Minsmere South Levels during the breeding season; however, no breeding was confirmed during the Arcadis surveys, but considered to be likely.

Assessment

- Given that redshank is a breeding and wintering qualifying feature of nearby European Sites and several nationally designated sites; and that redshank is an amber listed BoCC (Ref. 1.11); then the population of this species located within the ZOI); and
- of high importance under the EIA-specific methodology.

1.3.23 Redshank was recorded commuting along the coast during the Wood Group and Arcadis surveys in the breeding and wintering season. Although recorded in small numbers, it is likely that a proportion of these birds were associated with the adjacent SPAs/Ramsar sites, and, as such, would be considered to be of international level and high importance.

iv. Feature: Shoveler (breeding and wintering)

Description

1.3.24 The results of the desk-study identified that shoveler is a qualifying feature (breeding and wintering) of the Minsmere to Walberswick Heaths and Marshes SPA/Ramsar site. Shoveler is also part of the over wintering waterfowl population designated as part of the Alde-Ore Estuary SPA. In addition, Shoveler is a breeding species within the Minsmere to Walberswick Heaths and Marshes, Alde-Ore Estuary and Sizewell Marshes SSSIs. Shoveler is also an amber listed BoCC (Ref. 1.11).

1.3.25 More recent Wetland Bird Survey data showed a five-year peak mean wintering population of 301 birds 2010/11–14/15 with a peak of 371 in 2013/14 and 259 in 2014/15 at the RSPB Minsmere Reserve (Ref. 1.45). There has been a 195% increase in the wintering population 1991/92–2014/15 and a 93% increase 1998/99–2014/15 (Ref. 1.45). This indicates that the wintering population at Minsmere has increased relative to the national population, which has shown a 30% increase between 1998/99 and 2014/15. Within the wider Minsmere to Walberswick Heaths and Marshes SPA, at Dingle Marshes and Walberswick, shoveler numbers have declined over the past ten years from approximately 40–50 birds to a mean peak of 19 birds over the 2010/11–2014/15 period. Small numbers of shoveler are present on the Blyth Estuary, with a five-year mean of seven birds for the period 2010/11–2014/15.

1.3.26 Shoveler was present within the survey area during the Winter (with a peak count of 85 birds). The majority of birds were recorded in Minsmere South Levels, with small numbers (less than five birds at any one time) recorded within Sizewell Marshes SSSI. Small numbers of birds (again less than ten birds at any one time) were also recorded commuting along the coast during the cormorant and red-throated diver surveys. Shoveler have bred within the survey area in the past (likely to be Sizewell Marshes SSSI or Minsmere South Levels), but the last confirmed breeding record was 2007. The current UK wintering population is estimated to be 18,000 birds (Ref. 1.60). The shoveler population wintering within the site, therefore, represents approximately 0.4% of the UK wintering population.

Assessment

1.3.27 Given that shoveler is an amber listed BoCC (Ref. 1.11); is a qualifying feature of the Minsmere to Walberswick Heaths and Marshes Ramsar and SPA; and is also a part of wintering waterfowl population designated as part of the Alde-Ore Estuary SPA; then the population of this species located within Minsmere to Walberswick Heaths and Marshes Ramsar site and SPA and Alde-Ore Estuary SPA would be:

- an IEF at the international level under the CIEEM guidelines (Ref. 1.4); and
- of high importance under the EIA-specific methodology.

1.3.28 Shoveler was recorded during the Wood Group and Arcadis surveys in the breeding and wintering season within Sizewell Marshes SSSI. Although recorded in relatively small numbers in the breeding season, it is likely that a proportion of these birds were associated with the adjacent SPAs/Ramsar sites, along with birds from the wider UK breeding population, and, as such, would be considered to be of international level and high importance. The wintering population could include birds from the SPA/Ramsar site as well as the wider UK wintering population. This therefore makes it difficult to assign a specific value to the wintering population, however, potential impacts on wintering shoveler within the site has been included within the detailed impact assessment.

v. Feature: Gadwall (breeding and wintering)

Description

- 1.3.29 The results of the desk-study identified that gadwall is a qualifying feature of the Minsmere to Walberswick Heaths and Marshes Ramsar and SPA during the breeding and wintering seasons. In addition, gadwall are a breeding species within the following SSSIs: Minsmere to Walberswick Heaths and Marshes, Sizewell Marshes and Leiston to Aldeburgh. Gadwall is an amber listed BoCC (Ref. 1.11).
- 1.3.30 More recent Wetland Bird Survey data showed a five-year peak mean wintering population of 427 birds 2010/11–2014/15, with a peak of 632 in 2012/13 and 437 in 2014/15 at the RSPB Minsmere Reserve (Ref. 1.45). There has been a 290% increase in the wintering population between 1991/92–2014/15 and a 76% increase between 1998/99–2014/15. This mirrors the trend nationally where the wintering gadwall population has increased by nearly 300% between 1990 and 2014/15. Within the wider Minsmere to Walberswick Heaths and Marshes SPA at Dingle Marshes and Walberswick, gadwall is often present in reasonable numbers with a mean peak for the period 2010/11–2014/15 of 61 birds. Small numbers of gadwall are present on the Blyth Estuary, with a five-year mean of five birds for the period 2010/11–14/15. The 2018 Suffolk Bird Report (Ref. 1.22) stated that the average annual peak count at RSPB Minsmere Reserve continued to exceed the threshold for national importance (peak count of 292).
- 1.3.31 Gadwall was observed within the survey area during the Winter, particularly within Sizewell Marshes SSSI (peak count 29 birds) and South Minsmere Levels (peak count 126 birds). In addition, gadwall was occasionally observed commuting along the coastline adjacent to the site and around the main platform.
- 1.3.32 Breeding season observations were of single birds or pairs. The breeding bird survey carried out by Wood Group in 2010 provided in **Report 14A7.3-5, Annex 14A7.3** of this volume, identified one record of gadwall. The two birds were seen in Sizewell Marshes SSSI but were not recorded in further surveys. Gadwall was also seen in Sizewell Marshes SSSI by SWT wardens in 2010, but breeding could not be confirmed.

Assessment

- 1.3.33 Given that gadwall is an amber listed BoCC (Ref. 1.11); is a qualifying feature of the Minsmere to Walberswick Heaths and Marshes SPA/Ramsar site; and is a breeding species within Minsmere to Walberswick Heaths and Marshes, Sizewell Marshes and Leiston to Aldeburgh SSSIs; then the population of this species located within the zone of influence would be:

NOT PROTECTIVELY MARKED

- an IEF at the international level under the CIEEM guidelines (Ref. 1.4); and
- of high importance under the EIA-specific methodology.

1.3.34 Gadwall was recorded during the Wood Group and Arcadis surveys in the breeding and wintering season within Sizewell Marshes SSSI. Similarly, to shoveler, although recorded in relatively small numbers during the breeding season, it is likely that a proportion of these birds were associated with the adjacent SPAs/Ramsar sites, and, as such, would be considered to be of international level and high importance. The wintering population could also include birds from the SPA/Ramsar site as well as the wider UK wintering population. This therefore makes it difficult to assign a specific value to both the breeding and wintering population within Sizewell Marshes SSSI, however, potential impacts on both breeding and wintering Gadwall within Sizewell Marshes will be included within the detailed impact assessment.

vi. **Feature: Teal (breeding and wintering)**

Description

1.3.35 The results of the desk-study identified that teal is a qualifying feature (breeding/wintering) of the Minsmere to Walberswick Heaths and Marshes SPA/Ramsar site. Teal is part of the over wintering waterfowl population at the Alde-Ore Estuary SPA. Teal also forms part of the assemblage population at the following SSSIs: Leiston- Aldeburgh, Alde-Ore Estuary and Sizewell Marshes. The Sizewell Levels and Associated Areas CWS also includes teal within its assemblage population. Teal is an amber listed BoCC (Ref. 1.11).

1.3.36 More recent Wetland Bird Survey data showed a five-year peak mean population of 1,486 birds 2010/11–2014/15 with a peak of 1,755 in 2013/14 and 1,357 in 2014/15 at Minsmere (Ref. 1.45). There has been little change in the number of birds present over the Winter since the late 1990's, although there are often substantial fluctuations in the number of birds present, depending on Winter conditions on the near continent. On the Blyth Estuary, the five-year mean peak population for the period 2010/11–2014/15 is 816 birds, which compares to a five-year mean peak of 388 birds for the period 1998/89–02/03. Within the wider Minsmere to Walberswick Heaths and Marshes SPA at Dingle Marshes and Walberswick supports lower numbers on average than Minsmere and the Blyth Estuary with a five-year mean peak for the period 2010/11–2014/15 of 675. Nationally the wintering teal population has increased by approximately 20% between 1998 and 2014/15.

NOT PROTECTIVELY MARKED

- 1.3.37 Teal was observed along the coast, and within Sizewell Marshes SSSI and Minsmere South Levels during the Winter, and occasionally in the vicinity of the main platform north of the EDF power station complex. Teal was observed frequently within the survey area and often in large numbers during the Winter (with a peak count of 434 birds). Observations of teal within the survey area during the breeding season were infrequent and rare with the last recorded evidence of breeding within the EDF Energy Estate in the 2007 breeding season provided in **Report 14A7.3-2, Annex 14A7.3** of this volume.

Assessment

- 1.3.38 Given that teal is an amber listed BoCC (Ref. 1.11); is a qualifying species of a SPA and a Ramsar site; is an assemblage population feature of three SSSIs; and the habitat within the survey area supports overwintering teal in high numbers and occasionally breeding teal; then the breeding population of this species located within the ZOI would be:

- an IEF at the international level under the CIEEM guidelines (Ref. 1.4); and
- of high importance under the EIA specific methodology.

- 1.3.39 Observations of teal within the survey area were infrequent during the breeding season, and no breeding was confirmed. During the Winter, teal forms part of wider waterfowl wintering population; however, it is considered likely that a proportion of these birds could be associated with the breeding population at Minsmere to Walberswick Heaths and Marshes SPA/Ramsar site, and, as such, would be considered to be of international level and high importance. This therefore makes it difficult to assign a specific value to the wintering population; however, potential impacts on wintering Teal within the site and Sizewell Marshes SSSI have been included within the detailed impact assessment.

vii. Feature: White-fronted goose (wintering)**Description**

- 1.3.40 White-fronted goose is a red listed BoCC (Ref. 1.11), a NERC Act (Ref. 1.13) Section 41 species, and a qualifying feature of the Minsmere to Walberswick Heaths and Marshes SPA and the Alde-Ore Estuary Ramsar. In addition, white-fronted goose is a wintering species within the Alde-Ore Estuary and the Leiston to Aldeburgh SSSI.
- 1.3.41 White-fronted goose was reported at the following locations during the desk-study; RSPB Minsmere Reserve, Thorpness, Leiston, Aldringham Walks and Common, Thorpness Golf club and “Sizewell”.

NOT PROTECTIVELY MARKED

1.3.42 Wetland Bird Survey data for Minsmere (not including sea) showed a five-year average of 41 birds 2010/11–2014/15, none counted as part of Wetland Bird Survey since the Winter of 2011/12 (Ref. 1.45). There has been a 75% decrease between 1996/97 and 2014/15. This species occasionally makes use of habitat at Walberswick/Dingle (five-year mean peak of 17 birds) and around the Blyth Estuary, with a five-year mean of 29 birds for the period 2010/11–2014/15.

1.3.43 White-fronted goose was observed rarely during the surveys, although when recorded, the birds were in large flocks. All records of white-fronted goose within the survey area were from the arable fields at the northern end of the EDF Energy Estate. Anecdotal evidence from the RSPB indicate that white-fronted geese roost at Minsmere and fly out to sea to go around the existing power station to then land and feed at North Warren. This implies a direct avoidance of the existing power station complex.

Assessment

1.3.44 Given that white-fronted goose is a red listed BoCC (Ref. 1.11) and a Section 41 NERC Act (Ref. 1.13) species; and is a qualifying feature of an SPA and a Ramsar site as well as a Winter assemblage species for an SPA and two SSSIs; then the population of this species located within Minsmere to Walberswick Heaths and Marshes SPA would be:

- an IEF at the international level under the CIEEM guidelines (Ref. 1.4); and
- of high importance under the EIA-specific methodology.

1.3.45 It is considered that the large flocks of white-fronted geese recorded within the survey area form part of the wider wintering population; however, it is likely that a proportion of these birds are associated with the adjacent SPA/Ramsar site and therefore would be considered to be of international level and high importance.

viii. Feature: Marsh harrier (breeding and wintering)

Description

1.3.46 The results of the desk-study identified that marsh harrier is a qualifying feature of several designated sites during the breeding season Minsmere to Walberswick Heaths and Marshes Heaths and Marshes SPA/SSSI, and Alde-Ore Estuary SPA. In addition, marsh harrier is a breeding species (or forms part of the breeding assemblage) at Alde-Ore Estuary SSSI and Leiston to Aldeburgh SSSI. Marsh harrier is not a qualifying feature with respect to the above designated sites during the Winter period.

NOT PROTECTIVELY MARKED

- 1.3.47 Marsh harrier were known to breed at Minsmere, Dingle Marshes and RSPB North Warren Reserves. Data provided by the RSPB (in 2016 (Ref. 1.61) and in 2019 (RSPB, *pers. comm.*) confirmed six nests in 2014 and nine in 2015 at the RSPB Minsmere Reserve (although three nests failed in 2015), one nest at Dingle Marshes in both 2014 and 2015, and two nests in 2014 and one in 2015 at North Warren. In 2018, the Sizewell Land Management Annual Report stated that a peak count of four marsh harrier was recorded in the survey area (Ref. 1.62). In 2018, a total of eight nests were reported at RSPB Minmere Reserve (with 12 young fledged) (Ref. 1.22). A total of ten nests were located within the RSPB Minsmere Reserve in 2019 which fledged 12 young.
- 1.3.48 Records for over-wintering marsh harrier have been provided for locations to the south of the site for areas such as Thorpeness, Aldringham Common, Leiston and Lower Abbey Farm marshes, and Leiston. Wintering marsh harrier are also present at Minsmere but no specific data quantifying the Winter population was obtained.
- 1.3.49 Marsh harrier is described as a Summer visitor to Suffolk, although an increasing number of birds are likely to overwinter (Ref. 1.21). Whilst the species is most frequently observed in the east of the county, along the coastal fringe, marsh harriers have increasingly been observed in the west of Suffolk. The current UK breeding population is estimated to be 374 to 392 pairs (Ref. 1.53). The citation for the Minsmere to Walberswick Heaths and Marshes SPA states that the SPA supports 16 breeding pairs at least 10% of the UK population (five-year mean, 1993–1997).
- 1.3.50 Marsh harrier have been recorded passing over Kenton and Goose Hill Woods, the arable fields north of these woods, Minsmere South Levels and Sizewell Marshes SSSI. The highest concentration of activity was within Minsmere South Levels. Surveys undertaken by Arcadis, Wood Group and SWT have all observed marsh harrier on a regular basis within the site, with males, females and juveniles being recorded during these surveys. Based on extensive surveys, there is no evidence (such as nesting sites, display flights, or food passes) to suggest that marsh harrier are breeding within the site itself. In 2019, marsh harrier established a breeding territory within Aldhurst Farm within the new reedbed creation area, adjacent to the site.
- 1.3.51 Based on the Wood Group and Arcadis survey results, it is concluded that birds breeding off-site, are using habitats within the site as a foraging resource. Marsh harrier have also been recorded foraging within the site during the Winter period. Marsh harriers roost communally during the Winter, and roost sites are located within the RSPB Minsmere Reserve, Orford Ness and Dingle Marshes (Ref. 1.34). The closest roost site would be the Minsmere reedbed; however, specific Winter roost locations are not provided.

1.3.52 Extensive work has been carried out to establish how foraging harriers are using the site, and this has been used to calculate the relative intensity of foraging use of the wetland (Sizewell Marshes SSSI and Minsmere South Levels) and arable areas within the ZOI, to inform the impact assessment. A detailed analysis of the marsh harrier flight lines has been undertaken to ascertain the foraging intensity over specific areas of habitat. This has been expressed as both flight length (m) per hour of observation and flights per day (a day being defined as 12 hours of daylight). This information has been brought together in the Ornithology Synthesis Report (Appendix 14B2) and Shadow HRA Report).

Assessment

1.3.53 Given that marsh harrier is legally protected under Schedule 1 of the Wildlife and Countryside Act (Ref. 1.14); is a breeding and wintering qualifying feature of nearby European Sites and SSSIs; is a Suffolk BAP priority species (Ref. 1.12), an amber listed BoCC (Ref. 1.11) and a NERC Act (Ref. 1.13) Section 41 species; is rare across the UK but comprises a notable proportion of the neighbouring Minsmere to Walberswick Heaths and Marshes SPA population; and is known to nest at Minsmere and forage within Sizewell Marshes SSSI and the arable fields in the wider area; then the population of this species located within Minsmere to Walberswick Heaths and Marshes SPA, and Alde-Ore Estuary SPA would be:

- an IEF at the international level under the CIEEM guidelines (Ref. 1.4); and
- of high importance under the EIA-specific methodology.

1.3.54 Marsh harrier have been recorded foraging within and adjacent to the site during the Winter period. These birds form part of the wider wintering marsh harrier population along the east coast. It is likely that a proportion of the birds wintering within and adjacent to the site are birds which have bred within adjacent SPAs. This therefore makes it difficult to assign a specific value to the wintering population, as it's only when breeding that marsh harrier is an SPA interest feature. However, Suffolk supports a significant number of wintering marsh harrier and the birds present in and adjacent to the site are therefore considered to be of at least national importance and potential impacts on wintering marsh harrier within the site and Sizewell Marshes SSSI have been included within the detailed impact assessment.

1.3.55 Therefore, taking a precautionary approach, the birds present within and adjacent to the site during the Winter period could be considered to be of international level and high importance.

ix. Feature: Hen harrier (wintering)

Description

- 1.3.56 Hen harrier is a qualifying feature of the Minsmere to Walberswick Heaths and Marshes SPA, is afforded protection under Schedule 1 of the Wildlife and Countryside Act (Ref. 1.14), is a red listed BoCC (Ref. 1.11), and is a NERC Act (Ref. 1.13) Section 41 species.
- 1.3.57 In recent years, hen harrier has been recorded within Minsmere South Levels, Sizewell Marshes SSSI and in the northern part of the EDF Energy Estate. Sightings have been rare, with only one or two sightings a year witnessed by SWT during monitoring of the EDF Energy Estate over the last ten years. In addition, two records were provided by SBIS (2014, Ref. 1.23) from “Sizewell” (with the location unspecified).
- 1.3.58 Within the wider landscape, hen harrier is classed as a scarce Winter visitor and passage migrant in Suffolk. A maximum of 22 hen harrier sightings and a minimum of four were recorded within Suffolk between 2004 and 2012 (Birds of Suffolk, 2003, 2009–2012 Ref. 1.16–1.20). In addition to the record for “Sizewell”, records of hen harrier from SBIS (Ref. 1.23) within 2km of the site included locations such as RSPB Minsmere Reserve, Eastbridge, Thorpeness, Aldringham Common, and Leiston. In 2018, one sighting was reported at RSPB Minsmere Reserve (Ref. 1.22).
- 1.3.59 During surveys undertaken by Wood Group provided in **Report 14A7.3-4, Annex 14A7.3** of this volume, hen harrier flights were observed on only two occasions over Minsmere South Levels. During surveys undertaken by Arcadis, a total of 14 hen harrier flights were observed comprised of adult males, adult females and juveniles on multiple days throughout the survey period. Seven flights were within Sizewell Marshes SSSI, five within Minsmere South Levels and three within the northern part of the EDF Energy Estate. The flights were predominantly recorded between October and March, with one record from April and one from August. This suggests that the site is used by hen harrier on an infrequent basis during the Winter period, and occasionally during the passage period, when birds are moving to and from their breeding grounds. No wintering roost sites were identified during the surveys, the nearest known roost site is Sutton and Hollesley Heaths SSSI (Ref. 1.63), more than 10km to south of the site.
- 1.3.60 The small number of flights recorded during the Wood Group and Arcadis surveys (relative to the amount of survey time) is consistent with the numbers recorded more widely within RSPB Minsmere Reserve and the county.

Assessment

1.3.61 Given that hen harrier is afforded protection under Schedule 1 of the Wildlife and Countryside Act (Ref. 1.14); is a qualifying feature (during the Winter) of one nearby European site and one SSSI; is a red listed BoCC (Ref. 1.11) and a NERC Act (Ref. 1.13) Section 41 species; is rare across the UK and a key feature of the neighbouring Minsmere to Walberswick Heaths and Marshes SPA; is a scarce Winter visitor in Suffolk; and has been observed (albeit infrequently) within the site and neighbouring areas; then the wintering population of this species located within Minsmere to Walberswick Heaths and Marshes SPA would be:

- an IEF at the international level under the CIEEM guidelines (Ref. 1.4); and
- of high importance under the EIA-specific methodology.

1.3.62 Similar to marsh harrier, hen harrier has been recorded foraging within and adjacent to the site during the Winter period. These birds form part of the wider wintering hen harrier population along the east coast. Only a small number of hen harrier have been recorded foraging within and adjacent to the site during the Winter, however, it is likely that a proportion of these birds are associated with the wintering populations within adjacent SPAs. Therefore, taking a precautionary approach, the birds present within and adjacent to the site during the Winter period would be considered to be of international value.

x. Feature: Nightjar (breeding)

Description

1.3.63 Nightjar is a qualifying species of the Minsmere to Walberswick Heaths and Marshes SPA/SSSI, Sandlings SPA and the Leiston to Aldeburgh SSSI. It is also classified as an amber listed BoCC (Ref. 1.11), is NERC Act (Ref. 1.13) Section 41 species and is a Suffolk BAP priority species (Ref. 1.12). Nightjar have been recorded within RSPB Minsmere Reserve, Aldringham Common, RSPB North Warren Reserve, Dunwich Heath and Dingle Marshes, and is described as a locally common Summer visitor within Suffolk, and a scarce migrant (Ref. 1.16–1.20).

NOT PROTECTIVELY MARKED

- 1.3.64 Within the wider landscape nightjar have been reported within Aldringham Walks and Common in the last ten years (2005, 2010) (Ref. 1.21). Additionally, the RSPB reported 23 records of nightjar within 5km of the existing Sizewell power station complex between 2003 and 2013. Eleven records were from RSPB Minsmere Reserve ranging between eight and 22 churring males, one record of 44 churring males was from Minsmere to Walberswick Heaths and Marshes SPA. Ten records of between one and 12 singing males were recorded at RSPB North Warren Reserve and one record of 97 churring males was from Sandlings SPA. In 2014–2015, RSPB recorded the following records: four nightjar records within RSPB Minsmere reserve, where a peak count of eight displaying males were recorded in 2014 and 2015, four nightjar records from Dingle Marshes/Dunwich Forest, with a peak count of four displaying males in 2014 and 2015, two records of RSPB North Warren Reserve, one nightjar was recorded in each year and six records in Snape, with a peak count of six displaying males recorded in 2014. Nightjar (churring males) was observed at North Warren/Aldringham Walk in 2016, 2017 and 2018, with a peak count of 5 in 2018.
- 1.3.65 The 2018 Suffolk Bird Report (Ref. 1.22) stated that a total of 65 territories were recorded in The Sandlings and RSPB Minsmere Reserve held 10 territories.
- 1.3.66 Although the Goose Hill and Kenton Hills plantations comprise some suitable (though sub-optimal) foraging and breeding habitat for nightjar, currently these areas do not provide sufficient suitable habitat (such as areas of clear-fell and re-growth) to support this species. No nightjars have been recorded by Wood Group or Arcadis between 2007 and 2015 during targeted surveys within these woodlands.

Assessment

- 1.3.67 Given that nightjar is a breeding qualifying species of the Minsmere to Walberswick Heaths and Marshes SPA/SSSI, Sandlings SPA and the Leiston to Aldeburgh SSSI; are present within the Sandlings SPA/SSSI, small parts of which are within the ZOI; and are a NERC Act (Ref. 1.13) Section 41 species, as well as a Suffolk BAP priority species (Ref. 1.12); but that habitat within the site (specifically Goose Hill and Kenton Hills) is currently considered sub-optimal for nightjar; then the populations of nightjar located within the Minsmere to Walberswick Heaths and Marshes SPA/SSSI and Sandlings SPA would be:
- an IEF at the international level under the CIEEM guidelines (Ref. 1.4); and
 - of high importance under the EIA-specific methodology.

xi. Feature: Woodlark (breeding and wintering)

Description

- 1.3.68 Woodlark is a qualifying species within the Minsmere to Walberswick Heaths and Marshes SPA (20 pairs, five-year mean 1995–99) and the Sandlings SPA/SSSI (154 pairs, count as at 1997). It is afforded protection under Schedule 1 of the Wildlife and Countryside Act (Ref. 1.14), and is classified as a Section 41 species of the NERC Act (Ref. 1.13) as well as a Suffolk BAP priority species (Ref. 1.12).
- 1.3.69 Within the wider landscape, woodlark have been reported from “Sizewell” in the desk-study (likely to be within the survey area), RSPB Minsmere Reserve, Eastbridge, Aldringham Common, Thorpeness, Leiston and Sizewell Common. RSPB reported woodlark present within RSPB Minsmere Reserve (peak count of 22 birds) and RSPB North Warren Reserve (peak count of 53 birds) (Ref. 1.32). RSPB also provided data for 2014 and 2015. A total of 34 woodlark records were recorded in RSPB Minsmere Reserve, with a peak count of 21 pairs in 2015. Other records of woodlark were from within the wider Minsmere to Walberswick Heaths and Marshes SPA at Dingle Marshes, where four records were reported, a peak count of nine pairs was recorded in 2014, and Snape, where six records were reported with a peak count of 10 pairs.
- 1.3.70 Within the Sandlings SPA/SSSI (RSPB North Warren Reserve), woodlark has been recorded every year between 2003 and 2013; however, numbers have steadily declined during this time, with a maximum of 53 recorded in 2003 and only eight recorded in 2013. A total of 13 records of woodlark were provided for RSPB Minsmere Reserve, with a peak count of 20 pairs in 2014. In addition, woodlark have also been recorded within Dunwich Forest, with a peak count of eight recorded in 2012 (RSPB, 2013 Ref. 1.32). Between 2015–2018, a total of 89 woodlark records were recorded in RSPB Minsmere Reserve throughout 2015–2018, with a peak count of 27 in 2016. Other records of woodland were from Dunwich Area, where 64 records were reported between 2015 and 2018 with a peak count of 18 in 2016; Hollesley Common, where 64 records were reported between 2015 and 2018 with a peak count of 17 in 2017 and 2018. In 2018, woodlark pairs were recorded in Dunwich Forest (15 pairs) and RSPB Minsmere Reserve (17 pairs) (Ref. 1.22).

- 1.3.71 Within Suffolk more generally, woodlark are described as a fairly common breeding species, though scarce on passage (Ref. 1.16–1.20). Suffolk was thought to contain 30% of the UK’s breeding woodlark population (403 to 457 territories) in 1997; however, this has declined to 370 territories in 2006 (Ref. 1.64 and Ref. 1.65). Woodlark have been recorded infrequently during the breeding and Winter season, within both the northern and southern parts of the EDF Energy Estate, and in Minsmere South Levels. Sightings within the site during the breeding season have been rare, with one singing woodlark recorded by SWT, whilst in 2008, one singing woodlark was recorded, in 2014 singing was heard within the arable fields to the south of the site).
- 1.3.72 Breeding woodlark was reported by Wood Group in 2007, 2010 and 2012: in 2007, the species was recorded in two locations, the northern edge of Leiston Carr and south of Walk Barn provided in **Report 14A7.3-2, Annex 14A7.3** of this volume. In 2010, a single bird was observed singing on one occasion within the vicinity of Ash Wood Cottages provided in **Report 14A7.3-5, Annex 14A7.3** of this volume; and in 2012, one bird was recorded singing south-west of Walk Barn provided in **Report 14A7.3-8, Annex 14A7.3** of this volume.
- 1.3.73 Wood Group also recorded woodlark during their Winter bird surveys between September 2007 and March 2008, when woodlark was observed in between Lower and Upper Abbey, and within Minsmere South Levels, with a peak count of four and 13 birds provided respectively **Report 14A7.3-1, Annex 14A7.3** of this volume.
- 1.3.74 No woodlark was recorded by Arcadis during either the breeding bird surveys or the Winter bird surveys between 2014 and 2015.
- 1.3.75 No woodlark was recorded in 2018 during breeding bird surveys or wintering bird surveys undertaken by the Suffolk Wildlife Trust (Ref. 1.62).

Assessment

- 1.3.76 Given that woodlark is a qualifying species within the Minsmere to Walberswick Heaths and Marshes SPA and the Sandlings SPA/SSSI, and is afforded protection under Schedule 1 of the Wildlife and Countryside Act (Ref. 1.14); are classified as NERC Act (Ref. 1.13) Section 41 species, as well as Suffolk BAP priority species (Ref. 1.12); and over 10% of the Suffolk breeding population of woodlark are within the ZOI; then the populations of these species located within the Minsmere to Walberswick Heaths and Marshes SPA and Sandlings SPA would be:
- an IEF at the international level under the CIEEM guidelines (Ref. 1.4); and

- of high importance under the EIA specific methodology.

xii. **Feature: Bearded tit (breeding and wintering)**

Description

1.3.77 A detailed species account, based on bearded tit records from desk-study, secondary and primary data sources, is presented in **Annex 14A7.5** of this volume.

1.3.78 Bearded tit is a qualifying feature of the Minsmere to Walberswick Heaths and Marshes Ramsar site/SSSI. Desk-study records provided by SBIS (2014, Ref. 1.23) revealed four records of bearded tit between 2003 and 2010. These were located within RSPB Minsmere Reserve and Sizewell Marshes SSSI. NGL also recorded bearded tit as present on the EDF Energy Estate in seven of the last ten years although one breeding territory was recorded in 2007 in the reedbed in Sizewell Marshes SSSI, successful breeding at this location was not proven. Birds were predominantly recorded foraging in autumn and winter. Two adult bearded tit were ringed in 2016 and three adult bearded tit were ringed in 2018. In 2017, RSPB Minsmere Reserve held 34 territories (Ref. 1.21).

1.3.79 During Wood Group and Arcadis surveys, bearded tit was regularly recorded during the Winter, using the reedbeds on Minsmere South Levels. They were also recorded incidentally during the December and January 2019 marsh harrier surveys at Aldhurst Farm. On both occasions three individuals were recorded at the western end of the reedbed. There were no confirmed records of breeding.

Assessment

1.3.80 Given that bearded tit is a qualifying feature of one nearby Ramsar site and SSSI; is an uncommon resident in Suffolk; and has been observed (mostly during the Winter) within the site and neighbouring areas; then the breeding population of this species located within the Minsmere to Walberswick Heaths and Marshes Ramsar site would be:

- an IEF at the international level under the CIEEM guidelines (Ref. 1.4); and
- of high importance under the EIA-specific methodology.

1.3.81 The majority of sightings were of birds during the Winter period. It is likely that a proportion of the birds wintering within the survey area forms part of a larger more widespread UK wintering population. These wintering birds would be considered to be of at least county importance.

xiii. Feature: Red-throated diver (wintering)

Description

- 1.3.82 Red-throated diver is afforded protection under Schedule 1 of the Wildlife and Countryside Act (Ref. 1.14), and is a qualifying feature of the Outer Thames Estuary SPA. The species was only recorded offshore (part of which overlaps with the Outer Thames SPA). The SPA citation states that the Outer Thames Estuary supports 38% of the Great Britain population (peak mean over the period 1989–2006/07) of this species.
- 1.3.83 Within the wider landscape, the Suffolk coast is known to support a red-throated diver Winter population estimated at 1,500 to 3,000 birds during the 1990s (Ref. 1.66). The Suffolk Birds reports (Ref. 1.6–1.10) note that red-throated divers can be seen offshore from Suffolk in all months of the year, but that the peak period is between November and February (as confirmed by the Wood Group and Arcadis surveys).
- 1.3.84 Red-throated diver is described as a common Winter visitor and a passage migrant in Suffolk. The current UK wintering population is estimated to be 17,000 birds (Ref. 1.60). The wintering red-throated diver population within the survey area (peak count commuting 710 birds, peak count foraging/resting 190 birds recorded by Wood Group) represents up to approximately 4% (based on commuting birds) or 1.1% (based on foraging/resting birds) of the UK wintering population.
- 1.3.85 During Wood Group and Arcadis surveys, sightings of red-throated diver occurred more frequently during the winter months (October to March) than the passage/breeding season, with peak counts occurring between December and March.
- 1.3.86 During Wood Group coastal surveys, red-throated diver was observed in relatively high numbers (peak count commuting 710 birds) between the site and Orford Ness to the south provided in **Report 14A7.3-3, Annex 14A7.3** of this volume. Lower numbers were observed from the VPs in close proximity to the site (with peak counts of commuting birds being; 95, 150 and 49 respectively for VPs 1, 2 and 3) compared with the VPs located at Orford Ness (peak counts of commuting birds being; 330 and 710, respectively, recorded at VPs 11 and 12).
- 1.3.87 A similar pattern was recorded during surveys carried out by Arcadis. Lower peak counts were recorded at VPs 1 to 3 (peak counts of 108, 200 and 79, respectively) compared with VP 11 located at Orford Ness, which had a peak count of 227 in Winter 2012/13 and 200 in Winter 2013/2014.

- 1.3.88 Overall, the desk-study and field surveys confirmed that the area offshore of the site is utilised by red-throated diver throughout the Winter. However, the surveys indicate that red-throated diver occur in greater numbers offshore to the north and south of the site.

Assessment

- 1.3.89 Given that red-throated diver is afforded protection under Schedule 1 of the Wildlife and Countryside Act (Ref. 1.14); and the nearby population of this species comprises a small proportion of the Outer Thames Estuary SPA wintering population; then the population of this species which forage within the Outer Thames SPA (the entire survey area, lies within a small proportion of the Outer Thames Estuary SPA, and as such all birds recorded would be associated with the SPA) would be:

- an IEF at the international level under the CIEEM guidelines (Ref. 1.4); and
- of high importance under the EIA-specific methodology.

xiv. Feature: Little tern (breeding)

Description

- 1.3.90 Little tern is afforded protection under Schedule 1 of the Wildlife and Countryside Act (Ref. 1.14), and is an amber list BoCC (Ref. 1.11) as well as a Suffolk BAP priority species (Ref. 1.12). It is also a qualifying feature of several designated sites within 20km of the site. These comprise: Minsmere to Walberswick Heaths and Marshes SPA (28 pairs, five-year mean, 1992–1996); the Alde-Ore Estuary SPA (58 pairs, five-year mean, 1993/4, 1996/8); Outer Thames Estuary SPA (foraging only) and Alde-Ore Estuary SSSI.

- 1.3.91 Desk-study records reported eight records of little tern within 2km of the site. These records were located at RSPB Minsmere Reserve, Thorpeness, the rigs associated with the Sizewell A power station, “Sizewell”, Aldringham Common, and Thorpeness golf club. Within Suffolk, little tern had historically bred infrequently (and often with poor fledging rates) at a total of 17 locations throughout the county. Little tern has been described as a common Summer visitor and passage migrant (Ref. 1.16–1.20). In 2018, a peak count of three individuals were reported at RSPB Minsmere Reserve, no breeding attempts were reported.

- 1.3.92 The nearest habitat to the site historically used by breeding little tern is located at RSPB Minsmere Reserve. This location last held a breeding colony of little tern in 2009 (Ref. 1.39), hence only small numbers of birds have been recorded during the field surveys between 2010 and 2015. However, after the RSPB introduced gravel on the South Scrape within the RSPB Minsmere Reserve, little terns were successful in breeding on the South Scrape in 2019. A total of ten pairs fledged seven young (RSPB, *pers. comm.*). Desk-study records also reported little tern records in the vicinity of the site (likely to be along the coast).
- 1.3.93 Little tern have only been recorded off the coast during the breeding season (April to September), and all observations have been of foraging or commuting birds. As little tern forage close to their breeding location, the number of sightings was very much dependant on the proximity of VPs to active little tern breeding colonies. As there were no known active little tern colonies in close proximity of the site (i.e. within 2km), the sightings are likely to be of failed breeders from other locations, or birds in transit later in the breeding season. Although breeding colonies are established each year, these tend to be in similar locations, but not all previous colony sites are used again the following year.
- 1.3.94 Little tern was observed offshore during Wood Group surveys. In both 2007 and 2008, a peak count of 13 birds was recorded, whilst in 2010 this increased to 21. In 2011, the peak count increased again, to 51 little terns, provided in **Annex 14A7.3** of this volume. The Wood Group surveys show that little tern is using the offshore areas as a foraging resource.
- 1.3.95 Little tern was recorded less frequently by Arcadis during coastal surveys undertaken during the breeding season in 2013. As there were no breeding colonies in the vicinity of the site during the 2013 breeding season, the number of sightings of little tern were relatively low. Eight individuals were observed to the north of the site (within the vicinity of Minsmere) and to the south (within the vicinity of Aldeburgh); no little tern flights were recorded offshore of the site provided by **Report 14A7.4-3, Annex 14A7.4** of this volume.

Assessment

- 1.3.96 Given that little tern are qualifying features of a number of designated sites within the ZOI (in particular, the Minsmere to Walberswick Heaths and Marshes and Alde-Ore Estuary SPAs); is an amber listed BoCC (Ref. 1.11) and is also afforded protection under Schedule 1 of the Wildlife and Countryside Act (Ref. 1.14); have been recorded in reasonable numbers during the breeding season foraging along the coast close to the site; and the potential exists for nesting to occur within the ZOI (although little tern has not raised a significant number of young bred since 2009); then the population of this species located within the Minsmere to Walberswick Heaths and Marshes SPA, the Alde-Ore Estuary SPA/SSSI, and the Outer Thames Estuary SPA would be:
- an IEF at the international level under the CIEEM guidelines (Ref. 1.4); and
 - of high importance under the EIA specific methodology.

xv. Feature: Common tern (breeding)

Description

- 1.3.97 Common tern is regarded as being of medium conservation importance in the UK following its inclusion on the amber List of BoCC (Ref. 1.11). Common tern is a qualifying feature of Outer Thames Estuary SPA (foraging only).
- 1.3.98 SBIS (2014, 1.21) reported ten records of common tern within 2km of the site, eight of which were from within the last ten years. Records were from RSPB Minsmere Reserve, Thorpeness, Aldringham Walks and Common, rigs associated with Sizewell A power station, and “Sizewell”. On a county level, common tern was described as a common Summer visitor and passage migrant (Ref. 1.16–1.20). In 2018, 40 young fledged from 120 pairs at RSPB Minsmere Reserve. The population of common tern appears to have increased recently with 200 pairs (highest count since 1974) raising 53 young to fledging on the RSPB Minsmere Reserve in 2019 (RSPB, *pers. comm.*).

1.3.99 Common tern was observed only during the breeding season offshore from Sizewell. The nearest common tern breeding colony is located at RSPB Minsmere Reserve. The peak count was 57 birds on the 6 August 2011 were recorded by Wood Group found in **Report 14A7-2, Annex 14A7.3** of this volume. Common tern was also recorded frequently during the Wood Group seabird survey in 2011–2012 provided in **Report 14A7-2, Annex 14A7.3** of this volume. The peak count of foraging common tern was 110 birds. The birds were observed foraging adjacent to the coast. The peak count of common tern commuting offshore was 183 from VP 1. Common tern was recorded on 29 occasions during the little tern coastal surveys provided in **Report 14A7-4-3, Annex 14A7.4** of this volume. A peak count of 80 birds were recorded from VP 13 (Orford Ness). Within the vicinity of the site (VPs 1, 2 and 3) a peak count of 40 common tern were observed at VP 1 during the little tern survey in 2013.

Assessment

1.3.100 Given that common tern are a potential qualifying features of one designated site within the ZOI (Outer Thames Estuary SPA); are an amber listed BoCC (Ref. 1.11); and have been recorded in reasonable numbers during the breeding season foraging along the coast close to the site; then the populations of this species from nesting colonies which forage within the Outer Thames Estuary SPA would be:

- an IEF at the international level under the CIEEM guidelines (Ref. 1.4); and
- of high importance under the EIA specific methodology.

xvi. Feature: Sandwich tern (breeding)

Description

1.3.101 Sandwich tern is an amber listed BoCC (Ref. 1.11) as well as a Suffolk BAP priority species (Ref. 1.12), and is a qualifying feature of the Alde-Ore Estuary SPA/SSSI.

1.3.102 SBIS (Ref. 1.23) reported nine records of sandwich tern within 2km of the site. These were located at RSPB Minsmere Reserve, Thorpeness, Aldringham Common and “Sizewell”. In 2019, 50 pairs of sandwich tern raised 28 fledglings on the RSPB Minsmere Reserve (RSPB, *pers. comm.*). This was a **significant** increase from the 2018 breeding season on a county level, sandwich tern is described as a common passage migrant and a declining summer visitor (Ref. 1.16–1.20). In 2018, breeding pairs were recorded at RSPB Minsmere Reserve, only two young fledged from 32 nesting pairs (ref. 1.22).

1.3.103 Sandwich tern was observed offshore from Sizewell during Wood Group and Arcadis surveys. Wood Group reported peak counts of 28 sandwich terns in 2007, provided in **Report 14A7.3-2, Annex 14A7.3** of this volume, six birds in 2008, provided in **Report 14A7.3-1, Annex 14A7.3** of this volume, and 17 in 2011, provided in **Report 14A7.3-3, Annex 14A7.3** of this volume. In 2013, Arcadis reported a peak count of just three birds, provided in **Report 14A7.4-3, Annex 14A7.4** of this volume. A small number of birds were also regularly observed foraging adjacent to the power station (between one and two) in all years.

1.3.104 Sandwich tern was only observed during the breeding season (April to September), and all observations were of foraging or commuting birds. Sightings of sandwich tern were independent of breeding colony locations, as sandwich tern can forage greater distances from the breeding colony, and as such, are less constrained to the areas around the breeding colonies. Sandwich tern was a rare breeders within Suffolk; as with little tern. It is assumed that a proportion of the birds recorded during the Winter surveys could originate from breeding populations of designated sites beyond Minsmere.

Assessment

1.3.105 Given that sandwich tern is a qualifying feature of a number of designated sites within the ZOI of the site (in particular, the Alde-Ore Estuary SPA/SSSI); are amber listed BoCC (Ref. 1.11); have been recorded in reasonable numbers during the breeding season foraging along the coast close to the site; nesting sites are key and rare features for this species; and that the potential exists for nesting to occur within the ZOI (although this species has not bred successfully since 2009); then the breeding population of this species located within the Alde-Ore Estuary SPA would be:

- an IEF at the international level under the CIEEM guidelines (Ref. 1.4); and
- of high importance under the EIA specific methodology.

xvii. Feature: Kittiwake (breeding)

Description

1.3.106 Kittiwake is a red listed BoCC (Ref. 1.11), and the Sizewell Rigs CWS has been designated specifically for the species.

NOT PROTECTIVELY MARKED

1.3.107 Kittiwake are known to breed on the rig structures offshore of Sizewell, which are used by a relatively large colony comprising approximately 200 nests and are also known to utilise the Sizewell B offshore outfalls although this is outside of the site boundary. This site is one of only two kittiwake colonies between Yorkshire and Kent (the second colony being located on a wall at Ness Point, Lowestoft). The rigs therefore provide an important nesting structure for kittiwake on the east coast. The 2018 Suffolk Bird Report (Ref. 1.22) stated that breeding was noted at Sizewell offshore rigs, with a peak count of 240 nests. Outside of the breeding season, 200 individuals were recorded at Minsmere Beach. A small number of kittiwake attempted to breed at the RSPB Minsmere Reserve in 2019; however, no eggs were laid (RSPB, *pers. comm.*). Kittiwake was regularly recorded foraging off the coast during both the Wood Group and Arcadis surveys.

Assessment

1.3.108 Given that kittiwake is a red listed BoCC for which a CWS has been designated; and that the offshore rigs associated with the Sizewell A power station support an important kittiwake colony for the east coast of England; then the population of this species associated with the offshore rigs would be:

- an IEF at the regional level under the CIEEM guidelines (Ref. 1.4); and
- of medium importance using the EIA specific methodology.

xviii. Feature: Lesser black-backed gull (breeding)**Description**

1.3.109 Lesser black-backed gull is an amber listed BoCC (Ref. 1.11) and a qualifying species of the Alde-Ore Estuary SPA/Ramsar site.

1.3.110 Within the Minsmere (not including sea) British Trust for Ornithology Wetland Bird Survey count zone the annual five-year mean of peaks of lesser black-backed gull was 45. Lesser black-backed gull was also observed in the Minsmere offshore count zone, with an annual five-year mean of peaks of two birds.

1.3.111 During the Wood Group and Arcadis surveys, lesser black-backed gull was observed flying over the arable fields at the northern end of the EDF Energy Estate, roosting within Minsmere South Levels and commuting, foraging and loafing along the coast adjacent to the power station. Lesser black-backed gull was not recorded breeding within the site.

Assessment

- 1.3.112 Given that lesser black-backed gull is an amber listed BoCC (Ref. 1.11); and is a qualifying feature of the Alde-Ore SPA/Ramsar site; then the population of this species located within the Alde-Ore SPA/Ramsar site would be:
- an IEF at the international level under the CIEEM guidelines (Ref. 1.4); and
 - of high importance using the EIA specific methodology.
- 1.3.113 Although the site lies within the foraging range of lesser black-backed gull, the site does not offer substantial foraging opportunities. Also, given its distance from the site, it is considered unlikely that the lesser black-backed gull breeding within the Alde-Ore Estuary are using the habitats within and adjacent to the site in significant numbers.
- 1.3.114 Although the site lies within the foraging range of lesser black-backed gull, no lesser black-backed breeding sites were identified within the survey area; therefore, the foraging lesser black-backed gull recorded within and adjacent to the site would be considered to be of no more than local level (under the CIEEM guidelines (Ref. 1.4); and of low importance using the EIA specific methodology.

xix. Feature: Seabird assemblage (breeding) qualifying feature of Alde-Ore Estuary SPA

Description

- 1.3.115 This assemblage qualification which is listed under Article 4.2 of the Directive, refer to **Table 1.4**, comprises two species which have not already been included as separate features above, but which have been specifically listed as forming part of the Alde-Ore Estuary SPA site seabird assemblage qualification (herring gull and black-headed gull). The three other species listed as forming part of the Alde-Ore Estuary SPA seabird assemblage qualification (lesser black-backed gull, little tern and sandwich tern) are qualifying species in their own right within other European Sites and have therefore been dealt with separately above.
- 1.3.116 The desk-study information confirmed that herring gull have been recorded as probably breeding within RSPB Minsmere Reserve, but no confirmed nest sites were recorded within the site during surveys. The herring gulls recorded inland were mainly foraging within the arable fields; however, the majority of the sightings were offshore of the site (peak count 300 birds).

1.3.117 Black-headed gull have been recorded breeding within Minsmere South Levels and were regularly recorded foraging across the site during the Wood Group and Arcadis surveys (peak count 74 birds during the Arcadis wetland bird surveys 2018–2019).

Assessment

1.3.118 Given that herring gull and black-headed gull form part of seabird assemblage of a European site; and the habitats within the vicinity of the site are unlikely to be especially important for these species (given the widespread availability of arable fields and offshore habitat); then the seabird assemblage located within the ZOI would be:

- an IEF at the international level under the CIEEM guidelines (Ref. 1.4); and
- of high importance under the EIA-specific methodology.

1.3.119 Similarly, to lesser black-backed gull, given its distance from the site and lack of substantial foraging opportunities within the site, it is considered unlikely that the black-headed gull and herring gull associated within the Alde-Ore Estuary SPA are using the habitats within and adjacent to the site in significant numbers on a regular basis.

1.3.120 Although the site lies within the foraging range of black-headed gull and herring gull, no black-headed gull and herring gull breeding sites were identified within the survey area; therefore, the foraging gulls recorded within and adjacent to the site are likely to form part of the wider gull population within the surrounding areas. In 2019, 2,800 pairs of black-headed gull were recorded on the RSPB Minsmere Reserve (RSPB, *pers. comm*). These would be considered to be of no more than local level (under the CIEEM guidelines (Ref. 1.4); and of low importance using the EIA specific methodology.

- xx. Feature: Waterbird assemblage qualifying feature of Alde-Ore Estuary SPA (wintering)/Ramsar site (breeding and wintering) and SSSI

Description

- 1.3.121 This assemblage qualification which is listed under Article 4.2 of the Directive, refer to **Table 1.4**, regularly supports at least 20,000 waterfowl, including black-tailed godwit, dunlin, lapwing, shoveler, teal, wigeon, shelduck, white-fronted goose, avocet and redshank. Six of these species (black-tailed godwit, dunlin, lapwing, wigeon, shelduck and redshank) have not already been included as separate features above but have been specifically listed as forming part of the Alde-Ore Estuary SPA site water bird assemblage qualification. The four other species listed as forming part of the Alde-Ore Estuary SPA waterbird assemblage qualification (shoveler, teal, white-fronted goose and avocet) are qualifying species in their own right within European Sites and have therefore been dealt with separately above.
- 1.3.122 Desk-study information, as well as baseline surveys confirmed that black-tailed godwit, dunlin, lapwing, wigeon, shelduck and redshank have been recorded within or near to the site. Black-tailed godwit was very occasionally recorded within the EDF Energy Estate, RSPB Minsmere Reserve and Sizewell Marshes SSSI. Dunlin was predominantly observed commuting along the coast. Lapwing was recorded in Winter within the fields at the northern end of the EDF Energy Estate and commuting over along the coast. Lapwing is not considered to be breeding within Sizewell Marshes SSSI. Wigeon was observed predominately within Minsmere South Levels, Sizewell Marshes SSSI and along the coast, and were recorded more frequently during the Winter than the breeding season. Shelduck was recorded commuting along the coast, are present within Minsmere South Levels during the Winter and were within Minsmere South Levels occasionally during the breeding season. Redshank was observed in low numbers along the coast during the Winter and within Minsmere South Levels during the breeding season. It is considered unlikely that redshank breed on the site.
- 1.3.123 This assemblage qualification of the Ramsar site which is listed under Ramsar criterion 3, refer to **Table 1.4**, does not comprise a specific list of species; however, would include those already discussed associated with the SPA.

Assessment

- 1.3.124 Given that the breeding and wintering assemblage comprised of species of international and national importance; and a proportion of the birds recorded within the ZOI could be associated with the Alde-Ore Estuary assemblage population; then the waterbird assemblage associated with the Alde-Ore Estuary SPA/Ramsar site would be:

NOT PROTECTIVELY MARKED

- an IEF at the international level under the CIEEM guidelines (Ref. 1.4); and
 - of high importance under the EIA-specific methodology.
- xxi. Feature: Waterbird assemblage qualifying feature of Minsmere to Walberswick Ramsar site (breeding)/assemblage associated with Minsmere to Walberswick Heaths and Marshes SSSI (breeding/wintering)

Description

- 1.3.125 This assemblage qualification that is listed under Ramsar criterion 2, refer to **Table 1.4**, comprises an important assemblage of rare breeding birds associated with marsh land and reedbed including bittern, gadwall, teal, shoveler, marsh harrier, avocet and bearded tit. The Ramsar site also encompasses Minsmere to Walberswick Heaths and Marshes SSSI (including Minsmere South Levels) which comprises a complex series of habitats, notably mudflats, shingle beach, reedbeds, heathland and grazing marsh. The tidal mudflats form sheltered feeding grounds for wildfowl and shorebirds, notably wigeon, shelduck, redshank and dunlin.
- 1.3.126 Each of the species listed associated with the assemblage qualification have been included as separate features (bittern, gadwall, teal, shoveler, marsh harrier, avocet and bearded tit) or discussed previously within the waterbird assemblage qualifying feature of Alde-Ore Estuary Ramsar site (wigeon, shelduck, redshank and dunlin), and therefore will not be repeated here.

Assessment

- 1.3.127 Given that the breeding and wintering waterfowl and wader assemblage associated with Minsmere to Walberswick Heaths and Marshes Heaths and Marshes Ramsar site/SSSI comprises a number of bird species considered to be of international and or national nature conservation importance; and wetland birds are a significant component within the SSSI citations for the SSSI; then the populations of these species located within and adjacent to the site would be:
- an IEF at the international level under the CIEEM guidelines (Ref. 1.4); and
 - of high importance using the EIA specific methodology.

xxii. Feature: Bird assemblage associated with Sandlings Forest SSSI and other component SSSI of the Sandlings SPA

Description

- 1.3.128 This assemblage qualification includes woodlark and nightjar associated with the SPA itself, as well as the component SSSIs within and surrounding the SPA. The site has been designated for its coniferous woodland which supports internationally important populations of woodlark and nightjar.
- 1.3.129 Both species listed are associated with the assemblage qualification have been included as separate features, and therefore will not be repeated here.

Assessment

- 1.3.130 Given that the breeding and wintering assemblage associated with Sandlings SPA/SSSI, comprises species considered to be of International and or national nature conservation importance; then the populations of these species located within the ZOI of the site would be:
- an IEF at the international level under the CIEEM guidelines (Ref. 1.4); and
 - of high importance using the EIA specific methodology.

xxiii. Feature: Bird assemblage associated with Sizewell Marshes SSSI

Description

- 1.3.131 This feature comprises the wintering and breeding bird assemblage which forms one of the qualifying features of Sizewell Marshes SSSI. The Sizewell Marshes SSSI citation does not specifically specify which bird species comprise the assemblage. Detailed species accounts of the species included within this feature (based upon desk-study, secondary and primary data sources), are presented in **Annex 14A7.6** of this volume.

Breeding

- 1.3.132 The assemblage recorded during the breeding season consists of a number of species considered to be of nature conservation importance (such as species associated with nearby internationally designated sites, red, amber listed BoCC (Ref. 1.11), NERC Act Section 41 species (Ref. 1.13), and Suffolk BAP priority species (Ref. 1.12). A suite of passerine species was recorded during surveys; however, the main species likely to constitute an assemblage of wetland species are set out in **Table 1.9**.

Table 1.9: Summary of species present at Sizewell Marshes SSSI within the breeding season.

Species	Arcadis Surveys (Peak Count).	Wood Group Surveys (Peak Count).	NGL (Peak Count, Assumed to be within the SSSI).
Mute swan.	0	1 pair.	7 (2005–06).
Greylag goose.	0	Present on large pool in reedbed.	2 (2004–05).
Mallard	11 breeding territories.	Up to 27 pairs.	28 (2005–06).
Gadwall	0	1 pair.	11 (2007–08).
Bearded tit.	0	0	One breeding territory (2007), breeding not confirmed.
Kingfisher	1 pair.	1 pair.	1 pair (2014).
Cetti's warbler.	4 breeding territories.	4 breeding territories.	11 breeding territories (2010).
Reed bunting (<i>Emberiza schoeniclus</i>).	2 breeding territories.	4 breeding territories.	8 (2013).
Turtle dove.	3	0	3 (2006–07).

- 1.3.133 Bittern was recorded occasionally within Sizewell Marshes SSSI but not confirmed as breeding. There are also historical records of breeding redshank and lapwing for Sizewell Marshes SSSI; however, it is not thought that they are currently breeding at this site, with no records of breeding confirmed during the surveys provided in **Annex 14A7.3-5** of this volume.
- 1.3.134 Shoveler has bred within the survey area in the past (likely to be Sizewell Marshes SSSI or Minsmere South Levels), but the last confirmed breeding record was 2007. It is not currently considered that Shoveler is breeding within Sizewell Marshes SSSI.
- 1.3.135 Observations of teal during the breeding season were infrequent and rare with the last recorded evidence of breeding within the EDF Energy Estate in the 2007 breeding season, provided in **Report 14A7.3-2, Annex 14A7.3** of this volume. It is assumed that teal is no longer breeding within Sizewell Marshes SSSI.

Wintering

1.3.136 The desk-study and field surveys confirmed that the wetland habitat within Sizewell Marshes SSSI also provides suitable habitat for over-wintering waterfowl and waders. The wintering assemblage consists of species associated with nearby internationally designated sites, red and amber listed BoCC (Ref. 1.11). **Table 1.10** provides a summary of the species recorded.

Table 1.10: Summary of species present during the Winter.

Species	Arcadis Surveys (Peak Count).	Wood Group Surveys.	NGL (Peak Count, Assumed to be within the Brackets Year. SSSI) Indicates
Mute swan.	7	Present	15 (2014).
Gadwall	29	Present	151 (2010).
Teal	22	Present	180 (2013).
Shoveler	5	-	26 (2013).
Mallard	46	Present	158 (2004–05).
Moorhen	4	-	-
Coot (<i>Fulica atra</i>).	2	-	-
Bittern	Present	Present	1 (2014).
Grey heron (<i>Ardea cinerea</i>).	1	-	-
Little egret (<i>Egretta garzetta</i>).	1	-	-
Kingfisher	1	Present	Present
Water rail (<i>Rallus aquaticus</i>).	4	0	4 (2013).
Jack snipe (<i>Lymnocyptes minimus</i>).	1	-	-
Snipe	18	Present	36 (2013).
Woodcock	4	0	5 (2010).

Assessment

1.3.137 Although the breeding and wintering waterfowl and wader species present were recorded in relatively low numbers, given that they comprise species considered to be of local and national nature conservation importance (including red and amber listed (Ref. 1.11), NERC Act Section 41 species (Ref. 1.13), and priority species listed within Suffolk BAP (Ref. 1.12)); then the populations of these species located within and adjacent to the site would be:

NOT PROTECTIVELY MARKED

- an IEF at the national level under the CIEEM guidelines (Ref. 1.4); and
- of high importance using the EIA specific methodology.

xxiv. Feature: Stone-curlew (breeding)**Description**

- 1.3.138 Stone-curlew is afforded protection under Schedule 1 of the Wildlife and Countryside Act (Ref. 1.14) and was an amber BoCC (Ref. 1.11).
- 1.3.139 Desk-study confirms stone-curlew as a breeding species within the wider RSPB Minsmere Reserve, with a peak count of 15 pairs. Stone-curlew breeding records were also reported from Westleton Walks and Eastbridge. Stone-curlew are known to have bred historically on the EDF Energy Estate but are have not been present for a number of decades (RSPB *pers. comm.*) The East Anglian population included 202 pairs in 2018, with 165 of the pairs located in the Brecks (Ref 1.66). The population within RSPB Minsmere Reserve equates to approximately 7% of the East Anglian population.
- 1.3.140 Only a single incidental sighting was recorded during the Arcadis surveys, with a bird resting on Minsmere South Levels in April 2015.

Assessment

- 1.3.141 Given that stone-curlew is afforded protection under Schedule 1 of the Wildlife and Countryside Act (Ref. 1.14) and is an amber BoCC species (Ref. 1.11); and are known to breed at RSPB Minsmere Reserve, north of the site; then the population of this species located within RSPB Minsmere Reserve would be:
- an IEF at the regional level under the CIEEM guidelines (Ref. 1.4); and,
 - of medium importance using the EIA-specific methodology.

xxv. Feature: Barn owl – Schedule 1 species (breeding and wintering)**Description**

- 1.3.142 As well as being listed as a Schedule 1 species of the Wildlife and Countryside Act (Ref. 1.14), barn owl is included on the UK Green List of BoCC (Ref. 1.11), and is a Suffolk BAP priority species for conservation action in the county (Ref. 1.12).

1.3.143 The 2015 Arcadis surveys confirmed two breeding pairs of barn owl between Lower and Upper Abbey, and one breeding pair within Sizewell Marshes SSSI. Surveys undertaken in 2018 recorded a pair of barn owls nesting in the Goose Hill box, raising three young (Ref. 1.62). Bat surveys undertaken in 2019 recorded two barn owls at Lower Abbey Farm, no nesting was confirmed, but the sightings indicated their continued presence in the area. Barn owl have been regularly recorded foraging throughout the breeding and Winter period.

1.3.144 The current UK population estimate of barn owl is 4,000 birds (Ref. 1.60). Within Suffolk in 2017, barn owl was recorded at 469 nesting sites, and of these 379 sites produced young (Ref. 1.21). In 2018, only 125 active nests were recorded in the county, resulting in a very poor breeding season (Ref. 1.22). The two barn owl breeding pairs recorded represent 0.5% of the known Suffolk breeding population.

Assessment

1.3.145 Given that barn owl is afforded protection under Schedule 1 of the Wildlife and Countryside Act (Ref. 1.14); and that a number of barn owls have been recorded breeding, foraging or otherwise utilising the site during the breeding/Winter/passage period; but that barn owl is still relatively widespread across the UK; then the population of barn owl located within and adjacent to the site would be:

- an IEF at the local level under the CIEEM guidelines (Ref. 1.4); and
- of low importance under the EIA-specific methodology.

xxvi. Feature: Kingfisher – Schedule 1 species (breeding)

Description

1.3.146 During the Wood Group and Arcadis surveys, at least one confirmed kingfisher nest was identified within Sizewell Marshes SSSI. Kingfisher was also regularly recorded foraging within the ditch network.

1.3.147 The current UK population estimate of kingfisher is 3,800–4,600 pairs (Ref. 1.59). Within Suffolk, kingfisher was confirmed breeding at 14 sites (Ref. 1.16–1.20), however, given the difficulty in confirming breeding, this is considered likely to be an underestimate. During 2018 10 confirmed breeding sites were recorded in Suffolk (Ref. 1.22). The single breeding pair recorded represents approximately 7% of the confirmed Suffolk breeding population.

Assessment

1.3.148 Given that kingfisher is afforded protection under Schedule 1 of the Wildlife and Countryside Act (Ref. 1.14); and have been recorded breeding, foraging or otherwise utilising the site during the breeding/Winter/passage period; but that kingfisher is still relatively widespread across the UK; then the populations of kingfisher located within and adjacent to the site would be:

- an IEF at the county level under the CIEEM guidelines (Ref. 1.4); and
- of medium importance under the EIA-specific methodology.

xxvii. Feature: Hobby – Schedule 1 species (breeding)

Description

1.3.149 Up to two breeding hobby territories in plantation woodland to the south-east of Broom Covert and in the Goose Hill area were recorded within the site during surveys undertaken in 2007 (Ref. 1.1), one within the northern part of EDF Energy Estate and the second within Sizewell Marshes SSSI. Hobby was also recorded foraging within the Goose Hill and Kenton Hills plantations. During surveys undertaken in 2018, hobby was absent from the survey area (Ref. 1.61). The current UK population estimate of hobby is 2,800 birds (Ref. 1.68). Within Suffolk, breeding was recorded at various sites including RSPB Minsmere Reserve (Ref. 1.16 –1.20), however in 2018 none of these pairs were located within the survey area. In 2017, at RSPB Minsmere Reserve, the peak count was seven individuals, with three breeding pairs confirmed (Ref. 1.21). In 2018, breeding was confirmed at 13 sites across the county, with four pairs reported at RSPB Minsmere Reserve (Ref. 1.22). In the UK, Hobby has undergone a large-scale expansion, consolidating their range in the south and expanding into the north, east and west, and undergoing a 16% population increase between 1995-2010 (Ref 1.68).

Assessment

1.3.150 Given that hobby is afforded protection under Schedule 1 of the Wildlife and Countryside Act (Ref. 1.14); and have been recorded breeding, foraging or otherwise utilising the site during the breeding period; but that hobby is relatively widespread across the UK; then the population of hobby located within and adjacent to the site would be:

- an IEF at the county level under the CIEEM guidelines (Ref. 1.4); and
- of medium importance under the EIA specific methodology.

xxviii. Feature: Peregrine – Schedule 1 species (breeding)

Description

1.3.151 Peregrine was recorded during the Arcadis marsh harrier surveys. This species was regularly observed foraging over the Minsmere South Levels and on three occasions within Sizewell Marshes SSSI (in 2015). Anecdotal information confirmed that peregrine was recorded nesting on the Sizewell A and B power station reactor buildings. This indicated that peregrine was present during the breeding seasons of 2014 to 2017, during which construction and demolition activity were undertaken at Sizewell A and B power stations. Peregrine were recorded during the 2018 surveys although breeding was not confirmed.

1.3.152 The current UK population estimate for peregrine is 1,500 pairs (Ref. 1.60). Within Suffolk, peregrine is described as uncommon, but breeding peregrine have been present within the county since 2008 (Ref. 1.16 –1.20). Breeding pairs were confirmed from six locations within the county in 2017 (Ref. 1.21). A total of 327 sightings were reported in 2018, with up to two individuals recorded each month at RSPB Minsmere, with the exception of July. Records were also reported at Orfordness and Hollesley Marshes. Pairs were noted to be holding territories in Orfordness and Sizewell, however no breeding evidence was found (Ref. 1.22).

Assessment

1.3.153 Given that peregrine is afforded protection under Schedule 1 of the Wildlife and Countryside Act (Ref. 1.14); and have been recorded breeding, foraging or otherwise utilising the site throughout the year; but that this species is relatively widespread across the UK; then the populations of peregrine located within and adjacent to the site would be:

- an IEF at the county level under the CIEEM guidelines (Ref. 1.4); and
- of medium importance under the EIA specific methodology.

xxix. Feature: Cetti's warbler – Schedule 1 species (breeding)

Description

- 1.3.154 Cetti's warbler was confirmed breeding around the edges of the arable fields north of Kenton Woods, and within Sizewell Marshes SSSI and Minsmere South Levels. During surveys between 2007-2012 a peak count of 13 territories were recorded within the site in 2007. Surveys undertaken in 2012 reported six breeding territories in the north of the site, whilst surveys undertaken in 2018 recorded one breeding territory (Ref. 1.62). The current UK population estimate of Cetti's warbler is 2,000 males (Ref. 1.60). Within Suffolk, 138 singing males were reported (Ref. 1.16–1.20). The 13 territories recorded within the survey area represents approximately 9% of the known Suffolk breeding population. During 2018, harsh weather in February decimated the population, particularly on the coast. From 11 sites, there was a decline in singing males in 10 of the sites and only an increase of 11% at Snape Warren. At Sizewell, there was an estimated decline of 95% with only one singing male recorded and at Minsmere there was a decline of 96% with only four males singing (Ref. 1.22).

Assessment

- 1.3.155 Given that Cetti's warbler is afforded protection under Schedule 1 of the Wildlife and Countryside Act (Ref. 1.14); and has been recorded breeding, foraging or otherwise utilising the site during the breeding/Winter/passage period; but that this species is predominantly restricted to the southern and eastern counties in England and the south coast of Wales; then the populations of Cetti's warbler located within and adjacent to the site would be:
- an IEF at the county level under the CIEEM guidelines (Ref. 1.4); and
 - of medium importance under the EIA specific methodology.

xxx. Feature: Black redstart – Schedule 1 species (breeding)

Description

- 1.3.156 Black redstart is associated with the existing Sizewell power station complex and Sizewell beach, adjacent to the complex, and have therefore only been recorded within these areas. Sightings of black redstart within the site occurred during the breeding bird surveys, and there was an occasional sighting during the Winter bird surveys.

NOT PROTECTIVELY MARKED

1.3.157 Wood Group recorded black redstart in 2007, 2010 and 2011 within the existing Sizewell power station complex and Sizewell beach. A peak count of three breeding pairs were recorded. Arcadis recorded black redstart during the 2014 breeding bird survey, the 2014–2015 wintering bird survey and the specific black redstart survey undertaken in 2015. In the latter, breeding was confirmed, with the presence of a fledged juvenile reported in June 2015, and the possibility of two other pairs breeding within the vicinity of the existing Sizewell power station complex and Sizewell beach.

1.3.158 The presence of black redstart during the breeding season, and the availability of suitable breeding habitat, would indicate that up to three black redstart territories were present within the site in 2015. With a UK breeding population size of between 19 to 44 pairs, this breeding population could represent 7–15% of the known UK's breeding population. In 2008 and 2012, the existing Sizewell power station complex had the only confirmed successful breeders in the county (Ref. 1.16 – Ref. 1.20). In 2018, up to two birds were recorded at Sizewell in January and February and a pair bred successfully at Sizewell Power Station in 2018, with another pair recorded (Ref. 1.22).

Assessment

1.3.159 Given that black redstart is afforded protection under Schedule 1 of the Wildlife and Countryside Act (Ref. 1.14); has been recorded breeding, foraging or otherwise utilising the site during the breeding/Winter/passage period; and is relatively limited in its range across the UK; then the population of black redstart located within the and adjacent to the site would be:

- an IEF at the county level under the CIEEM guidelines (Ref. 1.4); and
- of medium importance under the EIA specific methodology.

xxxi. Feature: Birds of nature conservation importance within the site

Description

1.3.160 This assemblage comprises the wintering and breeding bird assemblage within the site (excluding Sizewell Marshes SSSI, discussed above). This consists of other non-breeding, or wintering Schedule 1 species, red and amber listed BoCC (Ref. 1.11), Section 41 of the NERC Act (Ref. 1.13) and/or Suffolk BAP priority species (Ref. 1.12) (not included in the above assemblages) considered to be of some nature conservation importance.

NOT PROTECTIVELY MARKED

1.3.161 Collectively, these constitute a valuable wintering/passage/breeding bird assemblage. However, none are considered as IEFs in their own right owing to the limited importance of the site for the local populations, hence they are considered collectively as an assemblage. Individual species accounts based upon desk-study, secondary and primary data sources, are presented in **Annex 14A7.6** of this volume.

Wintering/passage

1.3.162 Wintering/passage red listed BoCC (Ref. 1.11) and/or Section 41 species of the NERC Act (Ref. 1.13) were recorded across the survey area. The highest diversity and number of birds were observed in the northern part of EDF Energy Estate and in Sizewell Marshes SSSI (discussed in above). These areas comprised suitable habitat for overwintering species.

1.3.163 Few wintering species were recorded in the coastal habitat (only song thrush, house sparrow and linnet) or the main platform, north of the EDF Power Station complex (only linnet).

1.3.164 In total, ten red listed BoCC (Ref. 1.11) and/or NERC Act Section 41 species (Ref. 1.13) were recorded within the site during the Winter period. All ten of these species have been recorded in areas within the wider landscape such as Theberton, Eastbridge, Thorpeness, Leiston Common and Aldringham Common. Further details are provided in **Annex 14A7.6** of this volume. Summary data for these species is shown in **Table 1.11**.

Table 1.11: Red listed BoCC and/or NERC Act species recorded during the Winter/passage period.

Species	Arcadis Surveys (Peak Count).	Wood Surveys (Peak Count).	Group	NGL (Peak Count) Brackets Indicates Year.
Marsh tit.	6	Present		9 (2018).
Skylark	16	Present		98 (2004–05).
Starling	0	0		150 (2011 and 2016).
Song thrush.	2	Present		9 (2016).
Whinchat	0	Present only.	passage	Present (2011).
House sparrow.	3	Present		50 (2013).
Tree sparrow.	0	Not recorded.		Present (2008).
Tree pipit.	0	Present only.	passage	1 (2008).
Linnet	19	73		250 (2011).

NOT PROTECTIVELY MARKED

Species	Arcadis Surveys (Peak Count).	Wood Group Surveys (Peak Count).	NGL (Peak Count) Brackets Indicates Year.
Lesser redpoll.	51	Not recorded.	0
Yellowhammer	5	Present	22 (2013).

1.3.165 In addition to the red listed BoCC (Ref. 1.11) and/or NERC Act Section 41 species (Ref. 1.13), a total of 8 amber list BoCC (Ref. 1.11) species have been recorded within the site during the Winter period. Summary data is provided in **Table 1.12**.

Table 1.12: Amber listed BoCC species recorded during the Winter/passage period.

Species	Arcadis Surveys (Peak Count).	Wood Group Surveys (Peak Count).	NGL (Peak Count) Brackets Indicates Year.
Short-eared owl (<i>Asio flammeus</i>).	0	0	1 (2011).
Stock dove (<i>Columba oenas</i>).	3	Not recorded.	25 (2004–05).
Kestrel (<i>Falco tinnunculus</i>).	1	Present	2 (2013).
Dunnock (<i>Prunella modularis</i>).	10	Present	14 (2014).
Mistle thrush (<i>Turdus viscivorus</i>).	1	Not recorded.	2 (2007–08).
Meadow pipit (<i>Anthus pratensis</i>).	9	Present	130 (2004–05).
Bullfinch (<i>Pyrrhula pyrrhula</i>).	3	Present	3 (2016).
Reed bunting.	0	Not recorded.	24 (2016).

NOT PROTECTIVELY MARKED

1.3.166 Amber listed BoCC (Ref. 1.11) were observed across the survey area, with the exception of the arable fields to the south which were not surveyed during the Winter, and Minsmere South Levels which is predominantly wetland habitat so only the edge could be effectively surveyed. Similarly to the red listed BoCC (Ref. 1.11), the highest diversity and number of species was recorded within the northern arable fields, which provided the most suitable Winter foraging habitat. Within the wider landscape, all eight of these species have also been recorded in areas such as Theberton, Eastbridge, Thorpeness, Leiston Common and Aldringham Common further details are provided in **Annex 14A7.6** of this volume.

1.3.167 In addition to the species described above, a number of Green list species were recorded across the site during the wintering season. These comprised, sparrowhawk (*Accipiter nisus*), buzzard, wood pigeon (*Columba palumbus*), feral pigeon (*Columba livia domestica*), green woodpecker (*Picus viridis*), great spotted woodpecker (*Dendrocopos major*), magpie (*Pica pica*), jay (*Garrulus glandarius*), jackdaw (*Corvus monedula*), rook (*Corvus frugilegus*), carrion crow (*Corvus corone*), goldcrest (*Regulus regulus*), blue tit (*Cyanistes caeruleus*), great tit (*Parus major*), coal tit (*Periparus ater*), long tailed tit (*Aegithalos caudatus*), chiffchaff (*Phylloscopus collybita*), treecreeper (*Certhia familiaris*) wren (*Troglodytes troglodytes*), blackbird (*Turdus merula*), robin (*Erithacus rubecula*), stonechat (*Saxicola rubicola*), wheatear, pied wagtail (*Motacilla alba*), rock pipit (*Anthus petrosus*), chaffinch (*Fringilla coelebs*), greenfinch (*Carduelis chloris*), goldfinch (*Carduelis carduelis*) and siskin (*Carduelis spinus*). In addition, the following non-listed species were recorded; red-legged partridge (*Alectoris rufa*) and pheasant (*Phasianus colchicus*).

Breeding

1.3.168 The breeding bird assemblage within the survey area also consists of a number of other species considered to be of nature conservation importance (such as red and amber listed BoCC (Ref. 1.11), NERC Act Section 41 species (Ref. 1.13) and/or Suffolk BAP priority species (Ref. 1.12).

1.3.169 Red listed BoCC (Ref. 1.11) and/or NERC Act Section 41 species (Ref. 1.13) was observed across the survey area within the site. The arable fields to the north of Kenton Wood comprised the most diverse breeding bird assemblage, with all red listed BoCC (Ref. 1.11) and/or NERC Act Section 41 species (Ref. 1.13) listed in **Table 1.14** being recorded here (with the exception of turtle dove which remained absent following surveys undertaken in 2018 (Ref. 1.70)). This area comprises arable habitat interspersed with hedgerows, woodland and farm buildings, particularly suited to the range of red listed BoCC (Ref. 1.11) and/or NERC Act Section 41 species (Ref. 1.13) recorded.

NOT PROTECTIVELY MARKED

1.3.170 Within the wider landscape, 15 of the red listed BoCC (Ref. 1.11) and/or NERC Act Section 41 listed species (Ref. 1.13) have also been recorded in areas such as Theberton, Eastbridge, Thorpeness, Leiston Common and Aldringham Common further details are provided in **Annex 14A7.6** of this volume.

1.3.171 A summary of observations of breeding red listed BoCC (Ref. 1.11) and/or NERC Act Section 41 listed species (Ref. 1.13) (not included in any of the other feature assemblages) is provided in **Table 1.13**.

Table 1.13: Red listed BoCC and/or NERC Act Section 41 species recorded during the breeding season.

Species	Arcadis Surveys Territories (Peak Count).	Wood Surveys Pairs (Peak Count).	Group Breeding (Peak)	NGL (Peak Count and Year Peak was Recorded).
Grey partridge	1	0		2 (2004–2005).
Turtle dove	3	1		2 (2014).
Cuckoo	2	2		2 (2014, 2015 and 2018).
Willow tit	1	0		0
Marsh tit	4	5		9 (2013).
Skylark	7	18		27 (2018).
Wood warbler	0	1		0
Starling	10	3		0
Ring ouzel	0	Present passage breeding).	(on not)	0
Song thrush	3	12		13 (2012).
Spotted flycatcher	0	1		1 (2007).
House sparrow	4	16		15 (2008–2009).
Yellow wagtail	0	0		1 (2005).
Linnet	10	8		15 (2015).
Yellowhammer	4	14		7 (2006–07).

1.3.172 In addition, a total of 14 other amber listed BoCC (Ref. 1.11) have also been recorded within the site during the breeding season. A summary of observations of breeding amber list species is provided in **Table 1.14**.

Table 1.14: Amber listed BoCC recorded during the breeding season.

Species	Arcadis Surveys (Peak Count).	Wood Surveys (Peak Count of Territories).	Group of Territories)	NGL (Peak Count of Territories) Brackets Indicates Year.
Stock dove.	26	9		12 (2017).
Tawny owl (<i>Strix aluco</i>).	0	2		1(2016).
Swift (<i>Apus apus</i>).	36	Present		0
Green woodpecker.	2	10		8 (2011).
Kestrel	1	1		2 (2018).
Swallow (<i>Hirundo rustica</i>).	4	3		2 (2011).
House martin (<i>Delichon urbicum</i>).	Present	Present		0
Willow warbler (<i>Phylloscopus trochilus</i>).	3	16		7 (2013).
Whitethroat (<i>Sylvia communis</i>).	9	14		39 (2005–06).
Mistle thrush.	3	3		5 (2004–05).
Nightingale (<i>Luscinia megarhynchos</i>).	0	5		3 (2012).
Meadow pipit.	1	1		3 (2017).
Bullfinch	0	10		2 (2018).

1.3.173 Amber listed BoCC (Ref. 1.11) present during the breeding season were observed across survey area. All amber listed BoCC (Ref. 1.11) were again observed within the arable fields to the north of Kenton Wood, with the exception of reed bunting (which was restricted to Sizewell Marshes SSSI, see above). Sand martin (*Riparia riparia*) was observed flying over the survey area although given the lack of suitable habitat, breeding within the site is considered unlikely.

1.3.174 Within the wider landscape, all 14 of the amber listed BoCC (Ref. 1.11) species present during the breeding season have been recorded in areas such as Theberton, Eastbridge, Thorpeness, Leiston Common further details are presented in **Annex 14A7.6** of this volume.

1.3.175 In addition to the species described above, a number of Green listed BoCC (Ref. 1.11) were recorded across the site during the breeding season. It is considered that the majority of these species are likely to breed within the survey area. These species are; sparrowhawk, buzzard, wood pigeon, feral pigeon, collared dove (*Streptopelia decaocto*), little owl (*Athene noctua*), great spotted woodpecker, magpie, jay, jackdaw, rook, carrion crow, goldcrest, blue tit, great tit, coal tit, long tailed tit, chiffchaff, blackcap (*Sylvia atricapilla*), garden warbler (*Sylvia borin*), lesser whitethroat (*Sylvia curruca*), sedge warbler (*Acrocephalus schoenobaenus*), reed warbler (*Acrocephalus scirpaceus*), tree creeper, wren, blackbird, robin, stonechat, pied wagtail, chaffinch, greenfinch, goldfinch and siskin. In addition, the following non-listed species were recorded; red-legged partridge and pheasant.

Non-breeding and wintering Schedule 1 species

1.3.176 A number of other Schedule 1 species of the Wildlife and Countryside Act (Ref. 1.14) species were also observed within the survey area, but were either recorded only during the Winter/passage season or were considered not to be breeding within the survey area; these are shown in **Table 1.15**.

Table 1.15: Schedule 1 of the Wildlife and Countryside Act species recorded during the Winter.

Species	Arcadis Surveys (Peak Count).	Wood Surveys (Peak Count).	Group	NGL (Peak Count).
Red kite (<i>Milvus milvus</i>).	1	0		3 (2011).
Goshawk	0	1		1 (2011).
Firecrest (<i>Regulus ignicapilla</i>).	0	2		2 (2008).
Crossbill (<i>Loxia curvirostra</i>).	5	100		30 (2006).
Fieldfare (<i>Turdus pilaris</i>).	2	0		44 (2007/08).
Redwing (<i>Turdus iliacus</i>).	8	0		21 (2018).
Brambling (<i>Fringilla montifringilla</i>).	1	0		24 (2014).

NOT PROTECTIVELY MARKED

- 1.3.177 Although suitable breeding habitat for goshawk, firecrest and crossbill is present within Kenton Wood and Goose Hill (where the majority of the sightings of these species were recorded), no breeding by any of these species was incidentally recorded. Bearded tit records are discussed in 1.3.73xii.
- 1.3.178 The sightings of fieldfare, redwing and brambling were during the Winter/passage period and were associated with the arable habitat north of Kenton Woods. Red kite was only recorded on a small number of occasions, again flying over the arable habitat north of Kenton Woods. All of the observations of red kite were of birds commuting across the site.
- 1.3.179 In addition, the following incidental sightings of Schedule 1 species were recorded, as described in **Annex 14A7.6** of this volume.
- osprey (*Pandion haliaetus*) observed commuting over the survey area on one occasion during an arable marsh harrier survey; and
 - snow bunting (*Plectrophenax nivalis*) (peak count 13 birds) recorded within the coastal habitats adjacent to the beach, in December 2011.

Assessment

- 1.3.180 Given that the assemblage of breeding and non-breeding bird species within the site includes wintering Schedule 1 of the Wildlife and Countryside Act (Ref. 1.14) species, as well as red list, amber listed BoCC (Ref. 1.11) and/or NERC Act Section 41 species (Ref. 1.13); but that these species are still relatively widespread across the UK; then the overall assemblage of breeding and non-breeding species located within and adjacent to the site would be:
- an IEF at the county level under the CIEEM guidelines (Ref. 1.4); and
 - of medium importance using the EIA-specific methodology.

c) Summary of ecological features

- 1.3.181 Following a review of the known baseline within the Zol, **Table 1.16** lists the ornithological features/receptors and identifies which will be carried forward into the detailed assessment. Those carried forward are IEFs of sufficient conservation value that will be sufficiently affected by the site to require material consideration within the planning determination.

Table 1.16: Ornithological features taken forward for detailed assessment.

Feature/Receptor.	Importance (CIEEM/EIA Methodology).	Justification	Scope In/Out.
Bittern (breeding and wintering).	International/High	<p>Bittern is a qualifying feature of the Minsmere to Walberswick Heaths and Marshes SPA (breeding and wintering) (Ref. 1.46)/Ramsar site (breeding) (Ref. 1.8 and Ref. 1.10). It is also a Schedule 1 species (Ref. 1.14), amber listed BoCC (Ref. 1.11), NERC Act Section 41 species (Ref. 1.13), a priority species within Suffolk BAP (Ref. 1.12), and a qualifying feature of Minsmere to Walberswick Heaths and Marshes SSSI (Ref. 1.9), and Leiston to Aldburgh SSSI (Ref. 1.51).</p> <p>The targeted surveys confirmed that whilst bittern do not breed within the site or Minsmere South Levels, they do forage within Minsmere South Levels and have also been occasionally observed using Sizewell Marshes SSSI during the Winter, and have therefore been scoped into the detailed assessment.</p>	Scoped in.
Avocet (breeding and wintering).	International/High	<p>Avocet is a qualifying feature of the Minsmere to Walberswick Heaths and Marshes SPA (breeding and wintering) (Ref. 1.47)/Ramsar site (breeding) (Ref. 1.8 and 1.10) and Alde-Ore Estuary SPA (breeding and wintering) (Ref. 1.5)/Ramsar site (wintering) (Ref. 1.7). It is also a Schedule 1 species (Ref. 1.14), amber listed BoCC (Ref. 1.11), NERC Act Section 41 species (Ref. 1.13), a Priority species within Suffolk BAP (Ref. 1.12), and a qualifying feature of the Alde-Ore Estuary SSSI (Ref. 1.53).</p> <p>Avocet was regularly recorded commuting along the coastline. The birds were observed during the breeding and wintering season. Due to its proximity to the site, avocet has been scoped into the detailed assessment.</p>	Scoped in.
Redshank (breeding and wintering).	International/High	<p>Redshank (an amber listed BoCC; Ref. 1.11) is a qualifying feature of the Alde-Ore Estuary SPA (wintering) (Ref. 1.5)/Ramsar site (wintering) (Ref. 1.7) and is a qualifying feature of Minsmere to Walberswick Heaths and Marshes SSSI (Ref. 1.9), Alde-Ore Estuary SSSI (Ref. 1.53) and Sizewell Marshes SSSI (Ref. 1.51).</p> <p>Redshank was regularly recorded commuting along the coastline during both the breeding and wintering season. This species was also recorded within Minsmere South Levels during the breeding season; however, no confirmed breeding was identified. Due to its proximity to the site, redshank has been scoped into the detailed assessment.</p>	Scoped in.

NOT PROTECTIVELY MARKED

Feature/Receptor.	Importance (CIEEM/EIA Methodology).	Justification	Scope In/Out.
Shoveler (breeding and wintering).	International/High	<p>Shoveler (an amber listed BoCC; Ref. 1.11) is a qualifying feature of the Minsmere to Walberswick Heaths and Marshes SPA (breeding and wintering) (Ref. 1.47)/Ramsar site (breeding) (Ref. 1.8) and a qualifying feature of Minsmere to Walberswick Heaths and Marshes SSSI (Ref. 1.9), Alde-Ore Estuary SSSI (Ref. 1.53) and Sizewell Marshes SSSI (Ref. 1.51).</p> <p>Shoveler was confirmed as present within Sizewell Marshes SSSI and Minsmere South Levels during the breeding season, however, no confirmed breeding sites were identified (last confirmed breeding record was in 2007). Due to its proximity to the site, shoveler has been scoped into the detailed assessment.</p>	Scoped in.
Gadwall (breeding and wintering).	International/High	<p>Gadwall (an amber listed BoCC; (Ref. 1.11)) is a qualifying feature of the Minsmere to Walberswick Heaths and Marshes SPA (breeding and wintering) (Ref. 1.47)/Ramsar site (breeding) (Ref. 1.8) and a qualifying feature of Minsmere to Walberswick Heaths and Marshes SSSI (Ref. 1.9), Leiston- Aldeburgh SSSI (Ref. 1.52) and Sizewell Marshes SSSI (Ref. 1.51).</p> <p>Gadwall was confirmed as present within Sizewell Marshes SSSI and Minsmere South Levels during the Winter period. Breeding season observations were of single or pairs of birds, and breeding gadwall have previously been recorded within the survey area by NGL. Gadwall was also regularly recorded commuting along the coastline during the seabird surveys during both the breeding and wintering seasons. Given its presence adjacent to the site, gadwall has been scoped into the detailed assessment.</p>	Scoped in.
Teal (breeding and wintering).	International/High	<p>Teal (an amber listed BoCC; Ref. 1.11) is a qualifying feature of the Minsmere to Walberswick Heaths and Marshes SPA (breeding) (Ref. 1.47)/Ramsar site (breeding) (Ref. 1.8) and a qualifying feature of Alde-Ore Estuary SSSI (Ref. 1.52), Leiston- Aldeburgh SSSI (Ref. 1.52) and Sizewell Marshes SSSI (Ref. 1.51).</p> <p>Teal was regularly observed commuting along the coastline, with large numbers recorded during the Winter. Observations of teal within the site during the breeding season were infrequent and rare but have been scoped into the detailed assessment.</p>	Scoped in.

NOT PROTECTIVELY MARKED

Feature/Receptor.	Importance (CIEEM/EIA Methodology).	Justification	Scope In/Out.
White-fronted goose (wintering).	International/High	<p>White-fronted goose (a red listed BoCC (Ref. 1.11) and NERC Act Section 41 species (Ref. 1.13)) is a qualifying feature of the Minsmere to Walberswick Heaths and Marshes SPA (wintering) (Ref. 1.47) and a qualifying feature of Leiston- Aldeburgh SSSI (Ref. 1.52).</p> <p>White-fronted goose was occasionally observed during the Winter, with all records within the site associated with the arable fields at the northern end of the EDF Energy Estate. This species has therefore been scoped into the detailed assessment.</p>	Scoped in.
Marsh harrier (breeding).	International/High	<p>Marsh harrier (a Schedule 1 species (Ref. 1.14) and amber listed BoCC (Ref. 1.11)) is a qualifying feature of the Minsmere to Walberswick Heaths and Marshes SPA (breeding) (Ref. 1.47)/Ramsar site (breeding) (Ref. 1.8) and Alde-Ore Estuary SPA (breeding) (Ref. 1.5).</p> <p>The results of the targeted surveys confirmed that whilst marsh harrier do not breed within the site, they do use Minsmere South Levels, Sizewell Marshes SSSI and the arable fields at the northern end of the EDF Energy Estate as a foraging resource during the breeding season. This species has therefore been scoped into the detailed assessment during the breeding season.</p>	Scoped in.
Marsh harrier (wintering).	National/High.	<p>Marsh harrier is a not a qualifying feature of any European designated sites within 20km of the site during the Winter period. However, the results of targeted surveys confirmed that marsh harrier do use Minsmere South Levels, Sizewell Marshes SSSI and the arable fields at the northern end of the EDF Energy Estate as a foraging resource during the Winter. This species has therefore been scoped into the detailed assessment during the Winter.</p>	Scoped in.
Hen harrier (wintering).	International/High	<p>Hen harrier is a qualifying feature of the Minsmere to Walberswick Heaths and Marshes SPA (wintering) (Ref. 1.47). It is also a Schedule 1 species (Ref. 1.14), red listed BoCC (Ref. 1.11), and NERC Act Section 41 species (Ref. 1.13). The desk-study also identified that Hollesley Heaths SSSI (Ref. 1.63) supports a Winter hen harrier roost.</p> <p>Hen harrier was recorded occasionally in the Winter period, but no Winter roosting sites were identified. Due to the presence of the species in the vicinity of the site, hen harrier has been scoped into the detailed assessment.</p>	Scoped in.

NOT PROTECTIVELY MARKED

Feature/Receptor.	Importance (CIEEM/EIA Methodology).	Justification	Scope In/Out.
Nightjar (breeding).	International/High	<p>Nightjar is a qualifying feature of the Minsmere to Walberswick Heaths and Marshes SPA (breeding) (Ref. 1.47) and Sandlings SPA (Ref. 1.49)/SSSI (breeding) (Ref. 1.54) and a qualifying feature of Minsmere to Walberswick Heaths and Marshes SSSI (Ref. 1.9) and Leiston- Aldeburgh SSSI (Ref. 1.52). It is also an amber listed BoCC (Ref. 1.11), NERC Act Section 41 species (Ref. 1.13), and a Priority species within Suffolk BAP (Ref. 1.12).</p> <p>No nightjars were recorded within the site during the targeted surveys; however, they have been recorded within RSPB Minsmere Reserve, Aldringham Common, RSPB North Warren Reserve, Dunwich Heath and Dingle Marshes. As these areas could be subject to increased recreational pressure as a result of the Sizewell C Project, this species has been scoped into the detailed assessment.</p>	Scoped in.
Woodlark (breeding and wintering).	International/High	<p>Woodlark is a qualifying feature of the Minsmere to Walberswick Heaths and Marshes SPA (breeding) (Ref. 1.47) and Sandlings SPA (Ref. 1.49)/SSSI (breeding) (Ref. 1.54) and a qualifying feature of Minsmere to Walberswick Heaths and Marshes SSSI (Ref. 1.9). It is also a NERC Act Section 41 species (Ref. 1.13) and a Priority Species within Suffolk BAP (Ref. 1.12).</p> <p>Woodlark was observed during the Winter and breeding season; however, no breeding was confirmed. Larger, more robust populations are known to be present at Dunwich Forest and the Sandlings SPA/SSSI, to the north and the south of the site, respectively. As these areas could be subject to increased recreational pressure as a result of the Sizewell C Project, this species has been scoped into the detailed assessment.</p>	Scoped in.
Bearded tit (breeding and wintering).	International/High	<p>Bearded tit (a Schedule 1 species (Ref. 1.14)) is a qualifying feature of the Minsmere to Walberswick Heaths and Marshes Ramsar site (breeding) (Ref. 1.8).</p> <p>Bearded tit was observed within the reedbed/wet grassland habitat of Minsmere South Levels and Sizewell Marshes SSSI throughout the year; however, this species was not confirmed to be breeding. Due to its proximity to the site, bearded tit has been scoped into the detailed assessment.</p>	Scoped in.

NOT PROTECTIVELY MARKED

Feature/Receptor.	Importance (CIEEM/EIA Methodology).	Justification	Scope In/Out.
Red-throated diver (wintering).	International/High	<p>Red-throated diver (a Schedule 1 species (Ref. 1.14)) is a qualifying feature of the Outer Thames Estuary SPA (wintering) (Ref. 1.48).</p> <p>Red-throated diver was present along the entire coastline, including adjacent to the site. However, the greatest numbers were recorded to the north (at Dunwich) and south (Orford Ness) of Sizewell. Given its presence adjacent to the site, red-throated diver has been scoped into the detailed assessment.</p>	Scoped in.
Little tern (breeding).	International/High	<p>Little tern is a qualifying feature of the Minsmere to Walberswick Heaths and Marshes SPA (breeding) (Ref. 1.47), Alde-Ore Estuary SPA (breeding) (Ref. 1.5), Outer Thames Estuary SPA (foraging) (Ref. 1.48), Alde-Ore Estuary SSSI (Ref. 1.53). It is also a Schedule 1 species (Ref. 1.14), an amber listed BoCC (Ref. 1.11) and NERC Act Section 41 species (Ref. 1.13).</p> <p>Little tern was recorded commuting and foraging offshore of the site. The amount of activity varies significantly depending on the location of the nearest breeding colony each year, (this species tends to forage in close proximity to its breeding sites). Little tern colonies have not been very successful within Suffolk in recent years, and the most recent colony within close proximity of the site was at RSPB Minsmere Reserve in 2009, the small number of birds recorded during the surveys carried out by Arcadis/Wood Group reflects this current status. Due to the presence of foraging birds in the vicinity of the site, little tern has been scoped into the detailed assessment.</p>	Scoped in.
Common tern (breeding).	International/High	<p>Common tern (an amber listed BoCC (Ref. 1.11)) is a qualifying feature of the Outer Thames Estuary SPA (breeding) (Ref. 1.48).</p> <p>Common tern was observed foraging or commuting, with the majority of the birds seen foraging adjacent to the power station. The nearest breeding colony in the vicinity of the site is the RSPB Minsmere Reserve. Due to the presence of foraging birds in the vicinity of the site, common tern has been scoped into the detailed assessment.</p>	Scoped in.

NOT PROTECTIVELY MARKED

Feature/Receptor.	Importance (CIEEM/EIA Methodology).	Justification	Scope In/Out.
Sandwich tern (breeding).	International/High	Sandwich tern is (an amber listed BoCC (Ref. 1.11)) is a qualifying feature of the Alde-Ore Estuary SPA (breeding) (Ref. 1.5) and Alde-Ore Estuary SSSI (Ref. 1.53). Sandwich tern was observed foraging or commuting along the coastline. The last known breeding colony in the vicinity of the site was at RSPB Minsmere Reserve in 2009. Due to the presence of foraging birds in the vicinity of the site, sandwich tern has been scoped into the detailed assessment.	Scoped in.
Kittiwake (breeding).	Regional/Medium	Kittiwake is a red listed BoCC (Ref. 1.11) and the Sizewell Rigs CWS (Ref. 1.57) has been designated specifically for this species. The rigs associated with the Sizewell A power station are used by a relatively large colony of kittiwake (approximately 200 nests). This site is one of only two kittiwake colonies between Yorkshire and Kent (the second colony being located on a wall at Ness Point, Lowestoft). The rigs therefore provide an important nesting resource for kittiwake on the east coast. Due to the proximity of the important colony to the site, kittiwake has been scoped into the detailed assessment.	Scoped in.
Lesser black-backed gull (breeding).	International/High	Lesser black-backed gull (an amber BoCC (Ref. 1.11)) is a qualifying feature of the Alde-Ore Estuary SPA (breeding) (Ref. 1.5)/Ramsar site (breeding) (1.7)/SSSI (Ref. 1.53). Lesser black-backed gull was observed flying over the arable fields at the northern end of the EDF Energy Estate, roosting within Minsmere South Levels and commuting, foraging and loafing along the coast. However, no breeding was recorded. Given the presence of foraging birds within and adjacent to the site, this species has been scoped into the detailed assessment.	Scoped in.
Seabird assemblage (breeding) qualifying feature of Alde-Ore Estuary SPA.	International/High	Species listed as forming part of the Alde-Ore Estuary SPA (Ref. 1.5) seabird (breeding) assemblage qualification include herring gull, black-headed gull, lesser black-backed gull, little tern and Sandwich tern. Collectively these species constitute a valuable breeding gull and seabird assemblage. Given the presence of species which make up the assemblage within and around the site, this assemblage has been scoped into the detailed assessment.	Scoped in.

NOT PROTECTIVELY MARKED

Feature/Receptor.	Importance (CIEEM/EIA Methodology).	Justification	Scope In/Out.
Waterbird assemblage qualifying feature of Alde-Ore Estuary Ramsar site (breeding and wintering) /SPA (wintering) and SSSI.	International/High	Species listed as forming part of the Alde-Ore Estuary SPA (wintering) (Ref. 1.5)/Ramsar site (breeding and wintering) (Ref. 1.7) assemblage qualification include black-tailed godwit, dunlin, lapwing, shoveler, teal, wigeon, shelduck, white-fronted goose, avocet and redshank. Collectively these species constitute a valuable breeding and wintering waterbird assemblage. Given the presence of species which make up the assemblage within and around the site, this assemblage has been scoped into the detailed assessment.	Scoped in.
Waterbird assemblage qualifying feature of Minsmere to Walberswick Heaths and Marshes Ramsar site (breeding)/assemblage associated with Minsmere to Walberswick Heaths and Marshes SSSI (breeding/wintering).	International/High	Species listed as forming part of the Minsmere to Walberswick Heaths and Marshes Ramsar site (Ref. 1.8)/Minsmere to Walberswick Heaths and Marshes SSSI (Ref. 1.9) qualification include bittern, gadwall, teal, shoveler, marsh harrier, avocet and bearded tit. Collectively these species constitute a valuable breeding and wintering waterbird assemblage. Given the presence of species which make up the assemblage within and around the site, this assemblage has been scoped into the detailed assessment.	Scoped in.

NOT PROTECTIVELY MARKED

Feature/Receptor.	Importance (CIEEM/EIA Methodology).	Justification	Scope In/Out.
Bird assemblage associated with Sandlings Forest SSSI and other component SSSI of the Sandlings SPA.	International/High.	Species listed as forming part of the Sandlings SPA and Sandlings Forest SSSI include nightjar and woodlark. Collectively these species constitute a valuable breeding and wintering assemblage. Given the potential for recreational pressure on the bird assemblage present within the SPA/ SSSI, this assemblage has been scoped into the detailed assessment.	Scoped in.
Bird assemblage associated with Sizewell Marshes SSSI.	National/High.	This feature comprises the wintering and breeding bird assemblage which forms the qualifying features of Sizewell Marshes SSSI (Ref. 1.51). A small section of the north-east corner of the SSSI lies within the site. Collectively the species associated with Sizewell Marshes SSSI constitute a valuable wintering/passage/breeding bird assemblage and have therefore been scoped into the detailed assessment.	Scoped in.
Stone-curlew (Schedule 1 species).	Regional/Medium	Stone-curlew is not a qualifying feature of any of the designated site within 20km of the site. However, they are confined to the Sandlings and Breckland areas in East Anglia, and are a breeding species within the RSPB Minsmere Reserve, with a peak count of 15 pairs. Stone-curlew was recorded incidentally during surveys, with a single observation on Minsmere South Levels in April 2015. As RSPB Minsmere Reserve could be subject to increased recreational pressure as a result of the Sizewell C Project, stone-curlew has been scoped into the detailed assessment.	Scoped in.
Barn owl (Schedule 1 species).	Local/Low.	Barn owl was confirmed to be breeding at Lower and Upper Abbey (two pairs), and one breeding pair within Sizewell Marshes SSSI (Ref. 1.51). Barn owl have also been regularly recorded foraging across these areas throughout the year. Although barn owl would not constitute an IEF based on its value and importance, however, given its legal protection, potential impact on the barn owl population would be considered in the detailed assessment, and has therefore been scoped in.	Scoped in.

NOT PROTECTIVELY MARKED

Feature/Receptor.	Importance (CIEEM/EIA Methodology).	Justification	Scope In/Out.
Kingfisher (Schedule 1 species).	County/Medium.	Kingfisher was confirmed to be breeding within the site (at least one pair). This species has therefore been scoped into the detailed assessment.	Scoped in.
Hobby (Schedule 1 species).	County/Medium.	Hobby was confirmed to be breeding within the site (up to two pairs). This species has therefore been scoped into the detailed assessment.	Scoped in.
Peregrine (Schedule 1 species).	County/Medium.	Peregrine are known to breed on the existing Sizewell power station complex (at least one pair). This species has therefore been scoped into the detailed assessment.	Scoped in.
Black redstart (Schedule 1 species).	County/Medium.	Black-redstart was confirmed to be breeding within the site (up to three pairs). This species has therefore been scoped into the detailed assessment.	Scoped in.
Cetti's warbler (Schedule 1 species).	County/Medium.	Cetti's warbler was confirmed to be breeding within the site (up to 13 pairs). This species has therefore been scoped into the detailed assessment.	Scoped in.
Birds of nature conservation importance within the site.	County/Medium.	This assemblage comprises red and amber listed BoCC (Ref. 1.11), NERC Act, Section 41 species (Ref. 1.13) and/or Suffolk BAP priority species (Ref. 1.12), and non-breeding and/or wintering Schedule 1 species (Ref. 1.14) (none are considered as IEFs in their own right owing to their limited importance of the site for the local populations). Collectively these constitute a valuable wintering/passage/breeding bird assemblage and have therefore been scoped into the detailed assessment.	Scoped in.

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SIZEWELL C DEVELOPMENT – MAIN DEVELOPMENT SITE: VOLUME 2, CHAPTER 14, APPENDIX 14A7 – ORNITHOLOGY

Documents included within this Appendix group are as follows:

ANNEX 14A7.1 FIGURES (provided separately)

ANNEX 14A7.2 ORNITHOLOGY METHODOLOGY

ANNEX 14A7.3 ORNITHOLOGY SECONDARY DATA

- Annex 14A7.3 Sizewell First Interim Bird Report February 2008
- Annex 14A7.3 Nightjar Survey Report 2010
- Annex 14A7.3 Black Redstart Survey Report 2011
- Annex 14A7.3 Sizewell Second Interim Bird Report
- Annex 14A7.3 Seabird Report 2011-12
- Annex 14A7.3 Sizewell Bittern Report 2008
- Annex 14A7.3 Breeding Bird Survey Report 2010
- Annex 14A7.3 Marsh Harrier and Bittern Survey Report 2011-12
- Annex 14A7.3 Sizewell Little Tern Report 2010
- Annex 14A7.3 Arable Reversion CBC 2012
- Annex 14A7.3 Sizewell Marsh Harrier Report 2008



ANNEX 14A7.4 HYDER ARCADIS REPORTS (included in Part 2)

- Annex 14A7.4 Red-throated Diver Report 2012-13
- Annex 14A7.4 Red-throated Diver Report 2013-14
- Annex 14A7.4 Little tern Report 2013
- Annex 14A7.4 Wintering bird survey Technical Note 2018-19

ANNEX 14A7.5 SPECIES ACCOUNTS- QUALIFYING SPECIES

ANNEX 14A7.6 SPECIES ACCOUNTS- RED AND AMBER LIST SPECIES



VOLUME 2, CHAPTER 14: APPENDIX 14A7 – ORNITHOLOGY: ANNEX 14A7.2 METHODOLOGY

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Figures

None provided.

1 Methodology

1.1 Purpose of annex

1.1.1 This annex sets out the detailed methodologies used during the bird surveys undertaken between 2007 and 2019 both by Wood Group (formerly Entec and Amec Foster Wheeler) and Arcadis Consulting (UK) Limited (formerly Hyder Consulting, and hereafter referred to as Arcadis). Where full details of the bird survey methodologies have been included within reports already produced for the Sizewell C power station at the main development site (referred to throughout this volume as the “proposed development”), the full methodology has not been repeated here, but a summary has been provided.

1.1.2 Published reports already produced by Wood Group and Arcadis have been included within **Annexes 14A7.3** and **14A7.4**, respectively.

1.1.3 Wood Group carried out bird surveys between 2007 and 2012, whilst Arcadis carried out surveys between 2013 and 2019 for the proposed development site (hereafter referred to as the “site”). **Table 1.1** provides a list of the ornithology surveys carried out by Wood Group. Details of the scope and methodologies of this survey work are presented in **section 1.2**. **Table 1.2** lists the ornithology surveys carried out by Arcadis, and further details of the scope and methodologies are presented in **section 1.13**.

Table 1.1: Wood Group surveys 2007-2012.

Survey	Dates	Reference to full methodology (Annex 14A7.3)
Intertidal and inshore marine bird surveys	April 2007 to August 2008	14A7.3-1 and 14A7.3-2
Seabird surveys	March 2011 to April 2012	14A7.3-3
Little tern colony surveys	Mid-May to early August 2010 and mid-May to early August 2011	14A7.3-7
Bittern, marsh harrier and hen harrier surveys	May to August 2008, April 2011 to March 2012	14A7.3-4 , 14A7.3-6 and 14A7.3-9
Nightjar surveys	2008 and 2010	14A7.3-2 and 14A7.3-10
Breeding bird surveys	April to July 2007, March to June 2010	14A7.3-2 , 14A7.3-5 and 14A7.3-8
Dabbling duck surveys	April to June 2007	14A7.3-2
Hobby surveys	April, May and August	14A7.3-2

Survey	Dates	Reference to full methodology (Annex 14A7.3)
	2007	
Black redstart surveys	April to July 2011	14A7.3-11
Wintering bird surveys	September and November 2007, and January and March 2008	14A7.3-1

Table 1.2: Arcadis Surveys (2013 to 2019).

Survey	Dates	Reference to full methodology (Annex 14A7.4)
Red-throated diver surveys	October 2012 to March 2013, October 2013 to March 2014	14A7.4-1 and 14A7.4-2
Cormorant surveys	November 2014 to March 2015	Methodology provided in section 1.13 to this Annex
Little tern and sandwich tern surveys	Late April to September 2013	14A7.4-3
Waterfowl surveys	November 2014 to March 2015	Methodology provided in section 1.13
Bittern, marsh harrier and hen harrier surveys	May 2014 to September 2014, October 2014 to March 2015, and April 2015 to October 2015	Methodology provided in section 1.14
Marsh harrier arable surveys	April 2015 to September 2015	Methodology provided in section 1.14
Nightjar surveys	May and June 2014, and June 2015	Methodology provided in section 1.15
Barn owl foraging surveys	April to May 2015	Methodology provided in section 1.16
Black redstart foraging surveys	April to June 2015	Methodology provided in section 1.16
Breeding bird surveys (site)	April to June 2014	Methodology provided in section 1.16
Wintering bird surveys	November 2014 to March 2015	Methodology provided in section 1.16
Wintering wetland bird surveys	December 2018 to February 2019	Methodology provided in section 1.12
Marsh harrier surveys Aldhurst Farm	December 2018 to February 2019	Methodology provided in section 1.14

1.2 Wood Group surveys

a) Approach and methodology

1.2.1 A detailed suite of ornithological surveys was carried out by Wood Group between 2007 and 2012, as listed in **Table 1.1**. The detailed methodologies, timings and results of these surveys are presented in the respective Wood Group survey reports, provided within **Annex 14A7.3**.

1.2.2 In the context of the Wood Group surveys, the term ‘survey area’ (in the majority of instances) refers to the EDF Energy estate and land within 1km of the EDF Energy estate boundary, an area covering approximately 9km². A wider survey area was used for some seabird surveys, as discussed below (**section 1.4**). A full description of the Wood Group survey area is presented in the individual reports found in **Annex 14A7.3**. Due to uncertainties at the time of the Wood Group surveys regarding the final layout of the proposed development, the survey area was larger than that used for the more recent Arcadis surveys. However, as well as providing information about the site, the Wood Group surveys provide valuable contextual information regarding the distribution of birds within the wider landscape and over a greater period of time. It should be noted that the site boundary has changed, albeit not substantially, since the Wood Group surveys (see **Appendix 14A1 – Introduction to the Ecological Baseline**).

1.2.3 The following sections provide a summary of the survey methodologies used by Wood Group.

1.3 Intertidal and inshore marine surveys

1.3.1 Intertidal and inshore marine surveys were undertaken between April 2007 and August 2008 (inclusive) from two Vantage Points (VPs) offshore of the site (Ordnance Survey (OS) Grid Reference squares TM4764 (Location 1) and OS Grid Reference TM4763 (Location 2)). The main aims of the surveys were to record the diversity, activity and abundance of seabirds, waterfowl and wading species, and to identify any differences in use of the intertidal and inshore marine waters by these birds within the two areas (refer to **Figure 2.5, Report 14A7.3-2, Annex 14A7.3**). The surveys also allowed investigation as to whether birds commuting parallel to the shore, or over the intertidal area, showed any disturbance reaction, or actual avoidance of the existing Sizewell A and B power stations.

1.3.2 The surveys commenced close to either high or low tide and continued for six hours to identify any changes or patterns in bird distribution, and behaviour across the full tidal cycle. During each hour of survey, the intertidal and inshore area was scanned with binoculars for 45 minutes, and

all species present or commuting through were identified. At the end of each 45-minute session, a 15-minute break was taken.

- 1.3.3 Further details on survey times, dates, location and weather conditions during surveys are detailed in **Report 14A7.3-2, Annex 14A7.3** (April 2007 – July 2007) and within **Report 14A7.3-1, Annex 14A7.3** (August 2007 to March 2008).

1.4 Seabird surveys

- 1.4.1 Seabird surveys were undertaken between March 2011 and April 2012 (inclusive). The aim of these surveys was to identify species present (seabirds and wildfowl) and to identify how birds utilise the Suffolk coast stretching from 500m north of the proposed main platform to Orford Ness approximately 10km south. Priority was given to the collection of data for breeding little tern (*Sternula albifrons*) and wintering red-throated diver (*Gavia stellata*).

- 1.4.2 The surveys were carried out from 12 VP locations (VPs 1 to 12 are shown on **Figure 14A7.3**). VPs were spaced approximately 1km apart from the area closest to the site (found to the north of Sizewell B power station) south to Thorpeness; VPs were approximately 2km apart between Thorpeness and Orford Ness. At each VP location, a 45-minute watch was undertaken, during which flight-lines, activity and number of seabirds and wildfowl were mapped. A complete survey of all 12 VPs was undertaken approximately once a fortnight. The order of the VPs was varied each visit to ensure that VPs were undertaken at different times of day.

- 1.4.3 Further details of the survey methodology, dates, times and weather conditions recorded during the seabird surveys are provided within **Report 14A7.3-3, Annex 14A7.3**.

1.5 Little tern colony and foraging surveys

- 1.5.1 Two types of survey work were undertaken in relation to breeding little terns: colony surveys and foraging surveys. Little tern colony surveys were undertaken in both 2010 and 2011 between May and August (inclusive), the period during which little tern breed. As little tern breeding colonies are not fixed, and vary in location and size each year, the surveys aimed to identify whether or not breeding colonies became established at Minsmere beach, Slaughden beach (Slaughden was added due to the formation of a colony in 2010) and Dingle marshes (refer to **Figure 14A7.4**), and where birds from these colonies foraged.

- 1.5.2 The colony surveys involved watching each colony from a distance of 100m (to avoid disturbance) using a telescope, and recording the directions of incoming and outgoing flights, as well as any foraging activity close to the breeding colony. Details of breeding success, such as the number of fledged young, were also recorded.
- 1.5.3 The aims of the foraging surveys, undertaken in 2010 only, were to establish the direction of flight of little terns when leaving and/or returning to the breeding colony, and to determine whether or not foraging activity was undertaken within close proximity to the breeding colony. Foraging surveys were also undertaken to identify whether terns were foraging close to the inshore waters in the vicinity of the site. The surveyed area extended from approximately 500m north of the site south to Thorpeness (where an area of shallow water extends offshore provides a potentially suitable foraging area). The foraging surveys used the same VPs and a similar methodology as described in **section 1.4**.
- 1.5.4 Further information on the methodology, dates, time and weather conditions during the little tern surveys in 2010 are shown within **Report 14A7.3-7** in **Annex 14A7.3**, and **Report 14A7.3-3** in **Annex 14A7.3** for the 2011 surveys.
- 1.6 **Bittern, marsh harrier and hen harrier surveys**
- 1.6.1 Surveys recording flight activity for bittern (*Botaurus stellaris*) and marsh harrier (*Circus aeruginosus*) were carried out between May and August 2008 (inclusive), and between April 2011 and March 2012 (inclusive). During the Winter period (October 2011 to March 2012), observations of hen harriers (*Circus cyaneus*) were also recorded. The same methodologies were used to detect all three species, as summarised below.
- a) **Bittern**
- 1.6.2 The aim of the surveys in 2008 was to determine whether bittern were flying between the Minsmere to Walberswick Special Protected Area (SPA) and the Sizewell Marshes Site of Special Scientific Interest (SSSI). Survey work involved the use of a series of VPs, as shown in Figure 2.1 within **Report 14A7.3-6, Annex 14A7.3**. On each survey day, two surveyors were stationed at complementary VPs and carried out co-ordinated watches, with all flight lines communicated to the other surveyor using walkie-talkies. All bittern flight lines were mapped, including take-off and landing locations. Wherever possible, these surveys were co-ordinated with the Royal Society for the Protection of Birds (RSPB) surveys, aimed at identifying nesting locations of bittern at the RSPB Minsmere Reserve. This co-ordination enabled any bittern flights towards the southern edge of the Sizewell

Marshes SSSI to be communicated to the surveyors by RSPB staff (using walkie-talkies), further increasing likely detection rates.

- 1.6.3 Between April 2011 and March 2012, VP surveys were undertaken bi-monthly. The same VP locations used for bittern surveys in 2008, were also used in April 2011 to March 2012 (with some minor amendments). In April 2011, a bittern was heard booming within the reedbed just south of the woodland at Grimseys, within Sizewell Marshes SSSI. An additional six hours of survey was, therefore, undertaken from three additional VPs to ascertain if bitterns had established a breeding territory. From November 2011, another three VPs were added, and the duration of each watch decreased, enabling a greater geographical area to be covered. Figure 2.2, within **Report 14A7.3-4, Annex 14A7.3**, shows the location of the VPs used. Further information on the methodology, dates, time and weather conditions during the survey are provided within **Report 14A7.3-4, Annex 14A7.3**.
- 1.6.4 In addition to the VP surveys, walkover surveys for bittern were also undertaken within Sizewell Marshes SSSI. These surveys were carried out twice monthly between April 2011 and March 2012 (inclusive) to flush any bittern located within ditch and reedbed habitat (and therefore not visible using the VP survey methodology). During each visit, the surveyor walked the edges of the ditches and the reedbed and recorded any bittern that were observed. The area covered by the walkover survey is shown on Figure 2.1 within **Report 14A7.3-4, Annex 14A7.3**.
- 1.6.5 Further details on the bittern survey methodology, survey timings and conditions are provided within **Report 14A7.3-6, Annex 14A7.3** for the 2008 surveys, and within **Report 14A7.3-4, Annex 14A7.3** for the April 2011 and March 2012 surveys.
- b) **Marsh harrier**
- 1.6.6 Marsh harrier surveys ran concurrently with bittern surveys. They took place in 2008 (between May and July for 12 days) and between April 2011 and March 2012. The aim of the surveys was to establish whether birds from the Minsmere to Walberswick SPA were also utilising Sizewell Marshes SSSI as a foraging resource, as well as determining the frequency with which birds flew between the Minsmere to Walberswick SPA and Sizewell Marshes SSSI. A similar survey methodology was adopted as for the bittern surveys, although the marsh harrier VP locations were more numerous (refer to Figure 2.2 within **Report 14A7.3-6, Annex 14A7.3**).

1.6.7 Further detailed methodology and survey timings can be found within **Report 14A7.3-9, Annex 14A7.3** for the 2008 surveys, and **Report 14A7.3-4, Annex 14A7.3** for the April 2011 and March 2012 surveys.

c) **Hen harrier**

1.6.8 The hen harrier surveys ran concurrently with the bittern and marsh harrier surveys during the period October 2011 to March 2012 (inclusive). During this time, any wintering hen harriers seen were recorded and the flight lines mapped. The methodology used was the same as that adopted for the bittern and marsh harrier surveys. For more details refer to bittern, above (**section 1.6a**), and **Report 14A7.3-4, Annex 14A7.3**.

1.7 **Nightjar surveys**

1.7.1 Nightjar (*Caprimulgus europaeus*) surveys were undertaken in 2008 and 2010. In 2008, the aim of the surveys was to ascertain whether nightjar forage and/or hold breeding territory in suitable habitat within the site. In 2010, the survey area was extended to locate foraging and territory-holding nightjars within a 500m radius of the site.

1.7.2 In 2008, surveys took place over two nights in July. In 2010, surveys took place twice, once in May and once in June. During each visit, two surveyors worked in tandem, and walked a transect around all tracks (and around all clearings along the transect routes) to locate calling nightjars (male and female) or singing (known as ‘churring’) male nightjars. Surveys followed the guidelines recommended by Gilbert *et al.* (Ref. 1.1). The same transect routes were used in 2008 and 2010.

1.7.3 The survey areas are shown on Figure 2.4 within **Report 14A7.3-2, Annex 14A7.3**, whilst further details on survey methodology can be found within **Report 14A7.3-2** and **Report 14A7.3-9, Annex 14A7.3**.

1.8 **Breeding bird surveys**

1.8.1 Breeding bird surveys were carried out between April and July (inclusive) in 2007, and between March and June (inclusive) in 2010. The aim of these surveys was to determine the breeding bird assemblage present within the survey area. In 2012, it was proposed to take a number of arable fields out of production and sow them with acid grassland; therefore, further breeding bird surveys were carried out in these areas to inform this process. The locations of the breeding bird surveys are shown on Figure 1.1 within **Report 14A7.3-8, Annex 14A7.3**.

- 1.8.2 The breeding bird survey methodology comprised a simplified version of the British Trust for Ornithology (BTO) Common Bird Census (CBC) methodology within Gilbert *et al.* (Ref. 1.1). The survey involved walking transects across the survey area, plotting all visual and audial observations of bird species over a number of repeat visits to identify breeding territories.
- 1.8.3 The area covered by the 2007 surveys is shown on Figure 2.2 within **Report 14A7.3-2, Annex 14A7.3**. For further details on survey methodology, refer to **Report 14A7.3-2 in Annex 14A7.3**.
- 1.8.4 In 2010, the survey area was more restricted, and is shown on Figure 1.1 within **Report 14A7.3-5, Annex 14A7.3**. For further details on survey methodology, refer to **Report 14A7.3-5 in Annex 14A7.3**.
- 1.8.5 The location of the 2012 breeding bird surveys is shown on Figure 1.1 within **Report 14A7.3-8, Annex 14A7.3**. For further details on survey methodology, refer to **Report 14A7.3-8 in Annex 14A7.3**.
- 1.9 **Dabbling duck surveys**
- 1.9.1 Surveys for breeding dabbling ducks (including those species (shoveler (*Anas clypeata*), gadwall (*Anas strepera*) and teal (*Anas crecca*)) listed on the Sizewell Marshes SSSI citation) were carried out between April and June 2007 (inclusive). The aim of these surveys was to determine the breeding assemblage of dabbling ducks within Sizewell Marshes SSSI.
- 1.9.2 The surveys were undertaken in accordance with the guidelines outlined in Gilbert *et al.* (Ref. 1.1). The edges of all ditches and the reedbed within Sizewell Marshes SSSI were walked by two surveyors between dawn and 10am. One survey was carried out each month in April, May and June 2007.
- 1.9.3 The age, sex and activity of all wildfowl was recorded, where possible. Reedbed passerines and other breeding species were also noted, and the results used to inform the breeding bird survey (refer to **section 1.8**). The locations of the dabbling duck surveys are shown on Figure 2.3 within **Report 14A7.3-2, Annex 14A7.3**.
- 1.10 **Hobby surveys**
- 1.10.1 Hobby (*Falco subbuteo*) were thought to nest annually within the mature plantation in Kenton Hills, as early-season territorial behaviour and fledged young have been frequently recorded by Suffolk Wildlife Trust (SWT) in this area.

- 1.10.2 Hobby surveys were therefore carried out in April, May and August 2007. The aim of the surveys was to establish breeding locations, with particular emphasis on Kenton Hills. A range of survey work was undertaken to establish territory locations. An initial territory-mapping survey was conducted in April 2007. The upper branches of trees were scanned to establish the positions of any existing nests that could be used by hobbies. Following this, surveys were undertaken from a series of suitable VPs in May 2007. Any hobby flights observed were mapped and behaviour noted.
- 1.10.3 Surveys were repeated on four occasions in August 2007, with one surveyor concentrating on areas where hobby activity had been observed during the previous three months, and during the initial hobby surveys (i.e. Kenton Hills, Broom Covert and Ash Wood). Local VPs providing good views of these areas were used to map flight lines, and all behavioural activity was noted.
- 1.10.4 For further information on hobby survey methodology refer to **Report 14A7.3-2, Annex 14A7.3**.
- 1.11 **Black redstart surveys**
- 1.11.1 Black redstart (*Phoenicurus ochruros*) have historically bred within the Sizewell A and B power stations. During 2011, black redstart surveys were undertaken between April and July 2011 (inclusive). The aim of the surveys was to identify any nesting black redstart within and adjacent to the Sizewell A and B power stations. The locations of the surveys are shown on Figure 2.1 within **Report 14A7.3-5, Annex 14A7.3-5**.
- 1.11.2 Four visits were made to the Sizewell A and B power stations. Areas of suitable nesting and foraging habitat were surveyed, and any observations of black redstarts were recorded. The sex and approximate age of the individuals was also recorded, together with details of their activity. One visit per month was carried out between April and July 2011 (inclusive).
- 1.11.3 Further details of the survey methodology and timings are presented in **Report 14A7.3-11, Annex 14A7.3**.
- 1.12 **Winter bird surveys**
- 1.12.1 Winter walkover surveys were carried out in September and November 2007, and in January and March 2008. Four survey visits (once a month) were completed, and on most days two surveyors worked in combination. The aim of the surveys was to determine the wintering bird assemblage present within the survey area. During each survey visit, the species and activity of any wintering birds were recorded.

- 1.12.2 The location and extent of the area covered by the Winter bird surveys is shown on Figure 2.2 within **Report 14A7.3-1, Annex 14A7.3**.
- 1.12.3 Transects were walked within the EDF Energy estate. Outside the EDF Energy estate, and where access could not be secured, Public Rights of Way (PRoW), roads and tracks were walked. For a full survey methodology refer to **Report 14A7.3-1, Annex 14A7.3**.
- 1.13 **Arcadis surveys**
- a) **Approach**
- 1.13.1 Arcadis carried out a suite of ornithological surveys between 2012 and 2019. This survey work was designed to update the previous surveys undertaken by Wood Group and to fill any gaps in information due to the evolution of the development proposals. For example, to obtain a greater understanding of the use of specific habitats by qualifying species (such as marsh harrier and bittern), and to add additional contextual information to the seabird information (such as extending the survey area north to Dunwich).
- 1.13.2 Consultation regarding ornithology has been undertaken throughout the survey period. The scope of the ornithological surveys, as well as the survey methodologies used, have been agreed in consultation with Natural England.
- 1.13.3 The survey area for each of the Arcadis ornithology surveys was dependent upon the survey type and the species involved; however, the majority of the surveys were carried out in the habitats within and adjacent to the site. The site boundary is shown on **Figure 14A7.1, Annex 14A7.1**. The survey area was extended from Dunwich in the north to Orford Ness in the south for the red-throated diver, tern and cormorant (*Phalacrocorax carbo*) surveys to record any bird activity within the area in which shipping vessel movements (if required) during the construction phase of the Sizewell C Project could occur. However, for the remaining surveys, the survey area was defined as “the site and its immediate surrounds”.
- 1.13.4 The VP locations and viewsheds (i.e. the area visible to the surveyor from the VP location), as well as the transect routes used for the various Arcadis surveys, are presented on **Figures 14A7.3 to 14A7.12**.
- b) **Red-throated diver surveys**
- 1.13.5 Red-throated diver surveys were undertaken during the Winters of 2012/13 and 2013/14. The surveys comprised a repeat of the Wood Group methodology used for the seabird surveys (refer to **section 1.4**, and **Report**

14A7.3-3, Annex 14A7.3), but with the addition of three VPs to the north of Sizewell, as far as Dunwich. The new VPs were added to record any bird activity along the potential route of boat movements close to shore during the construction phase of the proposed development. The survey locations therefore extended from Dunwich in the north to Orford Ness in the south (refer to **Figure 14A7.3**).

1.13.6 Both day-time VP and dawn and dusk surveys were carried out, as agreed with Natural England (pers.comm. between Hyder Consulting 2013 and Natural England). Dusk and dawn elements were undertaken to ascertain if any significant dusk/dawn roosts or movements of red-throated divers occurred.

1.13.7 At each VP, red-throated diver activity was recorded across 45 minutes. Surveys were repeated on a fortnightly basis during the periods October 2012 to March 2013 and October 2013 to March 2014 (with the exception of October and November 2012, when only one survey was undertaken each month). To reduce the likelihood of double-recording, two surveyors worked simultaneously from opposite ends of the coast, undertaking observations at different VP locations. Surveyors were in regular contact by mobile phone to notify each other if, and when, substantial movements of divers occurred, to reduce the likelihood of these birds being counted twice from different VP locations. Although the focus of the survey effort was the collection of information relating to red-throated divers, other seabirds were also recorded.

1.13.8 Information on timings and weather conditions for the 2012/13 and 2013/14 surveys can be found in Annex B of **Report 14A7.4-1** and Annex A of **Report 14A7.4-2**, respectively, in **Annex 14A7.4**.

c) Cormorant surveys

1.13.9 Surveys undertaken in 2014/15 specifically targeted cormorant. This was because cormorant had been identified as a potential candidate for addition to the Outer Thames SPA designation. However, this species has been omitted from the latest list. As well as recording cormorants, all other seabird, waterfowl and wader species encountered were recorded. The VP locations for these surveys were the same as the red-throated diver survey locations described in **section b**). In addition to the above counts, records of roosting/loafing cormorants (present on the rigs associated with Sizewell A and B power stations, located in the sea in front of the existing Sizewell power station complex) were also carried out. As requested by Natural England, these rig surveys were conducted at dusk (to monitor the birds flying in to roost on the rigs overnight) and approximately three hours after

dawn (when cormorants ‘haul out’ to loaf and dry out their wings after early foraging (Ref. 1.1).

1.13.10 Refer to **Figure 14A7.3** for the location of these VPs. Details of weather and survey timings can be found within **Table 1.3** to **Table 1.17** in **section 1.17b)** of this report.

d) Little tern and sandwich tern surveys

i. Little tern surveys

1.13.11 Little tern surveys were undertaken between May and August 2013 (inclusive). The aim of the surveys was to identify which areas of the coast between Dunwich and Orford Ness provided the most important foraging resource for this species. Observations of breeding colonies in close proximity to the site were not undertaken, since in both 2012 and 2013 little tern failed to establish in any of the three colonies monitored by Wood Group. Therefore, the Arcadis surveys focused on establishing whether little terns forage in the vicinity of the site, even in the absence of a nearby breeding colony.

1.13.12 The field surveys in 2013 were based on the methodology used by Wood Group when undertaking little tern foraging surveys (with the inclusion of the three additional VPs north to Dunwich, see **section b)** for more details; the VP locations are shown on **Figure 14A7.3**). Fortnightly VP watches at 15 locations between Dunwich and Orford Ness were thus carried out during May to August (inclusive). During these surveys, observations of flight lines, flight duration and distance from the coast were recorded.

1.13.13 Information on timings and weather conditions for these surveys can be found in **Report 14A7.4-3, Annex 14A7.4**.

ii. Sandwich tern surveys

1.13.14 Surveys for foraging sandwich tern (*Thalasseus sandvicensis*) were undertaken between May and August 2013 (inclusive). The aims and methodology of the survey were the same as for the foraging little tern survey (see **section 1.13d)** for further details).

1.13.15 Information on timings and weather conditions for these surveys can be found in **Report 14A7.4-3, Annex 14A7.4**.

1.14 Waterfowl surveys

1.14.1 Waterfowl point-count surveys were undertaken between November 2014 and March 2015 (inclusive). The aim of these surveys was to identify the

wintering waterfowl assemblage present within Minsmere South Levels and Sizewell Marshes SSSI. Both these areas are used by some species of wintering wildfowl (such as gadwall and shoveler) that are designated features of the Minsmere to Walberswick SPA. A particular emphasis of the survey work was to map the spatial distribution of the wintering wildfowl.

- 1.14.2 The surveys followed the BTO Wetland Bird Survey (WeBS) methodology (Ref. 1.2). This involved undertaking a count of waterfowl observed (audibly or visually) within a set count area. Surveys were carried out once a month during the period November 2014 to March 2015 within two to three hours of high-tide on each occasion (this being the time when maximum wildfowl numbers were likely to be present). The areas covered by this survey are shown on **Figure 14A7.5**.
- 1.14.3 For the Minsmere South Levels, the surveyors walked transects around the boundary of the area (the sea wall), stopping at specific VPs to carry out point counts. The VPs were located on the raised areas (the sea wall) around the Minsmere South Levels (refer to **Figure 14A7.5**) and therefore gave good visibility over the entire Minsmere South Levels. This was undertaken to avoid disturbing the waterfowl assemblage. During each survey, the number of each waterfowl species was recorded, and the distribution of aggregations of birds (i.e. more than five individuals) was plotted on a map.
- 1.14.4 Within Sizewell Marshes SSSI, wildfowl were mainly present within the ditches; therefore, an alternative methodology was adopted, with the side of each ditch walked and any birds seen or flushed counted. Aggregations of each waterfowl species were plotted on a map to assess the spatial distribution. The waterfowl transect areas 1-3 are shown in **Figure 14A7.5**.
- 1.14.5 Further details of the survey timings and weather conditions are presented in **Table 1.18** to **Table 1.21**, **section 1.19**.
- b) [Marsh harrier, bittern and hen harrier surveys](#)
- i. [Marsh harrier surveys](#)
- 1.14.6 The aim of the Wood Group surveys was to “...characterise the nature and extent of use of the Sizewell Estate by marsh harriers breeding in the Minsmere to Walberswick SPA...”. The Arcadis survey work for marsh harrier updated and expanded upon that undertaken by Wood Group, with the specific aim of establishing the intensity of foraging activity within Sizewell Marshes SSSI and Minsmere South Levels, and also to categorise habitat use by marsh harriers.

1.14.7 Surveys were undertaken between April and September 2014 (inclusive), November 2014 to March 2015 (inclusive), and April to October 2015 (inclusive). A series of six VPs were used to cover these areas, and these are shown on **Figure 14A7.6**:

- one VP covered Minsmere South Levels (VP3);
- four VPs covered Sizewell Marshes SSSI (VPs 1, 2, 4 and 6); and
- one VP covered the northern part of the EDF Energy estate (VP5).

1.14.8 During the survey period, VPs were surveyed at least once per month (six hours per month), with the exception of VP3 which (at the request of RSPB) was surveyed at least twice per month (12 hours per month). Two surveyors, located at a VP each, carried out the survey consisting of two three-hour watches with a break in between to refocus. These surveys took place between dawn and dusk, and surveys were organised to ensure that each VP had a mix of start times to ensure maximum coverage during daylight hours over the course of the surveys. On some occasions, surveys had to be cancelled/postponed due to external factors (weather/farming activities etc.) and any “missing” hours were made up on the next survey visit. The weather conditions and survey timings are presented in **Table 1.22** to **Table 1.39**, **section 1.20**.

The following details were recorded during VP observations:

- flight paths plotted on a map;
- height of flights (in metres, with an estimated error margin);
- length of the flight (in seconds);
- gender of the bird and any obvious identification features;
- noting when a bird was observed carrying prey items (if observable) and in which direction the bird was travelling; and
- noting any behaviour indicative of nesting birds.

ii. **Bittern surveys**

1.14.9 Bittern surveys were carried out concurrently with the marsh harrier surveys using the same locations (refer to **Figure 14A7.6**) and methodology.

1.14.10 The weather conditions and survey timings are presented in **Table 1.22** to **Table 1.39**, **section 1.20**.

iii. Hen harrier surveys

- 1.14.11 Hen harrier surveys were carried out concurrently with the marsh harrier surveys using the same locations (refer to **Figure 14A7.6**) and methodology. Hen harriers were a particular focus during the Winter months (November 2014 to March 2015), although if they were encountered at other times of the year they were also recorded.
- 1.14.12 The weather conditions and survey timings are presented in in **Table 1.22 to Table 1.39, section 1.20.**

c) Marsh harrier farmland surveys

- 1.14.13 In 2015, an additional six VPs located in arable and acid grassland habitat within the site boundary (refer to **Figure 14A7.7**) were used to assess marsh harrier flight activity over these habitats. These surveys took place between April and August 2015 (inclusive). Five of these VPs overlooked arable habitat located in the northern part of the site, and a single VP was located overlooking the short sward acid grassland of Black Walks. Although this survey targeted marsh harriers specifically, any hen harrier and bittern activity were also recorded. VPB was discarded due to better coverage provided by VPF.
- 1.14.14 Details of any marsh harrier flight observed were recorded in the same way as the previous marsh harrier surveys, and survey timings were also arranged in the same way. At least one six-hour survey was undertaken at each VP per month.
- 1.14.15 The weather conditions and survey timings are presented in **Table 1.40 to Table 1.45 in section 1.21.**

d) Marsh harrier surveys Aldhurst Farm winter 2018/19

- 1.14.16 Walkover surveys were undertaken covering the Aldhurst Farm and the reptile receptor areas forming the southern portion of the EDF Energy estate (refer to **Annex 14A7.4-4**) during December 2018 to February 2019. Surveys included a 30 minute VP survey from a location of higher ground at each area. Any marsh harrier flights were recorded onto maps and the activity noted. In addition, wetland bird species using the wetland area at Aldhurst Farm and other bird species of note using both areas were also recorded.
- 1.14.17 The primary aim of these surveys was to collect anecdotal evidence of marsh harrier utilising the areas of newly created receptor habitat for foraging, but no attempt was made to undertake detailed VP watches or to calculate flight activity levels. The secondary aim of these surveys was to

determine the wintering bird assemblage within both areas, particularly the wetland bird assemblage utilising the wetland habitat creation at Aldhurst Farm.

1.14.18 Any marsh harrier observed during the 2018/19 wintering wetland bird surveys undertaken at Sizewell Marshes SSSI and Minsmere South Levels, were also recoded (see **section 1.16d**).

1.14.19 The weather conditions and survey timings are presented in **Table 1.46 and Table 1.47, section 1.22**.

1.15 Nightjar surveys

1.15.1 Nightjar surveys were undertaken in May and June 2014, and in May 2015, with one survey undertaken in each of these months. The aim of the surveys was to identify whether breeding nightjar were present within the site.

1.15.2 Nightjar surveys were undertaken in areas of suitable breeding habitat, notably open areas of forestry clear-fell and young plantation in Kenton Hills and Goose Hill. The locations of the nightjar surveys are shown on **Figure 14A7.10**, with the surveys in both years following the same transect route.

1.15.3 Following the recommended guidelines (Ref. 1.1) the surveys started at, or just before, dusk and consisted of a transect route being walked around suitable habitat, typically lasting two hours. The song of breeding males and wing claps (if heard) were noted, and any observations of nightjar were recorded. The weather conditions and survey timings are presented in **Table 1.48, section 4.8**.

1.16 Barn owl foraging surveys

1.16.1 Barn owl (*Tyto alba*) foraging surveys were undertaken in April and May 2015, with two surveys carried out per month, one at dusk and one at dawn. The aim of the surveys was to gain an insight into the use of the site by foraging barn owls (which are known to breed within the EDF Energy estate).

1.16.2 There is no specific recommended survey guidance for surveying for foraging barn owls; however, elements have been taken from the barn owl breeding survey methodology within Gilbert *et al.* (Ref. 1.1). This guidance recommends that only suitable areas need to be surveyed, and that any unsuitable habitat can be ignored. The surveys were planned to commence in the hour before dusk, and to maximise the encounter rates, surveys were also undertaken for an hour after dawn to record barn owls

foraging at this time.

- 1.16.3 The survey area was divided into four survey transects (see **Figure 14A7.9**).
- 1.16.4 Each transect was walked by a single surveyor, making occasional stops to scan the fields, and each survey was timed to last an hour. During the course of the survey, surveyors scanned fields and hedgerows for any barn owl activity. Any flight lines and associated target notes were recorded onto survey maps, along with notes on the conditions in which the survey took place.
- 1.16.5 Further details including dates, weather conditions during the surveys, etc., are provided in **Table 1.49 to Table 1.52, section 1.24**.
- 1.16.6 As well as the targeted barn owl foraging surveys, anecdotal observations of foraging barn owl were also recorded incidentally during other surveys, such as marsh harrier vantage point surveys and bat surveys.

b) **Black redstart foraging surveys**

- 1.16.7 Black redstart surveys were carried out between mid-April and June 2015 (inclusive). The aim of the surveys was to determine the extent to which the breeding population of black redstart within the existing Sizewell power station complex use the proposed main platform and adjacent coastal habitat for foraging.
- 1.16.8 Field surveys were undertaken in accordance with best practice guidelines (Ref. 1.1) using a series of transect-based surveys. The survey locations are shown on **Figure 14A7.8**.
- 1.16.9 Two separate transects were used, one along the coast extending from the Sizewell A power station to the southern extent of the proposed main platform, with the second transect covering the area to the north of Sizewell B power station covering the proposed main platform. These transects covered a range of habitats suitable for foraging black redstart, including short-sward grassland and scrub, sand dune and shingle. Although the two transects did not enter the existing Sizewell power station complex, any black redstart foraging activity noted within these areas was recorded.
- 1.16.10 The transects were scheduled to last an hour and involved two separate surveyors walking both transects simultaneously and recording all black redstart activity observed (including the sex, age and the behaviour of all birds encountered) on a survey map. Where a bird was heard to sing but was not seen, it was assumed that these birds were male, as females rarely sing (Ref. 1.3).

1.16.11 Best practice guidelines recommend that these surveys should take place in the hours after sunrise and before sunset, and that cold, wet and windy conditions should be avoided. Whilst carrying out these surveys, it became clear that birds were not being encountered in expected numbers, and so three extra surveys were scheduled for the middle of the day to increase the potential encounter rates. A summary of the timings and the weather conditions during the surveys is provided in **Table 1.53** and **Table 1.54, section 1.25.**

c) **Breeding bird surveys**

1.16.12 Breeding bird surveys were undertaken in accordance with best practice survey guidance (Ref. 1.1). A series of transect-based surveys were carried out within the site on a monthly basis between April and June 2014 (inclusive). Breeding bird surveys of the arable fields in the northern part of the EDF Energy estate were also undertaken in April and May 2015. The aim of the surveys was updating the work carried out by Wood Group, in particular to determine the breeding bird assemblage within the site.

1.16.13 The transect surveys extended along field boundaries, tractor tracks within arable fields, woodland edges and forest tracks within the survey area. Any areas of reedbed were surveyed from tracks around the edge to avoid any areas of open water. During each survey, focus was placed upon species of local and/or national nature conservation importance, with these species being mapped and recorded using standard BTO species and behaviour codes. An inventory of all other species was also produced (but not mapped). Species of local importance are listed on the Suffolk Biodiversity Action Plan (BAP) (Ref. 1.4) and Suffolk's Priority Species and Habitats list (Ref. 1.5), and species of national nature conservation are listed within the Birds of Conservation Concern (BOCC) (Ref. 1.6).

1.16.14 The surveys were timed to commence approximately one hour after sunrise, with each transect lasting between one to two hours. Given the size of the survey area, the site was split into a number of sections; these comprised the following (all undertaken in 2014, unless noted) (refer to **Figure 14A7.11**):

- Arable transect;
- Goose Hill transect;
- Coronation Wood/proposed main platform and Sizewell Beach transect;
- Sizewell Marshes SSSI transect; and

- Northern arable transects 1 and 2 (undertaken in 2015, refer to **Figure 14A.28**).

1.16.15 The surveys were aimed to avoid poor weather conditions (i.e. heavy rain, mist/fog and strong winds), wherever possible. Surveys were undertaken by individual surveyors for all areas except the area of Sizewell Marshes SSSI due to be lost to the development and reedbed, as these contained areas of deep water, so surveyors worked in pairs in these locations. Further details, including dates and weather conditions during the surveys, are provided in **Table 1.55** to **Table 1.60**, **section 1.26**.

d) **Wintering bird surveys**

1.16.16 Wintering bird transect surveys were initially undertaken between November 2014 and March 2015 (inclusive). The aim of the surveys was to determine the wintering bird assemblage within the site.

1.16.17 As for the breeding bird surveys, the transect surveys extended along field boundaries, tractor tracks, woodland edges and forest tracks within the survey area (where land access permitted), and any areas of reedbed were surveyed from the edge to avoid any areas of open water. During each survey, particular focus was placed upon species of local and/or national nature conservation importance, with these species being mapped and recorded using standard BTO species and behaviour codes. An inventory of all other species recorded was also produced (but again not mapped).

1.16.18 The surveys were timed to take place during daylight hours, with each transect lasting for approximately two hours. The site was split into four sections (refer to **Figure 14A7.12**), these comprised:

- Arable transect;
- Goose Hill transect;
- Coronation Wood/proposed main platform and Sizewell Beach transect; and
- Sizewell Marshes SSSI transect.

1.16.19 The surveys were aimed to avoid poor weather conditions (i.e. heavy rain, mist/fog and strong winds), wherever possible. As for the breeding bird surveys, surveys were undertaken by individual surveyors for all areas except those that contained areas of deep water. Further details, including dates and weather conditions during the surveys, are provided in **Table 1.61** to **Table 1.68**, **section 1.27**.

1.16.20 Additional wintering bird surveys were undertaken during 2018/19 to

supplement the previous surveys detailed above. The survey areas included the Sizewell Marshes SSSI and Minsmere Reserve South Levels, which forms part of the Minsmere to Walberswick Heaths and Marshes SSSI. Surveys were undertaken specifically of the Minsmere South Levels and Sizewell Marshes SSSI to provide spatial data regarding the numbers and distribution of wintering wetland birds. Although WeBS data exists for both sites, the data does not provide information on the spatial distribution of birds.

- 1.16.21 Three wetland bird survey visits were undertaken monthly between December 2018 and February 2019. Surveys were undertaken by a team of three surveyors, two surveying the ditch network within the Sizewell Marshes SSSI, and the other surveying the Minsmere South Levels. Surveys were undertaken simultaneously at both areas to reduce the chances of double-counting birds moving between the two. Target species for both areas were wetland bird species, including species of swans, geese, ducks, grebes, rails, waders and herons. Any marsh harrier observed were also noted.
- 1.16.22 Sizewell Marshes SSSI was separated into four survey areas: compartments A, B, C and D (refer to **Annex 14A7.4-4**). All ditches within these compartments were walked and any wetland bird species observed or flushed were identified and counted, and their distribution recorded onto maps. Care was taken to note if birds were flushed into neighbouring compartments to avoid double-counting.
- 1.16.23 The Minsmere South Levels was surveyed using a telescope from the periphery bund and seawall to avoid causing disturbance. Wetland birds were identified and counted, and their distribution recorded onto maps.
- 1.16.24 During the marsh harrier surveys (see **section 1.14d**) covering Aldhurst Farm and the southern reptile receptor areas (refer to refer to **Annex 14A7.4-4**), wetland bird species using the wetland area at Aldhurst Farm and other bird species of note using both areas were also recorded. The aim was to determine the wintering bird assemblage within both areas, particularly the wetland bird assemblage utilising the wetland habitat creation at Aldhurst Farm.

1.17 Tables

a) Introduction

- 1.17.1 This section provides details of the survey conditions and timings associated with the surveys carried out by Arcadis. Equivalent information for the Wood Group surveys can be found within the individual Wood Group

reports, presented in **14A7.3**.

b) **Red-throated diver and cormorant surveys**

1.17.2 The survey conditions and timings associated with the red-throated diver surveys carried out in Winter 2012/13 and 2013/14 are presented in **Reports 14A7.4-1** and **14A7.4-2 (Annex 14A7.4)** and are therefore not repeated here. **Table 1.3** to **Table 1.17** show the survey conditions and timings of the red-throated diver and cormorant surveys undertaken in Winter 2014/2015.

1.17.3 The results of the red-throated diver and cormorant surveys can be found in **Annex 14A7.4-2**.

NOT PROTECTIVELY MARKED

Table 1.3: Winter season 2014/15 (VP1).

Date	Start	Finish	Duration of survey (Hours)	Weather	High tide/low tide	Wave height	Vis. obscured by waves?	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
12/11/14	08:15	09:00	45 MINS	Windy and overcast	H 01:27/14:12 L 7:50/19:50	70	Y	7	S	8/8
25/11/14	11:55	12:40	45 MINS	Overcast	H 12:12 L 06:07/18:19	50	N	5	E	8/8
03/12/14	10:00	10:45	45 MINS	Overcast	H 7:28/20:13 L 01:00/13:25	100	Y	3-4	NE	8/8
16/12/14	10:00	10:45	45 MINS	Sunny	H 4:46/17:55 L 11:05/23:35	25	N	1	W	2-3/8
07/1/15	10:05	10:50	45 MINS	Overcast	H 11:57 L 5:18/17:28	10	N	1	SW	7/8
20/1/15	10:15	11:00	45 MINS	Bright, still	H 10:19/16:11 L 3:35/15:55	20	N	1	E	0/8
4/2/15	13:50	14:35	45 MINS	Showers	H 10:58/23:01 L 4:19/16:31	40	Y	3	NW	8/8
17/2/15	7:05	7:50	45 MINS	Overcast, some sun	H 9:07/21:22 L 2:21/14:46	20	N	1-2	NW	0-2/8
17/2/15	15:50	16:35	45 MINS	Sunny	H 9:07/21:22 L 2:21/14:46	20	N	1	NW	0/8
17/3/15	13:50	14:35	45 MINS	Overcast, some fog	H 7:46/20:00 L 00:56/13:29	75-100	Y	4	NE	6/8

NOT PROTECTIVELY MARKED

Date	Start	Finish	Duration of survey (Hours)	Weather	High tide	Low tide	Wave height	Vis. obscured by waves?	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
		TOTAL	7hours 30mins								

Table 1.4: Winter season 2014/15 (VP2).

Date	Start	Finish	Duration of survey (Hours)	Weather	High tide	Low tide	Wave height (cm)	Vis obscured by waves?	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
12/11/14	07:00	07:45	45 MINS	Windy	H 01:27/14:12	L 7:50/19:50	40	Y	6	S	8/8
12/11/14	10:26	11:11	45 MINS	Windy	H 01:27/14:12	L 7:50/19:50	100	Y	7	S	7/8
12/11/14	15:50	16:35	45 MINS	Sunny, windy	H 01:27/14:12	L 7:50/19:50	70	Y	5	S	2/8
25/11/14	10:38	11:23	45 MINS	overcast	H 12:12	L 06:07/18:19	50	Y	5	E	8/8
25/11/14	15:40	16:25	45 MINS	windy	H 12:12	L 06:07/18:19	60	Y	6	E	8/8
03/12/14	10:55	11:40	45 MINS	Raining	H 7:28/20:13	L 01:00/13:25	100	Y	4	NE	8/8
03/12/14	15:25	16:10	45 MINS	Overcast	H 7:28/20:13	L 01:00/13:25	100	Y	4-5	NE	8/8

NOT PROTECTIVELY MARKED

Date	Start	Finish	Duration of survey (Hours)	Weather	High tide/low tide	Wave height (cm)	Vis obscured by waves?	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
16/12/14	11:10	11:55	45 MINS	Sunny	H 4:46/17:55 L 11:05/23:35	25	N	1-2	W	1/8
17/12/14	15:20	16:05	45 MINS	Overcast	H 5:50/18:50 L 12:02	10	N	1	W	8/8
07/1/15	11:20	12:05	45 MINS	Overcast	H 11:57 L 5:18/17:28	20	N	2-3	SW	7-8/8
07/1/15	15:40	16:25	45 MINS	Raining	H 11:57 L 5:18/17:28	30	N	2-3	SW	8/8
20/1/15	11:20	12:05	45 MINS	Bright, still	H 10:19/16:11 L 3:35/15:55	20	N	1	E	0/8
20/1/15	15:45	16:30	45 MINS	Overcast, breezy	H 10:19/16:11 L 3:35/15:55	20	N	1-2	SE	2-6/8
4/2/15	10:06	10:51	45 MINS	Clear	H 10:58/23:01 L 4:19/16:31	40	N	4	NW	3/8
4/2/15	16:30	17:15	45 MINS	Overcast	H 10:58/23:01 L 4:19/16:31	30-40	N	3	NW	6-7/8
17/2/15	9:50	10:35	45 MINS	Sunny	H 9:07/21:22 L 2:21/14:46	10	N	2-3	N	0/8
17/2/15	16:45	17:30	45 MINS	Sunny	H 9:07/21:22 L 2:21/14:46	20	N	1	NW	0/8
17/3/15	7:00	7:45	45 MINS	Overcast, fog	H 7:46/20:00 L 00:56/13:29	75-100	Y	2	N	8/8



NOT PROTECTIVELY MARKED

Date	Start	Finish	Duration of survey (Hours)	Weather	High tide/low tide	Wave height (cm)	Vis obscured by waves?	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
17/3/15	17:35	18:20	45 MINS	Overcast	H 7:46/20:00 L 00:56/13:29	75-100	Y	3	NE	7-8/8
		TOTAL	14hours 15mins							

NOT PROTECTIVELY MARKED

Table 1.5: Winter season 2014/15 (VP3).

Date	Start	Finish	Duration of survey (Hours)	Weather	High tide/low tide	Wave height (cm)	Vis. Obscured by waves?	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
12/11/14	07:00	07:45	45 MINS	Windy, overcast	H 01:27/14:12 L 7:50/19:50	100	Y	4-5	SE	8/8
12/11/14	10:25	11:10	45 MINS	Sunny	H 01:27/14:12 L 7:50/19:50	150	Y	3-4	SE	4/8
12/11/14	15:50	16:35	45 MINS	Sunny	H 01:27/14:12 L 7:50/19:50	50	N	1-2	SE	0/8
25/11/14	10:38	11:23	45 MINS	Overcast, windy	H 12:12 L 06:07/18:19	50	N	3-4	E	7/8
25/11/14	15:38	10:23	45 MINS	Overcast	H 12:12 L 06:07/18:19	150	Y	5	E	7
03/12/14	10:55	11:40	45 MINS	Raining	H 7:28/20:13 L 01:00/13:25	150	Y	5	NE	8/8
03/12/14	15:25	16:10	45 MINS	Overcast	H 7:28/20:13 L 01:00/13:25	150	Y	5-6	NE	8/8
16/12/14	11:10	11:55	45 MINS	Sunny	H 4:46/17:55 L 11:05/23:35	50	N	2-3	W	1/8
17/12/14	15:20	16:05	45 MINS	Overcast	H 5:50/18:50 L 12:02	10	N	2-3	W	7/8



SIZEWELL C PROJECT – ENVIRONMENTAL STATEMENT

NOT PROTECTIVELY MARKED

Date	Start	Finish	Duration of survey (Hours)	Weather	High tide/low tide	Wave height (cm)	Vis. Obscured by waves?	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
07/1/15	11:20	12:05	45 MINS	Overcast	H 11:57 L 5:18/17:28	20-30	N	3-4	SW	4-6/8
07/1/15	15:40	16:25	45 MINS	Raining	H 11:57 L 5:18/17:28	50	Y	4	SE	8/8
20/1/15	11:20	12:05	45 MINS	Clear, cold	H 10:19/16:11 L 3:35/15:55	15	N	0	n/a	1/8
20/1/15	15:45	16:30	45 MINS	Overcasts, drizzling	H 10:19/16:11 L 3:35/15:55	20	N	3	S	8/8
4/2/15	10:06	10:51	45 MINS	Clear, cold	H 10:58/23:01 L 4:19/16:31	75	Y	2	NW	1/8
4/2/15	16:30	17:15	45 MINS	Clear, cold	H 10:58/23:01 L 4:19/16:31	50	N	1	NW	2/8
17/2/15	9:50	10:35	45 MINS	Clear	H 9:07/21:22 L 2:21/14:46	50	Y	2	NW	0/8
17/2/15	16:45	17:30	45 MINS	Clear	H 9:07/21:22 L 2:21/14:46	20-30	N	1	NW	0/8
17/3/15	7:00	7:45	45 MINS	Light rain, fog	H 7:46/20:00 L 00:56/13:29	30	N	3	N	8/8
17/3/15	17:35	18:20	45 MINS	Hazy	H 7:46/20:00 L 00:56/13:29	30	N	3	N	6/8
		TOTAL	14hours 15mins							

NOT PROTECTIVELY MARKED

Table 1.6: Winter season 2014/15 (VP4).

Date	Start	Finish	Duration of survey (Hours)	Weather	High tide/low tide	Wave height (cm)	Vis. obscured by waves?	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
12/11/14	08:10	08:55	45 MINS	Overcast, windy	H 01:27/14:12 L 7:50/19:50	100	Y	4-5	SE	8/8
25/11/14	09:33	10:18	45 MINS	Overcast, windy	H 12:12 L 06:07/18:19	100	Y	5	E	7/8
03/12/14	7:30	8:15	45 MINS	Raining	H 7:28/20:13 L 01:00/13:25	70	N	3-4	NE	8/8
03/12/14	14:20	15:05	45 MINS	Overcast	H 7:28/20:13 L 01:00/13:25	70	N	4	NE	8/8
16/12/14	9:40	10:25	45 MINS	Sunny	H 4:46/17:55 L 11:05/23:35	30	N	2	W	1/8
07/1/15	13:50	14:35	45 MINS	Overcast, light drizzle at end	H 11:57 L 5:18/17:28	50	Y	4	SW	8/8
20/1/15	12:40	13:25	45 MINS	Clear	H 10:19/16:11 L 3:35/15:55	20	N	1	S	3-5/8
4/2/15	11:30	12:15	45 MINS	Overcast	H 10:58/23:01 L 4:19/16:31	75	Y	3	NW	3-7/8
17/2/15	8:10	8:55	45 MINS	Clear	H 9:07/21:22 L 2:21/14:46	30	N	1	N	0/8
17/3/15	11:20	12:05	45 MINS	Fog	H 7:46/20:00 L 00:56/13:29	75	Y	2	N	5/8

NOT PROTECTIVELY MARKED

Date	Start	Finish	Duration of survey (Hours)	Weather	High tide/low tide	Wave height (cm)	Vis. obscured by waves?	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
		TOTAL	7hours 30mins							

Table 1.7: Winter season 2014/15 (VP5).

Date	Start	Finish	Duration of survey (Hours)	Weather	High tide/low tide	Wave height (cm)	Vis. obscured by waves?	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
12/11/14	09:10	09:55	45 MINS	Overcast, windy	H 01:27/14:12 L 7:50/19:50	150	Y	4	SE	7/8
25/11/14	08:23	09:08	45 MINS	Overcast	H 12:12 L 06:07/18:19	75	N	3	E	6/8
03/12/14	7:45	8:30	45 MINS	Raining	H 7:28/20:13 L 01:00/13:25	150	Y	5	NE	8/8
03/12/14	14:10	14:55	45 MINS	Raining	H 7:28/20:13 L 01:00/13:25	150	Y	5-6	NE	8/8
16/12/14	8:30	9:15	45 MINS	Sunny	H 4:46/17:55 L 11:05/23:35	25	N	1	W	2-3/8
07/1/15	12:40	13:25	45 MINS	Overcast	H 11:57 L 5:18/17:28	30-50	Y	4	SW	6-8/8
20/1/15	9:55	10:40	45 MINS	Clear	H 10:19/16:11 L 3:35/15:55	15	N	0-1	W	1/8
4/2/15	12:47	13:32	45 MINS	Showers	H 10:58/23:01 L	75	Y	3	NW	4-8/8

NOT PROTECTIVELY MARKED

Date	Start	Finish	Duration of survey (Hours)	Weather	High tide/low tide	Wave height (cm)	Vis. obscured by waves?	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
					4:19/16:31					
17/2/15	6:57	7:42	45 MINS	Clear	H 9:07/21:22 L 2:21/14:46	30	N	0-1	NW	0-1/8
17/2/15	15:05	15:50	45 MINS	Clear	H 9:07/21:22 L 2:21/14:46	30	N	1	NW	0/8
17/3/15	9:10	9:55	45 MINS	Fog	H 7:46/20:00 L 00:56/13:29	100	Y	3	N	7-8/8
		TOTAL	8hours 15mins							

Table 1.8: Winter season 2014/15 (VP6).

Date	Start	Finish	Duration of survey (Hours)	Weather	High tide/low tide	Wave height (cm)	Vis. obscured by waves?	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
12/11/14	12:10	12:55	45 MIINS	Sunny	H 01:27/14:12 L 7:50/19:50	150	Y	2-3	SE	4/8
25/11/14	07:10	07:55	45 MINS	Overcast	H 12:12 L 06:07/18:19	10	N	1	W	5/8
25/11/14	12:20	13:05	45 MINS	Overcast, windy	H 12:12 L 06:07/18:19	100	Y	4	E	8/8

NOT PROTECTIVELY MARKED

Date	Start	Finish	Duration of survey (Hours)	Weather	High tide/low tide	Wave height (cm)	Vis. obscured by waves?	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
03/12/14	9:00	9:45	45 MINS	Overcast	H 7:28/20:13 L 01:00/13:25	150	Y	5	NE	7/8
16/12/14	7:20	8:05	45 MINS	Overcast	H 4:46/17:55 L 11:05/23:35	20	N	1	W	8/8
16/12/14	12:55	13:40	45 MINS	Sunny	H 4:46/17:55 L 11:05/23:35	50	N	2-3	W	1/8
07/1/15	9:48	10:33	45 MINS	Sunny	H 11:57 L 5:18/17:28	20	N	2-3	SW	1-4/8
20/1/15	8:50	9:35	45 MINS	Clear	H 10:19/16:11 L 3:35/15:55	15	N	0-1	W	1/8
4/2/15	8:22	9:07	45 MINS	Clear	H 10:58/23:01 L 4:19/16:31	50	Y	1	NW	1/8
17/2/15	12:25	13:10	45 MINS	Clear	H 9:07/21:22 L 2:21/14:46	30	N	1	NW	0/8
17/3/15	5:50	6:35	45 MINS	Fog	H 7:46/20:00 L 00:56/13:29	75	N	2	N	8/8
17/3/15	10:10	10:55	45 MINS	Fog	H 7:46/20:00 L 00:56/13:29	75	N	2-3	N	7-8/8
		TOTAL	9hours							

NOT PROTECTIVELY MARKED

Table 1.9: Winter season 2014/15 (VP7).

Date	Start	Finish	Duration of survey (Hours)	Weather	High tide/low tide	Wave height (cm)	Vis. obscured by waves?	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
12/11/14	13:15	14:00	45 MINS	Sunny	H 01:27/14:12 L 7:50/19:50	150	Y	3-4	SE	1/8
25/11/14	13:20	14:05	45 MINS	Overcast, windy	H 12:12 L 06:07/18:19	100	Y	5	E	6/8
03/12/14	12:55	13:40	45 MINS	Overcast	H 7:28/20:13 L 01:00/13:25	150	Y	5-6	NE	8/8
16/12/14	14:05	14:50	45 MINS	Sunny	H 4:46/17:55 L 11:05/23:35	30	N	1-2	W	0/8
07/1/15	8:30	9:15	45 MINS	Sunny	H 11:57 L 5:18/17:28	15-20	N	1-2	SW	0-1/8
20/1/15	7:35	8:20	45 MINS	Clear	H 10:19/16:11 L 3:35/15:55	15	N	0-1	W	1/8
20/1/15	14:00	14:45	45 MINS	Overcast, drizzling	H 10:19/16:11 L 3:35/15:55	20	N	2-3	S	7-8/8
4/2/15	7:00	7:45	45 MINS	Clear	H 10:58/23:01 L 4:19/16:31	50	N	1	NW	2/8
4/2/15	14:10	14:55	45 MINS	Overcast, sunny spells	H 10:58/23:01 L 4:19/16:31	50	Y	3	NW	4-6/8
17/2/15	11:15	12:00	45 MINS	Clear	H 9:07/21:22 L 2:21/14:46	30	N	2	NW	0/8

NOT PROTECTIVELY MARKED

Date	Start	Finish	Duration of survey (Hours)	Weather	High tide/low tide	Wave height (cm)	Vis. obscured by waves?	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
17/3/15	15:20	16:05	45 MINS	Sunny, hazy	H 7:46/20:00 L 00:56/13:29	10	N	3	N	6/8
		TOTAL	8hours 15mins							

Table 1.10: Winter season 2014/15 (VP8).

Date	Start	Finish	Duration of survey (Hours)	Weather	High tide/low tide	Wave height	Vis. obscured by waves?	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
12/11/14	15:45	16:30	45 MINS	Sunny	H 01:27/14:12 L 7:50/19:50	50	N	2	SW	0/8
25/11/14	14:30	15:15	45 MINS	Overcast	H 12:12 L 06:07/18:19	60	N	4	E	6/8
03/12/14	15:05	15:50	45 MINS	Overcast	H 7:28/20:13 L 01:00/13:25	150	Y	6-7	NE	8/8
16/12/14	14:25	15:20	45 MINS	Sunny	H 4:46/17:55 L 11:05/23:35	10	N	1	W	0/8
07/1/15	7:35	8:10	45 MINS	Sunny	H 11:57 L 5:18/17:28	15	N	0-1	SW	1/8
07/1/15	15:10	15:55	45 MINS	Raining, windy	H 11:57 L 5:18/17:28	75	Y	4-5	SE	8/8

NOT PROTECTIVELY MARKED

Date	Start	Finish	Duration of survey (Hours)	Weather	High tide/low tide	Wave height	Vis. obscured by waves?	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
20/1/15	14:50	15:35	45 MINS	Rain/ snow/ overcast	H 10:19/16:11 L 3:35/15:55	10	N	2	S	5-7/8
4/2/15	15:45	16:30	45 MINS	Overcast, some heavy rain	H 10:58/23:01 L 4:19/16:31	20	N	2-3	NW	6-8/8
17/2/15	15:30	16:15	45 MINS	Sunny	H 9:07/21:22 L 2:21/14:46	20	N	0-1	NW	0/8
17/3/15	5:50	6:35	45 MINS	Raining, fog	H 7:46/20:00 L 00:56/13:29	30	N	3	N	8/8
17/3/15	14:10	14:55	45 MINS	Sunny, hazy	H 7:46/20:00 L 00:56/13:29	10	N	2-3	N	5/8
		TOTAL	8hours 15mins							

Table 1.11: Winter season 2014/15 (VP9).

Date	Start	Finish	Duration of survey (Hours)	Weather	High tide/low tide	Wave height (cm)	Vis. obscured by waves?	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
12/11/14	14:15	15:00	45 MINS	Sunny, windy	H 01:27/14:12 L 7:50/19:50	150	Y	5	S	0/8
25/11/14	13:15	14:00	45 MINS	Overcast, windy	H 12:12 L 06:07/18:19	50	N	4-5	E	7/8



SIZEWELL C PROJECT – ENVIRONMENTAL STATEMENT

NOT PROTECTIVELY MARKED

Date	Start	Finish	Duration of survey (Hours)	Weather	High tide/low tide	Wave height (cm)	Vis. obscured by waves?	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
03/12/14	13:50	14:35	45 MINS	Overcast	H 7:28/20:13 L 01:00/13:25	75	Y	6-7	NE	8/8
16/12/14	13:15	14:00	45 MINS	Sunny	H 4:46/17:55 L 11:05/23:35	10	N	2-3	W	1/8
07/1/15	13:55	14:40	45 MINS	Overcast. windy	H 11:57 L 5:18/17:28	70	Y	5	S	8/8
20/1/15	13:35	14:20	45 MINS	Drizzling/raining	H 10:19/16:11 L 3:35/15:55	10	N	2-3	S	7-8/8
4/2/15	14:25	15:10	45 MINS	Bright and breezy	H 10:58/23:01 L 4:19/16:31	20-30	N	2-4	NW	4-6/8
17/2/15	14:10	14:55	45 MINS	Sunny, breezy	H 9:07/21:22 L 2:21/14:46	20	N	2	NW	0/8
17/3/15	12:55	13:40	45 MINS	Sunny, light fog	H 7:46/20:00 L 00:56/13:29	20	N	2	N	6/8
		TOTAL	6hours 45mins							

NOT PROTECTIVELY MARKED

Table 1.12: Winter season 2014/15 (VP10).

Date	Start	Finish	Duration of survey (Hours)	Weather	High tide/low tide	Wave height (cm)	Vis. obscured by waves?	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
12/11/14	13:05	13:50	45 MINS	Sunny, windy	H 01:27/14:12 L 7:50/19:50	150	Y	6	SW	1/8
25/11/14	12:00	12:45	45 MINS	Overcast	H 12:12 L 06:07/18:19	40	N	4-5	NE	7/8
03/12/14	12:40	13:35	45 MINS	Raining	H 7:28/20:13 L 01:00/13:25	150	Y	5-6	NE	8/8
16/12/14	12:00	12:45	45 MINS	Sunny	H 4:46/17:55 L 11:05/23:35	10	N	1-2	W	1/8
07/1/15	12:55	13:40	45 MINS	Overcast	H 11:57 L 5:18/17:28	50	Y	3	S	6-8/8
20/1/15	12:30	13:15	45 MINS	Overcast	H 10:19/16:11 L 3:35/15:55	10	N	1-2	S	4-5/8
4/2/15	13:20	14:05	45 MINS	Bright and breezy	H 10:58/23:01 L 4:19/16:31	50	Y	2-4	W	6-7/8
17/2/15	12:55	13:40	45 MINS	Sunny, calm	H 9:07/21:22 L 2:21/14:46	20	N	0-2	W	0/8
17/3/15	11:45	12:30	45 MINS	Fog, sunny spells	H 7:46/20:00 L 00:56/13:29	20	N	2-3	N	7-8/8
		TOTAL	6hours 45mins							

NOT PROTECTIVELY MARKED

Table 1.13: Winter season 2014/15 (VP11).

Date	Start	Finish	Duration of survey (Hours)	Weather	High tide/low tide	Wave height (cm)	Vis obscured by waves?	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
12/11/14	11:10	11:55	45 MINS	Bright, windy	H 01:27/14:12 L 7:50/19:50	200-250	Y	6	SW	4/8
25/11/14	10:45	11:30	45 MINS	Overcast	H 12:12 L 06:07/18:19	30	N	4	NE	7/8
03/12/14	11:10	11:55	45 MINS	Raining	H 7:28/20:13 L 01:00/13:25	150	Y	6-7	NE	7-8/8
16/12/14	10:40	11:25	45 MINS	Sunny	H 4:46/17:55 L 11:05/23:35	10	N	2-3	W	1/8
07/1/15	11:15	12:00	45 MINS	Overcast	H 11:57 L 5:18/17:28	50	Y	3	S	5-6/8
20/1/15	11:00	11:45	45 MINS	Clear	H 10:19/16:11 L 3:35/15:55	10	N	1	W	1/8
4/2/15	11:45	12:30	45 MINS	Breezy, some sun	H 10:58/23:01 L 4:19/16:31	30-50	N	3-4	W	6/8
17/2/15	10:55	11:40	45 MINS	Sunny, calm	H 9:07/21:22 L 2:21/14:46	20	N	1-2	W	0/8
17/3/15	10:35	11:20	45 MINS		H 7:46/20:00 L 00:56/13:29	20	N	2	N	8/8
		TOTAL	6hours 45mins							

NOT PROTECTIVELY MARKED

Table 1.14: Winter season 2014/15 (VP12).

Date	Start	Finish	Duration of survey (Hours)	Weather	High tide/low tide	Wave height (cm)	Vis obscured by waves?	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
12/11/14	09:10	09:55	45 MINS	Strong wind, dry, bright	H 01:27/14:12 L 7:50/19:50	100-200	Y	6	S	7/8
25/11/14	09:10	09:55	45 MINS	Overcast, windy	H 12:12 L 06:07/18:19	25	N	3	NE	7/8
03/12/14	9:15	10:00	45 MINS	Drizzle	H 7:28/20:13 L 01:00/13:25	150	Y	5-6	NE	7-8/8
16/12/14	9:05	9:50	45 MINS	Sunny	H 4:46/17:55 L 11:05/23:35	10	N	2-3	S	1-2/8
07/1/15	9:20	10:05	45 MINS	Bright	H 11:57 L 5:18/17:28	50	Y	3	S	2/8
20/1/15	9:15	10:00	45 MINS	Clear, cold	H 10:19/16:11 L 3:35/15:55	10	N	0-1	W	0/8
4/2/15	9:55	10:40	45 MINS	Bright and breezy	H 10:58/23:01 L 4:19/16:31	30	N	1-3	W	0/8
17/2/15	9:05	9:50	45 MINS	Sunny	H 9:07/21:22 L 2:21/14:46	30-40	N	1	W	0/8
17/3/15	9:05	9:50	45 MINS	Sunny spells, hazy	H 7:46/20:00 L 00:56/13:29	20	N	2	N	4-8/8
		TOTAL	6hours 45mins							

NOT PROTECTIVELY MARKED

Table 1.15: Winter season 2014/15 (VP13).

Date	Start	Finish	Duration of survey (Hours)	Weather	High tide/low tide	Wave height (cm)	Vis obscured by waves?	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
12/11/14	09:15	10:00	45 MINS	Windy	H 01:27/14:12 L 7:50/19:50	90	Y	7	S	6/8
25/11/14	13:00	13:45	45 MINS	Overcast	H 12:12 L 06:07/18:19	40	N	5	S	8/8
03/12/14	9:00	9:45	45 MINS	Drizzling	H 7:28/20:13 L 01:00/13:25	100	Y	4-5	NE	6-8/8
16/12/14	8:40	9:25	45 MINS	Sunny	H 4:46/17:55 L 11:05/23:35	20	N	1	W	1/8
07/1/15	8:50	9:35	45 MINS	Sunny	H 11:57 L 5:18/17:28	20	N	2	SW	2-4/8
20/1/15	8:35	9:20	45 MINS	Cold, clear	H 10:19/16:11 L 3:35/15:55	10	N	1	W	0-1/8
4/2/15	7:00	7:45	45 MINS	Cold	H 10:58/23:01 L 4:19/16:31	15	N	4	NW	2/8
4/2/15	11:50	12:35	45 MINS	Cold, overcast	H 10:58/23:01 L 4:19/16:31	30	N	3	NW	6/8
17/2/15	12:55	13:40	45 MINS	Sunny	H 9:07/21:22 L 2:21/14:46	10	N	1	NW	0/8
17/3/15	14:50	15:35	45 MINS	Hazy	H 7:46/20:00 L 00:56/13:29	75-100	Y	4-5	E	5-6/8

NOT PROTECTIVELY MARKED

Date	Start	Finish	Duration of survey (Hours)	Weather	High tide/low tide	Wave height (cm)	Vis obscured by waves?	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
		TOTAL	7hours 30mins							

Table 1.16: Winter season 2014/15 (VP14).

Date	Start	Finish	Duration of survey (Hours)	Weather	High tide/low tide	Wave height (cm)	Vis obscured by waves?	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
12/11/14	12:10	12:55	45 MINS	Windy	H 01:27/14:12 L 7:50/19:50	100	Y	7	S	5/8
25/11/14	08:05	08:50	45 MINS	Overcast	H 12:12 L 06:07/18:19	30	N	3	E	7/8
03/12/14	13:10	13:55	45 MINS	Raining	H 7:28/20:13 L 01:00/13:25	70	Y	5	NE	8/8
16/12/14	13:15	14:00	45 MINS	Sunny	H 4:46/17:55 L 11:05/23:35	10	N	1-2	W	1/8
07/1/15	13:25	14:10	45 MINS	Overcast	H 11:57 L 5:18/17:28	40	N	3-4	SW	8/8
20/1/15	7:35	8:20	45 MINS	Still, bright, cold	H 10:19/16:11 L 3:35/15:55	10	N	1	W	0-1/8
20/1/15	14:00	14:45	45 MINS	Overcast, cold	H 10:19/16:11 L 3:35/15:55	10	N	1-2	E	6-7/8

NOT PROTECTIVELY MARKED

Date	Start	Finish	Duration of survey (Hours)	Weather	High tide/low tide	Wave height (cm)	Vis obscured by waves?	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
4/2/15	8:04	8:49	45 MINS	Cold	H 10:58/23:01 L 4:19/16:31	20	N	4	NW	2/8
17/2/15	8:30	9:15	45 MINS	Sunny	H 9:07/21:22 L 2:21/14:46	20	N	2	N	0/8
17/3/15	15:43	16:38	45 MINS	Hazy	H 7:46/20:00 L 00:56/13:29	100	N	4-5	E	4-6/8
		TOTAL	7hours 45mins							

Table 1.17: Winter season 2014/15 (VP15).

Date	Start	Finish	Duration of survey (Hours)	Weather	High tide/low tide	Wave height (cm)	Vis obscured by waves?	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
12/11/14	13:10	13:55	45 MINS	Windy	H 01:27/14:12 L 7:50/19:50	100	Y	7	S	2/8
25/11/14	09:00	09:45	45 MINS	Overcast	H 12:12 L 06:07/18:19	30	N	4	E	8/8
25/11/14	07:10	07:55	45 MINS	Calm and cloudy	H 12:12 L 06:07/18:19	30	N	2	SE	7/8
03/12/14	12:15	13:00	45 MINS	Sunny spells	H 7:28/20:13 L 01:00/13:25	70	Y	4	NE	5-7/8

NOT PROTECTIVELY MARKED

Date	Start	Finish	Duration of survey (Hours)	Weather	High tide/low tide	Wave height (cm)	Vis obscured by waves?	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
16/12/14	7:10	7:55	45 MINS	Sunny	H 4:46/17:55 L 11:05/23:35	10	N	1	W	3/8
16/12/14	14:10	14:55	45 MINS	Sunny	H 4:46/17:55 L 11:05/23:35	10	N	1	W	1/8
07/1/15	7:40	8:25	45 MINS	Sunny	H 11:57 L 5:18/17:28	30	N	1-2	SW	0/8
07/1/15	14:25	15:10	45 MINS	Overcast, drizzling	H 11:57 L 5:18/17:28	30	N	2-3	SW	8/8
20/1/15	13:00	13:45	45 MINS	Bright, still	H 10:19/16:11 L 3:35/15:55	10	N	1	E	3-4/8
4/2/15	11:35	12:20	45 MINS	Cold, overcast	H 10:58/23:01 L 4:19/16:31	50	Y	5	NW	7/8
17/2/15	11:50	12:35	45 MINS	Sunny	H 9:07/21:22 L 2:21/14:46	10	N	2	NW	0/8
17/3/15	12:33	13:18	45 MINS	Misty	H 7:46/20:00 L 00:56/13:29	50-75	N	3	N	7-8/8
		TOTAL	9hours							

c) Little tern and sandwich tern surveys

1.17.4 The survey conditions and timings associated with the little tern and sandwich tern surveys are presented in **Report 14A7.4-3 (Annex 14A7.4)** and are therefore not repeated here.

1.17.5 The results of the little tern and sandwich tern surveys can be found (in the form of species accounts) within **Annex 14A7.5**.

d) Waterfowl surveys

1.17.6 **Table 1.18** to **Table 1.21** show the survey conditions and timings of the waterfowl surveys undertaken in Winter 2014/2015. The results of the waterfowl surveys can be found (in the form of species accounts) within **Annex 14A7.5** and **14A7.6**.

Table 1.18: Winter season 2014/15 (survey area 1).

Date	Start	Finish	Duration of survey (Hours)	Weather	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
11/11/14	11:30	12:40	1:10	Overcast, sunny spells	1-2	SE	4/8
04/12/14	8:10	9:30	1:20	Overcast	1	E	8/8
08/1/15	10:15	11:40	1:25	Raining	0	n/a	8/8
5/2/15	9:30	10:45	1:15	Clear	2	E	3/8
5/3/15	9:00	9:50	0:50	Sunny	0	n/a	3/8
		Total	6hours				

Table 1.19: Winter season 2014/15 (Minsmere South Levels).

Date	Start	Finish	Duration of survey (Hours)	Weather	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
11/11/14	12:00	14:10	2:10	Overcast, windy	4	SE	7/8
04/12/14	08:00	12:00	4	Overcast	1	E	8/8
8/1/15	11:00	13:40	2:40	Raining	0	n/a	8/8
5/2/15	10:00	12:40	2:40	Sunny	2	E	0/8
5/3/15	8:30	11:00	2:30	Overcast	2	W	5-7/8
		Total	14hours				

Table 1.20: Winter season 2014/15 (Survey area 3).

Date	Start	Finish	Duration of survey (Hours)	Weather	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
27/11/14	12:30	13:45	1:15	Overcast	1	E	8/8
18/12/14	7:50	9:10	1:20	Overcast	3-4	E	8/8
08/1/15	12:00	14:00	2	Raining	0	n/a	8/8
19/2/15	10:00	11:20	1:20	Overcast	2-3	S	8/8
3/3/15	8:45	10:15	1:30	Overcast	2	SW	8/8
		Total	7hours 25mins				

Table 1.21: Winter season 2014/15 (Survey area 2).

Date	Start	Finish	Duration of survey (Hours)	Weather	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
11/11/14	13:10	14:15	1:05	Overcast, some sun	0	n/a	5/8
04/12/14	10:00	11:10	1:10	Overcast	1	E	8/8
08/1/15	12:00	13:30	1:30	Raining	0	n/a	8/8
5/2/15	12:00	14:15	2:15	Raining, some sleet	5	E	7/8
5/3/15	10:15	11:45	1:30	Overcast	0	n/a	3/8
		Total	7hours 30mins				

e) [Bittern, marsh harrier and hen harrier surveys](#)

1.17.7 **Table 1.22 to Table 1.39** show the survey conditions and timings of the bittern, marsh harrier and hen harrier surveys undertaken in 2014 and 2015. The results of the bittern, marsh harrier and hen harrier surveys can be found (in the form of species accounts) within **Annex 14A7.5**.

Table 1.22: Breeding season 2014 (VP1).

Date	Start	Finish	Duration of survey (Hours)	Weather	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
30/04/2014	12:10	15:10	3	Fine	1-2	East	4
01/05/2014	14:30	17:30	3	Overcast some light rain	1-2	Southwest	7-8

Date	Start	Finish	Duration of survey (Hours)	Weather	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
20/05/2014	8:30	11:30	3	Sunny, became overcast later	1-2	Southeast	1-6
20/05/2014	11:45	14:45	3	Overcast and sunny later	1	Southeast	1-7
22/05/2014	5:30	8:30	3	Sunny with some cloud	2-4	Southwest	2-4
11/06/2014	11:35	14:35	3	Sunny 23-27°	1	Northwest	3-4
11/06/2014	14:45	17:45	3	Sunny with some cloud 21-24°	0-1	Northwest	4-8
25/06/2014	17:45	20:45	3	Overcast, sunny spells	1	East	5
22/07/2014	05:12	08:12	3	Overcast, windy	3	North	8
22/07/2014	08:22	10:22	2	Overcast and windy	3	North	8
22/07/2014	16:30	17:30	1	Sunny, warm	3	North	0
06/08/2014	8:45	11:45	3	Heavy rain, calm	1	NE	8
06/08/2014	11:55	14:55	3	Raining, calm	1-2	NE	6-8
24/09/2014	10:05	13:05	3	Overcast	2-4	NW	7-8
24/09/2014	13:15	16:15	3	Overcast	2-3	NW	6-8
		TOTAL	42hours				

Table 1.23: Breeding season 2014 (VP2).

Date	Start	Finish	Duration of survey (Hours)	Weather	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
30/04/2014	12:00	15:00	3	Warm, overcast with sunny spells	1-2	East	7-8
01/05/2014	11:00	14:00	3	Heavy rain	1	Southwest	7
13/05/2014	7:00	10:00	3	Overcast	0-1	Northeast	8

Date	Start	Finish	Duration of survey (Hours)	Weather	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
13/05/2014	10:15	13:15	3	Overcast some light rain	1	North	7-8
22/05/2014	5:30	8:30	3	Sunny with some cloud	3-4	Southwest	2-4
12/06/2014	6:45	9:45	3	Sunny	0-1	South	0-3
12/06/2014	10:00	13:00	3	Sunny	1-2	Southeast	2-4
25/06/2014	17:50	20:50	3	Sunny	0-1	East	2-3
24/07/2014	8:10	11:10	3	Sunny, warm	2	South	0-1
24/07/2014	11:20	14:20	3	Sunny, very hot	1-2	Northeast	0
05/08/2014	14:30	17:30	3	Overcast, sunny spells	2	SW	2-6
05/08/2014	17:40	20:40	3	Sunny, some cloud	1-2	SE	2-6
25/09/2014	10:10	13:10	3	Sunny spells	2-4	W	3-7
25/09/2014	13:15	16:15	3	Overcast	2-4	W	3-8
		TOTAL	42hours				

Table 1.24: Breeding season 2014 (VP3).

Date	Start	Finish	Duration of survey (Hours)	Weather	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
30/04/2014	12:30	15:30	3	Fine	1-2	Southwest	2-4
01/05/2014	8:15	11:15	3	Overcast, some light mist	0-2	East	8
15/05/2014	8:50	11:50	3	Sunny	1-3	Southeast	0-1
15/05/2014	12:00	15:00	3	Sunny	2-3	Southeast	0-1
21/05/2014	7:15	10:15	3	Overcast with some sun	1-3	West	4-8
21/05/2014	10:30	13:30	3	Overcast	1-2	Southeast	8
25/06/2014	8:20	11:20	3	Sunny spells	1-2	South	3-8

NOT PROTECTIVELY MARKED

Date	Start	Finish	Duration of survey (Hours)	Weather	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
25/06/2014	11:20	14:20	3	Sunny spells	2	South	5-7
26/06/2014	10:50	13:50	3	Sunny	2-3	East	2-3
26/06/2014	14:00	17:00	3	Overcast, sunny spells	2-3	East	4-7
21/07/2014	15:10	18:10	3	Sunny, hot	2-3	Northeast	2-3
23/07/2014	8:24	11:24	3	Sunny, humid	1-2	North	1-2
23/07/2014	14:20	17:20	3	Sunny, hot	2-3	North	0
23/07/2014	17:30	20:30	3	Sunny, hot	2-3	North	0
04/08/2014	14:20	17:20	3	Windy	4	East	5-7
07/08/2014	6:35	9:35	3	Overcast, sunny spells	0	N/A	1-6
20/08/2014	9:15	12:15	3	Sunny	1-2	NW	0-4
20/08/2014	12:25	15:25	3	Overcast, sunny spells	1-2	W	4-6
23/09/2014	7:20	10:20	3	Overcast, cold	1	NW	6-8
23/09/2014	10:30	13:30	3	Overcast with sunny spells, windy	1-3	W	5-7
25/09/2014	10:10	13:10	3	Overcast, sunny spells	2-3	W	2-7
25/09/2014	13:15	16:15	3	Overcast, sunny spells	2-3	W	3-7
		TOTAL	66hours				

Table 1.25: Breeding season 2014 (VP4).

Date	Start	Finish	Duration of survey (Hours)	Weather	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
01/05/2014	11:00	17:00	6	Overcast with some heavy rain	1-3	Southeast	8
21/05/2014	7:30	10:30	3	Sunny with some cloud later	0-1	Southwest	2-8
21/05/2014	10:30	13:30	3	Overcast	0-1	Southwest	4-8
25/06/2014	8:20	11:20	3	Sunny, some cloud	2-3	North	3-6
25/06/2014	11:30	14:30	3	Overcast, sunny spells	3-4	North	4-7
22/07/2014	5:10	8:10	3	Overcast	2-3	Northeast	8
22/07/2014	8:20	10:20	2	Overcast, cold, drizzling	1-2	North	8
22/07/2014	16:30	17:30	1	Sunny	2-3	North	0
05/08/2014	14:30	17:30	3	Sunny, Windy	4	East	4-7
05/08/2014	17:40	20:40	3	Sunny, windy	3-4	East	4-7
23/09/2014	7:20	10:20	3	Overcast	0-1	NW	6-7
23/09/2014	10:30	13:30	3	Overcast	2-3	S	4-8
		TOTAL	36hours				

Table 1.26: Breeding season 2014 (VP5).

Date	Start	Finish	Duration of survey (Hours)	Weather	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
20/05/2014	8:30	11:30	3	Sunny	2	Southwest	1-5
20/05/2014	11:30	14:30	3	Sunny with some cloud	1-4	Southwest	1-6
11/06/2014	11:30	14:30	3	Sunny	1-3	Southwest	2-6
11/06/2014	14:45	17:45	3	Sunny, overcast later	1-3	Southwest	5-7
23/07/2014	14:24	17:24	3	Windy, warm	4	North	0
23/07/2014	17:34	20:34	3	Sunny, windy	4	North	0
04/08/2014	14:20	17:20	3	Overcast with sunny spells	1-3	SW	3-7
07/08/2014	6:33	9:33	3	Sunny, calm	0	N/A	2-6

Date	Start	Finish	Duration of survey (Hours)	Weather	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
24/09/2014	10:05	13:05	3	Overcast, windy, some rain at end	2-4	NW	6-8
24/09/2014	13:15	16:15	3	Overcast with rain showers	3-4	NW	5-8
		TOTAL	30hours				

Table 1.27: Breeding season 2014 (VP6).

Date	Start	Finish	Duration of survey (Hours)	Weather	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
13/05/2014	7:00	10:00	3	Overcast	0-2	West	5-8
13/05/2014	10:15	13:15	3	Overcast and some light rain	0-2	West	6-8
12/06/2014	6:45	9:45	3	Sunny 19-22°	0	n/a	1-3
12/06/2014	10:00	13:00	3	Sunny 20-27°	0-1	Northeast	2-3
24/07/2014	8:10	11:10	3	Sunny	2	North	0
24/07/2014	11:20	14:20	3	Sunny, warm	2	South	0-1
06/08/2014	8:45	11:45	3	Heavy rain	2-4	S	8
06/08/2014	11:55	14:55	3	Rain at first, sunny later	1-4	S	2-8
22/09/2014	13:00	16:00	3	Sunny spells	1	NW	1-5
22/09/2014	16:10	19:10	3	Sunny	1	NW	1-3
		TOTAL	30hours				

Table 1.28: Wintering season 2014 (VP1).

Date	Start	Finish	Duration of survey (Hours)	Weather	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
26/11/14	09:25	12:25	3	Wet	1	E	8/8
26/11/14	12:35	15:35	3	Wet	2	E	8/8
02/12/14	9:35	12:25	3	Overcast	1	E	8/8
02/12/14	12:40	15:40	3	Raining	1-2	NE	7-8/8
06/1/15	10:00	13:00	3	Overcast	1	S	8/8
06/1/15	13:05	16:05	3	Heavy rain at times, some sun	2-3	W	2-8/8

Date	Start	Finish	Duration of survey (Hours)	Weather	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
03/02/2015	10:30	13:30	3	Bright and breezy with occasional showers	1-2	E	1 – 3/8
03/02/2015	14:00	17:00	3	Bright and breezy with occasional light showers	1-2	E	1 - 2/8
19/3/15	6:05	9:05	3	Overcast	1-4	E	8/8
19/3/15	9:10	12:10	3	Overcast	3-4	E	8/8
		TOTAL	30hours				

Table 1.29: Wintering season 2014 (VP2).

Date	Start	Finish	Duration of survey (Hours)	Weather	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
13/11/14	10:15	13:15	3	Overcast, breezy	5	S	5/8
13/11/14	13:25	16:25	3	Overcast, windy	4	S	8/8
02/12/14	09:35	12:35	3	Drizzle	0-1	E	8/8
02/12/14	12:40	15:40	3	Overcast	1	E	8/8
21/1/15	7:48	10:48	3	Light rain	1-2	SE	8/8
21/1/15	10:53	13:53	3	Light rain	2	E	8/8
18/2/15	6:45	9:45	3	Clear sky, still, cold but sunny	1	W	0/8
18/2/15	9:50	12:50	3	Sunny and calm	1-2	W – SW	0/8
4/3/15	1:15	12:15	3	Sunny	3-5	W-SW	1-4/8
4/3/15	12:20	15:20	3	Sunny	4-5	SW	4-6/8
		TOTAL	30hours				

Table 1.30: Wintering season 2014 (VP3).

Date	Start	Finish	Duration of survey (Hours)	Weather	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
14/10/14	9:15	12:15	3	Cloudy	1-3	W	5-8
14/10/14	12:25	15:25	3	Sunny spells	2	W	4/8

NOT PROTECTIVELY MARKED

Date	Start	Finish	Duration of survey (Hours)	Weather	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
15/10/14	8:25	11:25	3	Mist/fog	0-1	W	7-8/8
15/10/14	11:35	14:35	3	Warm, some mist/fog	1-2	W	6-8/8
26/11/14	09:25	12:25	3	Raining	2	E	8/8
26/11/14	12:35	15:35	3	Raining	2-3	E	8/8
27/11/14	08:42	11:42	3	Overcast	4	E	8/8
27/11/14	11:52	14:52	3	Overcast	5	E	6/8
17/12/14	7:35	10:35	3	Overcast	2-3	W	6-8/8
17/12/14	10:50	13:50	3	Overcast, some sunny spells	1-3	W	3-7/8
18/12/14	9:20	12:20	3	Overcast	2-5	W	6-8/8
18/12/14	12:25	15:25	3	Overcast, windy	4-5	W	8/8
21/1/15	7:50	10:50	3	Cold, windy, raining	2-3	E	8/8
21/1/15	10:50	13:50	3	Cold, windy, raining	3	SE	8/8
22/1/15	10:15	13:15	3	Overcast	3	NE	5-8/8
22/1/15	13:23	16:23	3	Overcast	3	NE	5-7/8
3/2/15	10:30	13:30	3	Cold, overcast	2-4	W	4 – 6/8
3/2/15	14:00	17:00	3	Cold, sunny	2-4	W	3 – 6/8
18/2/15	6:45	9:45	3	Frosty, clear and slight breeze	2-3	WNW	0 -1/8
18/2/15	9:50	12:50	3	Frosty, clear and slight breeze	3	WNW	0/8
4/3/15	11:30	14:30	3	Sunny, cloudy later	1-4	W	3-6/8
4/3/15	14:35	17:35	3	Overcast	1-4	W	6-8/8
19/3/15	6:05	9:05	3	Hazy, some mist	1-3	N	8/8
19/3/15	9:10	12:10	3	Sunny spells	2-3	N	3-8/8
		TOTAL	72hours				

Table 1.31: Wintering season 2014 (VP4)

Date	Start	Finish	Duration of survey (Hours)	Weather	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
13/11/14	10:15	13:15	3	Sunny	2-3	SE	5/8
13/11/14	13:25	16:25	3	Overcast	2-3	SE	8/8
17/12/14	7:35	10:35	3	Overcast	1-2	W	8/8
17/12/14	10:50	13:50	3	Overcast, some sunny spells	1-2	W	6-8/8
21/1/15	7:45	10:45	3	Overcast, cold, raining	2-3	S	8/8
21/1/15	10:50	13:50	3	Overcast, some showers	2-3	S	8/8
18/2/15	6:45	9:45	3	Sunny	1-2	SW	0 – 1/8
18/2/15	9:50	12:50	3	Sunny	1-2	S	0/8
4/3/15	9:15	12:15	3	Sunny	3-4	SW	1-3/8
4/3/15	12:30	15:30	3	Sunny	3-4	SW	4/8
		TOTAL	30hours				

Table 1.32: Wintering season 2014 (VP5).

Date	Start	Finish	Duration of survey (Hours)	Weather	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
13/11/14	10:15	13:15	3	Warm, windy, overcast	4	S	6/8
13/11/14	13:25	16:35	3	Windy, overcast	5	S	8/8
02/12/14	9:35	12:35	3	Raining	4-5	S	8/8
02/12/14	12:40	15:40	3	Drizzle	2-3	S	8/8
06/1/15	10:00	13:00	3	Overcast	1-2	SW	8/8
06/1/15	13:05	16:05	3	Raining, some sun	2-4	SW	4-8/8
19/2/15	7:30	10:30	3	Dry, windy, mostly sunny	4-5	SW	0 – 6/8
19/2/15	10:40	13:40	3	Overcast, windy but dry	5	SW	6 – 8/8
4/3/15	9:15	12:15	3	Sunny	4-5	W	1-6/8
4/3/15	12:20	15:20	3	Sunny spells	3-4	W	4-6/8

Date	Start	Finish	Duration of survey (Hours)	Weather	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
		TOTAL	30hours				

Table 1.33: Wintering season 2014 (VP6).

Date	Start	Finish	Duration of survey (Hours)	Weather	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
26/11/14	09:25	12:25	3	Raining	0	n/a	8/8
26/11/14	12:35	15:35	3	Raining	0	n/a	8/8
17/12/14	7:35	10:35	3	Overcast	1-2	W	7-8/8
17/12/14	10:50	13:50	3	Overcast	2-3	W	6-7/8
06/1/15	10:00	13:00	3	Overcast	3-4	S	8/8
06/1/15	13:05	16:05	3	Raining, some sunny spells	3-4	W	2-8/8
3/2/15	10:30	13:30	3	Frosty, still, and initially overcast	0-1	NW	1 – 4/8
3/2/15	14:00	17:00	3	Frosty, Still and sunny	0-1	NW	1/8
18/3/15	6:05	9:05	3	Overcast	0-1	N	8/8
18/3/15	9:10	12:10	3	Sunny spells	1	NW	2-8/8
		TOTAL	30hours				

Table 1.34: Breeding season 2015 (VP1).

Date	Start	Finish	Duration of survey (Hours)	Weather	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
14/4/15	7:30	10:30	3	Sunny	1	S	1-2/8
14/4/15	10:35	13:35	3	Sunny	2	SW	0/8
17/4/15	7:05	10:05	3	Overcast, windy	3-4	NE	6-8/8
27/4/15	14:20	17:20	3	Clear, cold	2-4	NE	3/8
1/5/15	6:15	9:15	3	Calm, cold	0	N/A	6-7/8
22/5/15	6:29	9:29	3	Overcast, calm	0	N/A	8/8
4/6/15	4:40	7:40	3	Clear, some cloud	0	N/a	0-3/8
4/6/15	7:50	10:50	3	Clear	0-1	SW	0/8

Date	Start	Finish	Duration of survey (Hours)	Weather	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
5/6/15	6:25	8:05	1:40	Overcast, thunderstorm at end	1	SW	6-8/8
19/6/15	7:55	9:25	1:30	Sunny spells	2-3	NW	3-4/8
10/7/15	7:00	10:00	3	Sunny	0-2	NW	0/8
20/7/15	14:55	20:00	5:05	Overcast, sunny spells	2-3	SW	3-7/8
28/8/15	7:20	10:20	3	Clear	0	N/a	1-2/8
9/9/15	13:00	16:00	3	Sunny	3-4	E	1-2/8
9/9/15	16:30	19:30	3	Sunny	4	E	0-3/8
		TOTAL	44hours 15mins				

Table 1.35: Breeding season 2015 (VP2).

Date	Start	Finish	Duration of survey (Hours)	Weather	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
13/4/15	17:10	20:10	3	Overcast	1-2	NE	6-8/8
15/4/15	8:15	11:15	3	Sunny, hot	1-2	SW	0/8
18/5/15	14:15	17:15	3	Sunny spells, some heavy rain	2-3	SW	2-8/8
18/5/15	17:20	20:20	3	Overcast	0-2	SW	2-7/8
3/6/15	4:55	7:55	3	Overcast, sunny spells	1-4	SW	1-4/8
3/6/15	8:00	11:00	3	Sunny	2-3	SW	1-5/8
8/7/15	9:25	12:25	3	Overcast	1-4	W	6-7/8
8/7/15	12:30	15:30	3	Overcast	1-3	W	4-8/8
13/8/15	6:00	9:00	3	Overcast, sunny spells	1-2	NW-N	2-8/8
13/8/15	9:30	12:30	3	Overcast, sunny spells	2-3	N-NW	4-8/8
9/9/15	13:00	16:00	3	Sunny, hot	1-2	N	1-2/8
9/9/15	16:30	19:30	3	Sunny spells	0-2	NE	0-3/8
		TOTAL	36hours				

Table 1.36: Breeding season 2015 (VP3).

Date	Start	Finish	Duration of survey (Hours)	Weather	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
14/4/15	7:30	10:30	3	Clear, warm	2-5	W	1-6/8
14/4/15	10:35	13:35	3	Clear, windy	5-6	W	0-1/8
29/4/15	14:25	17:25	3	Overcast, raining, sunny spells	1-3	W-SW	4-8/8
29/4/15	17:35	20:35	3	Sunny	1-2	S-W	2-4/8
06/05/15	05:06	08:06	3	Windy with showers	4-5	SW	6/8 – 8/8
06/05/15	08:36	11:36	3	Windy, overcast	5-7	SW	6/8 – 5/8
20/5/15	9:05	12:05	3	Overcast, sunny spells	2-3	SW-W	2-8/8
20/5/15	12:15	15:15	3	Overcast, sunny spells	1-4	W-E	6-8/8
21/5/15	14:15	17:15	3	Overcast, windy	2-5	NW-SE	3-7/8
21/5/15	17:50	20:50	3	Sunny	1-3	SE	1-4/8
4/6/15	4:40	7:40	3	Sunny	1-2	E-W	0-1/8
4/6/15	7:50	10:50	3	Sunny	2-4	SE-E	0/8
17/6/15	9:15	12:15	3	Overcast, sunny spells	3-4	SW-W	1-7/8
17/6/15	12:25	15:25	3	Overcast, sunny spells	3-4	W	7/8
7/7/15	14:30	17:30	3	Overcast, sunny spells	3-4	W	2-6/8
7/7/15	17:40	20:40	3	Sunny, windy	4-5	W	0-2/8
23/7/15	5:05	8:05	3	Sunny, some mist at start	0-1	W	1/8
23/7/15	8:10	11:10	3	Overcast, sunny spells	1-3	W	1-8/8
11/8/15	9:00	12:00	3	Overcast, some light rain	1-2	NE-NW	7-8/8
11/8/15	12:30	15:30	3	Overcast	2	NE	8/8
26/8/15	13:30	16:30	3	Overcast, raining at end of survey	3-6	SE-SW	8/8

Date	Start	Finish	Duration of survey (Hours)	Weather	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
26/8/15	17:00	20:00	3	Raining at start, then sunny spells	3-4	SW-W	3-8/8
8/9/15	6:20	9:20	3	Overcast, south light rain at start	1-2	NE	8/8
8/9/15	9:50	12:50	3	Overcast	1-2	NE	7-8/8
		TOTAL	72hours				

Table 1.37: Breeding season 2015 (VP4).

Date	Start	Finish	Duration of survey (Hours)	Weather	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
13/4/15	17:10	20:10	3	Overcast	2-3	SE	2-8/8
15/4/15	8:20	11:20	3	Sunny	0-1	SW	0/8
12/5/15	10:05	13:05	3	Sunny spells. Some rain	2-3	W	1-8/8
12/5/15	13:10	16:10	3	Sunny	2-3	S-W	2-6/8
17/6/15	9:15	12:15	3	Overcast, sunny spells	1-3	SE-SW	2-6/8
17/6/15	12:25	15:25	3	Overcast	3	SW	6-8/8
23/7/15	5:05	8:05	3	Clear, some early mist	0	N/a	0-1/8
23/7/15	8:10	10:30	2:20	Sunny at first, overcast at end of survey.	0-2	SW	1-5/8
26/8/15	13:05	16:45	4:40	Overcast, windy, rain at start	6	S	8/8
26/8/15	17:15	20:15	3	Windy, overcast	1-5	S	5-8/8
8/9/15	6:20	9:20	3	Overcast	1	S	8/8
8/9/15	9:50	12:50	3	Overcast, sunny spells	1-2	NW	6-8/8
		TOTAL	37hours				

Table 1.38: Breeding season 2015 (VP5).

Date	Start	Finish	Duration of Survey (Hours)	Weather	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
29/4/15	14:25	17:25	3	Overcast, some rain	0-2	SE	5-8/8
29/4/15	17:35	20:35	3	Overcast, sunny spells	0	N/A	2-5/8
18/5/15	14:15	17:15	3	Overcast, some rain	2-4	SW	3-8/8
18/5/15	17:20	20:20	3	Sunny spells	2-4	SW	3-5/8
4/6/15	4:40	7:40	3	Sunny	0-1	SE	0-2/8
4/6/15	7:50	10:50	3	Sunny	1-3	SE	0-1/8
8/7/15	9:25	12:25	3	Overcast	2	W	7-8/8
8/7/15	15:00	18:00	3	Overcast, some rain and sunny spells	3-4	SW	2-7/8
13/8/15	6:00	9:00	3	Hazy, overcast	4	NE	6-8/8
13/8/15	9:30	12:30	3	Overcast	4	NE	5-8/8
10/9/15	8:55	11:55	3	Sunny	4	E	1-2/8
10/9/15	12:25	15:25	3	Sunny	4-5	E	1-2/8
		TOTAL	36hours				

Table 1.39: Breeding season 2015 (VP6).

Date	Start	Finish	Duration of survey (Hours)	Weather	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
15/4/15	6:05	8:05	2	Clear, calm	0	N/A	0/8
15/4/15	8:15	12:15	4	Clear, calm	1	S	0/8
06/05/15	05:06	08:06	3	Windy, overcast	4-5	SW	6/8 – 8/8
06/05/15	08:36	11:36	3	Windy, overcast	5	SW	5/8 – 8/8
2/6/15	11:45	14:45	3	Windy, overcast	6-7	SW	8/8
2/6/15	15:00	18:00	3	Windy, overcast	6-7	SW	5-8/8
7/7/15	14:30	17:30	3	Overcast, sunny spells	4-5	SW	2-7/8

Date	Start	Finish	Duration of survey (Hours)	Weather	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
7/7/15	17:30	20:30	3	Sunny, windy	2-5	SW	2/8
11/8/15	9:00	12:00	3	Overcast	0-2	NW	8/8
11/8/15	12:30	15:30	3	Overcast	1-2	NW	8/8
10/9/15	8:55	11:55	3	Sunny	1-3	NE	0/8
10/9/15	12:25	15:25	3	Sunny	2-3	NE	2-3
		TOTAL	36hours				

f) Marsh harrier arable surveys

1.17.8 **Table 1.40** to **Table 1.45** show the survey conditions and timings of the marsh harrier arable surveys undertaken in 2015. The results of the marsh harrier arable surveys can be found in **Annex 14A7.5**.

Table 1.40: Breeding season 2015 (VPA).

Date	Start	Finish	Duration of survey (Hours)	Weather	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
14/4/15	7:30	10:30	3	Clear	1-2	SW	1/8
14/4/15	11:00	14:00	3	Fine/ bright	0	N/A	0/8
16/4/15	6:45	9:45	3	Sunny spells, overcast	1-2	S	2-5/8
16/4/15	9:50	12:50	3	Sunny	2	S	2/8
28/4/15	5:35	8:35	3	Clear, cold	1-3	E	0-1/8
28/4/15	8:40	11:40	3	Sunny, cold	2-4	E	0-2/8
30/4/15	14:30	17:30	3	Overcast	2-3	E	6-8/8
30/4/15	17:35	20:35	3	Overcast, heavy rain showers	1-2	E	1-7/8
19/5/15	11:35	14:35	3	Overcast, raining	2-4	W	5-8/8
19/5/15	14:40	17:40	3	Sunny spells, some rain	2-4	W	5-7/8
2/6/15	11:50	14:50	3	Overcast, windy	4-5	W	8/8
2/6/15	15:00	18:00	3	Overcast, windy, some sunny spells	4-6	W	4-8/8

Date	Start	Finish	Duration of survey (Hours)	Weather	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
18/6/15	15:20	18:20	3	Overcast, sunny spells	2	W	5-8/8
18/6/15	18:35	21:35	3	Overcast	2	SW-S	8/8
6/7/15	14:50	17:50	3	Overcast, some rain	2-3	SE	4-7/8
6/7/15	18:05	21:05	3	Overcast, sunny spells	2	SE	3-6/8
22/7/15	9:00	12:00	3	Sunny spells	1	SW	4/8
22/7/15	14:30	17:30	3	Overcast	1-3	SW	3-6/8
12/8/15	5:30	8:30	3	Overcast, some light rain	2-3	SW	7-8/8
12/8/15	9:00	12:00	3	Overcast	2-4	W	8/8
		TOTAL	60hours				

Table 1.41: Breeding season 2015 (VPB).

Date	Start	Finish	Duration of survey (Hours)	Weather	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
16/4/15	6:45	9:45	3	Overcast, clear spells	0	N/A	5-8/8
16/4/15	9:50	12:50	3	Sunny	0	N/A	0-4/8
28/4/15	5:35	8:35	3	Clear, cold	2-5	NE	0-2/8
28/4/15	8:40	11:40	3	Clear, cold, windy	4-5	NE	1-6/8
05/05/15	08:00	21:00	3	Very windy, dry	6-7	SW	5/8 – 5/8
05/05/15	14:55	17:55	3	Very windy, dry	6-7	SW	4/8 – 5/8
		TOTAL	18hours				

Table 1.42: Breeding season 2015 (VPC).

Date	Start	Finish	Duration of survey (Hours)	Weather	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
16/4/15	6:45	9:45	3	Clear spells	0-1	SW	0-4/8
16/4/15	10:00	13:00	3	Clear	2-3	SW	0-2/8

Date	Start	Finish	Duration of survey (Hours)	Weather	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
30/4/15	14:30	17:30	3	Windy, overcast	3-4	NW	7/8
30/4/15	17:35	20:35	3	Overcast, sunny spells	0-2	NW-W	2-8/8
05/05/15	14:55	17:55	3	Windy	6	S	7/8
05/05/15	18:00	21:00	3	Windy	6-7	S	6/8 – 4/8
07/05/15	05:58	08:58	3	Clear, dry	2-3	SW	0/8 – 3/8
07/05/15	09:03	12:03	3	Overcast, dry	1-3	SW - W	3/8 – 8/8
15/6/15	17:00	20:00	3	Sunny	1-3	E	1/8
18/6/15	15:20	18:20	3	Overcast	2	NW	5-7/8
10/7/15	7:00	10:00	3	Sunny	2	SW	2/8
22/7/15	9:00	12:00	3	Sunny spells	1-4	SW	3-6/8
22/7/15	12:05	15:05	3	Overcast, sunny spells	2-5	SW	6-7/8
10/8/15	16:20	19:20	3	Sunny spells	2-4	SW	2-4/8
28/8/15	7:20	10:20	3	Sunny	2	S	0-1/8
		TOTAL	45hours				

Table 1.43: Breeding season 2015 (VPD).

Date	Start	Finish	Duration of survey (Hours)	Weather	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
07/05/15	05:58	08:58	3	Calm	1	SW - W	0/8 – 2/8
07/05/15	09:03	12:03	3	Calm	2	SW	4/8 – 8/8
19/5/15	11:35	14:35	3	Showers, some thunder	2	W-SW	6-7/8
19/5/15	14:40	17:40	3	Showers at first, calm after	0-2	SW	5-8/8
2/6/15	11:49	14:49	3	Windy, overcast	4-5	SW	8/8
2/6/15	15:00	18:00	3	Windy, overcast	4-5	SW	5-8/8

Date	Start	Finish	Duration of survey (Hours)	Weather	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
16/6/15	8:30	11:30	3	Overcast, sunny spells	0-3	SE	1-8/8
16/6/15	11:35	14:35	3	Sunny	2-3	SE	0-1/8
9/7/15	5:10	8:10	3	Sunny	0-2	SW	1-2/8
9/7/15	8:15	11:15	3	Sunny	1-2	NW-W	1-5/8
21/7/15	14:30	17:30	3	Sunny	1-2	SW	1-2/8
21/7/15	17:45	20:45	3	Sunny spells	1-2	SW	3-5/8
10/8/15	14:40	16:10	1.5	Overcast, sunny spells	1-2	SW	6/8
10/8/15	19:30	21:00	1.5	Overcast, sunny spells	0	N/a	2-3/8
14/8/15	7:00	10:00	3	Overcast, some light rain at end	0-2	SW	8/8
27/8/15	10:45	13:45	3	Overcast	1-2	W	8/8
27/8/15	14:15	17:15	3	Overcast	1-3	W	3-8/8
		TOTAL	48hours				

Table 1.44: Breeding season (VPE).

Date	Start	Finish	Duration of survey (Hours)	Weather	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
21/5/15	14:15	17:15	3	Overcast, sunny spells	2-3	W	4-7/8
21/5/15	17:50	20:50	3	Cloudy, sunny spells	0-3	W	3-6/8
3/6/15	4:55	7:55	3	Sunny, calm	0-4	SW	3-4/8
3/6/15	8:00	11:00	3	Overcast, sunny spells	4	SW	2-6/8
18/6/15	18:35	21:35	3	Overcast	1	NW	8/8
6/7/15	18:05	21:05	3	Overcast	2-3	SW	6-7/8
12/8/15	5:30	8:30	3	Overcast	1-2	NE	7-8/8
12/8/15	9:00	12:00	3	Overcast	3-4	NE	8/8
14/8/15	7:00	10:00	3	Low cloud cover, some light rain	0-1	NW	8/8
25/8/15	7:55	10:55	3	Sunny	1-2	W	2-4/8

Date	Start	Finish	Duration of survey (Hours)	Weather	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
25/8/15	11:25	14:25	3	Sunny, overcast at end	2-3	S	3-8/8
27/8/15	10:45	13:45	3	Overcast	0-1	S	8/8
27/8/15	14:15	17:15	3	Overcast	0	N/a	5-8/8
		TOTAL	39hours				

Table 1.45: Breeding season 2015 (VPF).

Date	Start	Finish	Duration of survey (Hours)	Weather	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
20/5/15	9:05	12:05	3	Sunny, cold	3-4	NW	3-7/8
20/5/15	12:15	15:15	3	Overcast, some showers	3-4	NW	3-8/8
3/6/15	4:55	7:55	3	Sunny spells	2-4	NW	1-4/8
3/6/15	8:00	11:00	3	Sunny spells	4	NW	2-5/8
16/6/15	8:30	11:30	3	Overcast, sunny spells	1-2	SE	1-8/8
16/6/15	11:35	14:35	3	Clear	2-3	SE	1/8
6/7/15	14:50	17:50	3	Overcast, some light drizzle	2-3	SW	4-5/8
9/7/15	5:00	8:00	3	Clear	2-3	SW	0-2/8
9/7/15	8:15	11:15	3	Sunny spells	1-2	SW	1-4/8
21/7/15	14:35	17:35	3	Sunny spells	2-4	SW	3-6/8
21/7/15	17:40	20:40	3	Sunny	2-4	SW	2-4/8
10/8/15	14:40	17:40	3	Overcast, sunny spells	3-5	S	3-7/8
10/8/15	18:10	21:10	3	Overcast, sunny spells	2-4	S-SE	3-5/8
25/8/15	7:55	10:55	3	Wind, clear skies	4-6	W	2-3/8
25/8/15	11:25	14:25	3	Windy	5-6	W-SW	4-8/8
		TOTAL	45hours				

g) Marsh harrier surveys Aldhurst Farm 2018/19

1.17.9 **Table 1.46** and **Table 1.47** show the survey conditions and timings of the marsh harrier surveys undertaken in 2018 and 2019. The results of the marsh harrier surveys at Aldhurst Farm and the southern reptile receptor areas can be found in **Annex 14A7.4-4**.

Table 1.46: Marsh harrier survey conditions 2018 and 2019 (Aldhurst Farm).

Date	Start	Finish	Duration of survey (Hours)	Weather	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
12/12/2018	10:30	12:05	1:35	Calm, dry	N/A	N/A	2/8
11/01/2019	9:15	10:30	1:15	Light breeze	N/A	NW	7/8
07/02/2019	14:30	15:55	1:25	Strong winds (50mph), dry	N/A	SW	3/8
		Total	4hr15 min				

Table 1.47: Marsh harrier survey conditions 2018 and 2019 (Southern reptile receptor areas).

Date	Start	Finish	Duration of survey (Hours)	Weather	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
12/12/2018	9:00	10:55	1:55	Calm, dry	N/A	N/A	2/8
11/01/2019	9:00	10:25	1:25	Light breeze	N/A	NW	7/8
07/02/2019	14:30	16:05	1:35	Strong winds (50mph), dry	N/A	SW	3/8
		Total	4hr55min				

h) Nightjar surveys

1.17.10 **Table 1.48** shows the survey conditions and timings of the nightjar surveys undertaken in 2014 and 2015.

Table 1.48: Nightjar survey conditions 2014 and 2015.

Date	Start	Finish	Duration of survey (Hours)	Weather	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
19/5/14	21:15	22:45	1:30	Clear skies, no wind	0	N/a	0/8

Date	Start	Finish	Duration of survey (Hours)	Weather	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
23/6/14	21:20	23:15	1:55	Clear skies, no wind	0	N/a	0/8
		TOTAL	3hr25min				
18/5/15	21:30	23:00	1:30	Clear	2	W	2/8
		TOTAL	1hr30				

i) Barn owl surveys

1.17.11 **Table 1.49** to **Table 1.52** show the conditions and timings of the barn owl surveys undertaken in 2015. The results of the barn owl surveys can be found in **Annex 14A7.5**.

Table 1.49: Breeding season 2015 (transect 1).

Date	Start	Finish	Duration of survey (Hours)	Weather	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
15/4/15	19:15	20:15	1	Calm, clear, warm	0	N/A	0/8
16/4/15	5:25	6:25	1	Slightly misty, overcast	2	W	5/8
7/5/15	20:00	21:00	1	Overcast	0	N/a	8/8
13/5/15	4:30	5:30	1	Clear	0	N/a	0/8
		TOTAL	4				

Table 1.50: Breeding season 2015 (transect 2).

Date	Start	Finish	Duration of survey (Hours)	Weather	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
15/4/15	19:15	20:15	1	Fine	2	W	0/8
16/4/15	5:25	6:25	1	Overcast	1	W	3/8
07/05/15	20:00	21:00	1	Dry	0	0	8/8
14/5/15	4:30	5:30	1	Overcast	0	N/a	5/8
		TOTAL	4				

Table 1.51: Breeding season 2015 (transect 3).

Date	Start	Finish	Duration of Survey (Hours)	Weather	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
15/4/15	19:15	20:15	1	Clear	2	SE	2/8
16/4/15	5:20	6:20	1	Clear	2	W	4/8
07/05/15	04:30	05:30	1	Clear, dry	3	SW	0/8
20/5/15	20:30	21:30	1	Clear	0	N/A	2/8
		TOTAL	4				

Table 1.52: Breeding season (transect 4).

Date	Start	Finish	Duration of survey (Hours)	Weather	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
29/4/15	4:55	5:55	1	Overcast, still	0	N/A	8/8
28/4/15	19:50	20:50	1	Clear	1	E	1/8
07/05/15	04:30	05:30	1	Calm, clear	1		0/8
20/5/15	20:30	21:30	1	Clear	1	SW	2/8
		TOTAL	4				

j) Black redstart surveys

1.17.12 **Table 1.53** and **Table 1.54** show the conditions and timings of the black redstart surveys undertaken in 2015. The results of the black redstart surveys can be found in **Annex 14A7.5**

Table 1.53: Breeding season 2015 (main platform transect).

Date	Start	Finish	Duration of survey (Hours)	Weather	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
14/4/15	5:30	6:30	1	Fine, sunny	1	S	1/8
27/4/15	19:40	20:40	1	Overcast	2	E	7/8
30/4/15	7:45	8:45	1	Clear	1	E	0/8
19/5/15	10:00	11:00	1	Overcast	3-4	W	6/8
21/5/15	4:30	5:30	1	Sunny	0	N/a	0/8
18/6/15	13:35	14:25	1	Sunny	2	W	4/8

Date	Start	Finish	Duration of survey (Hours)	Weather	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
		TOTAL	6				

Table 1.54: Breeding season 2015 (coastal transect).

Date	Start	Finish	Duration of survey (Hours)	Weather	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
14/4/15	5:35	6:35	1	Sunny	1-2	S	1/8
27/4/15	19:40	20:40	1	Clear	4	NE	5/8
30/4/15	7:47	8:47	1	Clear	2	E	0/8
19/5/15	10:00	11:00	1	Overcast	3-4	W	7/8
21/5/15	4:30	5:30	1	Clear, calm	0	N/A	2/8
18/6/15	13:35	14:35	1	Sunny spells	3	SW	4/8
		TOTAL	6				

k) Breeding bird surveys

1.17.13 **Table 1.55 to Table 1.60** show the conditions and timings of the breeding bird surveys undertaken in 2014 and 2015. The results of the breeding bird surveys can be found in **Annex 14A7.5** and **Annex 14A7.6**.

Table 1.55: Breeding season 2014 (arable).

Date	Start	Finish	Duration of survey (Hours)	Weather	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
29/04/14	6:25	9:00	2:35	Overcast, misty	1	South	8
14/05/14	6:00	8:15	2:45	Sunny	0-3	North	0
05/06/14	5:20	7:40	2:20	Overcast, rain showers from 6.30 onwards	0-3	Southwest	8
		TOTAL	7hours 40mins				

Table 1.56: Breeding season 2014 (Goose Hill).

Date	Start	Finish	Duration of survey (Hours)	Weather	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
29/04/2014	6:30	9:00	2:30	Overcast	0	n/a	8
14/05/2014	6:15	8:20	2:05	Sunny	2	Northeast	0
05/06/2014	5:40	8:15	2:35	Overcast, some rain	0-3	Southwest	7-8
		Total	7hours 10mins				

Table 1.57: Breeding season 2014 (Reedbed within Sizewell Marshes SSSI).

Date	Start	Finish	Duration of survey (Hours)	Weather	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
13/05/2014	6:10	7:10	1	Overcast	0	n/a	8
05/06/2014	5:55	6:35	0:40	Overcast	2	Southwest	8
12/06/2014	5:40	6:40	1	Sunny	0	n/a	0
		Total	2hours 40mins				

Table 1.58: Breeding season 2014 (Coronation Wood/proposed main platform and Sizewell Beach).

Date	Start	Finish	Duration of survey (Hours)	Weather	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
23/04/14	6:15	8:45	2:30	Overcast, some drizzle	0	n/a	8
15/05/2014	6:10	7:15	1:05	Sunny, 6°	0	n/a	0
05/06/2014	5:30	7:30	2	Sunny, some drizzle later	2	Southwest	3-4
		Total	5hours 35mins				

Table 1.59: Breeding season 2015 (northern arable transect 1).

Date	Start	Finish	Duration of survey (Hours)	Weather	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
29/4/15	4:55	5:55	1	Overcast	1	E	5/8
7/5/15	4:30	5:30	1	Clear	3	SW	0/8
		TOTAL	2hours				

Table 1.60: Breeding season 2015 (northern arable transect 2).

Date	Start	Finish	Duration of Survey (Hours)	Weather	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
29/4/15	4:55	5:55	1	Overcast, still	0	N/A	8/8
7/5/15	4:30	5:30	1	Clear	1	SW	0/8
		TOTAL	2hours				

I) Wintering bird surveys

1.17.14 **Table 1.61** to **Table 1.68** show the conditions and timings of the wintering bird surveys undertaken in 2014/15 and 2018/19. The results of the 2014/15 wintering bird surveys can be found in **Annex 14A7.5** and **Annex 14A7.6**. The results of the 2018/19 wintering bird surveys can be found in **Annex 14A7.4-4**.

Table 1.61: Winter season 2014/15 (arable).

Date	Start	Finish	Duration of Survey (Hours)	Weather	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
13/11/14	08:10	10:10	2	Warm, dry	5	SE	6/8
02/12/14	7:30	9:30	2	Overcast	0	n/a	8/8
06/01/15	8:00	10:00	2	Overcast	0	n/a	8/8
3/2/15	7:15	9:30	2hr 15min	Sunny with showers	0	n/a	3-6/8
4/3/15	7:00	9:15	2hr 15min	Sunny	2-5	W	1/8
		Total	10hours 30mins				

Table 1.62: Winter season 2014/15 (Goose Hill).

Date	Start	Finish	Duration of Survey (Hours)	Weather	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
13/11/14	08:40	10:10	1.5	Sunny, light wind and some cloud	1	SE	2/8
02/12/14	7:30	9:30	2	Overcast, some light drizzle	0	n/a	8/8
06/1/15	7:50	9:40	1hr 50min	Overcast	0-1	S	8/8
3/2/15	7:55	9:55	2	Showers then clear	0	n/a	4/8
4/3/15	7:00	8:50	1hr 50min	Sunny	3	W	0/8
		Total	9hours 10mins				

Table 1.63: Winter season 2014/15 (Reedbed within Sizewell Marshes SSSI).

Date	Start	Finish	Duration of Survey (Hours)	Weather	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
11/11/14	12:00	12:30	30mins	Overcast	1-2	SE	6/8
04/12/14	8:10	8:35	25mins	Overcast	1	E	8/8
22/1/15	14:45	15:45	1	Sunny, still	0	n/a	3/8
5/2/15	9:30	10:00	30mins	Clear	2	E	3/8
5/3/15	8:20	9:00	0:40	Sunny	0	n/a	3/8
		Total	3hours 5mins				

Table 1.64: Winter season 2014/15 (Coronation Wood/proposed main platform and Sizewell Beach).

Date	Start	Finish	Duration of Survey (Hours)	Weather	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
13/11/14	08:10	09:50	1:40	Sunny	2-3	SE	2/8
02/12/14	7:30	9:15	1:45	Overcast	1-2	E	8/8
06/1/15	8:20	10:00	1:40	Overcast	2-3	SE	8/8
3/2/15	7:10	8:20	1:10	Overcast	2	NE	6/8
4/3/15	7:05	9:00	1hr 55min	Sunny	4	W	1/8
		Total	8hours 10mins				

Table 1.65: Winter season 2018/19 (Sizewell Marshes SSSI compartment A/B).

Date	Start	Finish	Duration of survey (Hours)	Weather	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
11/12/18	9:50	10:30	0:40	Calm, dry, ditches and flooded areas frozen 1-5°C	N/A	N/A	0/8
10/01/19	13:30	14:45	1:15	3-4°C, light breeze, shower	N/A	NW	8/8
07/02/2019	9:40	10:40	1	7-9°C, strong winds (50mph gusts), dry	N/A	SW	4/8-7/8
		Total	2hours 55mins				

Table 1.66: Winter season 2018/19 (Sizewell Marshes SSSI compartment C).

Date	Start	Finish	Duration of survey (Hours)	Weather	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
11/12/18	10:35	11:35	1	Calm, dry, ditches and flooded areas frozen 1-5°C	N/A	N/A	0/8
10/01/19	11:15	12:30	1:15	3-4°C, light breeze, shower	N/A	NW	8/8
07/02/2019	11:00	12:05	1:05	7-9°C, strong winds (50mph gusts), dry	N/A	SW	4/8-7/8
		Total	3hours 20mins				

Table 1.67: Winter season 2018/19 (Sizewell Marshes SSSI compartment D).

Date	Start	Finish	Duration of survey (Hours)	Weather	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
11/12/18	12:45	14:40	1:55	Calm, dry, ditches and flooded areas frozen 1-5°C	N/A	N/A	0/8
10/01/2019	9:20	11:00	1:40	3-4°C, light breeze, shower	N/A	NW	8/8

Date	Start	Finish	Duration of survey (Hours)	Weather	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
07/02/2019	13:15	14:25	1:10	7-9°C, strong winds (50mph gusts), dry	N/A	SW	4/8-7/8
		Total	4hours 45mins				

Table 1.68: Winter season 2018/19 (Minsmere South Levels).

Date	Start	Finish	Duration of survey# (Hours)	Weather	Wind speed (beaufort)	Wind direction	Cloud cover (octas)
11/12/18	10:30	14:30	4	Calm, dry, ditches and flooded areas frozen 1-5°C	N/A	N/A	0/8
10/01/19	9:30	13:30	4	3-4°C, light breeze, shower	N/A	NW	8/8
07/02/19	9:30	12:50	3.20	7-9°C, strong winds (50mph gusts), dry	N/A	SW	4/8-7/8
		Total	11hours 20mins				

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SIZEWELL C DEVELOPMENT – MAIN DEVELOPMENT SITE: VOLUME 2, CHAPTER 14, APPENDIX 14A7 – ORNITHOLOGY

ANNEX 14A7.3 ORNITHOLOGY SECONDARY DATA

- Annex 14A7.3 Sizewell First Interim Bird Report February 2008
- Annex 14A7.3 Nightjar Survey Report 2010
- Annex 14A7.3 Black Redstart Survey Report 2011
- Annex 14A7.3 Sizewell Second Interim Bird Report
- Annex 14A7.3 Seabird Report 2011-12
- Annex 14A7.3 Sizewell Bittern Report 2008
- Annex 14A7.3 Breeding Bird Survey Report 2010
- Annex 14A7.3 Marsh Harrier and Bittern Survey Report 2011-12
- Annex 14A7.3 Sizewell Little Tern Report 2010
- Annex 14A7.3 Arable Reversion CBC 2012
- Annex 14A7.3 Sizewell Marsh Harrier Report 2008

British Energy Group PLC

Sizewell

First Interim Bird Report

February 2008

Entec UK Limited

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First Interim Bird Report

February 2008

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1. Introduction

1.1 Purpose of this Report

British Energy (BE) is at the early stages of investigating the feasibility of building new nuclear power stations at a range of sites within their UK land holding. Sizewell has been identified as one potential site for investigation and likely progression to EIA. Entec UK Ltd have been appointed as BE's ecological consultants to lead and co-ordinate the baseline ornithological and terrestrial ecological work and assessment for Sizewell. An Ecological Scoping Report (Entec doc ref 19801cr050), detailing the desk study exercise and survey work to be undertaken at Sizewell between April 2007 and March 2008 has previously been produced and circulated to consultees.

This report summarises the first phase of ornithological work at Sizewell, the breeding bird surveys undertaken on the BE Estate between April and July 2007 inclusive. The results of intertidal and inshore marine surveys covering the late spring passage, summer and early return passage period have also been included. It is intended to issue this report to consultees for comment, and as such, any observations on the adequacy of work undertaken to date, and any recommendations with regard to further work required in 2008 to form the baseline for an EIA would be welcomed. BE is keen to develop appropriate ornithological mitigation and compensation measures through discussion with consultees, and while these will be easier to define once more information about the design of the proposed build becomes available, any initial recommendations based on the findings of this report would be very useful.

It should be noted that this report contains information relating to the nest locations of highly protected species. As such, it should be treated as **confidential** and should not enter the public domain.

1.2 Scheme Description

An area of land directly north of the Sizewell 'A' and 'B' Power Stations has been identified as having the potential to accommodate nuclear new build. This area, which covers 0.32km²/32ha and has an approximate central grid reference of TM473640, is referred to in this document as 'the preliminary works area.' A boundary, including an indicative access road and construction compound (accounting for a potential further 0.35km²/35ha of land take) is shown in **Figure 1.1**. It should be noted that this initial development footprint is purely indicative, as environmental, landscape and visual, hydrological and other constraints have not yet been considered and taken into account. These would all be addressed as a matter of course as part of an EIA.

No detailed information on the exact nature of the proposed nuclear power station can be provided at this stage, but it is assumed for the present that the power station would be water-cooled and that there would be a requirement for additional works associated with this in the sub-tidal zone. The range of development activities that could potentially affect biodiversity interests are typical of those associated with the construction, operation and decommissioning of

any large industrial structure, albeit one that it is likely to remain in place for an extended period of time.

1.3 Preliminary Works Area Description and Context

The preliminary works area comprises open sheep grazed pasture, fringed by reinstated coastal dune vegetation parts of which have been planted with trees and scrub. The hydrology and pedology of the preliminary works area were irreversibly altered as a result of works associated with the building of the Sizewell 'A' and 'B' Stations (adjacent to its southern boundary), and as a result it has lost much of its botanical merit. Habitats adjoining or in close proximity to the preliminary works area are of considerable ecological interest however. These include wet meadows (and associated wetland habitats and ditch systems), dune systems, shingle plant communities and wet semi-natural woodland. The quality of the shingle, grazing marsh and associated wetland habitats have led to substantial areas of these in close proximity to the preliminary works area being designated for their ecological interest.

The entire BE land holding at Sizewell, including the preliminary works area and the Sizewell 'B' Station (which occupies 0.36km²/36ha) extends to approximately 6.69km²/669ha. The dominant habitats are arable farmland and woodland/scrub, with each accounting for approximately 30% of the land area. A considerable area of coniferous and mixed woodland is present around Goose and Kenton Hills, and there are scattered blocks and linear belts of semi-natural deciduous woodland throughout. Grazing marsh and heathland/acid grassland are also well represented, with both habitats covering approximately 10% of the land holding, while fen/reedbed, foreshore and pasture each cover approximately 3% of the land within the estate. Two working farms and eight domestic properties are also present.

1.4 Background and Scope

The key potential ornithological issues relating to the development are:

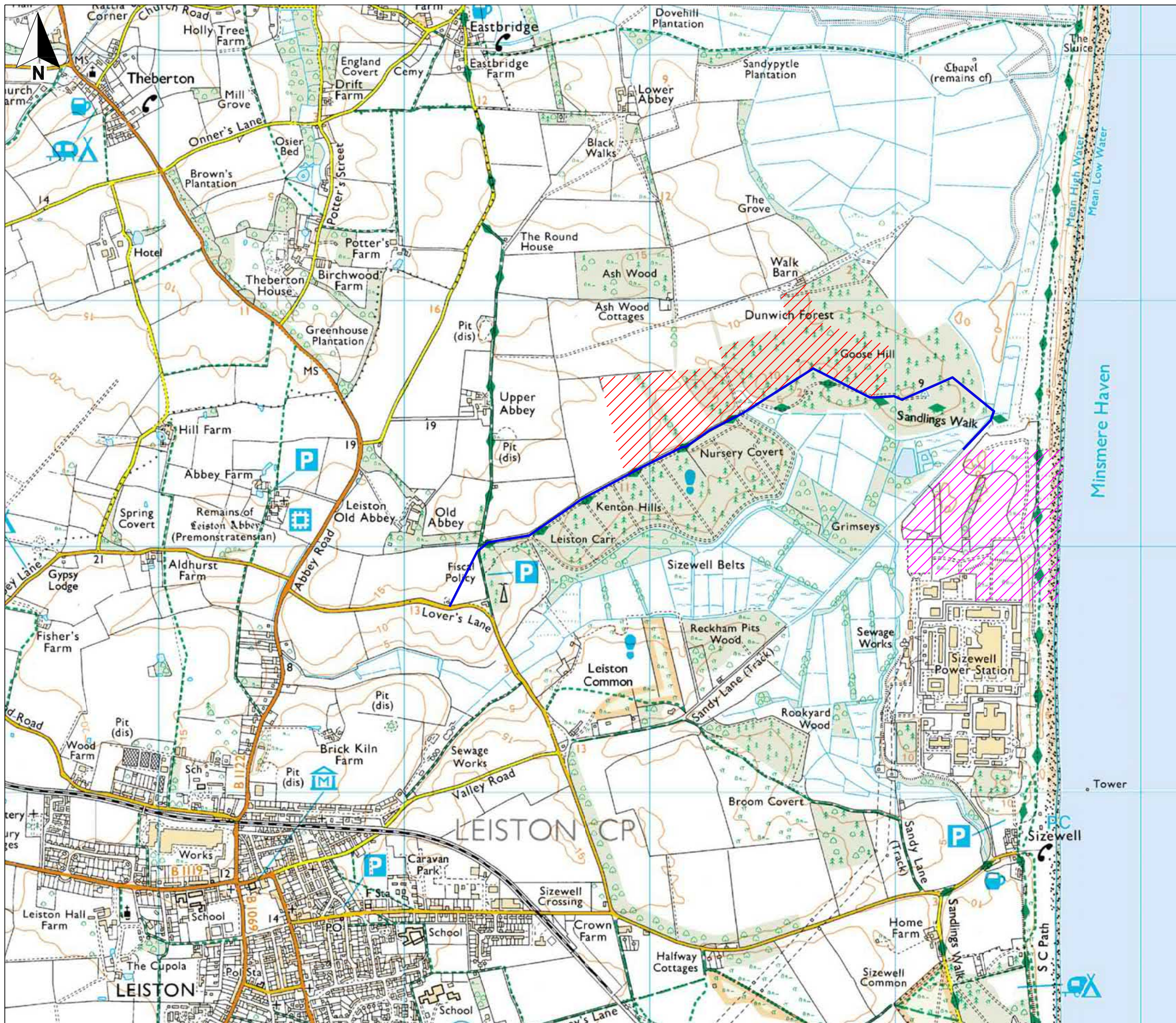
- The effects of direct habitat loss due to land take by the proposed power station, the access road and construction compounds;
- The effects of indirect habitat loss, i.e. the displacement of birds from the proximity of the proposed power and associated infrastructure as a result of disturbance. Such disturbance may occur as a consequence of construction work, or due to the presence of the power station or associated infrastructure close to nesting or feeding sites or on habitual flight routes;
- The fragmentation of habitat and the potential barrier to movement that would occur, particularly as a result of the construction of a new access road;
- Related to the three points above, the potential for effects on species that form the cited interest of European and nationally designated sites as a result of the proposed development.

There is no guidance available that details or discusses appropriate ornithological survey work for new nuclear power station proposals. Therefore, the bird survey programme for Sizewell




was developed following a considerable desk study exercise. The potential for species protected under Schedule 1 of the Wildlife & Countryside Act 1981 (as amended)¹ and / or listed under Annex 1 of the EC Directive on the Conservation of Wild Birds (79/409/EEC), commonly referred to as the Birds Directive² to occur within the survey area was the subject of specific investigation. As a result of the desk study, a survey programme incorporating a range of generic and species specific surveys was instigated.

¹ All species of wild birds are afforded some degree of protection under the Wildlife and Countryside Act 1981, though some species that are considered to be rare or vulnerable, which are listed on Schedule 1 of the Act, are afforded additional protection.

² Certain endangered, rare, or vulnerable bird species, which warrant special protection, are included on Annex 1 of the European Communities Council Directive on the Conservation of Wild Birds (79/409/EEC).



Key

-  Preliminary works area
-  Indicative construction compounds
-  Indicative access road

0 m 750 m
 Scale 1:15,000 @ A3



British Energy
 Sizewell 1st Interim Bird Report

Figure 1.1
Preliminary Works Area
 (including indicative construction compounds and access road)

October 2007
 19801-R65.dwg marsa01



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2. Methodology

2.1 Desk Study

To understand the ornithological context of the preliminary works area, the locations and qualifying features of Special Protection Areas (SPAs) and Sites of Special Scientific Interest (SSSIs) within 5km of the preliminary works area were determined through the use of the website www.magic.gov.uk and other published sources. There are no established criteria with regard to the distance from a development site that a search should cover, and 2km has been suggested as a sufficient distance in the past (IEA, 1995). Due to the known ornithological interest of the Sizewell area, however, this search area was extended to 5km for European and nationally important sites. The ornithological interest of non-statutory designated sites within 3km of the proposed new build and associated infrastructure were also considered. The positions of these designations in relation to the preliminary works area are shown on **Figures 2.1a&b**. The English Nature Report on the Suffolk Coast and Heaths Natural Area (English Nature, 1997) was also referenced to gain insight into the ecological context of the site and adjoining habitats from a wider perspective.

A considerable amount of baseline ecological survey work has been conducted on the BE Estate at Sizewell during the past twenty-five years. This has been undertaken by a range of organisations including Suffolk Wildlife Trust (SWT) ecological consultants (commissioned by Nuclear Electric and latterly by BE), the Environment Agency, universities and colleges, special interest groups and individuals. This information was made available to Entec by British Energy to assist the design of the ornithological survey programme. Additional data from survey work commissioned by Magnox in association with the decommissioning of Sizewell 'A,' and species records held by the Suffolk Biological Records Centre (SBRC) were also used to inform the work. Data requests to the British Trust for Ornithology (BTO) and Suffolk Ornithologists Group (SOG) will follow the release of this document as the initial ecological scoping phase has now been completed³.

In addition to this information, a number of further primary sources of data were identified and used to inform the work. These include:

- The results of annual breeding and wintering bird surveys conducted by the Suffolk Wildlife Trust on parts of the BE Estate (summarised in the annual land management review);
- Birds of Suffolk (Piotrowski, 2003);
- Suffolk Birds 2005 – the county bird report (Wright, M [Ed], 2006);
- Birds in England (Brown, A. & Grice, P, 2005);

³ The initial scoping phase concluded with a meeting with RSPB on 24 September 2007. Prior to this there were meetings with Natural England, Suffolk County Council (attended by the County Ecologist), and the Suffolk Wildlife Trust.

- The New Atlas of Breeding Birds of Britain and Ireland (Gibbons *et al.*, 1993).

2.2 Breeding Bird Surveys

The key objective of the bird surveys undertaken at Sizewell during the 2007 breeding season was to establish a suitable baseline for the evaluation of the potential effects of a new nuclear power station and associated infrastructure on the bird community present. Breeding, feeding and commuting birds were considered during the work. With regard to species of high nature conservation importance, where contemporary data indicating population size or distribution was not available, their occurrence was investigated (where this could not be established through generic survey) through species specific work. The numbers and diversity of bird species using the intertidal zone and inshore waters adjacent to the proposed new build and the existing power stations was also investigated through surveys conducted twice a month from two locations. The methods used are outlined below.

2.2.1 Territory Mapping

Territory mapping surveys based on the BTO's Common Bird Census (CBC) methodology were carried out in all areas within 1km of the proposed new build area and associated infrastructure (excluding the built nuclear plant, the gardens and driveways of domestic properties and associated farm buildings, and the edge of the village of Leiston). Surveys therefore covered approximately 9km². Much of this land (6.72km²) is under British Energy ownership⁴, and unrestricted access was therefore possible. Within the BE Estate, transects no further than 50m apart were walked across all open habitats, while all field boundaries, the edge of the small reedbed and the edge of the small belts of semi-natural woodland were also walked. In the coniferous plantation, all rides / firebreaks and tracks were walked, and all birds visible / audible from them were recorded. In those areas within 1km of the preliminary works area, but outside BE's land ownership and where access could not be secured, footpaths, roads and tracks were walked and all birds that were apparent were recorded. While these peripheral areas are relatively well served by footpaths, it is clear that breeding densities cannot be reliably derived from them. To ensure that disturbance was kept to a minimum on RSPB land (in the north-eastern part of the survey area), it was agreed that data would be provided by RSPB staff undertaking their usual annual surveys, on the understanding that BE and RSPB would exchange data following the survey season (Adam Rowlands, pers comm.). The survey area for the territory mapping work, and the BE Estate boundary are shown on **Figure 2.2**.

While eight to ten visits are the norm for CBC sites being monitored over the long-term, where territory mapping is being used for the purpose of assessing potential environmental impacts it is generally accepted that three to four visits are sufficient to determine the numbers and densities of breeding birds with reasonable accuracy. Four survey visits were therefore undertaken at Sizewell, with two surveyors working together to complete each visit. Due to the size of the area surveyed it took a minimum of ten survey days to complete each survey visit. The dates on which surveys were conducted were as follows:

- 10 – 15 April

⁴ BE is responsible for the management of the Estate, which is undertaken in partnership with SWT.

- 2, 3, 6, 8 & 12 May
- 5 & 15 – 18 June
- 6 – 8 & 21 – 22 July

Supplementary records of birds recorded outside timed surveys and during species-specific work were also used when compiling the final territory maps, along with information supplied by the Suffolk Wildlife Trust (who are responsible for the management of the BE Estate for conservation and conduct annual bird surveys).

2.2.2 Dabbling Duck Survey

In addition to the territory mapping survey, which covered all areas of wet meadow, ditch and reedbed (and recorded some waterfowl as a result); specific surveys focussed on locating breeding dabbling ducks⁵ were undertaken in accordance with the guidelines outlined in Gilbert *et al* (1998). The edges of all ditches and the reedbed within the Sizewell Belts were walked by two surveyors between dawn and 10am. Surveys were undertaken on three dates:

- 16 April
- 6 May
- 14 June

The age and sex of all wildfowl (where apparent) was recorded, and appropriate notes were made with regard to activity. Reedbed passerines and other breeding species were also noted, and the results used to inform the territory mapping survey. The survey area for the dabbling duck surveys is shown on **Figure 2.3**.

2.2.3 Hobby Survey

Hobby is thought to nest annually within the mature plantation in Dunwich Forest, as early season territorial behaviour and fledged young have been frequently recorded by SWT in this area. The precise location of the nest site may vary, as birds appropriate the nests of Corvids or the dreys of squirrels rather than building their own, and the afforested area is managed for a mix of purposes including landscape and commercial aims⁶, meaning that some potential nest sites will be occasionally lost due to forestry works. Hobby does not require extensive areas of mature woodland for nesting (e.g. Hardey *et al.*, 2006) and on this basis there was potential for nesting to occur elsewhere in the BE Estate, although there were no previous records to support this. Specific survey work was therefore instigated in an attempt to establish breeding locations. Particular emphasis was placed on Dunwich Forest during the survey work both due to the likelihood that hobby nests in this area and as it is likely, due to the intention to avoid designated sites of nature conservation importance, that the preferred route of any access road

⁵ The breeding bird assemblage was considered to be of national significance at the time of designation. Duck species present included shoveler, gadwall and teal. In addition, the areas of wet grassland supported breeding snipe and lapwing.

⁶ The main objective of management of the plantations is to meet the Sizewell B planning conditions and undertakings. It is also managed for timber production, biodiversity, access and amenity. Therefore there is an integrated approach to the management of the plantation, taking into account this range of objectives.

will be through this area, and that some parts of the plantation may also be lost to construction compounds (which would adjoin the proposed access). Currently the design of the power station and associated infrastructure is at the preliminary stage.

A range of survey work was undertaken to establish territory locations. During the initial territory mapping survey, conducted between 10 and 15 April, the upper branches of trees were scanned to establish the positions of existing nests that could be used by hobbies. Subsequent to this, a number of suitable vantage-points were selected overlooking the plantation at Dunwich Forest to watch for early season flight activity that would indicate territory occupancy. During these initial surveys, any hobby flights observed were mapped and behaviour noted. Two surveyors conducted the work. Each watch lasted for a minimum of thirty minutes, at which point, if no hobby activity had been recorded, or if hobby activity was reported elsewhere by the other surveyor, a new location was chosen. Two surveyors working independently, but communicating their sightings to each other, enabled appropriate vantage-points to be chosen in response to observed activity.

Surveys were repeated in early-mid August, concentrating on areas where hobby activity had been observed during the previous three months and during the initial hobby surveys: i.e. Dunwich Forest, Broom Covert and Ash Wood. Hobby young become increasingly active and vocal in the 10 days before they leave the nest (Hardey *et al.*, 2006), which occurs around mid August (Brown & Grice, 2005). Local vantage-points providing good views of these areas were again used to map flight lines, and all behavioural activity was noted.

Surveys were therefore conducted on eight 'man days': 5 May, 14 May (two surveyors on both days), 4, 5, 8 & 9 August (one surveyor on each day), with a minimum of six hours of survey per day. The interpretation of results was aided by observations made during the territory mapping surveys and made incidentally, outside formal survey work.

2.2.4 Nightjar Survey

There is no recorded history of nightjar occurring, as a breeding species, within the BE Estate at Sizewell. There is a limited extent of habitat potentially capable of supporting the species, however, particularly areas of young plantation within Dunwich Forest and (possibly) some discrete areas of lowland heath around Broom Covert and Retsoms⁷. To investigate whether nightjars were present at Sizewell, two nocturnal surveys were undertaken following methodology outlined in Gilbert (1998). Surveys took place on 8 and 10 July, with two surveyors working in tandem. Transects were walked across Broom Covert, through Walk Barns, along the northern and north-eastern edge of Dunwich Forest (along the edge of Retsoms), within the area of young plantation within Dunwich Forest and around the entire perimeter of Kenton Hills. Frequent stops were made to listen for 'churring' and other vocalisations. All bird species seen or heard were recorded on field maps. Areas covered during the surveys are indicated on **Figure 2.4**.

⁷ Retsoms is the field adjacent to the north-eastern boundary of Dunwich Forest / Goose Hills. This area is currently under reversion from arable farmland to heathland. Experimental plots in the western part of the field that have been treated with sulphur and spread with heather litter are slowly developing towards a heather dominated community, while in other parts of the field (where sulphur has not been applied) a dry maritime grassland has developed.

2.2.5 Intertidal and Inshore Marine Survey

In order that any potential disturbance effects resulting from the new build on birds using the intertidal areas and inshore marine waters adjacent to the proposed new build area could be evaluated, surveys were undertaken on a bi-monthly basis between April and July inclusive. Two locations were used: TM47633 64587 (Location 1) and TM47612 63379 (Location 2). These locations, and the areas surveyed from them are shown on **Figure 2.5**. The former location enabled observation of activity in the grid square adjacent to the proposed new build area, while the latter enabled observation of activity in the grid square adjacent to the existing power stations and took in the warm water outfall and associated towers. All waders, wildfowl and seabirds flying over the intertidal area and the inshore waters up to 300m offshore were recorded⁸. Numbers and apparent behaviour of all species was noted.

The aim of the surveys was to record the diversity, activity of species and differences in use of the intertidal and inshore marine waters by birds between the two grid squares (TM4764 and TM4763) in order that the importance of the existing power station outfall as a foraging resource could be quantified. The surveys also allowed investigation of whether birds commuting parallel to the shore or over the intertidal showed any reaction to the built power station and enabled an assessment of the likely value of the southern grid square to terns and black-headed gulls breeding at Minsmere to be made.

During each survey day, survey work commenced close to high or low water and was conducted over six full hours, so that any changes or patterns in bird distribution across the tidal cycle could be identified⁹. During each hour of survey the intertidal area and inshore waters within each grid square was scanned using binoculars for 45 minutes and all species present or commuting through were recorded¹⁰. There was then a fifteen minute break in survey, to allow the surveyors to rest their eyes and to regain focus before the next timed survey commenced. Six 45 minute surveys were completed during each survey day, resulting in a total of 18 hours of survey per month and 72 hours of survey (36 per point) over the season. Times, dates and weather conditions during surveys are shown in **Table 2.1** below.

⁸ 300m offshore was selected as the maximum threshold for recording on the basis that all relevant bird species within 300m were generally identifiable at this distance in normal sea states and weather conditions, and accurate counts could be made. It is also apparent that any disturbance effects are most likely to affect birds occurring in relatively close proximity to the proposed power station. Taking into account the width of the shoreline, it is likely that a bird flying at 300m offshore would be more than 450m from the proposed new build footprint (assuming the distance above mean high water of the proposed new build is ultimately similar to the built plant).

⁹ It is recognised that at Sizewell there is relatively little tidal range, so it was not assumed that there would necessarily be detectable patterns in bird distribution in the inshore waters as a result of changes in the state of tide.




¹⁰ Surveyors used telescopes to confirm identity and activity of birds as necessary. High quality rangefinders were used by both surveyors throughout the season to improve their distance estimation, although these were not generally of use in estimating the distance of individual birds on the sea (due to the more reflective nature of the water than the bird often preventing a confident estimate of distance).

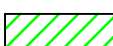

Table 2.1 Dates and Times of Intertidal and Inshore Marine Surveys

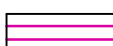
Location	Date	Survey Commenced	Wind Direction	Wind Speed
1	12/04/07	11:30	NE	2-3
2	12/04/07	11:25	NE	2-3
1	15/04/07	12:25	N-NE	1
2	15/04/07	12:25	N-NE	2
1	04/05/07	07:30	N-NNE	3
2	04/05/07	07:30	N-NNE	3
1	13/05/07	08:30	SE	2
2	13/05/07	08:30	SE	2
1	04/06/07	08:40	N	2
2	04/06/07	08:45	N	2
1	17/06/07	10:35	W-SW	2-3
2	17/06/07	10:10	W-SW	2
1	09/07/07	12:10	SW	1
2	09/07/07	12:10	SW	2-3
1	17/07/07	11:30	SE	4-5
2	23/07/07	09:55	ESE	3



Key

-  5km perimeter area around preliminary works area
-  Preliminary works area
-  Sites of Special Scientific Interest
 - 1. Minsmere to Walberswick Heaths and Marshes
 - 2. Sizewell Marshes
 - 3. Leiston Aldeburgh

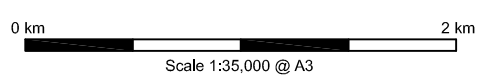
-  Special Areas of Conservation
 - 1. Minsmere to Walberswick Heaths and Marshes
-  Special Protection Areas
 - 1. Minsmere to Walberswick Heaths and Marshes
 - 3. Sandlings

-  Ramsar
 - 1. Minsmere to Walberswick Heaths and Marshes



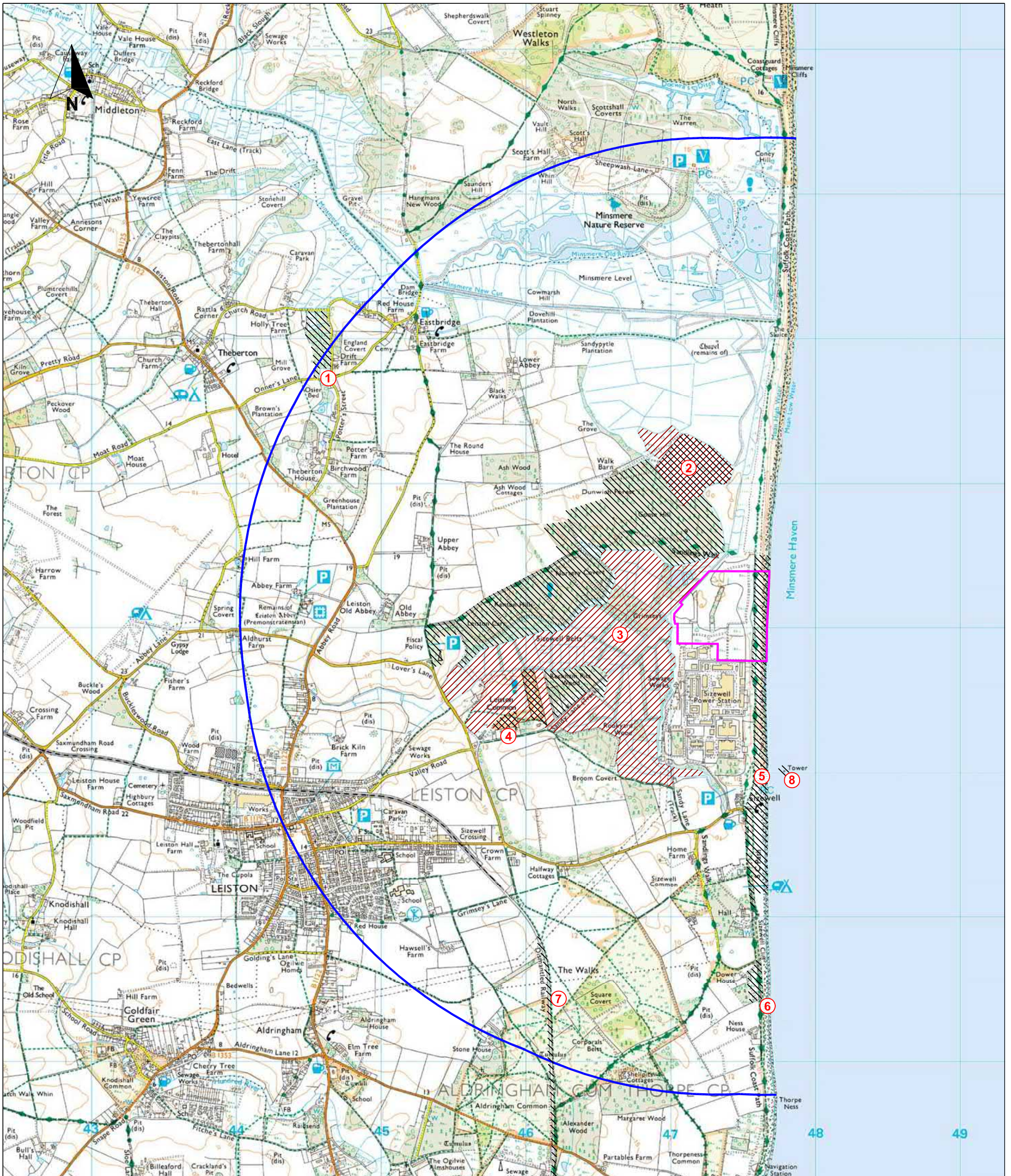
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Figure 2.1a
Statutory Designated Sites within 5km of the preliminary works area



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Key

- Preliminary works area
 - 3km perimeter area around preliminary works area
 - County Wildlife Site
 - Suffolk Wildlife Trust Reserve
 - ② Sites
1. Minsmere Valley
 2. Southern Minsmere Levels
 3. Sizewell Levels and associated areas
 4. Leiston Common
 5. Suffolk shingle beaches
 6. Dower House
 7. Disused railway line (Aldringham - Aldeburgh)
 8. Sizewell Rigs



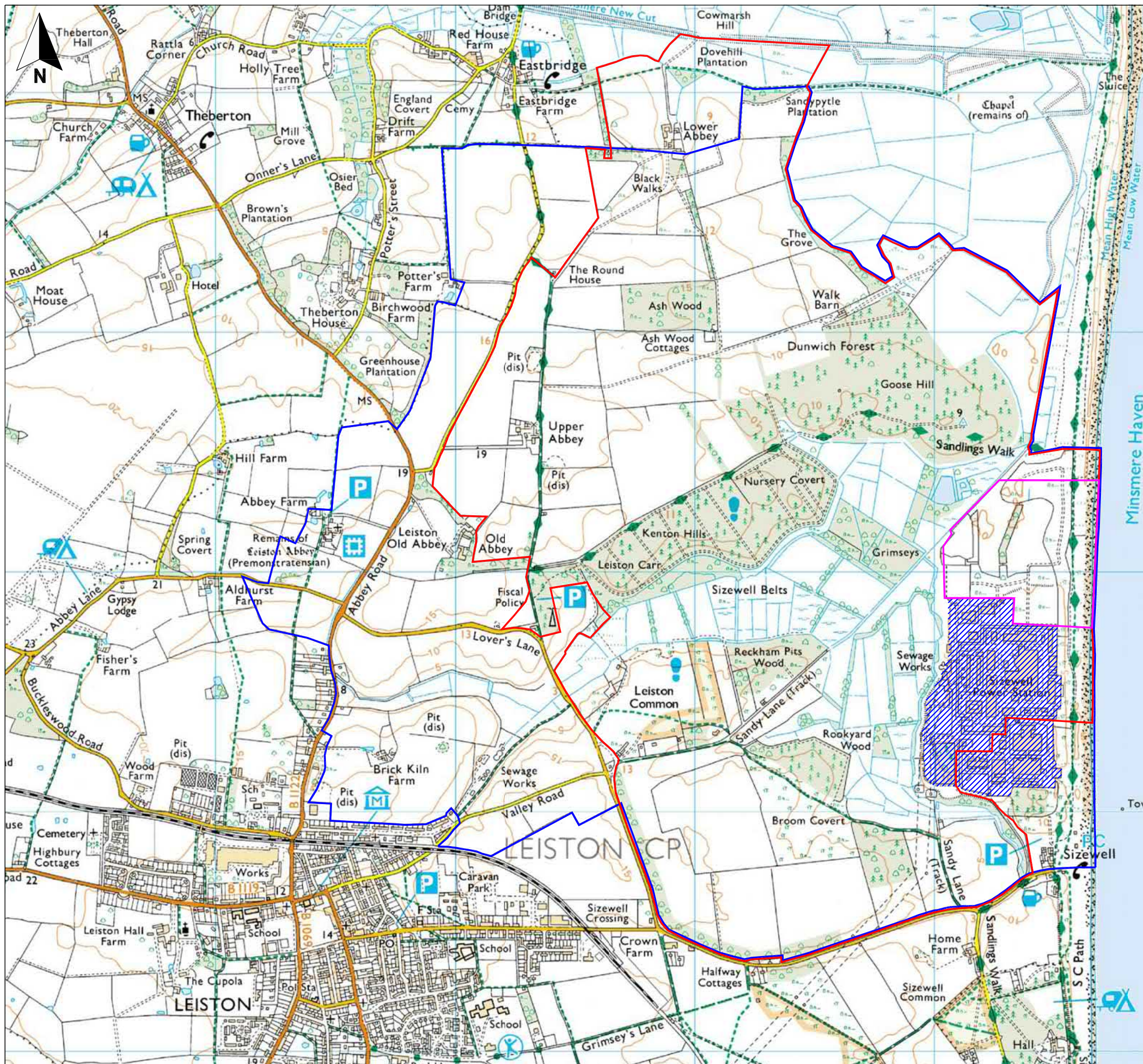
British Energy
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Figure 2.1b
Non-statutory designated sites within 3km of the preliminary works area

0 km 1.5 km
Scale 1:25,000 @ A3

October 2007
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- Key**
- British Energy land holding
 - Preliminary works area
 - Survey area
 - Excluded from survey

0 m 1 km
 Scale 1:16,000 @ A3



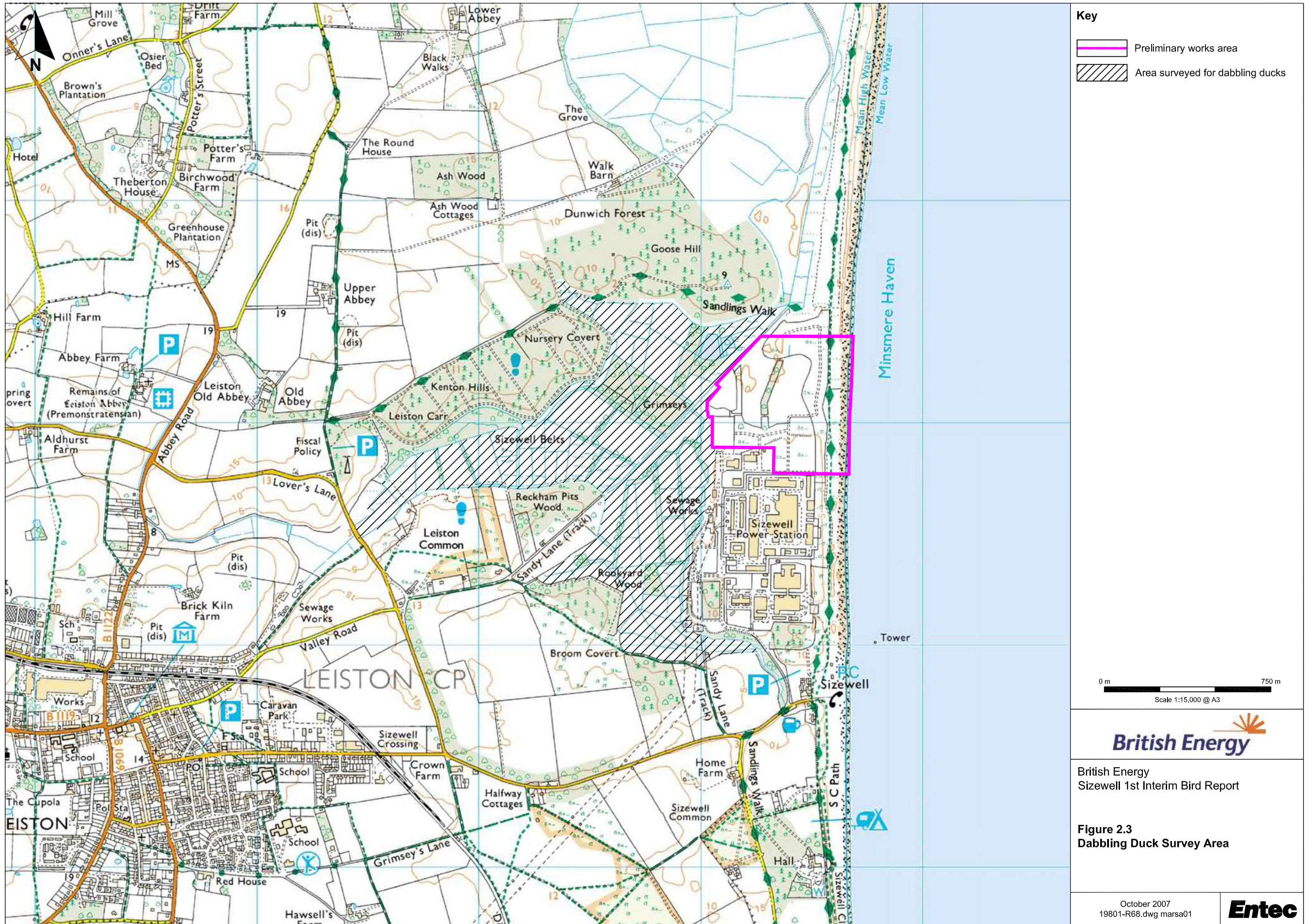
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Figure 2.2
Territory Mapping Survey Area and BE Estate Boundary

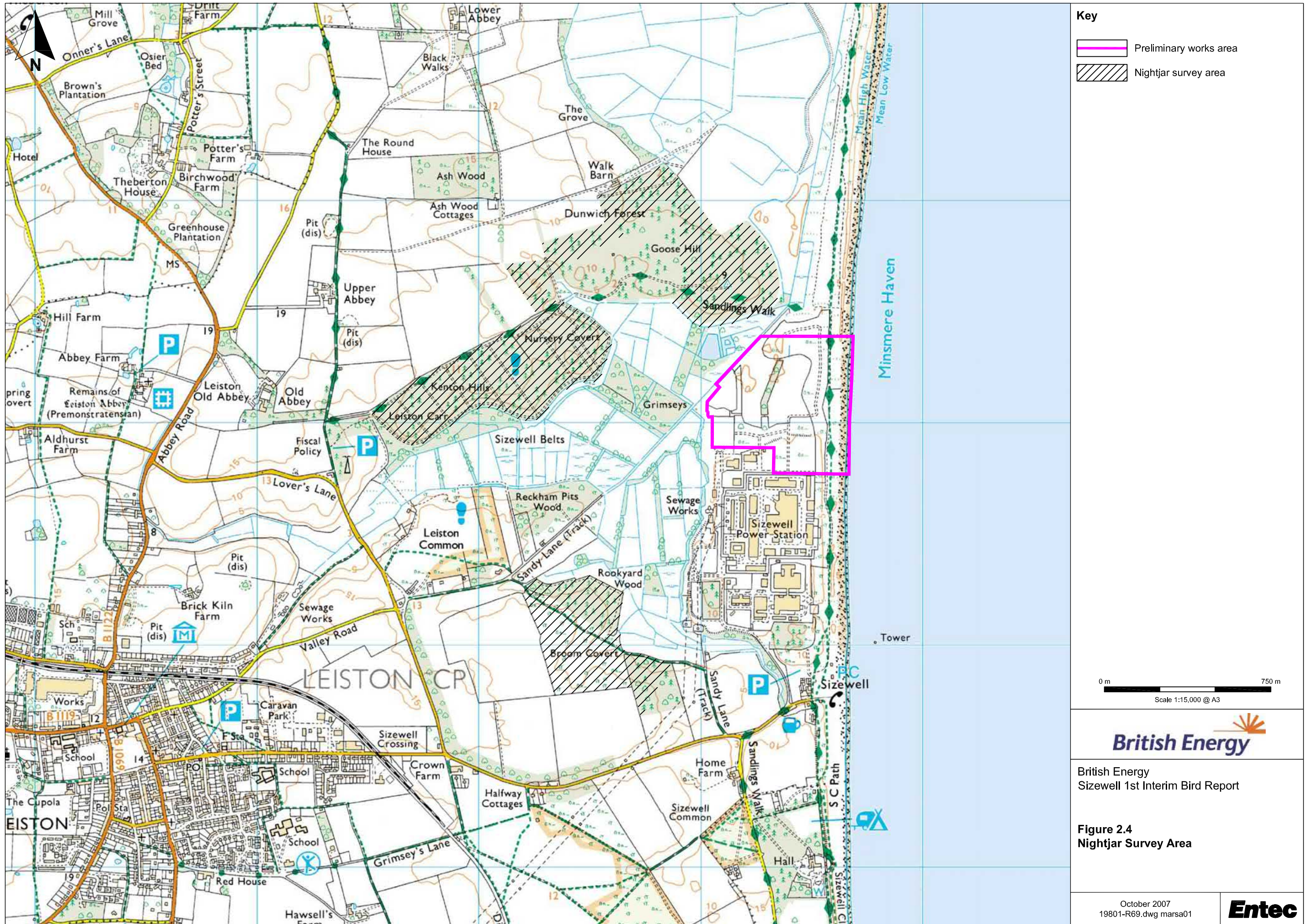
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Key

- Preliminary works area
- Nightjar survey area

0 m 750 m
 Scale 1:15,000 @ A3



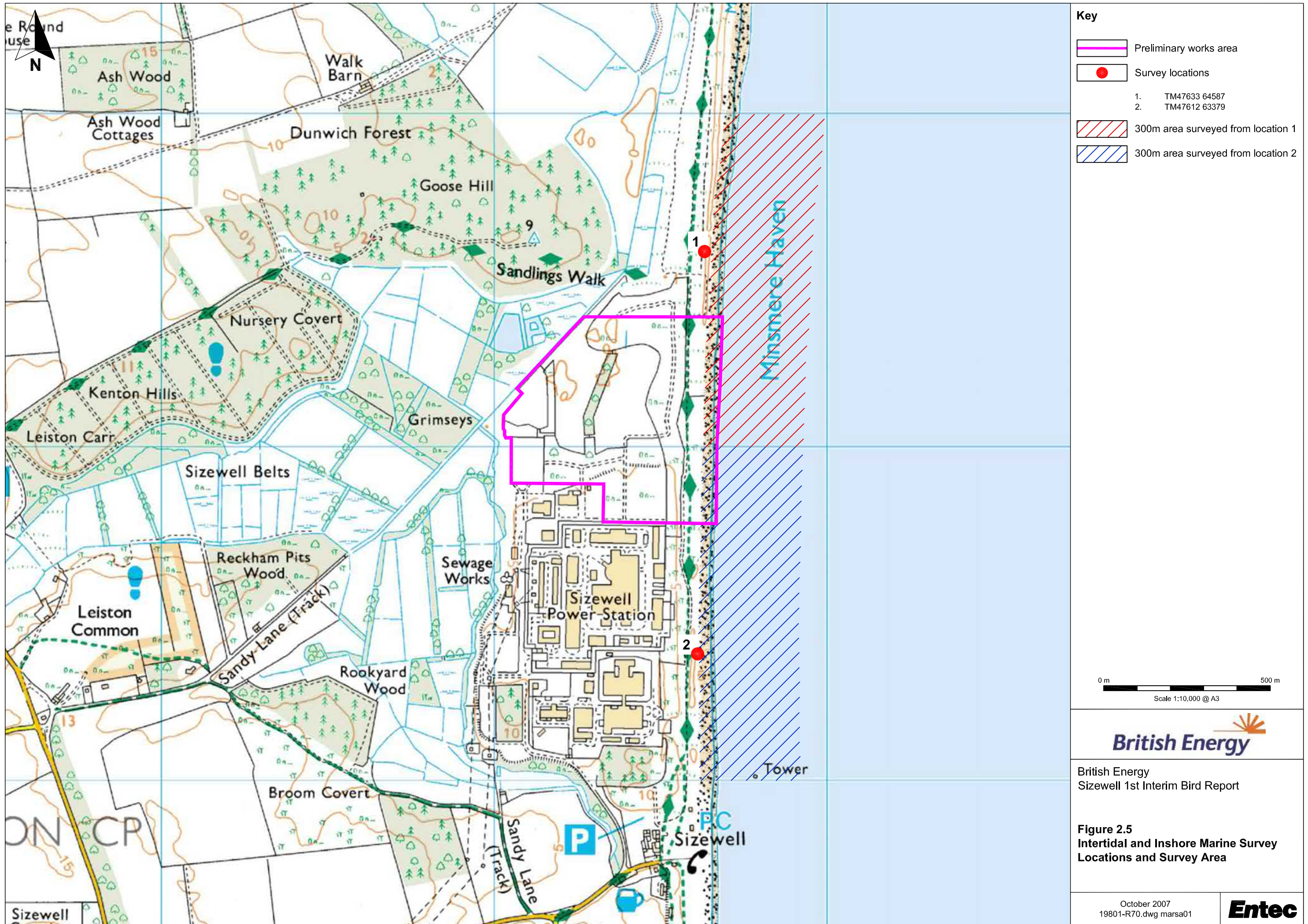
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Figure 2.4
Nightjar Survey Area

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3. Results

3.1 Designated Sites of Ornithological Importance

3.1.1 European Designated Sites

The closest site of European Importance for its habitats and bird populations is the Minsmere to Walberswick SPA approximately 200m to the north of the proposed new build power station (and adjacent to the proposed new access road at its closest point). The SPA was classified on the basis of its breeding and wintering bird interest:

Minsmere to Walberswick SPA qualifies under Article 4.1 of the EC Birds Directive (974/409/EEC) by supporting populations of the following species listed on Annex 1 of the Directive:

During the breeding season:

- Bittern (*Botaurus stellaris*), 35% of the GB breeding population (5 year mean, 1993-1997);
- Avocet (*Recurvirostra avosetta*) 10.4% of the GB breeding population. Count (early 1990s);
- Marsh harrier (*Circus aeruginosus*) 10.2% of the GB breeding population (5 year mean, 1993-1997);
- Little Tern (*Sterna albifrons*) 1.2% of the GB breeding population (5 year mean, 1992-1996);
- Nightjar (*Caprimulgus europaeus*) 0.7% of the GB breeding population count (1990).

Over winter:

- Hen harrier (*Circus cyaneus*) 2% of the GB population (5 year peak mean, 1985/6-1989/90).

The site also qualifies under Article 4.2 of the Directive by supporting populations of European importance of the following migratory species.

During the breeding season:

- Teal (*Anas crecca*) 4.9% of the population in Great Britain (Count, 1990);
- Gadwall (*Anas strepera*), 3.1% of the population in Great Britain (Count, 1990);
- Shoveler (*Anas clypeata*), 2.3% of the population in Great Britain (Count, 1990).

Over winter:

- Shoveler (*Anas clypeata*) 1% of the population in Great Britain (5 year peak mean 1991/92-1995/96);
- Gadwall (*Anas strepera*) 1.1% of the population in Great Britain (5 year peak mean 1991/92-1995/96);
- (Russian) White-fronted goose *Anser albifrons albifrons* 1.1% of the population in Great Britain 5 year peak mean.

A further site of European importance for its bird populations, Sandlings SPA, is approximately 900m to the south of the proposed new build footprint. This site qualifies under Article 4.1 of the EC Birds Directive 974/409/EEC) by supporting populations of the following species listed on Annex 1 of the Directive;

- Nightjar (*Caprimulgus europaeus*) 3.2% of the population in Great Britain (Count, 1992);
- Woodlark (10.3% of the population in Great Britain (Count, 1997).

3.1.2 Nationally Designated Sites

Sizewell Marshes SSSI, which was designated in 1987 (and subject to a revision increasing its size in 1992) covers an area of 104 hectares, entirely within the BE Estate. The SSSI is adjacent to the western boundary of the proposed new build area and is of national importance for the considerable area of lowland unimproved wet meadow it contains. Associated with the wet meadows are outstanding assemblages of invertebrates and breeding birds and several nationally scarce plant species.

The SSSI citation states that the breeding bird assemblage is of national significance with many species that are typical of wet grassland and associated habitats, including shoveler, gadwall, teal, snipe (*Gallinago gallinago*) and lapwing (*Vanellus vanellus*). Prior to the survey programme being initiated, the desk study revealed that this level of interest was likely to have significantly declined (Alan Miller, SWT, pers. comm.). This decline is not linked to changes in estate management; snipe, lapwing and teal numbers are in long term decline in the county, while numbers and productivity of breeding shoveler are prone to considerable fluctuation at nearby RSPB Minsmere¹¹ (Piotrowski, 2003). A review of the results of the annual breeding bird surveys that are conducted by BE/SWT suggested that gadwall and shoveler were the only species mentioned in the SSSI description that were likely to continue to breed with regularity (and in regionally rather than nationally important numbers) within the BE Estate.

Minsmere to Walberswick Heaths and Marshes SSSI, parts of which have been classified as SPA and designated SAC, is approximately 200m to the north of the proposed new build power station (and adjacent to the proposed new access road) at its closest point. The SSSI covers over 2,325 hectares and is managed by a variety of conservation organisations including Natural England, RSPB, SWT and The National Trust. The SSSI contains a complex series of habitats, notably mudflats, shingle beach, reedbeds, heathland and grazing marsh, which combine to create an area of exceptional scientific interest. Species mentioned in the site description are:

¹¹ At Minsmere 45 pairs of shoveler bred in 1960, but this had fallen to 6 pairs in 1992 – apparently due to nest predation (Piotrowski, 2003). A total of 13 pairs were present in 2003, with 32 pairs in 2004 and 36 pairs in both 2006 and 2007 (Robin Harvey [RSPB], pers. comm.)

wigeon, shelduck, redshank and dunlin (associated with the tidal mudflats of the River Blythe Estuary); breeding marsh harrier, bittern, Cetti's warbler, garganey, water rail and large populations of reed warbler and bearded tit in the Minsmere and Walberswick reedbeds; breeding avocets, shoveler, gadwall, teal and shelduck at the RSPB Minsmere Reserve; and high numbers of waterfowl including breeding snipe, redshank, gadwall, shoveler and black-tailed godwit at Eastbridge and Southwold.

Leiston to Aldeburgh SSSI, which includes Sandlings SPA, is approximately 900m to the south of the proposed new build at its nearest point. The designation contains a rich mosaic of habitats including acid grassland, heath, scrub, woodland, fen, open water and vegetated shingle. This mix of habitats in close juxtaposition and the associated transition communities between habitats is unusual in the Suffolk Coast and Heaths. Many species of bird are present including tree pipit, turtle dove, bullfinch and nightingale in the scrub; breeding water rail, marsh harrier, gadwall and grasshopper warbler in the marshes; and wintering waterfowl including Bewick's swan, bittern, white-fronted goose, gadwall and teal in a range of appropriate wetland and farmed habitats.

3.1.3 Non-Statutory Designated Sites

Eight non-statutory designated sites are present within 3km of the proposed new build and associated infrastructure. These include areas adjoining statutory designations which, while valued, do not meet the criteria for SAC, SPA or SSSI status, and include County Wildlife Sites and Suffolk Wildlife Trust Reserves. Although all of these sites will have some breeding bird interest, only two specifically mention birds as a key feature and reason for designation. The South Minsmere Levels SWT Reserve and Wildlife Site is of importance as it is directly adjacent to the Minsmere SPA, SAC and SSSI and is of interest for its breeding waders and wildfowl and its over-wintering bird community. Sizewell Rigs County Wildlife Site, which takes in the two offshore maintenance structures associated with the cooling water intake and outfall, is of interest as it supports a colony of over 200 breeding kittiwakes. This is one of two sites in Suffolk where kittiwake colonies have become established (the other being at Lowestoft¹²). The total numbers at these sites represent a very small proportion of the UK population, which has no other natural nesting sites on the UK east coast between Kent and Yorkshire.

3.2 Desk Study Data

Breeding bird surveys are conducted annually¹³ by SWT and transects are taken through all areas of marsh, Leiston Common, Reckham Pits Wood, Black Walks, Ash Wood and some agricultural field margins. The areas covered during annual surveys undertaken by SWT are shown on **Figure 3.1**.

Seventy species were reported to have bred within the BE Estate in 2004 (ADAS, 2006) reflecting its diversity, the quality of habitats within it and its size. Features of the breeding bird

¹² On a purpose built wall constructed by Associated British Ports to compensate for the loss of the Lowestoft South Pier Pavilion (which was demolished in 1988).

¹³ Regular recording of bird species present has been undertaken since at least 1971. The formality of recording has varied, with annual structured surveys becoming the norm from the late 1980s.

population are hobby which is known to breed in the Goose Hill area, grey heron (which has recently started to breed in Sizewell Wents), barn owl, kingfisher and Cetti's warbler. During the survey period¹⁴ increases in the numbers of reed bed passerines including reed warbler, sedge warbler and reed bunting have been recorded, skylark numbers have increased, and Cetti's warbler has become established as a breeding species.

Other species are known to have declined, have ceased to breed with regularity, or have disappeared completely from the Estate during this time. These include grasshopper warbler, which no longer breeds; teal and spotted flycatcher (which breed intermittently or persist in very low numbers) and grey partridge, the status of which is unclear. Breeding numbers of waders such as snipe and redshank are in long term decline in Suffolk (Piotrowski, 2003) despite there being no lack of apparently suitable breeding habitat. Snipe does not now breed within the estate¹⁵, while redshank numbers are low, with 1-2 pairs generally present on the grazing marsh bordering RSPB land to the north (8-10 pairs were present in the late 1980s and early 1990s (Henderson Consultants 1989, 1993)).

In addition to breeding snipe, redshank and teal, wetland and associated marshy habitats within the BE Estate have been known to support breeding populations of ducks and waders including shoveler, gadwall and lapwing. Breeding duck numbers vary between years, but all remain in single figures. Garganey may have bred on the BE Estate in 1998, as five birds including three juveniles were recorded in the reedbed in that year by SWT staff.

Fourteen red-listed species of particular conservation concern¹⁶ (Gregory *et al*, 2000) are known to have bred on the BE Estate since 2000, although some have been sporadic in their occurrence. Grey partridge has been present in very low numbers (the last record was of two birds in October 2005), with breeding not recorded in recent years. Farmland conservation initiatives within the estate, such as the creation of field margins and planting of hedgerows combined with the planting of winter bird cover, may encourage this species. One to six pairs of turtle dove have been present within the BE Estate in recent years and a lesser spotted woodpecker bred in Reckham Pits Wood in 2000¹⁷. Suffolk holds more than a third of the

¹⁴ Annual surveys have been conducted since 1996-97. Increasingly detailed lists of the number of each species breeding within the Estate have been provided in the Annual Land Management Reviews issued by ADAS and SWT during this period.

¹⁵ The rate of decline has been marked. In 1989 13 territories were recorded but by 1993, only 1 territorial bird was present (Henderson Consultants, 1989), and in recent years no snipe have been recorded breeding within the estate (Alan Miller, pers comm.). The availability of breeding habitat, habitat condition and management practices have not obviously changed to the detriment of the species and it is likely that the decline in snipe numbers reflects a wider decline in the population across Suffolk (including at Minsmere and Walberswick), the specific reasons for which are not completely clear.

¹⁶ The background to the establishment of a 'traffic light system' of conservation concern for UK birds is discussed in Gregory *et al* (2002). 'Red-listed' species include those that are globally threatened, have suffered an historical population decline (between 1800 and 1995) or which have experienced rapid declines in their UK breeding population or contractions in their UK range of more than 50% over the past twenty-five years. Amber listed species have suffered moderate (25-49%) declines in their UK breeding population or range over the past 25 years, have an unfavourable conservation status in Europe (and are therefore of European concern), breed in very low numbers (five year mean of 1-300 pairs), breed at 10 or fewer UK sites, or occur in relatively high numbers in the UK (exceeding 20% of the European breeding, migratory or non-breeding populations). Other species have 'green' status, as they do not fulfil these criteria. This implies that the population of a species is either stable or increasing or that too little is known about the population to allow the species to be included on the red or amber list.

¹⁷ Two birds were recorded holding territory in 1989 (Henderson Consultants, 1989).

British woodlark population, and up to five pairs have been recorded holding territory within the estate, although inter-annual fluctuations do occur and between 2004 and 2006 five, three and three pairs were considered to have bred respectively¹⁸. Targeted management to maintain and increase the woodlark population on the BE Estate has been carried out by SWT at Retsoms and Leiston Common.

The other red-listed species on the BE Estate comprise farmland passerines that have declined at regional and national level while remaining nationally common. These are skylark, song thrush, house sparrow, linnets, bullfinch, yellowhammer and reed bunting. All appear to have stable or increasing populations within the estate¹⁹, and this may be linked to sympathetic land management including the planting of winter cover crops that act as food sources. Grasshopper warbler was last recorded breeding in Sizewell Belts in 2000, while spotted flycatcher breeding has been sporadic in recent years. Marsh tit numbers within the BE Estate appear to fluctuate (from a high of 7 pairs in 2002 to just one in 2004, no recorded breeding in 2005 and two pairs in 2006).

A pair of barn owl is known to have bred in one of the nest boxes that have been erected at Goose Hills. A range of buildings within the estate are used for roosting on a seasonal basis. Estate management, including the creation of field margins, may have increased the attractiveness of the Estate to the species. Black redstart breeds within the operational power station where 2-3 pairs are normally present. Nightingale occurs in low numbers (typically 1-2 pairs), and in some years is not recorded breeding on the Estate.

Species that have been recorded breeding historically within the Sizewell Estate include crossbill and goshawk, both of which bred in the Kenton / Goose Hills area. Goshawk is considered to have bred in 1992 and 1998, while crossbill has been recorded on a more regular basis, and three pairs were thought to have bred in 1998. The number of crossbills breeding in Suffolk varies considerably from year to year and the breeding population appears to be sustained by periodic continental immigration (Piotrowski, 2003). Species that are long extinct from the Estate are stone-curlew which was last recorded breeding on the BE Estate in the 1950s, and corn bunting which last bred in the Sizewell / Minsmere area in 1970 (Hall, 1984).

3.3 Breeding Bird Surveys

3.3.1 Summary of Results

The survey programme resulted in 69²⁰ species of breeding bird being recorded across an area almost exactly 9km² in extent. The dabbling duck survey did not result in any unexpected

¹⁸ An initial estimate from SWT is that two pairs bred in 2007.

¹⁹ Bullfinch, yellowhammer and linnets numbers may in fact be lower than in the late 1980s and early 1990s (Henderson Consultants 1989, 1993), but recent population trends suggest stability or slight increases in annually monitored areas.

²⁰ It is possible that 80 species bred. Figures for swallow and house martin, which clearly breed within the estate, are not included in Table 3.1, as domestic properties and farm buildings were not generally entered or walked around, so no accurate census was possible. Feral pigeon and swift may also breed within these buildings, but were not recorded doing so. Single pairs of greylag goose, Canada goose, shoveler, tufted duck, teal and lapwing and bearded tit are included in SWT draft breeding bird territory figures for 2007, and it is assumed that these species are therefore likely to have bred. All except bearded tit were recorded using the site by Entec surveyors. SWT conducted more intensive

findings, with mallard being by far the commonest breeding species and lower numbers of gadwall and mute swan and a range of other common waterfowl. The focussed hobby survey resulted in the mapping of two territories, while nightjar was not recorded during the dedicated nocturnal work.

The location of breeding territories is shown on **Figure 3.2A-E** (this figure has been split into four 'sub-figures' to allow ease of reference). Highly protected species (i.e. Schedule 1 and Annex 1 species) are indicated by red two-letter BTO Codes, with dabbling duck registrations indicated in orange, and registrations of all other species in blue. A key indicating the species that each code refers to is also provided. It should be remembered when considering the figures that the two letter registrations refer to the apparent centre of territorial activity rather than nest sites. It should also be noted that the aim of this survey was to characterise the bird community rather than derive exact densities, something which would require a considerably more involved survey programme. It is inevitable that the densities of some mobile, vocal species have therefore been overestimated due to the precautionary approach that has been taken in interpreting the data. Where potential overestimation is considered likely this is acknowledged in the text.

Given the mosaic of habitats that is present within the area surveyed (which include reedbed, marshes, coniferous plantation, deciduous woodland, open farmland and heath), calculating densities of birds across the survey area as an entirety was not considered worthwhile or legitimate, although this can be easily undertaken with reference to the information provided in **Table 3.1**. Indicative densities of birds within the proposed nuclear power station footprint have been derived, however, as habitat is fairly homogeneous, and the figures thus derived can be used to evaluate the importance of the loss of the area should land take for new build occur. For simplicity, and due to potential changes in the likely land take required and the position of the indicative site compounds, however, numbers and densities of breeding species have not been presented for this area, or for areas in proximity to the indicative access road. This can be done once a final scheme design has been determined.

The results of the surveys are presented in **Table 3.1**.

surveys of the marshes in 2007 than were conducted by Entec, and were therefore able to confirm breeding in these species. Entec surveyors recorded lapwing breeding on RSPB land close to the border of the Sizewell Estate.

Table 3.1 Numbers of Breeding Bird Territories Recorded in the Survey Area and the Proposed Nuclear Power Station Footprint

Species	Estimated Number of Territories within survey area	Estimated Number of Territories within proposed power station footprint	Density of Territories within proposed power station footprint	Wildlife and Countryside Act Schedule 1 / Annex 1 of EU birds Directive	UK BAP Priority Species	Suffolk BAP Species	Birds of Conservation Concern Red List	Birds of Conservation Concern Amber List
Little grebe	1							
Grey heron	1*							
Mute swan	5							
Mallard	27	1						
Gadwall	6							4
Sparrowhawk	1							
Kestrel	1							4
Hobby	2 (3) ²¹			4				
Red-legged partridge	33							
Pheasant	3**							
Water rail	2**							4
Moorhen	50							
Coot	1							
Lapwing	3***				4			4
Redshank	2***							4
Woodpigeon	27**							
Stock dove	3							4
Collared dove	6							
Turtle dove	2				4	4	4	
Cuckoo	3****	1			4			4
Barn owl	1*			4				4
Tawny owl	2**							
Little owl	1							
Kingfisher	1			4				4

²¹ Two pairs are thought to have bred, with a third pair possibly breeding. Results are presented in 3.3.3 Hobby Surveys.

Table 3.1 (continued) Numbers of Breeding Bird Territories Recorded in the Survey Area and the Proposed Nuclear Power Station Footprint

Species	Estimated Number of Territories within survey area	Estimated Number of Territories within proposed power station footprint	Density of Territories within proposed power station footprint	Wildlife and Countryside Act Schedule 1 / Annex 1 of EU birds Directive	UK BAP Priority Species	Suffolk BAP Species	Birds of Conservation Concern Red List	Birds of Conservation Concern Amber List
Green woodpecker	34****							4
Great spotted woodpecker	34							
Skylark	71	3			4	4	4	
Woodlark	2			4	4	4	4	
Meadow pipit	1							4
Pied wagtail	13							
Wren	290	6						
Dunnock	165	5			4			4
Robin	246	2						
Nightingale	5							4
Stonechat	3							4
Blackbird	116	1						
Song thrush	40	1			4		4	
Mistle thrush	13	1						4
Cetti's warbler	13	1		4				
Sedge warbler	27							
Reed warbler	10							
Garden warbler	29							
Lesser whitethroat	9							
Whitethroat	120	5						
Blackcap	122							
Willow warbler	16	3						4
Chiffchaff	77							
Goldcrest	97	1						4
Spotted flycatcher	2				4	4	4	
Marsh tit	5				4		4	

Table 3.1 (continued) Numbers of Breeding Bird Territories Recorded in the Survey Area and the Proposed Nuclear Power Station Footprint

Species	Estimated Number of Territories within survey area	Estimated Number of Territories within proposed power station footprint	Density of Territories within proposed power station footprint	Wildlife and Countryside Act Schedule 1 / Annex 1 of EU birds Directive	UK BAP Priority Species	Suffolk BAP Species	Birds of Conservation Concern Red List	Birds of Conservation Concern Amber List
Blue tit	180	1						
Great tit	142	1						
Coal tit	84	1						
Long-tailed tit	67****	2						
Treecreeper	26							
Starling	2				4		4	
Jay	18							
Magpie	20	1						
Jackdaw	2							
Carrion crow	6							
Rook	30							
House Sparrow	89				4		4	
Chaffinch	396	16						
Greenfinch	84							
Goldfinch	34	1						
Bullfinch	10				4	4	4	
Linnet	27	6			4	4	4	
Yellowhammer	46				4		4	
Reed bunting	17				4	4	4	

* Grey heron and barn owl are known to breed within the Estate, although the nest site of the heron (in Sizewell Wents) and the barn owl (Lower Abbey Farm) were not recorded during the work. Barn owl has been recorded nesting in a pole-mounted nest box at Goose Hills (2006), but in 2007 this site was occupied by a kestrel (SWT, pers comm.).

** These species are considered to have been under recorded during the survey work. Pheasant is of commercial rather than conservation interest and not all registrations were mapped. Woodpigeon often flushes on approach but does not vocally alarm and sings relatively infrequently, hence is difficult to record accurately without intensive work. Surveys were not appropriate for recording tawny owl which exhibits greatest territorial activity between October and December and courtship behaviour between December and mid April (e.g. Hardey et al, 2006) and was not therefore adequately covered during the nightjar work (which also only covered discrete areas), or water rail, for which more accurate numbers can be estimated through tape luring techniques. Tape luring carried out by SWT in 2004 resulted in eight water rail territories being located. There is no reason to believe that the number of water rail territories on site will

have changed considerably as conditions have remained similar within the Sizewell Marshes during this time. Annual monitoring suggests that numbers of water rail at RSPB Minsmere appear stable (Robin Harvey [RSPB], pers comm.).

*** These registrations came from the north-eastern part of the survey area. This is under RSPB ownership, and following the first survey, it was agreed that RSPB should collect data as part of ongoing bird survey work. It is therefore unclear whether lapwing and redshank bred at this stage (registration from the initial survey have been included here for completeness but are not included on Figure 3.2).

**** These species can be difficult to accurately census as they are high mobile, vocal and / or have complex breeding ecology. Therefore, it is probable that the number of pairs of each has been overestimated to some extent.

Territory mapping showed that the commonest species in the survey area were those with wide ranging habitat preferences. Of these, chaffinch was the most numerous, with almost 400 territories, while wren with 290 territories and robin with 246 territories respectively were also well represented. Other common generalist species were great tit, blue tit and dunnock, while the amount of deciduous woodland and woodland edge, hedgerow and scrub habitats within the survey area resulted in relatively high numbers of blackcap and whitethroat being recorded. Areas of coniferous plantation held considerable numbers of goldcrest and coal tit.

Highly protected species that bred within the survey area were hobby, barn owl, kingfisher, woodlark and Cetti's warbler. Fifteen breeding UK Biodiversity Action Plan (BAP) Priority Species were recorded, of which seven also feature on the Suffolk BAP, while twelve breeding species that feature on the Birds of Conservation Concern red list²² and a further sixteen species that appear on the amber list²³ were present. These amber listed species included nightingale, which has a restricted distribution in the UK, with Suffolk being one of its core areas of distribution.

The diversity of breeding species within the proposed power station footprint was very limited in comparison with the wider survey area. Twenty-one species, including one pair of song thrush, three pairs of skylark and six pairs of linnet (all of which are red-listed) were considered to have held territory. Otherwise, the bird community comprised a range of species some of which feature on the amber list of birds of conservation concern, but all of which remain common at regional and national level. This lack of diversity was not unexpected, as the habitats present comprise semi-improved grassland, ornamental planting and (modified) dune vegetation, while well-developed scrub cover is confined to two discrete fenced areas, and there are no wetland habitats or tall ruderal vegetation. A number of the bird registrations included under Column 3 in Table 3.1 (which indicates the number of each species that occurred within the preliminary works area), including the Cetti's warbler, actually came from areas in close proximity to the works area rather than within it. They are included in this column as they were plotted as being so close to the works area that their core territory locations would potentially

²² The criteria for assigning species to the red list include: if they are globally threatened; if they have declined by 50% or more over the past 25 years; if they have experienced severe declines historically or if their range in the UK has contracted by over 50% in the past 25 years. Both wintering and breeding species are considered. All red-listed species recorded in the survey area at Sizewell appear on the list due to considerable range contractions or rapid declines in their breeding populations.

²³ Amber-listed species are those which have experienced moderate recent declines or range reductions (between 25 and 49%) over the past 25 years, that are rare breeders (with a population of 1-300 pairs in the UK), that have 50% or more of the breeding population occurring at 10 or fewer sites, or for which 20% or more of the European population breed (or winter in the case of wildfowl) within the UK.

overlap it. This suggests that they could be potentially displaced or disturbed by the works, resulting in nest failure and loss of the pair/pairs to the local population.

A more detailed discussion of the importance of the preliminary works area, and the wider survey area at Sizewell to breeding birds is presented in **Section 4**.

3.4 Intertidal Bird Surveys

3.4.1 Summary of Results

Four tern species - common, arctic, little and sandwich tern - were recorded during the intertidal and inshore marine surveys. Common tern was the most regularly recorded of the four, reflecting the proximity of the established breeding population at Minsmere, where 55-93 pairs have been present over the past three years (Robin Harvey, [RSPB] pers comm., Wright, M [Ed], 2006). There were no records during the April surveys, but between May and July there were regular records of 10-75 common terns associated with the outfall²⁴. The highest numbers recorded during the surveys were 55 on 13 May, 50 on 9 July and 75 on 23 July, and it was clear from the overall results that common terns feed at the outfall throughout the breeding season. In contrast, the maximum count of feeding common terns in the northern grid square adjacent to the proposed new build area was eight birds on 17 June, and it was apparent from the data that while birds do dip feed on occasion in the inshore waters in this area, most birds commute to and from the warm water outfalls off the existing nuclear power stations, passing through this square en route. Counts of common terns commuting through the northern grid square towards the warm water outfall included 69 south and 138 north on 4 June, and 239 south and 252 north on 9 July²⁵.

The only arctic tern records were on 4 May and involved small numbers (1-4) of dip-feeding birds moving north through the inshore waters. These birds showed no association with the warm water outfalls. There were 28 records of sandwich tern using or commuting over waters within 300m of the shore during the surveys. Single foraging birds were present around the warm water outfalls and associated towers on 4 May and 4 June, with the remaining birds commuting directly through. Little terns were recorded on 13 occasions, mainly in the northern grid square, and therefore in closer proximity to the coastal breeding colony at Minsmere (the colony is approximately 2km to the north of the northern survey location). There were only 2 records of feeding little terns, both in the southern grid square, 1 of which was associated with the outfall.

Gull species showed a marked association with the outfall. Black-headed gull was recorded throughout the period, with a peak count of 71 foraging around the outfall on 13 May and 14 other counts of 10-43 feeding birds recorded in this area during the survey period. In contrast, the peak count of black-headed gulls foraging in the waters surveyed from Location 1 during the

²⁴ As counts were conducted each hour, a considerable proportion of these records would have been conducted on the same day (i.e. during each 45 minute period there would have been an initial count of birds around the outfall, a peak count (if numbers increased) and a final count).

²⁵ These are counts of birds commuting over the intertidal and inshore marine waters (up to 300m offshore) only – additional birds may have commuted to the outfall via a more circuitous route or further offshore. The totals represent overall numbers in 270 minutes (4.5 hours) of survey.

survey period was 3 on 17 June. Some commuting to and from the Minsmere area was noted, although there was less of a clear pattern than for common tern. Little gull, was only recorded with regularity in July, with a peak count of 8 around the outfall on July 23 and most records involving feeding birds in this area.

Herring, lesser black-backed and great black-backed gulls which were recorded throughout the survey period, also occurred in greatest numbers around the warm water outfall, although frequently birds were recorded loafing rather than actively feeding. There was a peak herring gull count of 130 birds at the outfall on 15 April, with 5 additional counts of 50 or more loafing and feeding birds. The peak count of herring gull in the northern grid square was 20 loafing birds on 13 May. There were 40 lesser black-backed gulls feeding around the outfall on 23 July, with 11 further counts of 10-30 birds from this area recorded during the survey period. Very low numbers of lesser black-backed gulls were recorded using the waters surveyed from Location 1, with a peak count of 5 loafing birds on 15 April. Great back-backed gulls generally occurred in low numbers (1-7 birds), and were strongly associated with the outfall. There was a peak count of 35 loafing birds around the outfall on 15 April. No use of the inshore waters viewed from Location 1 by great black-backed gull was recorded other than occasional commuting birds.

Mediterranean gull was only recorded on an occasional basis, with a peak count of 2 birds on 17 June. All records involved birds commuting through the inshore waters, and the majority were recorded from Location 1, probably reflecting the proximity of breeding birds at Minsmere. Common gull was only recorded in April and May. Most records involved single birds passing through the inshore waters, and there was only one observation of foraging in the vicinity of the outfall, with no foraging recorded elsewhere. Kittiwakes nesting on the Sizewell Rigs were not generally counted. Loafing birds were recorded in close proximity to the Rigs, but there was no association with the outfall recorded, and feeding was not noted in the inshore waters from either survey location. Cormorant was regularly recorded loafing on the Rigs, with 11 birds on 9 July being the peak count. There was little recorded use of the inshore waters by this species.

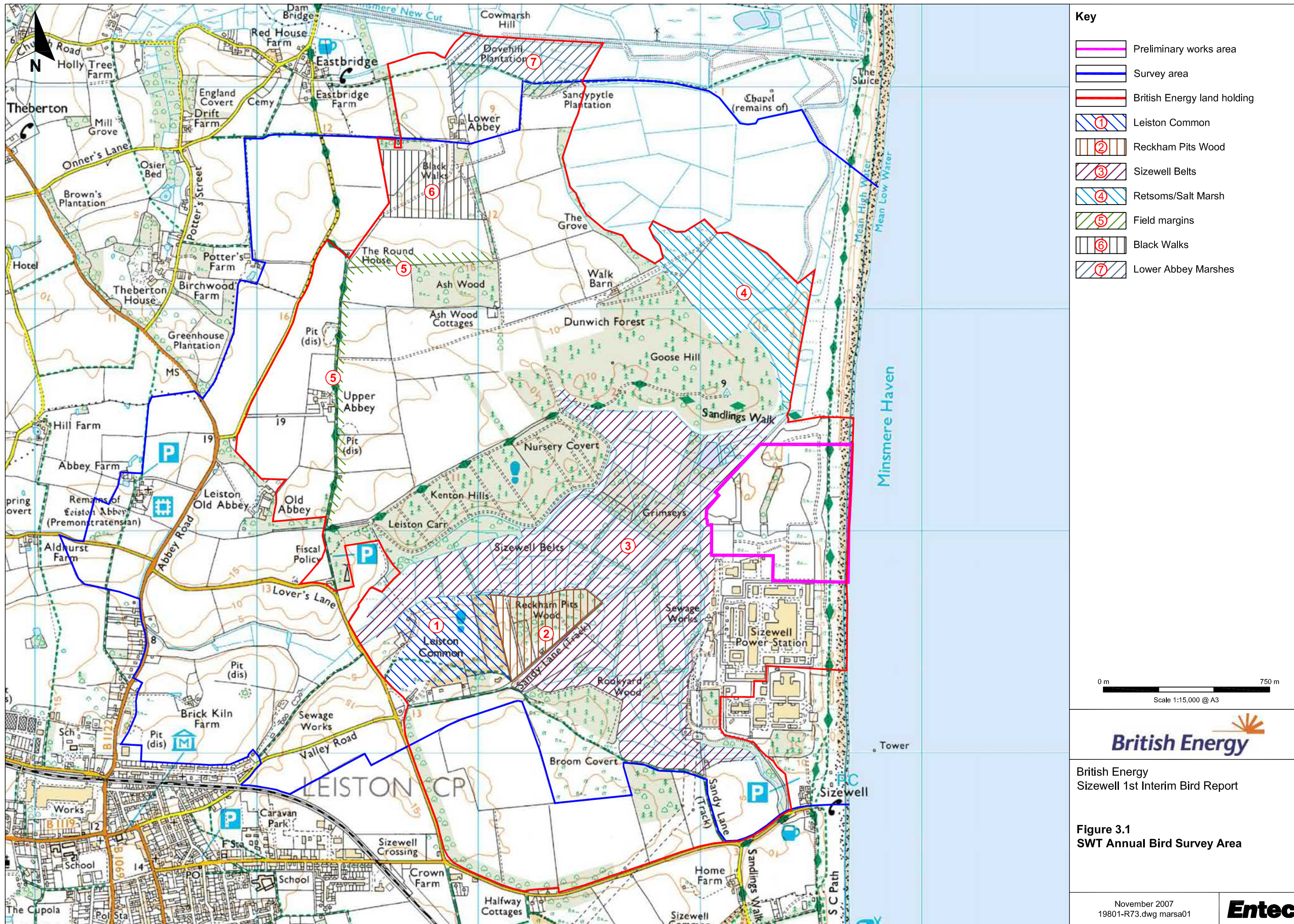
Eleven species of wader were recorded commuting over the littoral zone and the inshore waters. There were no records of waders feeding in either of the grid squares, although 2 ringed plover were noted loafing in the northern grid square on 17 July. There was a casual observation of displaying ringed plovers at TM4763 6453 on 10 April and birds may have bred in the vicinity of this sighting.



The commonest wader species recording during the surveys was oystercatcher, with 48 records (involving 1-8 birds) over the season. The spread of records over the season was relatively even, probably indicating regular movements of non-breeding birds or failed breeders back and fore between the Alde-Ore complex to the south of Sizewell, and the Minsmere area. A similar pattern of movement, albeit on a smaller scale, was noted in avocets with 1-2 birds recorded on five dates. Flight lines of all waders were over the inshore waters and followed the line of the coast. Oystercatchers were occasionally recorded commuting over the intertidal zone, but most oystercatcher and all avocet movements occurred across a relatively broad front between 0 and 300m below the tide line. There were 4 records of ringed plover, 2 in May and 2 in July (including the record of the loafing birds above).

Other well represented species were curlew and whimbrel, with most records occurring in July and indicating return passage south from their breeding grounds. There were 13 records of 1-2 curlew and 8 records of 1-5 whimbrel during the season. Other wader species recorded were greenshank (1 on 17 July), dunlin (2 records of 4 birds on 23 July), redshank (2 on 12 April),

sanderling (2 on 12 April), bar-tailed godwit (2 on 17 July) and turnstone (1 on 17 July). All of these species were recorded commuting or migrating parallel to the line of the coast, with all species except the sanderling flying over the sea (at varying distances from the shore). There were occasional additional records of waders beyond 300m, mostly large or vocal (and hence detectable) species or flocks of birds.

Species recorded on an irregular basis using or commuting through the inshore waters were red-throated diver (1 bird on 12 April), common scoter (peak counts of 5 birds, recorded on two July surveys), gadwall (peak count of 3 birds, recorded on two dates), eider (1 on 4 July), shelduck (a total of 5 birds over 3 dates) and little egret (2 birds on 4 July). Due to the infrequent nature of sightings of these species, no pattern of use has emerged. Fulmar, guillemot and gannet were infrequently recorded from the inshore waters, although they did occur on a more regular basis further offshore.



- Key**
-  Preliminary works area
 -  Survey area
 -  British Energy land holding
 -  ① Leiston Common
 -  ② Reckham Pits Wood
 -  ③ Sizewell Belts
 -  ④ Retsoms/Salt Marsh
 -  ⑤ Field margins
 -  ⑥ Black Walks
 -  ⑦ Lower Abbey Marshes

0 m 750 m
 Scale 1:15,000 @ A3



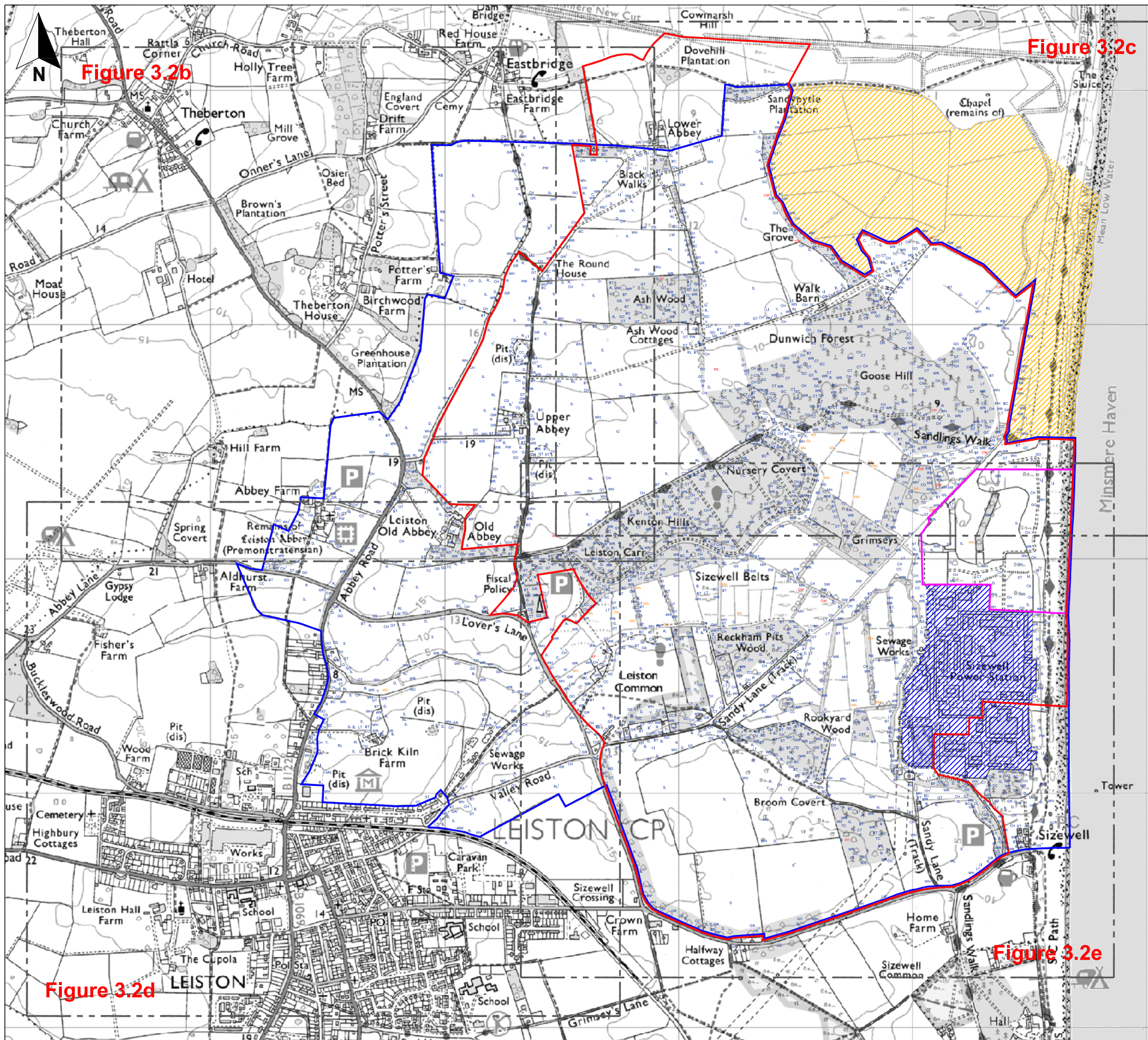
British Energy
 Sizewell 1st Interim Bird Report

Figure 3.1
 SWT Annual Bird Survey Area

November 2007
 19801-R73.dwg marsa01



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Key

- British Energy land holding
- Preliminary works area
- Survey area
- Data to be supplied by RSPB
- Excluded from survey

B.	Blackbird	M.	Mistle thrush
BC	Blackcap	MA	Mallard
BF	Bullfinch	MG	Magpie
BT	Blue tit	MH	Moorhen
C.	Carrion crow	MP	Meadow pipit
CC	Chiffchaff	MS	Mute swan
CD	Collared dove	MT	Marsh tit
CH	Chaffinch	N.	Nightingale
CK	Cuckoo	PH	Pheasant
CO	Coot	PW	Pied wagtail
CT	Coal tit	R.	Robin
CW	Cetti's warbler	RB	Reed bunting
D.	Dunnock	RL	Red-legged partridge
G.	Green woodpecker	RO	Rook
GA	Gadwall	RW	Reed warbler
GC	Goldcrest	S.	Skylark
GO	Goldfinch	SC	Stonechat
GR	Greenfinch	SD	Stock dove
GS	Great spotted woodpecker	SF	Spotted flycatcher
GT	Great tit	SG	Starling
GW	Garden warbler	SH	Sparrowhawk
HS	House sparrow	ST	Song thrush
HY	Hobby	SW	Sedge warbler
J.	Jay	TC	Treecreeper
JD	Jackdaw	TD	Turtle dove
K.	Kestrel	TO	Tawny owl
KF	Kingfisher	WA	Water rail
LG	Little grebe	WH	Whitethroat
LI	Linnet	WL	Woodlark
LO	Little owl	WP	Woodpigeon
LT	Long-tailed tit	WR	Wren
LW	Lesser whitethroat	WW	Willow warbler
		Y.	Yellowhammer

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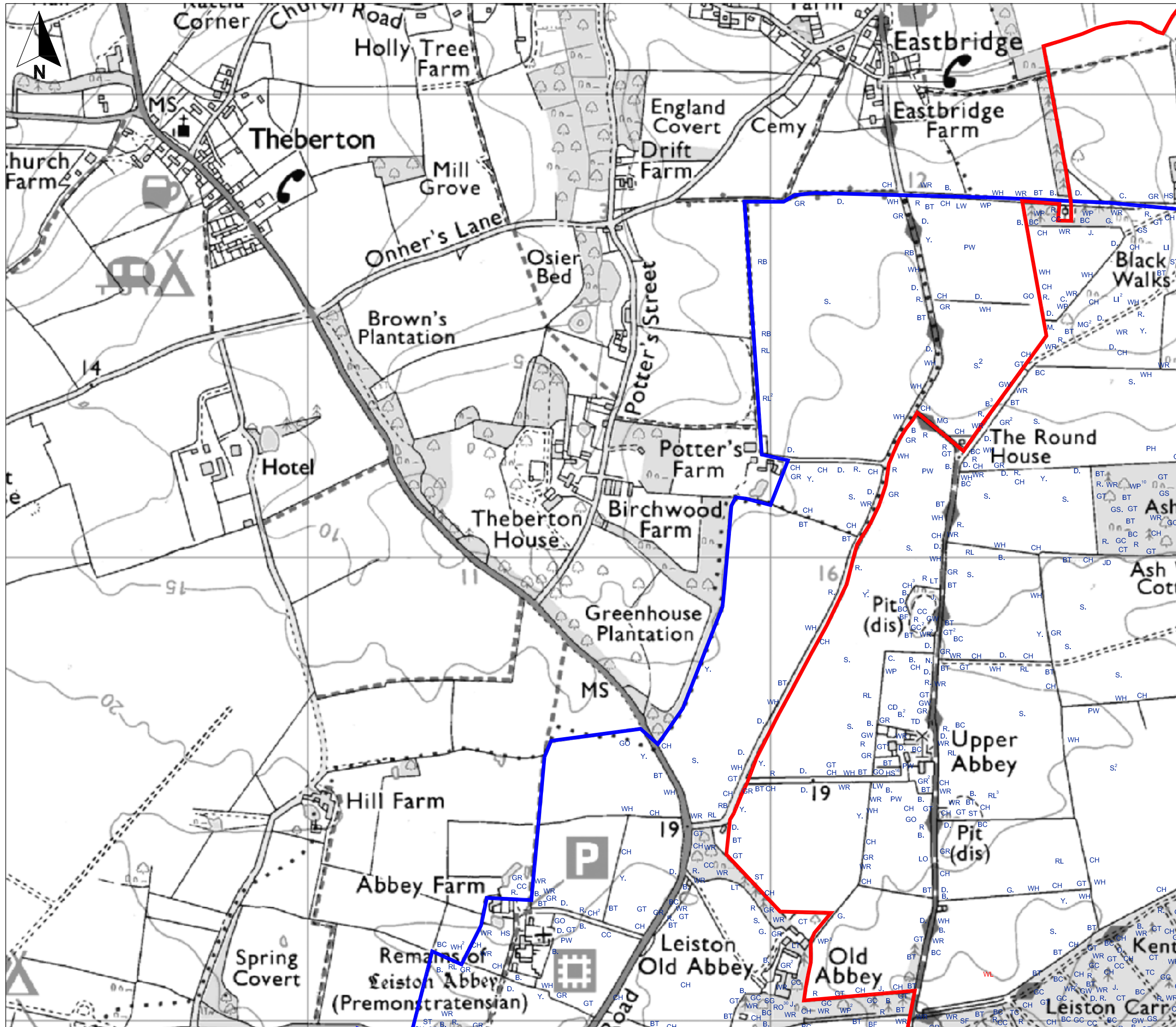
Figure 3.2a
 Birdmap overview

CONFIDENTIAL

September 2007
 19801-R58.dwg marsa01



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Key

- British Energy land holding
- Preliminary works area
- Survey area
- Data to be supplied by RSPB
- Excluded from survey

B.	Blackbird	M.	Mistle thrush
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CK	Cuckoo	PH	Pheasant
CO	Coot	PW	Pied wagtail
CT	Coal tit	R.	Robin
CW	Cetti's warbler	RB	Reed bunting
D.	Duncock	RL	Red-legged partridge
G.	Green woodpecker	RO	Rook
GA	Gadwall	RW	Reed warbler
GC	Goldcrest	S.	Skylark
GO	Goldfinch	SC	Stonechat
GR	Greenfinch	SD	Stock dove
GS	Great spotted woodpecker	SF	Spotted flycatcher
GT	Great tit	SG	Starling
GW	Garden warbler	SH	Sparrowhawk
HS	House sparrow	ST	Song thrush
HY	Hobby	SW	Sedge warbler
J.	Jay	TC	Treecreeper
JD	Jackdaw	TD	Turtle dove
K.	Kestrel	TO	Tawny owl
KF	Kingfisher	WA	Water rail
LG	Little grebe	WH	Whitethroat
LI	Linnet	WL	Woodlark
LO	Little owl	WP	Woodpigeon
LT	Long-tailed tit	WR	Wren
LW	Lesser whitethroat	WW	Willow warbler
		Y.	Yellowhammer

0 m 500m
 Scale 1:8,000 @ A3



British Energy
 Sizewell 1st Interim Bird Report

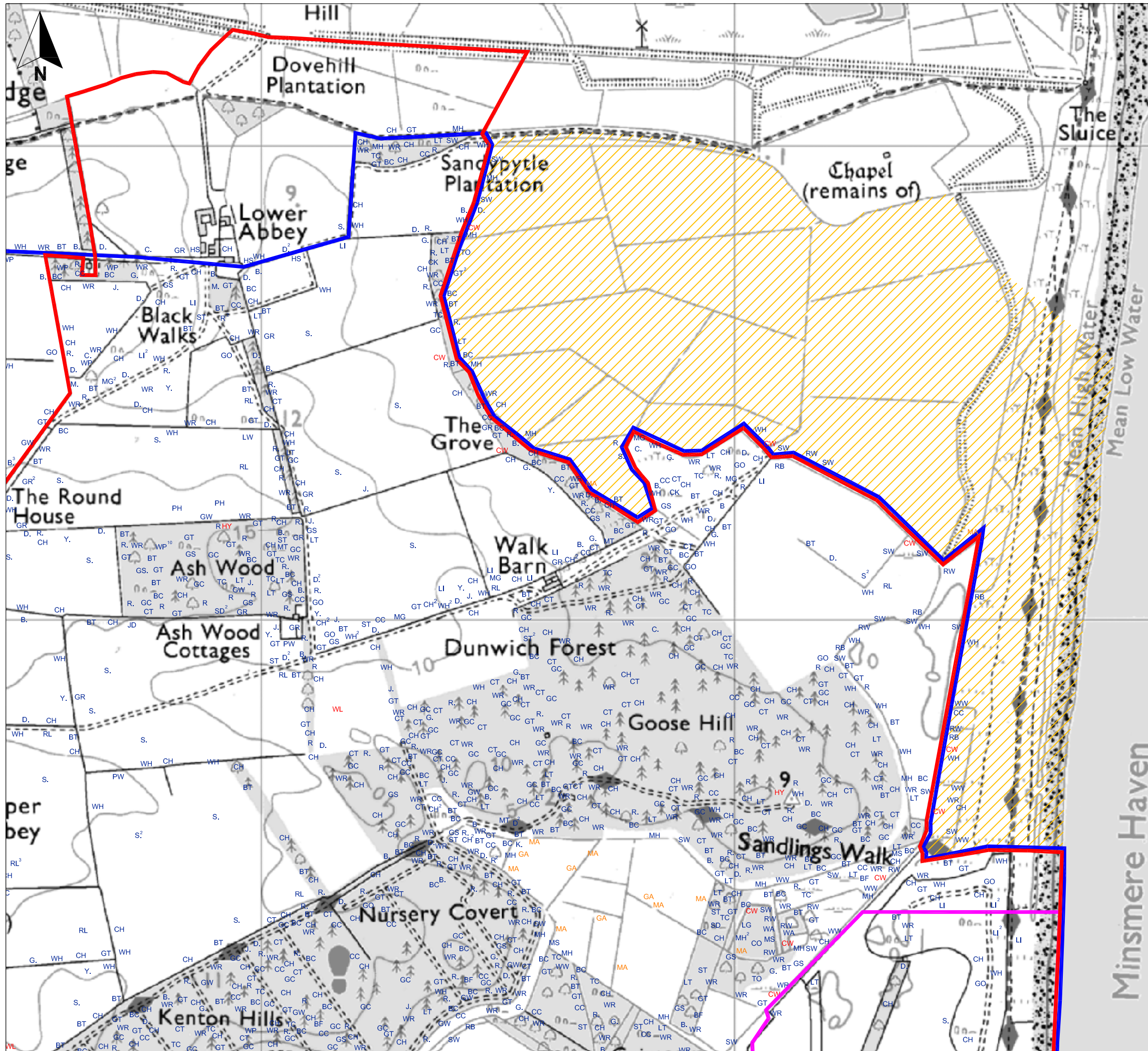
Figure 3.2b

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September 2007
 19801-R59.dwg marsa01



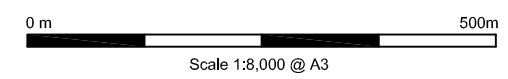
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Key

- British Energy land holding
- Preliminary works area
- Survey area
- Data to be supplied by RSPB
- Excluded from survey

B.	Blackbird	M.	Mistle thrush
BC	Bullfinch	MA	Mallard
BT	Blue tit	MG	Magpie
C.	Carrion crow	MH	Moorhen
CC	Chiffchaff	MP	Meadow pipit
CD	Collared dove	MS	Mute swan
CH	Chaffinch	MT	Marsh tit
CK	Cuckoo	N.	Nightingale
CO	Coot	PH	Pheasant
CT	Coal tit	PW	Pied wagtail
CW	Cetti's warbler	R.	Robin
D.	Dunnock	RB	Reed bunting
G.	Green woodpecker	RL	Red-legged partridge
GA	Gadwall	RO	Rook
GC	Goldcrest	RW	Reed warbler
GO	Goldfinch	S.	Skylark
GR	Greenfinch	SC	Stonechat
GS	Great spotted woodpecker	SD	Stock dove
GT	Great tit	SF	Spotted flycatcher
GW	Garden warbler	SG	Starling
HS	House sparrow	SH	Sparrowhawk
HY	Hobby	ST	Song thrush
J.	Jay	SW	Sedge warbler
JD	Jackdaw	TC	Treecreeper
K.	Kestrel	TD	Turtle dove
KF	Kingfisher	TO	Tawny owl
LG	Little grebe	WA	Water rail
LI	Linnet	WH	Whitethroat
LO	Little owl	WL	Woodlark
LT	Long-tailed tit	WP	Woodpigeon
LW	Lesser whitethroat	WR	Wren
		WW	Willow warbler
		Y.	Yellowhammer



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Figure 3.2c

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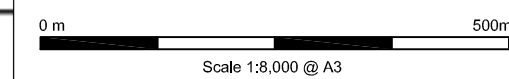
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Key

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B.	Blackbird	M.	Mistle thrush
BC	Blackcap	MA	Mallard
BF	Bullfinch	MG	Magpie
BT	Blue tit	MH	Moorhen
C.	Carrion crow	MP	Meadow pipit
CC	Chiffchaff	MS	Mute swan
CD	Collared dove	MT	Marsh tit
CH	Chaffinch	N.	Nightingale
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JD	Jackdaw	TD	Turtle dove
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LI	Linnet	WL	Woodlark
LO	Little owl	WP	Woodpigeon
LT	Long-tailed tit	WR	Wren
LW	Lesser whitethroat	WW	Willow warbler
		Y.	Yellowhammer



British Energy
Sizewell 1st Interim Bird Report

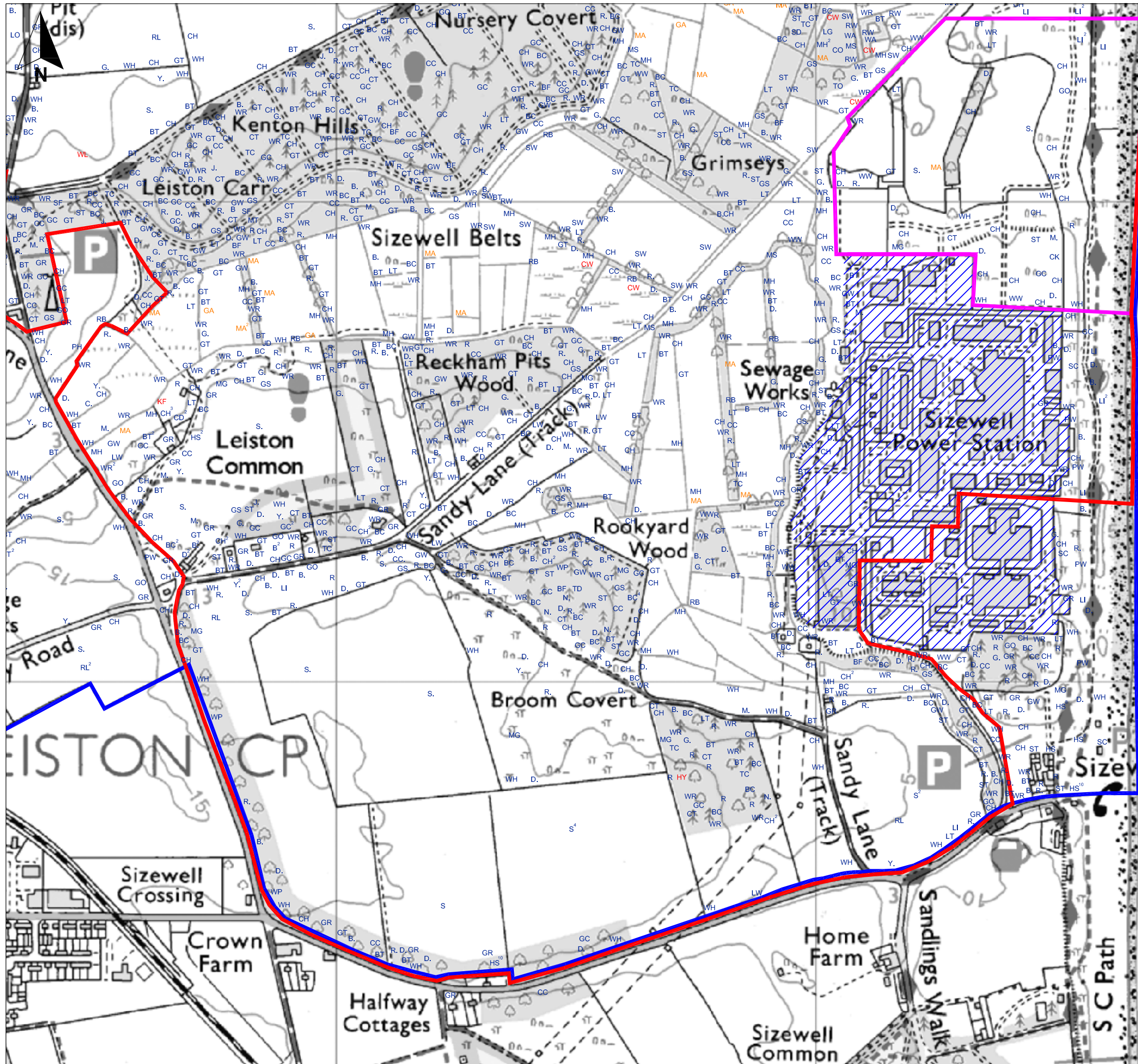
Figure 3.2d

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19801-R61.dwg marsa01



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Key

- British Energy land holding
- Preliminary works area
- Survey area
- Data to be supplied by RSPB
- Excluded from survey

B.	Blackbird	M.	Mistle thrush
BC	Blackcap	MA	Mallard
BF	Bullfinch	MG	Magpie
BT	Blue tit	MH	Moorhen
C.	Carrion crow	MP	Meadow pipit
CC	Chiffchaff	MS	Mute swan
CD	Collared dove	MT	Marsh tit
CH	Chaffinch	N.	Nightingale
CK	Cuckoo	PH	Pheasant
CO	Coot	PW	Pied wagtail
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D.	Dunnock	RL	Red-legged partridge
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GC	Goldcrest	S.	Skylark
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HS	House sparrow	ST	Song thrush
HY	Hobby	SW	Sedge warbler
J.	Jay	TC	Treecreeper
JD	Jackdaw	TD	Turtle dove
K.	Kestrel	TO	Tawny owl
KF	Kingfisher	WA	Water rail
LG	Little grebe	WH	Whitethroat
LI	Linnets	WL	Woodlark
LO	Little owl	WP	Woodpigeon
LT	Long-tailed tit	WR	Wren
LW	Lesser whitethroat	WW	Willow warbler
		Y.	Yellowhammer

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 Scale 1:8,000 @ A3



British Energy
 Sizewell 1st Interim Bird Report

Figure 3.2e

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4. Discussion

The results of the territory mapping survey are discussed in Section 4.1 below. Separate sections on dabbling ducks, hobby and intertidal and inshore marine birds, non-breeding birds and passage migrants are included in Sections 4.2-4.5 inclusive.

When considering bird populations, importance is often taken as meaning that a site supports at least 1% of the population under consideration at county (Suffolk), national (England unless otherwise specified) or international level. This approach has been taken when considering the results of the 2007 bird surveys of the preliminary works area and the wider survey area at Sizewell. To determine likely thresholds of importance, relevant county and national accounts (Piotrowski, 2005., Brown & Grice, 2005) have been used in conjunction with bird reports, scientific papers and information on population trends available from the BTO.

There is no fundamental biological reason to take 1% of a population as the threshold level for establishing the level of importance of a site. Nevertheless, this percentage is widely considered to be of value in developing measures that give an appropriate level of protection to populations, and has gained acceptance on this basis throughout the world. The criterion was, for example, adopted by parties involved in the Ramsar Convention 1971. Thereafter, the 1% level of national species totals has been taken as the basis of assessment in various countries, including Britain (Stroud, Mudge & Pienkowski, 1990).

4.1 Territory Mapping

4.1.1 Highly Protected Breeding Species

Kingfisher was recorded breeding towards the western edge of Sizewell Belts on an area of ditch bank which has been managed by SWT with the aim of providing a nesting location for the species (Carl Powell, SWT, pers comm.). Kingfishers are fairly common in Suffolk, with breeding season reports from 34 sites in 2005 (Wright [Ed], 2006). This suggests that one pair is of county importance. The English population has recently been estimated at 3,000-4,500 breeding pairs (Brown & Grice, 2005).

Woodlark was only regularly recorded, during the territory mapping and incidentally (i.e. outside formal survey work), in two locations - in arable fields adjacent to the northern edge of Leiston Carr, and adjacent to the south side of the recently planted Great Mount Wood. Singing was recorded in both areas, and these have been indicated as territory locations on **Figure 3.2** (although this interpretation should be treated with caution). Surveys for woodlark are best carried out between February and June, and if a three visit strategy is adopted as was undertaken for the national survey in 1997 (Wotton, 1997), only one territory mapping visit would fall within the survey period that this report covers (April to July inclusive). In addition, song perches and foraging areas are often 200-400m from nesting locations (Gilbert *et al.*, 1998); therefore there is a greater potential margin for error in the plotting of registrations for this species than for many others.

Despite the reservations expressed above, woodlark numbers recorded during the surveys were consistent with the numbers recorded by SWT in 2007 (SWT draft figures). Between 2005 and

2007, the number of woodlark territories in monitored areas has varied between 2 and 5, with the most consistently occupied areas of the Estate being Leiston Common and Black Walks (although a number of other locations have been used). The developing plantation at Great Mount Wood is certainly a feasible location for nesting woodlark; trends in the county population have been linked to forestry practices, and woodlark numbers often increase in response to the establishment of new plantation and rotational clearance of mature timber stands.

The UK woodlark population was estimated as being between 1,426 and 1,552 occupied territories in 1997. At that time it was estimated that almost 30% of woodlark territories (403-457) were in Suffolk, with 209-245 territories being located in the Suffolk Sandlings. At national level, the species has shown a marked contraction in range in recent decades, and since the census, declines in woodlark numbers in coastal areas of Suffolk have been recorded (Adam Rowlands, RSPB, pers. comm.). This has been linked to the maturation of existing plantations combined with unsuitable forest management practices and a lack of new planting. At present the scale of county decline is unclear. If a consistent county population of 209-245 pairs (and a continued fluctuating population on the BE Estate) is assumed, then in some years the Estate is likely to be of county importance for the species.

A total of 13 Cetti's warbler territories were located in 2007. Six territories were recorded in the Sizewell Belts, with a further four in the marshes around Retsoms and the south-eastern edge of the RSPB landholding and three in scrub in Lower Abbey Marshes. Cetti's warbler was first recorded holding territory within the BE Estate in 2000, when one was in the Sizewell Belts (SWT / ADAS, 2001). Since 2000 there has been a considerable rise in the population breeding within the Estate followed by a possible stabilisation. Four territories were recorded in 2002 and 2003, seven in 2004 rising to a peak (to date) of 19 in 2005. Subsequent to this, numbers have fallen or stabilised, with 11 territories in 2006 (SWT / ADAS, 2001-2007) and 13 territories detected during the 2007 surveys conducted by Entec. Draft figures from SWT suggest that they considered 14 (rather than 13) territories to be present within their survey area in 2007, with the distribution of territories being very similar²⁶.

Cetti's warbler is still considered a scarce resident in Suffolk despite rapid population growth at national level. During the national survey in 1996 a total of 4 territories were found at three Suffolk sites (Wotton *et al.*, 1998), while by 2005 this had risen to a minimum of 79 territorial males at 30 sites (Wright [Ed], 2006). The Entec / SWT survey results indicate that Sizewell is one of the strongholds for the species within the county, and the most recent population estimates for Suffolk clearly suggest that the Estate is of county importance for the species. At national level the number of territorial males was considered to have more than doubled (from 300 to 622) between 1997 and 2000, and was estimated at 851-878 by 2002 (Ogilvie, 2004). Based on these figures, and assuming a constant rate of increase since this time, the current number of territorial males in England would be estimated as being between 1,423 and 1,518 individuals. If this extrapolation is considered reasonable, the BE Estate is likely to currently hold just under 1% of the national population, and the BE Estate would not be considered of national importance for the species.

²⁶ SWT recorded a further Cetti's warbler territory in Lower Abbey Marshes. Entec surveyors recorded at least one additional bird singing within the nearby RSPB landholding, and this territory may overlap the boundary of the BE Estate.

Barn owl was not recorded during the survey work, but is known to breed on the BE Estate from information provided by SWT. The Suffolk population is virtually restricted to the eastern half of the county, with only sporadic reports elsewhere. Evidence suggests that densities in East Suffolk are relatively high, at approximately five breeding pairs per 10 kilometre square, indicating a county population of 100-125 pairs (Piotrowski, 2003). In this context 1 pair is potentially of county importance.

Crossbill, which has been recorded breeding on the BE Estate, was present in the plantation at Dunwich Forest in April, when small parties were recorded. As crossbills may have completed breeding by this time, it could not be concluded whether the species was likely to have bred within the survey area in 2007. Birds have bred sporadically in the past, and there is no reason to suggest that they will not continue to do so in future.

4.1.2 Red-listed Birds of Conservation Concern

In addition to woodlark, which has been considered above, eleven red-listed species of conservation concern were recorded breeding within the survey area in 2007. An account of the distribution and abundance of these species, and a discussion of the likely importance of the preliminary works area and survey area to them is contained below.

Turtle Dove was considered to have held territory in two locations - in woodland to the north of Broom Covert, and in close proximity to Upper Abbey Farm - as there were multiple records from these locations, including singing birds. Elsewhere within the survey area, there were records of turtle doves from near The Round House; along the track between Ash Wood Cottage and Upper Abbey, and at Old Abbey, but there was insufficient evidence to suggest that these indicated additional territories. Surveys undertaken by SWT have indicated that between one and three pairs of turtle dove have bred within annually monitored areas of the estate over the past three years (SWT / ADAS, 2005-07).

Numbers of turtle dove breeding in England have declined markedly over the past forty years, with BTO Data indicating a 79% decline in numbers in monitored plots since 1968 (www.bto.org). There are various reasons for this decline, which include hunting pressure during migration affecting survival rates, and limited seed availability due to agricultural intensification shortening the breeding season (Browne & Aebischer 2004 & 2005). In the UK, turtle doves occur in greatest numbers in open arable farmland with available woodland cover (for nesting) in the south-east, and the most recent national population estimate was 75,000 pairs in 1991. BTO data from the period 1994-2004 indicates a further 48% decrease in the population, which suggests the national population is now in the region of 30-36,000 pairs. At county level the species is widely distributed, with concentrations along some areas of coast and in the Breckland (Piotrowski, 2003). It is likely, therefore, that despite the declines, the BE Estate is currently of local rather than county importance for the species.

Spotted flycatcher was recorded in two locations - a pair was present in woodland to the north of the car park at Fiscal Policy, and a pair was also noted at Kenton Hills. It is possible that these sightings refer to the same pair, despite the distance between them (c. 300m). Draft SWT breeding bird figures indicate that there was possibly an additional pair in a field margin on the Estate.

Numbers of spotted flycatcher in the UK have declined rapidly and consistently since the 1960s. It is likely that a range of factors have contributed to this decline, including deterioration in the condition of woodland habitats (and linked to this, fewer large flying insects), and conditions on

migration routes and wintering grounds (Fuller *et al.*, 2005). As trends have been similar across UK regions and habitats, however, it is most likely that the decline has been driven by factors operating outside the UK. Spotted flycatcher is regarded as a fairly common breeding species in parks and large gardens in Suffolk (Piotrowski, 2003), although it is reported as being increasingly scarce by Wright (Ed), 2006. At present, it is likely that the BE Estate is of no more than local importance for the species.

Marsh tit was recorded holding territory in five locations, all in deciduous or mixed woodland (including the mixed woodland edge of large tracts of coniferous plantation); there were two territories in woodland edge habitat on the south-eastern side of Kenton Hills; one territory towards the western edge of Goose Hills; one territory in Ash Wood and one territory in the linear strip of woodland to the east of Walk Barn. The coastal strip between the Alde and the Blythe is considered to represent one of the strongholds for the species in the county. (Piotrowski, 2003). Marsh tit is a species that has experienced a sustained decline in the UK. Detailed demographic work suggests that the decline may have been driven by low annual survival and that neither increased predation nor interspecific competition is responsible (Siriwardena, 2006). Reductions in the structural and floristic diversity of woodland, resulting partly from increased browsing by deer, are likely to be the causes underpinning the population trends (Perrins 2003, Fuller *et al.* 2005). There is no readily available county estimate for marsh tit numbers, but as the national population is largely confined to southern England and Wales, and was estimated at 56,000 pairs at the time of the last breeding bird atlas (Gibbons *et al.*, 1993), even in the face of declines it seems unlikely that the BE Estate is of more than local importance for the species.

A maximum of 10 bullfinch territories were recorded within the survey area. Despite their bold colouration, bullfinches are often unobtrusive. They do not sing loudly or with the regularity of many other passerines, and often advertise their presence with calls rather than song. Within the survey area, territories were considered by the surveyors to have been present in the following locations; the Leiston Carr area of Kenton Hills; the central area of Kenton Hills; the Nursery Covert area of Kenton Hills; a belt of woodland running north-east from Grimseys; mixed woodland south of Old Abbey; woodland to the north of Broom Covert; the eastern fringe of Goose Hills (2); woodland adjoining the south of the built power station and near the disused pit to the north of Upper Abbey Farm.

Bullfinch will regularly forage some distance from the nest, possibly because they can store food for young in sacs in the mouth, and due to the fact that food sources are often patchily distributed (Brown & Grice, 2005). All territories included here are of birds noted on several occasions, however, and as such it would appear unlikely that there has been a significant over-estimation of numbers within the survey area. Both Piotrowski (2003) and Wright ([Ed], 2006) considered bullfinch a common but declining breeding species in Suffolk, hence numbers are unlikely to be of county importance. The density of territories within the survey area appears typical or rather low, as Gibbons *et al.* (1993) derived average densities of 8 territories per km² in woodland and 1 pair per km² in arable farmland habitats respectively.

Other red-listed species recorded breeding within the survey area (skylark, song thrush, starling, house sparrow, linnet, yellowhammer and reed bunting) remain common or very common at county and national level, despite significant population declines. Numbers occurring in the survey area are therefore unlikely to be of more than local importance.

Despite the considerable number of skylarks recorded during the survey work, the species does not breed in the Sizewell Marshes, and was recorded from farmland and heathland habitats in

the northern, western and southern parts of the survey area. Two territories were within the preliminary works area. Yellowhammer was recorded in the same habitats as skylark, although was not present in the preliminary works area. A concentration of territories was noted in the south-western part of the survey area, in the area between the edge of Leiston and Old Abbey.

Song thrush was recorded in a range of woodland and field edge habitats throughout the survey area. One territory was recorded within the preliminary works area, with a further territory within 100m of the western edge of it. The number of territories recorded suggests that the survey area does not support exceptional numbers of song thrush, as densities in woodland and rural garden habitats in Southern England can be as high as 25 per km² and 55 per km² respectively, while 3-5 pairs per km² is more typical of arable farmland (Peach *et al.*, 2002).

Starling and house sparrow numbers are likely to have been under-recorded, as likely breeding areas such as around dwellings and farm buildings were generally excluded from the survey. Nevertheless, it is apparent that only low numbers of starling hold territory within the survey area during the breeding season, while house sparrow is relatively common. House sparrow colonies with ten or more males were recorded near the Sewage Works on the edge of Leiston, at Halfway Cottages, Upper Abbey Farm and in bushes on the edge of the built power station car park. Neither species was recorded breeding in the preliminary works area.

Linnet was recorded breeding in the preliminary works area. Three pairs were present in the north-eastern part of this area in close proximity to the coastal path, with another three pairs just to the north of this. Elsewhere in the survey area, linnet were found nesting along the coastal strip, including five pairs in coastal scrub between the built Sizewell Power Stations and the sea, but were sparsely distributed in farmland habitats. Reed bunting showed a predictable association with wetland habitats, with concentrations of breeding territories recorded in the Sizewell Marshes and around ditches to the north-east of Goose Hills. As with linnet, only very low numbers were recorded in farmland habitats.

4.1.3 Other Notable Species

Five nightingale territories were located in 2007, three in scrubby woodland to the north of Broom Covert, one in woodland to the south-east of Broom Covert and a further territory in a thick hedge on the lane between Upper Abbey and The Round House. Occupancy of these areas was recorded on two or more occasions during the territory mapping surveys, and further ad hoc visits were undertaken by the surveyors to confirm their findings. A further singing male in the woodland to the south-east of Broom Covert was not considered to be breeding bird, as it was only recorded on a single occasion, and has not been marked on **Figure 3.1**. Nightingale numbers within the BE Estate have been low in recent years, with a single territory in the Sizewell Belts between 2004 and 2006 inclusive (although Broom Covert is not surveyed during annual SWT survey work and territories in this area may have gone undetected). A national nightingale survey undertaken in 1999 revealed a Suffolk population of 881 singing males, with a concentration of birds in the central coastal zone around Minsmere and Walberswick. Despite considerable range contractions in the UK, overall nightingale numbers only declined by 8% between annual censuses conducted in 1980 and 1999 by the BTO. This was partly due to a 140% increase in Suffolk between the surveys (Piotrowski, 2003). Even allowing for some decline at county level since this date it is unlikely that the population recorded within the BE Estate in 2007 is of county importance.

Heronries within Suffolk are counted on an annual basis, and contemporary information on numbers will need to be secured from SOG / BTO to inform the Environmental Statement for

the development. The indication from readily available data is that numbers of nesting heron in Suffolk vary between 160 and 190 birds each year. Any increase in the number of herons nesting on the Sizewell Estate (from the one pair that currently occurs) would therefore infer county importance upon it.

4.2 Dabbling Duck Survey

The dabbling duck survey work indicated that there were 6 pairs of gadwall and 27 pairs of mallard breeding within the survey area in 2007. Numbers of gadwall appear relatively consistent with surveys undertaken by SWT in 2005 and 2006, when 8 and 5 pairs were recorded respectively. In 2007 gadwall territories were concentrated in two areas, with four pairs in the area of enclosed grazing marsh to the east of Nursery Covert and two further pairs on the 'eastern arm' of the Sizewell Belts, between Leiston Carr and Leiston Common. Gadwall populations continue to grow at national level, and a minimum of 861 pairs were reported from English sites alone in 2000 (Brown & Grice, 2005). This indicated that the ditch systems on the Sizewell Marshes are likely to be of county rather than national importance for the species. Mallard numbers on the Marshes are also likely to be of county importance, as the Suffolk population is estimated to be in the region of 1,000 pairs (Piotrowski, 2003).

As a result of the dabbling duck surveys, population estimates of five pairs of mute swan, one pair of coot and fifty moorhen territories were also derived, while little grebe bred successfully, with at least one chick fledging. A census of mute swans conducted by SOG in 1990 recorded 131 pairs (Wright, 1991), indicating that this population is likely to be of county importance. In addition to the birds recorded above, draft figures from SWT indicate that single pairs of breeding teal, tufted duck and shoveler, all of which are likely to be of county importance, bred in 2007. Water rail numbers within the Estate are also of county importance. BTO Data indicates that 700 to 1400 pairs breed in Britain (BTO Website, 2007). Brown & Grice (2005) suggested that in excess of 1,000 pairs occur in England. Piotrowski (2003) does not provide a county estimate of water rail numbers, but does state that the species is mainly found in coastal wetlands. Given a localised county distribution and the numbers of birds apparently holding territory within the BE Estate, the Sizewell Marshes are therefore of county importance for the species.

4.3 Hobby Survey

Dunwich Forest

Hobbies were initially recorded displaying over farmland to the north-west of Kenton Hills and flying from Sizewell Marshes towards Dunwich Forest on 5 May. Surveys conducted on 14 May concentrated on the Goose Hills area of Dunwich Forest. During these surveys a high display flight, which included circling and stooping, was recorded. A hobby was subsequently seen calling to a second (flying) bird, from a perch in a cluster of five mature pines adjacent to an area of younger plantation towards the eastern end of Goose Hills. A third bird then joined the pair, and the picture became confused, with the apparent territory being temporarily abandoned. By the evening, however, there was no sign of a third bird and a pair had returned to the same location.

Following this early season territorial activity, despite relatively regular records indicating that birds were continuing to use the area, breeding was not confirmed until late August. Records of four birds, including two juveniles were recorded on a number of dates in the Goose Hills area and subsequently in Reckham Pits Wood.

The registration presented on **Figure 3.2** therefore represents an indicative rather than a confirmed central territory location. The area will be investigated further for evidence of pellets, kills and nests during September, as young are now known to have fledged. The location of the lookout perch of the male bird is usually within sight of the nesting tree (Sergio *et al.*, 2001) and this may provide further confidence to support the conclusion that this area was close to the centre of the territory.

Broom Covert

The presence of a pair of breeding hobby in Broom Covert was first suspected as a result of calls heard coming from within the plantation during a territory mapping survey.

During early August breeding was confirmed. Adult birds were recorded consistently commuting back and fore to Broom Covert on 5 and 9 August, and a range of other behaviour was noted including repeated sightings of two birds; extended flights over the plantation which included periods when a bird was recorded as 'hanging in the air'; occupancy of perches in the plantation by two birds; calling between adults, and territorial defence/alarm calling in response to a carrion crow commuting over. On two occasions on 9 August begging calls were heard from within the plantation in response to adults flying over. The centre of all territorial activity was near the western edge of the plantation, and it is assumed that the nest site was very close to where this observed activity occurred. Subsequent to the August hobby surveys, three hobbies were seen together in flight over Broom Covert, and it is therefore reasonable to assume that at least one young bird fledged.

Ash Wood

Sightings of hobby activity in the Ash Wood area during territory mapping surveys, and calling birds heard incidentally on three separate occasions, also led to the potential for a further pair to be nesting in Ash Wood being investigated. The indications that a territorial bird or pair was present were circumstantial however, with the most compelling evidence being the behaviour of an adult bird on 5 August. This bird, initially seen perched on a dead tree in the north-east corner of the wood, was observed flying from the perch and returning to the wood on several occasions. The location of the perch is marked on **Figure 3.2** with a BTO two letter symbol, and the total number of hobby territories in **Table 3.1** is shown as 2(3) in recognition that a third pair could have been present. No indication of fledging has been recorded from Ash Wood, and as only one bird was ever recorded in the area there are a number of possible explanations for the observed activity. The nearest that a nest site could be to the preliminary works area if hobby did breed in Ash Wood would be approximately 1.3km distant. Further work is being conducted to identify whether prey remains, pellets, nests, or any other signs that indicate a potential nest site, are present in this area.

4.3.1 Summary of Hobby Activity

The results of the field surveys suggest that two pairs of hobby bred within the survey area. Both were within the BE Estate, in plantation to the south-east of Broom Covert and in the Goose Hills area of Dunwich Forest respectively. The nesting location in Broom Covert,

approximately 1.1km from the proposed new build, has been mapped with confidence, while the location in Goose Hills, which is approximately 300m from the build area, is more indicative. The presence of a third territory in Ash Wood cannot be discounted, as hobby nests have been recorded as close together as 200m (Sergio *et al.*, 2001) and the local foraging resource is exceptional. There is no strong evidence to conclude that there are three active territories as a result of the survey work, however.

Wright (2001) (in Piotrowski (2003)) reported that between 15 and 25 pairs of hobby occur annually in Suffolk. While the species is very difficult to census accurately and the population continues to grow at national level, 2 pairs is likely to exceed 1% of the county total and the BE Estate is therefore of county importance for the species. The population is unlikely to be of national importance, however, as Brown & Grice (2005) estimated that between 1,000 and 2,000 pairs of hobby now breed in England, and the range of the species continues to expand.

4.4 Intertidal and Inshore Marine Survey

The survey work to date indicates that the warm water outfall that serves the built nuclear power stations at Sizewell provides a regionally important foraging resource for gulls and common terns, including a substantial proportion of breeding common terns and some black-headed gulls from the breeding colonies at Minsmere. Numbers of birds foraging and loafing in this area considerably exceed numbers that occur in the inshore waters off the preliminary works area, where no significant concentrations of any species have been found to date. Little tern, which is a qualifying species of the Minsmere to Walberswick SPA, has not been recorded foraging in the area on more than an occasional basis, and Mediterranean gull, which has a very low national breeding population (Mitchell *et al.*, 2004) has not been recorded feeding or loafing in the survey area. At Dungeness Nuclear Power Station, small numbers of Mediterranean gull commonly forage around the warm water outfall, and growth in the small Minsmere breeding population may result in the outfall becoming a feeding resource for this species.

Common terns are known to switch rapidly between prey types and feeding methods as circumstances change (Snow & Perrins, 1998), while all gull species recorded in association with the outfall are also opportunistic feeders. It is therefore likely that these adaptable species are taking advantage of a food resource that has been made more accessible by the operation of the power station. Sea water is constantly pumped into the nuclear plant in order to cool the reactor, before being pumped back out to sea (the outfall). To prevent debris and large marine organisms entering the cooling water, the intake is covered with mesh. This mesh does not prevent small fish and amphipods being sucked in, however. The water is subsequently warmed, during which these organisms are killed or become moribund, and expelled where they can be picked off by surface feeders such as gulls and common tern.

The Minsmere common tern colony is of county importance, as 'Seabird 2000' data suggests that less than 200 pairs breed in Suffolk (Mitchell *et al.*, 2004). The number of common terns feeding at the outfall during the breeding season, and the evidence of direct flights to and from the outfall from Minsmere, indicate that it is a key foraging area for this population.

The surveys have not indicated that there is a regularly used flight line over the upper reaches of the shore by commuting and migrating wildfowl or waders during the late spring passage, summer and early autumn passage periods. During the survey period recorded movements have been relatively small scale, and have occurred on a relatively broad front, with birds moving

parallel to the shore and showing no reaction to the built power station (i.e. they were not observed moving further offshore or inshore in response to it)..

4.5 Non-Breeding Birds and Passage Migrants

A bittern was heard 'booming' from an area of marsh approximately 450m due west of the preliminary works area (a field between Kenton Hills and Grimseys) on 16 April. It called at least six times, which allowed the surveyor to triangulate an approximate position by moving around the boundary of the wetland habitat. It had apparently been present the previous day, when it was heard by Alan Miller (SWT). It is highly unlikely that breeding occurred in this location, as bitterns tend to favour large reedbeds of over 200 hectares in extent (Gilbert *et al.*, 1998). The bird was not heard again during the survey work, although its location was communicated to the RSPB who have undertaken considerable work on bittern vocalisations and radio-tracking.

Bittern was first recorded at Sizewell in 1997, since when there have been virtually annual sightings. In 2002 and 2003, year-round use of the marshes by a single bird was noted, although most other records have been in winter or post-breeding. A radio-tagged bird was recorded commuting between Sizewell and Minsmere in winter 2000/01 (Sizewell Land Management Reviews [SWT / ADAS], 1998-2007). Due to the low populations of both breeding and wintering bittern in the UK, any site regularly supporting the species is of national importance. The Minsmere population is of European importance, however, and there is an ecological link between the two areas, meaning that the bird observed contributes to the integrity of the Minsmere SPA.

Waterfowl and waders recorded during the season included regular sightings of little egret on the grazing marshes; April records of small numbers of teal, tufted duck, feral greylag and Canada geese on the large pool in the Sizewell reedbed, and small numbers of passage green sandpiper and snipe feeding and commuting over the survey area. During the spring passage period single greenshank and whimbrel were recorded flying over the survey area.

Non-breeding raptors included a buzzard in July, regular sightings of foraging and commuting marsh harriers (which are a qualifying feature of the Minsmere to Walberswick SPA), a record of a merlin near Fiscal Policy on 4 May and a female goshawk near the main Sizewell power station car park on 16 April.

Tree pipit was recorded singing at Kenton Hills on 10 April, but subsequent visits did not record the species in this area, and it was assumed to be a passage bird. Other passage species recorded included ring ouzel, wood warbler (singing near the car park at Fiscal Policy), yellow wagtail, wheatear and whinchat.

5. Conclusions

The breeding bird surveys and desk study exercise have shown that the preliminary works area and immediately adjacent habitats support a limited bird community mainly comprising common and widespread passerines, a few of which are red-listed species of conservation concern. In close proximity to the proposed new build, the ditches support small numbers of breeding wildfowl including mute swan, mallard and moorhen. No waders were recorded breeding within the preliminary works area. The only highly protected species breeding in immediate proximity to the build area was Cetti's Warbler, although suitable breeding habitat for this species is around the periphery of the preliminary works area rather than within it. This suggests that the direct effects on the breeding bird community as a result of land take would be of limited importance. In contrast, the wider survey area, which took in the vast majority of the BE Estate, supports a considerable diversity of breeding and foraging species, some of which are qualifying species of the adjacent Minsmere to Walberswick SPA, some which are statutorily protected and others which are present in numbers of county importance.

Qualifying species of the Minsmere to Walberswick SPA that occur within the BE Estate are bittern and marsh harrier. Avocet, little tern and nightjar (which are also qualifying species) do not breed on or within the survey area, and have not been recorded foraging or commuting over areas where they are likely to be in any way affected by new nuclear build during the baseline survey programme. There is also no indication from historical data that effects on these species are likely to occur. Shoveler, teal, gadwall and woodlark breeding within the BE Estate at Sizewell are not considered to be directly ecologically linked to the Minsmere to Walberswick or Sandlings SPA populations respectively, as they are likely to forage within the confines of the marshes / the Estate boundary. The exact nature of breeding season use of the survey area by bittern is not understood at present, however. A male bittern was heard calling territorially within the Sizewell Marshes on two consecutive days in early summer. It is possible that foraging bitterns commute between the SPA and the Sizewell Marshes / adjacent areas of marsh owned by RSPB during the breeding season. Further survey work will therefore be required to determine the likely scale of any potential impact and to inform any Appropriate Assessment. In addition, although it is known that at least two marsh harriers commonly use the Sizewell Marshes (as both male and female birds have been recorded), further work will be required to indicate how many harriers use the area and with what frequency. Outline recommendations to address these data gaps are included in Section 6 (Recommendations).

The surveys and desk study have illustrated that the Sizewell Marshes SSSI is no longer of national importance for its breeding bird community. The bird community was not the principal interest of the SSSI at the time of designation, but does feature prominently in the site description. Breeding populations of several species that occur within the Sizewell Marshes are nevertheless of county importance (mute swan, gadwall, mallard, water rail and Cetti's warbler). It is likely that adequate mitigation can be developed to minimise any potential effects on these species without the necessity for further breeding season work, particularly given the annual surveys of the area that are undertaken by Suffolk Wildlife Trust and the depth of baseline data.

Highly protected breeding species that do not occur in the preliminary works area but are present within the wider survey area are hobby, barn owl, kingfisher and woodlark. Both hobby and woodlark breed in habitats that could be lost to site compounds or the site access road,

while barn owl and kingfisher breeding locations would be unlikely to be affected. It is likely that suitable mitigation to prevent and minimise effects on all of these species can be developed without further survey work.

This survey area also has a nightingale population that is of county importance and a number of other breeding species of particular conservation interest due to rapid declines at national and regional level (including turtle dove, spotted flycatcher, marsh tit and a range of declining farmland passerines). It is not envisaged that further generic breeding bird survey work will be required prior to an ES for the site being submitted. The RSPB has indicated that for this location it will accept data from breeding bird surveys as being relevant up to five years after it was collected, assuming no changes in management or other confounding factors (Kirsty Coutts, RSPB, pers comm.), and annual surveys conducted by SWT can also be used to inform the EIA process.

Surveys of the intertidal zone and inshore marine waters adjacent to the preliminary works area and the built nuclear power station have indicated that there is very little use of the shore in either area by seabirds and waders during the survey period. Gull and common tern foraging activity centres on the warm water outfall of the existing nuclear plant, and there is regular commuting between the breeding common tern colony at Minsmere and the outfall, indicating that this is an important feeding area for breeding bird populations of county importance. The waters adjacent to the preliminary works area had very low levels of use by feeding terns and feeding and loafing gulls during the work. No regular flight line of seabirds, wildfowl or waders over the preliminary works area was noted, although broad front movements of waders and commuting flights of small numbers of oystercatchers and avocets were recorded over the inshore waters (parallel to the shoreline). No avoidance of or attraction to the built nuclear power station was indicated by the flight lines of these or other wader species. Therefore, it seems reasonable to assume that a new power station would have no likely negative effects on species using the intertidal and inshore marine areas, whereas it would result in the likely creation of a new foraging resource.

Survey work, comprising bi-monthly intertidal surveys from both of the two observation points and a programme of winter passerine surveys to complement the winter wildfowl and farmland bird surveys conducted by SWT, is ongoing and will conclude in March 2008.

6. Recommendations

- Further survey work will be required in the 2008 breeding season to investigate the level of use of the survey area by bittern and marsh harrier from the Minsmere and Walberswick SPA populations. This information will be used to inform any Appropriate Assessment that is required. Survey methodologies will need to be discussed with consultees, particularly RSPB, prior to the instigation of work;
- The proximity of wader territories on the Minsmere South Marshes²⁷ to the preliminary works area will need to be investigated in order that potential effects can be assessed;
- Mitigation measures for key breeding species can begin to be explored through consultee meetings organised to discuss the results of the survey work and desk study that are detailed in this report;
- As the results of the various ecological surveys become available and the design of the project progresses, the Integrated Land Management Plan (ILMP) for the BE Estate (ADAS, 2006) should be reassessed to ensure that key species likely to be affected by the build have appropriate targeted conservation initiatives implemented elsewhere within the land holding.

²⁷ On land owned by RSPB.

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EDF Energy

**Sizewell C New Nuclear Power Station:
Terrestrial and Freshwater Ecology, and
Ornithology**

DRAFT Nightjar Survey 2010

June 2012

AMEC Environment & Infrastructure UK Limited

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Document Revisions

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1. Introduction

1.1 Purpose of this Report

Breeding nightjar (*Caprimulgus europaeus*) is an interest feature of the Minsmere-Walberswick and Sandlings Special Protection Areas (SPAs). The potential for the construction and operation of a new nuclear facility at Sizewell to affect foraging nightjar that breed within these SPAs was raised as a potential issue in the Habitats Regulations Assessment (HRA) conducted by DECC in the preparation of the Nuclear National Policy Statement.

AMEC Environment & Infrastructure UK Ltd (formerly Entec UK Ltd) was commissioned by EDF Energy in 2010 to complete a desk study and survey of nightjars in order to inform the environmental impact assessment and HRA of the proposed Sizewell C nuclear power station. This report describes the methods employed and details the results from the desk study and survey work.

1.2 Scope

The proposed site for the new nuclear power station is not likely to support breeding or foraging nightjar (the area is primarily open grassland and scrub) and therefore was not included in the survey area. The work described in this report focuses on the following areas, which are the only parts of EDF's Sizewell estate that were assessed as being likely to be affected by the proposed development and where it was assessed that the habitats were potentially suitable to support breeding and/or foraging nightjar (see section 1.3 for details):

- the access road to the new nuclear facility; and
- the temporary area set-aside for construction compounds, referred to as the indicative Construction Compounds Area (CCA).

The locations of the proposed access road and CCA (which together form what is referred to in this report as the 'survey area') are likely to be subject to change. However, for the purpose of this survey, their locations were taken to be that shown in Sizewell Site Plot Plan Review, 4 June 2010 (see **Figure 1.1**).

1.3 Survey Area Description

From west to east, the route of the access road (as proposed in June 2010) first runs along the northern boundary of Kenton Hills, an area predominantly comprising mature conifer plantation. To the north of the access road and north of Kenton Hills the land is predominantly arable farmland, with the fields bounded by broken 'gappy' hedgerows. The access road then crosses the eastern edge of Kenton Hills after which it runs along the southern boundary of Goose Hill plantation, again an area of mature conifer plantation. At the time of the surveys, there were two areas in Kenton Hills that contained recently planted conifers (5-10 years old) and a large open area on Goose Hill where the trees have recently (in the last 5 years) been

clear-felled. These areas provide potentially suitable habitat for breeding nightjars, and these clearings and the fringes and rides through the woodland provide suitable foraging areas. The wet meadows and woodland to the south of the eastern section of the road also provide potentially suitable foraging areas.

Along the southern boundary of Goose Hill (through which the access road would pass) there is a narrow band of wet deciduous woodland and scrub running parallel to it. South of the wet woodland are wet meadows that are interspersed with water-filled ditches (part of Sizewell Marshes SSSI). The access road then runs along the northern edge of the SSSI before heading south (over a bridge) and into the proposed new build area.

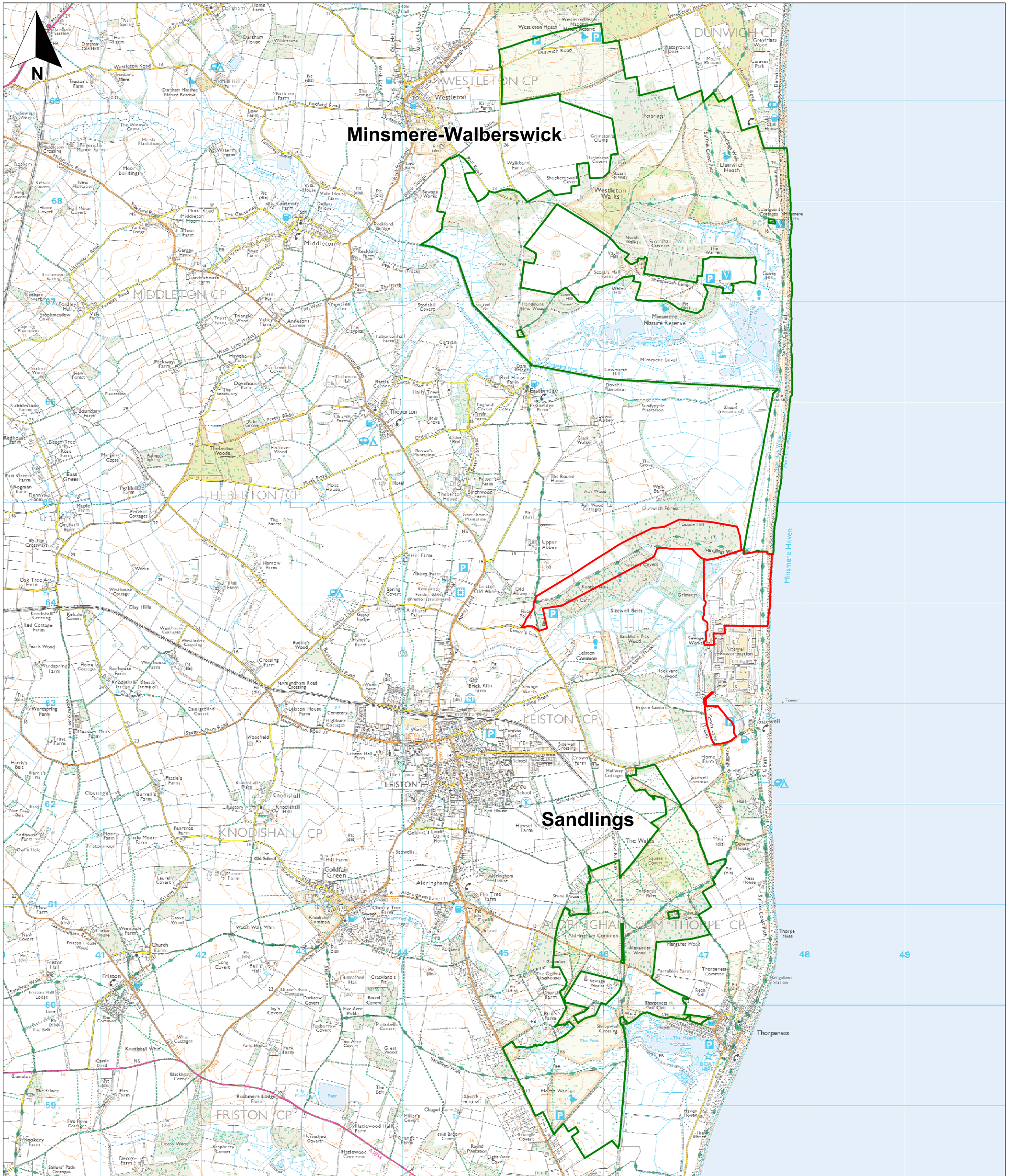
The CCA comprises primarily arable farmland bordered by hedgerows in the west, and an area of mature and recently planted conifer plantation (Goose Hill) in the east, which provides some suitable foraging habitat for nightjar. Arable farmland provides limited foraging opportunities for nightjar, although radar studies have shown that birds will hunt for insects over arable areas close to more suitable habitat, such as heathland and young forestry plantation. In view of this, much of the CCA potentially provides suitable foraging habitat for nightjar.

1.4 Context and potential effects

As well as being an interest feature of the Sandlings and Minsmere-Walberswick SPAs, nightjar is also an interest feature of two of the SPAs' component Sites of Special Scientific Interest (SSSIs) namely (and respectively) Leiston-Aldeburgh SSSI, and the Minsmere-Walberswick Heaths and Marshes SSSI (see Figure 1.1). The Sandlings SPA and Leiston-Aldeburgh SSSI are at their nearest point 1.6km south of the study area. The Minsmere-Walberswick SPA and Minsmere-Walberswick Heaths SSSI adjoin the study area.

Given the habitats that would be affected by the access road and CCA (as proposed in June 2010), and the locations of nearby designated sites which have nightjar as interest features, there is the potential for the construction and operation of the access road and CCA to affect nightjars in the following ways.

- Construction and operation of the new access road has the potential to disturb nightjars derived from local SPAs foraging in the Kenton Hills and Goose Hill plantations, and the adjacent arable areas and wetland habitat on Sizewell Marshes SSSI.
- Operation of the access road and CCA may act as a barrier to the movement of nightjars between the local SPAs and other feeding grounds.
- Construction of the CCA may result in a temporary (medium term) loss of suitable foraging areas for nightjars from local SPAs.
- There is potentially suitable breeding habitat for nightjars in the Kenton Hills and Goose Hill plantations. Therefore, there is the potential for the construction and operation of the access road and CCA to result in disturbance and loss of habitat (in Goose Hill) to breeding nightjars located in these areas (outside the local SPAs).



Key:

- SSA boundary
- SPAs within 5km of Sizewell site boundary



Sizewell Nightjar Report

Figure 1.1
Site Location and SPAs

0 km 2 km

Scale 1:36,000 @ A3

June 2010
19801-R795.WOR.tugwc

Entec

2. Methodology

2.1 Desk study

A literature search was undertaken to investigate the habitat requirements and likely foraging distances of nightjar from their nest sites. Specific information on the occurrence of nightjars in the survey area was obtained using the following sources:

- data from the National Nightjar Census undertaken in 2004 and 2005 were obtained from the British Trust for Ornithology (BTO) for an area within approximately 5km of the CCA;
- data were obtained from the RSPB on nightjar territories recorded in 2009 for Minsmere RSPB and Aldringham Walks¹;
- Suffolk Wildlife Trust (SWT) Wardens (who work in the Sizewell Belts area);
- results from surveys undertaken by Entec UK Ltd in the area, including breeding bird surveys carried out in 2007 and 2010 (including a specific nightjar survey in 2007);
- bat workers undertaking bat surveys in the survey area in 2010;
- Suffolk Birds 2000-2008 inclusive (the annual Suffolk Bird Reports); and
- *The Birds of Suffolk* (Piotrowski, 2003).

2.2 Surveys

Given the survey information that was obtained from the sources mentioned above (notably SWT's surveys during the nightjar breeding season period), it was appropriate to carry out only two visits to identify the presence or likely absence of nightjars in the CCA. These visits were undertaken on 25th May and 24th June 2010, with the objective of locating foraging and territory-holding nightjar in suitable habitat within 500m of the survey area.

The survey involved the surveyor walking along tracks and around all clearings within the survey area to locate calling (male and female) and singing ('churring') (male) nightjars. Churring can be heard over a considerable distance (Bowden & Green, 1994) although strong winds and rain are likely to suppress churring activity or lead to it being missed due to background noise. Therefore, the two survey visits were undertaken in conditions of light wind and no rain. The surveys were undertaken during the period one hour either side of sunset, when hunting and display activity is most concentrated (Bowden & Green, 1994).

¹ RSPB wardens, Robin Harvey provided nightjar data for Minsmere, and Dave Thurlow for Aldringham Walks.

3. Results

3.1 Desk study

3.1.1 Foraging distance and habitat

Studies of radio-tagged nightjar in Thetford Forest (Norfolk and Suffolk) indicated that foraging birds flew up to 2km from their nest sites, with most activity occurring within 1km. Alexander and Cresswell (1990) found radio-tagged nightjars in Dorset foraging up to 6km from their nest sites, with an average distance of 3.1km recorded (most foraging flights were within 2-4km of the nest site). Glutz von Blotzheim (1962) and Schlegal (1967) also noted that nightjars could be found several kilometres away from the nearest nest sites, with birds occasionally feeding by water and in fields of pasture containing livestock.

Alexander and Cresswell (1990) recorded many of their radio-tagged nightjars foraging in areas containing habitat that is not typical for nesting (including deciduous woodland). They recorded few birds foraging in enclosed conifer plantations and over improved or arable farmland and none in dry heathland. Most of their foraging records were in deciduous and mixed woodland, and more rarely in wetlands.

3.1.2 Nightjar records

Of the 284 churring male nightjars recorded in Suffolk during the BTO National Nightjar Census, 123 were in the Suffolk Sandlings area (Suffolk Birds, 2004). This compares to 167 in the Sandlings and 317 in Suffolk during the 1992 Census, indicating that a decline has occurred in the Sandlings. Changes in nightjar numbers are linked to changes in the age structure of forestry plantations (Piotrowski, 2003). **Table 3.1** presents the number of nightjar territories recorded each year, in areas close to the CCA/access road (Suffolk Birds, 2000-2008).

Table 3.1 Number of Nightjar Pairs² (n/a = no data available)

Location	2000	2001	2002	2003	2004	2005	2006	2007	2008
Minsmere RSPB Reserve	14	16	13	22	22	22	13	15	13
Aldringham Walks & North Warren RSPB Reserve	14	10	12	12	13	10	8	8	7
Walberswick & Westleton NNRS	n/a	n/a	20	21	19	9	n/a	11	n/a

² Data derived from the 2000-2008 Suffolk Bird Reports

The figures in Table 3.1 indicate that numbers of nightjars have declined in the local area around Sizewell since 2004-05, although this decline is less easily explained than that for the wider area (the Suffolk coast and the county), given that the main breeding habitat for nightjar in these areas is open or scrubby heathland rather than clear-felled or young forestry plantation.

Figure 3.1 shows the location of nightjar territories recorded during the Nightjar Census in 2004-05 (within approximately 5km of the CCA/access road), and by RSPB in 2009. It should be noted that the RSPB surveys cover Minsmere and Aldringham Walks RSPB reserves, but do not include any survey of land outside these areas, including Dunwich Heath.

The nearest nightjars holding breeding territories in the Minsmere-Walberwick SPA were 3.0km from the CCA/access road in 2004-05 and 2.5km in 2009. The nearest nightjars in the Sandlings SPA were 2.4km from the CCA/access road in 2004-05 and 2.5km in 2009.

The Census data indicate that within the Minsmere-Walberswick SPA area, there is a concentration of nightjar territories on the Westleton and Dunwich Heaths, which, at its closest point is 2.5 to 3.5km north of the study area. A total of 21 pairs/territories were recorded in this area in 2004-05. There is also a smaller cluster of territories to the west of Westleton and Dunwich Heaths (south of Mill Road) that is a similar distance from the proposed development; three pairs were recorded in 2004-05 and 2 pairs in 2009. There were no records of nightjars breeding on the Minsmere Level, which separates the study area from the heathlands to the north, although an isolated territory was recorded near Hangmans New Wood in 2009, 2.3km north of the study area. However, there is much suitable foraging habitat between the Mill Road and Dunwich/Westleton breeding areas and the study area, including areas of wet woodland, grassland and freshwater marshes.

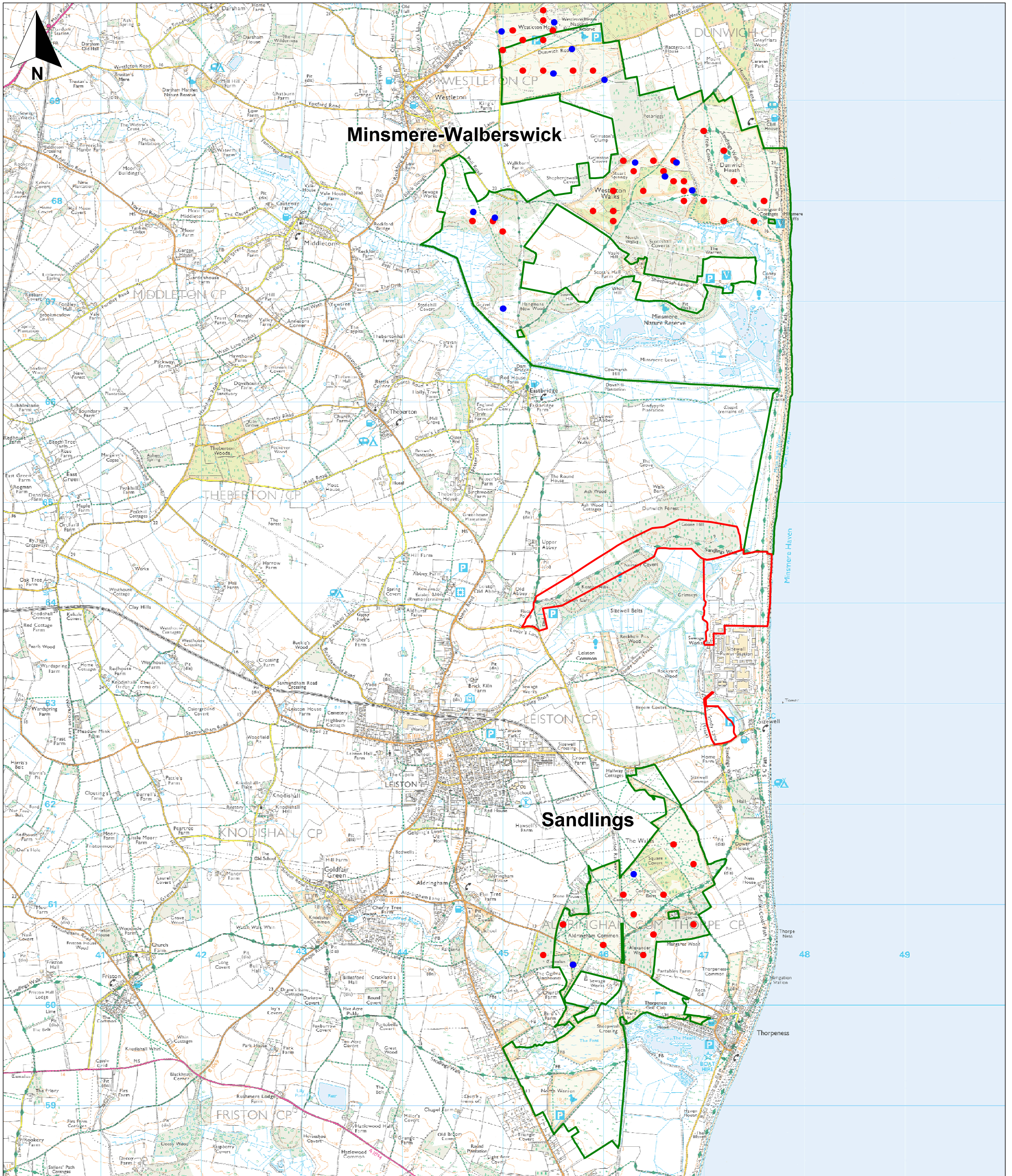
South of the study area, nightjars are found on the heathland areas of Aldringham Walks (within the Sandlings SPA). Census data indicate that there is a concentration of territories on Aldringham Walks, 2.5 to 3.5km south of the study area, with a total of 11 pairs recorded in 2004-05 but only 2 pairs in 2009. Between Aldringham Walks and the study area, the habitat comprises arable farmland, woodland and wet meadows. Immediately to the south of the study area is Sizewell Marshes SSSI, which primarily comprises wet, unimproved grassland interspersed by blocks of wet deciduous woodland. To the south of this (between Sizewell Marshes SSSI and Aldringham Walks) is a broad (500-1000m) band of arable farmland. To the south of Aldringham Walks is the extensive area of wet meadows and freshwater marsh which forms part of North Warren RSPB reserve.

Churring nightjars have not been recorded by wardens working in the survey area over the past 20 years (*pers. comm.* Alan Miller, SWT Warden) and nightjars were not recorded during fieldwork undertaken in the area by AMEC ecologists and bat survey workers³ in 2007 and/or 2010.

3.2 Survey findings

No nightjars were heard or seen during the survey visits on 25th May and 24th June 2010.

³ Including subconsultants Baker Shepherd Gillespie.



Key:

- SSA boundary
- SPAs within 5km of Sizewell site boundary
- Nightjar territories, Census data 2004-05
- Nightjar territories, RSPB 2009



Sizewell Nightjar Report

Figure 3.1
Nightjar territories from
Nightjar Census 2004-05 data

0 km 2 km

Scale 1:36,000 @ A3

Entec

4. Conclusions

Evidence from the desk study and surveys indicates that nightjars are unlikely to be breeding in the survey area. However, given that there is suitable habitat present, there is the potential for nightjars breeding in local SPAs to forage within the survey area.

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**Sizewell C New Nuclear Power Station:
Terrestrial and Freshwater Ecology, and
Ornithology**

DRAFT Black Redstart Breeding Bird Report 2011

June 2012

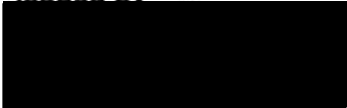
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Report 2011

June 2012

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Document Revisions

No.	Details	Date
1	Draft Report	June 2012

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1. Introduction

1.1 Purpose and of this Report

AMEC Environment & Infrastructure UK Ltd (AMEC) was commissioned by EDF Energy to undertake a breeding bird survey to provide information on the type and level of use by black redstart (*Phoenicurus ochruros*) around the Sizewell Power Stations (Sizewell A and B) in Suffolk. The primary purpose of this work was to gather information that may be used to identify any potential impacts on the breeding population of black redstart due to the development of a new nuclear facility at Sizewell (referred to in this report as Sizewell C). This report details the findings from surveys undertaken in spring and summer 2011.

1.2 Scope and Survey Area Description

The aim of the surveys was to identify breeding pairs of black redstart within the built area of the Sizewell Power Stations (Sizewell A and B). The surveys would also identify any potential foraging areas for black redstart within the power stations and adjacent areas of land.

The survey area referred to in this report comprises the built area of Sizewell A and B Power Stations and the areas of open ground immediately outside the fenced area of the complex, to the north and east of the fenced area.

To the east of the power stations (on the seaward side) is short grassland and scrub which leads down to sand dunes, vegetated shingle and ultimately shingle beach. To the north of Sizewell B is an area of grassland and scrub, and to the west, wet scrub, woodland and wet unimproved grassland (bordering on the Sizewell Marshes SSSI). The survey area includes the coastal habitat adjacent to the east of the power stations and the grassland adjacent to the north. The wet scrub and woodland to the west of the power stations does not provide any suitable foraging areas for black redstarts. **Figure 2.1** shows the survey area.

The build area of the Sizewell A and B complex primarily comprises of buildings and hard standing areas. These hard standing areas are often used for the temporary storage of materials and machinery, and both these areas and the buildings provide potential nest sites for black redstart. This area also includes small areas and strips of short grassland and amenity plantings of scrub and trees. All of these areas provide potential foraging sites for black redstart.

1.3 Species Background

The black redstart is a rare breeder, passage migrant and winter visitor in Britain. In Europe, the species is a common breeding bird, with an estimated population of between four and eight million pairs (BirdLife International, 2004). In Britain, up until the 1940s, the black redstart was a very sporadic breeder in the country. During WW2, black redstarts began to nest in bombed-out urban sites in London after which a regular breeding population was established here and in other urban areas in England. By 1977, the population in England totalled 104 territory-holding males, of which 22 were within 8km of the centre of London and 20 in Suffolk

(Brown & Grice, 2005). Of these, 61 pairs were proven to breed (of which 10 pairs were in Suffolk). Today, the species is still predominantly associated with urban area, but also breeds in other large built structures such as power stations, gas works and dock yards (Brown & Grice, 2005). Numbers have varied considerably between years, with generally 60-110 territory-holding males reported in England in the 1990s. In 2008, 54 territory-holding males were reported in England, although this was considered to be an underestimate of the true population due to the low reporting rates in London and other urban areas that are rarely visited by birdwatchers (Holling, 2010).

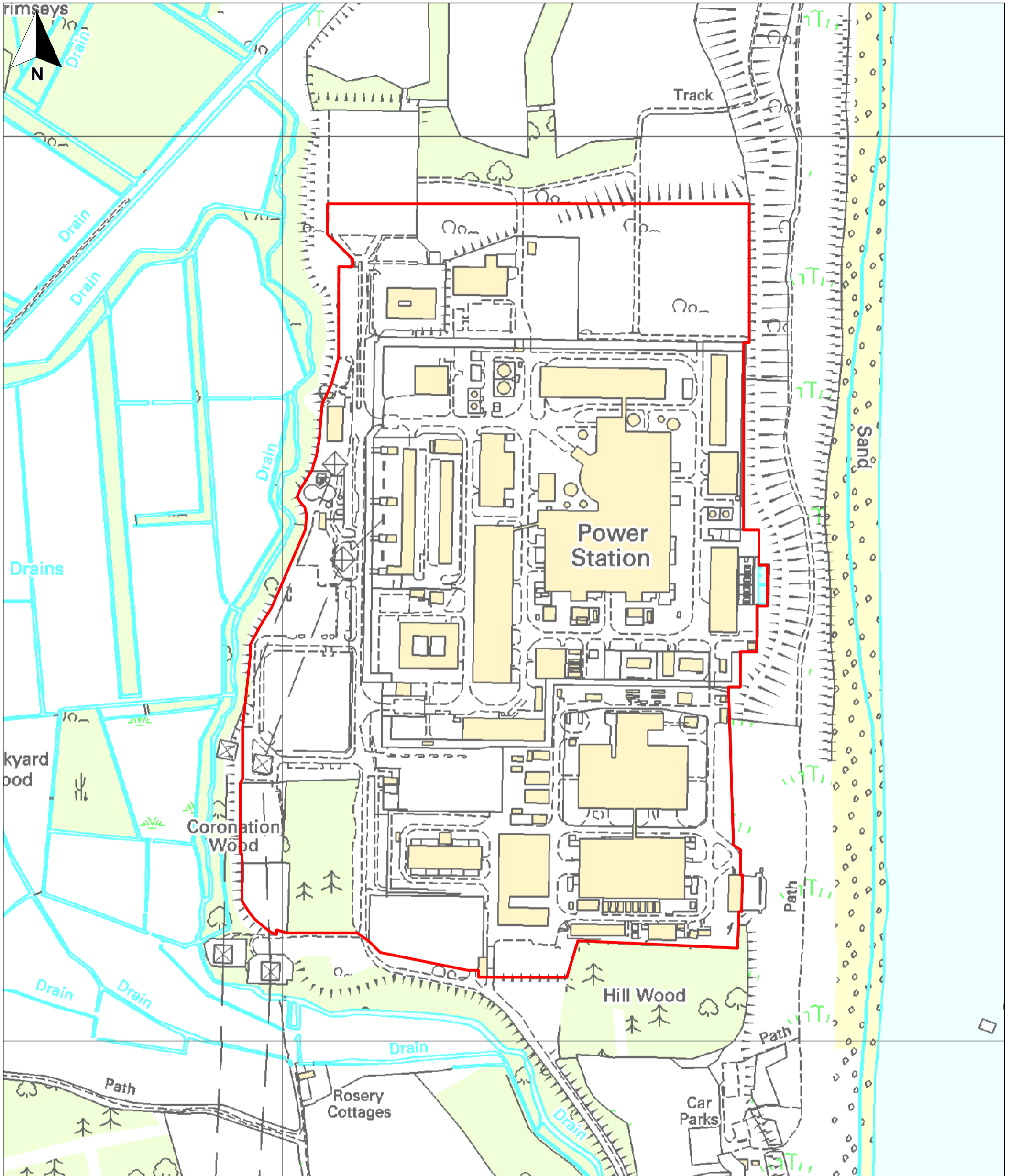
During winter, some black redstarts remain within their breeding home ranges although most urban areas are deserted (Brown & Grice, 2005). During the Winter Bird Atlas period of 1981-84 much of the UK winter population of black redstart (estimated at 500 birds) was concentrated along south and southwest coasts of England, with few recorded on the east coast (Lack, 1986). Many of the passage migrant and wintering birds are likely to originate from western Continental Europe, with some of our home-bred birds known to over-winter in southern Europe (Brown & Grice, 2005).

In Suffolk, the black redstart is an uncommon summer visitor and passage migrant, with occasional birds over-wintering (Piotrowski, 2003). Black redstart first bred in Suffolk in 1938 after which a small but regular breeding population established itself in the county. Since the 1940s, the breeding population in Suffolk has varied greatly in numbers between years, with high numbers recorded during the 1970s and 1980s. Up to 40 territory-holding males were present in 1985-86, of which many were found to be first-summer birds, whose nesting attempts were often unsuccessful (Piotrowski, 2003). Black redstarts have bred at various locations within Suffolk, but particularly in the docklands of Ipswich and Felixstowe, in Lowestoft, Bury St Edmunds and at the Sizewell nuclear power stations. The population remained at a high level in the county during the late 1980s and early 1990s (c.20-40 territories), centred in Felixstowe, Ipswich and Lowestoft after which numbers declined rapidly to only five in 1998 (Piotrowski, 2003). In 2010, 4-5 pairs bred in Suffolk at: Bury St Edmunds (1), Sizewell (2+), Ipswich (1) and Lowestoft (1) (Mason [ed], 2011). Black redstarts first bred at Sizewell in 1963 (Brown & Grice) and 1-2 pairs have bred at the site in most years since the 1990s. One or two birds also over-winter at the site in most years (pers. comm. Tony Howe, Magnox employee at Sizewell A).

2. Methodology

A breeding bird survey was undertaken within the survey area during the 2011 breeding season for black redstart (April-July). Four visits were made to the Sizewell A and B complexes during which areas of suitable nesting and foraging habitat was searched and any observations of black redstarts were recorded onto detailed maps of the area. The sex and approximate age (juvenile, adult female, first winter/summer adult male or full-plumaged adult male)¹ of the individuals was recorded together with details of their activity, such as singing, feeding and returning to nest sites. Tony Howe (Magnox employee at Sizewell A) has been monitoring and ringing black redstarts at Sizewell A for more than ten years. During this period he has located many black redstart nest sites and has built-up a detailed knowledge of the use of the area by this species. During the visits to Sizewell A, Tony Howe escorted the surveyor around the site. Visits were undertaken on 15 April, 11 May, 16 June and 5 July 2011. Any observations of black redstarts obtained subsequent to the survey from August to December 2011 have also been included in this report.

¹ The plumage of male black redstarts in their first winter and following summer is very similar to that of the female which remains largely unchanged in appearance from first winter onwards. In the third year, the male birds acquire their full adult male plumage.



Key:
 Survey area



Sizewell Black Redstart Survey Report

Figure 2.1
 Study Area

0 m 250 m
 Scale 1:4,000 @ A3

January 2012
 28130-A331.wor tugwc



3. Results

A detailed account of the observations of black redstarts obtained during each visit is provided below.

Visit 1: April 15

Sizewell A: a male bird was heard singing in the south-east corner of Sizewell A.

Sizewell B: A pair of birds was seen foraging along the fence-line on short-grass along the boundary between the proposed new build area and Sizewell B. A male bird was also heard singing nearby.

Visit 2: May 11

Sizewell A: a female and young adult male (a first summer male) were seen in the south and south-east of Sizewell A. The male bird was heard singing.

Sizewell B: a female bird and first summer male bird were seen. The male was heard singing from a number of locations within the Sizewell B complex. The male was also seen carrying nesting material to a potential nest site within Sizewell B.

Visit 3: June 16

Sizewell A: a first summer male was heard singing and seen carrying food to a potential unidentified nest site in the south-east of Sizewell A. A female bird was also seen with the immature male bird; a different male (a full adult plumaged bird) was also seen on the side of a building in the same area.

Sizewell B: a pair of birds was seen carrying caterpillars to a nest site within Sizewell B. The nest was hidden from view, located behind a vent, 6-8m up on the side of a building. These birds were also seen feeding on short grass along the boundary between Sizewell B and the proposed new build area, and flying around buildings and construction equipment in the area.

Visit 4: July 5

Sizewell A: adult birds were heard alarm calling and at least two recently fledged young were seen on the south-east boundary of Sizewell A. An adult bird was also seen feeding inside the little tern fence which is located on the beach adjacent to Sizewell A and B.

Sizewell B: an adult female bird was seen feeding at least two recently fledged young on the north-east boundary of Sizewell B. No singing males were heard and there was no sign of activity at the nest site identified on June 16.

Subsequent Sightings in 2011

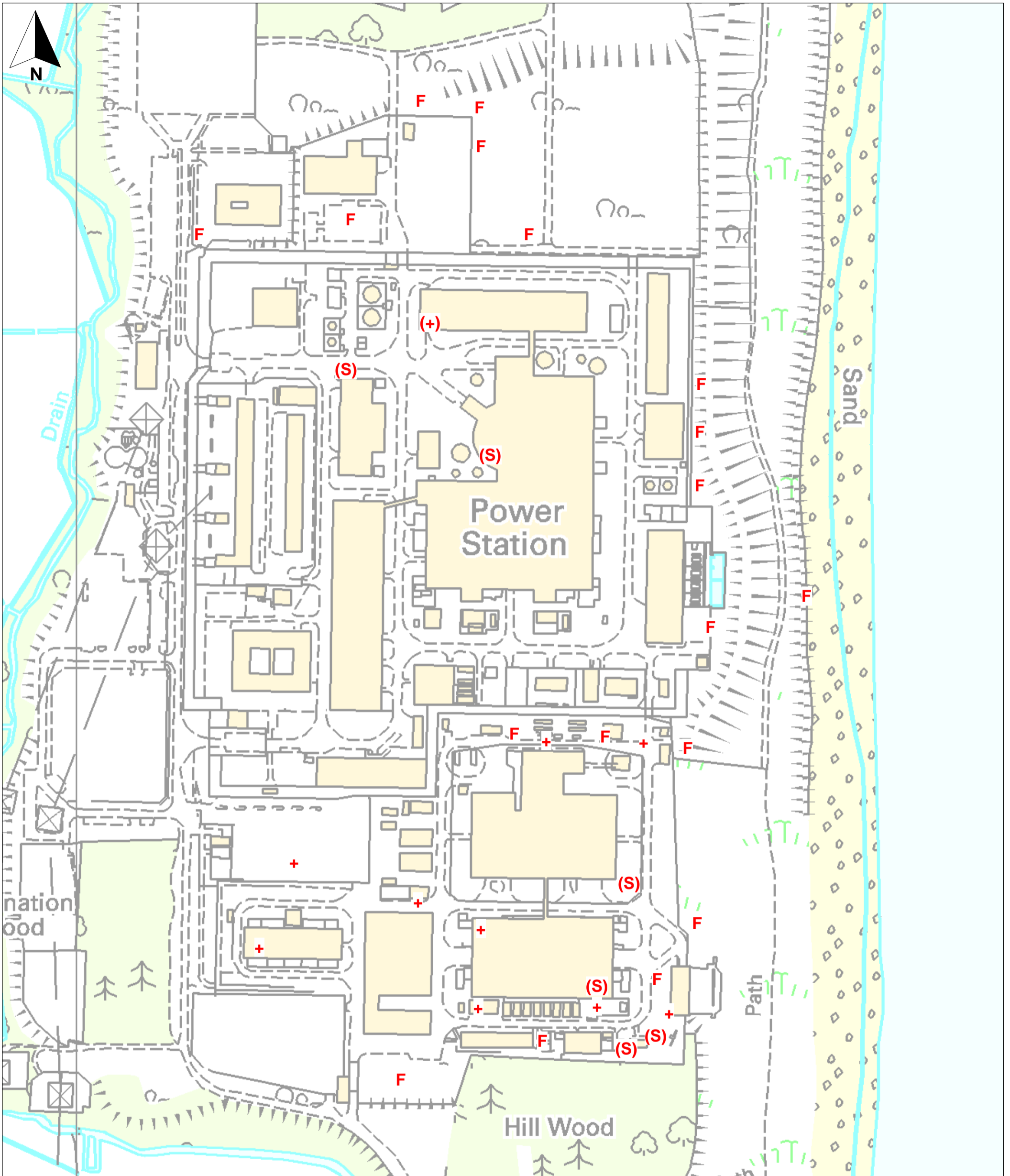
Following the breeding bird survey, black redstarts were seen on a further five dates during other ornithological survey visits to Sizewell in 2011, as follows:

- 12 August: a full-plumaged adult male was seen on the eastern boundary of Sizewell A;



- 31 August: two juvenile birds were seen feeding around the scrub adjacent to the eastern boundary of Sizewell A;
- 9 September: a female or first winter male bird was seen foraging within the fenced off area on Sizewell beach;
- 26 September: a male bird was heard singing from buildings on the eastern edge of Sizewell A, and
- 23 November: a male bird was heard singing from buildings on the eastern edge of Sizewell A.

Figure 3.1 shows the location of singing male birds, areas where foraging was observed and nest sites located in 2011, and in previous years within Sizewell A by Tony Howe.



- Key:**
- F Foraging area
 - (S) Singing male
 - + pre-2011 nest site
 - (+) 2011 nest site



Sizewell Black Redstart Survey Report

Figure 3.1
Survey Results

0 m 200 m

Scale 1:3,000 @ A3

January 2012
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4. Discussion

Results from the surveys indicate that two pairs of black redstart bred within the Sizewell Power Station complex in 2011, one each in Sizewell A and B. An additional male bird (in full adult-plumage) was also present in Sizewell A. Juvenile birds seen on the boundary of Sizewell A on August 31 indicate that a second brood may have been raised there. Black redstarts may start to produce a second brood whilst the first is still dependant on their parents (Weggler, 2006). In 2010, two pairs were reported to have bred at Sizewell (Mason [ed], 2011), although up to four singing males were observed during AMEC survey work undertaken in the area that year.

During the survey visits, Tony Howe identified various sites where nesting had taken place within Sizewell A since 2001. Nest boxes had been erected for the species, although had only been used on one occasion. The nest locations generally change each year, with a great variety of sites used including buildings (including within buildings that are being actively used by humans), piles of equipment and the inside of pipes. Buildings are used as high vantage points from where male birds sing, primarily from April to July, although occasional birds sing during autumn and winter (Cramp, [ed], 1988).

Black redstarts are primarily an insectivorous species, and the diet comprises a wide range of invertebrates but also includes seeds and fruit. Birds will hunt on the ground and from perches and will also catch insects in the air (Cramp [ed], 1988). The foraging areas at Sizewell primarily consist of areas of short grass around the perimeter of the built complex, including within the proposed new build area. Black redstarts were also seen feeding in the dunes adjacent and to the east of Sizewell A. Birds were seen perched on fence-lines (primarily along the seaward boundary of Sizewell A and B and the boundary between Sizewell B and the new build area) from where insect prey was pounced upon. Around the perimeter of the built area there are numerous small strips of short grassland which are well exposed to sunlight. This grassland is plant-species rich and provides important habitat for insects, with the sandy soils also providing ideal habitat for the holes of solitary wasps and bees (all potential prey for black redstart). During the various surveys undertaken at Sizewell in 2010 and 2011, no black redstarts were observed more than 200m from the built area of the power stations. Cramp [ed] 1988 states that black redstarts typically forage up to 200m from the nest site. This indicates that the foraging resource for black redstarts breeding at Sizewell is likely to be within or adjacent to the power stations complex.

Black redstarts have bred at Sizewell since 1963, and since the decline of the county population in the 1990s, Sizewell has become one of the most reliable breeding sites in Suffolk for the species. Black redstarts will raise two and occasionally three broods within the breeding season, which generally extends from mid-April to August. Much of the population at Sizewell consists of summer visitors although 1-2 individuals regularly stay at the site throughout the winter (pers. comm. Tony Howe). Migrant birds arrive on the Suffolk coast in late March although territorial behaviour is generally not observed until April. Tony Howe noted that the majority of male black redstarts breeding at Sizewell were first year birds (yearlings). Weggler (2008) found that yearling male black redstarts were more likely to pair with yearling females, which successfully raised only half the number of chicks as full adult females.

Table 4.1 shows the number of pairs and territory-holding males of black redstart (not all males find a partner) recorded at Sizewell since 2000 (figures derived from the annual county bird

report, Suffolk Birds). It should be noted that much of the monitoring of this species within the Sizewell Power Station complex has been confined to Sizewell A, and that it is possible that pairs breeding in Sizewell B have not been recorded (pers. comm. Tony Howe).

Table 4.1 Breeding Black Redstart at Sizewell

Year	Number of pairs	Number of Additional Territorial Males
2000	2	1
2001	2-3	0
2002	3	0
2003	1+	0
2004	1	0
2005*	0	1
2006	1	0
2007	n/a	n/a
2008	1	0
2009	1	0
2010	2	1-2*

* Additional data derived from AMEC surveys undertaken in the Sizewell area in 2010

The data shown in Table 4.1 shows that in most years at least 1-2 pairs of black redstart breed at Sizewell. A study of black redstarts in the Czech Republic found that the mean territory size was 1.2 hectares although this varied from 1 to 3 hectares in urban environments (Schwarzova & Exnerova, 2004). The study found that the selection of territories was dependant on the presence of buildings which were very important in providing nest sites and sites for feeding and singing. Buildings and other song posts also frequently formed the boundary of a breeding territory. Other studies have found territory sizes ranging from 0.35-1.0 ha in France and 2.9 to 7.4 ha in Germany (Cramp [ed], 1988). The current built area of the Sizewell Power Stations covers approximately 30 hectares and therefore the breeding density at Sizewell is clearly much smaller than that of many urban and non-urban study sites in Continental Europe.

Two pairs of black redstart represent 4% of the estimated UK population of 50 pairs. The Sizewell site is therefore clearly of national importance to this species. The one or two birds that occasionally stay during the winter represent less than 1% of the estimated 500 birds present in the UK in winter (Lack, 1986). In Suffolk during winter, a handful of birds are present, usually at sites such as Lowestoft and Felixstowe and therefore on this basis, Sizewell is of regional importance to black redstart in winter.

5. Conclusion

Results from the surveys indicate that Sizewell supports a nationally important breeding population of black redstart that has remained relatively stable over a long period of time. The proposed development has the potential to have both negative and positive effects on the population. The construction and operation of Sizewell C could be beneficial to black redstart by providing additional nesting habitat within the built area of the new power station. However, there is also the potential for foraging areas used by birds primarily from Sizewell B to be lost due to the construction of Sizewell C.

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British Energy Group PLC

Sizewell

Second Interim Bird Report: Non-Breeding
Season

2 October 2009

Entec UK Limited

Report for

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1. Introduction

1.1 Purpose of this Report

British Energy (BE) is currently investigating the feasibility of building new nuclear power stations at a range of sites within their UK land holding. Sizewell has been identified as one potential site for investigation and likely progression to EIA. Entec UK Ltd have been appointed as BE's ecological consultants to lead and co-ordinate the baseline ornithological and terrestrial ecological work and assessment for Sizewell. An Ecological Scoping Report (Entec doc ref 19801cr050), detailing the desk study exercise and survey work to be undertaken at Sizewell between April 2007 and March 2008 has previously been produced and circulated to consultees.

This report summarises the second phase of ornithological work at Sizewell, the surveys undertaken on the BE Estate between August 2007 and March 2008 inclusive. It includes a summary of results from intertidal and inshore marine surveys conducted throughout the period, as well as walkover surveys of the BE Estate aimed at characterisation of the bird community outwith the breeding season. A summary of previous studies of wintering birds, including annual surveys conducted by Suffolk Wildlife Trust, is also included.

This is the second ornithological report for Sizewell that has been produced by Entec. The first, issued in December 2007 (Entec document reference 19801cr080), summarised the results of breeding bird survey work and intertidal and inshore marine surveys conducted between April and July 2007.

1.2 Scheme Description

An area of land directly north of the Sizewell 'A' and 'B' Power Stations has been identified as having the potential to accommodate nuclear new build. This area, which covers 0.316km²/31.6ha¹ and has an approximate central grid reference of TM473640, is referred to in this document as 'the preliminary works area.' A boundary, including an indicative access road and construction compound (accounting for a potential further 0.336km²/33.6ha of land take) is shown in **Figure 1.1**. It should be noted that this initial development footprint is purely indicative, as environmental, landscape and visual, hydrological and other constraints have not yet been considered and taken into account. These would all be addressed as a matter of course as part of an EIA.

No detailed information on the exact nature of the proposed nuclear power station can be provided at this stage, but it is assumed for the present that the power station would be water-cooled and that there would be a requirement for additional works associated with this in the sub-tidal zone. The range of development activities that could potentially affect biodiversity

¹ The indicative footprint of both the preliminary works area and the construction compounds have been slightly altered since the first bird report was produced.

interests are typical of those associated with the construction, operation and decommissioning of any large industrial structure.

1.3 Preliminary Works Area Description and Context

The preliminary works area comprises open sheep-grazed pasture, fringed by reinstated coastal dune vegetation, parts of which have been planted with trees and scrub. The hydrology and pedology of the preliminary works area were irreversibly altered as a result of works associated with the building of the Sizewell 'A' and 'B' Stations (adjacent to its southern boundary), and as a result it has lost much of its botanical merit. Habitats adjoining or in close proximity to the preliminary works area are of considerable ecological interest however. These include wet meadows (and associated wetland habitats and ditch systems), dune systems, shingle plant communities and wet semi-natural woodland. The quality of the shingle, grazing marsh and associated wetland habitats have led to substantial areas of these in close proximity to the preliminary works area being designated for their ecological interest.

The entire BE land holding at Sizewell, including the preliminary works area and the Sizewell 'B' Station (which occupies 0.36km²/36ha) extends to approximately 6.69km²/669ha. The dominant habitats are arable farmland and woodland/scrub, with each accounting for approximately 30% of the land area. A considerable area of coniferous and mixed woodland is present around Goose and Kenton Hills, and there are scattered blocks and linear belts of semi-natural deciduous woodland throughout. Grazing marsh and heathland/acid grassland are also well represented, with both habitats covering approximately 10% of the land holding, while fen/reedbed, foreshore and pasture each cover approximately 3% of the land within the estate.

1.4 Background and Scope

The key potential ornithological issues relating to the development are as follows.

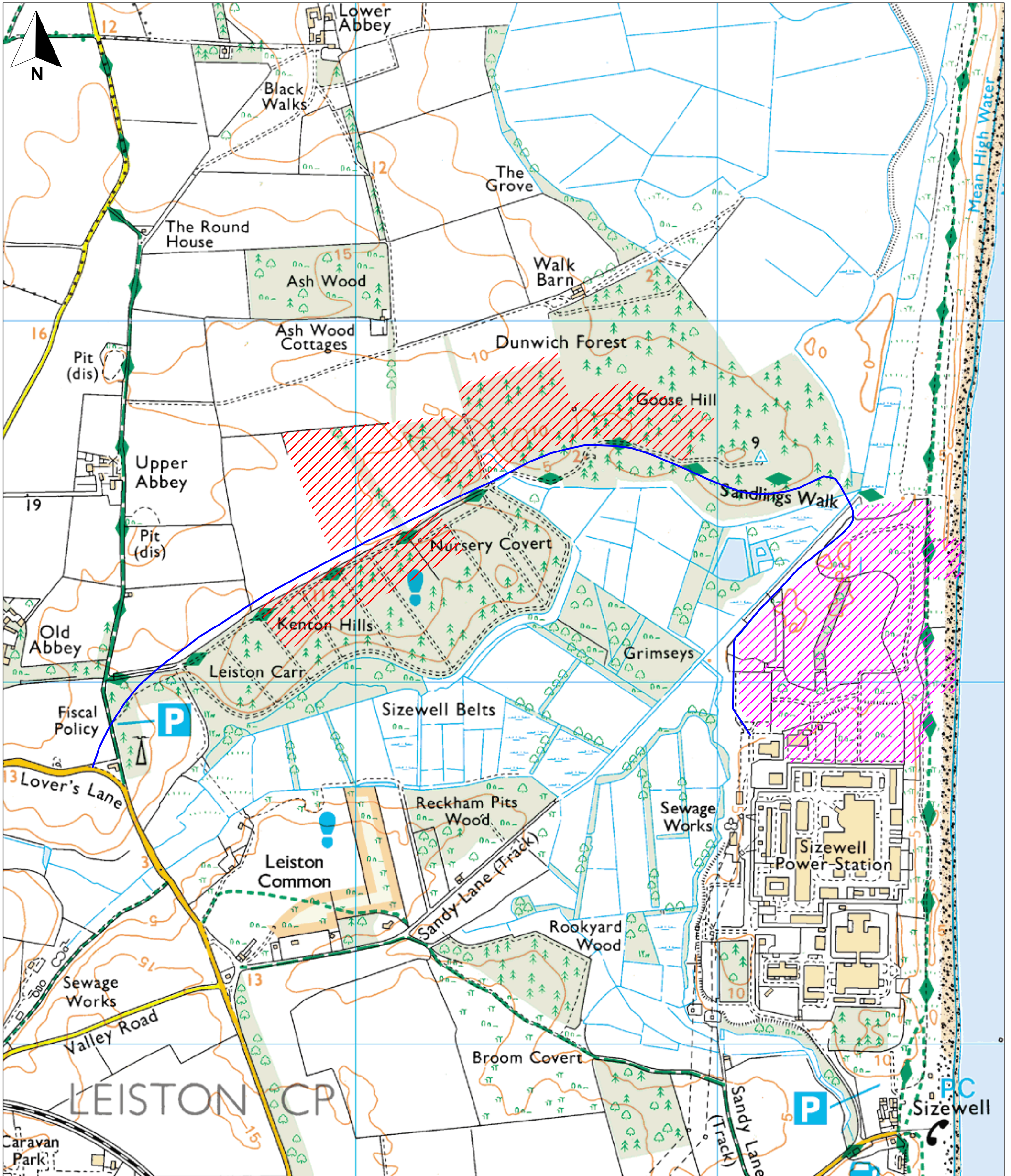
- The effects of direct habitat loss due to land take by the proposed power station, the access road and construction compounds;
- The effects of indirect habitat loss, i.e. the displacement of birds from the proximity of the proposed power and associated infrastructure as a result of disturbance. Such disturbance may occur as a consequence of construction work, or due to the presence of the power station or associated infrastructure close to nesting or feeding sites or on habitual flight routes;
- The fragmentation of habitat and the potential barrier to movement that would occur, particularly as a result of the construction of a new access road;
- Related to the three points above, the potential for effects on species that form the cited interest of European and nationally designated sites as a result of the proposed development.

There is no guidance available that details or discusses appropriate ornithological survey work for new nuclear power station proposals. Therefore, the bird survey programme for Sizewell was developed following a considerable desk study exercise. The potential for species protected

under Schedule 1 of the Wildlife & Countryside Act 1981 (as amended)² and / or listed under Annex 1 of the EC Directive on the Conservation of Wild Birds (79/409/EEC), commonly referred to as the Birds Directive³ to occur within the survey area was the subject of specific investigation. As a result of the desk study, a survey programme incorporating a range of generic and species specific surveys was instigated.

² All species of wild birds are afforded some degree of protection under the Wildlife and Countryside Act 1981, though some species that are considered to be rare or vulnerable, which are listed on Schedule 1 of the Act, are afforded additional protection.

³ Certain endangered, rare, or vulnerable bird species, which warrant special protection, are included on Annex 1 of the European Communities Council Directive on the Conservation of Wild Birds (79/409/EEC).



- Key:**
- Preliminary works area
 - Indicative construction compounds
 - Indicative access road



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Figure 1.1

Preliminary Works Area, Indicative construction compounds and access road locations

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2. Methodology

2.1 Desk Study

To understand the ornithological context of the preliminary works area, the locations and qualifying features of Special Protection Areas (SPAs) and Sites of Special Scientific Interest (SSSIs) within 5km of the preliminary works area were determined through the use of the website www.magic.gov.uk and other published sources. There are no established criteria with regard to the distance from a development site that a search should cover, and 2km has been suggested as a sufficient distance in the past (IEA, 1995). Due to the known ornithological interest of the Sizewell area, however, this search area was extended to 5km for European and nationally important sites. The ornithological interest of non-statutory designated sites within 3km of the proposed new build and associated infrastructure were also considered. The positions of these designations in relation to the preliminary works area are shown on **Figures 2.1a&b**. The English Nature Report on the Suffolk Coast and Heaths Natural Area (English Nature, 1997) was also referenced to gain insight into the ecological context of the estate.

A considerable amount of baseline ecological survey work has been conducted on the BE Estate at Sizewell during the past twenty-five years. This has been undertaken by a range of organisations including Suffolk Wildlife Trust (SWT) ecological consultants (commissioned by Nuclear Electric and latterly by BE), the Environment Agency, universities and colleges, special interest groups and private individuals. This information was made available to Entec by British Energy to assist the design of the ornithological survey programme. Additional data from survey work commissioned by Magnox in association with the decommissioning of Sizewell 'A,' and species records held by the Suffolk Biological Records Centre (SBRC) were also used to inform the work. Data has also been received from the British Trust for Ornithology (BTO) and Suffolk Ornithologists Group (SOG), while the RSPB have provided contextual data relating to Minsmere.

In addition to this information, a number of further data sources were identified and used to inform the work. These included:

- The results of annual wetland and farmland bird surveys conducted by the Suffolk Wildlife Trust on parts of the BE Estate (summarised in the annual land management reviews);
- Birds of Suffolk (Piotrowski, 2003);
- Suffolk Birds 2005 & 2006 – the county bird report (Wright, M [Ed], 2006);
- Birds in England (Brown, A. & Grice, P, 2005);
- The New Atlas of Breeding Birds of Britain and Ireland (Gibbons *et al.*, 1993).

2.2 Survey Work

The key objective of the bird surveys undertaken at Sizewell between August 2007 and March 2008 was to establish (in combination with the desk study and the survey work completed between April and July 2007) a suitable baseline for the evaluation of the potential effects of a new nuclear power station and associated infrastructure on the non-breeding bird community present. The Suffolk Wildlife Trust conduct winter bird surveys of both the Sizewell Marshes and some of the arable land within the estate, and the main aim of the walkover surveys conducted by Entec was to supplement this data with contextual information from other areas of the estate. To do this a series of walkover surveys were undertaken. In addition, the numbers and diversity of bird species using the intertidal zone and inshore waters adjacent to the proposed new build and the existing power stations was investigated through surveys conducted twice a month from two locations. The methods used are outlined below.

2.2.1 Walkover Surveys

Walkover surveys were carried out in all areas within 1km of the proposed new build area and associated infrastructure (excluding the built nuclear plant, the gardens and driveways of domestic properties and associated farm buildings, and the edge of the village of Leiston). Surveys therefore covered approximately 9km². Much of this land (6.72km²) is under British Energy ownership⁴, and unrestricted access was therefore possible. Within the BE Estate, transects no further than 50m apart were walked across all open habitats, while all field boundaries, the edge of the small reedbed and the edge of the small belts of semi-natural woodland were also walked. In the coniferous plantation, all rides / firebreaks and tracks were walked, and all birds visible / audible from them were recorded. In those areas within 1km of the preliminary works area, but outside BE's land ownership and where access could not be secured, footpaths, roads and tracks were walked and all birds that were apparent were recorded. RSPB conduct surveys of birds within their land ownership throughout the year, and as such, no duplication of effort (resulting in inevitable disturbance) was considered necessary for that part of the survey area under RSPB ownership. There is a verbal agreement with RSPB at Minsmere that data from respective survey work will be shared.

The survey area for the walkover work, and the BE Estate boundary are shown on **Figure 2.2**.

Four survey visits (in combination with a review of existing data) were considered an adequate survey effort to characterise the winter bird community at Sizewell. On most survey days two surveyors worked in combination. The dates on which surveys were conducted were as follows:

- 9, 10, 11, 14, 16 September;
- 1, 2, 5, 7, 9 & 11 November;
- 3, 7, 8, 18 & 25 January; and
- 4, 5, 6, 7 & 11 March.

⁴ BE is responsible for the management of the Estate: SWT are involved with the implementation of this management.

2.2.2 Intertidal and Inshore Marine Survey

In order that any potential disturbance effects resulting from the new build on birds using the intertidal areas and inshore marine waters adjacent to the proposed new build area could be evaluated, surveys were undertaken on a twice monthly basis between August 2007 and March 2008 inclusive. These surveys represented a continuation of work conducted between April and July 2007, and previously reported (ref Entec Report 19801cr080).

Two observing locations were used: TM47633 64587 (Location 1) and TM47612 63379 (Location 2). These locations, and the areas surveyed from them are shown on **Figure 2.3**. The former location enabled observation of activity in the inshore waters and the intertidal beach adjacent to the preliminary works area, while the latter enabled observation of activity in the grid square adjacent to the built nuclear plant and took in the warm water outfall and associated towers. All waders, wildfowl and seabirds flying over the intertidal area and the inshore waters up to 300m offshore were recorded⁵. Numbers and apparent behaviour of all species was also noted.

The aim of the surveys was to record the diversity, activity of species and differences in use of the intertidal and inshore marine waters by birds of the two grid squares (TM4764 and TM4763) in order that the importance of the existing power station outfall as a foraging resource could be quantified. The surveys also allowed investigation of whether birds commuting parallel to the shore or over the intertidal showed any reaction to the built power station.

During each survey day, survey work commenced close to high or low water and was conducted over six full hours, so that any changes or patterns in bird distribution across the tidal cycle could be identified⁶. During each hour of survey the intertidal area and inshore waters within each grid square were scanned using binoculars for 45 minutes and all species present or commuting through were recorded⁷. There was then a fifteen minute break in survey, to allow the surveyor(s) to rest their eyes and to regain focus before the next timed survey commenced. Six 45 minute surveys were completed during each survey day, resulting in a total of 18 hours of survey per month and 139.5 hours of survey (72 hours of survey for point 2 and 67.5 hours for point 1⁸) over the period reported here. Times, dates and weather conditions during surveys are shown in **Table 2.1** below.

⁵ 300m offshore was selected as the maximum threshold for recording on the basis that all relevant bird species within 300m were generally identifiable at this distance in normal sea states and weather conditions, and accurate counts could be made. It is also apparent that any disturbance effects are most likely to affect birds occurring in relatively close proximity to the proposed power station. Taking into account the width of the shoreline, it is likely that a bird flying at 300m offshore would be more than 450m from the proposed new build footprint (assuming the distance above mean high water of the proposed new build is ultimately similar to the built plant).

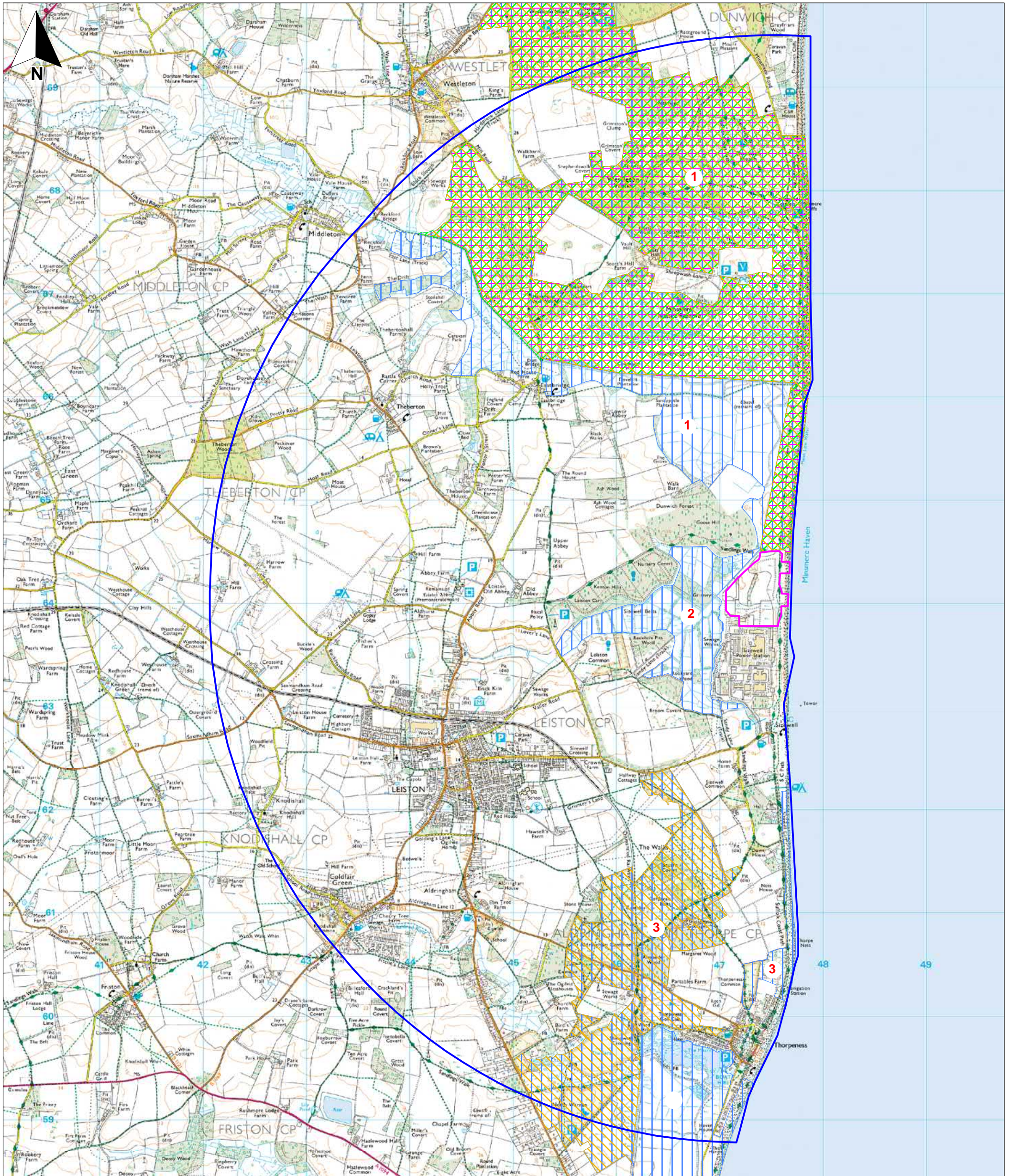
⁶ It is recognised that at Sizewell there is relatively little tidal range, so it was not assumed that there would necessarily be detectable patterns in bird distribution in the inshore waters as a result of changes in the state of tide.

⁷ Surveyors used telescopes to confirm identity and activity of birds as necessary. High quality rangefinders were used by the surveyors throughout the work to improve their distance estimation, although these were not generally of use in estimating the distance of individual birds on the sea (due to the more reflective nature of the water than the bird often preventing a confident estimate of distance).

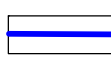
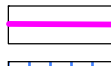

⁸ There was only 1 survey undertaken at Observation Point 1 in August due to inclement weather towards the end of the month.

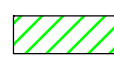

Table 2.1 Dates and Times of Intertidal and Inshore Marine Surveys

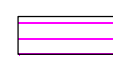
Location	Date	Survey Commenced	Wind Direction	Wind Speed
1	06/08/07	09:00	W-SW	1-3
2	06/08/07	08:55	W-SW	1-3
2	09/08/07	11:15	N	1-3
1	16/09/07	14:11	SW/SSW	2-4
2	01/09/07	07:30	Variable (NW-SW)	1-3
1	17/09/07	14:37	NW	1-2
2	06/09/07	12:00	N-NNE	1-2
1	01/10/07	13:17	E	3-4
2	02/10/07	15:07	E	2-4
1	06/10/07	07:55	E	1-3
2	15/10/07	12:36	SW	1
1	05/11/07	08:15	NW	1-3
2	06/11/07	08:25	W-NW	2-3
1	08/11/07	09:25	W	2-3
2	13/11/07	11:31	W	1-3
1	03/12/07	10:30	W-NW	2-4
2	01/12/07	09:55	SW	2-4
1	10/12/07	10:46	NW	2-4
2	16/12/07	09:45	E	2-3
1	04/01/08	10:15	S	1-3
2	04/01/08	09:15	S	2-5
1	17/01/08	09:45	SW	4-5
2	10/01/08	10:30	S	2-4
1	21/02/08	11:00	SW	3
2	06/02/08	10:22	No wind / SW	0 / 1-3
1	29/02/08	10:00	SW	1-3
2	15/02/08	10:00	E	3
1	11/03/08	12:06	SSW	1-4
2	07/03/08	10:30	SW	1-3
1	27/03/08	10:20	SW backing N	1 / 1-3
2	23/03/08	12:00	NNE	2-3



Key

-  5km perimeter area around preliminary works area
-  Preliminary works area
-  Sites of Special Scientific Interest
 - 1. Minsmere to Walberswick Heaths and Marshes
 - 2. Sizewell Marshes
 - 3. Leiston Aldeburgh

-  Special Areas of Conservation
 - 1. Minsmere to Walberswick Heaths and Marshes
-  Special Protection Areas
 - 1. Minsmere to Walberswick Heaths and Marshes
 - 3. Sandings

-  Ramsar
 - 1. Minsmere to Walberswick Heaths and Marshes



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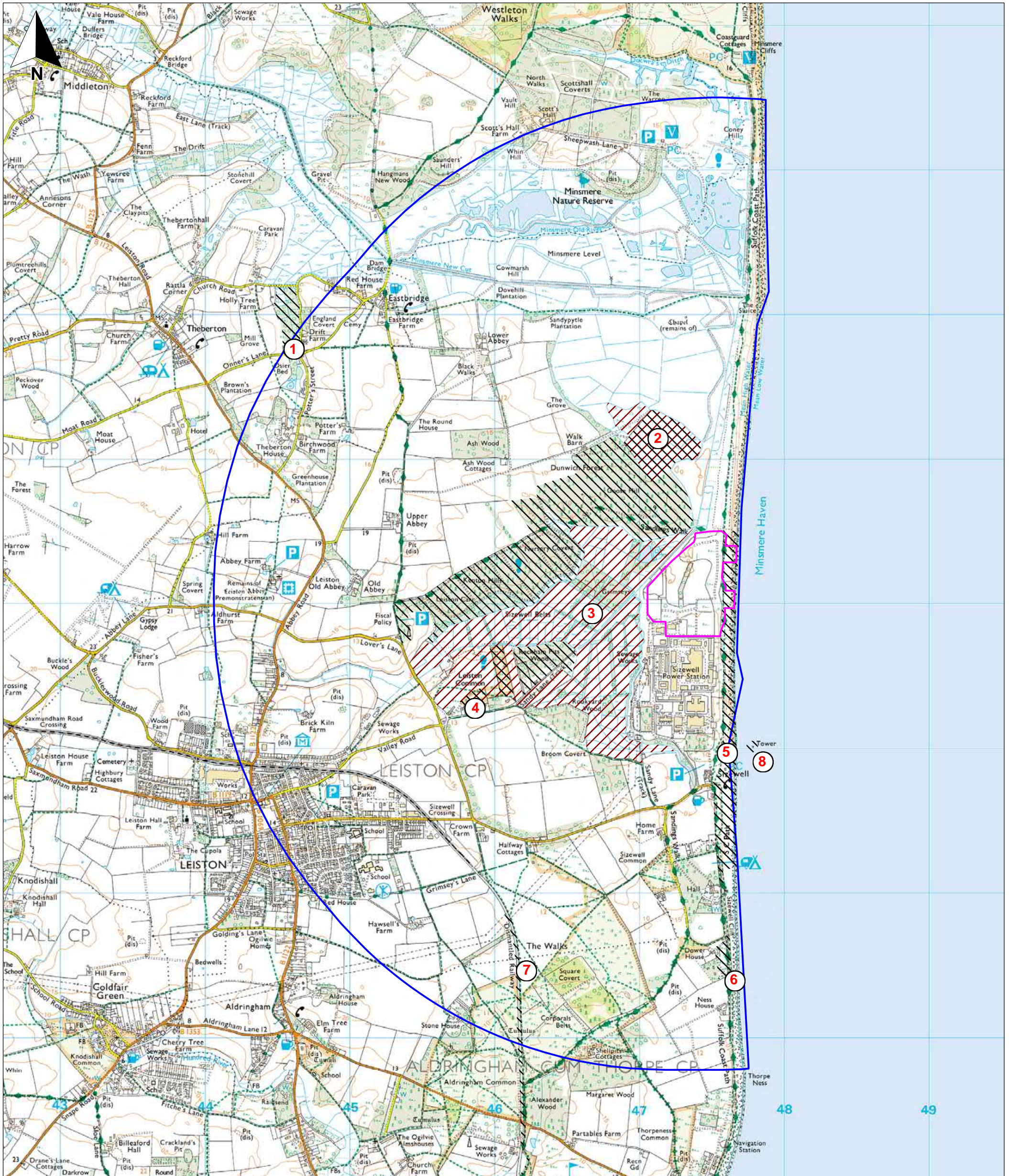
Figure 2.1a
Statutory Designated Sites within 5km of the preliminary works area



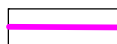

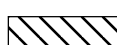
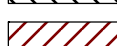
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


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Key

-  Preliminary works area
-  3km perimeter area around preliminary works area
-  County Wildlife Site
-  Suffolk Wildlife Trust Reserve

 Sites

1. Minsmere Valley
2. Southern Minsmere Levels
3. Sizewell Levels and associated areas
4. Leiston Common
5. Suffolk shingle beaches
6. Dower House
7. Disused railway line (Aldringham - Aldeburgh)
8. Sizewell Rigs



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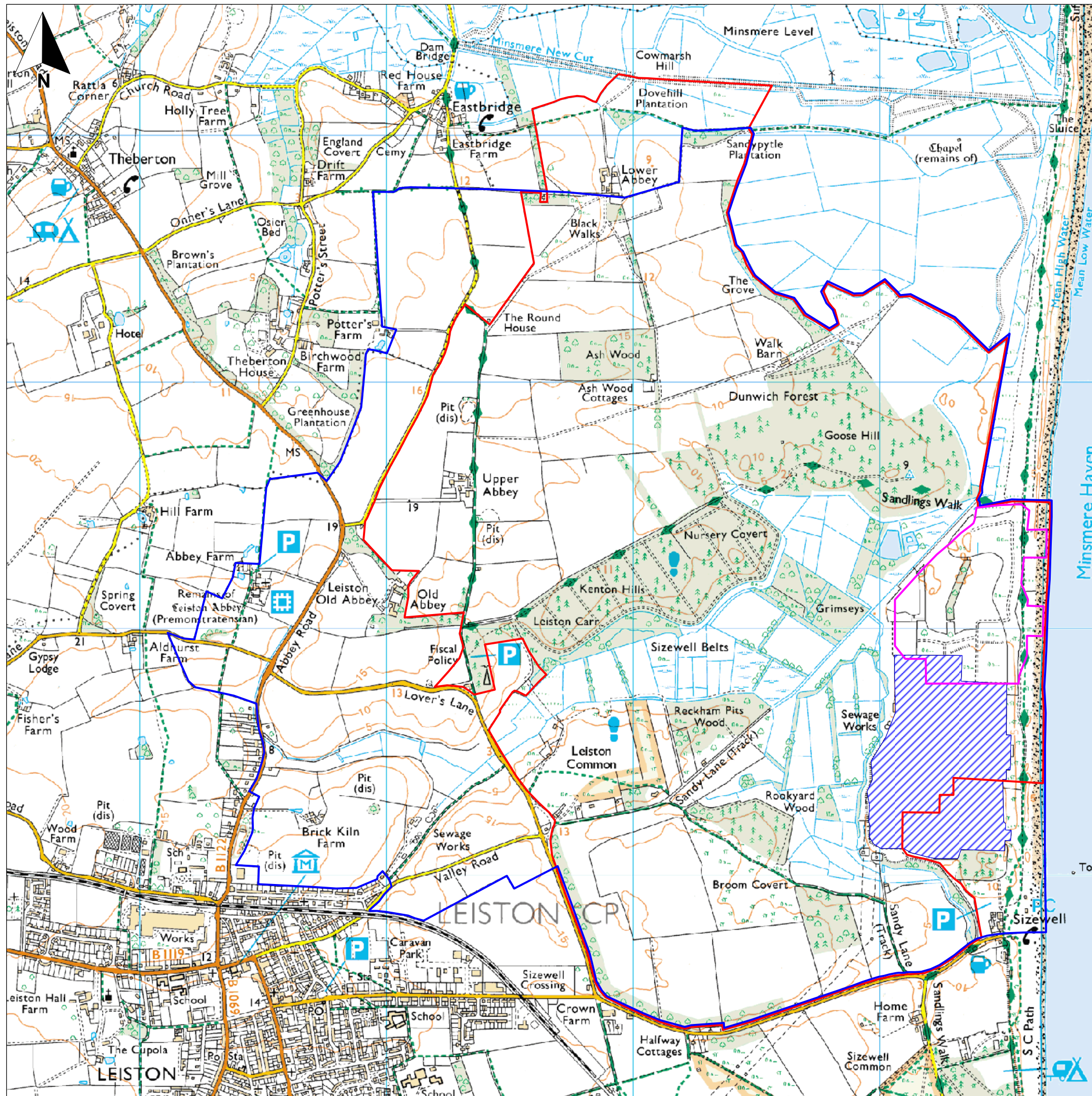
Figure 2.1b

Non - statutory designated sites within 3km of the preliminary works area



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- Key**
- British Energy land holding
 - Preliminary works area
 - Survey area
 - Excluded from survey

0 m 500 m
Scale 1:16,000 @ A3



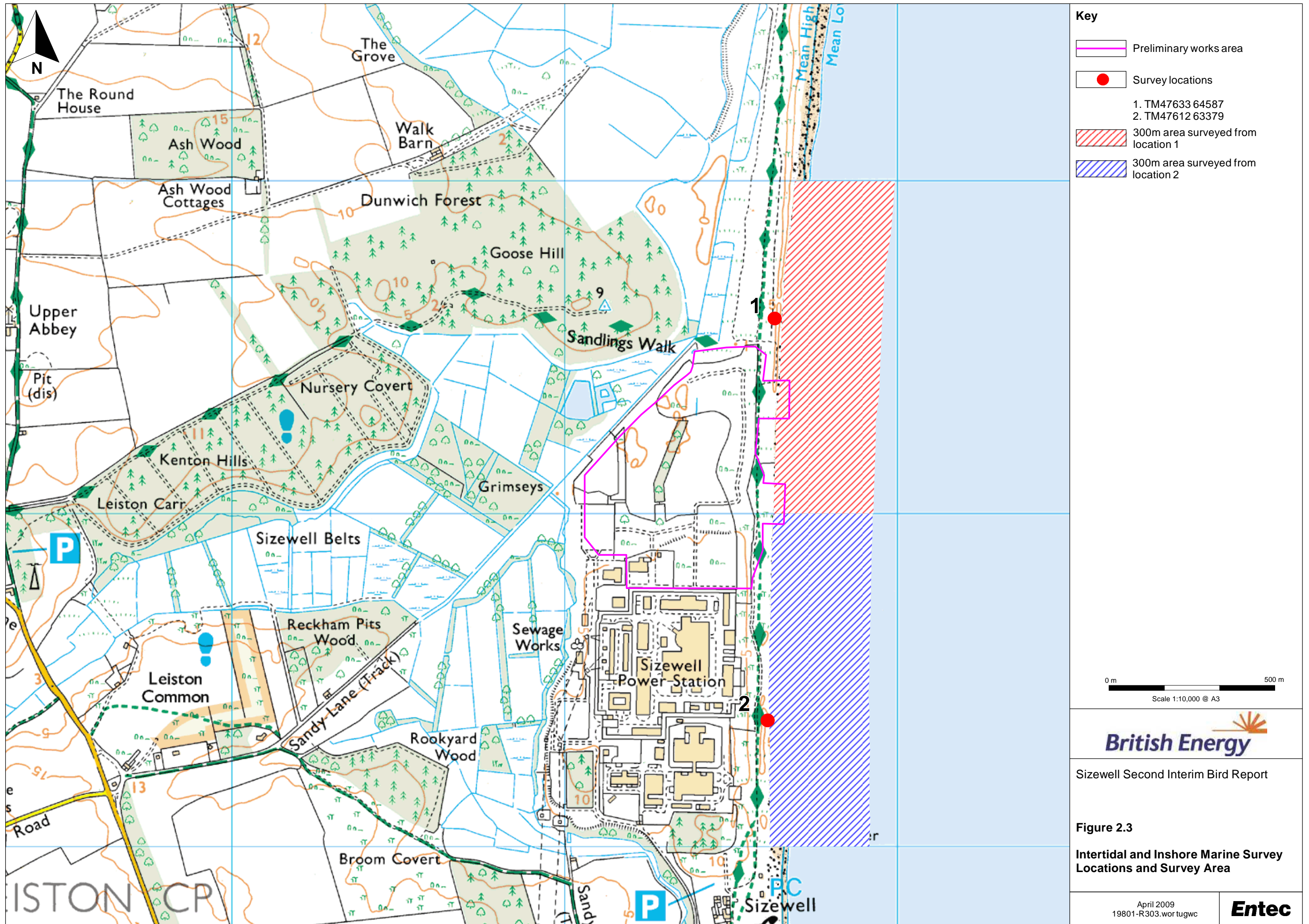
Sizewell Second Interim Bird Report

Figure 2.2
Entec Winter Bird Survey Area and
BE Estate Boundary

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3. Results

3.1 Designated Sites of Ornithological Importance

3.1.1 European Designated Sites

The closest site of European Importance for its habitats and bird populations is the Minsmere to Walberswick SPA (and Ramsar Site) approximately 200m to the north of the proposed new build power station (and adjacent to the proposed new access road at its closest point). The SPA was classified on the basis of its breeding and wintering bird interest:

The Natura 2000 Data Form states that Minsmere to Walberswick SPA qualifies under Article 4.1 of the EC Birds Directive 974/409/EEC) by supporting populations of the following species listed on Annex 1 of the Directive⁹:

During the breeding season:

- Bittern (*Botaurus stellaris*): 35% of the GB breeding population (5 year mean, 1993-1997);
- Avocet (*Recurvirostra avosetta*): 10.4% of the GB breeding population. Count (early 1990s);
- Marsh harrier (*Circus aeruginosus*): 10.2% of the GB breeding population (5 year mean, 1993-1997);
- Little Tern (*Sterna albifrons*): 1.2% of the GB breeding population (5 year mean, 1992-1996);
- Nightjar (*Caprimulgus europaeus*): 0.7% of the GB breeding population count (1990).

Over winter:

- Hen harrier (*Circus cyaneus*): 2% of the GB population (5 year peak mean, 1985/6-1989/90).

The Natura 2000 Data Form states that the site also qualifies under Article 4.2 of the Directive by supporting populations of European importance of the following migratory species¹⁰.

⁹ The SPA Review (Stroud *et al.*, 2001) has not been formally implemented, and Natura 2000 data remains the accepted baseline for the assessment of effects on SPA bird populations. Nevertheless, the data presented in the SPA Review can be used to indicate changes in SPA populations, as some population estimates have been updated. With regard to the Minsmere to Walberswick SPA, SPA Review figures stated that breeding avocet numbers were likely to make up a greater proportion of the national population (rising from 10.4% to 15.4% [91 pairs]) and breeding marsh harrier numbers a lower proportion of the national estimate (10.0% rather than 10.2%) than the Natura 2000 form reported. In addition, the SPA Review suggested that woodlark numbers at Minsmere (20 pairs representing approximately 1.3% of the national population of Great Britain [RSPB 5 year mean 1995-1999]).

During the breeding season:

- Teal (*Anas crecca*): 4.9% of the population in Great Britain (Count, 1990);
- Gadwall (*Anas strepera*): 3.1% of the population in Great Britain (Count, 1990);
- Shoveler (*Anas clypeata*): 2.3% of the population in Great Britain (Count, 1990).

Over winter:

- Shoveler (*Anas clypeata*): 1% of the population in Great Britain (5 year peak mean 1991/92-1995/96);
- Gadwall (*Anas strepera*): 1.1% of the population in Great Britain (5 year peak mean 1991/92-1995/96);
- (Russian) White-fronted goose (*Anser albifrons albifrons*): 1.1% of the population in Great Britain 5 year peak mean.

A further site of European importance for its bird populations, Sandlings SPA, is approximately 900m to the south of the proposed new build footprint. The Natura 2000 data form indicates that the site qualifies under Article 4.1 of the EC Birds Directive 974/409/EEC) by supporting populations of the following species listed on Annex 1 of the Directive¹¹;

- Nightjar: 3.2% of the population in Great Britain (Count, 1992);
- Woodlark (*Lullula arborea*): 10.3% of the population in Great Britain (Count, 1997).

In addition to the species covered under the SPA designations, the Ramsar citation includes the following species that occur in number of national importance:

- Breeding Mediterranean gull (*Larus melanocephalus*) (2 Apparently Occupied Nest Sites¹² [AONs] representing an average of approximately 1.8% of the GB population (Seabird 2000 Census);
- Breeding black-headed gull (*Larus ridibundus*) (2,558 AONs representing approximately 1.9% of the British population (5 year mean 1993-1997);
- Teal (passage periods). 3,083 individuals representing an average of 1.6% of the GB population;

¹⁰ The SPA Review (Stroud *et al.*, 2001) indicated that the winter qualifying interest of the SPA has changed since its designation. While hen harrier numbers present (and the estimated UK wintering population) remain the same, it would appear that none of the cited wildfowl now meet qualifying levels, while bittern (14 individuals representing at least 14% of the GB wintering population) and avocet (278 individuals representing at least 21.9% of the wintering population) do.

¹¹ There were no suggested updates to the qualifying interest of the site as a result of the SPA Review (Stroud *et al.*, 2001)

¹² This is outdated. There are now in excess of 20 AONs on site (Owain Gabb, pers obs, 2009).

- During passage periods: ruff (*Philomachus pugnax*), black-tailed godwit (*Limosa limosa islandica*), spotted redshank (*Tringa erythropus*) and common greenshank (*Tringa nebularia*);
- Wintering hen harrier (*Circus cyaneus*), water rail (*Rallus aquaticus*), pied avocet (*Avocetta recurvirostra*), European golden plover (*Pluvialis apricaria* races *apricaria* and *altifrons*), common redshank (*Tringa totanus*) and lesser black-backed gull (*Larus fuscus graellsii*).

3.1.2 Nationally Designated Sites

Sizewell Marshes SSSI, which was designated in 1987 (and subject to a revision increasing its size in 1992) covers an area of 104 hectares, entirely within the BE Estate. The SSSI is adjacent to the western boundary of the proposed new build area and is of national importance for the considerable area of lowland unimproved wet meadow it contains. Associated with the wet meadows are outstanding assemblages of invertebrates and breeding birds and several nationally scarce plant species.

The SSSI citation states that the breeding bird assemblage is of national significance with many species that are typical of wet grassland and associated habitats, including shoveler, gadwall, teal, snipe (*Gallinago gallinago*) and lapwing (*Vanellus vanellus*)¹³. There is no reference to the winter bird community in the citation.

Minsmere to Walberswick Heaths and Marshes SSSI, parts of which have been classified as SPA and designated SAC, is approximately 200m to the north of the proposed new build power station (and adjacent to the proposed new access road) at its closest point. The SSSI covers over 2,325 hectares and is managed by a variety of conservation organisations including Natural England, RSPB, SWT and The National Trust. The SSSI contains a complex series of habitats, notably mudflats, shingle beach, reedbeds, heathland and grazing marsh, which combine to create an area of exceptional scientific interest. Species mentioned in the site description are: wigeon, shelduck, redshank and dunlin (associated with the tidal mudflats of the River Blythe Estuary); breeding marsh harrier, bittern, Cetti's warbler, garganey, water rail and large populations of reed warbler and bearded tit in the Minsmere and Walberswick reedbeds; breeding avocets, shoveler, gadwall, teal and shelduck at the RSPB Minsmere Reserve; and high numbers of waterfowl including breeding snipe, redshank, gadwall, shoveler and black-tailed godwit at Eastbridge and Southwold.

Leiston to Aldeburgh SSSI, which includes the area also designated as Sandlings SPA, is approximately 900m to the south of the proposed new build at its nearest point. The designation contains a rich mosaic of habitats including acid grassland, heath, scrub, woodland, fen, open water and vegetated shingle. This mix of habitats in close juxtaposition and the associated transitional communities between habitats is unusual in the Suffolk Coast and Heaths Natural Area. Many species of bird are present including tree pipit, turtle dove, bullfinch and nightingale in the scrub; breeding water rail, marsh harrier, gadwall and grasshopper warbler in the marshes; and wintering waterfowl including Bewick's swan, bittern, white-fronted goose, gadwall and teal in a range of suitable wetland and farmed habitats.

¹³ The breeding bird interest of the site has declined considerably since its designation. Data indicating this decline and contextual information is presented in the 1st of Entec's ornithological reports relating to Sizewell (report reference 19801cr080).

The position of all statutory sites of importance for their bird populations are shown on **Figure 2.1a**.

3.1.3 Non-Statutory Designated Sites

Eight non-statutory designated sites are present within 3km of the proposed new build and associated infrastructure. These include areas adjoining statutory designations which, while valued, do not meet the criteria for SAC, SPA or SSSI status, and include County Wildlife Sites and Suffolk Wildlife Trust Reserves. Although all of these sites will have some bird interest, only two specifically mention birds as a key feature and reason for designation. The South Minsmere Levels SWT Reserve and Wildlife Site is of importance as it is directly adjacent to the Minsmere SPA, SAC and SSSI and is of interest for its breeding waders and wildfowl and its over-wintering bird community. Sizewell Rigs County Wildlife Site, which takes in the two offshore maintenance structures associated with the cooling water intake and outfall, is of interest as it supports a colony of over 200 breeding kittiwakes. This is one of two sites in Suffolk where kittiwake colonies have become established (the other being at Lowestoft¹⁴). The total numbers at these sites represent a very small proportion of the UK population, which has no natural nesting sites on the UK east coast between Kent and Yorkshire.

The position of all statutory sites of importance for their bird populations are shown on **Figure 2.1b**.

3.2 Desk Study Data

3.2.1 Historical Information

Historical accounts of the winter bird population of the Sizewell area have included a review of records of bird sightings (plus some additional site visits) between 1971 and 1984 (Hall, 1984) to inform the Sizewell 'C' Public Inquiry, and some structured survey work conducted by Henderson Consultants in the early 1990s (also in connection with a potential planning application).

Hall (1984) analysed and compared sightings for three periods: 1971-74; 1975-79 and 1980-the end of winter 1983/84. Seasonal occurrence, abundance (abundant to extremely rare) and the long term trend in the population within the area considered were evaluated. While providing some context, however, the report covers a considerable area of land and in most cases it is unclear which records relate to the Sizewell Estate, how many to Minsmere and how many to inland farmland. It is therefore difficult to infer a great deal other than relative abundance of species within the area. Of interest was the fact that little egret was a rare (but increasingly regular) vagrant at the end of the recording period (1984), bittern was considered a local resident and winter visitor to freshwater marshes and reed swamp during the whole period, while white-fronted goose numbers fluctuated, with birds variously occurring in coastal areas, freshwater and brackish marshes. Marsh harrier was considered a local resident species, corn bunting had ceased to occur locally by 1970, and the decline of willow tit in the area had become apparent (the species is now rarely recorded on the Sizewell Estate).

¹⁴ On a purpose built wall constructed by Associated British Ports to compensate for the loss of the Lowestoft South Pier Pavilion (which was demolished in 1988).

Henderson Consultants undertook winter bird surveys of the Sizewell Estate (which then included part of the Minsmere South Levels that have since been sold to RSPB) in 1988/89 and in 1992/93. Each survey took approximately 4 days to complete, during which time the area was slowly walked. Three surveys were carried out in both winters (in December to February inclusive). A summary of key findings is presented below.

- Wildfowl included a peak of 5 white-fronted geese in 1992/93 (mean per visit 2.7 birds). Larger numbers were present in 1988/89, when a mean of 85.7 birds was recorded. Moderate numbers of wigeon and mallard were recorded during both winters, while numbers of other wildfowl were very low;
- Hen harrier was recorded during both winters, with marsh harrier noted in 1988/89 and short-eared owl in 1992/93 respectively;
- Snipe was the commonest wintering wader in 1992/93, with all records from the South Minsmere Levels. Curlew and redshank were recorded in very low numbers during both winters, with woodcock being the most commonly recorded wader in 1988/89;
- The commonest passerines on the estate included farmland birds such as skylark and jackdaw, ubiquitous species with wide-ranging habitat preferences including wren, blackbird, long-tailed and blue tits, starling, chaffinch and goldfinch, and species primarily associated with coniferous plantation such as coal tit and goldcrest;
- Locally notable species included Iceland gull, which was recorded offshore on a single date, black redstart which was present in the built plant and willow tit (peak count of 2 in 1992/93) which was noted in the Sizewell Marshes and adjacent coniferous plantation.

3.2.2 Suffolk Wildlife Trust Surveys and Records

Wetland Bird Survey (WeBS) Counts are undertaken by SWT staff on a monthly basis between September and March inclusive¹⁵. These cover both the Sizewell Marshes and the Lower Abbey Marshes adjoining RSPB land. The survey area is shown on **Figure 3.1**. Peak winter counts of all wildfowl and waders recorded at Sizewell during the past 5 years are presented in **Table 3.1**.

¹⁵ There was no September count in 2005/06.

Table 3.1 Summary of Results of Annual WeBS Counts 2003/04-2007/08

Species	Year									
	2003/04		2004/05		2005/06		2006/07		2007/08	
	Peak Count	Month	Peak Count	Month	Peak Count	Month	Peak Count	Month	Peak Count	Month
Little grebe	1	Sep	1	Mar	2	Nov	1	Mar	2	Nov & Feb
Cormorant	0	N/a	0	N/a	1	Nov	1	Jan	0	N/a
Little egret	0	N/a	0	N/a	0	N/a	1	Nov	1	Dec
Grey heron	5	Mar	5	Sep & Nov	7	Nov	6	Mar	6	Mar
Mute swan	19	Nov	17	Oct & Mar	14	Feb	12	Oct	14	Sep
White-fronted goose	43	Feb	0	N/a	0	N/a	0	N/a	0	N/a
Greylag goose	23	Nov	172	Nov	177	Jan	95	Feb	16	Feb
Canada goose	85	Nov	55	Dec	0	N/a	49	Dec	19	Feb
Barnacle goose	0	N/a	0	N/a	0	N/a	1	Dec	0	N/a
Wigeon	30	Mar	68	Feb	75	Feb	66	Mar	27	Oct
Gadwall	50	Dec	53	Dec	66	Sep	97	Jan	84	Sep
Teal	72	Feb	56	Mar	61	Mar	54	Feb	69	Feb
Mallard	106	Sep	158	Sep	80	Feb	83	Feb	55	Nov
Shoveler	2	Mar	8	Mar	2	Oct & Jan-Feb	0	N/a	2	Jan
Tufted duck	2	Mar	2	Mar	0	N/a	1	Sep	1	Oct
Water rail	2	Sep	3	Dec	2	Feb	1	Oct	2	Oct
Moorhen	37	Jan	18	Oct & Nov	16	Dec	12	Dec	18	Jan
Coot	2	Jan	2	Mar	0	N/a	1	Mar	0	N/a
Oystercatcher	2	Mar	0	N/a	2	Mar	1	Mar	0	N/a
Lapwing	0	N/a	0	N/a	0	N/a	3	Jan	2	Mar
Jack snipe	0	N/a	1	Mar	0	N/a	0	N/a	0	N/a
Snipe	39	Mar	38	Feb	20	Jan	3	Nov-Dec & Mar	11	Mar
Woodcock	1	Dec	1	Dec	0	N/a	0	N/a	1	Dec
Curlew	17	Mar	25	Dec	17	Nov	0	N/a	0	N/a
Kingfisher	2	Mar	1	Throughout	3	Oct	1	Sep	1	Nov & Jan

Winter farmland bird surveys in fields around Upper Abbey Farm have been carried out annually since 2001/02, when monthly walkover surveys were undertaken between December and March. In 2003/04 this survey work was extended to all months between September and March¹⁶. The survey area is shown on **Figure 3.2**. Peak counts of selected farmland species recorded during the past 5 years are presented in **Table 3.2** below¹⁷.

Table 3.2 Summary of Results of Annual Farmland Bird Surveys 2003/04-2007/08

Species	Year									
	2003/04		2004/05		2005/06		2006/07		2007/08	
	Peak Count	Month	Peak Count	Month	Peak Count	Month	Peak Count	Month	Peak Count	Month
Grey heron	0	N/a	0	N/a	0	N/a	1	Jan	0	N/a
White-fronted goose	0	N/a	0	N/a	252	Feb	0	N/a	0	N/a
Greylag goose	0	N/a	200	Nov	6	Mar	85	Oct	0	N/a
Canada goose	0	N/a	0	N/a	0	N/a	0	N/a	5	Sep
Mallard	0	N/a	4	Mar	0	N/a	0	N/a	1	Mar
Marsh harrier	0	N/a	0	N/a	0	N/a	0	N/a	1	Mar
Hen Harrier	1	Dec	0	N/a	0	N/a	0	N/a	0	N/a
Sparrowhawk	0	N/a	0	N/a	1	Nov	3	Sep	1	Sep & Feb -Mar
Kestrel	0	N/a	1	Dec	0	N/a	1	Oct & Jan	1	Oct & Mar
Hobby	0	N/a	0	N/a	0	N/a	1	Sep & Oct	0	N/a
Grey partridge	4	Oct	0	N/a	0	N/a	0	N/a	0	N/a
Red-legged partridge	62	Oct	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a
Moorhen	15	Dec	1	Mar	1	Mar	2	Dec	2	Feb
Lapwing	0	N/a	2	Jan	2	Mar	33	Dec	56	Nov
Snipe	1	Feb	0	N/a	1	Oct & Feb	0	N/a	0	N/a
Woodcock	0	N/a	2	Mar	1	Jan	1	Feb	0	N/a
Curlew	17	Mar	46	Nov	37	Dec	17	Nov	8	Nov
Herring gull	0	N/a	0	N/a	0	N/a	0	N/a	2	Mar
Lesser black-backed gull	0	N/a	0	N/a	0	N/a	0	N/a	1	Jan

¹⁶ In 2004/05 and 2005/06 the September survey was not completed.

¹⁷ Peak counts of all waders, waterfowl and raptors are included. Any additional species listed under Schedule 1 of the Wildlife and Countryside Act 1981 or featuring on the red or amber lists of birds of conservation concern (Gregory *et al.*, 2002) are also included. Finally, species not featuring in any of these categories and lists but occurring in large numbers, defined here as 50+ birds, are also included in the Table. For these latter species, no data is presented for winters in which peak counts did not exceed 50 birds.

Table 3.2 (continued) Summary of Results of Annual Farmland Bird Surveys 2003/04-2007/08

Species	Year									
	2003/04		2004/05		2005/06		2006/07		2007/08	
	Peak Count	Month	Peak Count	Month	Peak Count	Month	Peak Count	Month	Peak Count	Month
Black-headed gull	0	N/a	0	N/a	8	Mar	35	Feb	0	N/a
Stock dove	13	Feb	25	Feb	3	Mar	0	N/a	5	Mar
Woodpigeon	343	Feb	232	Jan	130	Mar	695	Feb	849	Jan
Lesser spotted woodpecker	0	N/a	0	N/a	0	N/a	0	N/a	1	Mar
Barn owl	0	N/a	0	N/a	1	Mar	2	Oct	0	N/a
Turtle dove	2	Sep	0	N/a	0	N/a	0	N/a	0	N/a
Woodlark	5	Nov	3	Jan	4	Nov	4	Sep	54	Jan
Skylark	108	Nov	98	Dec	60	Jan	35	Nov	53	Jan
Meadow pipit	85	Feb	130	Jan	83	Nov	28	Oct	42	Jan
Duncock	3	Dec	2	Oct & Dec	2	Nov	7	Feb	5	Feb
Robin	3	Dec	0	N/a	1	Dec	4	Jan	10	Feb
Stonechat	0	N/a	0	N/a	0	N/a	0	N/a	2	Dec
Ring ouzel	1	Oct	0	N/a	N/a	N/a	0	N/a	0	N/a
Fieldfare	3	Dec	0	N/a	31	Mar	35	Feb	44	Mar
Song thrush	0	N/a	0	N/a	1	Dec	2	Nov	2	Throughout
Redwing	0	N/a	0	N/a	0	N/a	0	N/a	31	Jan
Mistle thrush	3	Oct	1	Nov	0	N/a	4	Jan	2	Jan-Mar
Firecrest	0	N/a	0	N/a	0	N/a	0	N/a	2	Mar
Goldcrest	0	N/a	0	N/a	1	Jan	0	N/a	2	Sep
Rook	150	Nov	43	Nov	15	Oct	95	Feb	158	Oct
Jackdaw	100	Sep	N/a	N/a	N/a	N/a	115	Dec	77	Oct
Carrion crow	N/a	N/a	65	Nov	N/a	N/a	56	Dec	282	Oct
Starling	8	Oct	0	N/a	28	Mar	6	Nov	30	Mar
House sparrow	0	N/a	0	N/a	0	N/a	6	Feb	12	Oct
Chaffinch	50	Nov	N/a	N/a	N/a	N/a	N/a	N/a	64	Dec
Brambling	3	Oct	0	N/a	0	N/a	0	N/a	0	N/a
Greenfinch	0	N/a	0	N/a	0	N/a	0	N/a	54	Dec
Goldfinch	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	192	Feb
Linnet	23	Sep	40	Dec	40	Feb	9	Oct	6	Oct
Bullfinch	0	N/a	0	N/a	0	N/a	5	Feb	1	Jan-Mar

Table 3.2 (continued) Summary of Results of Annual Farmland Bird Surveys 2003/04-2007/08

Species	Year									
	2003/04		2004/05		2005/06		2006/07		2007/08	
	Peak Count	Month	Peak Count	Month	Peak Count	Month	Peak Count	Month	Peak Count	Month
Yellowhammer	14	Feb	0	N/a	1	Feb	1	Dec & Feb	11	Dec
Reed bunting	3	Oct	1	Jan	1	Dec	0	N/a	1	Feb

In addition to this structured recording, Wildlife Trust staff record their incidental¹⁸ sightings (and sightings reported to them) of scarce passage migrants and vagrants and species and aggregations of particular conservation interest. These, along with the farmland and wetland bird surveys are summarised in detail in the annual land management reviews. A summary of key incidental records between August and March during the past 5 years is given below.

- Bittern: An adult was recorded feeding on Salt Marsh (to the north of the preliminary works area) in August 2006; a colour ringed bird seen on Lower Abbey Marshes in December 2005 had been ringed at Minsmere in 1998; single birds were sighted occasionally throughout the year in 2004/05 and 2003/04;
- Bewick's swan: 7 birds were recorded foraging on harvested beet fields in 2005/06;
- White-fronted goose: a peak count of 252 birds (13 February) were recorded feeding in winter cereals in 2006;
- Marsh harrier: recorded frequently over the estate throughout the year;
- Hen harrier: recorded in most winters at variable frequency. Records have occurred between August and February in the last 5 years;
- Buzzard, goshawk, peregrine, merlin, red kite and short-eared owl: all have been recorded in the last 5 years, and most are annual or virtually annual in occurrence. The frequency of buzzard records is increasing (the species may breed in the near future);
- Grey partridge: Last recorded in winter 2006, when 2 birds were seen during October; prior to this in winter 2003/04 when the largest covey noted comprised 14 birds;
- Bearded tit: noted in the winters of 2005/06 and 2004/05 feeding around cut areas of reed on the estate;
- Crossbill: present throughout the year in 2006/07 and 2005/06; crossbill is an early breeder (breeding is timed to coincide with cone ripening and can occur as early in the year as January), and these records suggest that breeding could have occurred

¹⁸ I.e. those outside of formal survey work.

in Dunwich Forest / Goose Hills, the most suitable habitat on the estate, in both years¹⁹;

- Reed bunting: a flock of approximately 100 birds drawn to winter cover crops / wild bird seed mix crops in December 2004 was exceptional (in comparison to the peak counts of 1-3 birds generally recorded during the winter farmland bird surveys);
- Scarce passage migrants and winter visitors have included yellow-browed warbler (which is recorded virtually annually), red-backed shrike, great grey shrike, and common crane. An Iceland gull was recorded frequenting the warm water outfall in winter 2003/04;
- Species outside the normal limit of their range that have occurred on the Sizewell Estate between August and March in the past 5 years include great white egret, alpine swift and slender-billed curlew.

3.2.3 Summary of Suffolk Wildlife Trust Data

WeBS data collected by SWT suggests that the most notable feature of the wetland bird community at Sizewell is the consistently high number of wintering gadwall. Peak counts in the 2 most recent winters are far higher than in previous years (e.g. the peak count was 97 in 2006/07 in comparison with 50 in 2003/04). In contrast, peak counts of mallard have fallen over the past 5 years from a high of 158 birds in 2004/05 to 55 in 2007/08, while teal numbers have remained relatively constant (54-72 birds), with the peak counts occurring in the late winter. Of the other duck species recorded, the abundance of wigeon varies between years (although even the highest counts over the past 5 years are low in comparison with the winter population in the county), while numbers of shoveler and tufted duck are consistently very low.

The number of wintering geese using the marshes and the arable farmland within the Sizewell Estate is very variable. Geese, when they do occur, tend to roost and loaf in the Lower Abbey Marshes and / or feed in the winter cereal crops around Upper Abbey. Of greatest nature conservation importance are the (Russian) white-fronted geese, as these are a qualifying feature of the Minsmere to Walberswick SPA. These birds were last recorded using the estate in February 2006, when a peak annual count of 252 birds was present. Wintering (predominantly feral²⁰) greylag and feral Canada geese make more consistent use of the marshes, but occur sporadically on the farmland, and relatively consistent numbers of mute swan are present in the marshes.

Wader numbers in both the marshes and the farmland are low during the winter period. The peak counts of snipe and curlew over the past 5 years appear typical of the habitat types and the region; flocks of over 1,000 lapwing are not uncommon in Suffolk in winter (Piotrowski, 2003), indicating that the peak counts of wintering lapwing are also unexceptional.

¹⁹ Piotrowski (2003) concluded that coastal plantations in Suffolk were less regularly used than tracts of suitable habitat in the Breckland.

²⁰ At least one ringed bird among the flock has been found to be a wild Northern European bird, and it is therefore likely that a small proportion of the wintering flock comprises wild migratory stock.

The main feature of the wintering passerine community on the arable farmland is woodlark. The peak count of 54 birds (in 2 flocks) at Upper Abbey in winter 2007/08 was exceptional (a far higher number than has been previously recorded on the estate), and is likely to reflect the fact that there was a considerable area of arable land that remained unsown, with cereal stubbles and root crop residues providing a good feeding resource (Alan Miller [SWT], pers comm). Skylark numbers are variable on the estate, with peak counts having declined over the past few years, while other farmland passerines such as linnet, yellowhammer and reed bunting occur in unexceptional numbers. The number of goldfinches at Upper Abbey in winter 2007/08 was far higher than in previous years, and a roosting flock of around 200 birds was recorded in mid winter. Woodpigeon is abundant, rook and jackdaw occur in variable numbers but are common, and carrion crow has increased markedly in numbers in recent years. An increase in the number of outdoor pig units, which provide year round invertebrate prey, has been linked to the increase in carrion crow numbers (SWT/ADAS 2008., Wright [Ed.], 2007). Other than the waterfowl, the main bird interest associated with the wetland habitats comprises their year round use by kingfisher and by wintering bearded tit.

Barn owl, which breeds within the Sizewell Estate, will use the farmland and the marshes for foraging year round (as will kestrel and sparrowhawk), and there have been sightings of up to 2 birds during farmland bird surveys. Marsh harrier regularly commutes through the estate and is likely to forage in both wetland and arable habitats. Other wintering raptors are recorded on a more occasional basis, suggesting that the area is not generally of great importance to them.

Incidental records suggest that the Sizewell and Upper Abbey marshes have the capacity to support wintering bittern. The last sighting of a bird within the Sizewell Estate (during the August to March period) was in August 2006. Outside the breeding season, however, bittern is very difficult to survey for, and as such more recent use of the area cannot be discounted. The presence of crossbill throughout 2005/06 and 2006/07 indicates that the mature plantation at Dunwich Forest and Goose Hills may have supported breeding birds in these years.

3.3 Bird Surveys

3.3.1 Walkovers

The most widespread species recorded during the walkover survey work conducted by Entec in winter 2007/08 were resident species with a range of habitat preferences such as wren, dunnoek, robin, blackbird, and the commoner species of tit. Wood pigeon, rook and jackdaw, which form large feeding aggregations, were commonly recorded in the farmed areas, along with occasional flocks of linnet, chaffinch and goldfinch. As with the SWT surveys and the comparable previous work by Henderson Consultants, the Entec surveys represent snapshots of bird numbers in the areas surveyed.

The preliminary works area was limited in terms of the numbers and diversity of birds it supported. During the September survey a few foraging green woodpeckers, a chiffchaff and small numbers of meadow pipit were present among a range of relatively ubiquitous species, while in November there were very few birds recorded apart from a feeding song thrush and small numbers of commuting Corvids. The January survey recorded single snipe and woodcock, as well as up to 5 stonechats and a range of generalist passerines. The final survey, conducted in March, found linnet, meadow pipit, stonechat, pied wagtail and skylark (all of which breed along the coastal strip), as well as small numbers of passage siskin. This lack of

ornithological diversity in the preliminary works area was not unexpected, as the habitats present are relatively homogeneous and the area is open and exposed, comprising semi-improved grassland, amenity planting and (modified) dune vegetation. Scrub cover is confined to two discrete fenced areas and some peripheral planting (mainly of exotic species which have been slow to establish and provide little cover) and there are no wetland habitats or tall ruderal vegetation present.

Flocks of foraging tits were particularly common in the blocks of coniferous and mixed woodland at Kenton and Goose Hills. These flocks were mainly made up of coal, blue, great and long-tailed tits, with small numbers of marsh tit, treecreeper and goldcrest associated with some. Other common species in this area were blackbird, robin, dunnock, wren and bullfinch. Goldcrest occurred throughout the plantation, and records included a flock of 17 in Kenton Hills; firecrest were recorded in woodland to the west of Kenton Hills in January and on the northern edge of Nursery Covert in March. Crossbill was not recorded in the conifer plantation during the winter surveys²¹.

The semi-natural woodland, scrub and hedgerows shared many species with the coniferous plantation, although more woodpeckers (green and great spotted), yellowhammer and goldfinch were generally recorded. Sparrowhawk was noted with regularity foraging in all habitats, small numbers of siskin occurred throughout the estate (particularly between January and March), and house sparrow and greenfinch showed a predictable association with domestic properties and farms.

The most notable bird species and largest aggregations of birds recorded during the surveys were generally found in the more open habitats within the Sizewell Estate, particularly the farmland and the Sizewell Marshes.

Woodlark appeared to favour arable fields around Upper Abbey and Fiscal Policy in 2007/08. During the September survey 2 woodlark were recorded in a field on the south-east side of Fiscal Policy; in November a flock of 12-13 birds was noted on 2 occasions in a field to the east of Old Abbey and 8 birds were recorded in flight over fields to the south and south-east of Fiscal Policy; in January, 4 woodlark were present to the south of Fiscal Policy (but a flock of 18 birds reported as being in the area by SWT could not be located); in March a single woodlark was recorded in the field to the south-east of Eastbridge Farm, with an additional two birds in the field west of Lower Abbey. Woodlark are likely to have been on territory by the time this final survey was conducted.

Farmland bird aggregations included mixed flocks of 200 and 300 rook and jackdaw in September and November respectively, both near Upper Abbey Farm, 600 starlings in a field to the south of Leiston Common in January (along with 44 pied wagtails), and regular flocks of between 40 and 400 wood pigeons throughout the farmed area. Linnet flocks included 52 in a field to the south of Ash Wood in September; 70 in a field between Black Walks and Eastbridge Farm in January; and 73 and 23 to the west of Walks Barn and at Black Walks respectively in March.

²¹ Crossbill was apparent in the plantation during bittern and marsh harrier surveys undertaken in April and July 2008 (when flocks of up to 100 birds were present). These flocks included a large number of 'grey' and 'brown' crossbills (adult females are grey green and adult males tend to be boldly red), indicating these were dispersing post breeding birds from core breeding populations in Breckland, the wider UK or Continental Europe. The Goose Hills area provides a suitable feeding area for the species.

The most notable counts of lapwing on the arable farmland were 75 in a field to the north-east of Upper Abbey in November, and 34 in a field to the north-east of the Round House in March (although small flocks of less than 10 birds were regularly recorded). There were few records of wildfowl away from the Sizewell Marshes, with a foraging flock of 24 wigeon and 4 mallard to the north-east of Eastbridge in March being notable in this context.

The ditch system of the Sizewell Marshes and ditches adjoining the South Minsmere levels supported a number of species not generally found in other parts of the survey area. Kingfisher was recorded during all of the surveys, with sightings from the ditch adjacent to Sandypytle Plantation as well as the Sizewell Marshes. Cetti's warbler was present in scrub around the watercourses in many of the areas in which it had previously been recorded breeding (ref Entec Report 19801cr080). Gadwall was found in small groups throughout the ditch system during the survey period. Other waterfowl commonly recorded included moorhen, mallard, teal and mute swan, and there were sporadic sightings of water rail. Foraging snipe were most regularly recorded in the wet meadows during the November and January surveys, with a few woodcock also present.

Other species recorded commuting through or foraging in the survey area included hobby, buzzard and marsh harrier. Three hobbies were recorded in flight over Nursery Covert and Ash Wood with a further observation of a single bird over Reckham Pits Wood during the September surveys. Marsh harriers were occasionally noted commuting over the survey area throughout the period, and a buzzard was recorded over Dunwich Forest in January. Sparrowhawk and kestrel were recorded with regularity.

In summary, Entec surveys conducted during winter 2007/08 consolidated information provided by Suffolk Wildlife Trust and the more historical work undertaken by Henderson Consultants, providing additional information for some parts of the Sizewell Estate not regularly surveyed.

3.4 Intertidal and Inshore Marine Bird Surveys

3.4.1 Summary of Results

Terns

The intertidal and inshore marine surveys conducted during the April to July period (2007) recorded regular movements of common tern to and from the warm water outfall (off the built power station) from the breeding colony and roost at Minsmere. This pattern of activity continued during August and September: on 6 August there was a peak annual survey count of 137 foraging birds at the outfall; 75 birds were recorded on 6 September (the same number as the peak count in July). During these surveys juvenile birds accounted for the majority of the terns present. The highest common tern count during a 45 minute survey interval in the northern grid square (which takes in the majority of the inshore waters adjacent to the preliminary works area) was 57 birds on 6 August: 34 birds commuted north and 21 south indicating continued movement to and from Minsmere; and an additional 2 birds were seen moving directly south in a mixed group of tern species, and were considered likely to have been migrating. Common tern numbers had dropped considerably by mid September, and the species was last recorded on 2 October, when a peak count of 13 birds were foraging around the warm water outfall.

Very low numbers of juvenile Arctic terns²² were recorded amongst the juvenile common terns foraging around the warm water outfall in August and September. The final record of Arctic tern was 2 birds foraging around the warm water outfall on 15 October (throughout the 6 hour survey period).

Other tern species were recorded less regularly during the survey period, and showed less association with the warm water outfall. Little tern was only recorded on 6 August, when 11 birds were observed migrating south, approximately 150m offshore, and a single bird was recorded foraging around the warm water outfall during three of the six 45 minute survey intervals. Sandwich tern was recorded in August and September, with a peak count of 6 birds during a 45 minute survey. No foraging was recorded in the northern grid square, and activity associated with the warm water outfall in the southern grid square was limited to an adult and a juvenile bird foraging there on 16 September.

Black tern, which visits the warm water outfall annually in varying numbers²³, was not recorded during the survey work (surveys represent snapshots only), although will have been present on some dates in August and September.

Gulls

Mediterranean gull was recorded in September, October (twice) and November 2007 (twice), and in January 2008. Four of the six birds seen were winter-plumaged adults. There was one record of a feeding bird off the northern grid square, and one record of a feeding bird associated with the warm water outfall. All other records of Mediterranean gulls were of birds commuting or migrating through the inshore waters.

Little gull was mainly recorded between August and October and showed a clear association with the warm water outfall. In the inshore waters of the northern grid square the peak count during a 45 minute watch occurred on 17 September, when 15 birds were recorded. This, and the 2 other double figure counts from the northern grid square, involved little gulls foraging while commuting to or from the warm water outfall. Numbers foraging at the outfall reached a peak (in terms of the 12 months of survey) of 75 birds on 9 August, and remained at around this level into early September, when a monthly peak of 60 birds was noted. Thereafter, there was a gradual decline in numbers, with a peak daily count of 24 foraging birds around the outfall on 16 September and a maximum of 5 foraging birds during the October surveys. Single birds were recorded moving through the inshore waters in January and March 2008.

There were 21 45-minute survey counts of black-headed gulls involving 100 to 400 birds during the survey period. All of these counts occurred between August 2007 and early January 2008. On 4 January a considerable southerly movement of black-headed gulls was apparent, peaking at 400 birds moving through the inshore waters in 45 minutes. The highest counts of loafing and foraging birds occurred in the southern of the two grid squares, and were mainly associated with the warm water outfall. Some of the other notable aggregations were as follows: 300 black-headed gulls foraging and loafing around the outfall on 1 September was the peak count

²² Single figure numbers were not exceeded: getting an accurate count among the far larger numbers of juvenile common terns was very difficult.

²³ For example there was a peak count of 30 on 26th August 2005 (Wright, M [Ed.], 2006). Piotrowski (2003) noted peak passage as occurring in September. There is considerable variation in passage black tern recorded between years.

during the survey period; 266 birds were feeding and loafing around the outfall on 4 January; 200 birds were associated with the outfall on 13 November; 150 were loafing on the sea on 16 December; and 148 were loafing and feeding along the tide line on 6 August. Large flocks of loafing and foraging black-headed gulls occurred more occasionally in the inshore waters adjacent to the northern grid square (these were often, although not exclusively, birds that drifted away from the outfall following feeding there), e.g. there were 100 foraging birds present on 4 January and 40 birds were loafing on the sea between the shoreline and approximately 200m offshore on 10 December.

The largest flocks of common gull occurred between December 2007 and February 2008, and were strongly associated with the warm water outfall. There was a peak count of 575 feeding birds on 10 January, while other notable counts included 340 loafing birds to the north of the outfall on 6 February and 306 feeding birds around the outfall on 4 January. Numbers were far lower in August and September 2007 and in March 2008, when counts of foraging birds did not exceed 20. The inshore waters adjacent to the northern grid square generally had far fewer common gulls present, with a loafing flock of 100 birds 300m offshore on 10 December being exceptional. Otherwise, there were occasional flocks of 30-50 common gulls recorded feeding in the surf and loafing (having drifted north from the warm water outfall). In contrast to common gull, kittiwake showed no association with the warm water outfall, but did occur in varying numbers around the Sizewell Rigs (in the southern grid square) throughout much of the winter (apart from November and December 2007 when birds were absent). The peak count was 120 kittiwakes on the rigs on 29 February. Loafing kittiwakes were mainly recorded on the sea around the platforms, with infrequent foraging by very small numbers of birds recorded in both of the grid squares during the course of the survey work.

The large gull species (lesser black-backed, herring and great black-backed gull) were recorded regularly, and showed a strong association with the warm water outfall. Herring and great-black backed gull were noted throughout the period, with lesser-black backed gull being relatively infrequently recorded between November and January inclusive. There were peak counts of 153 herring gull and 71 great black-backed gull on 10 January, and 15 lesser black-backed gull on 15 February²⁴, all in the southern grid square. These are conservative estimates of peak numbers, however, as a flock of approximately 600 mixed large gulls assembling to roost in the southern grid square on 13 November 2007, and including all three species, could not be accurately counted in fading light. Numbers of large gulls using the northern of the two grid squares was considerably lower: there were peak counts of 37 foraging herring gull (around a fishing boat) on 17 January and 20 loafing great-black backed gull on 10 December. There were no counts of foraging or loafing lesser black-backed gulls that entered double figures from the northern grid square.

A first winter glaucous gull, a scarce winter visitor to Suffolk (annually recorded, principally in the north-east of the county), was noted during February and March. The bird was seen feeding at the outfall (twice) and commuting to and from Minsmere. It was present in the general area for about 6 weeks, and was reportedly recorded in the gull roosts at Minsmere and North Warren during its stay.

²⁴ Larger numbers were recorded commuting or migrating through the survey squares on occasion, but not using the area within them for foraging, roosting or loafing. The highest 45-minute survey count was 64 lesser black-backed gulls moving north over the beach in the northern grid square on 1 October 2007.

Other Seabirds

Cormorant was regularly recorded throughout the survey period, with 17-67 birds noted loafing on the Sizewell Rigs during each month between August 2007 and March 2008 inclusive. Consistently high counts occurred in September and October 2007 and in February and March 2008, with the peak count occurring on 7 March. Small numbers of cormorant were regularly recorded foraging around the warm water outfall. There was a peak count of 13 on 6 November, but 1-9 birds was more typical. Away from the outfall there was very little evidence of foraging in the inshore waters during the survey work. Shag was not recorded within 300m of the shore during the survey period²⁵.

Divers were not generally recorded within 300m of the shore, hence most records were incidental to the survey programme. Nevertheless, offshore passage was sometimes evident, including large numbers of red-throated diver noted moving in December 2007, February 2008 and March 2008. Black-throated and great northern diver were both recorded offshore on one date, although there were a number of additional unidentified diver records that could have been attributable to these species. Red-throated diver was recorded in the inshore waters during 2 surveys; there were records of a bird foraging in the northern grid square in December 2007 and March 2008. Great crested grebe was noted between November and March (1-20 birds), but there were no records within 600m of the shore.

Arctic skua was mainly noted outside the survey area, moving through offshore, although there were 2 records of the species harrying other seabirds (a common gull and a kittiwake respectively) in the inshore waters during the survey period. A great skua was noted flying along the shoreline of the northern grid square in October.

Auks, gannet, sooty shearwater and fulmar were recorded infrequently, with the latter 2 species not being recorded within 300m of the shore. A guillemot drifted north through the northern grid square in November, a razorbill was noted feeding at the warm water outfall in October, and a total of 12 little auks were recorded in the inshore waters on 13 November (one was seen to fly inland and another was caught and killed by a great black-backed gull). One of the little auks was recorded foraging within the survey area.

Wildfowl

A total of 15 species of swan, goose and duck were recorded during the survey work. The majority of records were of birds apparently migrating (moving directly thorough the airspace being surveyed). Most wildfowl tended to move parallel to the shoreline, although some species came in off the sea to make landfall to the west of the survey area (and were assumed to be immigrants rather than commuting birds as there was no evidence of regular movements of this nature). In the following summary account, the inshore waters are defined as being between 0 and 300m from shore²⁶. Wildfowl activity during the survey period is summarised as follows.

- Mute swan: 3 sub-adult birds flew south approximately 200m offshore on 6 February;

²⁵ A shag was seen a considerable distance from shore on 6 August.

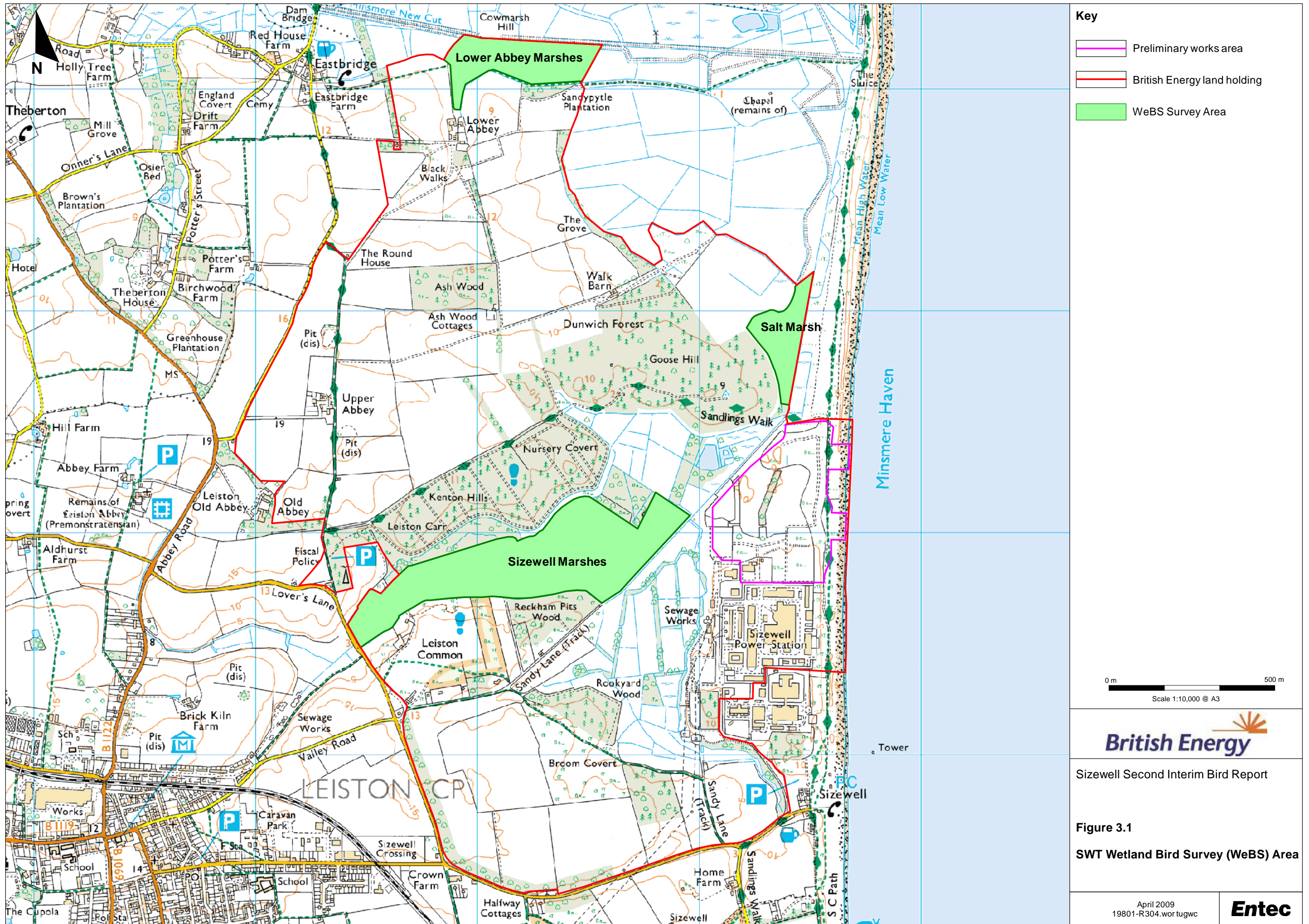
²⁶ Tidal range is limited and is unlikely to have had a bearing on results as a precautionary approach was taken to data interpretation, with birds seen between 300 and 400m of the shore being noted in the summarised results.

-
- Whooper swan: all activity of this species was noted on 10 December. The most notable sighting was 17 birds that came in off the sea and flew over the preliminary works area (heading inland). An additional 5 birds were recorded flying north, some 500m offshore, and some distant unidentified swans, seen incidentally some 3km offshore, are also likely to have been this species;
 - Canada goose: there were 5 records involving 1-120 birds moving through the inshore waters. The peak count occurred on 13 November. Two birds loafing on the sea in the southern grid square on 6 September was unusual;
 - Barnacle goose: 9 birds flew south approximately 25m offshore on 29 February;
 - Brent goose: regular small flocks of migrating birds were recorded in early October, with additional movements in November to January and 1 February record. The peak count was 35 moving south on 6 October. There were 20 records of birds moving through the inshore waters;
 - Shelduck: there were two records of birds moving parallel to the coast through the inshore waters;
 - Wigeon: small flocks of 2-22 birds were recorded moving both north and south parallel to the coast, mainly in October, but also in December, January and February. Many of these flocks were noted beyond the survey area, but there were 2 flights involving 15 birds through the inshore waters;
 - Teal: flocks of 1-55 birds were recorded, mainly moving south, in October, December and January. A total of 15 flights, involving 291 birds were recorded through the inshore waters;
 - Mallard: recorded between November and January and in March. Three flights appeared to relate to birds migrating into the UK (based on their trajectory), and there were 6 additional flights parallel to the coast involving a maximum of 6 birds on 5 November;
 - Shoveler: small groups of male birds were recorded twice, but both were considerably offshore and incidental to the survey;
 - Tufted duck: there was evidence of migratory movement offshore in November. Only 1 bird was recorded flying along the coast through the inshore waters;
 - Eider: there were 2 records during the survey period, both involving single flying birds;
 - Common scoter: 1-150 birds were seen offshore with relative regularity throughout the survey period. Activity in the inshore waters was limited to a total of 9 flying birds;
 - Velvet scoter: recorded in November (1) and December (4), but considerably offshore and incidental to the survey;
 - Goldeneye: a female recorded a considerable distance offshore during December was incidental to the survey.

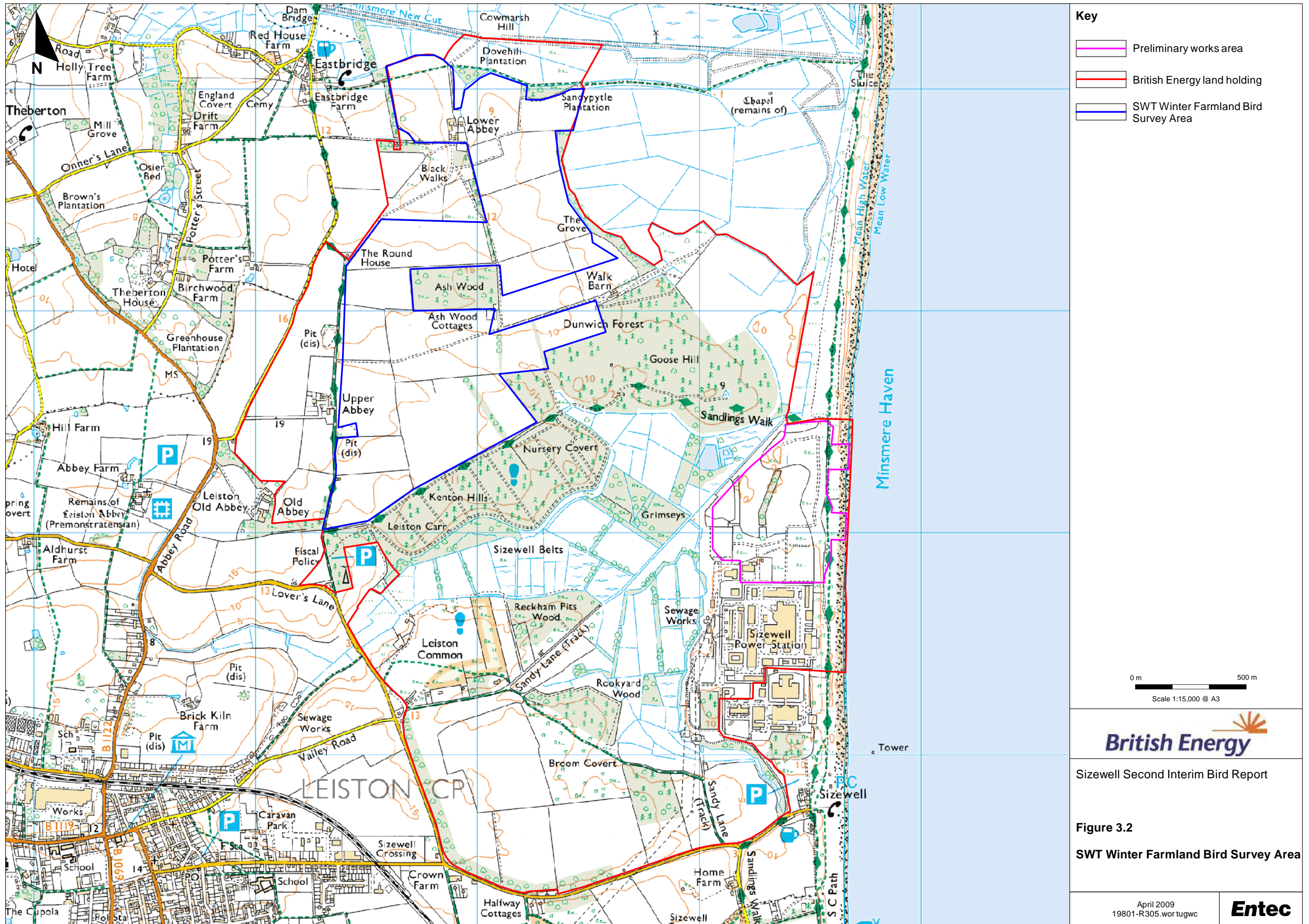
Waders

A total of 10 species of wader were recorded during the survey work. There was limited evidence of regular commuting up and down the coast, with most records probably relating to actively migrating birds. Waders tended to move parallel to the shoreline, and no feeding was noted in the survey area. The inshore waters are defined here as 0-300m from shore. Wader activity can be summarised as follows.

- Oystercatcher: there were 8 records of 1-3 birds commuting within 300m of the shore during the survey period;
- Avocet: 5 birds flew south on 23 March approximately 350m offshore;
- Ringed plover: there were 2 records from the northern grid square. A single bird was on the beach on 4 January and 3 birds were displaying on 27 March (ringed plover is known to breed in this area);
- Lapwing: the only movement of birds close inshore was 28 flying north (approximately 50m offshore) on 10 December 2007;
- Sanderling: a single flew south along the beach on 4 January;
- Dunlin: light passage was recorded in January and March 2008, when a total of 28 birds were recorded moving south through the inshore waters;
- Woodcock: there were 4 records of migrating birds coming in off the sea during the November survey work;
- Whimbrel: southerly passage was recorded in August and early September. A total of 3 birds were recorded moving through the inshore waters, with additional evidence of active migration further offshore (e.g. a peak count of 14 birds flying south 400m offshore on 1 September);
- Curlew: there were 4 records involving a total of 5 birds moving through the inshore waters within 300m of the shore;
- Turnstone: 1-2 birds were noted during the December and January surveys loafing on Sizewell Rigs. Light passage involving a total of 14 birds was noted through the inshore waters in March and November.



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4. Discussion

When considering bird populations, importance is often taken as meaning that a site supports at least 1% of the population under consideration at county (Suffolk), national (Great Britain unless otherwise specified) or international level. This approach has been taken when considering the results of the 2007/08 winter bird surveys of both the preliminary works area and the wider survey area. To determine likely thresholds of importance, relevant county and national accounts (Piotrowski, 2003., Brown & Grice, 2005) have been used in conjunction with bird reports, scientific papers and information on population trends available from the BTO.

There is no fundamental biological reason to take 1% of a population as the threshold level for establishing the level of importance of a site. Nevertheless, this percentage is widely considered to be of value in developing measures that give an appropriate level of protection to populations, and has gained acceptance on this basis throughout the world. The criterion was, for example, adopted by parties involved in the Ramsar Convention 1971. Thereafter, the 1% level of national species totals has been taken as the basis of assessment in various countries, including Britain (Stroud, Mudge & Pienkowski, 1990).

4.1.1 The Winter Bird Community of the Sizewell Estate

Wildfowl

The main feature of the wetland bird community of the Sizewell Estate is the relatively high number of gadwall that occur (predominantly) in the Sizewell Marshes. Currently, the threshold of national importance for gadwall is set at 171 birds, with wintering numbers in the UK peaking in December at slightly in excess of 15,000 birds (Austin *et al.*, 2008). At national level there has been a steady increase in Gadwall numbers over the past 30 years, reflecting the increase in availability of nutrient-rich artificial wetland habitats provided by new lowland reservoirs and flooded gravel pits (Wernham *et al.*, 2002., Brown & Grice, 2005)²⁷.

The peak count of gadwall on the Sizewell Estate was 97 birds in 2006/07, and the peak mean for the past 5 years is 70 birds. It follows that the wintering gadwall population using the Sizewell Estate does not currently approach the threshold of national importance. Given the relative size of the wintering population at Sizewell in comparison to the national population, however, it is reasonable to assume that the Sizewell Estate is of regional importance for gadwall.

Other wildfowl that occur on the Estate with regularity (and in more than very low numbers) are mallard, teal and mute swan. Peak means for the past 5 years for mallard and teal on the Sizewell Estate are 96 and 62 individuals respectively, with mallard apparently declining over the period and teal numbers remaining relatively stable. The threshold of national importance for mallard is 3,520 individuals, with UK wintering numbers peaking at (in excess of) 121,500 birds in October. Mallard is an abundant winter resident in Suffolk, and Clarke (1991 [in

²⁷ In Suffolk the development of wetland habitats at sites including Alton Water, Trimley Marshes and Loompit Lake, together with the sympathetic restoration and management of gravel pits at Lackford in the Lark Valley have provided additional wintering grounds that complement established wintering sites such as Minsmere (Piotrowski, 2003).

Piotrowski, 2003]) reported that Suffolk formed part of the most important wintering area for the Russian, Finnish and Scandinavian (and possibly the Baltic) breeding populations. There is little contemporary information on which to base an estimation of the size of the wintering mallard population in Suffolk, however, as wintering birds are widely dispersed and few sites hold large numbers. A precautionary assessment is that the Sizewell Estate is of county importance for wintering mallard. The threshold of national importance for teal is 1,920 individuals, and maximum numbers are recorded in December when in excess of 127,000 individuals are present in the UK (Austin et al, 2008). The large wintering populations of the Alde-Ore complex (5-year peak mean of 3,278 birds) and Minsmere (5-year peak mean of 2,320 birds) indicate that the wintering teal population in Suffolk is likely to exceed 6,000 birds (Piotrowski, 2002., Austin et al, 2008). It is therefore concluded that the Sizewell Estate is of no more than local importance for teal.

Peak wintering mute swan numbers on the Sizewell Estate have ranged between 14 and 19 individuals in recent years. This figure does not approach the threshold of national importance, currently 375 birds (Austin et al., 2008). At regional level, the Ouse Washes (Cambridgeshire) and Abberton Reservoir (Essex) regularly support nationally important wintering herds, and 150-400 mute swans also occur on the Ouse Washes, and have been recorded in recent years at Welney and Breydon (Brown & Grice, 2005., Piotrowski, 2003., Taylor *et al.*, 1999), suggesting a regional population well in excess of 1,000 birds. On this basis, peak counts of wintering mute swans on the Sizewell Estate may sometimes approach or exceed the threshold of regional importance, but in most years are likely to be of county importance.

The other species of wildfowl of particular conservation interest that has been recorded using the Sizewell Estate is (Russian) white-fronted goose. The species, which forms part of the qualifying interest of the Minsmere to Walberswick SPA, was last recorded on the Sizewell Estate in February 2006, when a peak count of 252 birds was present. The wintering flock ranges relatively widely, and has made limited use of the Minsmere Levels (adjacent to the BE land holding) in the past few years (Robin Harvey [RSPB Minsmere], pers comm.)²⁸, with RSPB's North Warren reserve (between Thorpeness and Aldeburgh) supporting the majority of birds (Alan Miller [SWT] and Tim Sykes [freelance ornithological surveyor], pers comms.). The attractiveness of the Sizewell Estate to white-fronted geese may be to some extent dependent on the availability of sugar beet stubbles on which geese have been recorded feeding in the past: in 2007 the only beet field was ploughed up almost immediately after harvesting and so there was no top or beet left to feed on (Alan Miller, pers comm.). Nevertheless, traditional winter feeding habitat for white-fronted geese includes a range of types of grassland, and wintering flocks have recently taken to feeding on autumn sown cereal crops (Brown & Grice, 2005), so it seems likely that these birds simply have a range of attractive feeding opportunities in the wider landscape. On the basis of available information, it is concluded that fields within the Sizewell Estate are unlikely to be of particular importance to the local white-fronted goose population.

Waders

The desk study, summary of SWT data and survey work conducted in winter 2007/08 indicated that wintering wader numbers on the Sizewell Estate are relatively low. Two species, curlew and lapwing, predominantly occur in the arable fields, while variable numbers of snipe occur in

²⁸ In winter 2007/08 the peak count at Minsmere was 98 birds, with a larger flock (of 236 birds) recorded on the South Levels in 2006/07.

the marshes and woodcock are found in marginal and woodland habitats. Numbers of these wader species are unlikely to be of more than local importance, and many records of snipe and woodcock are likely to be of passage birds rather than birds resident on the estate throughout the winter.

Other Waterfowl

Although there was no evidence from the Entec surveys to suggest that bittern occurred in the Sizewell Marshes in 2008, there is clear evidence of some use during previous winters from the desk study. In winter the English breeding population is supplemented by immigrants from Continental Europe, and the national population rises to approximately 150 individuals, spread across suitable sites in (mainly) southern Britain (Brown & Grice, 2005). It is therefore concluded that in those winters when bittern is present, the marshes are of regional importance to the species.

Kingfisher, which breeds on the estate (and for which the estate is of county importance) is present year round. It is therefore reasonable to conclude that the estate is of county importance for kingfisher throughout the year.

Raptors

Although various species of raptor are recorded on the Sizewell Estate annually and some species regularly commute through, there is no clear evidence from the survey data or the desk study that the area is a key foraging area for any species other than barn owl, which occurs in numbers of county importance. A precautionary assessment might also assume the freshwater marshes are of county importance to wintering marsh harrier.

Passerines

The most notable passerine species recorded using the Sizewell Estate during winter 2007/08, were woodlark, Cetti's warbler, firecrest, bearded tit and crossbill.

Woodlark numbers using the estate in winter 2007/08 peaked at 54 birds (in 2 flocks) in January. These flocks were present for 2-3 weeks (Alan Miller [SWT], pers comm). Woodlark is a resident and partial immigrant in the UK²⁹, with the more northerly UK breeding populations moving south in winter (Brown & Grice, 2005). The flocks on the BE Estate are likely to predominantly comprise UK breeding birds, and as national breeding population was (most recently) estimated at between 1,426 and 1,552 occupied territories (in 1997), and there is concern about a likely decline in numbers at national level, these numbers are of national importance. In a more typical winter, however, when peak counts of 3-5 birds are recorded, the estate is likely to be of county importance only.

Cetti's warbler is a resident species, and a total of 13-14 territories were recorded on the Sizewell Estate in 2007 (Entec & SWT figures). The conclusion of the First Interim Bird Report was that the estate is likely to currently hold just under 1% of territorial males (at UK level), and would therefore be considered of regional rather than national importance to the species. Given the resident status of Cetti's warbler, this assessment also applies to the winter population.

²⁹ Based on evidence of visible migration at bird observatories such as Portland and Dungeness rather than on ringing returns. It is not currently feasible to estimate to what extent Continental European birds swell the UK wintering population, although published sources indicate that this influx is likely to be very limited.

Firecrest is sporadically noted on the estate, and is inevitably under recorded due to the extent of suitable habitat and the unobtrusive nature of the species. Firecrest is likely to be a regular passage migrant (predominantly in March-April and October-November) and a rare winter resident (breeding has also occurred) at Sizewell. The wintering population of firecrest in the UK is relatively low, and was estimated at 200-400 birds in the last UK wintering bird atlas (Lack, 1986). On this basis, a precautionary conclusion would be that the Sizewell Estate is of regional importance for wintering firecrest.

Numbers of breeding bearded tit in the UK were estimated at 504 to 559 pairs in 1998-02 (www.bto.org), although weather related fluctuations occur and the wintering population is swelled by Continental immigrants (e.g. Brown & Grice, 2005). Given the proximity of the Sizewell Estate to Minsmere, a key site for the species at national level (due to the length of time the species has been established there and the high population), however, it is likely that any wintering bearded tit in the Sizewell Marshes are of local provenance. It is therefore reasonable to conclude that the Sizewell Estate will support a nationally important wintering population on occasion.

Of the additional red-listed and UK BAP species that were recorded (such as linnet and yellowhammer), none are likely to occur in numbers of county importance.

4.2 Intertidal and Inshore Marine Survey

Initial survey work conducted between April and July 2007 indicated that the warm water outfall that serves the built nuclear power stations at Sizewell provides a regionally important foraging resource for gulls and common terns, including a substantial proportion of breeding common terns and some black-headed gulls from the breeding colonies at Minsmere. The continuation of survey work between August 2007 and March 2008 has provided further data that consolidates this conclusion and which suggest that the outfall may assume particular importance as a feeding resource during the post-breeding and autumn passage periods. Very few birds were recorded in the inshore waters away from the outfall location, indicating an absence of regular foraging elsewhere.

Common tern shows a clear association with the outfall, and survey work during the breeding and post-breeding periods has demonstrated a clear movement of terns between Minsmere and the outfall. Common terns are known to switch rapidly between prey types and feeding methods as circumstances change (Snow & Perrins, 1998). It is therefore clear that these terns, and the large groups of mixed gull species that occur, take advantage of a food resource that has been made more accessible by the operation of the power station. Sea water is constantly pumped into the nuclear plant in order to cool the reactor, before being pumped back out to sea (the outfall). To prevent debris and large marine organisms entering the cooling water, the intake is covered with mesh. This mesh does not prevent small fish and amphipods being sucked in, however. The water is subsequently warmed, during which these organisms are killed or become moribund, and expelled where they can be picked off by surface feeders such as gulls and common tern.

The Minsmere common tern colony is of county importance, as 'Seabird 2000' data suggests that less than 200 pairs breed in Suffolk (Mitchell *et al.*, 2004). The number of common terns feeding at the outfall during the breeding season (identified in the 1st Interim Bird Report) and

post breeding, and the evidence of direct flights to and from the outfall from Minsmere, indicate that it is a key foraging area for the county population, and is therefore of regional importance³⁰. The indication from the August surveys that large numbers of juvenile birds, many of which are likely to be of local provenance, use the outfall following fledging consolidates this conclusion.

Gull numbers using the outfall are also of at least county importance. There is limited information on numbers of wintering gulls in the UK (counting gulls is optional during WeBS Counts and many gulls occur in agricultural habitats and around waste disposal facilities which are not routinely surveyed), and published information must therefore be treated with caution. On the basis of peak counts from Entec surveys and estimated maximum populations in annual WeBS reports, however, the area around the warm water outfall is likely to support regionally important numbers of wintering Mediterranean, common and great black-backed gull on occasion. Wintering numbers of lesser black-backed gulls at the outfall may be considered of national importance (as the wintering population of the area is a feature of the Ramsar site), but the level of use was limited during much of the survey period.

There was no evidence from the surveys conducted between August 2007 and March 2008 that migrating or commuting wildfowl showed any reaction (e.g. deviations in flight path or changes in altitude) to the built nuclear plant. This conclusion is consistent with that of the first interim bird report.

³⁰ The Minsmere population makes up considerably more than 1% of the East Anglian population

5. Conclusions

The long running data sets from surveys undertaken by SWT, in combination with the historical survey work carried out by Henderson Consultants and the 2007/08 Entec survey programme provide a solid baseline for assessment of likely effects of development on wintering birds on the Sizewell Estate. The review of historical information included in this report has shown that over time the winter use of the estate by some species (such as willow tit) has diminished or ceased, while other species have fluctuated in numbers or become sporadic in occurrence (such as white-fronted goose) and some (such as marsh harrier and little egret) have certainly increased in frequency of observation (reflecting wider trends in populations). Overall, however, the results of the various surveys have been consistent, indicating that they are robust and provide an accurate picture. On this basis, assuming there are annual updates using SWT data, this report should provide a suitable baseline for assessment for up to 5 years.

The winter bird community of the Sizewell Estate reflects the mosaic of wetland, farmland and woodland habitats present, its geographical location, and the position of the site in relation to large areas of semi-natural (mainly wetland) habitat. As such the estate as a whole is diverse, and the bird community includes a number of species of particular conservation interest. In contrast, the preliminary works area, which is located on the coastal strip and is open and exposed, was found to have a very limited bird community. The most valuable bird communities were associated with the freshwater marshes and arable habitats.

Within the wetland habitats, the main feature species is gadwall, with the wintering population being of regional importance. Other species that occur with regularity in wetland areas include bearded tit, kingfisher and Cetti's warbler, all of which are afforded enhanced protection during the breeding season. The sporadically occurring wintering bearded tit population is considered of national importance due to the direct ecological link to the Minsmere population, with the Cetti's warbler and kingfisher populations being of regional and county importance respectively. The desk study has revealed relatively regular records of post-breeding and wintering bittern in the freshwater marshes on the estate over the past 10 years, while marsh harrier is regularly observed commuting (and sometimes foraging) over all habitat types.

The numbers of waders and wildfowl (other than gadwall) regularly using the estate is relatively limited, although a precautionary assessment is that wintering numbers of mallard and mute swan may be of county importance. White-fronted geese have become less frequent winter visitors to local arable and freshwater marsh habitats in recent years. This is likely to be the result of low numbers wintering in the county, their current centre of distribution (they were primarily found at North Warren in winter 2007/08), and the wide availability of arable habitats for foraging in the North Warren area.

The main feature species of the arable habitats on the Sizewell Estate is wintering woodlark. In 2007/08 a nationally important population was present, although in most years numbers are far lower, and of county importance only. Other farmland species generally occur in low numbers, and while some relatively large flocks of finches occur, these are unlikely to be of more than local importance.

Surveys of the warm water outfall continued between August 2007 and March 2008, by which time a year of survey had been completed. The survey programme has clearly demonstrated

that the outfall is an important feeding resource for a range of water birds, particularly common tern and several species of gull. The clear link between the breeding common tern population at Minsmere and the outfall, and the high level of use observed during the post breeding period by both adult and juvenile birds suggests it is a regionally important foraging resource. Gull numbers using the outfall are also consistently high, and it may also support regionally important numbers of common, great black backed and Mediterranean gull at times during the winter. Wintering numbers of lesser black-backed gulls at the outfall may be considered of national importance (as the wintering population of the area is a feature of the Ramsar site), but the level of use was limited during much of the survey period.

6. Recommendations

- Mitigation measures for key wintering species can begin to be explored through consultee meetings organised to discuss the results of the survey work and desk study that are detailed in this report;
- As the results of the various ecological surveys become available and the design of the project progresses, the Integrated Land Management Plan (ILMP) for the BE Estate (ADAS, 2006) should be reassessed to ensure that key species likely to be affected by the build have appropriate targeted conservation initiatives implemented elsewhere within the land holding.

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**Sizewell C New Nuclear Power Station:
Terrestrial and Freshwater Ecology, and
Ornithology**

DRAFT Seabird Report 2011-12

June 2012

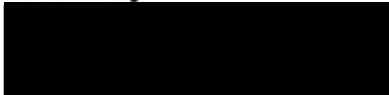
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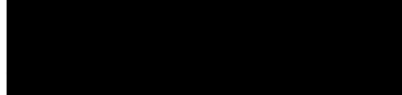
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Sizewell C New Nuclear Power Station: Terrestrial and Freshwater Ecology, and Ornithology

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1. Introduction

1.1 Purpose of this Report

An area of land directly north of Sizewell B Nuclear Power Station, which is located near Leiston in Suffolk, has been identified as having the potential to accommodate the proposed development of one or more new nuclear reactors. This proposed development is known as Sizewell C. The site of the proposed development has an approximate central National Grid Reference (NGR) of TM473640.

AMEC Environment & Infrastructure UK Ltd (formerly Entec UK Ltd) was commissioned by EDF Energy in 2011 to undertake seabird surveys of the inshore waters between Sizewell and Orford Ness. The purpose of this report, which outlines the findings of the survey work, is to inform the design of Sizewell C and the Environmental Statement for the scheme.

1.2 Scope

The primary purpose of this work is to gather information that will be used to identify any potential impacts on little tern (*Sternula albifrons*) and red-throated diver (*Gavia stellata*) populations due to the development of a new nuclear facility at Sizewell, Suffolk. The data will be used within both the Environmental Impact Assessment and Habitats Regulations Assessment processes, as little tern are a qualifying feature of the Minsmere-Walberswick Special Protection Area (SPA) and Alde-Ore Estuary SPA, and red-throated diver of the Outer Thames Estuary SPA. A desk study was also carried out to identify statutory and non statutory designated sites of ornithological importance that are designated or cited for bird species that could potentially use the inshore waters at Sizewell. This report details the findings from the desk study and surveys undertaken from March 2011 to April 2012 inclusive.

Potential effects on little tern and red-throated diver have been highlighted through the ongoing consultation process with the Royal Society for the Protection of Birds (RSPB) and Natural England (NE). The potential impacts on these species, highlighted by consultees are;

- the potential for construction and operation of the new nuclear build and offshore facilities to disturb or displace foraging little tern and red-throated diver (or their movements to and from breeding, resting and foraging areas), and
- the effects of temperature increase caused by warm water emitted from the proposed outtake facility (also referred to in this report as the cooling water discharge) on the availability of little tern and red-throated diver prey.

In addition, the proposed development could impact on other species of seabird and wildfowl using the inshore waters adjacent and close to Sizewell, as follows:

- the potential for construction and operation of the new nuclear build and offshore facilities to disturb or displace foraging, resting (loafing and roosting) and commuting seabirds and wildfowl;

- the potential for construction and operation of the new nuclear build and offshore facilities to disturb or displace nesting kittiwakes and other seabirds resting on the Sizewell rigs, and
- the effects of temperature increase caused by warm water emitted from the proposed outtake facility on the availability of prey for seabirds and wildfowl that use the inshore waters between Sizewell and Orford Ness for foraging.

1.3 Background

In order to provide baseline information on how little terns are using the inshore waters at Sizewell, surveys were initially undertaken from May to August 2010. At the time of designing and undertaking the 2010 little tern survey programme, results obtained from the initial options stages indicated that the discharge of warm water from the Sizewell C outfall would drift to the south of Sizewell towards the shallow waters off Thorpeness. Subsequent to this, further modelling work (made available after the completion of the 2010 survey season) indicated that the cooling water discharge had the potential to extend as far south as Orford Ness lighthouse. During much of the 2010 survey period, the outfall from Sizewell B was not in operation. The outfall is known to attract foraging seabirds (including terns) to the area. In addition, little tern failed to establish a breeding colony on the Minsmere beach in 2010, a site which is within the foraging range for this species from Sizewell. The data collected in 2010 was therefore not thought to be representative of 'normal' years when greater numbers of little tern could potentially occur in the Sizewell area. Subsequent to the 2010 surveys, the predicted spread of the cooling water discharge had extended south to Orford Ness lighthouse (well outside the 2010 survey area) and within the foraging range for any little terns breeding within the Alde-Ore Estuary SPA. In addition, in 2011, the Outer Thames Estuary SPA (which includes the inshore and offshore waters adjacent to the coast from Sizewell to Orford Ness) was classified for its internationally important wintering population of red-throated diver.

In view of this, the surveys were repeated in 2011, with the scope of the work being widened to encompass a larger survey area, extending south to Orford Ness lighthouse and the collection of data for a wider range of seabird and wildfowl species (including little tern and red-throated diver).

1.4 Study Area

The study area referred to in this report, includes the inshore waters visible (and where bird species will be reliably detected - this will vary depending upon species) from the 12 observation points used to undertake the VP surveys, detailed in Section 2.2.1. The study area covers much of the inshore waters that are likely to be affected by the cooling water discharge (based on modelling results available at the start of the surveys in spring 2011 as to where the cooling water discharge might spread to), and any inshore waters likely to be affected by disturbance due to construction of Sizewell C. Results from modelling work undertaken after the surveys were completed in spring 2012 indicate that the cooling water discharge is predicted to spread north to Dunwich beach, approximately 6km north of the study area (as well as south to Orford Ness lighthouse). The cooling water discharge is also predicted to primarily inhabit waters close (within approximately 1-2km) to the shoreline throughout its spread from north to south along the coast.



At the time of writing this report, the final location of Sizewell C (and its associated facilities) and the warm water outfall had not been determined. It is however known that the outfalls for Sizewell B and C will run concurrently for several years at least although the precise time period is not known at this stage. In addition, surveys were also undertaken at two little tern breeding colonies located outside the study area, on the beaches at Minsmere and Dingle Marshes.

2. Methods

2.1 Desk Study

A data-gathering exercise was undertaken in January 2012 to obtain information relating to statutory and non statutory designated nature conservation sites of ornithological importance that support species (that appear in their descriptions or citations) that could occur in the inshore waters within the study area (Sizewell to Orford Ness). The information on statutory designated sites was obtained through the use of the websites: www.magic.gov.uk, www.jncc.gov.uk and www.naturalengland.org.uk. The information on non-statutory designated sites and bird records were obtained from the Suffolk Biological Records Centre (SBRC). Given that seabird and wildfowl species can range widely during routine movements between foraging, resting and breeding sites, a 20km search area (for statutory designated sites) and a 3km search area (for non-statutory designated sites) from the study area was employed. Only those species that could potentially use the inshore waters for foraging or resting, or that might be disturbed by the proposed development works during migration and flights between foraging and resting areas were considered, and included the following species groups:

- Wildfowl (swans, geese and ducks);
- Other water birds (divers, grebes, herons and cormorants);
- Waders, and
- Seabirds (gannets, shearwaters & petrels, auks, skuas, terns and gulls).

Data on bird species that could potentially use the offshore waters between Sizewell and Orford Ness was also obtained from the following sources:

- Birds records within 3km of the study area, for 2005-2010, collected by the Suffolk Ornithologists' Group (SOG) was provided by the SBRC, and
- Wetland Bird Survey (WeBS) data for 2005-2010 was obtained from the British Trust for Ornithology, for WeBS count sectors that cover coastal areas and inshore waters within or adjacent to the study area.

This contextual information is important as it may highlight other notable species that could occur in the study area. A number of other primary sources of data were identified and used to inform the work. These include:

- Birds of Suffolk (Piotrowski, 2003);
- Suffolk Birds 2000-2010 inclusive (the annual county bird reports, published by the Suffolk Naturalists' Trust in collaboration with the Suffolk Ornithologists' Group);
- Annual bird reports for 2009 and 2010 for the Orford Ness National Nature Reserve, produced by the National Trust;

- Annual bird reports and data for 2006-2010 for Minsmere nature reserve produced by the RSPB, and
- Annual land management reports for the EDF Sizewell Estate for 2005-2010, produced by the Suffolk Wildlife Trust and ADAS.

2.2 Surveys

2.2.1 Seabird and Wildfowl VP Surveys

In order to identify the type and level of use by seabirds and wildfowl in the study area, a programme of surveys were carried out from 12 locations (vantage points - VPs) extending along the Sizewell coast from approximately 500m north of the proposed Sizewell C new build area, south to Orford Ness. These surveys were undertaken from late March 2011 to April 2012. This includes all of the period when little tern and red-throated diver are present in the area (primarily May-August and October-April respectively). A complete survey of the study area was undertaken (each survey taking 2-3 days) approximately every fortnight. A total of 328 45-minute watches were completed from 24 March 2011 to 25 April 2012 (a total of 246 hours of survey time). Additional watches were undertaken from VPs 1-4 during August 2011 when large congregations of common tern and little gull were foraging and resting around the Sizewell B outfall.

The number of 45-minute watches (in parenthesis) undertaken at each VP was as follows, from north to south: VP1 (28), VP2 (30), VP3 (30), VP4 (29), VP5 (27), VP6 (27), VP7 (27), VP8 (26), VP9 (26), VP10 (26), VP11 (26) and VP12 (26).

During each survey day, 45 minute watches were completed at up to eight different VPs. Each VP was spaced approximately 1km apart between Sizewell and Thorpeness (the area closest to the Sizewell C new build) and 2km apart between Thorpeness and Orford Ness. A suitable (minimum 10-15 minute) break was taken between each 45 minute watch to allow the surveyor to rest their eyes and move to the next VP. Surveys were undertaken during daylight hours with the timings varied during the survey period to ensure that as full a range of tidal states as possible were covered from each VP. **Figure 2.1** shows the location of the study area and VPs.

During each watch, details of any flight-lines or hunting activity of seabirds and wildfowl were drawn onto maps. Details of the numbers and type of activity (for example: foraging, loafing, roosting or commuting) were also recorded. The perpendicular distance between the shoreline and bird or birds was also recorded, generally to the nearest 100m for individuals less than 500m from the shoreline and to the nearest 500m for birds further out. Distant groups of birds flying offshore were recorded in distance bands (for example, 1-2km, 2-4km, etc). Priority was given to the collection of data for little tern and red-throated diver for which additional information was recorded, including the type of foraging activity (dives, surface feeding, etc) and any prey caught. The type of foraging activity can often determine what type of prey has been caught (e.g. for little terns, diving for fish, surface pick-ups for invertebrates). Searches were also made for terns and gulls resting along the shoreline between Sizewell and Orford Ness. The dates, time and weather conditions during the surveys are shown in **Table A1, Appendix A**.

2.2.2 Little Tern Colony Surveys

A programme of colony surveys were undertaken to identify the direction of flight of little terns when leaving or returning to colonies located within the Minsmere-Walberswick SPA and Alde-Ore Estuary SPA, and the levels of feeding activity close inshore adjacent to the colonies. Surveys for little terns were undertaken at three colonies: Minsmere beach (O.S Grid Reference TM 477 666), Dingle marshes (O.S. Grid Reference TM 489 733) and Slaughden beach (O.S. Grid Reference TM 459 579). **Figure 2.2** shows the location of the three little tern colonies.

Agreement was reached with Alan Miller (SWT) and Adam Rowlands (RSPB) that 100 metres would be a suitable distance to watch the terns from to avoid disturbing them. At Slaughden where there was greater concern about disturbance, watches were undertaken from a distance of 200m, in agreement with National Trust wardens who manage the site. The surveys involved watching little tern movements in and out of the colonies; recording the direction of incoming and outgoing flights. Birds leaving the colony were followed until out of sight, with the aid of a telescope. Details of the broad category of prey being returned to the colonies were noted (e.g. fish or invertebrates) and any foraging activity in inshore waters adjacent to the colonies was also recorded. Details of the colony development, such as display behaviour and any chicks or fledged young present were also recorded.

Between mid-May and early August 2011, weekly watches (each taking three hours) were undertaken at each active colony (only the Dingle colony remained in use by little terns throughout the breeding season). In addition, extended watches were undertaken once monthly from May to July 2011 at the Dingle and Minsmere colonies (none were undertaken at Slaughden due to the sensitivity of the site to disturbance), and at VPs 2 and 3 (located adjacent to the Sizewell B outfall). These extended watches were completed over a minimum 6 hour period to incorporate both low and high water (approximately half of a full tidal cycle). An additional 3 hours of watch was undertaken at VP2 on 12 August, during a period when large numbers of terns and little gull were feeding around Sizewell B outfall. The dates, time and weather conditions during the three hour and six hour colony surveys are shown respectively in **Tables A2 and A3 in Appendix A**. A total of 159 hours of survey was completed between 11 May and 12 August, broken down by site, as follows:

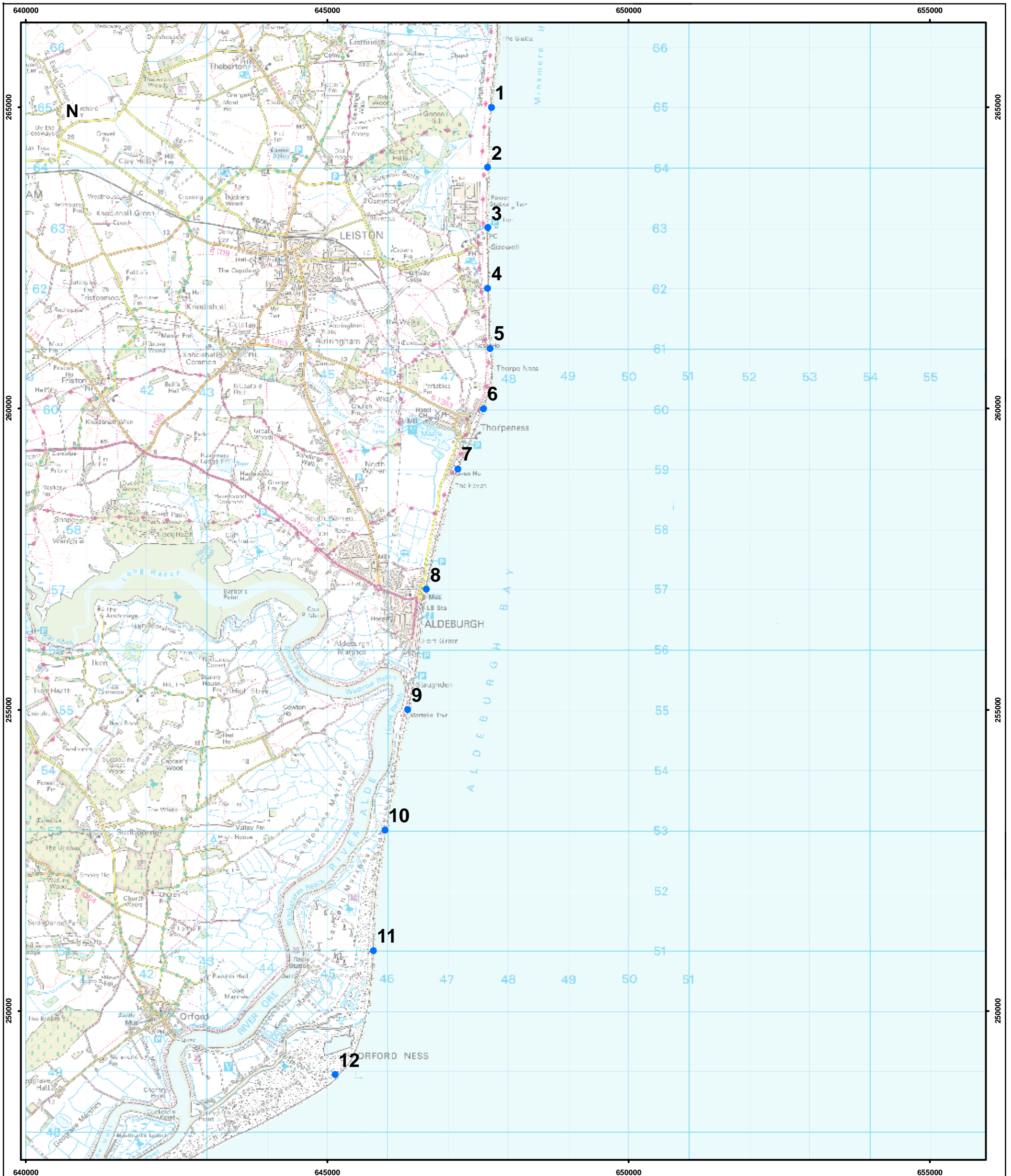
- Dingle: 17 May to 12 August (69 hours);
- Minsmere: 11 May to 1 August (39 hours);
- Slaughden: 2 June to 23 June (12 hours);
- VP2: 23 May to 12 August (21 hours);
- VP1: 24 May to 15 July (18 hours).

The start and finish times of the three-hour colony surveys were varied over the course of the breeding season to ensure that all aspects of the diurnal activity patterns of the species were covered (for example: foraging activity may be concentrated in the morning or evening). The timing of the surveys was also varied to ensure that watches were undertaken through much of the tidal cycle.

Records of other seabird and waterfowl species (seen over the sea and adjacent beach) were also collected during the colony surveys, particularly those undertaken from VPs 2 and 3, and at



Slaughden (i.e. locations within the study area), although priority was again given to the collection of little tern data.



Key:
 VP location

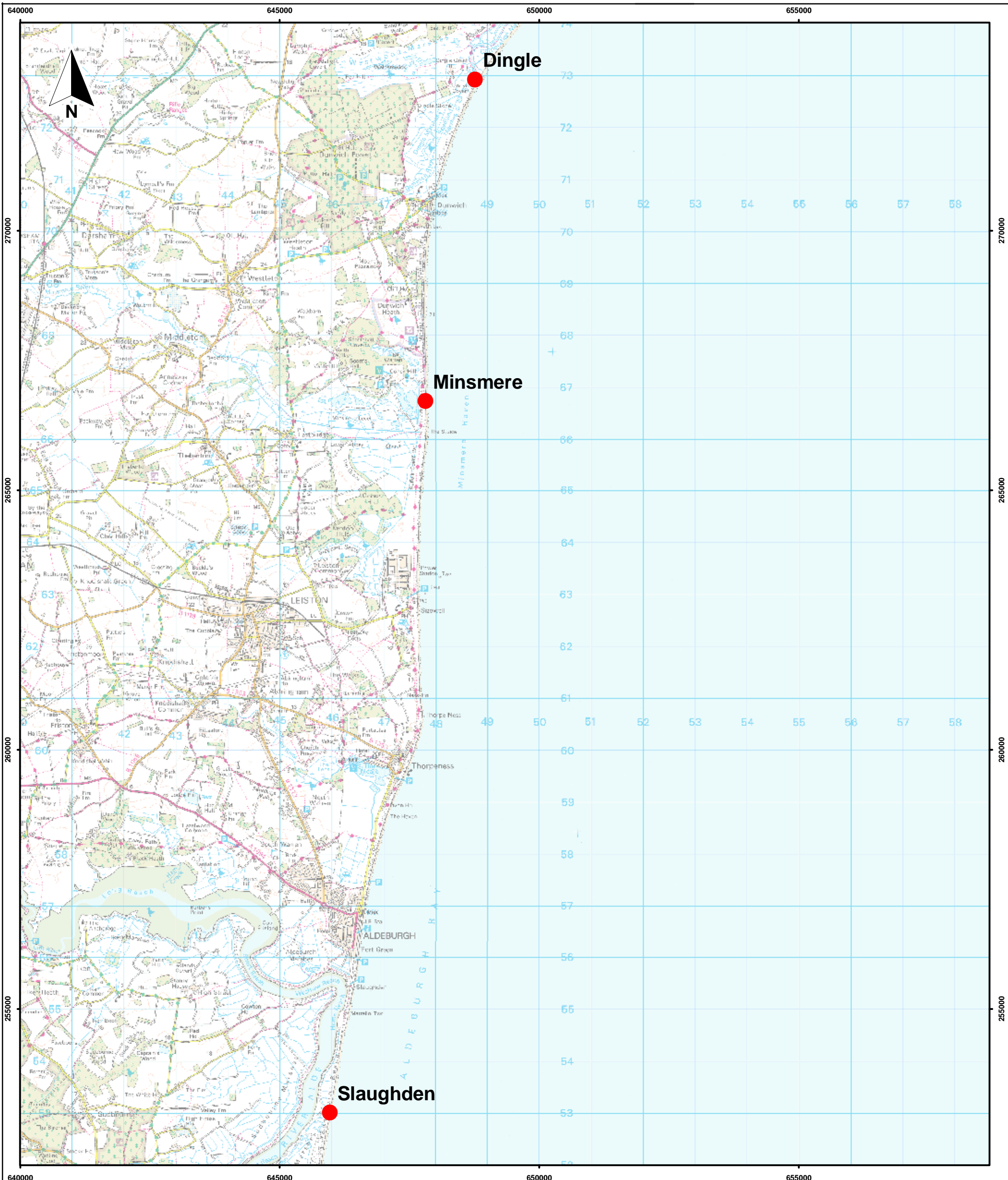


Sizewell Seabird Report 2011-12

Figure 2.1
VP locations

May 2012
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Key:
 Colony location



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Figure 2.2
Little Tern Colony Locations

0  3
 Kilometres
 Scale: 1:70,000 @ A3

May 2012
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3. Results

3.1 Designated Sites of Ornithological Importance

A total of five SPAs, three Ramsar sites and six SSSIs (which contain designated or cited species that could potentially use the inshore waters between Sizewell and Orford Ness) are located within 20km of the study area.

Key species which are designated features of SPAs that are likely to forage in the study area include: wintering red-throated diver (the designated feature of the Outer Thames Estuary SPA), breeding little tern (designated features of the Minsmere-Walberswick SPA, Alde-Ore Estuary SPA and Bencare-Easton Barents SPA) and breeding Sandwich tern (a designated feature of the Alde-Ore Estuary SPA). In addition, there is the potential for lesser black-backed gull (which is a designated feature of the Alde-Ore Estuary SPA during the breeding season) to rest and forage on the sea within the study area. Herring gull and black-headed gull (which appear in the breeding seabird assemblage qualification for the Alde-Ore Estuary SPA) may also rest and forage on the sea within the study area. Teal and wigeon, which appear in the winter waterfowl assemblage qualification for the Alde-Ore SPA may also rest on the sea.

Additional species which could potentially use the study area and appear in the SSSI citations and Ramsar site descriptions (detailed below) include: Mediterranean gull (breeds in nationally important numbers at the Minsmere-Walberswick and Alde-Ore Ramsar sites) and Arctic tern, common tern and common gull which appear as breeding species in the citation for the Alde-Ore Estuary SSSI.

Of the non-statutory designated sites, the Sizewell Rigs County Wildlife Site is designated for its regionally important breeding colony of kittiwake. Full details of these and other species of seabird and wildfowl that appear as designated or cited features of designated sites are provided below (nonseabird/wildfowl species are not included). The location of the SPAs, Ramsar Sites, SSSIs and non-statutory designated sites, in relation to the study area is shown in **Figures 3.1a-d** respectively.

3.1.1 European Designated Sites

Five SPAs, which contain designated or cited species that could potentially use the inshore waters in the study area are located within 20km of the study area (the locations of which are shown on **Figure 3.1a**).

Minsmere-Walberswick SPA

The Minsmere-Walberswick SPA is located adjacent to the north of the study area. The SPA was classified on the basis of its breeding and wintering bird interest, and includes the following:

Minsmere-Walberswick SPA qualifies under Article 4.1 of EC Directive 2009/147/EC on the conservation of wild birds (codified version)¹ by supporting populations of European importance of the following species listed on Annex 1 of the Directive:

During the breeding season:

- Avocet (*Recurvirostra avosetta*), 91 pairs representing at least 15.4% of the breeding population in Great Britain (RBBP 1996);
- Little tern (*Sternula albifrons*), 28 pairs representing at least 1.2% of the breeding population in Great Britain (5 year mean, 1992-1996);

The site also qualifies under Article 4.2 of the Directive by supporting populations of European importance of the following migratory species.

During the breeding season:

- Teal (*Anas crecca*), 73 pairs representing 4.9% of the population in Great Britain (Count, 1990);
- Gadwall (*Anas strepera*), 24 pairs representing 3.1% of the population in Great Britain (Count, 1990);
- Shoveler (*Anas clypeata*), 23 pairs representing 2.3% of the population in Great Britain (Count, 1990).

Over winter:

- Shoveler, 98 individuals representing 1% of the population in Great Britain (5 year peak mean 1991/92-1995/96);
- Gadwall, 93 individuals representing 1.1% of the population in Great Britain (5 year peak mean 1991/92-1995/96);
- (Russian) White-fronted goose (*Anser albifrons albifrons*), 67 individuals representing 1.1% of the population in Great Britain (5 year peak mean 1991/92-1995/96).

Subsequent to the publication of the data above (as included in the Natura 2000 Standard Data Form), the following changes have been suggested by the SPA Review (Stroud *et al.*, 2001):

Removal of the following species that originally qualified under Article 4.2 of the Directive

- During breeding season: teal, gadwall and shoveler;
- During winter: shoveler, gadwall and white-fronted goose;

Addition of the following species that now qualify under Article 4.2 of the Directive by supporting populations of European importance over winter:

¹ The European Union meets its obligations for bird species under the Bern Convention and Bonn Convention and more generally by means of Directive 2009/147/EC (Birds Directive) on the conservation of wild birds (the codified version of Council Directive 79/409/EEC as amended).

- Avocet, 278 individuals representing at least 21.9% of the wintering population in Great Britain (5 year peak mean 1991/2 - 1995/6)

The SPA Review has yet to be formally adopted, although in practice SPA Review information (regarding additional species) is given the same credence by nature conservation consultees as that contained on the Natura 2000 Data Sheets. JNCC states that individual site accounts should be taken as the definitive list of qualifying species at the SPAs concerned.

Alde-Ore Estuary SPA

The Alde-Ore Estuary SPA is located adjacent to the west of the study area between the town of Aldeburgh and Orford Ness. The SPA then extends south to Shingle Street and Bawdsey. The SPA was classified on the basis of its breeding and wintering bird interest, and includes the following:

Alde-Ore Estuary SPA qualifies under Article 4.1 of the EC Directive 2009/147/EC on the conservation of wild birds (codified version) by supporting populations of European importance of the following species listed on Annex 1 of the Directive during the breeding season:

- Avocet, 104 pairs, representing 23.1% of the breeding population in Great Britain (5 year mean, 1990-1994);
- Little tern, 48 pairs, representing 2% of the breeding population in Great Britain (5 year mean, 1993-94, 1996-98);
- Sandwich tern (*Sterna Sandvicensis*), 169 pairs, representing 1.2% of the breeding population in Great Britain (5 year mean, 1992-96).

During the winter:

- Ruff (*Philomachus pugnax*), 3 individuals, representing 0.4% of the population in Great Britain (5 year mean, 1991/2-1995/6);
- Avocet (*Recurvirostra avosetta*), 766 individuals, representing 60.3% of the breeding population in Great Britain (5 year mean, 1991/2-1995/6).

The site also qualifies under Article 4.2 of the Directive by supporting populations of European importance of the following migratory species during the breeding season:

- Lesser black-backed gull (*Larus fuscus*), 14,070 pairs representing 11.3% of the breeding population in Great Britain (5 year mean, 1994-98)².

During the winter:

- Redshank (*Tringa totanus*), 1,919 individuals, representing at least 1.1% of the population in Great Britain (5 year mean, 1991/2-1995/6).

Subsequent to the publication of the data above (as included in the Natura 2000 Standard Data Form), the following changes have been suggested by the SPA Review (Stroud *et al.*, 2001):

² In the SPA Review, the SPA qualifying population for lesser black-backed gull is given as, 21,700 pairs representing at least 17.5% of the breeding Western Europe/Mediterranean/Western Africa population (Count as at 1998).

Removal of ruff (during winter) that originally qualified under Article 4.1 of the Directive

Addition of the following:

- A seabird assemblage of international importance. The area qualifies under Article 4.2 of the Directive (79/409/EEC) by regularly supporting at least 20,000 seabirds during the breeding season. The area regularly supports 59,118 individual seabirds (Count period ongoing) including: herring gull (*Larus argentatus*), black-headed gull (*Chroicocephalus ridibundus*), lesser black-backed gull, little tern and Sandwich tern (*Sterna sandvicensis*);
- A wetland of international importance. The area qualifies under Article 4.2 of the Directive (79/409/EEC) by regularly supporting at least 20,000 waterfowl. Over winter, the area regularly supports 24,962 individual waterfowl (5 year peak mean 1991/2 - 1995/6) including: black-tailed godwit (*Limosa limosa islandica*), dunlin (*Calidris alpina alpina*), lapwing (*Vanellus vanellus*), shoveler, teal, wigeon (*Anas penelope*), shelduck (*Tadorna tadorna*), white-fronted goose, redshank and avocet.

Outer Thames Estuary SPA

The study area is located within the Outer Thames Estuary SPA which extends offshore from the Thames Estuary north along the Suffolk coast. The SPA was classified on the basis of its wintering bird interest, and includes the following:

The Outer Thames Estuary SPA qualifies under Article 4.1 of the EC Directive 2009/147/EC on the conservation of wild birds (codified version) by supporting populations of European importance of the following species listed on Annex 1 of the Directive during the winter:

- Red-throated diver: 6,466 individuals representing 38% of the winter population in Great Britain (peak mean over the period 1989-2006/07).

Deben Estuary SPA

The Deben Estuary SPA is located approximately 15km to the south and south-west of the study area. The SPA was classified on the basis of its breeding and wintering bird interest, and includes the following:

The Deben Estuary SPA qualifies under Article 4.1 of the EC Directive 2009/147/EC on the conservation of wild birds (codified version) by supporting populations of European importance of the following species listed on Annex 1 of the Directive, during winter:

- Avocet: 95 individuals, representing 7.5% of the winter population in Great Britain (5 year mean, 1991/2-1995/6).

The site also qualifies under Article 4.2 of the Directive by supporting populations of European importance of the following migratory species during the winter:

- Brent goose (*Branta bernicla*): 2,516 individuals, representing 0.8% of the winter population in Great Britain (5 year mean, 1991/2-1995/6).

Subsequent to the publication of the data above (as included in the Natura 2000 Standard Data Form), the following changes have been suggested by the SPA Review (Stroud *et al.*, 2001):

- Removal of brent goose (during winter) that originally qualified under Article 4.2 of the Directive

Bencare to Easton Bavents SPA

The Bencare to Easton Bavent SPA is located approximately 15km to the north of the study area. The SPA was classified on the basis of its breeding and wintering bird interest, and includes the following:

Alde-Ore Estuary SPA qualifies under Article 4.1 of the EC Directive 2009/147/EC on the conservation of wild birds (codified version) by supporting populations of European importance of the following species listed on Annex 1 of the Directive, during the breeding season:

- Little tern: 21 pairs, representing 0.9% of the breeding population in Great Britain (5 year mean, 1992-1996)³.

3.1.2 Internationally Designated Sites

Three Ramsar Sites, which contain designated or cited species that could potentially use the inshore waters between Sizewell and Orford Ness, are located within 20km of the study area (the locations of which are shown on **Figure 3.1b**).

Minsmere-Walberswick Ramsar Site

The Minsmere-Walberswick Ramsar Site is located adjacent to the north of the study area and shares a common boundary with the Minsmere-Walberswick SPA in this area. No species are listed under Ramsar Criterion 6 (i.e. those that occur in internationally important numbers). The Ramsar site however supports a number of species that occur at nationally important levels, as follows:

During the breeding season:

- Mediterranean gull (*Larus melanocephalus*): 2 apparently occupied nests, representing an average of 1.8% of the GB population (Seabird 2000 Census);
- Black-headed gull: 2,558 apparently occupied nests, representing an average of 1.9% of the GB population (Seabird 2000 Census);
- Little tern: 20 apparently occupied nests, representing an average of 1% of the GB population (Seabird 2000 Census);

Species with peak counts in spring/autumn:

- Teal: 3,083 individuals, representing an average of 1.6% of the GB population (5 year peak mean 1998/9-2002/3);
- Ruff: 10 individuals, representing an average of 1.4% of the GB population (5 year peak mean 1998/9-2002/3);

³ In the SPA Review, the SPA qualifying population for little tern is given as 53 pairs representing at least 2.2% of the breeding population in Great Britain (Count as at 1997)

- Black-tailed godwit: 846 individuals, representing an average of 5.4% of the GB population (5 year peak mean 1998/9-2002/3 - spring peak);
- Spotted redshank (*Tringa erythropus*), 15 individuals, representing an average of 11% of the GB population (5 year peak mean 1998/9-2002/3), and
- Greenshank (*Tringa nebularia*), 9 individuals, representing an average of 1.5% of the GB population (5 year peak mean 1998/9-2002/3).

Species with peak counts during winter:

- White-fronted goose: 212 individuals, representing an average of 3.6% of the GB population (5 year peak mean for 1996/7-2000/01);
- Gadwall: 261 individuals, representing an average of 1.5% of the GB population (5 year peak mean 1998/9-2002/3);
- Shoveler: 238 individuals, representing an average of 1.6% of the GB population (5 year peak mean 1998/9-2002/3);
- Avocet: 329 individuals, representing an average of 9.6% of the GB population (5 year peak mean 1998/9-2002/3);
- Golden plover (*Pluvialis apricaria*): 4,503 individuals, representing an average of 1.8% of the GB population (5 year peak mean 1998/9-2002/3);
- Redshank: 1,386 individuals, representing an average of 1.1% of the GB population (5 year peak mean 1998/9-2002/3), and
- Lesser black-backed gull: 905 individuals, representing an average of 1.4% of the GB population (5 year peak mean 1998/9-2002/3).

Alde-Ore Estuary Ramsar Site

The Alde-Ore Estuary Ramsar Site is located adjacent to the west of the study area between Aldeburgh and Orford Ness where it shares a common boundary with the SPA of the same name. The Ramsar site then extends south to Bawdsey. The Alde-Ore Estuary qualifies as a Ramsar Site under Criterion 3 for supporting a notable assemblage of breeding and wintering wetland birds. The Alde-Ore Estuary Ramsar site also qualified under Criterion 6 for supporting internationally important populations of the following:

Species regularly supported during the breeding season:

- Lesser black-backed gull: 5,790 apparently occupied nests, representing an average of 3.9% of the breeding population (Seabird 2000 Census)

Species with peak counts in winter:

- Avocet: 1,187 individuals, representing an average of 1.6% of the population (5 year peak mean 1998/9-2002/3)
- Redshank: 2,368 individuals, representing an average of 2% of the GB population (5 year peak mean 1998/9-2002/3).

The Alde-Ore Estuary Ramsar Site also supports a number of species that occur at nationally important levels, as follows:

- Mediterranean gull: 6 apparently occupied nests, representing an average of 5.5% of the GB population (Seabird 2000 Census);
- Sandwich tern: 169 pairs, representing an average of 1.6% of the GB population (5 year mean 1991-1995);
- Little tern: 88 apparently occupied nests, representing an average of 4.5% of the GB population (Seabird 2000 Census);

Species with peak counts in spring/autumn:

- Black-tailed godwit: 283 individuals, representing an average of 1.8% of the GB population (5 year peak mean 1998/9-2002/3);
- Spotted redshank: 44 individuals, representing an average of 32.3% of the GB population (5 year peak mean 1998/9-2002/3);
- Greenshank: 29 individuals, representing an average of 4.8% of the GB population (5 year peak mean 1998/9-2002/3);

Species with peak counts in winter:

- White-fronted goose: 186 individuals, representing an average of 3.2% of the GB population (5 year peak mean for 1996/7-2000/01);
- Shelduck: 1,398 individuals, representing an average of 1.7% of the GB population (5 year peak mean 1998/9-2002/3);
- Wigeon: 6,851 individuals, representing an average of 1.6% of the GB population (5 year peak mean 1998/9-2002/3);
- Teal: 2,447 individuals, representing an average of 1.2% of the GB population (5 year peak mean 1998/9-2002/3);
- Pintail (*Anas acuta*): 556 individuals, representing an average of 1.9% of the GB population (5 year peak mean 1998/9-2002/3), and
- Shoveler: 224 individuals, representing an average of 1.5% of the GB population (5 year peak mean 1998/9-2002/3).

Deben Estuary Ramsar Site

The Deben Estuary Ramsar Site is located approximately 15km south and south-west of the study area, where it shares a common boundary with the SPA of the same name. The Deben Estuary qualifies as a Ramsar Site under Criterion 6 for supporting internationally important populations of the following during the winter:

Species regularly supported during the breeding season:

- Brent goose (dark-bellied race): 1,953 individuals, representing an average of 1.9% of the GB population (5 year peak mean 1998/9-2002/3).

The Alde-Ore Estuary Ramsar Site also supports a number of species that occur at nationally important levels, as follows:

Species with peak counts in spring/autumn:

- Black-tailed godwit: 307 individuals, representing an average of 1.9% of the GB population (5 year peak mean 1998/9-2002/3);
- Greenshank: 22 individuals, representing an average of 3.6% of the GB population (5 year peak mean 1998/9-2002/3);

Species with peak counts in winter:

- Bean goose (*Anser fabalis fabalis*): 5 individuals, representing an average of 1.2% of the GB population (Source period not collated)
- Shelduck: 832 individuals, representing an average of 1% of the GB population (5 year peak mean 1998/9-2002/3);
- Avocet: 167 individuals, representing an average of 4.9% of the GB population (5 year peak mean 1998/9-2002/3);
- Spotted redshank: 3 individuals, representing an average of 2.2% of the GB population (5 year peak mean 1998/9-2002/3), and
- Redshank: 2,124 individuals, representing an average of 1.8% of the GB population (5 year peak mean 1998/9-2002/3).

3.1.3 Nationally Designated Sites

Six SSSIs, which contain designated or cited species that could potentially use the inshore waters between Sizewell and Orford Ness, are located within 20km of the study area (the locations of which are shown on **Figure 3.1c**).

Minsmere-Walberswick Heaths & Marshes SSSI

The Minsmere-Walberswick Heaths & Marshes SSSI is located adjacent to the north of the study area. The SSSI contains extensive reedbeds (at Minsmere and Walberswick) and marshes. The reedbeds are an important habitat for birds, including breeding garganey (*Anas querquedula*). At Minsmere, a 20 hectare area of shallow lagoons and islands has been created for wading birds and wildfowl. This area is renowned for its breeding colony of avocets, and shoveler, gadwall, teal and shelduck also breed.

Leiston-Aldeburgh SSSI

The Leiston-Aldeburgh SSSI is located adjacent to the west of the study area between Sizewell Hall and Thorpeness. The SSSI, which includes much of the North Warren and Aldringham Walks RSPB nature reserve, contains a rich mosaic of habitats including acid grassland, heath, scrub, woodland, fen, open water and vegetated shingle. The variety of habitats supports a diverse and abundant community of breeding and over-wintering birds. The marshes, the open water and their margins support a diverse range of breeding birds, including gadwall. The SSSI is also attractive to wintering waterfowl including Bewick's swan (*Cygnus columbianus*) and regularly supports important populations of white-fronted goose, gadwall and teal.

Alde-Ore Estuary SSSI

The Alde-Ore Estuary SSSI is located adjacent to the west of the study area between Aldeburgh and Orford Ness where it shares a common boundary with the SPA of the same name. The SSSI then extends south towards Bawdsey. The site is of national importance for its birdlife. Havergate Island holds one of the largest breeding colonies of avocet in Britain, and they also feed in large numbers on Hazelwood Marshes and the Alde mudflats. Other breeding birds on the Island and elsewhere on the site include gadwall, shoveler, oystercatcher (*Haematopus ostralegus*), ringed plover (*Charadrius hiaticula*), common gull (*Larus canus*), arctic tern (*Sterna paradisaea*), common tern, Sandwich tern and little tern. There are also very large breeding colonies of black-headed gull, lesser-black-backed gull and herring gull on Orford Ness. In winter and during migration, the site is visited by nationally important numbers of wildfowl and waders, including Bewick's swan, shelduck, teal, wigeon, redshank and avocet.

Sizewell Marshes SSSI

Sizewell Marshes SSSI is located at its nearest, 350m to the west of the study area. The SSSI is of national importance for the considerable area of lowland, unimproved wet meadow it contains. The SSSI citation states that the breeding bird assemblage is of national significance, with many species that are typical of wet grassland and associated habitats, including shoveler, gadwall, teal, snipe (*Gallinago gallinago*) and lapwing. However, since its notification, surveys undertaken by SWT who manage the area indicate that the level of ornithological interest for the SSSI has declined, with gadwall now the only species that is likely to continue to breed with regularity (and in regionally, rather than nationally important numbers).

Pakefield to Easton Bavents SSSI

The Pakefield to Easton Bavents SSSI is located approximately 13km north of the study area. The SSSI is nationally important for its vegetated shingle features, saline lagoons, flood-plain fens, and scarce breeding birds. The site supports nationally important populations of breeding little tern. The SSSI supports nationally important breeding bird assemblages of lowland open water and their margins (including gadwall), lowland heath, scrub and woodland.

Deben Estuary SSSI

The Deben Estuary SSSI is located approximately 15km south and south-west of the study area, where it shares a common boundary with the SPA of the same name. The numbers of redshank over-wintering on the estuary are of international importance and the summer breeding population of this species is of county significance. The site is of national importance for its winter populations of dark-bellied brent goose, shelduck and black-tailed godwit, with the numbers of wigeon, pintail and grey plover (*Pluvialis squatarola*) approaching this level in some years. The Deben Estuary supports many other species, including dunlin, curlew (*Numenius arquata*) and mute swan (*Cygnus olor*).

3.1.4 Non-Statutory Designated Sites

Ten non-statutory designated sites are located within 3km of the study area. These include areas adjoining statutory designations which, while valued, do not meet the criteria for SAC, SPA or SSSI status, and include County Wildlife Sites and Suffolk Wildlife Trust Reserves. Although all of these sites will have some bird interest, four specifically mention species of birds that might potentially use the waters within the study area, as follows (the locations of which are shown on **Figure 3.1d**):

- Middle Alde Intertidal River & Adjacent Marshes CWS (located 400m west of the study area) is an important area for breeding and wintering wildfowl. It is located adjacent to the Alde-Ore Estuary SSSI.
- Sizewell Levels & Associated Areas CWS (at its nearest located 200m west of the study area) is a large area of land, consisting of woodland, plantation, wet meadow, osier beds and scrub situated behind Sizewell power station. The numerous dykes provide good cover for wildfowl, including teal and mallard. The CWS is managed by the Suffolk Wildlife Trust.
- Sizewell Rigs County Wildlife Site (located within the study area), includes the two offshore maintenance structures (north and south rig respectively) associated with the cooling water intake and outfall. The rigs support a colony of over 200 breeding kittiwakes. This is one of two sites in Suffolk where kittiwake colonies have become established (the other being at Lowestoft⁴). The numbers of kittiwakes breeding at these sites represent a very small proportion of the UK population, which has no natural nesting sites on the UK east coast between Kent and Yorkshire.
- Southern Minsmere Levels CWS (located 600m NW of the study area) is of importance as it is directly adjacent to the Minsmere SPA, SAC and SSSI and is of interest for its breeding waders and wildfowl and its over-wintering bird community. The CWS is managed by the Suffolk Wildlife Trust.

3.2 Desk Study, Bird Records

3.2.1 Suffolk Biological Records Centre Bird Data

Suffolk Biological Record Centre (SBRC) data, for 1991-2010, much of which has been provided by the Suffolk Ornithologists' Group (SOG), indicates that the occurrence of different seabird and wildfowl species within the study area is very seasonal and that large numbers are recorded infrequently. A large proportion of the SBRC records since at least 2007 are for the waters offshore of Thorpeness where RSPB wardens for North Warren (Dave Thurlow and previously Rob Macklin) undertook frequent periods of sea-watching (counting birds offshore).

Table B1 in **Appendix B** shows the annual total number of each seabird and wildfowl species (for species that could potentially forage in offshore waters within the study area) recorded at each location, within approximately 3km of the study area, since 1990. A large proportion of the SBRC records are of birds commuting along the coastline and for most species there are very few records that specifically refer to birds foraging or loafing on the sea within the study area. However, the data shows that common scoter, red-throated diver, great crested grebe, cormorant, kittiwake, gulls (herring, black-headed, lesser black-backed and common), common tern, Sandwich tern and guillemot regularly migrate or undertake short-distance movements offshore between Minsmere and Orford Ness. Eider, velvet scoter, goldeneye, red-breasted merganser, skuas (pomarine, Arctic and great), little gull, terns (little, black and Arctic) and razorbill were also recorded more infrequently or in smaller numbers. **Table 3.1** shows the

⁴ On a purpose built wall constructed by Associated British Ports to compensate for the loss of the Lowestoft South Pier Pavilion (which was demolished in 1988).



monthly total number of individuals (for species for which the majority of records are likely to relate to birds recorded offshore) recorded in the study area since 1990.

Table 3.1 SBRC Data: Monthly total numbers of birds recorded in the Study Area

Species common name	Species biological name	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Scaup	<i>Aythya marila</i>	5	6			1			1		6	21	28
Eider	<i>Somateria mollissima</i>	13	22	10	6	2	5		8	37	146	182	177
Long-tailed duck	<i>Clangula hyemalis</i>	1			1						3	4	1
Common scoter	<i>Melanitta nigra</i>	571	451	166	176	107	578	1,037	1,155	1,241	486	1,447	675
Velvet scoter	<i>Melanitta fusca</i>	5	1		2			3	2		1	17	12
Goldeneye	<i>Bucephala clangula</i>	11	57	1							31	52	7
Red-breasted merganser	<i>Mergus serrator</i>	11	6	1	7	1		1		6	42	93	29
Red-throated diver	<i>Gavia stellata</i>	11,473	2,390	1,856	645	2	3	6	2	9	87	2,519	14,349
Black-throated diver	<i>Gavia arctica</i>	6	3	6	4	1				1	5	15	13
Great northern diver	<i>Gavia immer</i>	3	3			2	1			1	1	7	3
Great crested grebe	<i>Podiceps cristatus</i>	367	363	66	13	8	10	4	4	41	69	439	1,467
Red-necked grebe	<i>Podiceps grisegena</i>	3	3								2	2	6
Slavonian grebe	<i>Podiceps auritus</i>	5									2	2	3
Black-necked grebe	<i>Podiceps nigricollis</i>	8	3	8									
Fulmar	<i>Fulmarus glacialis</i>	26	22	104	181	282	69	28	22	54	2	45	18
Sooty shearwater	<i>Puffinus griseus</i>							2	44	41	71	3	1
Manx shearwater	<i>Puffinus puffinus</i>				5	3	28	29	5	31	2		
Storm petrel	<i>Hydrobates pelagicus</i>						1	10	1			11	
Leach's petrel	<i>Oceanodroma leucorhoa</i>									1			

Species common name	Species biological name	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Gannet	<i>Morus bassanus</i>	429	576	3,013	844	371	1,787	2,732	1,715	521	1,100	1,127	92
Cormorant	<i>Phalacrocorax carbo</i>	63	159	21		19		90	29	176	41	44	570
Shag	<i>Phalacrocorax aristotelis</i>	1							2	1	2	3	3
Grey phalarope	<i>Phalaropus fulicarius</i>										1		
Pomarine skua	<i>Stercorarius pomarinus</i>	43	14	1	11	17			4	14	12	14	8
Arctic skua	<i>Stercorarius parasiticus</i>	3	5	1	4	8	15	80	156	143	29	7	3
Long-tailed skua	<i>Stercorarius longicaudus</i>					5			2	4	2	2	
Great skua	<i>Stercorarius skua</i>	5			22	10	1	2	8	8	53	20	
Kittiwake	<i>Rissa tridactyla</i>	4,583	1,296	591	1,033	1,314	1,703	2,224	261	15	73	251	789
Black-headed gull	<i>Chroicocephalus ridibundus</i>	6,700	3,890	156		69		217		290	449	154	120
Little gull	<i>Hydrocoloeus minutus</i>	11		2	4	4	4	95	580	585	51	265	
Mediterranean gull	<i>Larus melanocephalus</i>	22	9	6	7	2	7	7	2	1	4	2	9
Common gull	<i>Larus canus</i>	210	244			86		2			50		
Lesser black-backed gull	<i>Larus fuscus</i>	106	102	41			32	61	620	133	118	31	26
Herring gull	<i>Larus argentatus</i>	2,242	5,350	500									300
Yellow-legged gull	<i>Larus michahellis</i>	7	4	2	1							1	6
Iceland gull	<i>Larus glaucoides</i>	8	7										3
Glaucous gull	<i>Larus hyperboreus</i>	2	2	1						1	3	4	3
Great black-backed gull	<i>Larus marinus</i>	222	26	14		22				1	97	284	280
Little tern	<i>Sternula albifrons</i>				18	131	111	237	82	2			
Black tern	<i>Chlidonias niger</i>					9	2	4	89	124			

Species common name	Species biological name	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Sandwich tern	<i>Sterna sandvicensis</i>				40	66	158	1,250	2,125	145	19		
Common tern	<i>Sterna hirundo</i>				117	700	122	4,490	13,766	2,896	29	1	
Roseate tern	<i>Sterna dougallii</i>					1	5	2					
Arctic tern	<i>Sterna paradisaea</i>				1	75	5	10	136	82	12	1	
Guillemot	<i>Uria aalge</i>	649	175	76	3	24	48	13	2	5	3	240	3,604
Razorbill	<i>Alca torda</i>	124	3		2	3	8	2	2	7	8	5	6
Little auk	<i>Alle alle</i>										51	411	3
Puffin	<i>Fratercula arctica</i>					1	2			2	3	5	4

NB: It has not been possible to separate the records of birds seen offshore from those seen inland, and therefore the figures shown in the table above will contain an unknown proportion of birds seen inland, at sites such as the North Warren and Minsmere RSPB reserves. However, for these species, the majority of individuals recorded will be birds flying over, or resting on the sea.

3.2.2 Wetland Bird Survey (WeBS) Data

Figure 3.2 shows the location of WeBS (Core Count) Count Sectors located within or adjacent to the study area. **Table B2** in **Appendix B** shows the peak monthly counts (from 2005/06 to 2009/10⁵) of seabirds and wildfowl species (that could potentially forage or rest on offshore waters within the study area) recorded within each WeBS Count Sector. Six WeBS Core Count Sectors were surveyed within or adjacent to the study area, of which only the Minsmere Offshore Sector (33074) includes counts of birds on the sea. No offshore WeBS counts are undertaken within the study area, although data from WeBS Count Sector 33074 (located 900m to the north of VP1) provides information about the numbers of birds occurring on the sea adjacent to the study area. It should also be noted that the days on which WeBS are undertaken (once-monthly) do not necessarily coincide with those days when peak numbers of seabirds occur in the area (which is often determined by specific weather conditions). However, the WeBS data does indicate that the large numbers of teal and wigeon that occur on the Minsmere RSPB reserve do not regularly rest on the adjacent sea. The data also suggests that large numbers of red-throated diver are also likely to be an infrequent occurrence offshore of Minsmere. Small numbers of terns and gulls were recorded offshore of Minsmere in relation to the large numbers counted on the adjacent Minsmere RSPB nature reserve.

3.3 Surveys

3.3.1 Vantage Point Surveys

A total of 68 species of seabird and wildfowl were recorded during the vantage point (VP) surveys undertaken from 22 March 2011 to 25 April 2012. Individuals were seen commuting along the shoreline, foraging on and over the sea, and resting on the sea. For most species, individuals could readily be detected with the use of a high-powered telescope up to a distance of about 1000-1500m. Beyond this distance, only the larger and/or more distinct species (such as gannet) could be identified to species level. Large numbers of divers were seen beyond 1500m from the shoreline, and these have been assumed to be red-throated diver as the desk study indicates that other diver species are rarely recorded in the study area.

Counts of birds foraging around the Sizewell B outfall and birds loafing on the outfall structures and rigs were also undertaken. However, Sizewell B outfall was not in operation from the beginning of September to mid-October 2011, which resulted in there being very little seabird activity in this area during this period.

The peak monthly counts of birds using the study area (for example, those foraging, resting or nesting/displaying, but excluding commuting birds) from each VP are presented in **Table C1** in **Appendix C**. The monthly total number of commuting birds recorded within the study area from each VP is presented in **Table C2** in **Appendix C**.

An account of the type and level of use of the study area by each species recorded during the VP surveys is provided below. Incidental records collected during other surveys undertaken in the Sizewell area in 2011-12, and records of species recorded during the little tern colony surveys in

⁵ The WeBS survey year runs from July to June the following year

2011 have also been included here. Records of regionally scarce species (such as little gull and black tern), extracted from the Birdguides website (www.birdguides.com) have also been included to provide a more complete picture of the numbers and seasonal timing of each species in the area.

Red-throated Diver

A total of 5,056 red-throated divers were recorded during the VP surveys of which 3,997 were recorded commuting through the study area and 1,059 were foraging or resting on the sea. The largest numbers of divers were recorded in March-April 2011 and from December 2011 to April 2012, with much smaller numbers seen from August to October 2011 and none in May, June and July 2011. Divers were seen on most survey dates from 22 March to 19 April 2011 and again from 31 August 2011 to 23 April 2012. Large numbers of birds were seen loafing and foraging on the inshore waters within the study area during VP surveys undertaken in very calm weather conditions (almost flat calm seas) on 24, 25 and 28 March 2011 (at the end of the 2010-11 winter period when divers are present in the area). These calm conditions continued until the 19th April. The divers were clearly visible at a distance of up to 2km from the shoreline, although additional birds were seen commuting north and south further out to sea. A total of 463 divers were counted from VPs 1-12 in late March 2011, of which 347 birds were seen from VPs 5-7 (offshore of Thorpeness village) and 42 from VP1 between Minsmere and Sizewell. Calm conditions such as these did not occur again during any of the VP surveys undertaken during the months when divers are present in good numbers (i.e. from December 2011 to April 2012). During periods when the sea was 'choppy', the divers were primarily seen when alighting or landing on the sea and many birds resting or foraging on the sea would not have been recorded. During each survey, the divers were primarily seen flying in one particular direction (either north or south along the coast). Many of the flights were relatively short in distance (a few hundreds of metres) as birds adjusted their positions in response to tidal water movements up and down the coast. There were several occasions when large groups of divers were seen making these short-distance movements for very brief periods, sometimes involving at least 50-100 birds. During the winter of 2011-12, large counts of divers undertaking short-distance movements (generally in one direction) included a total of 858 birds from VPs 10-12 on 6 January and 685 from VPs 1-8 on February 2. Large counts of divers foraging or loafing on the sea included 100 birds from VPs 1-7 on 20 February and 91 from VP 8-12 on 30 March.

Table 3.2 presents the total and mean number of divers (counted on each 45 minute count) recorded from each VP during the survey period.

Table 3.2 Total and mean number of Red-throated divers in each VP

VP	Commuting		Foraging/loafing	
	Total	Mean	Total	Mean
1	213	15.1	128	9.1
2	208	14.8	62	4.4
3	112	8.0	47	3.4

VP	Commuting		Foraging/loafing	
	Total	Mean	Total	Mean
4	464	33.1	50	3.6
5	210	15.0	222	15.9
6	264	18.9	157	11.2
7	322	22.9	119	8.5
8	379	29.0	38	2.9
9	102	7.7	18	1.4
10	322	24.8	57	4.4
11	445	34.2	108	8.3
12	956	73.5	53	4.1

The data collected during the VP surveys indicates that the distribution of divers was reasonably evenly spread through the study area in 2011-12, although the largest numbers of foraging and resting divers were seen in waters offshore of Thorpeness (VPs 5-7), with relatively low numbers observed offshore of Sizewell (VPs 2-3). The largest numbers of commuting birds were seen from VP12 from Orfordness lighthouse. The total number of commuting divers recorded in 1km distance bands from the shorelines was: 0-1km (741 birds, 19% of the total number of commuting divers recorded), 1-2km (663, 17%), 2-3km (805, 20%), 3-4km (497, 13%), 4-5km (494, 12%) and 5-6km (409, 10%), with the numbers observed decreasing with distance. This was expected due to decreased visibility caused by the often misty conditions occurring offshore. **Figures 3.3a-b** shows the peak number of red-throated divers recorded in each 1km grid square within the study area in VPs1-6 and VPs7-12 respectively.

Cormorant

Groups of cormorant were regularly seen loafing on the rigs at Sizewell (primarily the northern rig) and the nearby outfall structures. The waters immediately surrounding Sizewell B outfall were used by foraging cormorants. During the VP surveys there were regular flights of 1-10 cormorants flying to and from the rigs, both in a northerly and southerly direction, primarily within 500m of the shoreline. A count of 32 cormorant were recorded on the rigs on 24 March 2011 after which numbers fell to 1-10 birds, increasing again in August when 15 birds were counted there on the 31st. Numbers increased during the autumn and remained at a high level from October 2011 to March 2012 when 50-80 birds were present in the Sizewell rigs area on most visits. At least 78 birds were resting on north rig on 20 February (some parts of the rig platform where the cormorants roost are not visible from the shoreline), and a total of 96 birds were recorded on the rigs and surrounding waters on 3 February. Small numbers of cormorant were seen feeding on the waters surrounding the rigs and at the outfall, with a peak count of 25 birds at the outfall on 3 February, although generally 1-7 birds were usually present.

Away from the Sizewell outfall and rigs area, generally 1-10 cormorants were recorded from each VP, foraging in the waters usually within 1km of the shoreline. Birds were seen foraging in the inshore waters throughout much of the study area, with favoured areas being at Orford Ness (VPs 11-12). Large numbers of cormorants were seen feeding on the sea at Orford Ness

within 500m of the shoreline from November to February, although there was a count of 42 birds there on 20 May. During the winter, groups of cormorants were seen resting on the lagoon adjacent to VP12 and commuting between there and the adjacent sea where they were feeding. A total of 140 birds were seen on the lagoon on the 15 December and 20-30 birds were seen foraging on the sea nearby on most dates in the winter.

Kittiwake

Kittiwakes were recorded in the study area throughout much of the survey period but primarily during spring and summer. Nesting birds were present at the Sizewell Rigs at the start of the VP surveys on 24 March 2011, and remained there until early September. Without undertaking a survey from a boat it was not possible to accurately assess the number of pairs of kittiwake breeding on the rigs. Birds breed on the upper ledges that surround the rigs on all four sides (three of the four sides are visible from the shoreline), but also on ledges underneath the platforms. Photographic evidence provided in 2011 by Steve Parish (AMEC employee) suggests that a substantial number of kittiwakes nest under the platforms. Birds nesting on the seaward (eastern) ledge of the rigs and those nesting under the platforms are not visible from the beach. Counts undertaken from VPs 2 and 3 between March and July 2011 indicate that approximately 120 pairs were nesting on the upper ledges of each rig (240 pairs in total). This estimate includes birds on the ledges not visible from the shoreline and assumes that a similar number of birds are present here to that on the visible ledges. In addition, an unknown number of nests were located underneath the platforms, suggesting a minimum total of some 300 pairs.

The first kittiwake chicks were seen on the rigs on 16 June and by 21 June at least 250 chicks may have been present. The number of kittiwakes on the rigs began to decline during August as the juveniles fledged and departed the area, with 152 birds counted on 17 August, 94 on 24 August, 41 on 31 August, 6 on 9 September and none thereafter.

Very little foraging activity was observed within the study area during the breeding season, with only occasional adult and juvenile birds seen feeding with terns and other gulls at the outfall. However, there was an almost continual movement of kittiwakes flying from the rigs out to sea, generally in a south-east direction, but also north-east. Very few kittiwakes were noted offshore during colony counts undertaken from Dingle. During the VP surveys, kittiwakes were seen moving distantly offshore from VPs 5-8 (Thorpeness to Aldeburgh) but none were noted further south offshore from VPs 9-12 (Slaughden to Orford Ness).

The occurrence of kittiwakes in the study area outside the breeding season was much more sporadic (from September to February), although birds were seen in fairly large numbers on a number of occasions during periods of stormy weather. During rough weather occasional birds were seen resting on the rigs and feeding around the outfall. Notable records included a group of 100 kittiwakes foraging 4-7km offshore from VP12 on 15 December, 191 birds commuting past VPs 9-12 on 8 December and 129 from VPs 1-6 and 18 foraging at the outfall on 3 January. Kittiwakes began to return to the rigs to nest in early March 2012 and by 27 March an estimated 330 birds were present.

Little Gull

Little gulls were recorded during the VP surveys from 2 June to 8 December 2011. The first record involved two birds foraging offshore of Slaughden beach (VP10) on 2 June. An adult was then seen at the Sizewell B outfall on 6 July, after which numbers increased rapidly to 15 birds there on 15 July and 20 on 20 July. Numbers continued to increase at the outfall into

August, with a peak count of 72 birds recorded on 17 August. Also on 17 August, 44 birds were seen loafing on the sea at Thorpeness (VP5) and there was a steady flow of little gulls flying between there and the outfall, with rafts of birds resting on the sea between VPs 5 and 2. Up to 29 little gulls were also seen resting on the sea from VP4 on 17 August, and the total number of birds present in the VP1-5 area (between Sizewell and Thorpeness) was in the region of 100-140. A count of 72 birds was again recorded at the outfall on 31 August after which numbers declined rapidly to only 1-3 birds in early September when the outfall was not in operation. Much of the little gull activity was centred at the outfall, with birds picking food from the waters' surface and then resting in rafts of up to 20 birds primarily between the outfall and rigs. Elsewhere, a juvenile was seen loafing on the lagoon adjacent to VP12 on 24 August and two birds were foraging along the coastline off VP7 on 31 August. A similar number of little gulls were reported at Sizewell outfall by *Birdguides*, with birds being reported there from 6 July to 9 September, including 79 on 30 July 2011, and 150 flying south during a 2-hour watch on 31 July.

During late autumn and winter, little gulls were recorded during the VP surveys on three survey dates, with one bird commuting past VP11 on 7 November followed by a group of 16 past VP6 on the following day, all heading north. The last records of the survey period were of single birds flying north past VP9 and VP11 on 8 December. **Figure 3.4** shows the peak number of foraging and loafing little gulls recorded in each 1km grid square during the AMEC surveys.

Mediterranean Gull

During the 2011 breeding season, Mediterranean gulls were recorded on two (out of 29) VP survey dates and on an additional five dates (out of 29) during the little tern colony surveys, from 11 April to 20 July. Birds were seen flying along the coastline between Minsmere (where breeding was being attempted) and the Sizewell B outfall. Mediterranean gulls were also seen foraging around the outfall on four dates, with two birds there on 23 May, up to five different individuals on 24 May, one on 21 June and two on 15 July. From August 2011 to the end of the survey period in April 2012, Mediterranean gulls were recorded on seven (out of 41) dates during the VP surveys, involving 1-2 individuals commuting past VPs 1, 5, 9 and 10.

Other gull species

Flocks of up to 200 large gulls were occasionally seen following fishing boats, usually 2-4km offshore between Sizewell and Aldeburgh. The Sizewell B outfall attracted flocks of juvenile herring and lesser black-backed gull, which rested on the sea surrounding the outfall structure, and adult and juvenile birds were also seen resting on the nearby rigs. Numbers at the outfall were generally small during the breeding season, with 10-30 herring gulls and 1-5 lesser black-backed gulls usually present, although larger numbers were sometimes recorded, including 135 herring gull there on 24 March and 75 on 8 June. A peak count of 15 lesser black-backed gulls were counted on and around the rigs on 24 March and up to eight great black-backed gulls were recorded on the rigs and Sizewell A and B outfall structures in March-April 2011. Elsewhere within the study area, congregations of up to 100 lesser black-backed gulls were seen on the beach along Orford Ness between VPs 10 and 12, although there, very little foraging activity was observed on or over the adjacent sea. On Aldeburgh beach, a mixed flock of some 50-100 large gulls (herring, lesser black-backed and great black-backed) was present during the breeding season around the fishing boats on the shingle.

During May and June, there was an almost continual movement of black-headed gulls flying between the Sizewell outfall, where they were feeding and Minsmere scrapes, where large

numbers were nesting. The peak count of black-headed gulls at the outfall was 500 birds on 8 June, although these numbers were exceptional, with generally 30-100 birds present.

Numbers of large gulls increased after the breeding season, with congregations of mainly herring and great black-backed gulls present at Sizewell (on the beach and around the outfall) and on the beach at Aldeburgh. In contrast, numbers of lesser black-backed gull declined from November and very few were seen (usually 1-10 birds) from then until the following March. Large numbers of herring gulls were recorded foraging around the outfall, resting on the rigs and adjacent beach from November to early April, including 320 there on 7 March 2012 and 300 on 2 April 2012. Great black-backed gulls were also numerous around the outfall during the winter, with 80 recorded there and on the adjacent beach on 19 December 2011 and 70 on 7 March 2012. Both species also foraged in large numbers behind the incoming fishing boats between Sizewell and Aldeburgh.

Small numbers of common gull and black-headed gulls were seen foraging at the outfall during winter and included peak counts of 69 black-headed gulls there on 19 December and 60 common gulls on 3 January although numbers were usually less, with 5-20 birds of each species usually present. Much larger numbers of these species were seen resting on the sea (primarily during the late afternoon), within 500m of the shoreline between VPs 4 and 8, particularly offshore of North Warren (VPs 7 and 8). Here, 2000 common gulls were recorded on 20 January and 1000 black-headed gulls on 20 December, and there were 200 common and 100 black-headed gulls offshore of VP9 on 25 January.

Little Tern

The first little tern was recorded on Minsmere scrape on 21 April and the last at the Sizewell B outfall on 3 August (records from all AMEC bird survey work undertaken in the area in 2011). During the VP surveys, little terns were recorded in the study area from 10 May to 24 June 2011, with much of the foraging activity being close offshore (within 300m of the beach) at Sizewell (VPs 1-4) during May. Up to 16 birds were recorded foraging from VPs1-4 on May 10, 18 and 19, although no foraging activity was recorded during the six hour watches undertaken from VP2 and VP3 on May 23 and 24 respectively. Little terns were primarily seen moving up and down the shoreline, diving for small fish in the shallows. Foraging around the outfall was rarely observed although a group of 15 birds was seen there with common terns and gulls on 19 May. Foraging little terns were not recorded from VPs1-4 thereafter.

No foraging activity was recorded between VPs 6 and 9 (Thorpness to Aldeburgh), although four little terns were seen commuting past the area on 9 June. There was a concentrated period of activity at nearby Slaughden beach (VP10) from May 20 to 15 June. On 20 May, a group of 18 little terns were observed resting on Slaughden beach by VP10 after which up to 22 birds were present in the area until the last were seen on 15 June (details of the attempt to start a colony at Slaughden are provided in Section 3.2.2). During this period, little terns were often seen foraging over the spit (which is exposed at very low tides) that extends from VP10 to VP11, 500-1000m offshore. Little terns were not seen foraging over the spit in July. At Orford Ness (VPs 11-12), 2-4 little terns were seen foraging offshore on two dates (20 May and 24 June) and two birds were also seen resting on the lagoon near Orford Ness Lighthouse (VP12) also on 24 June.

Figures 3.5a-c show the little tern flight lines and any areas of concentrated foraging activity within the study area (split into three stretches covering VPs 1-4, VPs 5-8 and VPs 9-12 respectively).

Common Tern

Common terns were recorded in the Sizewell/Minsmere area during the 2011 AMEC bird surveys from 20 April until 21 October 2011, with returning birds seen on 23 April 2012. The largest numbers of foraging birds, when many juveniles were also present, were recorded from July to September. Large numbers of common terns were seen foraging offshore from Minsmere south to Orford Ness, including within much of the study area (VPs 1-12). Much of the foraging activity was close inshore with 47% of foraging common terns seen within 100m of the shoreline and 79% within 500m. Very few (only 4%) were seen foraging more than 1km offshore. Common terns were regularly seen commuting up and down the coast, often 2-3km from the shoreline, again with peak numbers recorded from July to September.

Large numbers of common tern were seen foraging around the Sizewell B outfall, although numbers did not peak until August, when many juveniles were present. However, during June and July there was an almost continual movement of common terns (often carrying fish) between the outfall and the breeding colony at Minsmere (150 bird passes per hour were recorded from VP2 on July 15). In August, a large mixed group of adult and juvenile birds was seen feeding around the outfall, picking up fish from the surface and then resting on the nearby beach (a peak count of 230 birds was recorded there on 12 August). The outfall was not operational throughout September and so very few common terns were seen from VPs1-4 during this period, although good numbers were seen elsewhere within the study area.

From VPs 5-7, congregations of common tern were seen foraging over the area of shallow water off Thorpeness, primarily from July to September, with a peak count of 42 birds recorded there on 17 August. At Aldeburgh (VPs 8-9), up to 16 birds were recorded foraging offshore, mostly from June to August. From VP10 and VP11, large numbers of common tern were seen foraging over the shallow water spit, 500-100m offshore, primarily during July and August, with a peak count of 45 birds present on 24 August. At Orford Ness (VP12), up to 14 common terns were recorded foraging offshore, with birds also seen commuting between there and the adjacent lagoon, where a peak count of 50 birds was noted on 29 July.

Figures 3.6a-c show the common tern flight lines (of foraging birds) and any areas of concentrated foraging activity within the study area (split into three stretches covering VPs 1-4, VPs 5-8 and VPs 9-12 respectively).

Sandwich Tern

Sandwich terns were recorded in the study area during the 2011 AMEC bird surveys from 11 April to 3 October 2011, with returning birds first noted on 13 April 2012. Small numbers of Sandwich terns were seen foraging offshore or commuting along the coastline, both close inshore and more than 1-2km from the shoreline. Peak numbers were recorded in July and August when up to 10 Sandwich terns were counted at any one time, although usually only 1-2 birds were recorded together. In common with little tern, the Sizewell B outfall did not attract any large congregations of Sandwich tern, with 1-2 birds occasionally stopping briefly to feed in the area before moving on. The most favoured feeding areas were over the shallow waters offshore of Thorpeness and between Slaughden beach and Orford Ness where up to 10-11 birds were occasionally noted. These birds were also seen resting on nearby lagoons adjacent to the Orford Ness lighthouse and Slaughden beach where peak counts of 12 birds (on 12 August) and 10 birds (on 8 August) were recorded respectively.

Figures 3.7a-c shows the Sandwich tern flight lines (of foraging birds) and any areas of concentrated foraging activity within the study area (split into three stretches covering VPs1-4, VPs5-8 and VPs9-12 respectively).

Black Tern

Black terns were recorded during the 2011 AMEC bird surveys on seven survey dates (including on four out of 70 VP survey dates and three out of 29 colony survey dates) from 20 July to 31 August 2011. Much of the activity was recorded at the Sizewell B outfall from VPs 2 and 3. Black terns were seen foraging around the outfall and then resting on the sea or nearby beach with common terns. The first black terns were recorded at the outfall on 20 July (2 birds), followed by counts of one bird on 4 August, four on 12 August, a peak of 31 birds on 24 August, then six on 26 August and five on 31 August. Elsewhere, four birds were seen foraging with common terns over the shallow water spit from VP10 on 24 August, and a single bird was on the beach with little terns at Dingle on 22 July. *Birdguides* also reported numerous records of up to 25 black terns at the Sizewell outfall from 9 July to 4 September.

Arctic Tern

Arctic terns were recorded during the 2011 AMEC bird surveys on four survey dates, from 4 to 26 August. The first record (and peak count) was of nine birds (six adults and three juveniles) feeding at Sizewell B outfall on 4 August, and these were followed by three juveniles on the 12th and 17th and two juveniles on 26 August. *Birdguides* also reported several records of 1-4 Arctic terns at the Sizewell outfall from 8 August to 1 September.

Roseate Tern

During the little tern colony surveys, a single first-year bird was seen resting on the beach at Dingle on 18 July. None were recorded in the study area although there were several reports from the *Birdguides* website of 1-2 birds on the Minsmere scrape from 29 May to 14 July, and one record from Sizewell outfall on 13 July.

Other Bird Species

Small numbers of other seabird and wildfowl species were recorded during the VP surveys undertaken between 24 March 2011 and 25 April 2012. Most records were of birds commuting along the sea both in a northerly and southerly direction.

Seabirds

One of the most frequently recorded seabird species was gannet, for which a total of 840 birds were counted on 39 survey dates, throughout much of the year. The only record of gannet feeding, was a single bird at Sizewell B outfall on 2 January, with the remaining birds seen commuting through the study area, usually at least 1km from the shoreline. There were occasional records of 1-2 fulmar commuting through the study area (a total of 14 birds on 7 dates), a Manx shearwater was seen flying south past VP12 on 7 November and 1-2 black-throated diver were recorded on the sea (and flying past) on 1 December and 20 February. Three species of skua were recorded commuting through the study area (and attacking terns and gulls), with Arctic skua being the most numerous (a total of 31 birds on 12 dates, primarily during September and October), followed by great skua (a total of 18 birds on 6 dates, primarily in October and November) and pomarine skua (a total of 7 birds on 4 dates, primarily in November and December). Small numbers of auks were seen commuting through the study area, with a total of 82 guillemots and razorbills recorded, primarily from October to December.

A single little auk was seen commuting south through the study area 200m from the shoreline on 7 November.

Waterfowl (ducks, geese and swans)

Very few waterfowl species were recorded foraging or resting on the inshore waters within the study area. Most of the records were of birds commuting (both north and south) through the area. Brent geese were frequently seen migrating, mostly south through the study area, from late September to early November, with a total of 730 birds counted, including a peak count of 255 birds on 7 November. Wigeon and teal were also frequently recorded flying past (primarily from October to February), with occasional records of flocks of birds resting on the sea, including 300 teal and 25 wigeon from VP9 on 25 January and 100 teal and 150 wigeon from VPs1-4 on 3 October. Smaller numbers (generally 1-10 birds) of mallard, shelduck, pintail, shoveler and gadwall were also seen commuting throughout the study area throughout much of the year.

Of those duck species that are more closely associated with marine habitats, 1-3 red-breasted merganser and 1-2 goldeneye were seen commuting through the study area on two and seven survey dates respectively during winter. Eider were also recorded (a total of 41 birds on 10 dates) including eight birds resting on the sea from VP9 on 7 March. Common scoter were the most frequently recorded 'sea duck' with a total of 495 birds seen on 35 dates, throughout much of the year. Scoters were occasionally seen resting on the sea, including a peak count of 32 from VP6 on 23 November.

Great crested grebe

A total of 416 great crested grebes were counted on 25 dates during the VP surveys, with birds recorded on all but one survey date from 23 November 2011 to 23 April 2012. Pairs of birds and small groups of usually 1-5 grebes were seen foraging on the sea (often close inshore) throughout much of the study area, with a peak count of 90 birds counted in VPs 1-7 on 20 February.

Waders

Small numbers of waders were occasionally seen commuting through the study area, moving between more suitable foraging and roosting areas further afield, such as the Blyth Estuary (11km to the north) and Alde/Ore Estuaries (adjacent and to the south of the study area).

A total of 16 species of wader were recorded during the VP surveys, the most frequently seen being turnstone, for which a total of 100 birds were noted on 19 dates. Small numbers (usually no more than ten birds) of curlew, dunlin, ringed plover, avocet and oystercatcher were also seen commuting through the study area on a reasonably regular basis (each species was recorded on between 11 and 16 survey dates during the survey period).

Very few waders were seen foraging along the shoreline in the study area, although birds were seen nearby on the River Alde (inland from VPs 9-10) and on the lagoon adjacent to VP12. The most notable record was of a grey phalarope foraging on the sea, 600-800m offshore from VP8 on 22 September. A mixed flock of 25 dunlin, 30 ringed plover and a turnstone were seen resting on the beach at VP10 on 20 May and there were 1-2 ringed plovers seen either resting or displaying on the beach at various locations on five further survey dates. Turnstones were regularly recorded feeding on the beach at VP9 where 19 birds were counted on 25 November.

3.3.2 Little Tern Colony Surveys

Colony surveys were undertaken at three sites where little terns attempted to breed in 2011: two within the Minsmere-Walberswick SPA (referred to in this report as Dingle and Minsmere) and one within the Alde-Ore Estuary SPA at Slaughden beach. The Minsmere, Dingle and Slaughden colonies are located approximately 3km north, 9km north and 10km south of Sizewell B outfall respectively. A summary of little tern activity recorded at each site during each visit is provided in **Table 3.2**. **Figures 3.8a-d** shows the flight lines of foraging and commuting little terns, and areas of concentrated foraging activity from Dingle, Minsmere, Slaughden and VPs2-3 respectively.

Table 3.2 Summary of Little Tern Activity at each Colony

Location	Date	Summary of little tern activity
Dingle	17-May-11	At least 7 little terns recorded, mainly commuting past colony. Some display noted.
Dingle	18-May-11	1-6 birds flying along shore, 2 stopping to display, but very little foraging offshore
Dingle	20-May-11	Up to 9 birds recorded, of which 7 were around/in the colony. Displaying and mating observed.
Dingle	03-Jun-11	Up to 90 birds around colony, then foraging well offshore (800-100m +) due to rough seas and strong winds
Dingle	09-Jun-11	Up to 110 birds present, with peak counts of 80 loafing on beach and 40-50 foraging offshore
Dingle	10-Jun-11	Continual activity at colony, with at least 17 birds bringing fish to colony
Dingle	10-Jun-11	Up to 30 birds present, loafing on shoreline
Dingle	13-Jun-11	Up to 50 birds present, with 20 nesting in colony (17 Walberswick, 3 Dingle)
Dingle	16-Jun-11	Peak count 84 birds, including 66 loafing on beach. 27 birds were in the colony, including at least 12 incubating. Plenty of foraging within 300m offshore, but little further offshore.
Dingle	24-Jun-11	Up to 80 birds present, with 60 loafing on the beach and much foraging activity close offshore (with plenty of fish being caught). Up to 26 birds incubating (20 Walberswick, 6 Dingle) but many birds had not settled to nest. The data suggests a total of 40 pairs of which 26 pairs were attempting to breed.
Dingle	29-Jun-11	Up to 28 birds present. The first chick was seen (1-2 days old), plus other birds incubating and displaying.
Dingle	06-Jul-11	30 birds present around colony including 3 pairs with young, 8 pairs on eggs and 8-10 unsettled birds
Dingle	07-Jul-11	Up to 25 birds in colony, but little foraging activity. At least 5 chicks present, and still plenty of incubating activity.
Dingle	14-Jul-11	44 birds present, including 32 loafing on beach, 5 on nests and 4-6 pairs with young.
Dingle	19-Jul-11	Up to 82 birds around colony, including 8 fledged young and 6 chicks. Plenty of foraging well offshore, up to 1km.
Dingle	22-Jul-11	Major influx of birds, with up to 180 present, including 150 on beach of which 10 were juveniles. Large numbers of common terns foraging 2-3km offshore, which may have included little tern also. 6 young still in colony.
Dingle	27-Jul-11	65 birds loafing on beach including at least 7 fledged young. Later, at least 30 birds foraging well offshore (1500m).

Location	Date	Summary of little tern activity
Dingle	01-Aug-11	Up to 22 birds flying around colony, but very little foraging offshore. A group of 4 chicks still in colony.
Dingle	12-Aug-11	No little tern recorded
Minsmere	11-May-11	Up to 36 birds present, with birds loafing on Minsmere South Scrape and foraging close offshore
Minsmere	18-May-11	Up to 23 birds present, loafing on South Scrape and beach and foraging close offshore. Fish being caught and presented to mates.
Minsmere	19-May-11	Up to 79 birds present, mainly on scrape, but also 34 seen on beach and adjacent colony area. Plenty of foraging offshore, and birds seen flying towards Dunwich.
Minsmere	23-May-11	Up to 4 birds recorded, foraging offshore in strong winds and occasionally resting on scrapes. No display noted.
Minsmere	08-Jun-11	4 birds on scrape, but no breeding activity
Minsmere	16-Jun-11	Up to 5 birds foraging offshore, but no breeding activity
Minsmere	23-Jun-11	No birds on the scrape, but up to 11 regularly foraging close offshore from Minsmere beach
Minsmere	29-Jun-11	No breeding activity, 1 bird on scrape, 4 commuting north
Minsmere	12-Jul-11	No breeding activity, 2 birds flew over beach and 1 was resting on the beach
Minsmere	27-Jul-11	1 bird flying north. No gulls and common terns on scrape (all departed)
Minsmere	01-Aug-11	No little tern recorded
Slaughden	02-Jun-11	Up to 12 birds foraging offshore and loafing around colony. Colony appeared to be extended along a long stretch of the beach.
Slaughden	10-Jun-11	22 birds present at colony and foraging close offshore
Slaughden	15-Jun-11	Up to 6 birds present, presenting fish and mating on beach. One possible nest on the beach where a female was being fed.
Slaughden	23-Jun-11	No birds present, colony abandoned
VP2	23-May-11	1-2 birds flying past VP on several occasions, no foraging offshore
VP2	15-Jun-11	No little tern recorded
VP2	20-Jul-11	No little tern recorded
VP2	12-Aug-11	No little tern recorded

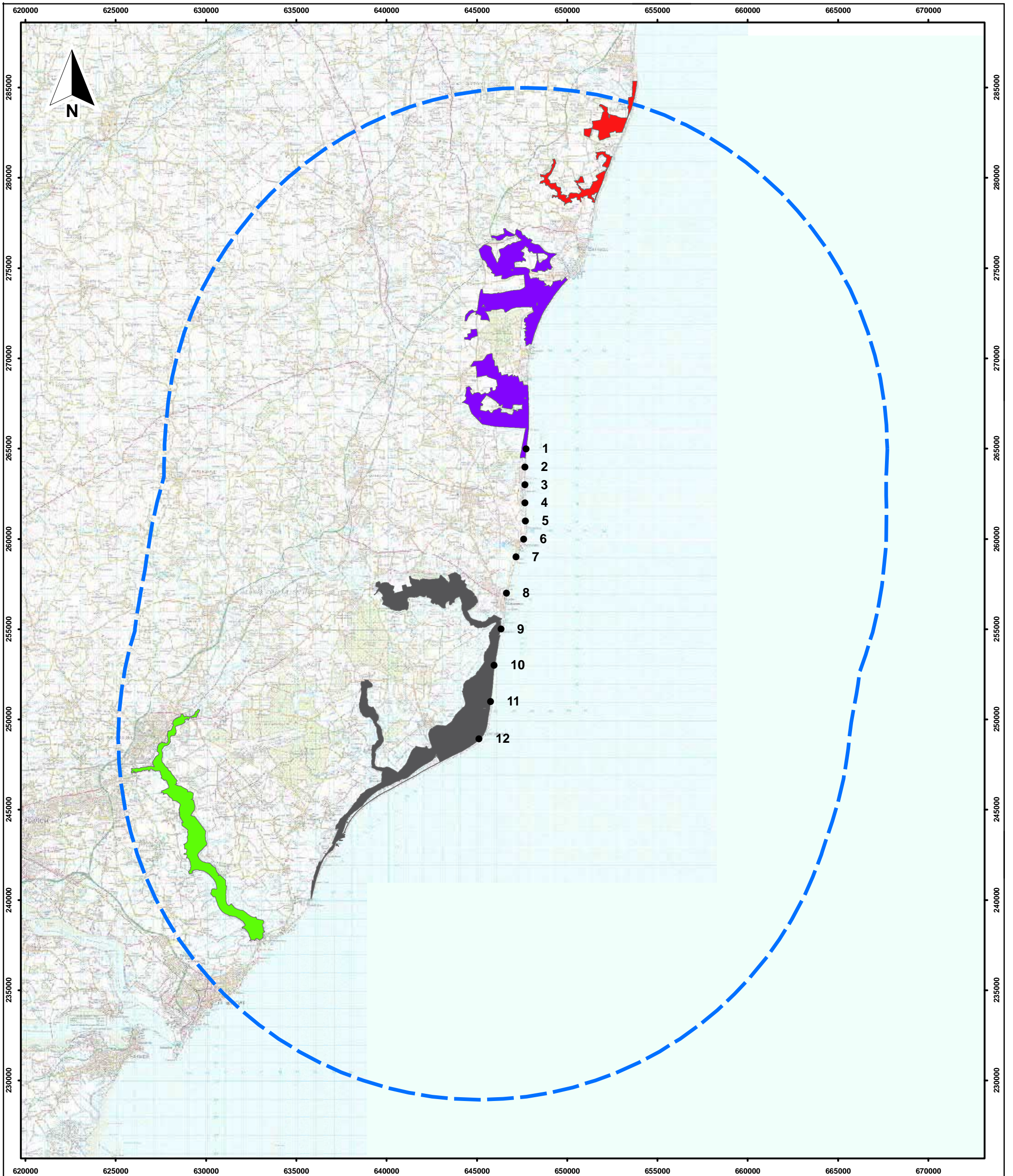
Location	Date	Summary of little tern activity
VP3	24-May-11	2 birds flying by outfall, no foraging offshore
VP3	23-Jun-11	No little tern recorded
VP3	15-Jul-11	No little tern recorded

Details presented in Table 3.2 show that little terns initially started to prospect for nest sites at Minsmere (little terns were first recorded there on 11 May) after which this area was abandoned in favour of Dingle. During May, there was plenty of foraging activity at Minsmere, generally close inshore and within 500m of the beach, and display was noted, with groups of birds alternating between resting on the Minsmere scrapes and foraging offshore. On 19 May, 79 little terns were seen on the South Scrape at Minsmere after which numbers fell quickly and only small groups of up to 11 birds were seen foraging offshore during June and July.

In the last week of May, National Trust wardens at Orford Ness reported that little terns were attempting to establish a colony on Slaughden beach. Up to 22 birds were present in the area between June 2 and 15, with at least one pair attempting to breed. The colony was however abandoned soon after, with no little terns recorded there on June 23.

At Dingle, up to 110 little terns were present on 3 June and between then and 19 July large numbers were seen in and around the colony. A breeding colony was established at Dingle during June within the fenced-off area on the beach either side of the boundary between the Dingle and Walberswick reserves (see blue hatched area shown in Figure 3.8a). The bulk of the activity was in the Walberswick section of the colony where successful breeding occurred. By late June, a total of c.40 pairs were present at the colony of which c.26 pairs were attempting to breed (3 pairs in the Dingle section and the remainder in the Walberswick section). Up to 80 little terns were at the Dingle colony throughout much of June and July, with groups of birds alternating between loafing on the beach and foraging close offshore. During June and July, there was a great deal of successful foraging activity at Dingle primarily involving little terns diving and catching small fish. Much of the foraging was close offshore (within 500m of the beach) although birds were occasionally seen flying further out to sea. The terns were regularly seen flying both north, and south towards Minsmere beach and the study area from the Dingle colony.

On 22 July, there was a major influx of up to 180 little terns at the Dingle colony. These birds did not stay long and were largely gone by 27 July, although large numbers of presumably resident breeding birds were still present on that date. Little terns were last seen at the Dingle colony on 1 August, when four well-grown young were still in the fenced off area.



- Key:**
- VP location
 - Minsmere-Walberswick SPA
 - Alde-Ore Estuary SPA
 - Deben Estuary SPA
 - Bencare to Easton Barents SPA

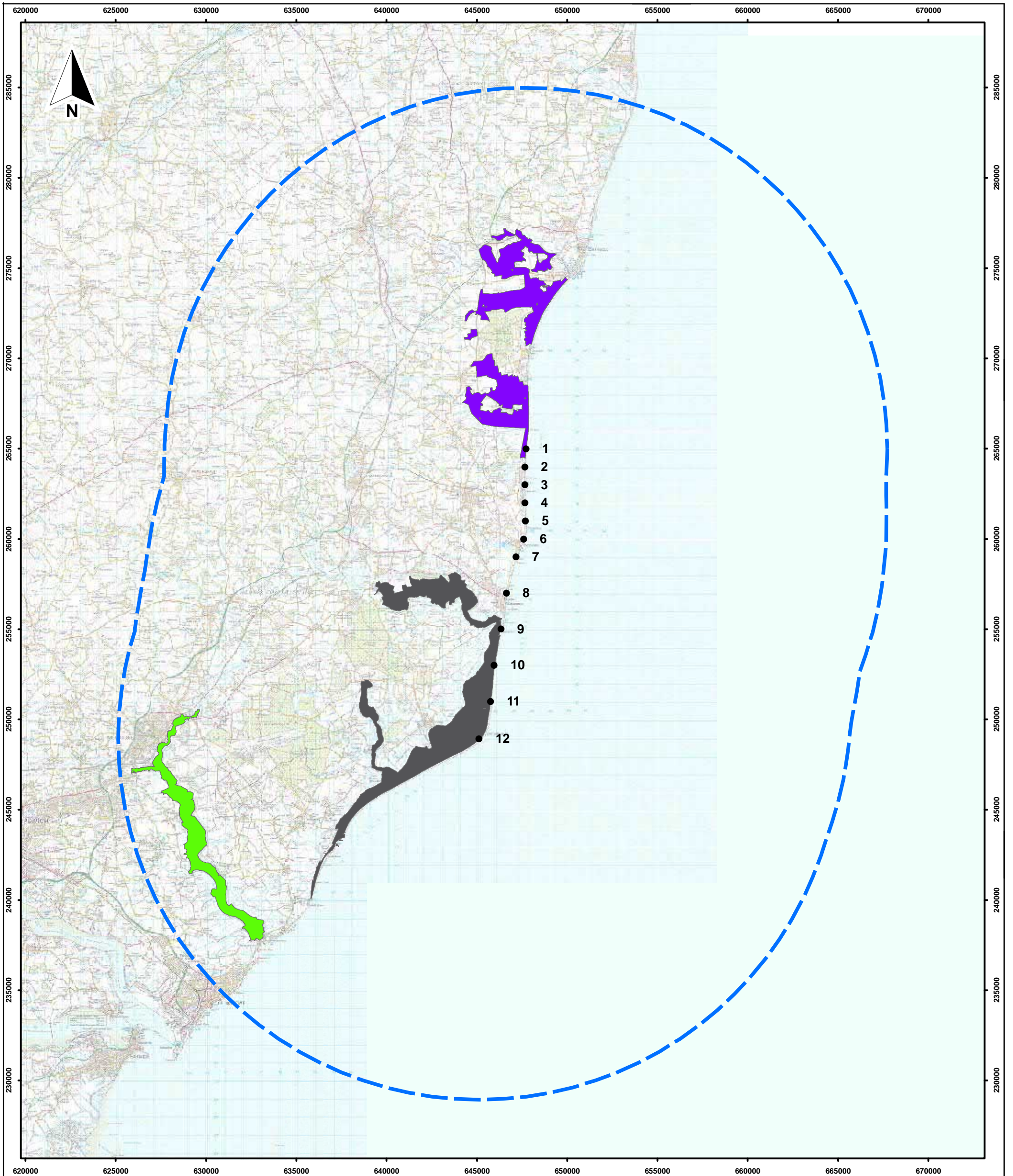


Sizewell Seabird Report 2011-12

Figure 3.1a
SPAs (designated in part for seabirds and wildfowl) within 20km of the Study Area

May 2012
 28130-A233a.mxd tugwc



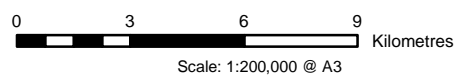


- Key:**
- VP location
 - Minsmere-Walberswick Ramsar site
 - Alde-Ore Estuary Ramsar site
 - Deben Estuary Ramsar site



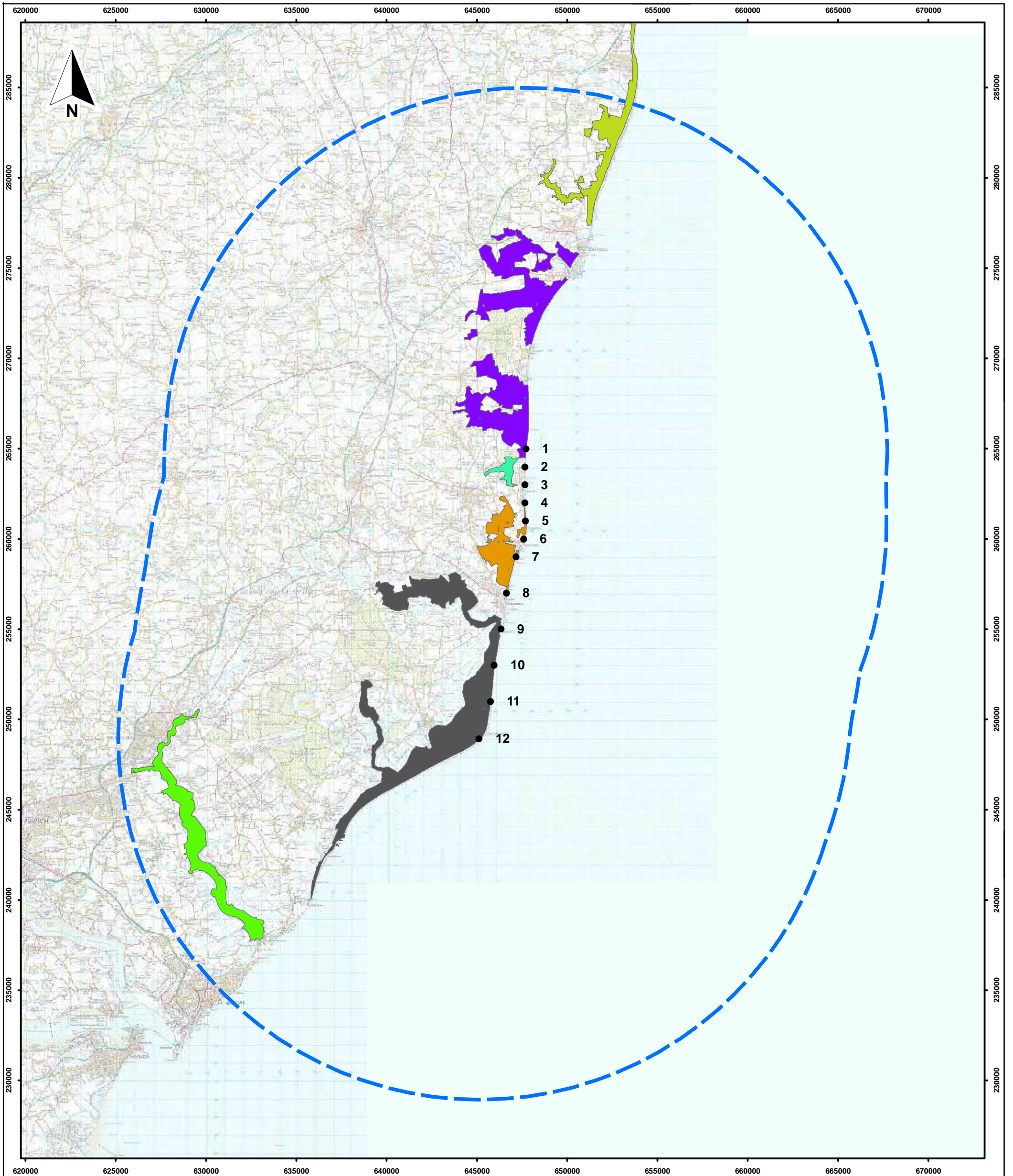
Sizewell Seabird Report 2011-12

Figure 3.1b
 Ramsar sites (designated in part for seabirds and wildfowl) within 20km of the Study Area



May 2012
 28130-A234a.mxd tugwc





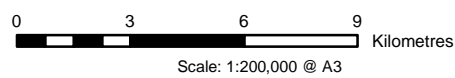
Key:

- VP location
- Minsmere-Walberswick Heaths & Marshes SSSI
- Leiston-Aldeburgh SSSI
- Alde-Ore Estuary SSSI
- Sizewell Marshes SSSI
- Pakefield to Easton Bavents SSSI
- Deben Estuary SSSI



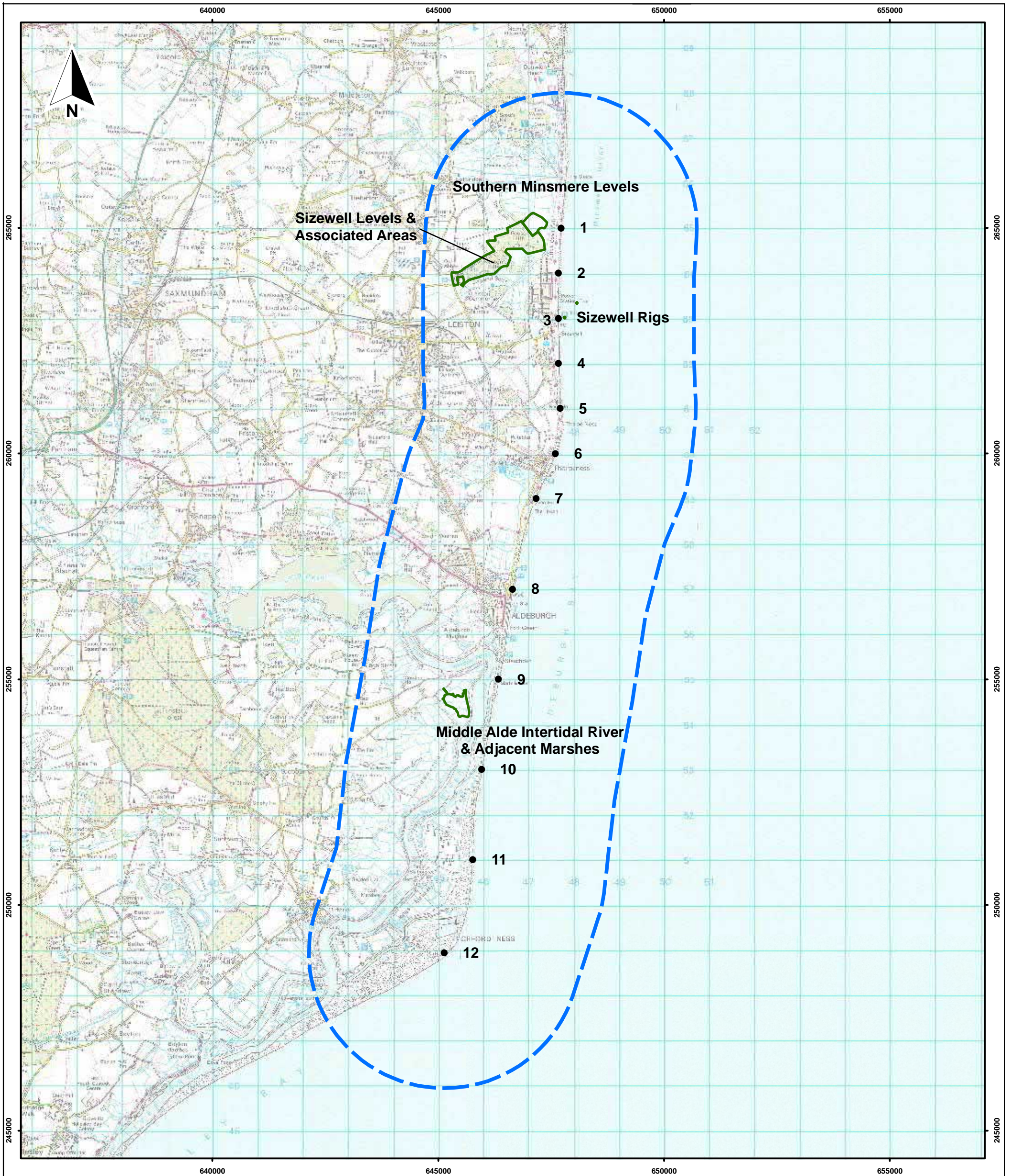
Sizewell Seabird Report 2011-12

Figure 3.1c
SSSIs (notified in part for seabirds and wildfowl) within 20km of the Study Area



May 2012
28130-A235a.mxd tugwc



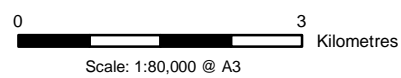


- Key:**
- VP location
 - ▭ County Wildlife Sites



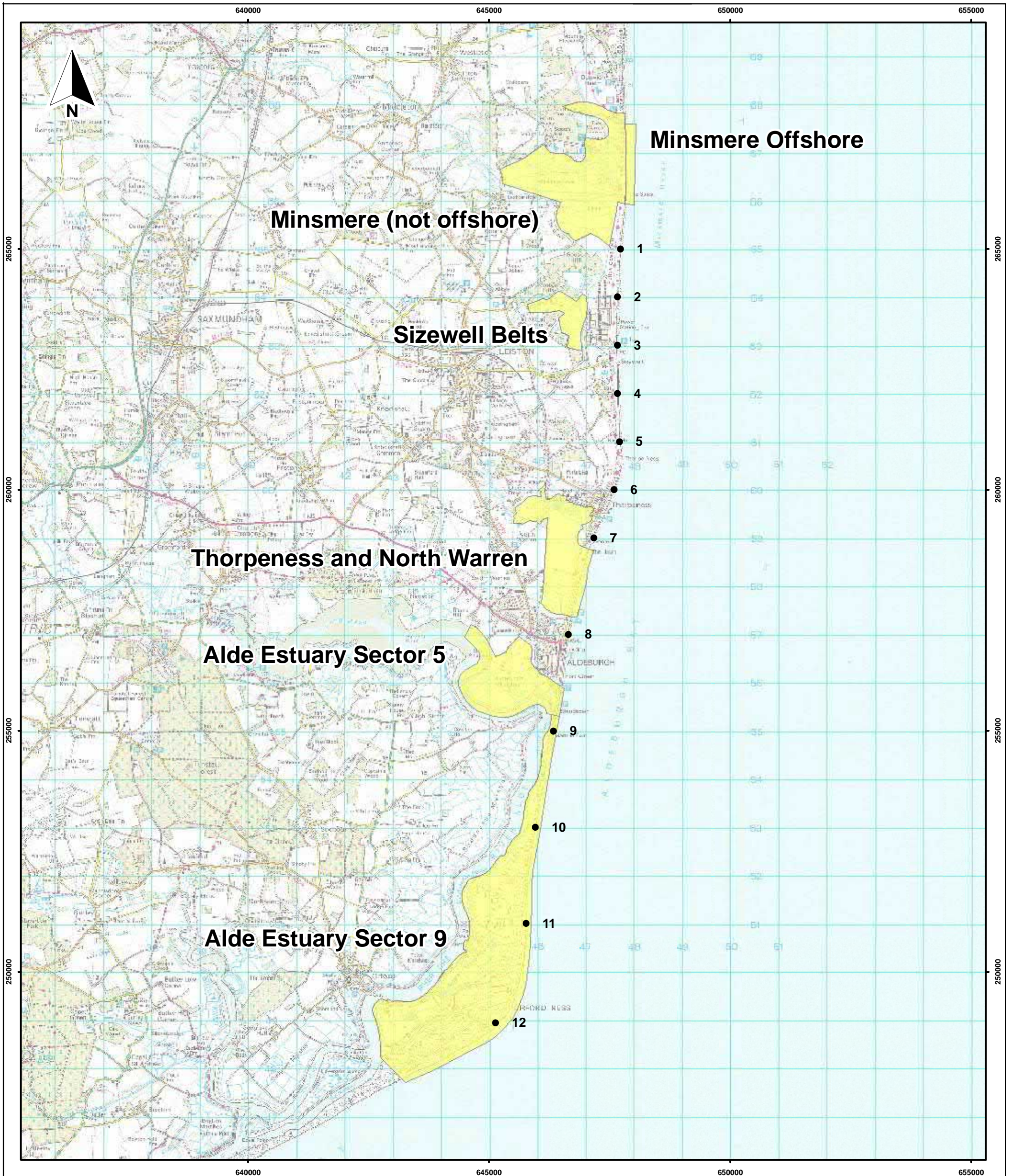
Sizewell Seabird Report 2011-12

Figure 3.1d
Non statutory sites (designated in part for seabirds and wildfowl) within 3km of the Study Area



May 2012
 28130-A411.mxd tugwc



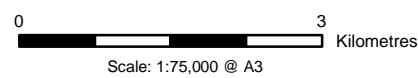


- Key:**
- VP location
 - WeBS Core Count Sector



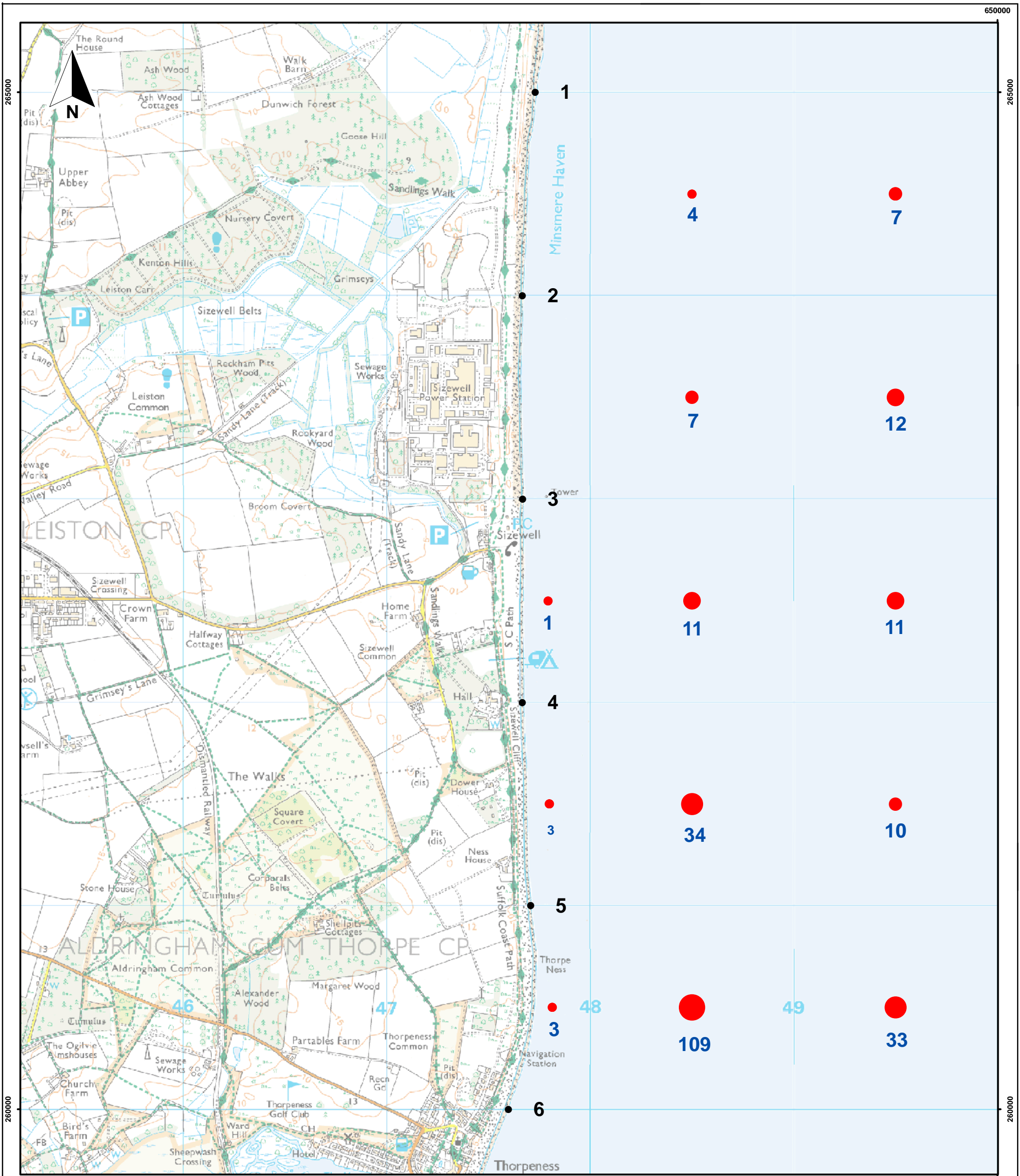
Sizewell Seabird Report 2011-12

Figure 3.2
WeBS Core Count Sectors within or adjacent to the Study Area



May 2012
28130-A236a.mxd tugwc





Key:

● VP location

1 Peak count of divers

Peak number of birds

- 1 - 5 birds
- 6 - 10 birds
- 11 - 20 birds
- 21 - 40 birds
- 40 + birds



Sizewell Seabird Report 2011-12

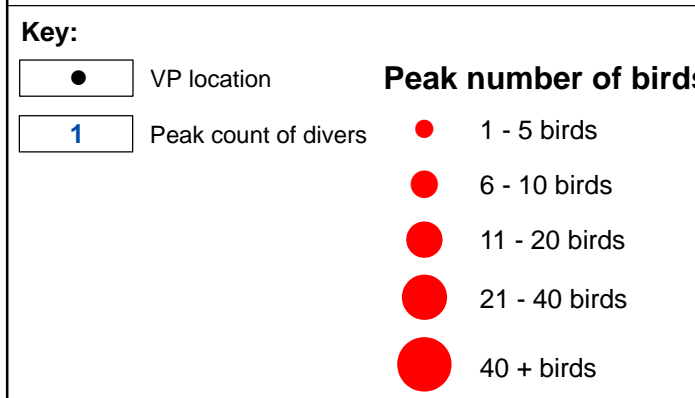
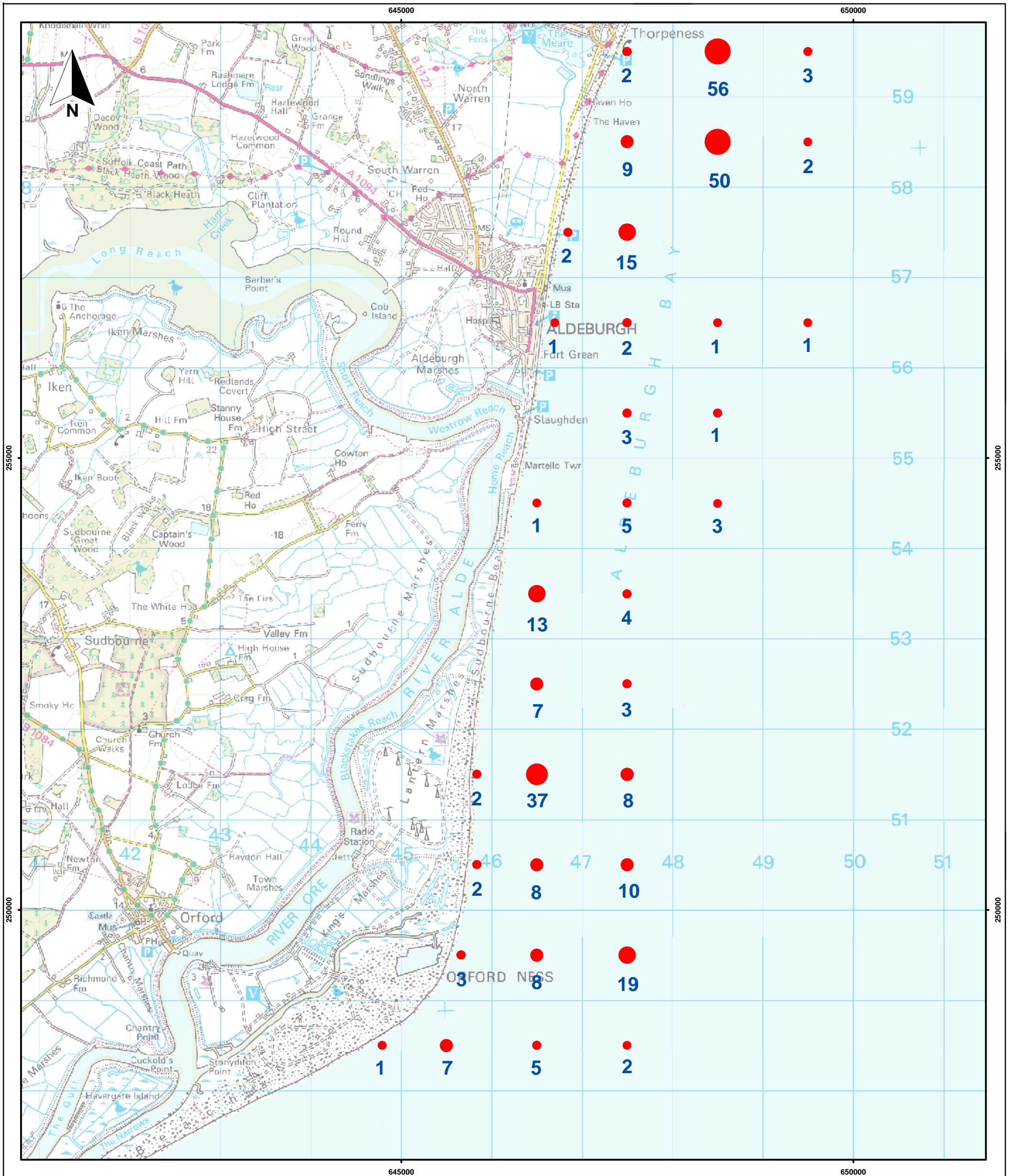
Figure 3.3a
Peak numbers of foraging and loafing Red-throated Divers in each 1km square, March 2011 to April 2012




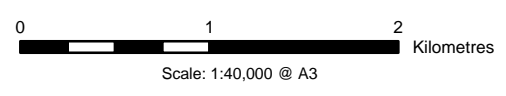
Scale: 1:18,000 @ A3

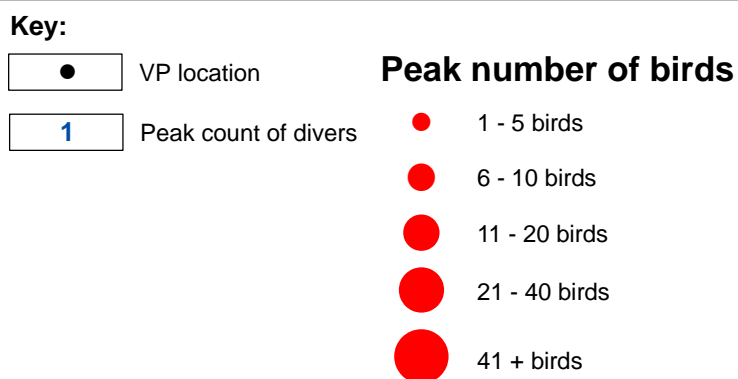
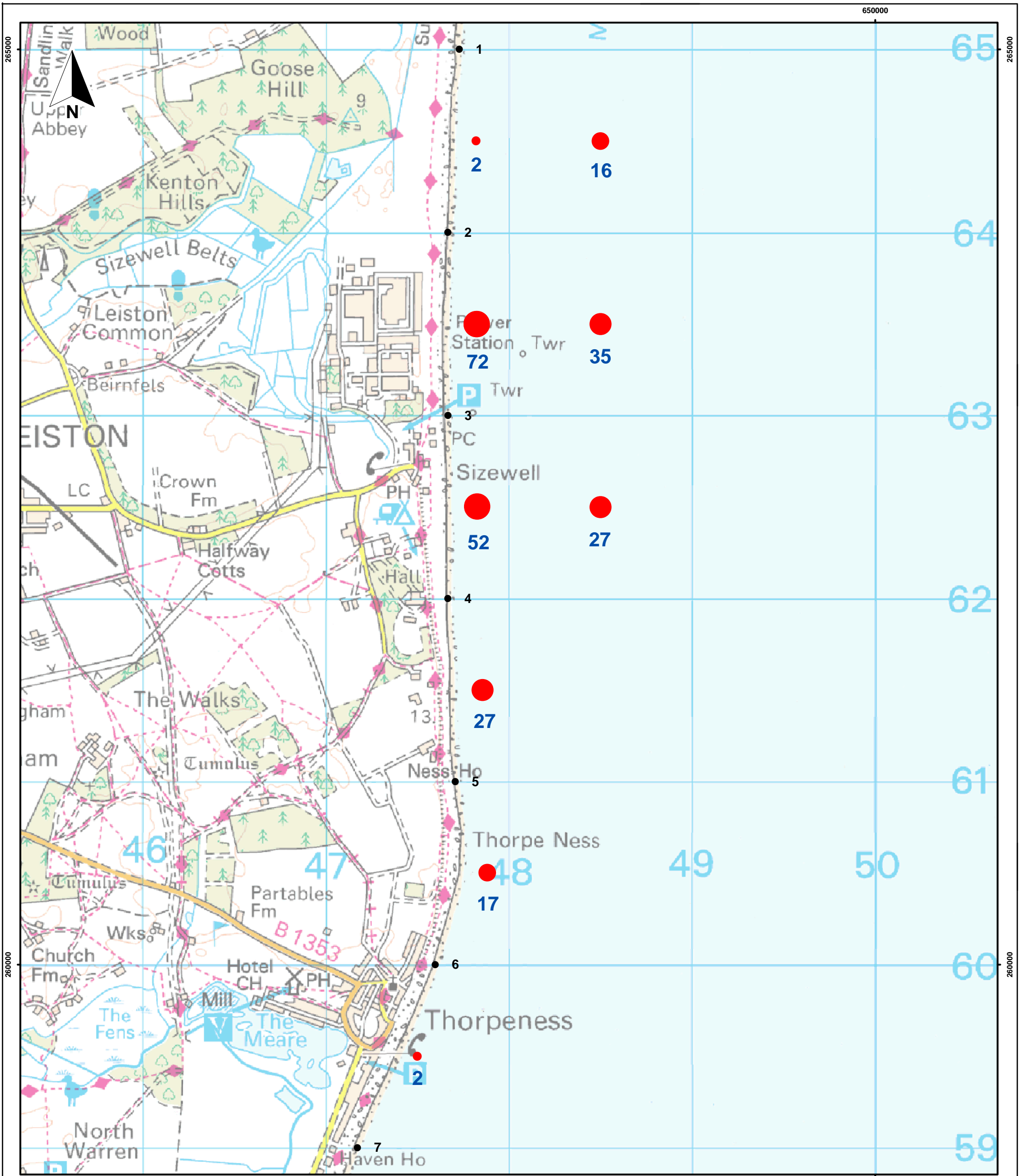
May 2012
28130-A237a.mxd tugwc





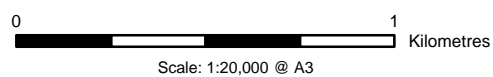

 Sizewell Seabird Report 2011-12
Figure 3.3b
Peak numbers of foraging and loafing Red-throated Divers in each 1km square, March 2011 to April 2012





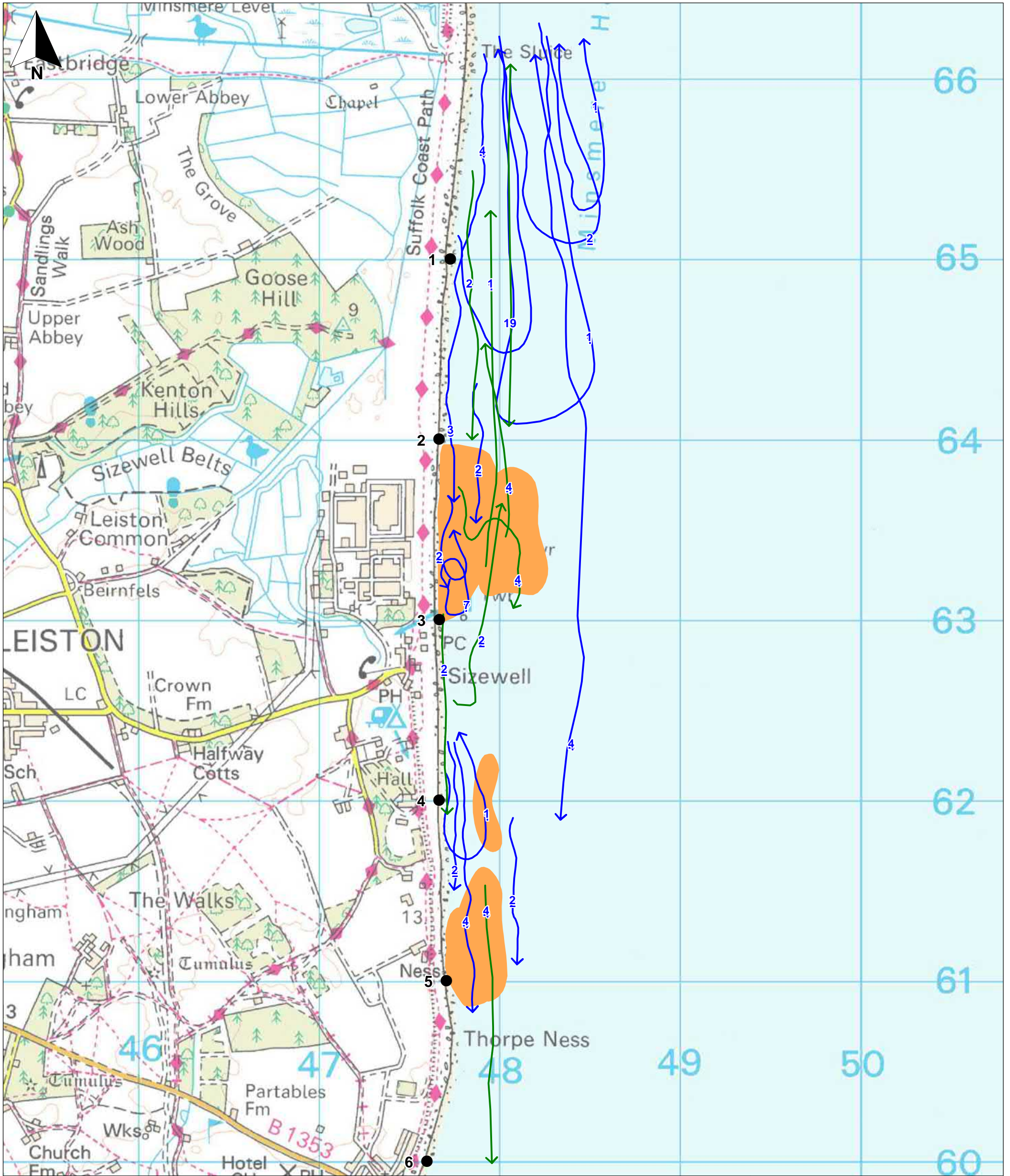
Sizewell Seabird Report 2011-12

Figure 3.4
Peak numbers of foraging and loafing Little Gulls in each 1km square, March 2011 to April 2012



May 2012
28130-A239a.mxd tugwc





- Key:**
- Flight lines of foraging birds
 - Flight lines of commuting birds
 - Areas of concentrated foraging activity
 - 1 ● Vantage point
 - 1 Number of birds along flight line



Sizewell Seabird Report 2011-12

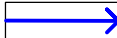
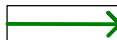

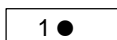

Figure 3.5a
VP Surveys:
Flight Lines and Foraging Areas of
Little Tern,
May to early August 2011

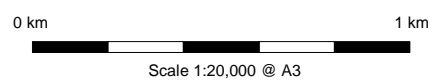
0 km 1 km
 Scale 1:20,000 @ A3

May 2012
 28130-A186b.wor tugwc





- Key:**
-  Flight lines of foraging birds
 -  Flight lines of commuting birds
 -  Areas of concentrated foraging activity
 -  Vantage point
 -  Number of birds along flight line

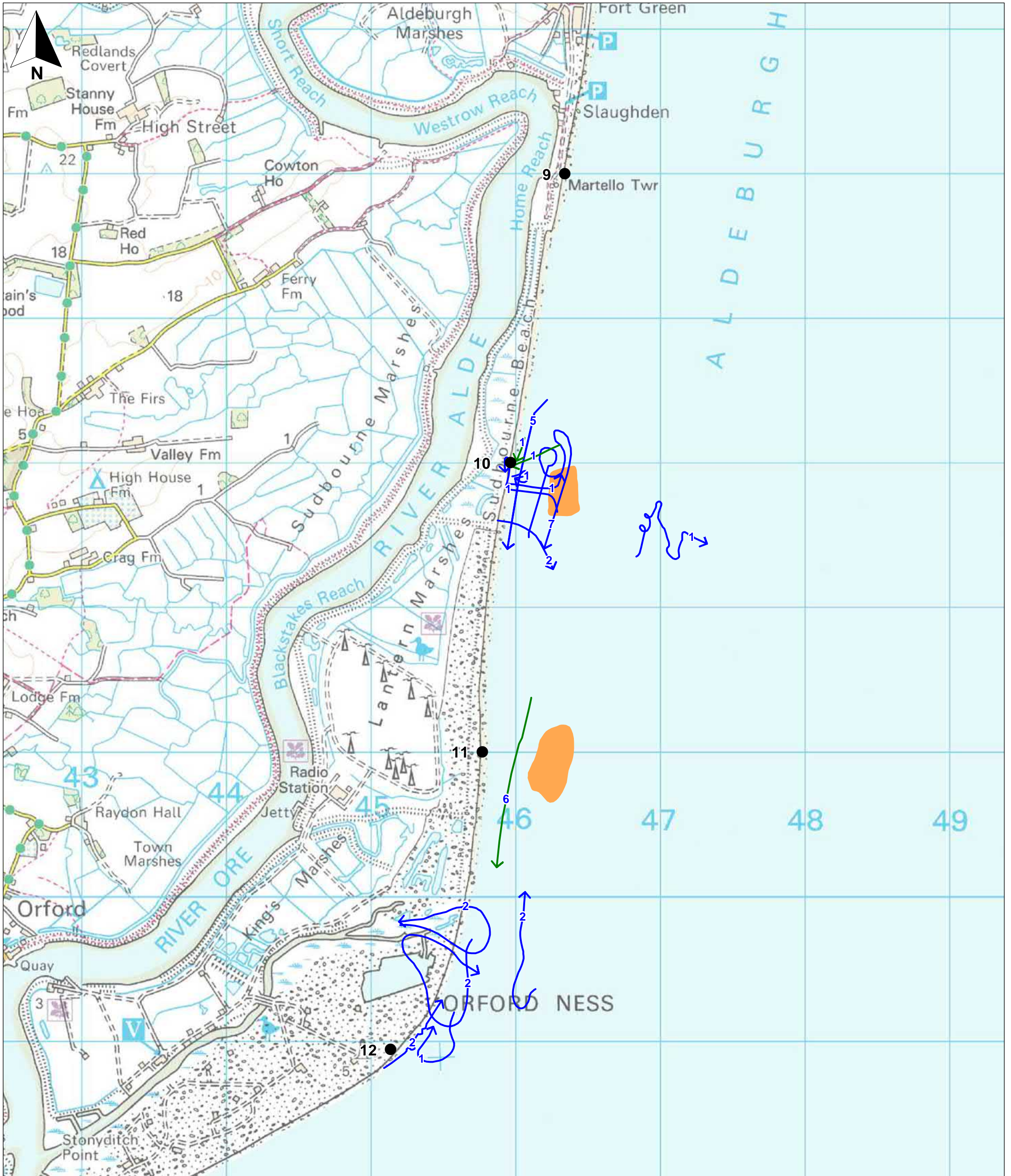





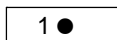

Sizewell Seabird Report 2011-12

Figure 3.5b
VP Surveys:
Flight Lines and Foraging Areas of
Little Tern,
March to September 2011

May 2012
 28130-A187b.wor tugwc





- Key:**
-  Flight lines of foraging birds
 -  Flight lines of commuting birds
 -  Areas of concentrated foraging activity
 -  Vantage point
 -  Number of birds along flight line



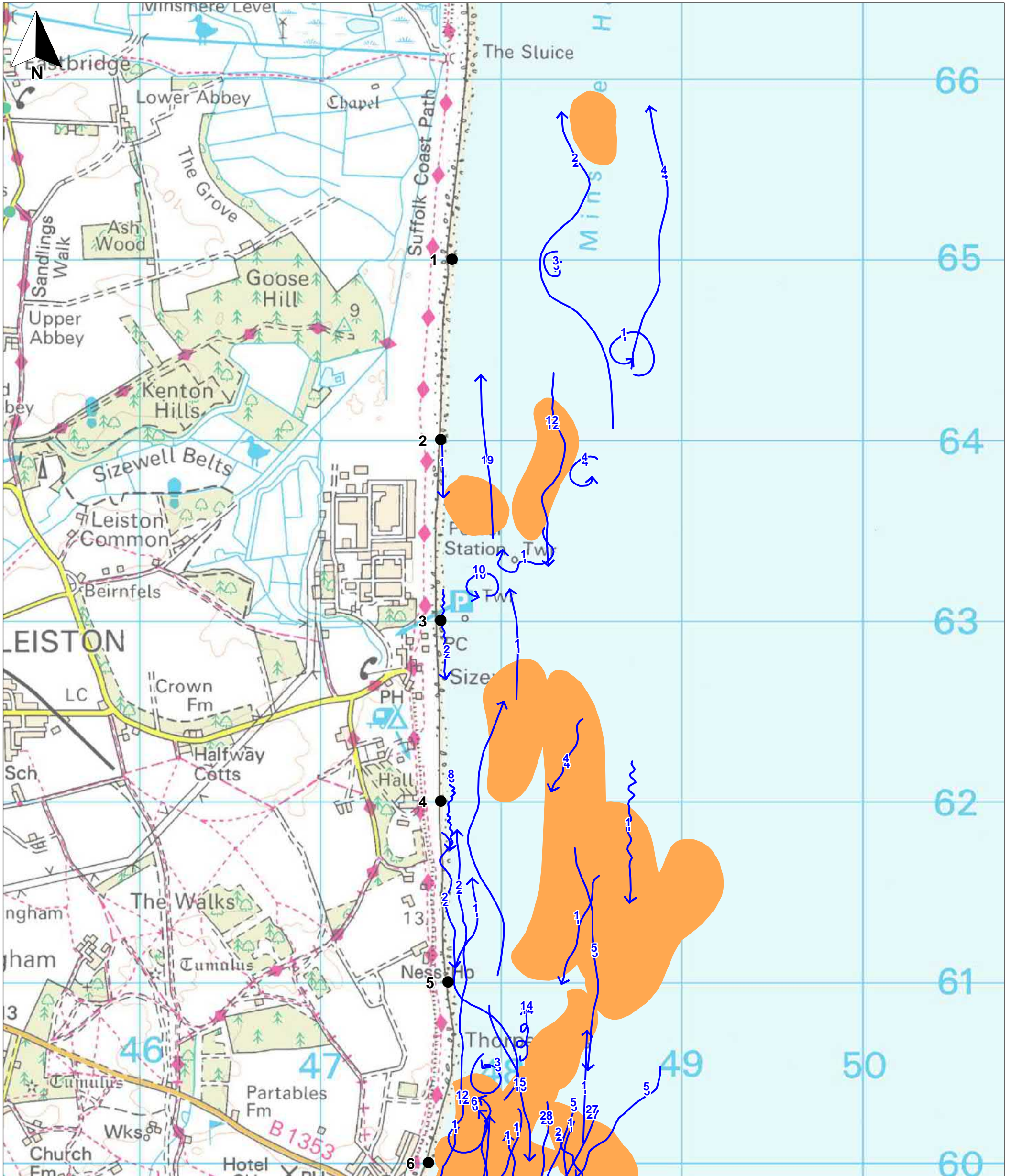
Sizewell Seabird Report 2011-12



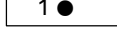

Figure 3.5c
VP Surveys:
Flight Lines and Foraging Areas of
Little Tern,
March to September 2011

0 km 1 km
 Scale 1:25,000 @ A3

May 2012
 28130-A188b.wor tugwc



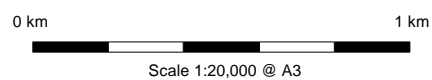


- Key:**
-  Flight lines of foraging birds
 -  Areas of concentrated foraging activity
 -  Vantage point
 -  Number of birds along flight line



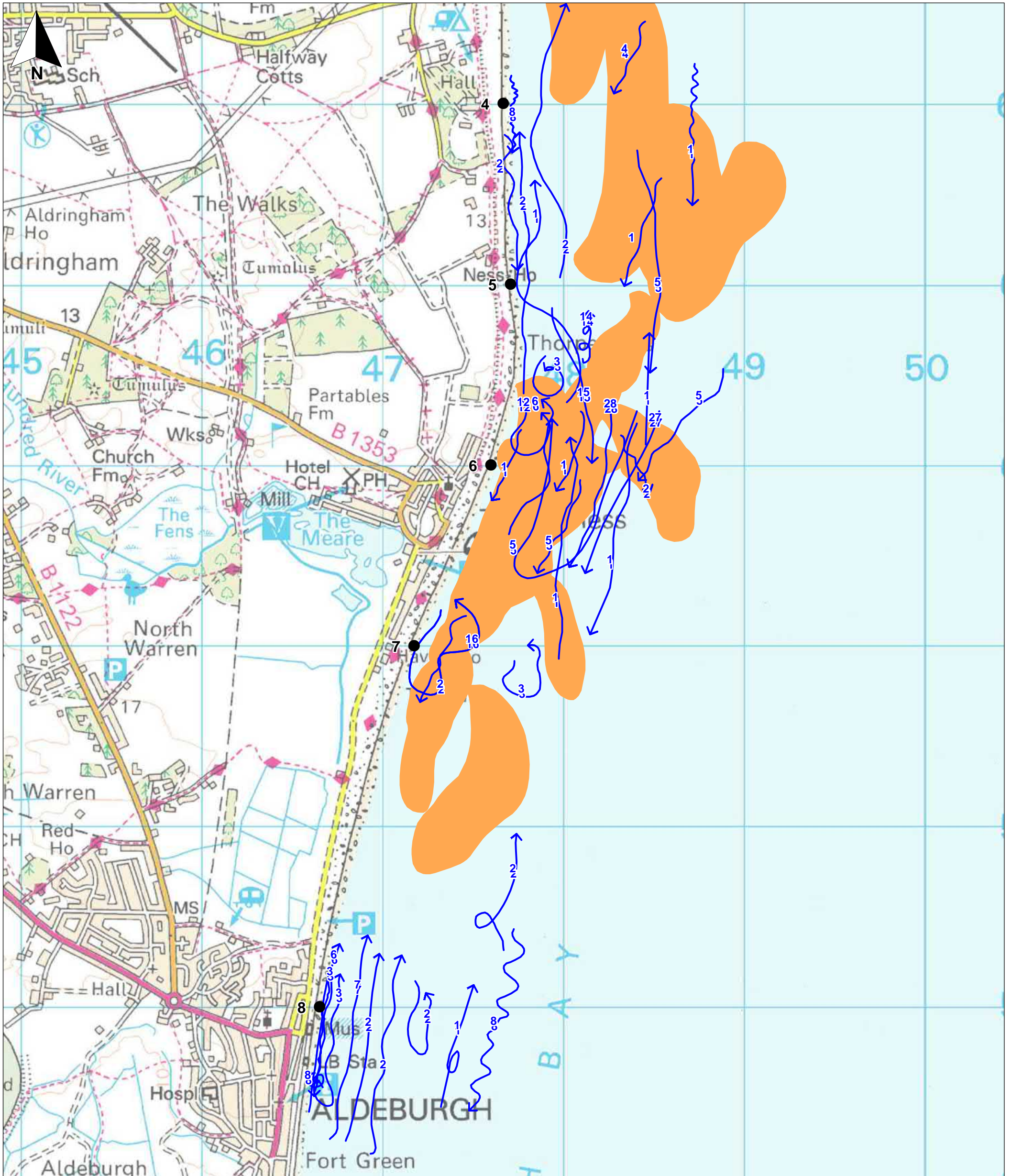
Sizewell Seabird Report 2011-12



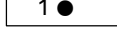

Figure 3.6a
VP Surveys:
Flight Lines and Foraging Areas of
Common Tern,
March to September 2011



May 2012
 28130-A183b.wor tugwc





- Key:**
-  Flight lines of foraging birds
 -  Areas of concentrated foraging activity
 -  Vantage point
 -  Number of birds along flight line



Sizewell Seabird Report 2011-12

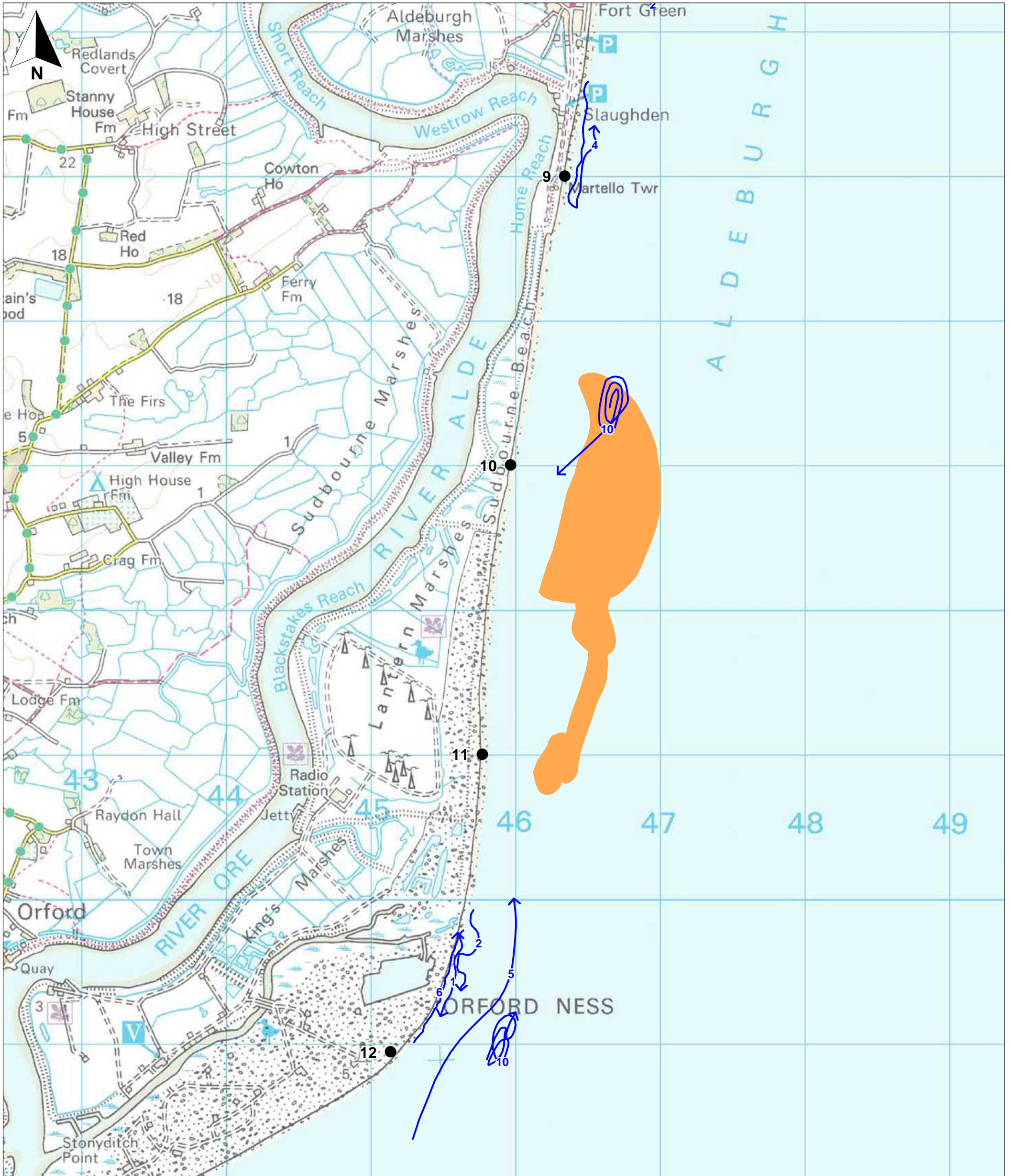
Figure 3.6b
VP Surveys:
Flight Lines and Foraging Areas of
Common Tern,
March to September 2011





0 km 1 km

Scale 1:20,000 @ A3

May 2012
 28130-A184b.wor tugwc





- Key:**
-  Flight lines of foraging birds
 -  Areas of concentrated foraging activity
 -  Vantage point
 -  Number of birds along flight line



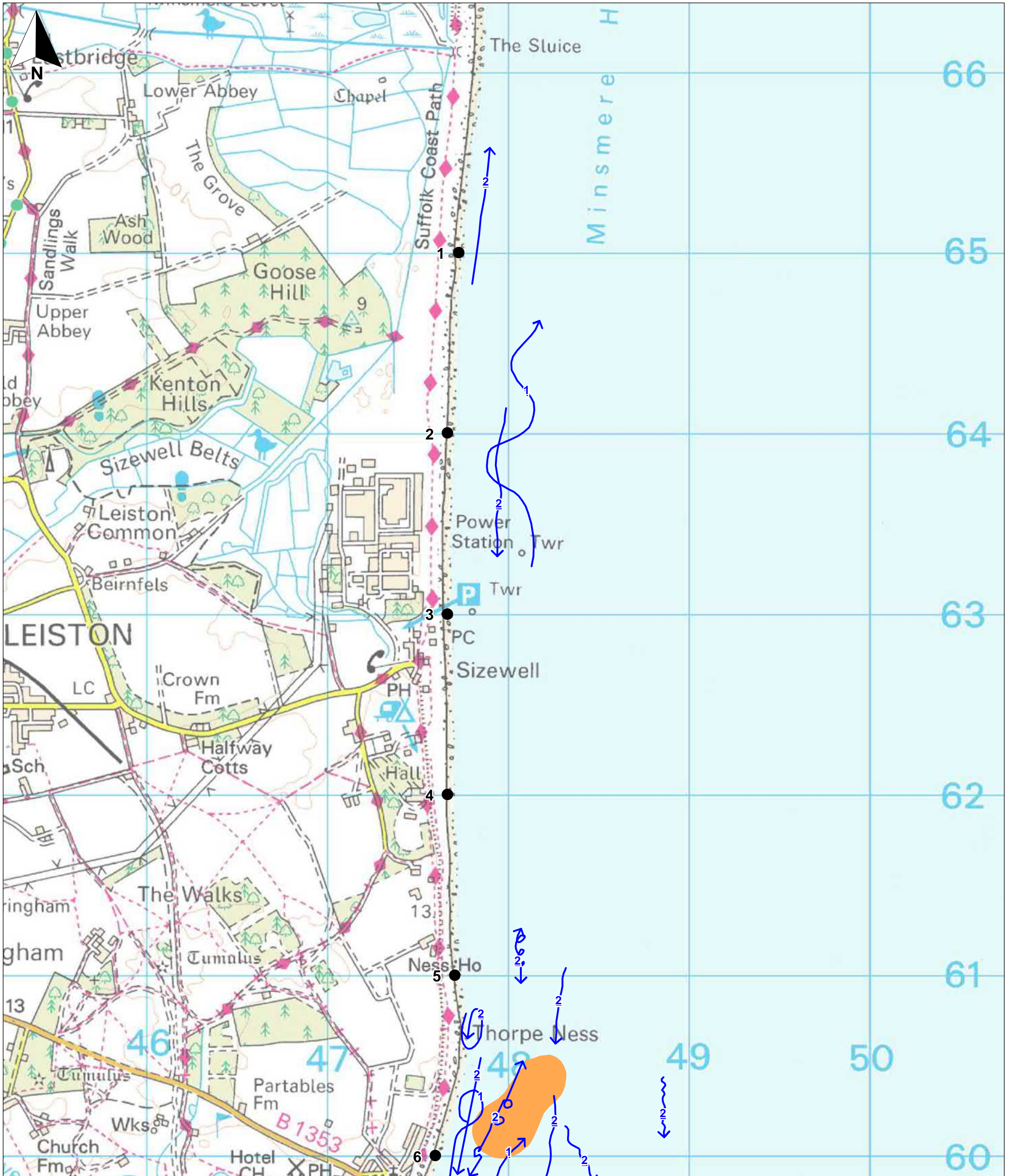
Sizewell Seabird Report 2011-12



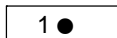

Figure 3.6c
VP Surveys:
Flight Lines and Foraging Areas of
Common Tern,
March to September 2011

0 km 1 km
 Scale 1:25,000 @ A3

May 2012
 28130-A185b.wor tugwc



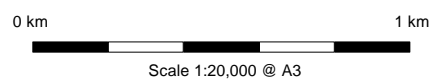


- Key:**
-  Flight lines of foraging birds
 -  Areas of concentrated foraging activity
 -  Vantage point
 -  Number of birds along flight line



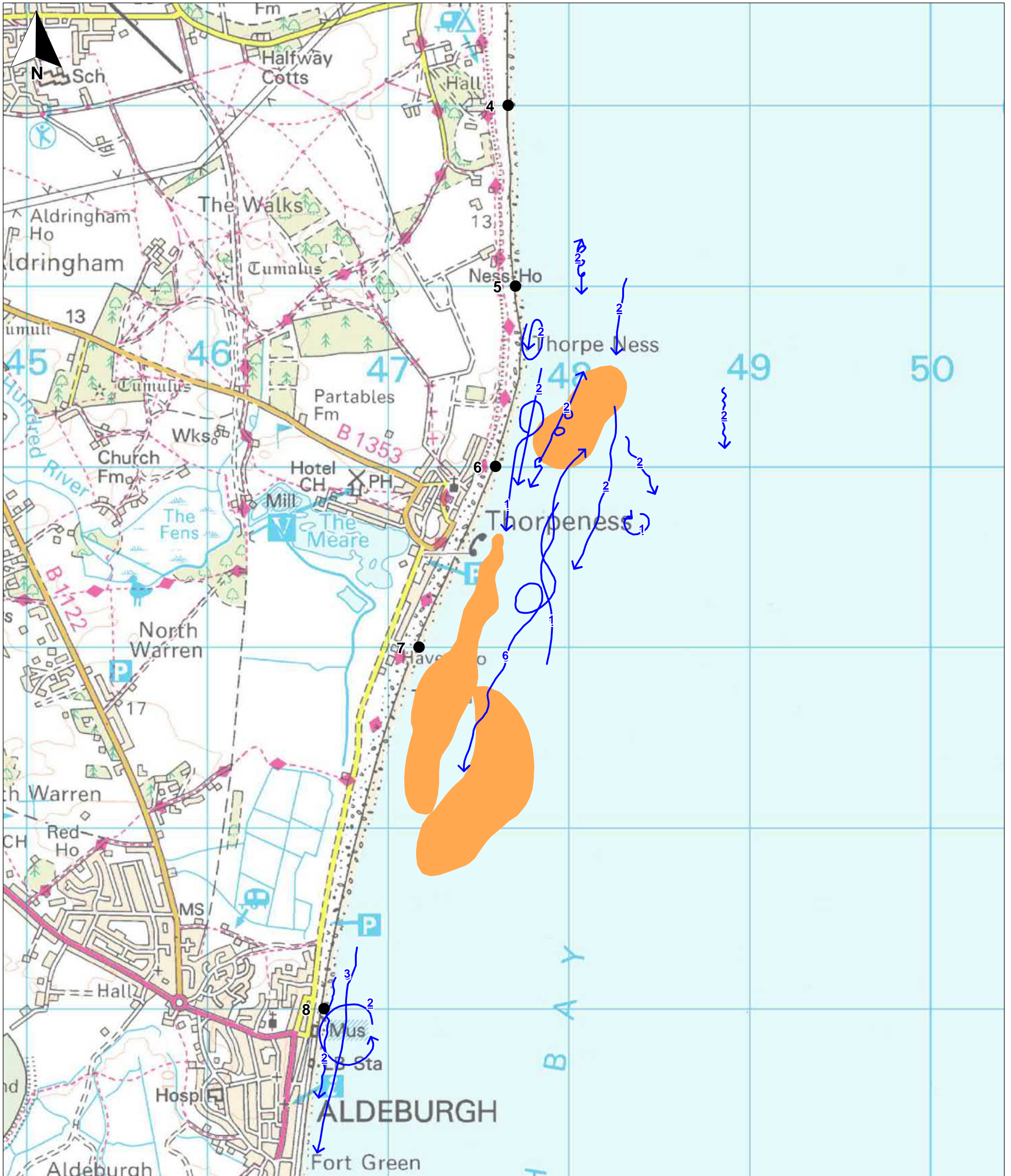
Sizewell Seabird Report 2011-12



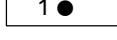

Figure 3.7a
VP Surveys:
Flight Lines and Foraging Areas of
Sandwich Tern,
March to September 2011



May 2012
 28130-A189b.wor tugwc





- Key:**
-  Flight lines of foraging birds
 -  Areas of concentrated foraging activity
 -  Vantage point
 -  Number of birds along flight line

0 km 1 km
 Scale 1:20,000 @ A3

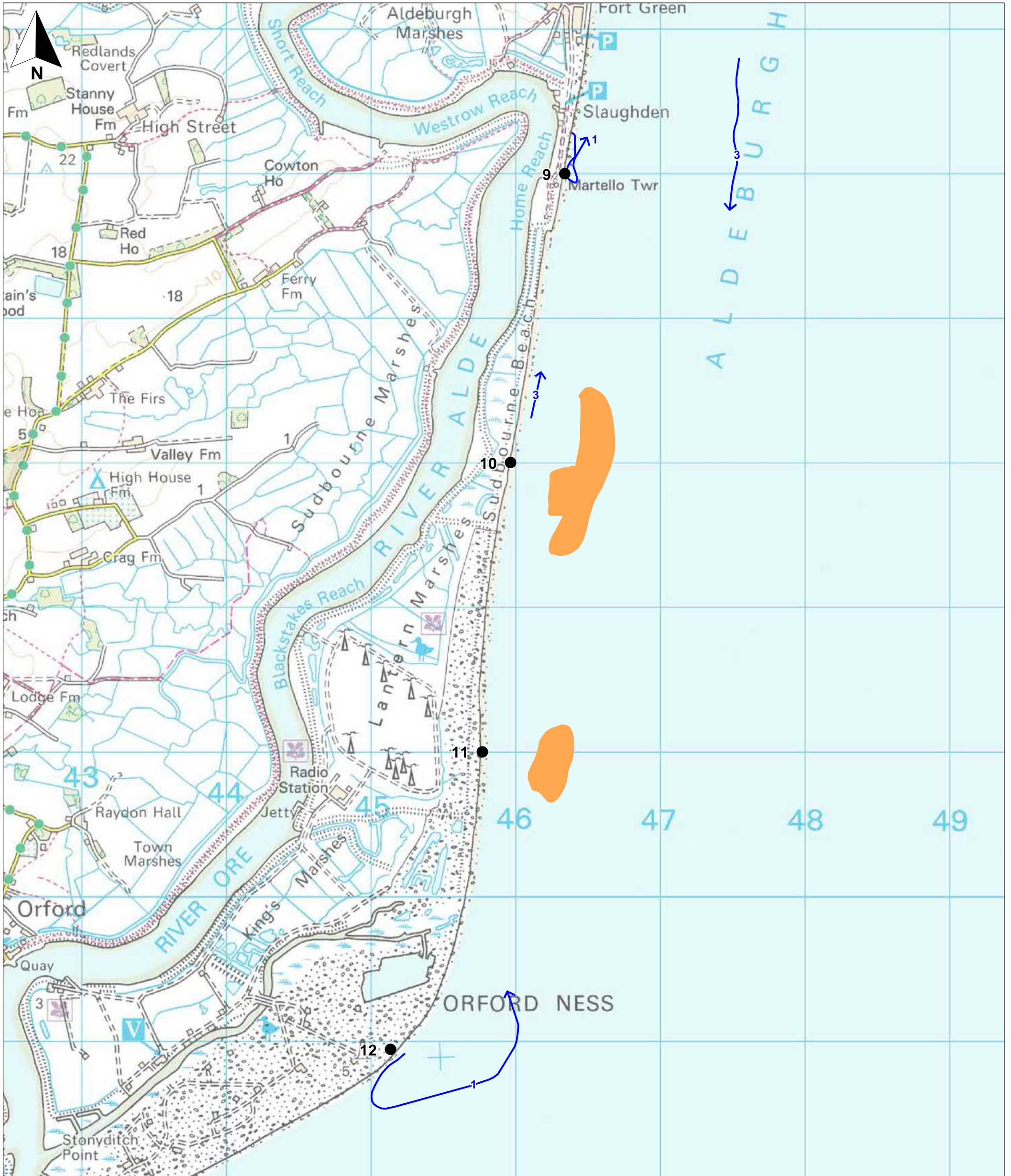




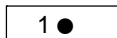

Sizewell Seabird Report 2011-12

Figure 3.7b
VP Surveys:
Flight Lines and Foraging Areas of
Sandwich Tern,
March to September 2011

May 2012
 28130-A190b.wor tugwc





- Key:**
-  Flight lines of foraging birds
 -  Areas of concentrated foraging activity
 -  Vantage point
 -  Number of birds along flight line



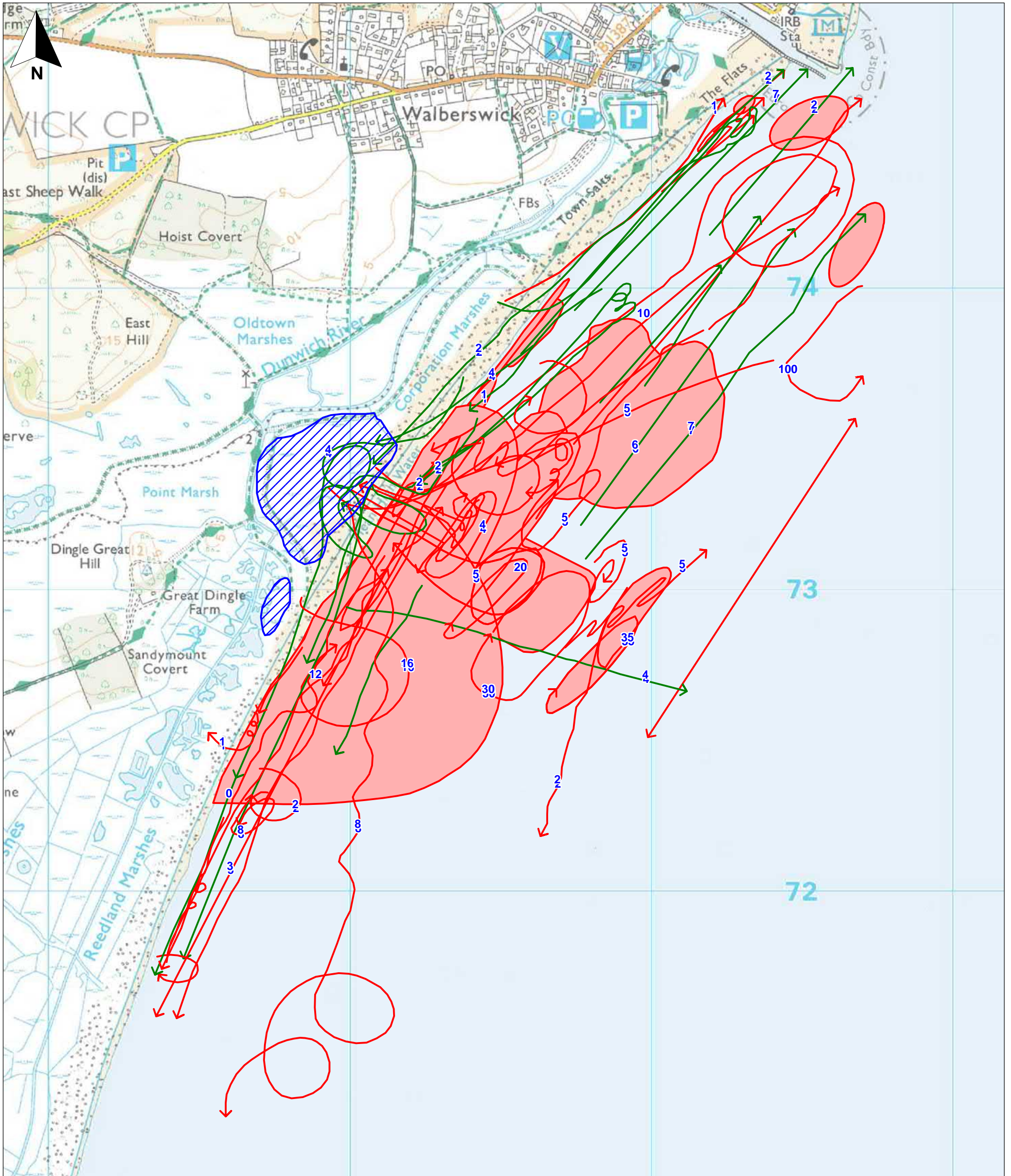
Sizewell Seabird Report 2011-12

Figure 3.7c
VP Surveys:
Flight Lines and Foraging Areas of
Sandwich Tern,
March to September 2011

0 km 1 km
 Scale 1:25,000 @ A3

May 2012
 28130-A191b.wor tugwc





- Key:**
- Flight lines of foraging birds
 - Flight lines of commuting birds
 - Areas of concentrated foraging activity
 - Main locations of nesting little terns



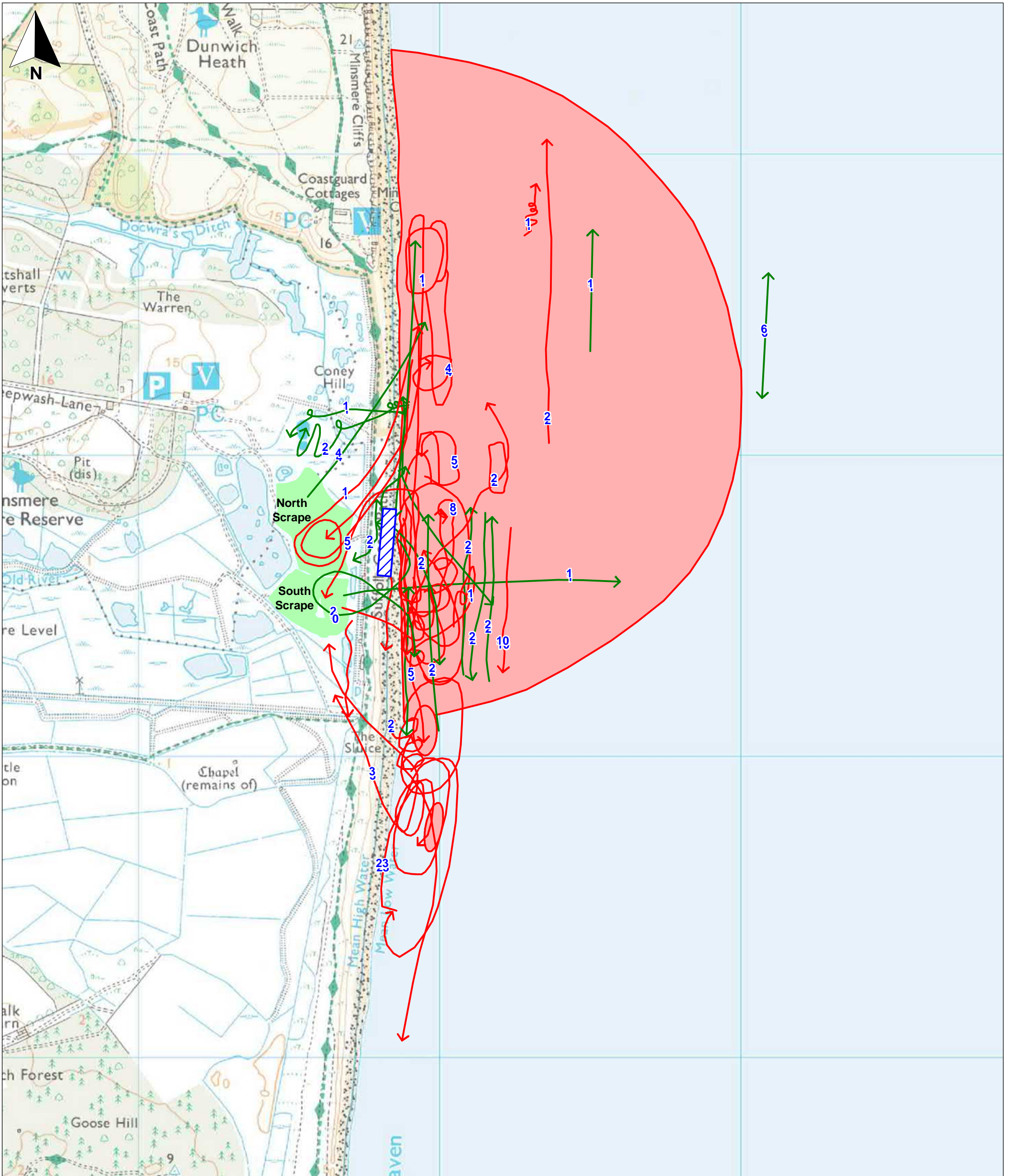
Sizewell Seabird Report 2011-12

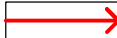



Figure 3.8a
Colony Surveys:
Flight Lines and Foraging Areas of
Little Tern at Dingle
May to early August 2011

0 m 500 m
 Scale 1:12,000 @ A3

May 2012
 28130-A192b.wor tugwc






- Key:**
-  Flight lines of foraging birds
 -  Flight lines of commuting birds
 -  Colony area
 -  Areas of concentrated foraging activity



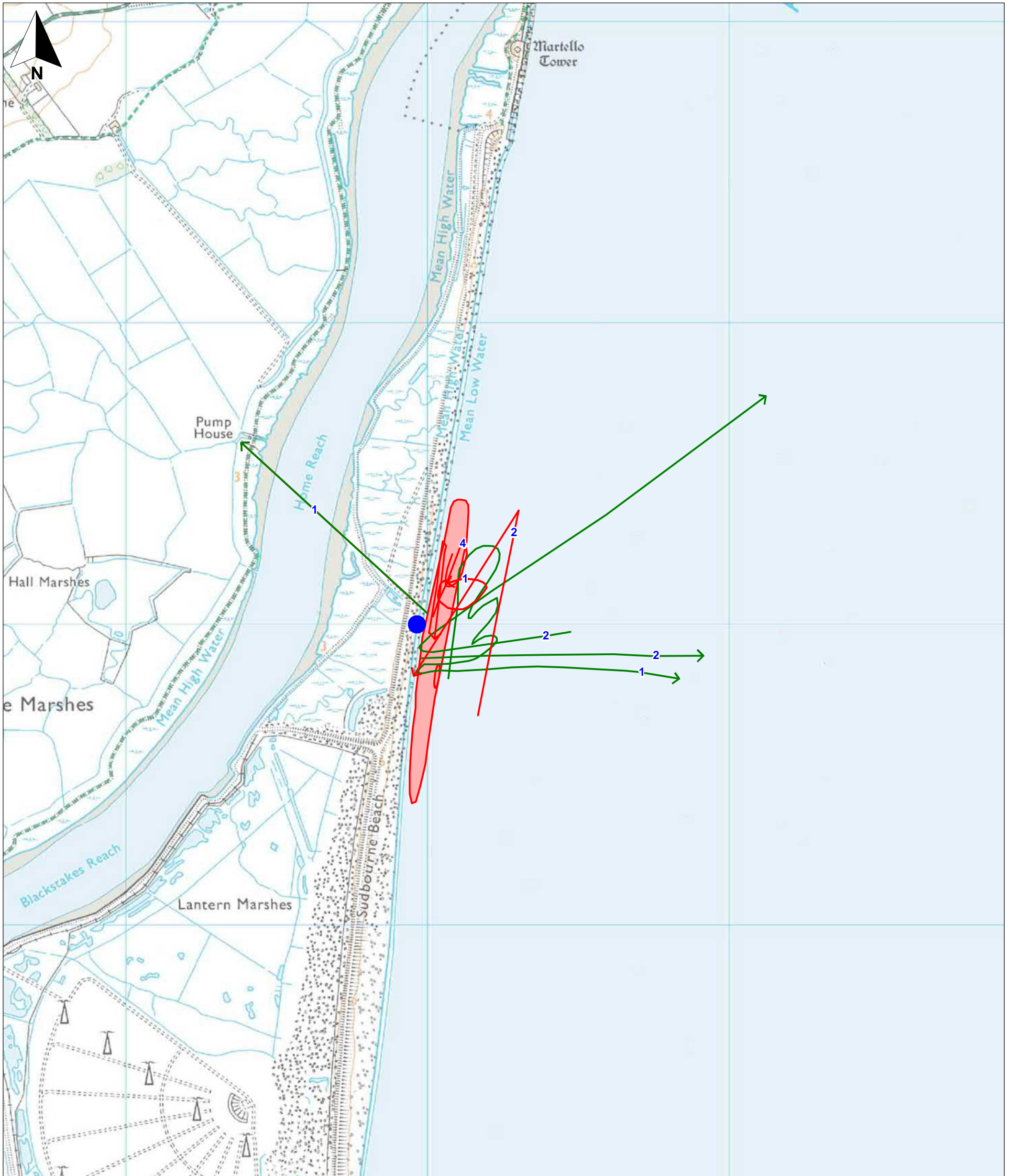
Sizewell Seabird Report 2011-12

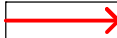



Figure 3.8b
Colony Surveys:
Flight Lines and Foraging Areas of
Little Tern at Minsmere
May to early August 2011

0 m 500 m

 Scale 1:12,000 @ A3

May 2012
 28130-A193b.wor tugwc





- Key:**
-  Flight lines of foraging birds
 -  Flight lines of commuting birds
 -  Areas of concentrated foraging activity
 -  Colony locations



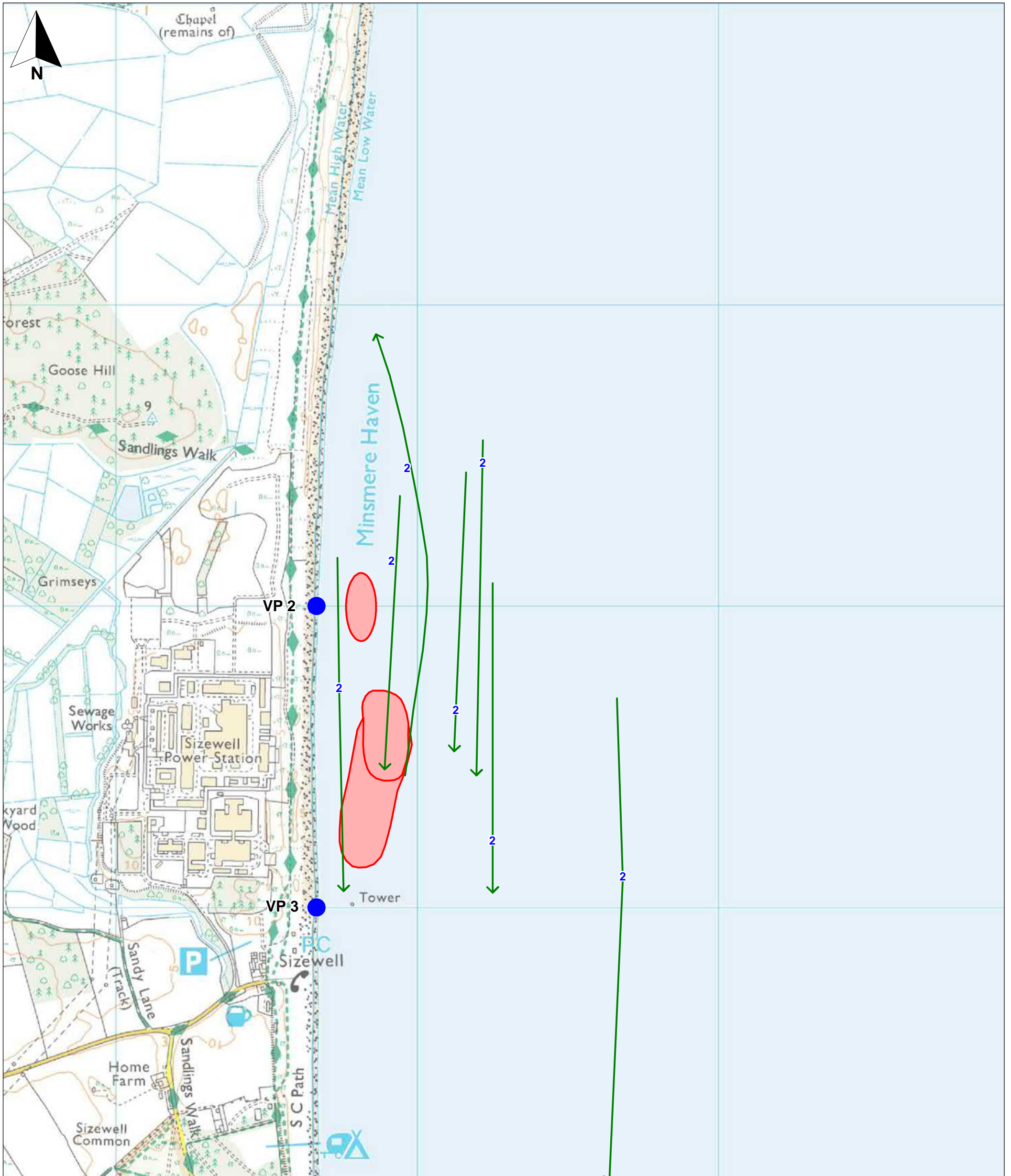
Sizewell Seabird Report 2011-12

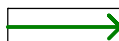


Figure 3.8c
Colony Surveys:
Flight Lines and Foraging Areas of
Little Tern at Slaughterden
May to early August 2011

0 m 500 m
 Scale 1:12,000 @ A3

May 2012
 28130-A194b.wor tugwc





- Key:**
-  Flight lines of commuting birds
 -  Areas of concentrated foraging activity
 -  Viewpoints



Sizewell Seabird Report 2011-12

Figure 3.8d
Colony Surveys:
Flight Lines and Foraging Areas of
Little Tern at Viewpoint 2 and 3
May to early August 2011

0 m 500 m
 Scale 1:12,000 @ A3

May 2012
 28130-A195b.wor tugwc



4. Discussion

Results from the VP surveys undertaken between Sizewell and Orford Ness (the study area) from March 2011 to April 2012 indicate that the inshore waters are used by a limited range of seabird and wildfowl species, primarily terns and gulls. There was generally a low level of bird movement (migration) during the daylight hours along the coast and inshore waters, usually involving small numbers of seabirds and wildfowl.

Results from the little tern colony surveys indicate that much of the foraging activity by this species is concentrated close offshore adjacent to the colony location and during 2011 there was a low level use of the study area (taking into account that colonies were not established at Minsmere and Slaughden in that year).

4.1 SPA and Ramsar Site Designated Species

Eight species which appear as designated features of SPAs and Ramsar Sites (within 20km of the study area) were recorded foraging and/or loafing on the waters within the study area: wigeon, teal, red-throated diver, black-headed gull, herring gull, lesser black-backed gull, little tern and Sandwich tern. Use of the study area by these species is discussed in further detail below:

Red-throated Diver

The Outer Thames Estuary SPA (which includes the study area) is designated for its internationally important wintering population of red-throated diver. The European (excluding Russian) breeding population of red-throated divers is estimated at 7,158 to 10,502 pairs, while the Russian population is estimated at 50,000 to 100,000 pairs (Hagemeijer & Blair, 1997). The vast majority of the European population winters in the southern North Sea and the offshore area from the Wadden Sea, but also in the Baltic. The divers wintering in the Baltic Sea (up to 26,000 birds) are thought likely to be derived from the Russian breeding population (Hemmingsson, 2002). The current estimated wintering population of red-throated divers in the UK is 17,000 birds, with the Greater Thames Estuary holding 44% (O'Brien *et al.*, 2008)¹. Recent aerial survey work suggests that the Greater Thames wintering population may be as high as 15,000 in some years, although there is likely to be considerable interchange of birds between this area and the Wadden Sea wintering grounds. These birds largely originate from Scottish and Scandinavian breeding populations along with some from as far away as Greenland (Hemmingsson, 2002). In addition, in the south-eastern North Sea area, up to 36,000 red-throated divers winter off the Wadden Sea (Laursen & Essink, 2005).

The peak count of 858 red-throated divers recorded in the study area in January 2012 represents 13.3% of the qualifying population for the Outer Thames Estuary SPA (of 6,466 birds) and exceeds the threshold of national importance for a site (170 birds, Holt *et al.*, 2011). These birds were seen undertaking short distance flights offshore from VPs 10-12, with individuals seen from close inshore (less than 1km from the shoreline) to beyond the horizon (a distance of approximately 5km assuming an observer eye height of roughly 1.7m above the level of the sea). Of these, 45% of birds were seen within 1km of the shoreline, with a further 10% present in each 1km distance band between 1-5km (e.g. 1-2km, 2-3km, etc). It is likely that most of

these birds took flight in order to reposition themselves due to tidal water flow and that they were feeding on the sea in the general area where they were seen to take flight.

Table 4.1 shows the monthly peak and total counts of red-throated divers recorded off the Suffolk Coast⁶ from 2004 to 2010.

Table 4.1 Peak counts of Red-throated Diver along the Suffolk Coast

Month	2010	2009	2008	2007	2006	2005	2004
Jan	932	2,001	2,726	862	1,764	1,393	4,710
Feb	849	257	775	180	633	367	1,029
Mar	1,528	665	640	100	101	116	(808)
Apr	35	606	189	109	n/a	n/a	(30)
May	2 (8)	(8)	1 (6)	(5)	2 (10)	1 (1)	2 (2)
Jun	0	1 (1)	1 (5)	1 (1)	2 (2)	0	1 (2)
Jul	1 (1)	0	1 (5)	0	1 (1)	0	1 (1)
Aug	1 (4)	n/a	1 (1)	2 (4)	1 (1)	1 (1)	1 (2)
Sep	15	n/a	33	n/a	2 (5)	n/a	(104)
Oct	26	117	18	n/a	8 (27)	n/a	(152)
Nov	291	66	868	336	828	153	2,141
Dec	2,170	2,703	3,294	700	1,051	1,320	1,559

The offshore waters between Orford Ness and Lowestoft are known to support large numbers of wintering red-throated divers. The highest counts of birds are consistently recorded from Thorpeness, although this may be due in part to greater observer effort at this location (Thurlow, 2010). Red-throated divers can be seen offshore from Suffolk in all months of the year, although the peak period for wintering birds is from late November to February (Piotrowski, 2003). The first wintering birds occur in the area in October, with some not departing until mid-April. The picture is complicated by the occurrence of migrating birds offshore, with spring migration occurring from March to early May and autumn migration from August through to October and November. Numbers occurring offshore of Suffolk during winter appear to vary greatly between years and it is likely that this is due to the abundance and distribution of sprat shoals in the area (Piotrowski, 2003). The winter red-throated diver population off the Suffolk coast was estimated at 1,500-3,000 birds during the 1990s (Piotrowski, 2003). Large numbers of divers were seen in 2004, followed by much smaller numbers in 2005-07 after which near-2004 levels were reached in 2008 and 2009.

⁶ The figures have been obtained from Suffolk Birds 2004-2010. The figures not in parenthesis show the peak daily count that month from any one location. The figures in parenthesis show the total number of divers recorded that month - these figures are shown for the period outside the main diver occurrence months of Jan-Apr and Oct-Dec or where no daily peak count was available.

The movements of divers recorded during the AMEC VP surveys in 2011-12 are likely to be due to the offshore flood tidal stream, which is virtually due south, and the ebb flood stream due north (Pye & Blott, 2006). Flood tidal velocities are greatest five hours before high tide and on the ebb tide, one hour after high tide (Pye & Blott, 2006). Tidal conditions may affect divers in two ways: firstly, birds may be subjected to tidal drift and secondly, tidal conditions may concentrate prey items, especially along the offshore sandbanks (Thurlow, 2010). Red-throated divers, (particularly loafing birds) are likely to be drifted by currents and wind and therefore it is reasonable to assume that after a period of southerly drift (on a flood tide) divers will compensate by flying north, and conversely compensate after drifting north on an ebb tide by flying south.

Thurlow (2010) found that the peak monthly counts from Thorpeness during winters 2000/01 to 2007/08 were consistently higher than those from a study undertaken at Covehithe (on the Suffolk coast, approx. 18-20km to the north of Sizewell) in 1994-96 (Dare, 1998) and from Kessingland (approx. 22-25km north of Sizewell) which, if anything, is watched more intensively than at Thorpeness. This indicates that the bulk of wintering divers in Suffolk generally occur in the southern part of Sole Bay in the Minsmere-Thorpeness area (Thurlow, 2010). Results from aerial surveys undertaken in 2004-05 (DTI, 2006) also seemed to show a higher density of divers occurring south from Thorpeness to Orford Ness than to the north of Thorpeness. Much greater numbers of divers are likely to feed and rest on the sea further offshore, well beyond that visible from the shoreline, (i.e. 5+km), Brown & Grice (2005). Aerial surveys of the Outer Thames have found divers up to 40km offshore and this species generally occurs in waters less than 30m deep, over sandy substrate (Brown & Grice 2005, Laursen & Essink 2005).

Results from the AMEC surveys indicate that the study area is likely to support an important proportion of the UK and Outer Thames Estuary SPA wintering populations of red-throated diver. However, it is acknowledged that counting divers from the shoreline is difficult, and that very calm sea conditions are needed to detect divers on the sea, although the large flocks of divers seen alighting from the sea during the AMEC surveys provide an indication of the numbers using the area at the time. Given that sea conditions during the surveys undertaken in winter 2011-12 were rarely calm, it is likely that the numbers of divers recorded represent an underestimate of the true numbers present.

Black-headed Gull

Black-headed gull is described as a very common resident, winter visitor and passage migrant in Suffolk (Mason [ed], 2011). Black-headed gull appears in the breeding seabird assemblage qualification for the Alde-Ore Estuary SPA and nationally important numbers (2,558 pairs) breed in the Minsmere-Walberswick Ramsar site. A total of 1,506 pairs (1,115 pairs in 2009) nested on Minsmere RSPB nature reserve in 2010, and 32-37 pairs bred on Orford Ness in that year (Mason [ed], 2011). Elsewhere, 2,000 pairs bred on Walberswick National Nature Reserve in 2007 (Mason [ed], 2009). The breeding population of black-headed gull in Suffolk ranged between 2,153 and 3,221 pairs in the 1990s (Piotrowski, 2003), and a total of 2,767 pairs were recorded in the county during the national seabird census (1998-2002).

During the VP surveys, a steady flow of black-headed gulls was recorded flying between the Sizewell B outfall and Minsmere from May to July 2011. Congregations of up to 500 black-headed gull were seen feeding around the outfall during the breeding season. Once the gulls had departed from the Minsmere colony at the end of July, very few birds were seen around the outfall, until numbers started to gradually increase in September as winter visitors began to

return to the area. Numbers of black-headed gulls remained relatively low (in comparison to the breeding season) through the winter. The evidence from the VP surveys indicates that the outfall at Sizewell provides an important food resource to black-headed gulls breeding at nearby Minsmere. However, it is likely that many birds from local breeding colonies also feed elsewhere, such as on rubbish tips and in recently ploughed arable farmland, and in the many pig farms in the area, such as those at Leiston and Blythburgh.

Herring Gull

Herring gull is described as a very common resident, winter visitor and passage migrant in Suffolk (Mason [ed], 2011) and this species appears in the breeding seabird assemblage qualification for the Alde-Ore Estuary SPA. Herring gulls breed with lesser black-backed gulls in a large colony on Lantern Marsh at Orford Ness (within the Alde-Ore SPA and adjacent to VPs 10-11), where a total of 150 pairs of the former species were counted in 2009 (Mason [ed], 2010). Numbers at this colony have declined dramatically in the last ten years, primarily due to fox predation (Mason [ed], 2010), with a peak of 6,750 pairs of herring gull recorded in 2000 (JNCC Seabird Monitoring Programme data). Away from this colony within Suffolk, 125 pairs bred on nearby Havergate Island in 2001 and increasing numbers of herring gulls are breeding in coastal urban areas, including 250 pairs in Lowestoft in 2000, and 71 pairs in Ipswich and 100 pairs at Felixstowe Docks in 2001 (JNCC Seabird Monitoring Programme data).

During the VP surveys undertaken in the breeding season period (from March to August 2011), relatively small numbers of herring gulls (usually 10-30 birds) were recorded loafing and foraging around Sizewell B outfall, and resting on the nearby rigs. However the number of herring gulls greatly increased at the outfall during winter when counts in excess of 200 birds were recorded.

The numbers of herring gull present at the outfall in winter is likely to represent an important proportion (i.e. more than 1%) of the total number present in Suffolk. Other congregations of herring gull feed on pig fields in the area, and rest on the Blyth Estuary.

Great Black-backed Gull

Great black-backed gull is described as a common winter visitor and passage migrant in Suffolk with a few staying through the summer (Piotrowski, 2003). This species mainly occurs at coastal and estuarine sites in Suffolk (primarily from late September to March) although a few birds now spend the winter at inland refuse tips (Piotrowski, 2003). During the 1993 Winter Gull Roost Census, a total of 523 great black-backed gulls were recorded in Suffolk of which most (75%) were recorded in Lowestoft Harbour. Estuaries are important feeding sites, with 150-500 birds sometimes present on the Alde-Ore complex. Results from the VP surveys indicate that the flocks of birds recorded on the beach at Aldeburgh and those feeding at the outfall represent an important proportion (i.e. more than 1%) of the likely Suffolk population in winter. These birds alternate between resting on the rigs and adjacent beach, and foraging at the outfall and behind fishing boats.

Lesser Black-backed Gull

Lesser black-backed gull is described as a very common summer visitor and passage migrant in Suffolk, with increasing numbers also over-wintering in the county (Mason [ed], 2011). A breeding population of European importance (of 14,070 pairs) appears as a designated feature of the Alde-Ore Estuary SPA. Nationally important numbers of this species (905 individuals) also appear in the description for the Minsmere-Walberswick Ramsar site. Lantern Marshes on

Orford Ness supports a very large breeding colony of lesser black-backed gull, with 23,000 pairs counted there in 2000 (JNCC, Seabird Monitoring Programme). However, numbers at this colony have declined dramatically since the turn of the century (primarily due to fox predation), with only 550 pairs reported there in 2010 (Mason [ed], 2011). Elsewhere, increasing numbers of birds are nesting in coastal urban locations, such as Felixstowe Docks (300 pairs in 2001), Ipswich (99 pairs in 2001) and Lowestoft (750 pairs in 2000).

During the VP surveys, small numbers of birds (generally 1-5 birds) were recorded loafing around the Sizewell B outfall and on the nearby rigs. Elsewhere within the study area, groups of up to 50 lesser black-backed gulls were seen resting on the beach adjacent to the Lantern Marshes gull colony (adjacent to VPs 10-11) or at nearby Orford Ness lighthouse (adjacent to VP12), although no large congregations of birds were seen on the sea. Numbers of lesser black-backed gulls declined in the study area in the autumn and remained at a low level from November 2011 to March 2012.

Results from the VP surveys provide no evidence to indicate that the outfall or other areas of inshore waters within the study area provide important resting or foraging areas for lesser black-backed gulls. It is likely that many birds breeding at local colonies feed widely along the coast and in pig fields, such as those at Blythburgh.

Little Tern

The little tern is described as being a common summer visitor and passage migrant in Suffolk (Mason [ed], 2011). Little terns breed on sand and shingle beaches in a number of colonies located along the Suffolk coast, including on Minsmere beach and between Dunwich and Walberswick. Both of these colonies are located on the upper reaches of shingle ridges, backed by reedbeds and lagoons that comprise the Minsmere and Dingle RSPB nature reserves respectively. However, these sites are not used every year and there is a considerable interchange of birds between colonies.

The Minsmere-Walberswick, Alde-Ore Estuary and Benacre to Easton Bavents SPAs all qualify under Article 4.1 of the Birds Directive by supporting little tern populations of European importance during the breeding season. The Minsmere and Dingle colonies are located within the Minsmere-Walberswick SPA. Within the Alde-Ore Estuary SPA, little terns have bred sporadically at Slaughden beach and on Havergate Island in recent years. There are also further colonies located along the Suffolk coast to the north of the Minsmere-Walberswick SPA and south of the Alde-Ore Estuary SPA. **Table 4.2** details the number of breeding little tern at colonies in Suffolk since 2000.

Table 4.2 Number of Breeding Pairs of Little Tern in Suffolk⁷

Site	Distance from Study Area	Nearest SPA	2010	2009	2008	2007	2006	2005	2004	2003	2002	2001	2000
Havergate Island	Adjacent	Alde-Ore (within)					3	0		0	0	1	3
Orford	Adjacent	Alde-Ore (within)					0	2					
Orford Ness	Adjacent	Alde-Ore (within)				?	?		0		31	48	85
Shingle Street	Adjacent	Alde-Ore (within)					0	?		6			
Slaughden	8km south	Alde-Ore (within)	0	0	0	5		7		28			
Kessingland	21-23km north	Benacre-Easton Barents (0-1km north)	100	0	0	0	0	?		0	10		
Benacre	20km north	Benacre-Easton Barents (within)	30	0	?	?	40	9	37	7	80	20	1
Covehithe	18km north	Benacre-Easton Barents (within)					0	4		0	2	2	0
Easton Barents	16km north	Benacre-Easton Barents (within)								0	0	0	0
Bawdsey/Deben	14-17km south	Deben (0-3km north)					0	4		0		40	
Southwold Beach	12-13km north	Minsmere-Walberswick (1-2km)											1
Dingle	9km north	Minsmere-Walberswick (within)	3	11	2	2	2	1		0	0	7	2
Dunwich beach	7-8km north	Minsmere-Walberswick (within)	0	20									
Minsmere	3km north	Minsmere-Walberswick (within)	0	1	41	12	7	36	2	0	0	0	13
Walberswick	10-11km north	Minsmere-Walberswick (within)					0	0	3	0	0		4
Felixstowe Docks	24km south	Stour & Orwell (3-4km east)										7	37

⁷ A zero count denotes that the colony was visited but no little terns were present; ? indicates that breeding may have taken place but no count was obtained, and a blank that no data either way was received.

Site	Distance from Study Area	Nearest SPA	2010	2009	2008	2007	2006	2005	2004	2003	2002	2001	2000
Landguard	25km south	Stour & Orwell (3-4km east)	0	0	0	0	0	0	1	2	8	0	0
Shotley	26km south	Stour & Orwell (within)								3	0	2	2
Trimley Marshes	25km south	Stour & Orwell (within)					0	10					
Suffolk total:			133	32	43	19	52	73	43	46	131	127	148

In 2010, breeding was attempted at three colonies, of which one (3 pairs at Dingle) was within the Minsmere-Walberswick SPA, with the remaining attempts located to the north at Kessingland and Benacre (Mason [ed], 2011). Breeding was attempted by little terns at three colonies in 2009 (all within the Minsmere-Walberswick SPA), and young were reported at one (Dunwich beach). Breeding was not recorded within the Alde-Ore Estuary SPA in 2010 or 2009. In 2008, breeding was reported from three sites (Dingle, Minsmere and Kessingland) and was successful only at Minsmere (Mason [ed] 2009). Breeding has also been reported from at least seven other locations along the Suffolk coast since 2005: Bawdsey, Havergate Island, Orford, Slaughden beach, Covehithe, Bawdsey and Trimley, although rarely with any success. The numbers breeding at each colony varies considerably between years, with the establishment of a colony dependant on habitat suitability and prey availability. Individuals often move to another colony after breeding failure, to attempt nesting again within the same year.

Results from radio-tracking work on little terns in Norfolk by Perrow *et al.* (2005) found that the average home range of nesting birds was 4km² (i.e. birds that were feeding chicks were primarily foraging within 2km of the colony). However, in 2004, the radio-tagged terns from the Norfolk colony being studied failed to breed, primarily due to a shortage of food, after which the birds were recorded foraging up to 25km from the site (Perrow *et al.*, 2005). The same scenario is likely to have occurred in 2010 and 2011 when large numbers of little terns were seen foraging off Dingle during the VP surveys undertaken in 2010 (from 30 June to 13 July) and 2011 (on 22 July). It is likely that these birds were failed breeders from colonies such as Kessingland. Langston (2009) gives a foraging distance of 5km from the breeding colony for little tern and states that this species generally makes numerous relatively short flights to catch fish for chicks. These data indicate that the area where the warm water plume could spread is within the regular foraging range for little terns derived from the Minsmere colony (3km to the north) but is likely to be visited on a more occasional basis by birds from the Dingle and Dunwich colonies (respectively, 9km and 6km to the north of Sizewell). In addition, any birds breeding at Slaughden and Havergate Island would also be respectively adjacent and within 1-2km of the cooling water discharge.

Figure 4.1 shows the approximate location of the little tern colonies reported along the Suffolk coast between 2000 and 2010, and the likely main foraging area for birds derived from each colony (i.e. within 5km of the colony) in relation to the predicted warm water plume.

Findings from the colony surveys and VP surveys undertaken from May to August 2011 support the results obtained from similar surveys in 2010. Results from the colony surveys undertaken at Dingle, Minsmere and Slaughden in 2011 indicate that much of the little tern foraging activity is concentrated within 1km of the colony location. At Dingle, foraging activity for the provisioning of chicks was also concentrated within 1km of the colony. Much of the foraging activity recorded during the VP surveys within the study area was in the shallow waters adjacent to the shoreline, or within 300m offshore. Low levels of little tern foraging activity were observed around the Sizewell B outfall, unlike common tern, which were attracted to the area in much larger numbers. Elsewhere within the study area, little tern foraging activity was sporadic and involved small numbers of birds (generally 1-5). Neither the colony nor VP survey results indicated that little terns were regularly flying further out to sea to feed. The foraging activity took two forms: firstly dives for small fish which would often be presented to chicks or to adults during courtship display, and secondly, surface dives to pick up other small prey such as invertebrates. Adults were observed carrying fish as they commuted up and down the shoreline, to and from the direction of the Dingle colony.

Results from the 2011 colony surveys indicate that as in 2010, Dingle was in the end the favoured breeding site. A number of young were successfully fledged at Dingle in 2011, from c.26 pairs, with many other pairs present but not attempting to breed. Initially the terns attempted to establish colonies at Minsmere, but no nesting was observed there, with birds feeding close offshore and then resting on the Minsmere South Scrape during May. These birds had largely departed from Minsmere by early June. Possible causes for the failure include the beach topography, which has become increasingly narrow (pers. comm. Robin Harvey, RSPB warden), and the presence of the large black-headed gull breeding colony on the adjacent RSPB reserve.

In early June 2011, a number of little terns also attempted to establish a colony on Slaughden beach, during which National Trust wardens fenced off a section of the beach to provide protection from humans and land-based predators. However, nesting was not attempted here, and the birds had departed from the area by the end of June, possibly a result of the large herring and lesser black-backed gull colony adjacent.

To conclude, results from the surveys in 2011 (as in 2010) show that the inshore waters between Sizewell to Orford Ness did not provide important feeding grounds for little terns from nearby breeding colonies. However, the lack of established colonies at Minsmere and Slaughden (2km north and adjacent to the study area respectively) in both years is likely to have lead to fewer little terns using the study area in those years. In a year when little terns breed at these locations a greater numbers of birds is predicted to use the waters in the study area for foraging.

Sandwich Tern

The Sandwich tern is described as being a common passage migrant but declining summer visitor to Suffolk (Mason [ed], 2010). An internationally important breeding population of Sandwich tern is a designated feature of the Alde-Ore Estuary SPA and Ramsar Site (of 169 pairs). Within Suffolk, Sandwich terns have primarily bred at Havergate Island (first bred there in 1951) and Minsmere (first bred in 1965). The numbers of Sandwich tern breeding on Havergate Island increased to a peak of 800 pairs in 1962 after which breeding became more and more irregular, particularly since 2005. At Minsmere, breeding has also become very sporadic, with no pairs present in most years, but occasionally large numbers in others. In 2009, a colony of 550 pairs established itself on Minsmere scrape (likely due to breeding failure at another colony along the North Sea coast), although no young survived to fledge due to predation. The species has now become an irregular and largely unsuccessful breeder in Suffolk, primarily due to predation from a variety of sources, both avian (gulls) and mammalian (foxes). **Table 4.3** details the number of breeding Sandwich tern in Suffolk since 2000.

Table 4.3 Number of Breeding Pairs of Sandwich Tern in Suffolk

Year	Minsmere	Havergate Island
2010	0	0
2009	550	2
2008	1	0
2007	0	0

Year	Minsmere	Havergate Island
2006	0	0
2005	0	3
2004	0	2
2003	0	15
2002	0	2
2001	0	1
2000	0	7

During the VP surveys, small numbers of Sandwich tern were regularly observed commuting along the coastline and through inshore waters in the study area. The number of birds recorded increased in August and September, after the breeding season period, suggesting that these were probably passage migrants, moving south through the area. Very few foraging Sandwich terns were recorded in the study area (that area potentially affected by the cooling water discharge) during the 2011 breeding season period (April to July). The most frequently used foraging areas by passage birds were the shallow waters off Thorpeness and between Slaughden and Orford Ness.

The surveys were however undertaken in a year when no breeding colony was established along the Suffolk coast and therefore fewer birds would be expected to be seen during the breeding season. It is predicted that in a year when birds breed (for example at Minsmere or Havergate Island) much larger numbers of Sandwich tern would use the inshore waters within the study area to forage.

4.2 Other Notable Species

A number of other notable species were recorded foraging and/or loafing in the study area during the VP and colony surveys undertaken from March 2011 to April 2012. These include the following, the details of which are discussed further below:

- Species which are listed as occurring in nationally important numbers at Ramsar sites (Mediterranean gull);
- or are listed in the citations of SSSI's within 20km of the study area (common gull, Arctic tern and common tern);
- or are primary reason for the designation of a County Wildlife Site (kittiwake);
- or are likely to occur in at least regionally important numbers (great crested grebe, little gull, great black-backed gull and black tern).

Great Crested Grebe

Great crested grebe is described as a locally common resident, passage migrant and winter visitor in Suffolk (Piotrowski, 2003). Numbers wintering in the county have increased greatly in recent years. Flocks of 30-100 birds were first reported in Sole Bay (off the Suffolk coast) in the 1980s and by the 1990s, numbers in excess of 500 were being counted, including 1,439

birds on 20 April 2000 (Piotrowski, 2003). The peak numbers of wintering great crested grebes occur in January and February, coinciding with the presence of sprat shoals – an important food source to divers and great crested grebes (Piotrowski, 2003). Wintering numbers of great crested grebe off the Suffolk coast in 2010 were considered to be low, with a peak count of 157 birds recorded off Thorpeness on 21 February (Mason [ed], 2011). The numbers of great crested grebes recorded during the VP surveys undertaken in winter 2011-12 were of a similar order to those in 2010 (peak count of 90 birds) although generally, numbers within the study area were much lower on most visits (10-40 birds). Elsewhere in Suffolk, congregations of wintering grebes occur on inland water bodies such as Alton Water, where a peak of 138 birds was recorded on 7 November 2010 (Mason [ed], 2011). Other counts in 2010 include 37 birds on Weybread Pits (inland) in November and 72 on the sea off Kessingland in March (Mason [ed], 2011).

To conclude, results from the VP surveys undertaken in 2011-12 indicate that the waters in the study area are likely to be used by a large proportion of the wintering population of great crested grebe in Suffolk during winter, principally from November to April.

Mediterranean Gull

Mediterranean gull is described as being an uncommon resident, passage migrant and winter visitor in Suffolk, and a rare breeder (Mason [ed], 2011). Nationally important numbers of breeding Mediterranean gull appear as notable features of the Minsmere-Walberswick and Alde-Ore Estuary Ramsar sites. Birds bred at two sites in Suffolk in 2009 and 2010: at Minsmere (two pairs in both years) and at an undisclosed coastal site (five pairs in both years), Mason [ed], 2011, 2010. Mediterranean gulls have over-summered in Suffolk since the early 1980s and the first breeding attempt was recorded on Havergate Island in 1986 (Piotrowski, 2003). Mediterranean gulls then attempted to breed at this site sporadically (and often unsuccessfully), and on the Blyth Estuary, and in the late 1990s at Minsmere.

During the VP surveys, small numbers of Mediterranean gulls were seen in the study area sporadically throughout much of survey period. During other AMEC bird surveys undertaken in the Sizewell area in 2011, birds were seen flying over Goose Hill between Minsmere and Leiston town, and birds were also observed feeding in pig fields just north-east of Leiston. Results from the surveys indicate that the outfall provides a foraging site for Mediterranean gulls derived from Minsmere. Mediterranean gulls generally depart from Minsmere in late July, after which few are observed at this site. It is likely that the Minsmere birds feed at a wide variety of sites, including recently ploughed arable fields, pig fields and coastal shore-lines and estuaries.

Large congregations of Mediterranean gulls occasionally occur on the Suffolk coast immediately after the breeding season, including 86 birds at Blythburgh and 125 birds at Southwold in July 2011 (Mason [ed], 2011). Notable post-breeding season movements of birds are also recorded off the Suffolk coast, with up to 70 Mediterranean gulls counted from various locations from Lowestoft to Languard in August and September 2011. However, no congregations of Mediterranean gulls were recorded at Sizewell in these years and very few birds were recorded there during the VP surveys undertaken after the 2011 breeding season from August 2011 to April 2012.

Kittiwake

Kittiwake first bred in Suffolk in 1958 on the South Pier Pavilion in Lowestoft (Piotrowski, 2003). Numbers breeding on the South Pier Pavilion increased to 107 pairs in 1988, after which

the site was demolished, with birds moving to a nearby purpose-built 'kittiwake breeding wall' where a peak of 259 pairs bred in 1995. Since 1994, kittiwakes have also bred on the two rigs (c.150-500m) offshore of Sizewell Power Stations where 219 pairs were present in 2001 (Piotrowski, 2003). More recently, 80 pairs bred in Lowestoft in 2009 (60 on the kittiwake wall and 20 on Clairemont Pier) and 374 pairs bred on the Sizewell rigs in 2008 (Mason [ed] 2009, 2010). The Suffolk colonies represent the only breeding locations for Kittiwake in the East of England Region, and the only ones between the Kent coast and Bempton cliffs / Flamborough colonies in Yorkshire. However, the numbers present on the rigs form a small proportion (0.5%) of the total in England (76,281 pairs during the 1998-2002 Seabird Census, Brown & Grice, 2005).

Results from the VP surveys in 2011-12 indicate that kittiwakes from the regionally important breeding colony at Sizewell generally forage further offshore and are rarely observed feeding within 2km of the shoreline during the breeding season. Most flights of kittiwake recorded during the breeding season (March to August 2011) were in a general south-east or north-east direction (i.e. birds heading out to sea). Very little foraging activity was observed from the shoreline vantage point locations within the study area (i.e. within 5km of the shoreline).

During the winter, congregations of kittiwakes were occasionally seen foraging well offshore (at least 3km from the shoreline) and at the outfall during rough or stormy sea conditions. Thurlow (2010) noted seeing groups of kittiwakes feeding over the sandbank that stretches offshore from Sizewell to Thorpeness. Kittiwakes feed on small shoaling fish such as sand-eels, herring and sprat (Brown & Grice, 2005). During winter, birds forage and rest on the sea far from land, and are rarely seen from the shore, except during stormy conditions (Brown & Grice, 2005).

To conclude, results from the VP surveys in 2011-12 indicate that the inshore waters within the study area do not provide important feeding grounds for the kittiwakes breeding on Sizewell rigs. After the departure of the young and adult birds in August, very few kittiwakes were recorded on the rigs during autumn and winter, although flocks of birds were occasionally seen foraging offshore and at the Sizewell B outfall during stormy conditions.

Little Gull

Little gull breed in Russia and in increasing numbers in Scandinavia, these birds migrating via the UK to their wintering grounds in the eastern Atlantic and Irish Sea (Brown & Grice, 2005). Numbers occurring in the UK have increased dramatically since the 1950s, possibly a result of a westward shift in the species' breeding distribution, with increasing numbers breeding in Scandinavia (Brown & Grice, 2005). In Suffolk, the little gull is described as a fairly common passage migrant and scarce summer and winter visitor (Piotrowski, 2003). Little gulls occur during both the spring passage (April-May) and autumn passage periods (July-September). Offshore movements of birds principally occur in the autumn from September to early November, and have included an exceptional count of 506 birds flying north past Thorpeness on 7 November 1999 (Piotrowski, 2003). Small numbers of little gull occur at Minsmere and Sizewell in spring (April-May) but much larger numbers occur in autumn, particularly around the Sizewell outfall. **Table 4.4** details the peak monthly counts at Sizewell since 2005.

Table 4.4 Peak Monthly Counts of Little Gull at Sizewell⁸

Year	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2011				79	70	30			
2010						26	12	6	
2009			4			75	86		
2008							135		
2007				20	75	5			
2006				8	75	45	20		2
2005				20	100	50	60		

The peak count of 100-140 little gulls (including both adults and first-year birds) recorded between Thorpeness and Sizewell during the VP surveys undertaken in August 2011 represents a very substantial proportion of the total numbers usually recorded in Suffolk during autumn passage. There is no national threshold of importance for a site for little gull (Holt *et al.*, 2011). However, results from Wetland Bird Survey (WeBS) show that the peak count recorded at Sizewell is likely to be of national importance, with only three other sites in the UK surpassing these numbers, as follows (the numbers provided are the 5-year peak mean WeBS Core counts for 2005/06-2009/10):

- Hornsea Mere, East Yorkshire (5,868 birds, peak numbers in September)
- Alt Estuary, Merseyside/Lancashire (186 birds, peak numbers in April)
- Tophill Low lakes, East Yorkshire (179 birds, peak numbers in July)

Little gulls (together with cormorant, other gull species and common tern) congregate around the Sizewell B outfall to forage for small fish. Little gulls appear in July and numbers build up to a peak in August, and then decline through September, with a few lingering into October in some years. Results from the VP surveys show that the Sizewell B outfall attracts nationally important numbers of little gulls during the autumn passage period. Numbers at the outfall vary between years, and are very dependant on whether the facility is in operation at the time. For example, the numbers of little gull fell dramatically immediately after the outfall was put out of operation in early September 2011. Likewise, very few little gulls were seen at Sizewell in 2010, when again the outfall was not expelling warm water.

Common Tern

The common tern is described as a common summer visitor and passage migrant in Suffolk (Mason [ed], 2011) and appears in the Alde-Ore Estuary SSSI citation as an important breeding species for the site. In Suffolk, common terns breed on the coast and in recent years at inland water bodies, such as at Alton Water Reservoir (particularly where tern nesting rafts are provided). Most of the tern colonies that used to occur on beaches have now been deserted due

⁸ The figures have been obtained from Suffolk Birds 2005-2010, and the website: www.birdguides.com

to human disturbance, although a few survive on very inaccessible locations such as Orford Ness. **Table 4.5** shows the number of pairs of breeding common tern recorded in Suffolk at each location since 2005.

Table 4.5 Number of Breeding Common Terns in Suffolk⁹

Site	2010	2009	2008	2007	2006	2005
Alton Water (inland)	n/c	53	n/c	40	35	18
Benacre Broad (coastal)	1					
Dingle Marshes (coastal)			n/c	2		
Flixton (inland)	1					
Havergate Island (coastal)	n/c	n/c	43	n/c	51	67
Lackford Lakes (inland)	1	1	1	1		
Lake Lothing, Lowestoft	5	10	30	13	24	n/c
Minsmere (coastal)	167	191	n/c	35	93	81
Needham Market (inland)		n/c	n/c	1		
Trimley Marshes (coastal)	n/c	0	n/c	35	55	45
Weybread GPs (inland)	2	1		n/c	11	
Suffolk Total:	177	256	74	127	269	211

In recent years, the principal sites holding colonies have been at Minsmere, Havergate Island, Lake Lothing and Alton Water. Allowing for counts that were not received, the county population is likely to be in the region of 200-250 pairs, compared with 1,000-1,500 pairs on Orford Ness alone in the early 1900s (Piotrowski, 2003). A total of 4,700 pairs were recorded breeding along the coast in England during the 1998-2002 Breeding Seabird Census (Brown & Grice, 2005). In addition to this, an estimated 600-1,000 pairs were nesting at inland sites in England (Brown & Grice, 2005). Totals of coastal breeding birds (during the 1998-2002 Census) for individual counties in the East of England Region included: 184 pairs in Suffolk, 502 pairs in Norfolk and 289 pairs in Essex (Brown & Grice, 2005).

In Suffolk, the first common terns usually arrive in mid-April and then breed from May to July. The return migration of these birds is well underway by late July and peaks in August. The migration southwards continues through September and into early October, with very few seen thereafter (Piotrowski, 2003).

During the VP surveys, common terns were regularly seen foraging around Sizewell B outfall from May to September 2011. A steady flow of birds was observed flying between the Minsmere colony and outfall, with many birds carrying fish, presumably to feed young. During the peak period of the breeding season in June, common terns were regularly seen at the outfall. However, in July and August, numbers increased substantially, with a peak count of 230 birds

⁹ n/c denotes that breeding probably took place but that no count was provided

recorded in August. By the end of July, the breeding terns had departed from Minsmere, and an increasing number of fledged juveniles and adults were seen at the outfall, with groups of birds resting on the adjacent beach and on the sea, then making regular visits to the outfall area to pick fish from the waters' surface. Elsewhere, within the study area, groups of 20-40 common terns were regularly seen foraging offshore, with the largest numbers observed diving into the shallow waters up to 1km offshore between Thorpeness and Orford Ness from late July to September. During this period, there was also a steady movement of common terns flying up and down the coastline, often well offshore at least 2km from the shoreline.

To conclude, the results from the surveys indicate that the Sizewell B outfall provides an important foraging resource to common terns derived from the Minsmere colony (and elsewhere) from May to September. Away from the outfall, the inshore waters between Thorpeness and Orford Ness also provide important foraging areas for this species, particularly during the post-fledging period from late July to September.

Arctic Tern

The Arctic tern is described as a fairly common passage migrant that occasionally breeds in Suffolk (Mason [ed], 2011). Breeding Arctic tern appears in the citation for the Alde-Ore Estuary SSSI, although in recent years nesting within the county has been very sporadic. Since 2005, breeding has been attempted in only one year, involving a single pair which bred at Minsmere (Suffolk Birds 2005-2010). Regular breeding has not occurred on Havergate Island since 1994 (Piotrowski, 2003). Small numbers of Arctic tern are recorded along the Suffolk coast during spring passage (April-June) and autumn passage (July-October) and birds also occasionally turn up at inland water bodies, particularly in spring. In 2009, a total of 15 birds were recorded in Suffolk in late July and August, followed by a further 17 in September and 44 in October (Mason [ed], 2010). Owing to the difficulties in identifying this species with certainty (even at modest distances), it is likely that many Arctic terns go undetected as they migrate along the Suffolk coast in spring and autumn. During the autumn migration, small numbers of Arctic tern (usually juveniles) join the common terns to forage around the Sizewell B outfall. Their occurrence at the outfall appears to be sporadic, and there are a number of very late records (in November and even December). **Table 4.6** shows the peak monthly counts of Arctic tern at Sizewell (the figures have been derived from Suffolk Birds 2005-2010, and the website: www.birdguides.com).

Table 4.6 Peak Monthly Counts of Arctic Tern at Sizewell

Year	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2011					7	2			
2010					1	2			
2009					1	2			
2008									
2007					2	15			
2006					2				1
2005					12	10	2	1	

To conclude, the Arctic tern appears to be an annual visitor to the Sizewell B outfall in very small numbers (usually just 1-3 birds, but occasionally in larger numbers) during the autumn passage period from August to November. The numbers occurring at the outfall are very small in terms of the UK breeding population of 52,600 pairs (Seabird 2000, Brown & Grice, 2005).

Black Tern

The black tern is described as a fairly common passage migrant in Suffolk (Mason[ed], 2011). Black terns occur at inland and coastal sites in the spring and autumn passage periods and are seen in the largest numbers during periods of south-easterly winds from late-April to early June (Piotrowski, 2003). The return autumn migration begins in late July (when juveniles are also recorded) and peaks in September, with a few birds lingering into October and even November. Exceptional counts have included 328 birds at Lackford Lakes (inland) in May 2000 and autumn movements off the coast have included 170 birds off Southwold and Minsmere in August 1992 (Piotrowski, 2003), although numbers are usually much smaller. During the autumn passage, black terns also occur around the Sizewell B outfall where birds feed with common terns and gulls. **Table 4.7** shows the peak monthly counts of black tern at Sizewell (the figures have been derived from Suffolk Birds 2005-2010, and the website: www.birdguides.com).

Table 4.7 Peak Monthly Counts of Black Tern at Sizewell

Year	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2011				4	21	1			
2010					5	4			
2009					2	3			
2008		6			3	2			
2007					30	2			
2006				1	7	8	1		
2005					30	8			

The black tern breeds throughout much of Europe and in Russia, and winters in sub-Saharan Africa. In the UK, the black tern was a regular breeder in England, with its stronghold in the Fenland of East Anglia (Brown & Grice, 2005). Due to the drainage of the fens in the 18th Century, the species declined and last bred on a regular basis in the UK in the 1840s and 1850s. Black terns have bred on a handful of occasions in England since, and now the species is almost solely a passage migrant. However, the species remains a regular migrant from mid-April to early June and again from July to October. Counts numbering several tens of black tern are not uncommon on inland water bodies in spring, and large movements of birds have also been recorded off the coast in autumn, including an exceptional count of 10,000 black terns past Dungeness in September 1992. There is no national threshold of importance for a site for black tern and similar to little gull, numbers recorded by the WeBS tend to be dependent on the survey dates coinciding with influxes of passage birds (Holt *et al.*, 2011). However, it is likely that in most autumns, at least several hundred black terns occur for brief periods along the coast and at inland sites. In view of this and evidence from the VP surveys, the Sizewell B outfall is likely



to provide an important foraging resource to migrating black tern during the autumn passage period (July to September).



- Key:**
- Main foraging area
 - Vantage point locations
 - Location of little tern colony



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Figure 4.1
Little Tern Colonies in Suffolk,
2005-2009

0 km 10 km
Scale 1:200,000 @ A3

May 2012
28130-A416.wor tugwc



5. Conclusion

Results from the desk study and VP surveys undertaken from March 2011 to April 2011 indicate that the inshore waters in the study area (including the Sizewell B outfall) provide an important foraging area to a number of seabird species. The outfall at Sizewell provides an important foraging area to black-headed gull and common tern during the breeding season (May-July), to common tern, little gull and black tern during autumn passage (August-September), and to herring gull and great black-backed gull in winter (October-March).

The inshore waters within the study area were also used by large numbers of common tern (primarily during the post-breeding period, in August to September) and smaller numbers of Sandwich tern. Numbers of red-throated diver that are important in terms of the Outer Thames Estuary SPA also occur in the study area from November to early April and these birds are often associated with small groups of great crested grebe, both of which are likely to be feeding on shoals of sprat.

Results from the VP surveys indicate that kittiwake do not forage in the inshore waters around Sizewell on a regular basis but are likely to feed further offshore. Results from the little tern colony surveys indicate that this species primarily feeds close to the colony locations, and that the outfall and waters' in the study area receive low level use by this species. The study area is located within the regular foraging range of little terns breeding at Minsmere, Slaughden and Havergate Island. However, in recent years, breeding has become increasingly sporadic at these sites for a variety of reasons, including beach profile (and therefore habitat suitability), predation and disturbance.

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Appendix A

Survey Visit Details

Table A1 VP Surveys, Survey Dates, Times and Weather Conditions

Location	Date	Time (from)	Time (to)	Wave height (cm)	Wind direction	Wind strength	Cloud cover (of 8)	Precipitation	Visibility
10	22-Mar-11	13:00	13:45	5-15	NE	2	1	None	Poor (misty at 1km+)
11	22-Mar-11	11:30	12:15	10-15	NE	2	0	None	Poor (misty at 1km+)
12	22-Mar-11	10:10	10:55	10-20	NE	0-1	4	None	Poor (misty at 1km+)
1	24-Mar-11	12:30	13:15	5-10	ENE	3	0	None	Very good (5km+)
2	24-Mar-11	13:45	14:30	5-10	ENE	2-3	0	None	Very good (5km+)
3	24-Mar-11	14:50	15:35	5-15	ENE	2-3	3	None	Very good (5km+)
4	25-Mar-11	12:05	12:50	10-15	NE	1-2	0	None	Good (moderate haze)
5	25-Mar-11	14:25	15:10	10-15	E	1-2	0	None	Good (light haze)
6	25-Mar-11	13:30	14:15	10-15	NE	1-2	0	None	Good (moderate haze)
7	28-Mar-11	10:35	11:20	10-20	NE	2-3	6	None	Very good (5km+)
8	28-Mar-11	11:45	12:30	10-20	ENE	3	1	None	Good (moderate haze)
9	28-Mar-11	14:30	15:15	5-15	NE	2	8	None	Poor (misty at 1km+)
9	07-Apr-11	13:25	14:10	0-10	W	3	8	None	Very good (5km+)
10	07-Apr-11	14:50	15:35	0-5	SE	0-2	7	None	Very good (5km+)
11	07-Apr-11	16:15	17:00	0-5	SE	2	8	None	Very good (5km+)

Location	Date	Time (from)	Time (to)	Wave height (cm)	Wind direction	Wind strength	Cloud cover (of 8)	Precipitation	Visibility
12	07-Apr-11	17:40	18:25	0-5	SE	1	7	None	Very good (5km+)
5	08-Apr-11	08:45	09:30	0-5		0	0	None	Very good (5km+)
6	08-Apr-11	10:20	11:05	0-5	W	1	0	None	Good (moderate haze)
7	08-Apr-11	11:35	12:20	0-5	SE	1	0	None	Very good (5km+)
8	08-Apr-11	12:50	13:35	0-5	SE	0-1	0	None	Very good (5km+)
1	11-Apr-11	08:25	09:10	10-15		1	2	None	Very good (5km+)
2	11-Apr-11	09:25	10:10	10-15	W	1-2	1	None	Good (light haze)
3	11-Apr-11	10:45	11:30	10-15	SW	2-3	1	None	Good (light haze)
4	11-Apr-11	11:45	12:30	20-30	SW	3-4	0	None	Good (light haze)
5	13-Apr-11	12:30	13:15	20-40	S	4	8	None	Very good (5km+)
6	13-Apr-11	11:35	12:20	30-60	S	4	8	None	Very good (5km+)
7	14-Apr-11	12:00	12:45	40-60	S	4-5	8	None	Very good (5km+)
8	14-Apr-11	13:15	14:00	30-60	SE	6	7	None	Very good (5km+)
1	18-Apr-11	14:35	15:20	0-10	NE	1-2	6	None	Very good (5km+)
2	18-Apr-11	15:40	16:25	0-10	NE	2	7	None	Very good (5km+)
3	18-Apr-11	16:45	17:30	0-10	NE	2	7	None	Very good (5km+)
4	18-Apr-11	17:50	18:35	0-5	NE	1	7	None	Very good (5km+)
9	19-Apr-11	12:45	13:20	0-5	E	1	7	None	Very good (5km+)
10	19-Apr-11	11:30	12:15	0-5	E	1-2	8	None	Very good (5km+)
11	19-Apr-11	10:10	10:55	0-20	E	2	4	None	Good (light haze)
12	19-Apr-11	08:55	09:40	0-20	E	2	7	None	Very good (5km+)

Location	Date	Time (from)	Time (to)	Wave height (cm)	Wind direction	Wind strength	Cloud cover (of 8)	Precipitation	Visibility
1	10-May-11	10:10	10:55	20	SSE	3-4	1	None	Slight haze
2	10-May-11	11:05	11:50	30-50	SSE	4-5	1	None	Moderate haze
3	10-May-11	12:10	12:55	40-60	SSE	5-6	0	None	Moderate haze
4	18-May-11	15:50	16:35	60-80	S	3-4	5	None	Very good (5km+)
1	19-May-11	14:20	15:05	40-50	ENE	5-6	1	None	Good (slight haze)
2	19-May-11	13:20	14:05	30-40	ENE	4	2	None	Good (slight haze)
3	19-May-11	12:25	13:10	30-40	ENE	4	4	None	Good (slight haze)
4	19-May-11	11:25	12:10	30-40	E	4	4	None	Very good (5km+)
9	20-May-11	08:45	09:30	25	W	1-2	1	None	Very good (5km+)
10	20-May-11	10:15	11:00	25	W	1	0	None	Very good (5km+)
11	20-May-11	11:45	12:30	25	SW	1-2	1	None	Very good (5km+)
12	20-May-11	13:10	13:55	25	SW	1-2	0	None	Very good (5km+)
5	26-May-11	10:40	11:25	50	SW	1-3	7	None	Very good (5km+)
6	26-May-11	09:10	09:55	50	SW	1-3	5	None	Very good (5km+)
7	26-May-11	07:55	08:40	40	SW	1-3	7	None	Very good (5km+)
8	26-May-11	06:55	07:40	25	SW	1-3	3	None	Very good (sun glare in east)
1	08-Jun-11	14:30	15:15	20-30	S	5-6	5	None	Good
2	08-Jun-11	15:30	16:15	30-40	S	5-6	4-5	None	Good
3	08-Jun-11	16:30	17:15	40	S	5-6	6	None	Good
4	08-Jun-11	17:30	18:15	30-40	S	5-6	6	None	Good
5	09-Jun-11	16:45	17:30	30	S-SE	4-5	6	None	Good

Location	Date	Time (from)	Time (to)	Wave height (cm)	Wind direction	Wind strength	Cloud cover (of 8)	Precipitation	Visibility
6	09-Jun-11	15:45	16:30	35	S-SE	5-6	6-7	Light drizzle	Moderate
7	09-Jun-11	14:45	15:30	40	SE	5-6	7-8	Heavy showers	Moderate to poor
8	09-Jun-11	13:45	14:30	30-40	SE	5-6	7-8	Heavy showers	Moderate to poor
9	14-Jun-11	17:00	17:45	20	SE	2	0	None	Very good (5km+)
10	14-Jun-11	18:10	18:55	20	SE	2	0	None	Very good (5km+)
11	14-Jun-11	19:25	20:10	15	SE	2-3	0	None	Very good (5km+)
12	14-Jun-11	20:35	21:20	10	SE	2	1	None	Very good (5km+)
3	16-Jun-11	13:15	14:00	15-30	SW	2	8	Heavy rain	Moderate
4	16-Jun-11	12:20	13:05	15-30	SW	3-4	8	Light rain	Good
1	21-Jun-11	17:20	18:05	100	SSE	5	5-8	None	Hazy
2	21-Jun-11	18:25	19:10	100	SSE	4-5	5-8	None	Hazy
3	21-Jun-11	19:25	20:10	100	SSE	4-5	8	None	Hazy
4	21-Jun-11	20:25	21:10	80	SSE	3-5	2-3	None	Hazy, some glare in east
5	22-Jun-11	08:10	08:55	40	SW	2-3	5	None	Hazy, some glare in east
6	22-Jun-11	09:20	10:05	40	SW	2-3	5	None	Hazy, some glare in east
7	22-Jun-11	10:25	11:10	40	SW	2-3	6-8	Light showers	Good, some glare in east
8	22-Jun-11	11:30	12:15	30	SW	2	8	Light showers	Good, some glare in east
9	24-Jun-11	12:30	13:15	10-20	W	4	6	None	Moderate haze
10	24-Jun-11	08:20	09:05	15-30	W	4	1	None	Slight haze
11	24-Jun-11	09:30	10:15	20-30	W	4-5	1	None	Moderate haze
12	24-Jun-11	11:05	11:50	30-50	W	5	3	None	Moderate haze

Location	Date	Time (from)	Time (to)	Wave height (cm)	Wind direction	Wind strength	Cloud cover (of 8)	Precipitation	Visibility
1	06-Jul-11	12:40	13:25	40-60	SW	4-6	4	None	Very good (5km+)
2	06-Jul-11	13:40	14:25	40-80	S	5-6	4-5	None	Very good (5km+)
3	06-Jul-11	14:45	15:30	60-80	S	6	3	None	Very good (5km+)
4	06-Jul-11	15:40	16:25	60-90	S	5-6	3	None	Very good (5km+)
5	12-Jul-11	10:00	10:45	150	NNE	5	7	None	Good
6	12-Jul-11	08:55	09:40	150	NNE	5	8	None	Good
7	12-Jul-11	07:55	08:35	125	N	4-5	6	None	Strong glare in east
8	12-Jul-11	07:00	07:45	100	N	4	4	None	Strong glare in east
9	13-Jul-11	13:30	14:15	75	NW	4	8	None	Fair, misty at 2km
10	13-Jul-11	10:50	11:35	50	NW	4	8	None	Good
11	13-Jul-11	09:40	10:25	50	NW	3	8	None	Good
12	13-Jul-11	08:25	09:10	50	NW	3	8	None	Good
1	26-Jul-11	18:20	19:05	50	NW	2	8	None	Fair
2	26-Jul-11	17:15	18:00	40	NW	2	8	Light drizzle	Fair
3	26-Jul-11	16:10	16:55	40	NW	2	8	None	Fair
4	26-Jul-11	15:00	15:45	40	NW	2	8	Light drizzle	Fair
5	28-Jul-11	11:40	12:25	25	NE	2	3	None	Misty at 3km
6	28-Jul-11	10:35	11:20	25	NE	2	5	None	Light haze, misty at 3km
7	28-Jul-11	09:35	10:20	25	NE	1	8	None	Misty at 3km
8	28-Jul-11	08:30	09:15	25	NE	1	8	None	Misty at 3km
9	29-Jul-11	13:55	14:45	25-50	N	2	6	None	Good

Location	Date	Time (from)	Time (to)	Wave height (cm)	Wind direction	Wind strength	Cloud cover (of 8)	Precipitation	Visibility
10	29-Jul-11	10:45	11:30	25-50	N	2	8	None	Fair, misty at 2km
11	29-Jul-11	09:30	10:15	25-50	N	1	8	None	Fair, misty at 2km
12	29-Jul-11	08:20	09:05	25-50	N	1	8	None	Fair, misty at 2km
5	03-Aug-11	15:30	16:15	30	S	2-3	4	None	Very good (5km+)
6	03-Aug-11	16:30	17:15	30	S	2-3	3	None	Very good (5km+)
7	03-Aug-11	17:35	18:20	30	S	2-3	2	None	Very good (5km+)
8	03-Aug-11	18:40	19:25	30	S	2-3	5	None	Very good (5km+)
1	04-Aug-11	13:05	13:50	30	W	3	8	Raining	Good
2	04-Aug-11	12:00	12:45	50	W	3	8	Light rain	Good
3	04-Aug-11	11:00	11:45	50	W	3-4	8	None	Very good (5km+)
4	04-Aug-11	09:50	10:35	50	W	4	8	None	Very good (5km+)
7	08-Aug-11	15:15	16:00	20-40	WNW	5-6	7	None	Very good (5km+)
8	08-Aug-11	14:10	14:55	30-40	WNW	6	4	Light rain	Very good (5km+)
9	08-Aug-11	13:05	13:50	20-30	WNW	6	4	None	Very good (5km+)
10	08-Aug-11	11:15	12:00	20-40	WNW	6	5	None	Slight haze
11	08-Aug-11	10:05	10:50	20-30	WNW	5-6	1-2	None	Very good (5km+)
12	08-Aug-11	08:35	09:20	30-40	WSW	4	2	None	Very good (5km+)
1	17-Aug-11	14:00	14:45	40-80	NE	4	7	None	Very good (5km+)
2	17-Aug-11	12:55	13:40	30-50	ENE	3	7	None	Good (light haze)
3	17-Aug-11	11:55	12:40	30-60	E	3	7	None	Very good (5km+)
4	17-Aug-11	10:55	11:40	20-40	ENE	3	6	None	Very good (5km+)

Location	Date	Time (from)	Time (to)	Wave height (cm)	Wind direction	Wind strength	Cloud cover (of 8)	Precipitation	Visibility
5	17-Aug-11	09:05	09:50	40-60	NE	2-3	5	None	Good (light haze)
6	17-Aug-11	08:05	08:50	20-40	N	2	3-4	None	Very good (5km+)
2	24-Aug-11	15:40	16:15	30-60	S	3-4	7	None	Very good (5km+)
3	24-Aug-11	14:40	15:25	30-50	SSW	3	8	None	Very good (5km+)
9	24-Aug-11	13:20	14:05	20-40	S	4	7	None	Very good (5km+)
10	24-Aug-11	11:30	12:15	30-60	SSW	3-4	8	None	Very good (5km+)
11	24-Aug-11	10:20	11:05	30-60	SSW	3-4	8	None	Very good (5km+)
12	24-Aug-11	08:30	09:15	30-60	S	2-3	8	Light rain	Misty at 1km+
2	26-Aug-11	15:10	15:55	60-90	WSW	3	7	None	Very good (5km+)
1	31-Aug-11	14:10	14:55	30-60	NE	3-4	8	None	Very good (5km+)
2	31-Aug-11	13:00	13:45	30-60	NNW	2	7	None	Very good (5km+)
3	31-Aug-11	12:00	12:45	30-60	N	3-4	7	None	Very good (5km+)
4	31-Aug-11	11:00	11:45	30-60	WNW	2	8	None	Very good (5km+)
5	31-Aug-11	09:30	10:15	30-60	W	2	8	None	Very good (5km+)
6	31-Aug-11	08:35	09:20	60-80	W	2	8	None	Very good (5km+)
7	31-Aug-11	07:30	08:15	10-20	W	2	8	None	Very good (5km+)
7	08-Sep-11	16:10	16:55	40-70	SW	4-5	6-8	None	Very good (5km+)
8	08-Sep-11	15:15	16:00	40-80	SSW	4-5	8	None	Very good (5km+)
9	08-Sep-11	14:15	15:00	50-80	SSW	5-6	8	None	Very good (5km+)
10	08-Sep-11	11:30	12:15	50-80	S	5-6	8	Light rain	Very good (5km+)
11	08-Sep-11	10:15	11:00	60-90	S	6	8	None	Very good (5km+)

Location	Date	Time (from)	Time (to)	Wave height (cm)	Wind direction	Wind strength	Cloud cover (of 8)	Precipitation	Visibility
12	08-Sep-11	08:20	09:05	90-120	S	5	8	None	Very good (5km+)
1	09-Sep-11	08:55	09:40	40-60	SW	3	8	Light rain	Good (Misty at 3km+)
2	09-Sep-11	10:05	10:50	30-60	SW	3	8	None	Very good (5km+)
3	09-Sep-11	11:05	11:50	30-60	SW	3-4	8	None	Very good (5km+)
4	09-Sep-11	12:35	13:20	20-40	SW	2-3	8	None	Very good (5km+)
5	09-Sep-11	14:05	14:50	40-60	S	3	8	None	Very good (5km+)
6	09-Sep-11	15:00	15:45	40-60	S	3	7	None	Very good (5km+)
7	22-Sep-11	15:25	16:10	20-40	WSW	4-5	4	None	Very good (5km+)
8	22-Sep-11	14:25	15:10	30-40	WSW	4	2	None	Very good (5km+)
9	22-Sep-11	13:25	14:10	20-30	WSW	5-6	3	None	Very good (5km+)
10	22-Sep-11	11:25	12:10	50-70	WSW	5	3	None	Very good (5km+)
11	22-Sep-11	10:10	10:55	50-70	SSW	5-6	2	None	Good (light haze)
12	22-Sep-11	08:25	09:10	60-90	S	4-5	0	None	Very good (5km+)
1	26-Sep-11	11:05	11:50	50-60	SW	3	7-8	None	Very good (5km+)
2	26-Sep-11	09:55	10:40	30-60	SW	3	7	None	Very good (5km+)
3	26-Sep-11	08:50	09:35	60-80	SW	4	7	None	Very good (5km+)
4	26-Sep-11	07:40	08:25	20-40	S	1-2	7	Light rain	Very good (5km+)
5	26-Sep-11	14:20	15:05	60-90	SW	2-3	4	None	Very good (5km+)
6	26-Sep-11	13:20	14:05	60-80	SW	2-3	7	Showers	Very good (5km+)
1	03-Oct-11	14:55	15:40	30-60	SSW	4	1	None	Light heat haze at 1.5km+
2	03-Oct-11	13:50	14:35	60-100	SSW	4	1	None	Light heat haze at 1.5km+

Location	Date	Time (from)	Time (to)	Wave height (cm)	Wind direction	Wind strength	Cloud cover (of 8)	Precipitation	Visibility
3	03-Oct-11	12:50	13:35	60-120	SSW	4-5	1	None	Light heat haze at 1.5km+
4	03-Oct-11	11:55	12:40	60-90	S	3	7	None	Very good (5km+)
5	03-Oct-11	09:50	10:35	30-60	S	2-3	7-8	Light showers	Very good (5km+)
6	03-Oct-11	08:55	09:40	40-60	SSE	2	5	None	Very good (5km+)
7	07-Oct-11	16:35	17:20	60-90	WNW	4-5	3-4	None	Very good (5km+)
8	07-Oct-11	15:40	16:25	60-80	WNW	5	5	None	Very good (5km+)
9	07-Oct-11	14:40	15:25	40-80	WNW	6	5	None	Very good (5km+)
10	07-Oct-11	12:15	13:00	80-100	WNW	4-5	6	None	Very good (5km+)
11	07-Oct-11	10:35	11:20	20-40	WNW	5-6	6	None	Very good (5km+)
12	07-Oct-11	08:50	09:35	20-40	W	5-6	2	None	Very good (5km+)
1	17-Oct-11	10:35	11:20	20-40	SW	3-4	3-4	None	Good, sun glare in SE
2	17-Oct-11	09:30	10:15	20-40	SW	3	1	None	Good, sun glare in SE
3	17-Oct-11	08:30	09:15	20-40	SW	2-3	0	None	Very good (5km+)
4	17-Oct-11	07:20	08:05	20-40		0-1	0	None	Very good (5km+)
5	17-Oct-11	13:15	14:00	60-100	SSW	5-6	4	None	Very good (5km+)
6	17-Oct-11	12:20	13:05	60-100	S	4-5	5	None	Very good (5km+)
7	21-Oct-11	07:30	08:15	20-40	SW	3	6	None	Good, sun glare in east
8	21-Oct-11	08:25	09:10	20-40	SW	2-3	4-5	None	Good, sun glare in east
9	21-Oct-11	15:35	16:20	60-80	S	5	1-2	None	Very good (5km+)
10	21-Oct-11	13:35	14:20	60-90	S	5-6	3	None	Very good (5km+)
11	21-Oct-11	12:20	13:05	60-100	S	5	6	None	Very good (5km+)

Location	Date	Time (from)	Time (to)	Wave height (cm)	Wind direction	Wind strength	Cloud cover (of 8)	Precipitation	Visibility
12	21-Oct-11	10:30	11:15	60-80	S	5-6	6-7	None	Very good (5km+)
7	07-Nov-11	07:10	07:55	120-160	N	6	8	None	Misty at 1500m+
8	07-Nov-11	15:10	15:55	150-180	NE	6-7	8	None	Misty at 1500m+
9	07-Nov-11	14:15	15:00	120-160	NNE	7	8	None	Misty at 1500m+
10	07-Nov-11	12:05	12:50	90-120	N	6	8	None	Misty at 1500m+
11	07-Nov-11	10:45	11:30	100-120	N	6-7	8	None	Misty at 1500m+
12	07-Nov-11	08:50	09:35	60-120	N	6	8	None	Misty at 1500m+
1	08-Nov-11	13:20	14:05	120-150	E	5-6	8	None	Misty at 1500m+
2	08-Nov-11	12:20	13:05	120-160	ESE	4-5	8	None	Misty at 2000m+
3	08-Nov-11	11:15	12:00	120-150	E	4-5	8	None	Misty at 2000m+
4	08-Nov-11	10:15	11:00	90-120	ESE	5	8	None	Misty at 3000m+
5	08-Nov-11	08:40	09:25	120-180	ENE	6	8	None	Misty at 2500m+
6	08-Nov-11	07:40	08:25	150-180	ENE	6	8	None	Misty at 1500m+
1	23-Nov-11	09:05	09:50	10-25		1	2	None	Good, but heat haze at 3km+
2	23-Nov-11	10:00	10:45	15-30	SW	2-3	4	None	Good, sun glare in SE
3	23-Nov-11	11:00	11:45	10-20	SW	2-3	3-4	None	Good, sun glare in SE
4	23-Nov-11	11:55	12:40	10-20	SW	2	5-6	None	Very good (5km+)
5	23-Nov-11	14:05	14:50	30-40	SW	2-3	8	None	Very good (5km+)
6	23-Nov-11	13:10	13:55	30-40	SW	3	7-8	None	Very good (5km+)
7	23-Nov-11	15:15	16:00	10-20	SW	2-3	8	None	Very good (5km+)

Location	Date	Time (from)	Time (to)	Wave height (cm)	Wind direction	Wind strength	Cloud cover (of 8)	Precipitation	Visibility
8	25-Nov-11	07:15	08:00	20-30	SW	3	8	Raining	Misty at 1500m+
9	25-Nov-11	14:50	15:35	60-80	SW	5-6	2-3	None	Very good (5km+)
10	25-Nov-11	12:15	13:00	40-80	SW	5-6	2-3	None	Very good (5km+)
11	25-Nov-11	10:55	11:40	80-100	SW	4-5	1	None	Good, sun glare in SE
12	25-Nov-11	08:55	09:40	60-80	SW	4-5	2-3	None	Good, sun glare in east
1	01-Dec-11	10:55	11:40	60-80	SW	2-3	8	None	Very good (5km+)
2	01-Dec-11	09:55	10:40	60-80	SW	2	8	None	Very good (5km+)
3	01-Dec-11	08:50	09:35	60-80	SW	2-3	7-8	None	Very good (5km+)
4	01-Dec-11	07:45	08:30	60-80	SW	3	6-7	None	Very good (5km+)
5	01-Dec-11	13:35	14:20	50-70	SW	2-3	7-8	None	Very good (5km+)
6	01-Dec-11	12:40	13:25	40-80	SW	3	5-6	None	Very good (5km+)
7	01-Dec-11	14:50	15:35	30-50	SW	2	8	None	Very good (5km+)
8	08-Dec-11	15:05	15:50	100-150	SSW	6-7	8	None	Very good (5km+)
9	08-Dec-11	14:10	14:55	100-120	SSW	7	8	None	Misty at 2000m+
10	08-Dec-11	12:10	12:55	60-150	SSW	7	8	None	Very good (5km+)
11	08-Dec-11	10:45	11:30	80-150	SSW	7	8	None	Very good (5km+)
12	08-Dec-11	08:50	09:35	100-150	SW	6	8	None	Very good (5km+)
9	15-Dec-11	14:35	15:20	50-80	WSW	6-7	2	None	Very good (5km+)
10	15-Dec-11	12:10	12:55	60-100	WSW	6	7	None	Very good (5km+)
11	15-Dec-11	10:50	11:35	80-120	WSW	6	7	Raining	Very good (5km+)
12	15-Dec-11	09:05	09:50	100-150	WSW	6-7	8	None	Very good (5km+)

Location	Date	Time (from)	Time (to)	Wave height (cm)	Wind direction	Wind strength	Cloud cover (of 8)	Precipitation	Visibility
1	19-Dec-11	15:05	15:50	60-80	SW	2-3	8	Light rain	Good, but misty at 3km+
2	19-Dec-11	14:05	14:50	60-80	SW	3	8	Light rain	Good, but misty at 3km+
3	19-Dec-11	13:10	13:50	60-80	SW	2	8	Raining	Good, but misty at 3km+
4	19-Dec-11	12:00	12:45	60-80	SW	3	8	Light rain	Very good (5km+)
5	19-Dec-11	10:30	11:15	60-80	SW	3	8	Light rain	Very good (5km+)
6	19-Dec-11	09:35	10:20	60-80	SW	3	8	None	Very good (5km+)
7	19-Dec-11	08:30	09:15	40-70	SW	3-4	5-6	None	Glare in SE, hazy at 4km+
8	20-Dec-11	15:00	15:45	20-40	NW	2	8	None	Very good (5km+)
1	03-Jan-12	10:45	11:30	120-180	SW	6-7	8	Light rain	Misty at 3km+
2	03-Jan-12	09:40	10:25	120-180	SW	7	8	None	Misty at 3km+
3	03-Jan-12	08:40	09:25	120-180	SW	7	8	None	Misty at 3km+
4	03-Jan-12	13:30	14:15	120-180	SW	6	8	None	Very good (5km+)
7	03-Jan-12	14:50	13:35	120-150	SW	6	1-2	None	Very good (5km+)
10	06-Jan-12	12:30	13:15	60-90	SW	3-4	1	None	Sun glare in SE
11	06-Jan-12	11:15	12:00	20-40	SW	4	1	None	Sun glare in SE
12	06-Jan-12	09:20	10:05	50-80	SW	6	1-2	None	Sun glare in east
5	18-Jan-12	12:25	13:10	60-90	SSW	4-5	8	None	Misty at 3km+
6	18-Jan-12	11:30	12:15	70-100	SSW	5	8	None	Misty at 2km+
8	18-Jan-12	09:55	10:40	60-90	S	5-6	8	Raining	Misty at 2km+
9	18-Jan-12	08:25	09:20	60-90	S	5-6	8	Light rain	Misty at 2km+
1	20-Jan-12	10:30	11:15	40-80	SW	3-4	8	Raining	Good (3km+)

Location	Date	Time (from)	Time (to)	Wave height (cm)	Wind direction	Wind strength	Cloud cover (of 8)	Precipitation	Visibility
2	20-Jan-12	09:25	10:10	40-60	SW	3-4	8	Raining	Misty at 4-5km+
3	20-Jan-12	08:30	09:15	60-90	SW	3-4	8	Light rain	Good (3km+)
4	20-Jan-12	12:05	12:50	60-100	SW	3-4	8	Raining	Good (3km+)
5	20-Jan-12	14:15	15:00	30-50	W	4	8	None	Very good (5km+)
6	20-Jan-12	13:20	14:05	60-90	SW	4	8	Light rain	Good (3km+)
7	20-Jan-12	15:25	16:10	40-60	W	4	8	None	Very good (5km+)
8	25-Jan-12	15:45	16:30	20-40	SW	2-3	8	None	Very good (5km+)
9	25-Jan-12	14:55	15:40	20-40	SW	3-4	8	None	Very good (5km+)
10	25-Jan-12	10:30	11:15	30-50	SW	3	8	None	Misty at 1.5-2km
11	25-Jan-12	11:40	12:25	30-60	SW	3-4	8	None	Very good (5km+)
12	25-Jan-12	13:20	14:05	30-50	SW	4	8	None	Very good (5km+)
1	03-Feb-12	15:35	16:20	30-50	NW	4	7	None	Very good (5km+)
2	03-Feb-12	14:35	15:20	30-50	NW	4	7	None	Very good (5km+)
3	03-Feb-12	13:40	14:25	30-50	NW	4	4	None	Very good (5km+)
4	03-Feb-12	08:00	08:45	60-80	NW	1-2	5	None	Very good (5km+)
5	03-Feb-12	11:20	12:05	40-60	WNW	3-4	0	None	Sun glare in SE
6	03-Feb-12	12:15	13:00	40-60	WNW	4	1	None	Sun glare in SE
7	03-Feb-12	09:15	10:00	60-100	NW	3	1	None	Sun glare in SE
8	03-Feb-12	10:10	10:55	40-60	NW	3-4	1	None	Sun glare in SE
9	07-Feb-12	14:50	15:35	90-120	ENE	5	1-2	Patchy snow cover to 10cm	Very good (5km+)
10	07-Feb-12	12:20	13:05	40-80	ENE	5	0	Patchy snow cover to 10cm	Sun glare in SE

Location	Date	Time (from)	Time (to)	Wave height (cm)	Wind direction	Wind strength	Cloud cover (of 8)	Precipitation	Visibility
11	07-Feb-12	10:55	11:40	80-170	ENE	5-6	0	None	Sun glare in SE
12	07-Feb-12	09:00	09:45	40-80	NE	4-5	2	None	Sun glare in east
1	20-Feb-12	08:35	09:20	60-80	SW	3	7-8	None	Very good (5km+)
2	20-Feb-12	09:40	10:25	40-60	SW	2-3	8	None	Very good (5km+)
3	20-Feb-12	10:40	11:25	30-60	SW	3-4	4	None	Sun glare in SE
4	20-Feb-12	12:30	13:15	40-60	SW	3	2	None	Very good (5km+)
5	20-Feb-12	13:55	14:40	60-90	S	4	7	None	Very good (5km+)
6	20-Feb-12	14:50	15:35	30-60	S	4	6	None	Very good (5km+)
7	20-Feb-12	15:55	16:40	40-70	S	5	6	None	Very good (5km+)
8	22-Feb-12	15:40	16:25	60-100	S	5	8	Light rain	Misty at 4-5km+
9	22-Feb-12	14:40	15:25	80-120	S	6	8	None	Misty at 4km+
10	22-Feb-12	12:10	12:55	80-120	S	6	8	None	Misty at 4km+
11	22-Feb-12	10:40	11:25	60-100	SSE	6	8	None	Misty at 3km+
12	22-Feb-12	09:00	09:45	80-120	SSE	5	8	None	Misty at 3km+
1	07-Mar-12	10:05	10:50	100-150	SSW	5-6	8	Raining	Misty at 3-4km+
2	07-Mar-12	09:05	09:50	100-150	SSW	5-6	8	Showers	Very good (5km+)
3	07-Mar-12	08:00	08:45	120-150	SSW	6	8	Raining	Very good (5km+)
4	07-Mar-12	15:20	16:05	100-150	SW	4-5	8	Showers	Very good (5km+)
5	07-Mar-12	16:15	17:00	100-150	SW	4	8	Showers	Misty at 6km+
6	07-Mar-12	14:25	15:00	100-150	SSW	5	8	Raining	Misty at 2-3km+, clearing to 6km+
9	07-Mar-12	12:30	13:15	100-150	SSW	5-6	8	Raining	Misty at 4km+

Location	Date	Time (from)	Time (to)	Wave height (cm)	Wind direction	Wind strength	Cloud cover (of 8)	Precipitation	Visibility
7	09-Mar-12	15:50	16:30	40-80	SW	5	7-8	None	Misty at 4-5km+
8	09-Mar-12	14:55	15:40	40-80	SW	4	7	None	Very good (5km+)
10	09-Mar-12	11:55	12:40	40-100	S	5	8	None	Very good (5km+)
11	09-Mar-12	10:30	11:05	40-80	SW	4-5	7-8	None	Very good (5km+)
12	09-Mar-12	08:55	09:40	80-120	SW	4-5	3-4	None	Sun glare in East
1	27-Mar-12	08:20	09:05	20-40	NE	1-2	0	None	Very good (5km+), sun glare in east
2	27-Mar-12	09:35	10:20	30-40	NE	2	0	None	Very good (5km+), sun glare in ESE
3	27-Mar-12	10:45	11:30	20-40	NE	1-2	0	None	Very good (5km+)
4	27-Mar-12	12:10	12:55	20-40	NE	3	1-2	None	Very good (5km+), sun glare in SE
5	27-Mar-12	13:30	14:15	20-40	NE	2-3	1-2	None	Very good (5km+)
6	27-Mar-12	14:25	15:10	20-40	NE	2	1-2	None	Very good (5km+)
7	27-Mar-12	15:30	16:15	20-40	NE	2-3	1	None	Very good (5km+)
8	30-Mar-12	15:00	15:45	30-60	NW	3	7-8	None	Misty at 5km+
9	30-Mar-12	14:05	14:50	30-60	NW	3-4	7	None	Misty at 5km+
10	30-Mar-12	11:55	12:40	20-40	NW	4	6	None	Misty at 4-5km+
11	30-Mar-12	10:30	11:15	20-40	NW	4	8	None	Misty at 4-5km+
12	30-Mar-12	09:00	09:45	10-20	NW	4-5	6	None	Misty at 4-5km+
1	02-Apr-12	08:35	09:20	20-40	WNW	3	5	None	Very good (5km+), sun glare in east
2	02-Apr-12	09:35	10:20	30-60	WNW	3	6-7	None	Very good (5km+), sun glare in ESE
3	02-Apr-12	10:35	11:20	20-40	WNW	3	5-6	None	Very good (5km+), sun glare in SE
4	02-Apr-12	12:05	12:50	30-50	W	3	2-3	None	Very good (5km+), sun glare in SSE

Location	Date	Time (from)	Time (to)	Wave height (cm)	Wind direction	Wind strength	Cloud cover (of 8)	Precipitation	Visibility
5	02-Apr-12	13:25	14:10	30-60	SW	4-5	2-3	None	Very good (5km+), misty at 4-5km+
6	02-Apr-12	14:20	15:05	40-70	SSW	4-5	6-7	None	Very good (5km+)
7	02-Apr-12	15:25	16:10	30-60	W	4-5	6-7	None	Very good (5km+)
8	13-Apr-12	15:30	16:15	30-50	E	2-3	6	None	Very good (5km+)
9	13-Apr-12	14:30	15:15	20-40	E	3	6	None	Very good (5km+)
10	13-Apr-12	12:30	13:15	20-40	E	2	7	None	Very good (5km+), light heat haze
11	13-Apr-12	11:15	12:00	20-40	E	2	4-5	None	Very good (5km+), sun glare in SE
12	13-Apr-12	09:15	10:00	20-40	ENE	2	7-8	None	Very good (5km+)
1	23-Apr-12	08:40	09:25	30-50	SE	3	7-8	None	Very good (5km+)
2	23-Apr-12	07:35	08:20	30-40	SE	3	7-8	None	Very good (5km+), misty at 5-6km+
3	23-Apr-12	06:35	07:20	30-40	SE	1	6-7	None	Very good (5km+), misty at 4km+
4	23-Apr-12	10:20	11:05	40-80	SE	4-5	4	None	Very good (5km+), sun glare in SE
5	23-Apr-12	11:15	12:00	40-80	SE	4	4	None	Very good (5km+), sun glare in SE
6	23-Apr-12	12:40	13:25	60-100	SE	5	2	None	Very good (5km+)
7	23-Apr-12	13:30	14:15	60-100	SE	5-6	3-4	None	Very good (5km+)
8	25-Apr-12	14:30	15:15	150-180	SE	7	8	Light rain	Very good (5km+)
9	25-Apr-12	13:35	14:20	150-180	SE	7	8	Light rain	Very good (5km+)
10	25-Apr-12	11:30	12:15	120-180	SSE	7	8	Heavy rain	Misty at 3km+
11	25-Apr-12	10:20	11:05	100-150	SSE	7	8	Heavy rain	Misty at 3km+
12	25-Apr-12	08:50	09:35	100-150	SSE	6	8	Light rain	Very good (5km+)

Table A2 Three Hour Colony Watches, Survey Dates, Times and Weather Conditions

Location	Date	Field worker	Time (from)	Time (to)	Wave height (cm)	Wind direction	Wind strength	Cloud cover (of 8)	Precipitation	Visibility
Minsmere	11-May-11	M Raven	13:00	16:00	30-40	SW	3	8	None	Very good (3km+)
Minsmere	18-May-11	S Haynes	08:20	12:20	50	SW	4	8	None	Very good (3km+)
Dingle	18-May-11	S Haynes	16:10	19:10	100-150	SW-S	2-3	7-8	None	Slight haze
Dingle	20-May-11	M Raven	12:30	15:30	10-15	SW	4-5	0	None	Moderate haze
Minsmere	23-May-11	M Raven	12:50	15:50	100-120	S	7	1	None	Very good (3km+)
Slaughden	02-Jun-11	S Haynes	08:20	11:20	25	NE	2-3	1	None	Misty, visibility poor beyond 200m
Dingle	09-Jun-11	S Haynes	12:00	15:00	50	SW	2-3	5-7	Heavy showers	Very good (3km+)
Dingle	10-Jun-11	A Miller	07:00	10:00	25	S	3	3	None	Very good (3km+)
Slaughden	10-Jun-11	S Haynes	08:30	11:30	50	SSW	2-3	8	Heavy showers	Moderate
Dingle	10-Jun-11	A Miller	11:00	14:00	20-30	S	4-5	7	None	Slight haze
Dingle	13-Jun-11	M Raven	12:35	15:35	90-120	SE	4-6	8	None	Very good (3km+)
Slaughden	15-Jun-11	S Haynes	08:35	11:35	10	SW	1-2	7-8	None	Very good (3km+)
Minsmere	16-Jun-11	T Sykes	05:30	08:30	5	W	1-3	8-3	None	Very good (3km+)
Dingle	16-Jun-11	T Sykes	09:40	12:40	5	W	1-2	6	Light rain from 1220hrs	Very good (3km+)
Minsmere	23-Jun-11	M Raven	07:55	10:55	15-20	W	4-5	7-8	None	Very good (3km+)
Slaughden	23-Jun-11	M Raven	12:55	15:55	40-60	W	4-7	7-8	Heavy showers	Very good (3km+)
Dingle	24-Jun-11	M Raven	14:25	17:25	15-30	SW	3-4	6	None	Very good (3km+)
Minsmere	29-Jun-11	S Haynes	08:00	11:00	25	SW	2	4	None	Very good (3km+)
Dingle	29-Jun-11	S Haynes	12:00	15:00	25	SW	2	3	None	Very good (3km+)
Dingle	07-Jul-11	S Haynes	08:30	11:30	50	SW	2	4	None	Very good (3km+)

Location	Date	Field worker	Time (from)	Time (to)	Wave height (cm)	Wind direction	Wind strength	Cloud cover (of 8)	Precipitation	Visibility
Minsmere	12-Jul-11	M Raven	12:35	15:35	70-100	N	4-6	8	None	Very good (3km+)
Dingle	14-Jul-11	S Haynes	16:00	19:00	200	SW	2	8	None	Fair-good, misty, spray at 1km
Dingle	22-Jul-11	S Haynes	08:10	11:35	50	SW	2	4	None	Fair, sun glare
Dingle	27-Jul-11	S Haynes	10:00	13:00	25	N	2	8	None	Misty at 3km
Minsmere	27-Jul-11	S Haynes	15:00	18:00	25	N	2	6	None	Good
Dingle	01-Aug-11	M Raven	10:20	13:20	50-70	E	4-5	1	None	Moderate haze
Minsmere	01-Aug-11	M Raven	14:50	17:50	60-90	E	5	0-1	None	Moderate haze
Dingle	12-Aug-11	M Raven	08:05	11:05	15-20	SW-NW	3-4	8	Light rain	Misty at 1-1.5km
Sizewell outfall	12-Aug-11	M Raven	12:40	15:40	40-60	NE	3	8	None	Very good (3km+)

Table A3 Extended Colony Watches, Survey Dates, Times and Weather Conditions

Location	Date	Field worker	Time (from)	Time (to)	Wave height (cm)	Wind direction	Wind strength	Cloud cover (of 8)	Precipitation	Visibility
Dingle	17-May-11	S Haynes	08:20	14:45	50-100	SW	3	7-8	None	Very good (3km+)
Minsmere	19-May-11	S Haynes	09:00	15:00	25	ENE	1-2	2-5	None	Very good (3km+)
VP2	23-May-11	S Haynes	08:45	15:50	150-200	SW	6-7	2-4	None	Very good (3km+)
VP3	24-May-11	S Haynes	08:00	15:00	25	W-SW	3	2	None	Good (sun glare in east)
Dingle	03-Jun-11	S Haynes	07:50	14:50	150	NE	3-5	0-8	None	Early mist clearing, then very good visibility
Minsmere	08-Jun-11	S Haynes	08:15	15:15	100	SW	2-4	5-7	None	Good, but some sun glare and haze
VP2	15-Jun-11	T Sykes	10:30	17:50	30	SSE	4	5-7	None	Very good (3km+)
VP3	23-Jun-11	T Sykes	08:00	15:45	50	S	3-5	3-8	None	Very good (3km+)
Dingle	06-Jul-11	S Haynes	08:15	15:15	50	SW	3-4	4	None	Good, but sun glare in east
VP3	15-Jul-11	S Haynes	08:00	15:00	100	SW	2-3	2-3	None	Good, but sun glare in east
Dingle	19-Jul-11	S Haynes	08:00	15:00	50	S-SE	3-4	5-6	None	Very good (3km+)
VP2	20-Jul-11	S Haynes	08:15	15:15	25	SW	1-2	5-7	None	Very good (3km+)

Appendix B

Desk Study, Bird Data

Table B1 SBRC Data, Total Annual Counts¹⁰

English name	Location	2000	2001	2002	2003	2004	2005	2006	2007	2008
Scaup	North Warren	12		8	13					
Scaup	Thorpeness								12	11
Eider	North Warren	717	549	54						
Eider	Slaughden								5	1
Eider	Thorpeness								75	251
Long-tailed duck	North Warren		1	4						
Long-tailed duck	Sizewell								1	
Long-tailed duck	Thorpeness								2	3
Common scoter	North Warren	4,031	6,440	2,602						
Common scoter	Sizewell									70
Common scoter	Slaughden								30	38
Common scoter	Thorpeness								1,622	4,526
Velvet scoter	North Warren	29	24	22	13					

¹⁰ NB: a blank cell does not confirm that the species was not present at that site in that year, but that no count was undertaken, or that the data was not submitted to the SBRC

English name	Location	2000	2001	2002	2003	2004	2005	2006	2007	2008
Velvet scoter	Sizewell									1
Velvet scoter	Slaughden								2	1
Velvet scoter	Thorpeness								9	18
Goldeneye	Aldeburgh								3	
Goldeneye	North Warren	66	24	32	1	2				
Goldeneye	Thorpeness								11	64
Red-breasted merganser	North Warren	181	56	45						
Red-breasted merganser	Slaughden									2
Red-breasted merganser	Thorpeness								19	66
Red-throated diver	North Warren	31,757	28,951	10,754	3,650					
Red-throated diver	Slaughden									1
Red-throated diver	Thorpeness								3,736	28,670
Black-throated diver	North Warren	7	8	4	6					
Black-throated diver	Slaughden								1	
Black-throated diver	Thorpeness								21	27
Great northern diver	North Warren	3	1	2	1					
Great northern diver	Slaughden									1
Great northern diver	Thorpeness								5	9
Great crested grebe	North Warren	826	917	602	445	11				
Great crested grebe	Thorpeness								1,416	1,292
Red-necked grebe	North Warren	7	4	7	2		1			
Red-necked grebe	Thorpeness								6	6

English name	Location	2000	2001	2002	2003	2004	2005	2006	2007	2008
Slavonian grebe	North Warren	4								
Cormorant	North Warren	3,772	2,875	1,206	392	173	149			
Cormorant	Sizewell Rigs								80	
Grey phalarope	North Warren	4								
Grey phalarope	Thorpeness									1
Pomarine skua	North Warren	292	30	20	5					
Pomarine skua	Sizewell								1	1
Pomarine skua	Thorpeness								36	73
Arctic skua	North Warren	143	168	74	57				1	
Arctic skua	Sizewell								1	8
Arctic skua	Sizewell Rigs									6
Arctic skua	Slaughden								1	
Arctic skua	Thorpeness								73	216
Long-tailed skua	North Warren	3	6	1						
Long-tailed skua	Orford Ness									5
Long-tailed skua	Thorpeness								3	6
Great skua	North Warren	33	34	13	9					
Great skua	Thorpeness								45	69
Kittiwake	North Warren	12,561	16,698	1,905						
Kittiwake	Thorpeness								2,063	11,044
Black-headed gull	North Warren	8,379	17,145	3,401	1,601	2,633	1,583			1,403
Black-headed gull	Thorpeness								482	219

English name	Location	2000	2001	2002	2003	2004	2005	2006	2007	2008
Little gull	Minsmere								3	
Little gull	North Warren	508	633	453	227	8	2		1	
Little gull	Sizewell								9	265
Little gull	Sizewell Rigs								194	49
Little gull	Slaughden								2	
Little gull	Thorpeness								174	718
Mediterranean gull	Aldeburgh									2
Mediterranean gull	North Warren	17	8	4			3		2	
Mediterranean gull	Sizewell								3	
Mediterranean gull	Thorpeness									24
Common gull	North Warren	1,695	19,964	164	4	31	28			
Common gull	Thorpeness									136
Lesser black-backed gull	North Warren	54	4,561	2,867	430	72	83			201
Lesser black-backed gull	Thorpeness									223
Herring gull	North Warren	119	1,413	430	346	333	268			
Iceland gull	North Warren	3				2	1		1	2
Iceland gull	Orford Ness									1
Glaucous gull	North Warren	4	1	1			2			1
Glaucous gull	Sizewell								1	
Glaucous gull	Sizewell Rigs								1	
Glaucous gull	Slaughden									3
Glaucous gull	Thorpeness									1

English name	Location	2000	2001	2002	2003	2004	2005	2006	2007	2008
Great black-backed gull	North Warren	74	71	37	78	78	107			351
Great black-backed gull	Thorpeness									22
Little tern	North Warren	62	99	99	44	2				
Little tern	Sizewell				1	16				
Little tern	Slaughden									2
Little tern	Thorpeness								89	340
Black tern	Minsmere									1
Black tern	North Warren	18	13	3						
Black tern	Sizewell								30	7
Black tern	Sizewell Rigs									11
Black tern	Thorpeness								10	25
Whiskered tern	Sizewell									2
Sandwich tern	North Warren	773	1,076	668	90		3			
Sandwich tern	Sizewell									2
Sandwich tern	Thorpeness								314	3,422
Common tern	Minsmere									3
Common tern	North Warren	1,338	4,869	1,296	389	7	8			20
Common tern	Sizewell Rigs								2	40
Common tern	Thorpeness								2,535	17,120
Roseate tern	North Warren		1							
Roseate tern	Thorpeness								3	2
Arctic tern	North Warren	22	11	7	1				1	

English name	Location	2000	2001	2002	2003	2004	2005	2006	2007	2008
Arctic tern	Sizewell								21	1
Arctic tern	Sizewell Rigs								16	7
Arctic tern	Slaughden								4	
Arctic tern	Thorpeness								72	22
Guillemot	North Warren	25,034	30,028	5,572	4,079					
Guillemot	Thorpeness								4,308	422
Razorbill	North Warren	16	3	4	5					
Razorbill	Thorpeness								18	124

Table B2 Peak Monthly WeBS Counts¹¹

Sector	Sector description	Species common name	Species biological name	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
33073	Minsmere (not offshore)	Wigeon	<i>Anas penelope</i>	4	27	291	241	517	768	714	935	550	190	2	2
33074	Minsmere (offshore)	Wigeon	<i>Anas penelope</i>	0	0	0	0	0	12	0	3	0	0		0
33312	Sizewell Belts	Wigeon	<i>Anas penelope</i>			16	27	12	7	31	75	60			
33352	North Warren & Thorpeness	Wigeon	<i>Anas penelope</i>			150	235	1,400	2,025	3,120	2,750	1,120			
33445	Alde Estuary (S5)	Wigeon	<i>Anas penelope</i>			0	0	331	1,070	359	160	888			
33445	Alde Estuary (S9)	Wigeon	<i>Anas penelope</i>				649	1,682	1,652	2,213	1,834	1,162			
33073	Minsmere (not offshore)	Teal	<i>Anas crecca</i>	75	761	1,252	1,796	1,429	1,155	1,105	735	643	388	4	33
33074	Minsmere (offshore)	Teal	<i>Anas crecca</i>	0	0	0	0	0	0	3	2	0	0		0
33312	Sizewell Belts	Teal	<i>Anas crecca</i>			12	20	28	60	117	69	61			
33352	North Warren & Thorpeness	Teal	<i>Anas crecca</i>			260	555	860	1,017	789	560	340			
33445	Alde Estuary (S5)	Teal	<i>Anas crecca</i>			0	0	10	17	54	13	11			
33445	Alde Estuary (S9)	Teal	<i>Anas crecca</i>				349	1,146	1,210	1,261	1,119	591			
33073	Minsmere (not offshore)	Scaup	<i>Aythya marila</i>	0	0	0	0	0	0	0	1	0	0	0	0
33073	Minsmere (not offshore)	Common scoter	<i>Melanitta nigra</i>	0	0	0	0	0	1	0	0	0	1	0	0
33074	Minsmere (offshore)	Common scoter	<i>Melanitta nigra</i>	0	1	0	0	40	10	200	6	0	0		0
33073	Minsmere (not offshore)	Goldeneye	<i>Bucephala clangula</i>	0	0	0	0	0	2	5	6	3	3	0	0
33074	Minsmere (offshore)	Goldeneye	<i>Bucephala clangula</i>	0	0	0	0	3	0	0	0	0	0		0
33445	Alde Estuary (S5)	Goldeneye	<i>Bucephala clangula</i>			0	0	3	4	5	3	3			

¹¹ Zero denotes that a count was undertaken but the species was not recorded; a blank that no count was undertaken for that species

Sector	Sector description	Species common name	Species biological name	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
33445	Alde Estuary (S9)	Goldeneye	<i>Bucephala clangula</i>				0	1	2	2	3	0			
33074	Minsmere (offshore)	Red-breasted merganser	<i>Mergus serrator</i>	0	0	0	1	0	0	0	0	0	0		0
33445	Alde Estuary (S5)	Red-breasted merganser	<i>Mergus serrator</i>				0	2	0	0	1	0			
33445	Alde Estuary (S9)	Red-breasted merganser	<i>Mergus serrator</i>				0	0	1	2	3	1			
33074	Minsmere (offshore)	Red-throated diver	<i>Gavia stellata</i>	0	0	0	0	2	56	3	1	10	3		0
33445	Alde Estuary (S5)	Great northern diver	<i>Gavia immer</i>				0	1	0	0	0	0			
33445	Alde Estuary (S9)	Great northern diver	<i>Gavia immer</i>				0	0	1	0	0	0			
33073	Minsmere (not offshore)	Great crested grebe	<i>Podiceps cristatus</i>	4	5	2	0	0	0	0	2	3	4	3	4
33074	Minsmere (offshore)	Great crested Grebe	<i>Podiceps cristatus</i>	0	0	0	2	21	57	10	202	18	0		0
33445	Alde Estuary (S5)	Great crested Grebe	<i>Podiceps cristatus</i>				0	5	4	7	5	6			
33445	Alde Estuary (S9)	Great crested Grebe	<i>Podiceps cristatus</i>				0	0	0	32	0	0			
33073	Minsmere (not offshore)	Cormorant	<i>Phalacrocorax carbo</i>	16	43	20	12	13	6	4	5	6	4	7	14
33074	Minsmere (offshore)	Cormorant	<i>Phalacrocorax carbo</i>	0	0	0	1	0	4	1	0	0	0		1
33312	Sizewell Belts	Cormorant	<i>Phalacrocorax carbo</i>				1	0	1	1	0	1	0		
33352	North Warren & Thorpeness	Cormorant	<i>Phalacrocorax carbo</i>				12	6	15	14	10	6	2		
33445	Alde Estuary (S5)	Cormorant	<i>Phalacrocorax carbo</i>				6	7	15	3	4	2	4		
33445	Alde Estuary (S9)	Cormorant	<i>Phalacrocorax carbo</i>				51	45	137	88	181	102			
33073	Minsmere (not offshore)	Black-headed gull	<i>Chroicocephalus ridibundus</i>	288	10	19	107	25	32	126	326	1,311	2,547	2,153	838
33074	Minsmere (offshore)	Black-headed gull	<i>Chroicocephalus ridibundus</i>				0	2	0	2	1	0	0		0
33312	Sizewell Belts	Black-headed gull	<i>Chroicocephalus ridibundus</i>				0	0	0	41	0	0			
33352	North Warren & Thorpeness	Black-headed gull	<i>Chroicocephalus ridibundus</i>				35	159	255	270	435	230	181		
33445	Alde Estuary (S5)	Black-headed gull	<i>Chroicocephalus ridibundus</i>				118	91	187	108	149	101	89		

Sector	Sector description	Species common name	Species biological name	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
33445	Alde Estuary (S9)	Black-headed gull	<i>Chroicocephalus ridibundus</i>				151	354	117	342	2,231	448			
33073	Minsmere (not offshore)	Little gull	<i>Hydrocoloeus minutus</i>	15	8	0	0	0	1	0	0	0	0	3	11
33074	Minsmere (offshore)	Little gull	<i>Hydrocoloeus minutus</i>			0	0	1	0	0	0	0			0
33073	Minsmere (not offshore)	Mediterranean gull	<i>Larus melanocephalus</i>	4	0	0	1	0	0	0	4	15	45	14	11
33445	Alde Estuary (S9)	Mediterranean gull	<i>Larus melanocephalus</i>				0	1	0	1	3	0			
33073	Minsmere (not offshore)	Common gull	<i>Larus canus</i>	0	0	4	7	13	16	46	18	10	10	154	1
33074	Minsmere (offshore)	Common gull	<i>Larus canus</i>			0	1	0	0	0	0	0			0
33352	North Warren & Thorpeness	Common gull	<i>Larus canus</i>			0	1	4	4	19	3	3			
33445	Alde Estuary (S5)	Common gull	<i>Larus canus</i>			0	1	0	0	2	0	3			
33445	Alde Estuary (S9)	Common gull	<i>Larus canus</i>				10	50	140	75	184	14			
33073	Minsmere (not offshore)	Lesser black-backed gull	<i>Larus fuscus</i>	177	3	14	26	22	5	29	16	36	29	29	88
33074	Minsmere (offshore)	Lesser black-backed gull	<i>Larus fuscus</i>			0	4	0	0	0	0	0			0
33352	North Warren & Thorpeness	Lesser black-backed gull	<i>Larus fuscus</i>			68	31	14	12	26	50	41			
33445	Alde Estuary (S5)	Lesser black-backed gull	<i>Larus fuscus</i>			1	0	11	0	0	0	0			
33445	Alde Estuary (S9)	Lesser black-backed gull	<i>Larus fuscus</i>				14	20	15	53	831	2,160			
33073	Minsmere (not offshore)	Herring gull	<i>Larus argentatus</i>	2	1	5	3	41	42	93	146	253	28	42	9
33074	Minsmere (offshore)	Herring gull	<i>Larus argentatus</i>			13	2	0	12	5	3	0			1
33312	Sizewell Belts	Herring gull	<i>Larus argentatus</i>			0	0	0	0	2	2	3			
33352	North Warren & Thorpeness	Herring gull	<i>Larus argentatus</i>			10	40	18	50	78	28	44			
33445	Alde Estuary (S5)	Herring gull	<i>Larus argentatus</i>			8	28	30	12	52	14	12			
33445	Alde Estuary (S9)	Herring gull	<i>Larus argentatus</i>				57	210	343	393	711	697			
33073	Minsmere (not offshore)	Yellow-legged gull	<i>Larus michahellis</i>	0	0	0	0	1	1	2	1	3	1	0	1

Sector	Sector description	Species common name	Species biological name	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
33073	Minsmere (not offshore)	Caspian gull	<i>Larus Cachinnans</i>	0	0	0	1	1	0	1	1	2	1	0	0
33074	Minsmere (offshore)	Caspian gull	<i>Larus Cachinnans</i>				0	0	1	0	0	0			0
33352	North Warren & Thorpeness	Caspian gull	<i>Larus Cachinnans</i>				0	1	0	1	0	1			
33445	Alde Estuary (S9)	Yellow-legged gull	<i>Larus michahellis</i>				1	1	1	0	3	0			
33073	Minsmere (not offshore)	Glaucous gull	<i>Larus hyperboreus</i>	0	0	0	0	0	0	0	0	1	0	0	0
33445	Alde Estuary (S9)	Glaucous gull	<i>Larus hyperboreus</i>				0	0	0	1	0	0			
33073	Minsmere (not offshore)	Great black-backed gull	<i>Larus marinus</i>	2	0	1	3	27	41	53	102	148	38	13	2
33074	Minsmere (offshore)	Great black-backed gull	<i>Larus marinus</i>				0	0	2	0	1	0			0
33352	North Warren & Thorpeness	Great black-backed gull	<i>Larus marinus</i>				10	59	21	20	53	58	16		
33445	Alde Estuary (S5)	Great black-backed gull	<i>Larus marinus</i>				0	3	7	0	2	2	4		
33445	Alde Estuary (S9)	Great black-backed gull	<i>Larus marinus</i>				41	52	64	32	39	76			
33073	Minsmere (not offshore)	Little tern	<i>Sternula albifrons</i>	67	1	0	0	0	0	0	0	0	0	16	53
33074	Minsmere (offshore)	Little tern	<i>Sternula albifrons</i>				0	0	0	0	0	0		6	20
33073	Minsmere (not offshore)	Sandwich tern	<i>Sterna sandvicensis</i>	847	50	0	0	0	0	0	0	0	10	3	405
33074	Minsmere (offshore)	Sandwich tern	<i>Sterna sandvicensis</i>				0	0	0	0	0	0		0	2
33073	Minsmere (not offshore)	Common tern	<i>Sterna hirundo</i>	210	64	0	0	0	0	0	0	0	2	163	189
33074	Minsmere (offshore)	Common tern	<i>Sterna hirundo</i>				0	0	0	0	0	0		0	3
33073	Minsmere (not offshore)	Roseate tern	<i>Sterna dougallii</i>	3	0	0	0	0	0	0	0	0	0	0	1
33073	Minsmere (not offshore)	Arctic tern	<i>Sterna paradisaea</i>	1	1	0	0	0	0	0	0	0	0	0	2

Appendix C

Survey Results

Table C1 Peak counts of foraging and resting birds recorded from each VP¹²

Species common name	Species biological name	VP	Location	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
Brent goose	<i>Branta bernicla</i>	1	On beach	0	0	0	0	0	0	0	0	16	0	0	0	0	0
Brent goose	<i>Branta bernicla</i>	4	Inshore waters	0	0	0	0	0	0	8	0	0	0	0	0	0	0
Brent goose	<i>Branta bernicla</i>	5	Inshore waters	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Brent goose	<i>Branta bernicla</i>	11	Inshore waters	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Wigeon	<i>Anas penelope</i>	1	Inshore waters	0	0	0	0	0	0	0	50	0	0	0	8	0	0
Wigeon	<i>Anas penelope</i>	2	Inshore waters	0	0	0	0	0	0	0	100	0	0	0	0	0	0
Wigeon	<i>Anas penelope</i>	3	Inshore waters	0	0	0	0	0	0	0	95	0	0	0	0	0	0
Wigeon	<i>Anas penelope</i>	4	Inshore waters	0	0	0	0	0	0	0	100	0	0	0	0	0	0
Wigeon	<i>Anas penelope</i>	7	Inshore waters	0	0	0	0	0	0	0	0	0	0	0	0	10	8
Wigeon	<i>Anas penelope</i>	8	Inshore waters	0	0	0	0	0	0	0	10	0	0	0	0	0	0
Wigeon	<i>Anas penelope</i>	9	Inshore waters	0	0	0	0	0	0	0	0	0	0	25	0	0	0
Wigeon	<i>Anas penelope</i>	11	Inshore waters	0	0	0	0	0	0	0	0	0	0	50	0	0	0

¹² The figures show the peak count of birds recorded during a 45-minute watch. The five species of 'common' gulls (black-headed, common, lesser black-backed, herring and great black-backed) were not routinely counted during the watches. Peak counts from the 3 and 6 hour colony survey watches undertaken from VP2 and VP3 have also been included.

Species common name	Species biological name	VP	Location	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
Wigeon	<i>Anas penelope</i>	12	Inshore waters	11	0	0	0	0	0	0	0	0	0	0	0	0	0
Gadwall	<i>Anas strepera</i>	1	Inshore waters	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Gadwall	<i>Anas strepera</i>	11	Inshore waters	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Teal	<i>Anas crecca</i>	1	Inshore waters	0	0	0	0	0	0	0	100	0	0	0	0	0	0
Teal	<i>Anas crecca</i>	2	Inshore waters	0	0	0	0	0	0	0	40	0	0	0	0	0	0
Teal	<i>Anas crecca</i>	3	Inshore waters	0	0	0	0	0	0	0	18	0	0	0	0	0	0
Teal	<i>Anas crecca</i>	4	Inshore waters	0	0	0	0	0	0	0	70	0	0	0	0	0	0
Teal	<i>Anas crecca</i>	5	Inshore waters	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Teal	<i>Anas crecca</i>	8	Inshore waters	0	0	0	0	0	0	0	5	0	0	140	0	0	0
Teal	<i>Anas crecca</i>	9	Inshore waters	0	0	0	0	0	0	0	0	0	0	300	0	0	0
Teal	<i>Anas crecca</i>	11	Inshore waters	0	0	0	0	0	0	0	0	0	0	10	0	0	0
Teal	<i>Anas crecca</i>	12	Inshore waters	0	0	0	0	0	0	0	0	0	0	100	0	0	0
Mallard	<i>Anas platyrhynchos</i>	11	Inshore waters	0	0	0	0	0	0	0	0	0	0	5	0	0	0
Eider	<i>Somateria mollissima</i>	7	Inshore waters	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Eider	<i>Somateria mollissima</i>	9	Inshore waters	0	0	0	0	0	0	0	0	0	0	0	0	8	0
Eider	<i>Somateria mollissima</i>	10	Inshore waters	0	0	0	4	0	0	0	0	0	0	0	0	0	0
Eider	<i>Somateria mollissima</i>	11	Inshore waters	0	0	0	5	0	0	0	0	4	0	0	0	0	0
Eider	<i>Somateria mollissima</i>	12	Inshore waters	0	0	0	0	0	2	1	0	0	0	0	0	0	0
Common scoter	<i>Melanitta nigra</i>	2	Inshore waters	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Common scoter	<i>Melanitta nigra</i>	4	Inshore waters	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Common scoter	<i>Melanitta nigra</i>	5	Inshore waters	0	1	0	0	0	0	0	0	24	4	0	0	0	0
Common scoter	<i>Melanitta nigra</i>	6	Inshore waters	0	11	0	0	20	0	8	5	32	0	0	0	0	0

Species common name	Species biological name	VP	Location	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
Common scoter	<i>Melanitta nigra</i>	7	Inshore waters	3	0	0	0	0	0	0	0	22	1	0	0	0	0
Common scoter	<i>Melanitta nigra</i>	8	Inshore waters	3	0	0	0	0	0	0	0	0	0	0	0	0	0
Common scoter	<i>Melanitta nigra</i>	9	Inshore waters	0	0	0	20	0	0	0	0	0	0	0	0	0	0
Common scoter	<i>Melanitta nigra</i>	10	Inshore waters	0	0	0	0	0	0	0	0	0	30	0	0	0	0
Red-throated diver	<i>Gavia stellata</i>	1	Inshore waters	42	3	0	0	0	0	0	0	0	3	0	57	18	0
Red-throated diver	<i>Gavia stellata</i>	2	Inshore waters	7	1	0	0	0	0	0	0	0	1	1	10	16	20
Red-throated diver	<i>Gavia stellata</i>	3	Inshore waters	14	5	0	0	0	0	0	0	0	1	0	7	14	1
Red-throated diver	<i>Gavia stellata</i>	4	Inshore waters	5	0	0	0	0	0	0	0	0	7	7	9	17	0
Red-throated diver	<i>Gavia stellata</i>	5	Inshore waters	190	4	0	0	0	0	0	0	0	3	3	8	2	2
Red-throated diver	<i>Gavia stellata</i>	6	Inshore waters	101	7	0	0	0	0	0	0	3	1	2	10	8	10
Red-throated diver	<i>Gavia stellata</i>	7	Inshore waters	56	2	0	0	0	0	0	0	1	3	13	8	13	12
Red-throated diver	<i>Gavia stellata</i>	8	Inshore waters	16	1	0	0	0	0	0	0	0	2	3	7	3	0
Red-throated diver	<i>Gavia stellata</i>	9	Inshore waters	2	1	0	0	0	0	0	0	0	1	1	0	10	1
Red-throated diver	<i>Gavia stellata</i>	10	Inshore waters	7	1	0	0	0	0	0	0	0	1	6	3	22	4
Red-throated diver	<i>Gavia stellata</i>	11	Inshore waters	5	11	0	0	0	0	0	0	1	0	6	2	60	2
Red-throated diver	<i>Gavia stellata</i>	12	Inshore waters	18	3	0	0	0	0	0	0	0	1	6	3	10	1
Black-throated diver	<i>Gavia arctica</i>	3	Inshore waters	0	0	0	0	0	0	0	0	0	1	0	1	0	0
Black-throated diver	<i>Gavia arctica</i>	4	Inshore waters	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Great crested grebe	<i>Podiceps cristatus</i>	1	Inshore waters	0	0	0	0	0	0	0	0	2	10	1	39	2	1
Great crested grebe	<i>Podiceps cristatus</i>	2	Inshore waters	0	0	0	0	0	0	0	0	0	0	0	1	4	0
Great crested grebe	<i>Podiceps cristatus</i>	3	Inshore waters	0	0	0	0	0	0	0	0	0	1	4	2	2	0
Great crested grebe	<i>Podiceps cristatus</i>	4	Inshore waters	0	0	0	0	0	0	0	0	0	12	5	6	3	0

Species common name	Species biological name	VP	Location	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
Great crested grebe	<i>Podiceps cristatus</i>	5	Inshore waters	2	0	0	0	0	0	0	0	1	2	6	2	1	0
Great crested grebe	<i>Podiceps cristatus</i>	6	Inshore waters	0	0	0	0	0	0	0	0	0	4	6	4	3	0
Great crested grebe	<i>Podiceps cristatus</i>	7	Inshore waters	0	0	0	0	0	0	0	0	0	3	5	10	2	0
Great crested grebe	<i>Podiceps cristatus</i>	8	Inshore waters	0	0	0	0	0	0	0	0	1	2	1	1	1	1
Great crested grebe	<i>Podiceps cristatus</i>	9	Inshore waters	0	0	0	1	0	0	0	0	0	0	1	1	0	0
Great crested grebe	<i>Podiceps cristatus</i>	10	Inshore waters	0	0	0	0	0	0	0	0	0	0	0	2	0	0
Great crested grebe	<i>Podiceps cristatus</i>	11	Inshore waters	0	0	0	0	0	0	0	0	0	0	4	1	3	0
Great crested grebe	<i>Podiceps cristatus</i>	12	Inshore waters	0	0	0	0	0	0	0	0	0	0	20	1	5	3
Fulmar	<i>Fulmarus glacialis</i>	3	Inshore waters	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Gannet	<i>Morus bassanus</i>	2	Siz B outfall	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Gannet	<i>Morus bassanus</i>	8	Inshore waters	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Gannet	<i>Morus bassanus</i>	10	Inshore waters	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Cormorant	<i>Phalacrocorax carbo</i>	1	Inshore waters	20	0	0	0	0	0	1	1	0	1	5	3	0	1
Cormorant	<i>Phalacrocorax carbo</i>	2	Inshore waters	0	0	0	0	0	15	2	21	37	63	0	96	0	1
Cormorant	<i>Phalacrocorax carbo</i>	2	North Rig	32	5	4	0	4	13	8	36	29	40	67	78	75	48
Cormorant	<i>Phalacrocorax carbo</i>	2	Siz A outfall structure	0	0	0	0	0	0	1	0	0	2	0	0	1	0
Cormorant	<i>Phalacrocorax carbo</i>	2	Siz B outfall	0	0	0	0	1	6	0	1	10	6	24	25	1	2
Cormorant	<i>Phalacrocorax carbo</i>	2	Siz B outfall structure	0	0	0	0	2	0	0	3	4	5	7	5	0	0
Cormorant	<i>Phalacrocorax carbo</i>	3	Inshore waters	8	0	1	10	0	2	9	1	31	59	31	102	45	5
Cormorant	<i>Phalacrocorax carbo</i>	2 & 3	Rigs & outfall area	0	0	0	0	0	0	0	0	0	0	39	0	83	0
Cormorant	<i>Phalacrocorax carbo</i>	3	South Rig	0	0	0	0	0	0	0	2	0	0	0	0	6	0
Cormorant	<i>Phalacrocorax carbo</i>	4	Inshore waters	1	1	0	0	0	1	4	3	0	4	9	10	2	4

Species common name	Species biological name	VP	Location	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
Cormorant	<i>Phalacrocorax carbo</i>	5	Inshore waters	3	0	0	0	0	1	1	1	1	6	7	5	1	1
Cormorant	<i>Phalacrocorax carbo</i>	6	Inshore waters	5	1	0	0	0	1	1	2	1	7	4	2	3	2
Cormorant	<i>Phalacrocorax carbo</i>	7	Inshore waters	3	0	0	0	0	2	1	2	1	1	5	2	0	2
Cormorant	<i>Phalacrocorax carbo</i>	8	Inshore waters	0	0	0	0	0	1	0	0	2	0	3	0	0	1
Cormorant	<i>Phalacrocorax carbo</i>	9	Inshore waters	4	0	0	0	0	0	0	2	0	2	3	1	0	1
Cormorant	<i>Phalacrocorax carbo</i>	10	Inshore waters	6	0	0	0	0	0	1	0	5	5	6	0	0	0
Cormorant	<i>Phalacrocorax carbo</i>	11	Inshore waters	4	0	0	1	0	0	1	7	31	19	12	1	1	1
Cormorant	<i>Phalacrocorax carbo</i>	12	Inshore waters	8	1	42	1	0	0	0	2	14	90	27	6	5	7
Marsh harrier	<i>Circus aeruginosus</i>	7	Inshore waters	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Marsh harrier	<i>Circus aeruginosus</i>	12	On beach	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Kestrel	<i>Falco tinnunculus</i>	2	Inshore waters	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Kestrel	<i>Falco tinnunculus</i>	10	Inshore waters	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Hobby	<i>Falco subbuteo</i>	1	Inshore waters	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Hobby	<i>Falco subbuteo</i>	4	Inshore waters	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Peregrine	<i>Falco peregrinus</i>	2	Inshore waters	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Peregrine	<i>Falco peregrinus</i>	12	Inshore waters	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Ringed plover	<i>Charadrius hiaticula</i>	7	On beach	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Ringed plover	<i>Charadrius hiaticula</i>	9	On beach	0	0	0	0	0	0	0	0	0	0	3	0	0	0
Ringed plover	<i>Charadrius hiaticula</i>	10	On beach	2	0	30	0	0	0	0	0	0	0	0	0	2	0
Golden plover	<i>Pluvialis apricaria</i>	12	On beach	0	0	0	0	10	0	0	0	0	0	0	0	0	0
Grey plover	<i>Pluvialis squatarola</i>	10	On beach	0	0	0	0	0	0	0	0	0	2	0	0	0	0
Sanderling	<i>Calidris alba</i>	7	On beach	0	0	0	0	0	1	0	0	0	0	0	0	0	0

Species common name	Species biological name	VP	Location	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
Dunlin	<i>Calidris alpina</i>	10	On beach	0	0	25	0	0	0	0	0	0	0	0	0	0	0
Whimbrel	<i>Numenius phaeopus</i>	12	On beach	0	0	0	0	1	0	3	0	0	0	0	0	0	0
Turnstone	<i>Arenaria interpres</i>	2	North Rig	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Turnstone	<i>Arenaria interpres</i>	7	On beach	0	0	0	0	0	0	0	1	3	0	0	0	0	0
Turnstone	<i>Arenaria interpres</i>	8	On beach	0	0	0	0	0	0	0	1	0	0	5	0	0	0
Turnstone	<i>Arenaria interpres</i>	9	On beach	0	0	0	0	0	0	0	0	19	0	7	0	0	0
Turnstone	<i>Arenaria interpres</i>	10	On beach	0	0	1	0	0	0	0	0	0	4	0	0	0	0
Grey phalarope	<i>Phalaropus fulicarius</i>	8	Inshore waters	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Pomarine skua	<i>Stercorarius pomarinus</i>	7	Inshore waters	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Pomarine skua	<i>Stercorarius pomarinus</i>	12	Inshore waters	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Arctic skua	<i>Stercorarius parasiticus</i>	1	Inshore waters	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Arctic skua	<i>Stercorarius parasiticus</i>	2	Inshore waters	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Arctic skua	<i>Stercorarius parasiticus</i>	4	Inshore waters	0	0	0	0	4	0	0	0	0	0	0	0	0	0
Arctic skua	<i>Stercorarius parasiticus</i>	7	Inshore waters	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Arctic skua	<i>Stercorarius parasiticus</i>	8	Inshore waters	0	0	0	0	1	0	1	0	0	0	0	0	0	0
Great skua	<i>Stercorarius skua</i>	8	Inshore waters	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Great skua	<i>Stercorarius skua</i>	9	Inshore waters	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Great skua	<i>Stercorarius skua</i>	11	Inshore waters	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Great skua	<i>Stercorarius skua</i>	12	Inshore waters	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Kittiwake	<i>Rissa tridactyla</i>	1	Inshore waters	0	0	0	0	0	1	0	0	0	0	6	0	0	20
Kittiwake	<i>Rissa tridactyla</i>	2	North Rig	67	61	95	66	50	36	3	0	2	0	0	5	92	76
Kittiwake	<i>Rissa tridactyla</i>	2	Siz B outfall	0	0	0	0	0	2	0	0	0	0	18	1	0	0

Species common name	Species biological name	VP	Location	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
Kittiwake	<i>Rissa tridactyla</i>	2 & 3	Rigs & outfall area	0	12	255	200	80	63	2	0	0	0	0	3	330	30
Kittiwake	<i>Rissa tridactyla</i>	3	South Rig	116	63	99	86	134	107	1	0	1	0	0	4	65	82
Kittiwake	<i>Rissa tridactyla</i>	4	Inshore waters	27	1	0	0	0	5	0	0	0	0	5	0	0	0
Kittiwake	<i>Rissa tridactyla</i>	5	Inshore waters	5	8	0	0	0	0	0	0	0	0	0	0	0	0
Kittiwake	<i>Rissa tridactyla</i>	6	Inshore waters	0	3	0	0	0	0	0	0	0	1	1	0	0	23
Kittiwake	<i>Rissa tridactyla</i>	7	Inshore waters	0	0	0	0	0	0	0	0	0	0	0	0	0	10
Kittiwake	<i>Rissa tridactyla</i>	9	Inshore waters	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Kittiwake	<i>Rissa tridactyla</i>	10	Inshore waters	0	0	0	0	0	0	0	0	0	3	0	0	0	0
Kittiwake	<i>Rissa tridactyla</i>	11	Inshore waters	0	0	0	0	0	0	0	0	0	0	15	0	0	0
Kittiwake	<i>Rissa tridactyla</i>	12	Inshore waters	0	0	0	0	0	0	0	0	0	100	0	0	0	0
Black-headed gull	<i>Chroicocephalus ridibundus</i>	1	Inshore waters	0	0	0	0	0	0	0	0	0	10	0	0	0	0
Black-headed gull	<i>Chroicocephalus ridibundus</i>	2	Inshore waters	0	0	110	0	0	0	0	0	0	0	0	0	0	0
Black-headed gull	<i>Chroicocephalus ridibundus</i>	2	Siz B outfall	0	0	0	0	5	0	0	1	12	20	25	10	2	0
Black-headed gull	<i>Chroicocephalus ridibundus</i>	2 & 3	Rigs & outfall area	0	0	0	500	0	0	0	0	0	69	0	0	0	0
Black-headed gull	<i>Chroicocephalus ridibundus</i>	3	On beach	0	0	0	0	0	0	0	0	0	17	0	0	0	0
Black-headed gull	<i>Chroicocephalus ridibundus</i>	4	Inshore waters	0	0	0	0	0	0	0	14	40	0	70	150	52	0
Black-headed gull	<i>Chroicocephalus ridibundus</i>	5	Inshore waters	0	0	0	0	0	0	0	0	10	10	100	150	90	0
Black-headed gull	<i>Chroicocephalus ridibundus</i>	6	Inshore waters	0	0	0	0	0	4	0	0	0	0	250	0	0	0
Black-headed gull	<i>Chroicocephalus ridibundus</i>	7	Inshore waters	0	0	0	0	0	0	0	0	50	50	300	50	0	0
Black-headed gull	<i>Chroicocephalus ridibundus</i>	8	Inshore waters	0	0	0	0	0	0	0	0	0	1000	400	0	0	0
Black-headed gull	<i>Chroicocephalus ridibundus</i>	8	On beach	0	0	0	0	0	0	0	0	0	0	30	5	0	0
Black-headed gull	<i>Chroicocephalus ridibundus</i>	9	Inshore waters	0	0	0	0	0	0	0	0	0	0	450	0	0	0

Species common name	Species biological name	VP	Location	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
Black-headed gull	<i>Chroicocephalus ridibundus</i>	10	Inshore waters	0	0	0	0	0	0	0	0	1	0	25	0	0	0
Black-headed gull	<i>Chroicocephalus ridibundus</i>	11	Inshore waters	0	0	0	0	0	0	0	26	0	0	0	0	0	0
Little gull	<i>Hydrocoloeus minutus</i>	1	Inshore waters	0	0	0	0	0	4	3	0	0	0	0	0	0	0
Little gull	<i>Hydrocoloeus minutus</i>	2	Inshore waters	0	0	0	0	11	0	1	0	0	0	0	0	0	0
Little gull	<i>Hydrocoloeus minutus</i>	2	Siz B outfall	0	0	0	0	29	72	0	0	0	0	0	0	0	0
Little gull	<i>Hydrocoloeus minutus</i>	3	Inshore waters	0	0	0	0	0	53	0	0	0	0	0	0	0	0
Little gull	<i>Hydrocoloeus minutus</i>	4	Inshore waters	0	0	0	0	0	29	0	0	0	0	0	0	0	0
Little gull	<i>Hydrocoloeus minutus</i>	5	Inshore waters	0	0	0	0	0	44	0	0	0	0	0	0	0	0
Little gull	<i>Hydrocoloeus minutus</i>	7	Inshore waters	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Mediterranean gull	<i>Larus melanocephalus</i>	2	Siz B outfall	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Mediterranean gull	<i>Larus melanocephalus</i>	5	Inshore waters	0	0	0	0	0	0	0	0	0	0	1	0	1	1
Common gull	<i>Larus canus</i>	1	Inshore waters	0	0	0	0	0	0	0	0	0	72	0	0	0	0
Common gull	<i>Larus canus</i>	2	Inshore waters	0	0	0	0	0	0	0	0	0	0	0	0	0	24
Common gull	<i>Larus canus</i>	2 & 3	Rigs & outfall area	0	0	0	0	0	0	0	0	0	0	0	10	0	0
Common gull	<i>Larus canus</i>	2	Siz B outfall	0	0	0	0	1	0	0	0	12	30	60	30	10	0
Common gull	<i>Larus canus</i>	3	Inshore waters	0	0	0	0	0	0	0	0	0	53	0	0	0	0
Common gull	<i>Larus canus</i>	4	Inshore waters	0	0	0	0	0	0	0	0	0	0	20	50	3	0
Common gull	<i>Larus canus</i>	5	Inshore waters	0	0	0	0	0	0	0	0	3	25	300	200	25	0
Common gull	<i>Larus canus</i>	6	Inshore waters	0	0	0	0	0	0	0	0	0	0	250	0	1	0
Common gull	<i>Larus canus</i>	7	Inshore waters	0	0	0	0	0	0	0	1	150	50	2000	50	0	1
Common gull	<i>Larus canus</i>	8	Inshore waters	0	0	0	0	0	0	0	0	0	200	100	0	0	0
Common gull	<i>Larus canus</i>	9	Inshore waters	0	0	0	0	0	0	0	0	11	0	100	0	0	0

Species common name	Species biological name	VP	Location	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
Common gull	<i>Larus canus</i>	10	Inshore waters	0	0	0	0	0	0	0	0	0	0	25	0	0	0
Lesser black-backed gull	<i>Larus fuscus</i>	1	Inshore waters	0	0	0	0	0	2	1	0	15	1	0	0	0	0
Lesser black-backed gull	<i>Larus fuscus</i>	2	Inshore waters	15	0	0	0	0	5	0	0	0	0	0	0	0	0
Lesser black-backed gull	<i>Larus fuscus</i>	2	North Rig	0	4	4	0	5	4	2	0	9	0	0	0	5	4
Lesser black-backed gull	<i>Larus fuscus</i>	2	Siz B outfall	0	0	0	0	1	10	0	0	0	2	10	0	2	2
Lesser black-backed gull	<i>Larus fuscus</i>	3	Inshore waters	0	0	0	10	0	0	3	0	0	1	0	0	2	0
Lesser black-backed gull	<i>Larus fuscus</i>	3	On beach	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Lesser black-backed gull	<i>Larus fuscus</i>	3	South Rig	14	9	8	6	2	10	0	3	1	0	0	1	1	8
Lesser black-backed gull	<i>Larus fuscus</i>	4	Inshore waters	1	4	0	0	0	5	2	10	2	0	0	4	0	0
Lesser black-backed gull	<i>Larus fuscus</i>	5	Inshore waters	0	0	0	0	0	0	4	0	0	0	10	0	2	13
Lesser black-backed gull	<i>Larus fuscus</i>	6	Inshore waters	0	0	0	0	0	3	0	0	0	0	4	0	0	0
Lesser black-backed gull	<i>Larus fuscus</i>	7	Inshore waters	0	0	0	0	0	1	9	0	0	0	25	0	0	0
Lesser black-backed gull	<i>Larus fuscus</i>	8	Inshore waters	7	0	0	0	0	0	20	0	0	0	0	0	0	0
Lesser black-backed gull	<i>Larus fuscus</i>	8	On beach	0	0	0	0	0	0	10	0	0	0	0	0	0	0
Lesser black-backed gull	<i>Larus fuscus</i>	9	Inshore waters	0	0	0	0	0	0	4	0	0	0	0	0	0	0
Lesser black-backed gull	<i>Larus fuscus</i>	10	Inshore waters	3	0	0	0	0	0	0	0	4	0	0	0	0	0
Lesser black-backed gull	<i>Larus fuscus</i>	10	On beach	0	0	0	0	0	0	0	25	0	0	0	0	0	0
Lesser black-backed gull	<i>Larus fuscus</i>	11	Inshore waters	2	0	0	0	0	9	0	0	0	0	0	0	0	0
Lesser black-backed gull	<i>Larus fuscus</i>	11	On beach	0	0	0	0	0	0	0	40	0	0	0	0	0	0
Lesser black-backed gull	<i>Larus fuscus</i>	12	Inshore waters	0	0	0	0	0	15	0	0	0	0	0	0	0	0
Lesser black-backed gull	<i>Larus fuscus</i>	12	On beach	0	0	0	4	0	0	50	0	0	0	0	0	0	0
Herring gull	<i>Larus argentatus</i>	1	Inshore waters	0	0	0	0	0	20	14	0	65	22	0	0	0	60

Species common name	Species biological name	VP	Location	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
Herring gull	<i>Larus argentatus</i>	1	On beach	0	0	0	0	0	0	0	0	22	10	10	0	0	0
Herring gull	<i>Larus argentatus</i>	2	Inshore waters	135	0	0	0	0	43	0	0	55	0	130	0	0	300
Herring gull	<i>Larus argentatus</i>	2	North Rig	0	28	3	0	12	9	16	4	33	7	23	11	34	23
Herring gull	<i>Larus argentatus</i>	2 & 3	Rigs & outfall area	0	0	0	0	0	0	0	0	0	0	0	185	200	0
Herring gull	<i>Larus argentatus</i>	2	Siz A outfall structure	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Herring gull	<i>Larus argentatus</i>	2	Siz B outfall	0	0	3	0	7	43	0	24	38	100	100	80	320	30
Herring gull	<i>Larus argentatus</i>	3	Inshore waters	0	0	0	75	0	0	80	0	100	186	0	0	0	0
Herring gull	<i>Larus argentatus</i>	3	On beach	0	0	0	0	0	0	0	0	0	60	0	0	0	0
Herring gull	<i>Larus argentatus</i>	3	South Rig	11	9	16	18	7	15	8	7	27	23	32	20	39	29
Herring gull	<i>Larus argentatus</i>	4	Inshore waters	0	10	0	0	0	5	80	30	2	0	0	0	0	0
Herring gull	<i>Larus argentatus</i>	4	On beach	0	0	0	0	0	0	0	0	0	34	0	0	0	0
Herring gull	<i>Larus argentatus</i>	5	Inshore waters	0	12	0	0	0	0	0	0	6	0	0	10	0	50
Herring gull	<i>Larus argentatus</i>	5	On beach	0	0	0	0	0	0	0	0	0	3	30	0	0	0
Herring gull	<i>Larus argentatus</i>	6	Inshore waters	0	0	0	0	0	0	25	0	20	0	0	0	0	0
Herring gull	<i>Larus argentatus</i>	7	Inshore waters	0	0	0	0	0	5	0	0	0	14	0	0	0	0
Herring gull	<i>Larus argentatus</i>	7	On beach	0	0	0	0	0	0	0	95	0	0	0	0	0	0
Herring gull	<i>Larus argentatus</i>	8	Inshore waters	25	0	0	0	0	0	65	0	0	0	0	0	0	0
Herring gull	<i>Larus argentatus</i>	8	On beach	0	0	0	0	0	0	40	0	14	25	70	40	25	0
Herring gull	<i>Larus argentatus</i>	9	Inshore waters	5	0	0	0	0	0	0	0	0	0	0	0	0	0
Herring gull	<i>Larus argentatus</i>	10	Inshore waters	24	0	0	0	0	0	0	0	101	0	0	0	0	0
Herring gull	<i>Larus argentatus</i>	10	On beach	0	0	0	0	0	0	0	25	0	0	0	0	0	0
Herring gull	<i>Larus argentatus</i>	11	Inshore waters	44	0	0	0	0	0	0	6	0	0	20	0	0	0

Species common name	Species biological name	VP	Location	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
Herring gull	<i>Larus argentatus</i>	11	On beach	0	0	0	0	0	0	0	20	0	0	0	0	0	0
Herring gull	<i>Larus argentatus</i>	12	Inshore waters	0	0	0	0	0	10	0	0	0	0	0	0	0	0
Great black-backed gull	<i>Larus marinus</i>	1	Inshore waters	0	1	0	0	0	3	8	1	20	23	4	0	0	0
Great black-backed gull	<i>Larus marinus</i>	1	On beach	0	0	0	0	0	0	0	0	13	35	35	0	0	0
Great black-backed gull	<i>Larus marinus</i>	2	Inshore waters	0	0	0	0	0	3	0	0	30	0	30	0	0	20
Great black-backed gull	<i>Larus marinus</i>	2	North Rig	1	1	0	0	0	1	1	0	8	1	0	1	10	2
Great black-backed gull	<i>Larus marinus</i>	2 & 3	Rigs & outfall area	0	0	0	0	0	0	0	0	0	0	0	45	50	0
Great black-backed gull	<i>Larus marinus</i>	2	Siz A outfall structure	0	0	0	0	0	1	2	2	0	0	0	1	0	0
Great black-backed gull	<i>Larus marinus</i>	2	Siz B outfall	0	0	0	0	0	1	0	3	17	60	60	50	70	15
Great black-backed gull	<i>Larus marinus</i>	3	Inshore waters	0	0	0	5	0	0	5	0	40	80	0	0	2	0
Great black-backed gull	<i>Larus marinus</i>	3	On beach	0	0	0	0	0	0	0	0	0	10	0	0	0	0
Great black-backed gull	<i>Larus marinus</i>	3	South Rig	1	0	0	0	0	1	0	2	1	5	0	4	30	0
Great black-backed gull	<i>Larus marinus</i>	4	Inshore waters	1	0	0	0	0	1	5	6	2	0	0	2	0	0
Great black-backed gull	<i>Larus marinus</i>	4	On beach	0	0	0	0	0	0	0	0	0	5	0	0	0	0
Great black-backed gull	<i>Larus marinus</i>	5	Inshore waters	0	0	0	0	0	2	0	0	1	2	0	0	2	0
Great black-backed gull	<i>Larus marinus</i>	5	On beach	0	0	0	0	0	0	0	0	0	3	5	0	0	0
Great black-backed gull	<i>Larus marinus</i>	6	Inshore waters	1	0	0	0	0	1	1	1	2	6	0	0	0	0
Great black-backed gull	<i>Larus marinus</i>	6	On beach	0	0	0	0	0	0	0	0	0	7	0	0	0	0
Great black-backed gull	<i>Larus marinus</i>	7	Inshore waters	0	0	0	0	0	1	0	2	3	5	5	0	0	0
Great black-backed gull	<i>Larus marinus</i>	7	On beach	0	0	0	0	0	0	0	5	0	0	0	0	0	0
Great black-backed gull	<i>Larus marinus</i>	8	Inshore waters	0	0	0	0	0	0	7	0	0	0	0	0	2	0
Great black-backed gull	<i>Larus marinus</i>	8	On beach	0	0	0	0	0	0	0	20	12	20	40	15	5	0

Species common name	Species biological name	VP	Location	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
Great black-backed gull	<i>Larus marinus</i>	9	Inshore waters	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Great black-backed gull	<i>Larus marinus</i>	10	Inshore waters	0	0	0	0	0	0	0	0	16	0	0	0	0	0
Great black-backed gull	<i>Larus marinus</i>	10	On beach	0	0	0	0	0	0	0	15	0	0	0	0	0	0
Great black-backed gull	<i>Larus marinus</i>	11	Inshore waters	0	0	0	0	0	0	0	5	4	0	1	0	0	0
Great black-backed gull	<i>Larus marinus</i>	11	On beach	0	0	0	0	0	0	0	10	0	0	0	0	0	0
Great black-backed gull	<i>Larus marinus</i>	12	Inshore waters	0	0	0	0	0	5	0	0	3	0	2	0	6	2
Great black-backed gull	<i>Larus marinus</i>	12	On beach	0	0	0	0	0	0	5	0	0	0	0	0	0	0
Little tern	<i>Sternula albifrons</i>	1	Inshore waters	0	0	4	0	0	0	0	0	0	0	0	0	0	0
Little tern	<i>Sternula albifrons</i>	2	Inshore waters	0	0	14	0	0	0	0	0	0	0	0	0	0	0
Little tern	<i>Sternula albifrons</i>	2	Siz B outfall	0	0	15	0	0	0	0	0	0	0	0	0	0	0
Little tern	<i>Sternula albifrons</i>	4	Inshore waters	0	0	16	0	0	0	0	0	0	0	0	0	0	0
Little tern	<i>Sternula albifrons</i>	10	Inshore waters	0	0	7	8	0	0	0	0	0	0	0	0	0	0
Little tern	<i>Sternula albifrons</i>	10	On beach	0	0	18	0	0	0	0	0	0	0	0	0	0	0
Little tern	<i>Sternula albifrons</i>	12	Inshore waters	0	0	2	2	0	0	0	0	0	0	0	0	0	0
Black tern	<i>Chlidonias niger</i>	2	Siz B outfall	0	0	0	0	0	31	0	0	0	0	0	0	0	0
Black tern	<i>Chlidonias niger</i>	3	Inshore waters	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Black tern	<i>Chlidonias niger</i>	11	Inshore waters	0	0	0	0	0	4	0	0	0	0	0	0	0	0
Sandwich tern	<i>Sterna sandvicensis</i>	1	Inshore waters	0	0	0	0	0	2	1	1	0	0	0	0	0	0
Sandwich tern	<i>Sterna sandvicensis</i>	2	Inshore waters	0	0	0	0	0	0	2	0	0	0	0	0	0	0
Sandwich tern	<i>Sterna sandvicensis</i>	2	Siz B outfall	0	0	0	1	0	2	0	0	0	0	0	0	0	0
Sandwich tern	<i>Sterna sandvicensis</i>	5	Inshore waters	0	0	2	2	2	1	2	0	0	0	0	0	0	0
Sandwich tern	<i>Sterna sandvicensis</i>	6	Inshore waters	0	0	3	0	2	8	2	1	0	0	0	0	0	0

Species common name	Species biological name	VP	Location	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
Sandwich tern	<i>Sterna sandvicensis</i>	7	Inshore waters	0	0	0	0	0	4	6	0	0	0	0	0	0	0
Sandwich tern	<i>Sterna sandvicensis</i>	8	Inshore waters	0	0	0	0	0	3	0	0	0	0	0	0	0	0
Sandwich tern	<i>Sterna sandvicensis</i>	9	Inshore waters	0	0	0	0	0	1	3	0	0	0	0	0	0	0
Sandwich tern	<i>Sterna sandvicensis</i>	10	Inshore waters	0	0	0	0	3	2	0	0	0	0	0	0	0	0
Sandwich tern	<i>Sterna sandvicensis</i>	11	Inshore waters	0	0	0	0	0	2	0	0	0	0	0	0	0	0
Sandwich tern	<i>Sterna sandvicensis</i>	12	Inshore waters	0	0	0	0	11	2	2	0	0	0	0	0	0	0
Common tern	<i>Sterna hirundo</i>	1	Inshore waters	0	0	1	0	0	15	12	5	0	0	0	0	0	0
Common tern	<i>Sterna hirundo</i>	2	Inshore waters	0	0	19	1	0	76	8	0	0	0	0	0	0	0
Common tern	<i>Sterna hirundo</i>	2	On beach	0	0	0	0	0	25	0	0	0	0	0	0	0	0
Common tern	<i>Sterna hirundo</i>	2	Siz B outfall	0	0	14	38	110	55	0	0	0	0	0	0	0	1
Common tern	<i>Sterna hirundo</i>	3	Inshore waters	0	0	0	3	0	19	10	1	0	0	0	0	0	0
Common tern	<i>Sterna hirundo</i>	4	Inshore waters	0	0	0	6	0	10	7	0	0	0	0	0	0	0
Common tern	<i>Sterna hirundo</i>	5	Inshore waters	0	0	0	0	0	30	7	0	0	0	0	0	0	0
Common tern	<i>Sterna hirundo</i>	6	Inshore waters	0	0	0	0	14	42	28	0	0	0	0	0	0	0
Common tern	<i>Sterna hirundo</i>	7	Inshore waters	0	0	0	0	0	28	2	1	0	0	0	0	0	0
Common tern	<i>Sterna hirundo</i>	8	Inshore waters	0	0	0	2	16	8	2	0	0	0	0	0	0	0
Common tern	<i>Sterna hirundo</i>	9	Inshore waters	0	0	0	0	0	4	0	0	0	0	0	0	0	0
Common tern	<i>Sterna hirundo</i>	10	Inshore waters	0	0	0	0	12	16	0	0	0	0	0	0	0	0
Common tern	<i>Sterna hirundo</i>	11	Inshore waters	0	0	0	0	0	45	0	1	0	0	0	0	0	0
Common tern	<i>Sterna hirundo</i>	12	Inshore waters	0	0	0	6	10	14	0	0	0	0	0	0	0	0
Arctic tern	<i>Sterna paradisaea</i>	2	Siz B outfall	0	0	0	0	0	9	0	0	1	0	0	0	0	0
Guillemot	<i>Uria aalge</i>	2	Inshore waters	0	0	0	0	0	1	0	0	0	0	0	0	0	0

Species common name	Species biological name	VP	Location	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
Guillemot	<i>Uria aalge</i>	12	Inshore waters	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Razorbill	<i>Alca torda</i>	5	Inshore waters	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Razorbill	<i>Alca torda</i>	7	Inshore waters	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Razorbill	<i>Alca torda</i>	11	Inshore waters	0	0	0	0	0	0	0	0	0	8	0	0	0	0
Razorbill / guillemot ¹³		1	Inshore waters	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Razorbill / guillemot		5	Inshore waters	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Razorbill / guillemot		6	Inshore waters	0	0	0	0	0	0	0	0	0	1	1	0	0	0
Razorbill / guillemot		8	Inshore waters	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Razorbill / guillemot		9	Inshore waters	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Short-eared owl	<i>Asio flammeus</i>	5	Inshore waters	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Short-eared owl	<i>Asio flammeus</i>	10	On beach	0	0	0	0	0	0	0	0	0	0	0	0	2	0
Snow bunting	<i>Plectrophenax nivalis</i>	2	On beach	0	0	0	0	0	0	0	0	0	0	8	0	0	0
Snow bunting	<i>Plectrophenax nivalis</i>	3	On beach	0	0	0	0	0	0	0	0	0	13	0	0	0	0

¹³ Auk species can only reliably be identified at close distance, and therefore sightings of unidentified auk species have been attributed to either guillemot or razorbill (the remaining auk species are rare in coastal waters off Suffolk).

Table C2 Total count of commuting birds recorded from each VP¹⁴

Species common name	Species biological name	VP	Mar -11	Apr- 11	May- 11	Jun- 11	Jul -11	Aug -11	Sep- 11	Oct- 11	Nov- 11	Dec- 11	Jan- 12	Feb- 12	Mar- 12	Apr -12
Pink-footed goose	<i>Anser brachyrhynchus</i>	9									2					
Greylag goose	<i>Anser anser</i>	2														2
Greylag goose	<i>Anser anser</i>	5										20				
Greylag goose	<i>Anser anser</i>	12													3	
Brent goose	<i>Branta bernicla</i>	1							1					50		
Brent goose	<i>Branta bernicla</i>	2							21		21					2
Brent goose	<i>Branta bernicla</i>	3							9		6		6			1
Brent goose	<i>Branta bernicla</i>	4							24		8					
Brent goose	<i>Branta bernicla</i>	5							5		72					
Brent goose	<i>Branta bernicla</i>	6							85	12	59	1			11	
Brent goose	<i>Branta bernicla</i>	7		1							3					
Brent goose	<i>Branta bernicla</i>	8								7	55					
Brent goose	<i>Branta bernicla</i>	9								13	127		1			
Brent goose	<i>Branta bernicla</i>	10								17	50					
Brent goose	<i>Branta bernicla</i>	11								5	14					
Brent goose	<i>Branta bernicla</i>	12								4	9		2	2		
Shelduck	<i>Tadorna tadorna</i>	1												2		2
Shelduck	<i>Tadorna tadorna</i>	2										1				1

¹⁴ The figures show the total number of individuals counted during each month. The numerous flights of cormorant and the five species of 'common' gulls (black-headed, common, lesser black-backed, herring and great black-backed) were not routinely counted during the watches and have therefore not been included in Table C2.

Species common name	Species biological name	VP	Mar -11	Apr- 11	May- 11	Jun- 11	Jul -11	Aug -11	Sep- 11	Oct- 11	Nov- 11	Dec- 11	Jan- 12	Feb- 12	Mar- 12	Apr -12
Shelduck	<i>Tadorna tadorna</i>	3											10			
Shelduck	<i>Tadorna tadorna</i>	4								2		4				
Shelduck	<i>Tadorna tadorna</i>	5		1										2		
Shelduck	<i>Tadorna tadorna</i>	6									1					
Shelduck	<i>Tadorna tadorna</i>	7										3				
Shelduck	<i>Tadorna tadorna</i>	8											1			1
Shelduck	<i>Tadorna tadorna</i>	12										2				
Wigeon	<i>Anas penelope</i>	1								7	5					
Wigeon	<i>Anas penelope</i>	2										2				
Wigeon	<i>Anas penelope</i>	3									14		3			
Wigeon	<i>Anas penelope</i>	4								7	30					
Wigeon	<i>Anas penelope</i>	5							3	9						
Wigeon	<i>Anas penelope</i>	6								12	10					
Wigeon	<i>Anas penelope</i>	7										7				23
Wigeon	<i>Anas penelope</i>	9											8		1	
Wigeon	<i>Anas penelope</i>	11											3			
Wigeon	<i>Anas penelope</i>	12									1	2				
Gadwall	<i>Anas strepera</i>	6										20				
Teal	<i>Anas crecca</i>	1									6		1			
Teal	<i>Anas crecca</i>	2							8							
Teal	<i>Anas crecca</i>	4	3						3	19						
Teal	<i>Anas crecca</i>	5									1					

Species common name	Species biological name	VP	Mar -11	Apr- 11	May- 11	Jun- 11	Jul -11	Aug -11	Sep- 11	Oct- 11	Nov- 11	Dec- 11	Jan- 12	Feb- 12	Mar- 12	Apr -12
Teal	<i>Anas crecca</i>	6										1				
Teal	<i>Anas crecca</i>	7					1					10				
Teal	<i>Anas crecca</i>	10										230	215			
Teal	<i>Anas crecca</i>	11						5								
Teal	<i>Anas crecca</i>	12						21				56				
Mallard	<i>Anas platyrhynchos</i>	1						2								
Mallard	<i>Anas platyrhynchos</i>	2									1					
Mallard	<i>Anas platyrhynchos</i>	9												5		
Pintail	<i>Anas acuta</i>	3											5			
Pintail	<i>Anas acuta</i>	8										1				
Pintail	<i>Anas acuta</i>	11										6				
Pintail	<i>Anas acuta</i>	12										4				
Shoveler	<i>Anas clypeata</i>	1									1					
Shoveler	<i>Anas clypeata</i>	7										16	2			
Shoveler	<i>Anas clypeata</i>	9												2		
Tufted duck	<i>Aythya fuligula</i>	2														1
Eider	<i>Somateria mollissima</i>	1														8
Eider	<i>Somateria mollissima</i>	5									1					
Eider	<i>Somateria mollissima</i>	6									2					
Eider	<i>Somateria mollissima</i>	11										2				
Eider	<i>Somateria mollissima</i>	12									1					
Common scoter	<i>Melanitta nigra</i>	1							5						2	

Species common name	Species biological name	VP	Mar -11	Apr- 11	May- 11	Jun- 11	Jul -11	Aug -11	Sep- 11	Oct- 11	Nov- 11	Dec- 11	Jan- 12	Feb- 12	Mar- 12	Apr -12
Common scoter	<i>Melanitta nigra</i>	2					4					2				
Common scoter	<i>Melanitta nigra</i>	3		3				20				8	7			11
Common scoter	<i>Melanitta nigra</i>	5							15		10		1			
Common scoter	<i>Melanitta nigra</i>	6		7					1		8					
Common scoter	<i>Melanitta nigra</i>	7			5		15	11	4		29					
Common scoter	<i>Melanitta nigra</i>	8		22	2		6		3							
Common scoter	<i>Melanitta nigra</i>	9										2				
Common scoter	<i>Melanitta nigra</i>	10								8						
Common scoter	<i>Melanitta nigra</i>	11					16				16					
Common scoter	<i>Melanitta nigra</i>	12		20			1		3			15	2		2	
Goldeneye	<i>Bucephala clangula</i>	11											3			
Goldeneye	<i>Bucephala clangula</i>	12										2				
Red-breasted merganser	<i>Mergus serrator</i>	2										2				
Red-breasted merganser	<i>Mergus serrator</i>	4											1			
Red-breasted merganser	<i>Mergus serrator</i>	5									2					
Red-breasted merganser	<i>Mergus serrator</i>	6														7
Red-breasted merganser	<i>Mergus serrator</i>	12										1	1			
Red-throated diver	<i>Gavia stellata</i>	1	22	2				1	1		1	95	7	69	2	13
Red-throated diver	<i>Gavia stellata</i>	2	1							1	2	23	14	11	150	6

Species common name	Species biological name	VP	Mar -11	Apr- 11	May- 11	Jun- 11	Jul -11	Aug -11	Sep- 11	Oct- 11	Nov- 11	Dec- 11	Jan- 12	Feb- 12	Mar- 12	Apr -12
Red-throated diver	<i>Gavia stellata</i>	3	4	2								10	24	49	13	10
Red-throated diver	<i>Gavia stellata</i>	4	61	1							10	13	156	202	20	1
Red-throated diver	<i>Gavia stellata</i>	5	3	1							2	19	8	173	3	1
Red-throated diver	<i>Gavia stellata</i>	6	31	5							2	35	14	21	151	11
Red-throated diver	<i>Gavia stellata</i>	7	24						1			40	10	225	22	
Red-throated diver	<i>Gavia stellata</i>	8	7	2						2		276	1	40	51	
Red-throated diver	<i>Gavia stellata</i>	9	1	3					1	1		12	3	1	80	
Red-throated diver	<i>Gavia stellata</i>	10	1	1							4	3	39	224	46	4
Red-throated diver	<i>Gavia stellata</i>	11	17	1						1	1	12	330	37	45	1
Red-throated diver	<i>Gavia stellata</i>	12	11	4							1	159	710	51	20	
Black-throated diver	<i>Gavia arctica</i>	1										1				
Great crested grebe	<i>Podiceps cristatus</i>	1										5	2	13		
Great crested grebe	<i>Podiceps cristatus</i>	2	2									6				
Great crested grebe	<i>Podiceps cristatus</i>	3												2		2
Great crested grebe	<i>Podiceps cristatus</i>	4										2	3	1		
Great crested grebe	<i>Podiceps cristatus</i>	5									3	1		1	1	
Great crested grebe	<i>Podiceps cristatus</i>	6										1		2		1
Great crested	<i>Podiceps cristatus</i>	7										1			1	

Species common name	Species biological name	VP	Mar -11	Apr- 11	May- 11	Jun- 11	Jul -11	Aug -11	Sep- 11	Oct- 11	Nov- 11	Dec- 11	Jan- 12	Feb- 12	Mar- 12	Apr -12
grebe																
Great crested grebe	<i>Podiceps cristatus</i>	8												5		
Great crested grebe	<i>Podiceps cristatus</i>	10												4		
Great crested grebe	<i>Podiceps cristatus</i>	11											1	4		
Great crested grebe	<i>Podiceps cristatus</i>	12										1	9	7		
Fulmar	<i>Fulmarus glacialis</i>	1												1		2
Fulmar	<i>Fulmarus glacialis</i>	3													1	4
Fulmar	<i>Fulmarus glacialis</i>	5			1											
Fulmar	<i>Fulmarus glacialis</i>	6			1											
Fulmar	<i>Fulmarus glacialis</i>	7			1											
Fulmar	<i>Fulmarus glacialis</i>	8														1
Fulmar	<i>Fulmarus glacialis</i>	10					1									
Fulmar	<i>Fulmarus glacialis</i>	12													1	
Manx shearwater	<i>Puffinus puffinus</i>	12									1					
Gannet	<i>Morus bassanus</i>	1					3	1	1	3			27	6	2	3
Gannet	<i>Morus bassanus</i>	2					11		5	1		1	24		10	1
Gannet	<i>Morus bassanus</i>	3					1		7					2	4	
Gannet	<i>Morus bassanus</i>	4				1	8		11		2		9		2	
Gannet	<i>Morus bassanus</i>	5			6			2	3	3	4		1		2	1
Gannet	<i>Morus bassanus</i>	6		2	29		33			3		2	2		15	2

Species common name	Species biological name	VP	Mar -11	Apr- 11	May- 11	Jun- 11	Jul -11	Aug -11	Sep- 11	Oct- 11	Nov- 11	Dec- 11	Jan- 12	Feb- 12	Mar- 12	Apr -12
Gannet	<i>Morus bassanus</i>	7	4	2	22		8		5	54	1					
Gannet	<i>Morus bassanus</i>	8	1	1			18		7	91				26		
Gannet	<i>Morus bassanus</i>	9					1		3	42	1	3		3	1	
Gannet	<i>Morus bassanus</i>	10					3			8	1	30	1	1	4	
Gannet	<i>Morus bassanus</i>	11	1				7	1	1	12	4	22		33	4	
Gannet	<i>Morus bassanus</i>	12					25	17	12	15	39	5			38	3
Grey heron	<i>Ardea cinerea</i>	3														1
Grey heron	<i>Ardea cinerea</i>	5								1						
Marsh harrier	<i>Circus aeruginosus</i>	7		1												
Marsh harrier	<i>Circus aeruginosus</i>	12								1						
Hobby	<i>Falco subbuteo</i>	1					2		1							
Hobby	<i>Falco subbuteo</i>	7							1							
Hobby	<i>Falco subbuteo</i>	8							1							
Hobby	<i>Falco subbuteo</i>	11							1							
Peregrine	<i>Falco peregrinus</i>	11										1				
Peregrine	<i>Falco peregrinus</i>	12								1						
Oystercatcher	<i>Haematopus ostralegus</i>	1				1										
Oystercatcher	<i>Haematopus ostralegus</i>	2		1												7
Oystercatcher	<i>Haematopus ostralegus</i>	3							2		1					
Oystercatcher	<i>Haematopus ostralegus</i>	4				1		2	3							
Oystercatcher	<i>Haematopus ostralegus</i>	5						3			1					
Oystercatcher	<i>Haematopus ostralegus</i>	7	1					12								

Species common name	Species biological name	VP	Mar -11	Apr- 11	May- 11	Jun- 11	Jul -11	Aug -11	Sep- 11	Oct- 11	Nov- 11	Dec- 11	Jan- 12	Feb- 12	Mar- 12	Apr -12
Oystercatcher	<i>Haematopus ostralegus</i>	8				1		1								
Oystercatcher	<i>Haematopus ostralegus</i>	10		3												
Oystercatcher	<i>Haematopus ostralegus</i>	11								1						
Oystercatcher	<i>Haematopus ostralegus</i>	12						4								
Avocet	<i>Recurvirostra avosetta</i>	1				5										
Avocet	<i>Recurvirostra avosetta</i>	2			1	3										
Avocet	<i>Recurvirostra avosetta</i>	3														2
Avocet	<i>Recurvirostra avosetta</i>	4				3										2
Avocet	<i>Recurvirostra avosetta</i>	5				2										
Avocet	<i>Recurvirostra avosetta</i>	6		55					7							6
Avocet	<i>Recurvirostra avosetta</i>	8				2										
Avocet	<i>Recurvirostra avosetta</i>	9		2											2	
Ringed plover	<i>Charadrius hiaticula</i>	1								4						
Ringed plover	<i>Charadrius hiaticula</i>	8								1						
Ringed plover	<i>Charadrius hiaticula</i>	9							3							
Ringed plover	<i>Charadrius hiaticula</i>	10						1								
Ringed plover	<i>Charadrius hiaticula</i>	11	1					1	1	1						
Ringed plover	<i>Charadrius hiaticula</i>	12						13	25							
Golden plover	<i>Pluvialis apricaria</i>	11						3								
Grey plover	<i>Pluvialis squatarola</i>	2							1							
Grey plover	<i>Pluvialis squatarola</i>	4							2							
Grey plover	<i>Pluvialis squatarola</i>	12								1						

Species common name	Species biological name	VP	Mar -11	Apr- 11	May- 11	Jun- 11	Jul -11	Aug -11	Sep- 11	Oct- 11	Nov- 11	Dec- 11	Jan- 12	Feb- 12	Mar- 12	Apr -12
Lapwing	<i>Vanellus vanellus</i>	4												11		
Knot	<i>Calidris canutus</i>	1														1
Knot	<i>Calidris canutus</i>	9												1		
Knot	<i>Calidris canutus</i>	11								2						
Knot	<i>Calidris canutus</i>	12							3							
Sanderling	<i>Calidris alba</i>	4						6								
Sanderling	<i>Calidris alba</i>	5				1										
Sanderling	<i>Calidris alba</i>	9							2							
Sanderling	<i>Calidris alba</i>	12						1								
Curlew sandpiper	<i>Calidris ferruginea</i>	12							1							
Dunlin	<i>Calidris alpina</i>	1			8			7	7	2				12		8
Dunlin	<i>Calidris alpina</i>	2							15							
Dunlin	<i>Calidris alpina</i>	3						3						2		
Dunlin	<i>Calidris alpina</i>	4						5								
Dunlin	<i>Calidris alpina</i>	5				3			6							
Dunlin	<i>Calidris alpina</i>	6							8							
Dunlin	<i>Calidris alpina</i>	7							2							
Dunlin	<i>Calidris alpina</i>	8				7				1						
Dunlin	<i>Calidris alpina</i>	9												1		
Dunlin	<i>Calidris alpina</i>	11								1				1		
Dunlin	<i>Calidris alpina</i>	12							8	1						
Bar-tailed godwit	<i>Limosa lapponica</i>	6							4							

Species common name	Species biological name	VP	Mar -11	Apr- 11	May- 11	Jun- 11	Jul -11	Aug -11	Sep- 11	Oct- 11	Nov- 11	Dec- 11	Jan- 12	Feb- 12	Mar- 12	Apr -12
Bar-tailed godwit	<i>Limosa lapponica</i>	10										1				
Bar-tailed godwit	<i>Limosa lapponica</i>	12							1							
Whimbrel	<i>Numenius phaeopus</i>	1		1												
Whimbrel	<i>Numenius phaeopus</i>	3						1								1
Whimbrel	<i>Numenius phaeopus</i>	4						1	1							
Whimbrel	<i>Numenius phaeopus</i>	12					2	1								
Curlew	<i>Numenius arquata</i>	1		1		6	3									
Curlew	<i>Numenius arquata</i>	2				2	8									3
Curlew	<i>Numenius arquata</i>	3					4						1			
Curlew	<i>Numenius arquata</i>	4						15						1		
Curlew	<i>Numenius arquata</i>	6				1										
Curlew	<i>Numenius arquata</i>	7				1										
Curlew	<i>Numenius arquata</i>	8				1		1							1	
Curlew	<i>Numenius arquata</i>	9				4								1		
Curlew	<i>Numenius arquata</i>	10		2		4										
Curlew	<i>Numenius arquata</i>	11				3										
Curlew	<i>Numenius arquata</i>	12														2
Redshank	<i>Tringa totanus</i>	3						6								
Redshank	<i>Tringa totanus</i>	4						4								
Redshank	<i>Tringa totanus</i>	10							1							
Turnstone	<i>Arenaria interpres</i>	1											5			
Turnstone	<i>Arenaria interpres</i>	2								1	3					

Species common name	Species biological name	VP	Mar -11	Apr- 11	May- 11	Jun- 11	Jul -11	Aug -11	Sep- 11	Oct- 11	Nov- 11	Dec- 11	Jan- 12	Feb- 12	Mar- 12	Apr -12
Turnstone	<i>Arenaria interpres</i>	3						2								
Turnstone	<i>Arenaria interpres</i>	5						2								
Turnstone	<i>Arenaria interpres</i>	6												3		
Turnstone	<i>Arenaria interpres</i>	8								9		5				
Turnstone	<i>Arenaria interpres</i>	9									19			1	1	
Turnstone	<i>Arenaria interpres</i>	10										1	1			
Turnstone	<i>Arenaria interpres</i>	11											13			
Turnstone	<i>Arenaria interpres</i>	12					1	6								
Grey phalarope	<i>Phalaropus fulicarius</i>	8							1							
Pomarine skua	<i>Stercorarius pomarinus</i>	2											1			
Pomarine skua	<i>Stercorarius pomarinus</i>	10											1			
Pomarine skua	<i>Stercorarius pomarinus</i>	11											1			
Pomarine skua	<i>Stercorarius pomarinus</i>	12									1	1				
Arctic skua	<i>Stercorarius parasiticus</i>	1						1								
Arctic skua	<i>Stercorarius parasiticus</i>	2								1						
Arctic skua	<i>Stercorarius parasiticus</i>	5								2						
Arctic skua	<i>Stercorarius parasiticus</i>	6								1						
Arctic skua	<i>Stercorarius parasiticus</i>	8								4						
Arctic skua	<i>Stercorarius parasiticus</i>	9							1	4		1				
Arctic skua	<i>Stercorarius parasiticus</i>	10					2			1		1				
Arctic skua	<i>Stercorarius parasiticus</i>	12							2							
Great skua	<i>Stercorarius skua</i>	1							1							

Species common name	Species biological name	VP	Mar -11	Apr- 11	May- 11	Jun- 11	Jul -11	Aug -11	Sep- 11	Oct- 11	Nov- 11	Dec- 11	Jan- 12	Feb- 12	Mar- 12	Apr -12
Great skua	<i>Stercorarius skua</i>	5														1
Great skua	<i>Stercorarius skua</i>	6														1
Great skua	<i>Stercorarius skua</i>	9								6						
Great skua	<i>Stercorarius skua</i>	10								1	2					
Great skua	<i>Stercorarius skua</i>	12							1	1	1					
Kittiwake	<i>Rissa tridactyla</i>	1			21		26						21	1	1	47
Kittiwake	<i>Rissa tridactyla</i>	2		5	7		28		1					1	4	32
Kittiwake	<i>Rissa tridactyla</i>	3			37		15	3					29	3	14	
Kittiwake	<i>Rissa tridactyla</i>	4			10	17	39						82		2	5
Kittiwake	<i>Rissa tridactyla</i>	5		10	8		36								1	7
Kittiwake	<i>Rissa tridactyla</i>	6	15	8			41					1	2		1	55
Kittiwake	<i>Rissa tridactyla</i>	7	58	1			14						5			17
Kittiwake	<i>Rissa tridactyla</i>	8	6				25						1		1	2
Kittiwake	<i>Rissa tridactyla</i>	9								1	1	8			13	
Kittiwake	<i>Rissa tridactyla</i>	10										28				
Kittiwake	<i>Rissa tridactyla</i>	11								1		59		1		
Kittiwake	<i>Rissa tridactyla</i>	12									12	109		1		
Little gull	<i>Hydrocoloeus minutus</i>	1						16	7							
Little gull	<i>Hydrocoloeus minutus</i>	2						48	1							
Little gull	<i>Hydrocoloeus minutus</i>	3						10								
Little gull	<i>Hydrocoloeus minutus</i>	4						27								
Little gull	<i>Hydrocoloeus minutus</i>	5						29								

Species common name	Species biological name	VP	Mar -11	Apr- 11	May- 11	Jun- 11	Jul -11	Aug -11	Sep- 11	Oct- 11	Nov- 11	Dec- 11	Jan- 12	Feb- 12	Mar- 12	Apr -12
Little gull	<i>Hydrocoloeus minutus</i>	6						2			16					
Little gull	<i>Hydrocoloeus minutus</i>	7					1	1								
Little gull	<i>Hydrocoloeus minutus</i>	9											1			
Little gull	<i>Hydrocoloeus minutus</i>	11									1	1				
Mediterranean gull	<i>Larus melanocephalus</i>	1		2											2	
Mediterranean gull	<i>Larus melanocephalus</i>	5														1
Mediterranean gull	<i>Larus melanocephalus</i>	9								1						
Mediterranean gull	<i>Larus melanocephalus</i>	10										1				
Little tern	<i>Sternula albifrons</i>	1			51											
Little tern	<i>Sternula albifrons</i>	2			14											
Little tern	<i>Sternula albifrons</i>	3			4											
Little tern	<i>Sternula albifrons</i>	5				4										
Little tern	<i>Sternula albifrons</i>	7			1											
Little tern	<i>Sternula albifrons</i>	10			18	1										
Little tern	<i>Sternula albifrons</i>	11			6											
Little tern	<i>Sternula albifrons</i>	12				1										
Sandwich tern	<i>Sterna sandvicensis</i>	1			4	2		8	13							1
Sandwich tern	<i>Sterna sandvicensis</i>	2		4				5	10							
Sandwich tern	<i>Sterna sandvicensis</i>	3		2			2	4	17							
Sandwich tern	<i>Sterna sandvicensis</i>	4			1	2	7	4	3							
Sandwich tern	<i>Sterna sandvicensis</i>	5					1	2	2							
Sandwich tern	<i>Sterna sandvicensis</i>	6					4	1	2							

Species common name	Species biological name	VP	Mar -11	Apr- 11	May- 11	Jun- 11	Jul -11	Aug -11	Sep- 11	Oct- 11	Nov- 11	Dec- 11	Jan- 12	Feb- 12	Mar- 12	Apr -12
Sandwich tern	<i>Sterna sandvicensis</i>	7					1	1	3							
Sandwich tern	<i>Sterna sandvicensis</i>	8					3	2	7							
Sandwich tern	<i>Sterna sandvicensis</i>	9					6	1	6							
Sandwich tern	<i>Sterna sandvicensis</i>	10				2	1	1	7							1
Sandwich tern	<i>Sterna sandvicensis</i>	11					11	2								
Sandwich tern	<i>Sterna sandvicensis</i>	12			3		13	5	9							
Common tern	<i>Sterna hirundo</i>	1			28	81	183	146	16							1
Common tern	<i>Sterna hirundo</i>	2			8	75	39	16	20							
Common tern	<i>Sterna hirundo</i>	3			1	8	25	16	20	1						
Common tern	<i>Sterna hirundo</i>	4				18	2	15	23							
Common tern	<i>Sterna hirundo</i>	5					26	42	19							2
Common tern	<i>Sterna hirundo</i>	6			3		20	79	7							
Common tern	<i>Sterna hirundo</i>	7				3	15	20	2							
Common tern	<i>Sterna hirundo</i>	8				2	17	28	5	1						
Common tern	<i>Sterna hirundo</i>	9					2									
Common tern	<i>Sterna hirundo</i>	10					12	2								
Common tern	<i>Sterna hirundo</i>	11					21	4	3							
Common tern	<i>Sterna hirundo</i>	12			3		5	9	5							
Guillemot	<i>Uria aalge</i>	1				1										
Guillemot	<i>Uria aalge</i>	3												1		
Guillemot	<i>Uria aalge</i>	4										1				
Razorbill	<i>Alca torda</i>	4										1				

Species common name	Species biological name	VP	Mar -11	Apr- 11	May- 11	Jun- 11	Jul -11	Aug -11	Sep- 11	Oct- 11	Nov- 11	Dec- 11	Jan- 12	Feb- 12	Mar- 12	Apr -12
Razorbill	<i>Alca torda</i>	7			2				1		1					
Razorbill	<i>Alca torda</i>	9								2						
Razorbill	<i>Alca torda</i>	11								1						
Razorbill	<i>Alca torda</i>	12								4	16	1				
Razorbill / guillemot		1								1						
Razorbill / guillemot		5								1						
Razorbill / guillemot		6											1			
Razorbill / guillemot		7								2						
Razorbill / guillemot		8								1		1				
Razorbill / guillemot		9								1						
Razorbill / guillemot		10								2		4				
Razorbill / guillemot		11								3	1	7				
Razorbill / guillemot		12								1	1	6				
Little auk	<i>Alle alle</i>	11									1					

Species common name	Species biological name	VP	Mar- 11	Apr- 11	May- 11	Jun- 11	Jul- 11	Aug- 11	Sep -11	Oct- 11	Nov -11	Dec- 11	Jan -12	Feb- 12	Mar -12	Apr -12
Pink-footed goose	<i>Anser brachyrhynchus</i>	9									2					
Greylag goose	<i>Anser anser</i>	2														2
Greylag goose	<i>Anser anser</i>	5										20				
Greylag goose	<i>Anser anser</i>	12													3	
Brent goose	<i>Branta bernicla</i>	1							1					50		
Brent goose	<i>Branta bernicla</i>	2							21		21					2
Brent goose	<i>Branta bernicla</i>	3							9		6		6			1
Brent goose	<i>Branta bernicla</i>	4							24		8					
Brent goose	<i>Branta bernicla</i>	5							5		72					
Brent goose	<i>Branta bernicla</i>	6							85	12	59	1			11	
Brent goose	<i>Branta bernicla</i>	7		1							3					
Brent goose	<i>Branta bernicla</i>	8								7	55					
Brent goose	<i>Branta bernicla</i>	9								13	127		1			
Brent goose	<i>Branta bernicla</i>	10								17	50					
Brent goose	<i>Branta bernicla</i>	11								5	14					
Brent goose	<i>Branta bernicla</i>	12								4	9		2	2		
Shelduck	<i>Tadorna tadorna</i>	1												2		2
Shelduck	<i>Tadorna tadorna</i>	2										1				1
Shelduck	<i>Tadorna tadorna</i>	3											10			
Shelduck	<i>Tadorna tadorna</i>	4								2		4				
Shelduck	<i>Tadorna tadorna</i>	5		1										2		

Species common name	Species biological name	VP	Mar- 11	Apr- 11	May- 11	Jun- 11	Jul- 11	Aug- 11	Sep- 11	Oct- 11	Nov- 11	Dec- 11	Jan- 12	Feb- 12	Mar- 12	Apr- 12
Shelduck	<i>Tadorna tadorna</i>	6									1					
Shelduck	<i>Tadorna tadorna</i>	7										3				
Shelduck	<i>Tadorna tadorna</i>	8											1			1
Shelduck	<i>Tadorna tadorna</i>	12										2				
Wigeon	<i>Anas penelope</i>	1								7	5					
Wigeon	<i>Anas penelope</i>	2										2				
Wigeon	<i>Anas penelope</i>	3									14		3			
Wigeon	<i>Anas penelope</i>	4								7	30					
Wigeon	<i>Anas penelope</i>	5							3	9						
Wigeon	<i>Anas penelope</i>	6								12	10					
Wigeon	<i>Anas penelope</i>	7										7				23
Wigeon	<i>Anas penelope</i>	9											8		1	
Wigeon	<i>Anas penelope</i>	11											3			
Wigeon	<i>Anas penelope</i>	12									1	2				
Gadwall	<i>Anas strepera</i>	6										20				
Teal	<i>Anas crecca</i>	1										6		1		
Teal	<i>Anas crecca</i>	2							8							
Teal	<i>Anas crecca</i>	4	3						3	19						
Teal	<i>Anas crecca</i>	5									1					
Teal	<i>Anas crecca</i>	6									1					
Teal	<i>Anas crecca</i>	7					1					10				
Teal	<i>Anas crecca</i>	10										230	215			

Species common name	Species biological name	VP	Mar- 11	Apr- 11	May- 11	Jun- 11	Jul- 11	Aug- 11	Sep- 11	Oct- 11	Nov- 11	Dec- 11	Jan- 12	Feb- 12	Mar- 12	Apr- 12
Teal	<i>Anas crecca</i>	11						5								
Teal	<i>Anas crecca</i>	12						21				56				
Mallard	<i>Anas platyrhynchos</i>	1						2								
Mallard	<i>Anas platyrhynchos</i>	2									1					
Mallard	<i>Anas platyrhynchos</i>	9												5		
Pintail	<i>Anas acuta</i>	3											5			
Pintail	<i>Anas acuta</i>	8										1				
Pintail	<i>Anas acuta</i>	11										6				
Pintail	<i>Anas acuta</i>	12										4				
Shoveler	<i>Anas clypeata</i>	1									1					
Shoveler	<i>Anas clypeata</i>	7										16	2			
Shoveler	<i>Anas clypeata</i>	9												2		
Tufted duck	<i>Aythya fuligula</i>	2														1
Eider	<i>Somateria mollissima</i>	1														8
Eider	<i>Somateria mollissima</i>	5									1					
Eider	<i>Somateria mollissima</i>	6									2					
Eider	<i>Somateria mollissima</i>	11										2				
Eider	<i>Somateria mollissima</i>	12									1					
Common scoter	<i>Melanitta nigra</i>	1							5						2	
Common scoter	<i>Melanitta nigra</i>	2					4					2				
Common scoter	<i>Melanitta nigra</i>	3		3				20				8	7			11
Common scoter	<i>Melanitta nigra</i>	5							15		10		1			

Species common name	Species biological name	VP	Mar- 11	Apr- 11	May- 11	Jun- 11	Jul- 11	Aug- 11	Sep- 11	Oct- 11	Nov- 11	Dec- 11	Jan- 12	Feb- 12	Mar- 12	Apr- 12
Common scoter	<i>Melanitta nigra</i>	6		7					1		8					
Common scoter	<i>Melanitta nigra</i>	7			5		15	11	4		29					
Common scoter	<i>Melanitta nigra</i>	8		22	2		6		3							
Common scoter	<i>Melanitta nigra</i>	9										2				
Common scoter	<i>Melanitta nigra</i>	10								8						
Common scoter	<i>Melanitta nigra</i>	11					16				16					
Common scoter	<i>Melanitta nigra</i>	12		20			1		3			15	2		2	
Goldeneye	<i>Bucephala clangula</i>	11											3			
Goldeneye	<i>Bucephala clangula</i>	12										2				
Red-breasted merganser	<i>Mergus serrator</i>	2										2				
Red-breasted merganser	<i>Mergus serrator</i>	4											1			
Red-breasted merganser	<i>Mergus serrator</i>	5									2					
Red-breasted merganser	<i>Mergus serrator</i>	6														7
Red-breasted merganser	<i>Mergus serrator</i>	12										1	1			
Red-throated diver	<i>Gavia stellata</i>	1	22	2				1	1		1	95	7	69	2	13
Red-throated diver	<i>Gavia stellata</i>	2	1							1	2	23	14	11	150	6
Red-throated diver	<i>Gavia stellata</i>	3	4	2								10	24	49	13	10
Red-throated diver	<i>Gavia stellata</i>	4	61	1							10	13	156	202	20	1
Red-throated diver	<i>Gavia stellata</i>	5	3	1							2	19	8	173	3	1

Species common name	Species biological name	VP	Mar- 11	Apr- 11	May- 11	Jun- 11	Jul- 11	Aug- 11	Sep- 11	Oct- 11	Nov- 11	Dec- 11	Jan- 12	Feb- 12	Mar- 12	Apr- 12
Red-throated diver	<i>Gavia stellata</i>	6	31	5							2	35	14	21	151	11
Red-throated diver	<i>Gavia stellata</i>	7	24						1			40	10	225	22	
Red-throated diver	<i>Gavia stellata</i>	8	7	2						2		276	1	40	51	
Red-throated diver	<i>Gavia stellata</i>	9	1	3					1	1		12	3	1	80	
Red-throated diver	<i>Gavia stellata</i>	10	1	1							4	3	39	224	46	4
Red-throated diver	<i>Gavia stellata</i>	11	17	1						1	1	12	330	37	45	1
Red-throated diver	<i>Gavia stellata</i>	12	11	4							1	159	710	51	20	
Black-throated diver	<i>Gavia arctica</i>	1										1				
Great crested grebe	<i>Podiceps cristatus</i>	1										5	2	13		
Great crested grebe	<i>Podiceps cristatus</i>	2	2									6				
Great crested grebe	<i>Podiceps cristatus</i>	3												2		2
Great crested grebe	<i>Podiceps cristatus</i>	4										2	3	1		
Great crested grebe	<i>Podiceps cristatus</i>	5									3	1		1	1	
Great crested grebe	<i>Podiceps cristatus</i>	6										1		2		1
Great crested grebe	<i>Podiceps cristatus</i>	7										1			1	
Great crested grebe	<i>Podiceps cristatus</i>	8												5		
Great crested grebe	<i>Podiceps cristatus</i>	10												4		
Great crested grebe	<i>Podiceps cristatus</i>	11											1	4		
Great crested grebe	<i>Podiceps cristatus</i>	12										1	9	7		
Fulmar	<i>Fulmarus glacialis</i>	1												1		2
Fulmar	<i>Fulmarus glacialis</i>	3													1	4
Fulmar	<i>Fulmarus glacialis</i>	5			1											

Species common name	Species biological name	VP	Mar- 11	Apr- 11	May- 11	Jun- 11	Jul- 11	Aug- 11	Sep- 11	Oct- 11	Nov- 11	Dec- 11	Jan- 12	Feb- 12	Mar- 12	Apr- 12
Fulmar	<i>Fulmarus glacialis</i>	6			1											
Fulmar	<i>Fulmarus glacialis</i>	7			1											
Fulmar	<i>Fulmarus glacialis</i>	8														1
Fulmar	<i>Fulmarus glacialis</i>	10					1									
Fulmar	<i>Fulmarus glacialis</i>	12													1	
Manx shearwater	<i>Puffinus puffinus</i>	12									1					
Gannet	<i>Morus bassanus</i>	1					3	1	1	3			27	6	2	3
Gannet	<i>Morus bassanus</i>	2					11		5	1		1	24		10	1
Gannet	<i>Morus bassanus</i>	3					1		7					2	4	
Gannet	<i>Morus bassanus</i>	4				1	8		11		2		9		2	
Gannet	<i>Morus bassanus</i>	5			6			2	3	3	4		1		2	1
Gannet	<i>Morus bassanus</i>	6		2	29		33			3		2	2		15	2
Gannet	<i>Morus bassanus</i>	7	4	2	22		8		5	54	1					
Gannet	<i>Morus bassanus</i>	8	1	1			18		7	91				26		
Gannet	<i>Morus bassanus</i>	9					1		3	42	1	3		3	1	
Gannet	<i>Morus bassanus</i>	10					3			8	1	30	1	1	4	
Gannet	<i>Morus bassanus</i>	11	1				7	1	1	12	4	22		33	4	
Gannet	<i>Morus bassanus</i>	12					25	17	12	15	39	5			38	3
Grey heron	<i>Ardea cinerea</i>	3														1
Grey heron	<i>Ardea cinerea</i>	5								1						
Marsh harrier	<i>Circus aeruginosus</i>	7		1												
Marsh harrier	<i>Circus aeruginosus</i>	12								1						

Species common name	Species biological name	VP	Mar- 11	Apr- 11	May- 11	Jun- 11	Jul- 11	Aug- 11	Sep- 11	Oct- 11	Nov- 11	Dec- 11	Jan- 12	Feb- 12	Mar- 12	Apr- 12
Hobby	<i>Falco subbuteo</i>	1					2		1							
Hobby	<i>Falco subbuteo</i>	7							1							
Hobby	<i>Falco subbuteo</i>	8							1							
Hobby	<i>Falco subbuteo</i>	11							1							
Peregrine	<i>Falco peregrinus</i>	11											1			
Peregrine	<i>Falco peregrinus</i>	12								1						
Oystercatcher	<i>Haematopus ostralegus</i>	1				1										
Oystercatcher	<i>Haematopus ostralegus</i>	2		1												7
Oystercatcher	<i>Haematopus ostralegus</i>	3							2		1					
Oystercatcher	<i>Haematopus ostralegus</i>	4				1		2	3							
Oystercatcher	<i>Haematopus ostralegus</i>	5						3			1					
Oystercatcher	<i>Haematopus ostralegus</i>	7	1					12								
Oystercatcher	<i>Haematopus ostralegus</i>	8				1		1								
Oystercatcher	<i>Haematopus ostralegus</i>	10		3												
Oystercatcher	<i>Haematopus ostralegus</i>	11								1						
Oystercatcher	<i>Haematopus ostralegus</i>	12						4								
Avocet	<i>Recurvirostra avosetta</i>	1				5										
Avocet	<i>Recurvirostra avosetta</i>	2			1	3										
Avocet	<i>Recurvirostra avosetta</i>	3														2
Avocet	<i>Recurvirostra avosetta</i>	4				3										2
Avocet	<i>Recurvirostra avosetta</i>	5				2										
Avocet	<i>Recurvirostra avosetta</i>	6		55					7							6

Species common name	Species biological name	VP	Mar- 11	Apr- 11	May- 11	Jun- 11	Jul- 11	Aug- 11	Sep- 11	Oct- 11	Nov- 11	Dec- 11	Jan- 12	Feb- 12	Mar- 12	Apr- 12
Avocet	<i>Recurvirostra avosetta</i>	8				2										
Avocet	<i>Recurvirostra avosetta</i>	9		2												2
Ringed plover	<i>Charadrius hiaticula</i>	1										4				
Ringed plover	<i>Charadrius hiaticula</i>	8										1				
Ringed plover	<i>Charadrius hiaticula</i>	9							3							
Ringed plover	<i>Charadrius hiaticula</i>	10						1								
Ringed plover	<i>Charadrius hiaticula</i>	11	1					1	1	1						
Ringed plover	<i>Charadrius hiaticula</i>	12						13	25							
Golden plover	<i>Pluvialis apricaria</i>	11						3								
Grey plover	<i>Pluvialis squatarola</i>	2							1							
Grey plover	<i>Pluvialis squatarola</i>	4							2							
Grey plover	<i>Pluvialis squatarola</i>	12								1						
Lapwing	<i>Vanellus vanellus</i>	4												11		
Knot	<i>Calidris canutus</i>	1														1
Knot	<i>Calidris canutus</i>	9												1		
Knot	<i>Calidris canutus</i>	11										2				
Knot	<i>Calidris canutus</i>	12							3							
Sanderling	<i>Calidris alba</i>	4						6								
Sanderling	<i>Calidris alba</i>	5				1										
Sanderling	<i>Calidris alba</i>	9							2							
Sanderling	<i>Calidris alba</i>	12						1								
Curlew sandpiper	<i>Calidris ferruginea</i>	12							1							

Species common name	Species biological name	VP	Mar- 11	Apr- 11	May- 11	Jun- 11	Jul- 11	Aug- 11	Sep- 11	Oct- 11	Nov- 11	Dec- 11	Jan- 12	Feb- 12	Mar- 12	Apr- 12
Dunlin	<i>Calidris alpina</i>	1			8			7	7	2				12	8	
Dunlin	<i>Calidris alpina</i>	2							15							
Dunlin	<i>Calidris alpina</i>	3						3						2		
Dunlin	<i>Calidris alpina</i>	4						5								
Dunlin	<i>Calidris alpina</i>	5				3			6							
Dunlin	<i>Calidris alpina</i>	6							8							
Dunlin	<i>Calidris alpina</i>	7							2							
Dunlin	<i>Calidris alpina</i>	8				7				1						
Dunlin	<i>Calidris alpina</i>	9												1		
Dunlin	<i>Calidris alpina</i>	11								1				1		
Dunlin	<i>Calidris alpina</i>	12							8	1						
Bar-tailed godwit	<i>Limosa lapponica</i>	6							4							
Bar-tailed godwit	<i>Limosa lapponica</i>	10										1				
Bar-tailed godwit	<i>Limosa lapponica</i>	12							1							
Whimbrel	<i>Numenius phaeopus</i>	1		1												
Whimbrel	<i>Numenius phaeopus</i>	3							1							1
Whimbrel	<i>Numenius phaeopus</i>	4							1	1						
Whimbrel	<i>Numenius phaeopus</i>	12					2	1								
Curlew	<i>Numenius arquata</i>	1		1		6	3									
Curlew	<i>Numenius arquata</i>	2				2	8									3
Curlew	<i>Numenius arquata</i>	3					4						1			
Curlew	<i>Numenius arquata</i>	4						15						1		

Species common name	Species biological name	VP	Mar- 11	Apr- 11	May- 11	Jun- 11	Jul- 11	Aug- 11	Sep- 11	Oct- 11	Nov- 11	Dec- 11	Jan- 12	Feb- 12	Mar- 12	Apr- 12
Curlew	<i>Numenius arquata</i>	6				1										
Curlew	<i>Numenius arquata</i>	7				1										
Curlew	<i>Numenius arquata</i>	8				1		1								1
Curlew	<i>Numenius arquata</i>	9				4								1		
Curlew	<i>Numenius arquata</i>	10		2		4										
Curlew	<i>Numenius arquata</i>	11				3										
Curlew	<i>Numenius arquata</i>	12														2
Redshank	<i>Tringa totanus</i>	3						6								
Redshank	<i>Tringa totanus</i>	4						4								
Redshank	<i>Tringa totanus</i>	10							1							
Turnstone	<i>Arenaria interpres</i>	1											5			
Turnstone	<i>Arenaria interpres</i>	2								1	3					
Turnstone	<i>Arenaria interpres</i>	3						2								
Turnstone	<i>Arenaria interpres</i>	5						2								
Turnstone	<i>Arenaria interpres</i>	6												3		
Turnstone	<i>Arenaria interpres</i>	8								9		5				
Turnstone	<i>Arenaria interpres</i>	9									19			1	1	
Turnstone	<i>Arenaria interpres</i>	10										1	1			
Turnstone	<i>Arenaria interpres</i>	11											13			
Turnstone	<i>Arenaria interpres</i>	12					1	6								
Grey phalarope	<i>Phalaropus fulicarius</i>	8							1							
Pomarine skua	<i>Stercorarius pomarinus</i>	2										1				

Species common name	Species biological name	VP	Mar- 11	Apr- 11	May- 11	Jun- 11	Jul- 11	Aug- 11	Sep- 11	Oct- 11	Nov- 11	Dec- 11	Jan- 12	Feb- 12	Mar- 12	Apr- 12
Pomarine skua	<i>Stercorarius pomarinus</i>	10										1				
Pomarine skua	<i>Stercorarius pomarinus</i>	11										1				
Pomarine skua	<i>Stercorarius pomarinus</i>	12									1	1				
Arctic skua	<i>Stercorarius parasiticus</i>	1						1								
Arctic skua	<i>Stercorarius parasiticus</i>	2								1						
Arctic skua	<i>Stercorarius parasiticus</i>	5								2						
Arctic skua	<i>Stercorarius parasiticus</i>	6								1						
Arctic skua	<i>Stercorarius parasiticus</i>	8								4						
Arctic skua	<i>Stercorarius parasiticus</i>	9							1	4		1				
Arctic skua	<i>Stercorarius parasiticus</i>	10					2			1		1				
Arctic skua	<i>Stercorarius parasiticus</i>	12							2							
Great skua	<i>Stercorarius skua</i>	1							1							
Great skua	<i>Stercorarius skua</i>	5														1
Great skua	<i>Stercorarius skua</i>	6														1
Great skua	<i>Stercorarius skua</i>	9								6						
Great skua	<i>Stercorarius skua</i>	10								1	2					
Great skua	<i>Stercorarius skua</i>	12							1	1	1					
Kittiwake	<i>Rissa tridactyla</i>	1			21		26						21	1	1	47
Kittiwake	<i>Rissa tridactyla</i>	2		5	7		28		1					1	4	32
Kittiwake	<i>Rissa tridactyla</i>	3			37		15	3					29	3	14	
Kittiwake	<i>Rissa tridactyla</i>	4			10	17	39						82		2	5
Kittiwake	<i>Rissa tridactyla</i>	5		10	8		36								1	7

Species common name	Species biological name	VP	Mar- 11	Apr- 11	May- 11	Jun- 11	Jul- 11	Aug- 11	Sep- 11	Oct- 11	Nov- 11	Dec- 11	Jan- 12	Feb- 12	Mar- 12	Apr- 12
Kittiwake	<i>Rissa tridactyla</i>	6	15	8			41					1	2		1	55
Kittiwake	<i>Rissa tridactyla</i>	7	58	1			14						5			17
Kittiwake	<i>Rissa tridactyla</i>	8	6				25						1		1	2
Kittiwake	<i>Rissa tridactyla</i>	9								1	1	8			13	
Kittiwake	<i>Rissa tridactyla</i>	10										28				
Kittiwake	<i>Rissa tridactyla</i>	11								1		59		1		
Kittiwake	<i>Rissa tridactyla</i>	12									12	109		1		
Little gull	<i>Hydrocoloeus minutus</i>	1						16	7							
Little gull	<i>Hydrocoloeus minutus</i>	2						48	1							
Little gull	<i>Hydrocoloeus minutus</i>	3						10								
Little gull	<i>Hydrocoloeus minutus</i>	4						27								
Little gull	<i>Hydrocoloeus minutus</i>	5						29								
Little gull	<i>Hydrocoloeus minutus</i>	6						2			16					
Little gull	<i>Hydrocoloeus minutus</i>	7					1	1								
Little gull	<i>Hydrocoloeus minutus</i>	9										1				
Little gull	<i>Hydrocoloeus minutus</i>	11									1	1				
Mediterranean gull	<i>Larus melanocephalus</i>	1		2											2	
Mediterranean gull	<i>Larus melanocephalus</i>	5														1
Mediterranean gull	<i>Larus melanocephalus</i>	9								1						
Mediterranean gull	<i>Larus melanocephalus</i>	10										1				
Little tern	<i>Sternula albifrons</i>	1			51											
Little tern	<i>Sternula albifrons</i>	2			14											

Species common name	Species biological name	VP	Mar- 11	Apr- 11	May- 11	Jun- 11	Jul- 11	Aug- 11	Sep- 11	Oct- 11	Nov- 11	Dec- 11	Jan- 12	Feb- 12	Mar- 12	Apr- 12
Little tern	<i>Sternula albifrons</i>	3			4											
Little tern	<i>Sternula albifrons</i>	5				4										
Little tern	<i>Sternula albifrons</i>	7			1											
Little tern	<i>Sternula albifrons</i>	10			18	1										
Little tern	<i>Sternula albifrons</i>	11			6											
Little tern	<i>Sternula albifrons</i>	12				1										
Sandwich tern	<i>Sterna sandvicensis</i>	1			4	2		8	13							1
Sandwich tern	<i>Sterna sandvicensis</i>	2		4				5	10							
Sandwich tern	<i>Sterna sandvicensis</i>	3		2			2	4	17							
Sandwich tern	<i>Sterna sandvicensis</i>	4			1	2	7	4	3							
Sandwich tern	<i>Sterna sandvicensis</i>	5					1	2	2							
Sandwich tern	<i>Sterna sandvicensis</i>	6					4	1	2							
Sandwich tern	<i>Sterna sandvicensis</i>	7					1	1	3							
Sandwich tern	<i>Sterna sandvicensis</i>	8					3	2	7							
Sandwich tern	<i>Sterna sandvicensis</i>	9					6	1	6							
Sandwich tern	<i>Sterna sandvicensis</i>	10				2	1	1	7							1
Sandwich tern	<i>Sterna sandvicensis</i>	11					11	2								
Sandwich tern	<i>Sterna sandvicensis</i>	12			3		13	5	9							
Common tern	<i>Sterna hirundo</i>	1			28	81	183	146	16							1
Common tern	<i>Sterna hirundo</i>	2			8	75	39	16	20							
Common tern	<i>Sterna hirundo</i>	3			1	8	25	16	20	1						
Common tern	<i>Sterna hirundo</i>	4				18	2	15	23							

Species common name	Species biological name	VP	Mar- 11	Apr- 11	May- 11	Jun- 11	Jul- 11	Aug- 11	Sep- 11	Oct- 11	Nov- 11	Dec- 11	Jan- 12	Feb- 12	Mar- 12	Apr- 12
Common tern	<i>Sterna hirundo</i>	5					26	42	19							2
Common tern	<i>Sterna hirundo</i>	6			3		20	79	7							
Common tern	<i>Sterna hirundo</i>	7				3	15	20	2							
Common tern	<i>Sterna hirundo</i>	8				2	17	28	5	1						
Common tern	<i>Sterna hirundo</i>	9					2									
Common tern	<i>Sterna hirundo</i>	10					12	2								
Common tern	<i>Sterna hirundo</i>	11					21	4	3							
Common tern	<i>Sterna hirundo</i>	12			3		5	9	5							
Guillemot	<i>Uria aalge</i>	1				1										
Guillemot	<i>Uria aalge</i>	3												1		
Guillemot	<i>Uria aalge</i>	4										1				
Razorbill	<i>Alca torda</i>	4										1				
Razorbill	<i>Alca torda</i>	7			2				1		1					
Razorbill	<i>Alca torda</i>	9								2						
Razorbill	<i>Alca torda</i>	11								1						
Razorbill	<i>Alca torda</i>	12								4	16	1				
Razorbill / guillemot		1								1						
Razorbill / guillemot		5								1						
Razorbill / guillemot		6										1				
Razorbill / guillemot		7								2						
Razorbill / guillemot		8								1		1				
Razorbill / guillemot		9								1						

Species common name	Species biological name	VP	Mar- 11	Apr- 11	May- 11	Jun- 11	Jul- 11	Aug- 11	Sep- 11	Oct- 11	Nov- 11	Dec- 11	Jan- 12	Feb- 12	Mar- 12	Apr- 12
Razorbill / guillemot		10								2		4				
Razorbill / guillemot		11								3	1	7				
Razorbill / guillemot		12								1	1	6				
Little auk	<i>Alle alle</i>	11										1				

British Energy Group PLC

Confidential Bittern Survey Report 2008

1. Introduction

1.1 Confidentiality

Please note that this report includes confidential data concerning the location of bittern nest sites that has been provided by RSPB. It is not for general circulation.

1.2 Background

British Energy (BE) is currently investigating the feasibility of building a new nuclear power station within their landholding at Sizewell, Suffolk. An area of land directly north of the Sizewell 'B' Power Station has been identified as having potential to accommodate nuclear new build. This area, which covers approximately 0.32km²/32ha and has an approximate central grid reference of TM473640, is referred to in this document as 'the preliminary works area'. The proposed location of the new power station, the indicative access road and construction compound (accounting for a potential further 0.35km²/35ha of land take) are shown in **Figure 1.1**. The position of the proposed access road and the construction compounds in particular are subject to change.

1.3 Preliminary Works Area Description and Context

The preliminary works area comprises open sheep grazed pasture, fringed by reinstated coastal dune vegetation, parts of which have been planted with trees and scrub. The hydrology and pedology of the preliminary works area were irreversibly altered as a result of works associated with the building of the Sizewell 'A' and 'B' Stations (adjacent to its southern boundary), and as a result the area has lost much of its botanical merit. Habitats adjoining or in close proximity to the preliminary works area are of considerable ecological interest however. These include wet meadows (and associated wetland habitats and ditch systems), dune systems, shingle plant communities and wet semi-natural woodland. The quality of the shingle, grazing marsh and associated wetland habitats have led to substantial areas of these in close proximity to the preliminary works area being designated for their ecological interest.

The likely route of any new access associated with the new build would pass through the extreme north-east corner of the Sizewell Marshes, which would entail a bridge crossing over at least one ditch, then through the extensive conifer plantation at Goose Hills and along the northern edge of Kenton Hills before linking to the existing road network near the pocket of broad-leaved woodland known as Fiscal Policy. The location and extent of the construction compounds has not been confirmed, but these are likely to take in parts of Kenton and Goose Hills as well as adjacent arable land.

The Sizewell Estate lies within the Suffolk Coast and Heaths Natural Area. This covers the land extending as far as Great Yarmouth in the north, and Harwich in the south. The area is generally very flat, with land-use dominated by arable farming (particularly for root crops),

although cattle farming is common on the low-lying land adjacent to the coast. Whilst heathlands were extensive throughout the area in the eighteenth and nineteenth centuries, only a small fraction of these remain with most being taken over for arable and forestry. The Natural area also contains over one-fifth of the national reedbed resource¹. All of the larger reedbeds have been statutorily designated reflecting their national and /or international importance for bird conservation. The estuarine habitats present along the coastline are also of international importance for nature conservation (Natural England, 2008).

1.4 Purpose of this Report

Breeding bird surveys undertaken by Entec in 2007 recorded bittern using the Sizewell Estate during April (see: Sizewell First Interim Bird Report, Entec Doc. Reg. 19801cr080). It was also apparent from an initial literature search that there were previous records of bittern on the Sizewell Estate².

During a consultation meeting with Adam Rowlands and Kirsty Coutts of RSPB (in September 2007) to discuss the results of the Sizewell breeding bird surveys, concerns were raised about the potential value of the Sizewell Marshes as a foraging resource for the Minsmere to Walberswick Special Protection Area (SPA) bittern population³. The SPA lies adjacent to the preliminary works area⁴, so any changes in the level or nature of use of the Sizewell Estate by breeding bittern would have the potential to result in effects on the SPA population. It was suggested that survey work be undertaken to investigate this further. Of chief concern to RSPB was the potential effect of disturbance associated with construction, as this was considered to have the potential to result in the displacement of females preferentially foraging in the Sizewell Marshes in order to provision nests within the SPA.

Therefore, the aim of the survey work undertaken in 2008 was to establish whether there were flight lines between the SPA and the Sizewell Marshes suggesting a direct ecological link between the areas. This report details the findings of the survey work plus a contextual study looking at previous use of the estate and the wider (local) area in the context of county, regional and national population trends.

¹ 474 Hectares of reed bed are within the Natural Area.

² This has been explored in more detail in section 3.1.1.

³ The Natura 2000 Data Form indicated that at the time of designation the site supported 35% of the UK breeding bittern population (equating to 7 territorial males). There were no updates to this assessment suggested by the SPA Review, although it was considered in this document that bittern should be added to the winter qualifying interest of the SPA. Links to these documents are as follows;

<http://www.jncc.gov.uk/pdf/SPA/UK9009101.pdf> <http://www.jncc.gov.uk/default.aspx?page=2009>

⁴ It should be noted, however, that the reedbed habitats within the designation are at least 1km from the indicative location of the construction compounds and over 1.6km from the likely location of the new plant (www.magic.gov.uk, www.maps.live.com).

1.5 Species Information

1.5.1 Legislative Protection

Bittern is afforded enhanced protection at European level under Annex 1 of the Birds Directive (1979)⁵, and in the UK under Schedule 1 of the Wildlife and Countryside Act (1981), which makes it an offence to disturb or otherwise interfere with nesting birds.

Bittern is also included on the list of species of principal importance for biodiversity, under Section 41 of the Natural Environment and Rural Communities Act (2006). Amongst other things, this requires local authorities to take steps to ensure the conservation of the species through the planning process.

1.5.2 Breeding Ecology

In the UK, breeding bittern occurs in wet, freshwater reedbeds dominated by common reed (*Phragmites australis*). Males often mate with up to 5 females and take no part in the chick rearing process; they will exclude other males from their territory throughout the breeding season (Snow & Perrins, 1998). The first eggs are laid at the end of March or in early April. These hatch approximately 25 days later and the young are usually independent at 8 weeks (Harrison & Castell, 2002) i.e. around mid June.

Foraging tends to take place mainly in marginal stands of emergent vegetation and radio tracking studies have shown that vegetation within 10m of the water-reed interface is of particular importance (Noble *et al.*, 2004). Nestling bittern have been shown to be fed on a fairly limited range of fish species in Britain. These include nine-spined stickleback (*Pungitius pungitius*), eel (*Anguilla anguilla*) and rudd (*Scardinius erythrophthalmus*) (Gilbert *et al.*, 2003). When the immediate area around the nest is too dry to support sufficient prey, the females will fly to more suitable foraging areas, such as wet ditches (Brown & Grice, 2005). Commuting to forage appears to be more common in British populations than elsewhere in the species' European range possibly due to lower prey abundance in reedbeds than other suitable wetland habitats (Luca Puglisi⁶, pers comm)⁷.

⁵ This obliges national governments to identify and designate areas of critical importance to the conservation of the species.

⁶ Dipartimento di Etologia, Ecologia ed Evoluzione, Università degli Studi di Pavia. July 2008. L. Puglisi has published a number of articles on bittern ecology and conservation in journals such as *Biodiversity and Conservation*, *Avian Science* and *Waterbirds*.

⁷ A lower species diversity and abundance of fish in wetland reedbeds in the UK (compared to other habitats such as shallow lakes) has been documented, and has been identified as a potential limiting factor for the recovery of the bittern (Noble *et al.*, 2004).

2. Methods

2.1 Desk Study

Contextual information regarding bittern at local, county and national level was obtained from the following individuals, groups and published sources:

- Suffolk Wildlife Trust [SWT] (in particular Alan Miller);
- RSPB Minsmere (Robin Harvey); and
- RSPB Conservation Science (Simon Wotton);
- Wotton, S., *et al.* (2008). Bittern *Botaurus stellaris* monitoring in the UK - Summary of the 2008 season. RSPB and Natural England;
- ADAS & Suffolk Wildlife Trust, Sizewell Annual Land Management Reviews;
- ADAS (2006). Sizewell Estate – Integrated Land Management Plan;
- Suffolk Wildlife Trust (1996). A Biological Survey of Abbey Farms, Sizewell;
- Hall, M. A. (1984). An Ecological Survey of the Birdlife of Sizewell and its immediate surrounding area (1971 to 1984);
- Holling, M & the Rare Breeding Birds Panel [RBBP] (2007). Rare breeding birds in the United Kingdom in 2003 and 2004. *British Birds*, 100, 321–367;
- Suffolk Naturalists Society (2007). Suffolk Birds 2006. Suffolk Naturalist's Society, Ipswich;
- Piotrowski, S. (2003). *The Birds of Suffolk*. Helm, London.

The Decommissioning Environmental Statement for Sizewell 'A' (Cresswell Associates, 2005) was also consulted, but contained no additional relevant information.

2.2 Field Surveys

In order to determine whether bittern were flying between the SPA and the Sizewell Marshes, a series of surveys were conducted using vantage-points overlooking land between the areas. On each survey day 2 Entec surveyors, stationed at complementary vantage-points, undertook co-ordinated watches, communicating any observed flights to each other with walkie-talkies, and mapping any bittern flight lines, take off and landing locations. Wherever possible, these surveys were co-ordinated with RSPB work aimed at identifying indicative nesting locations of birds at Minsmere (and which therefore focussed on reedbed habitats within the SPA). This co-ordination enabled any bittern flights towards the southern edge of the marshes to be communicated to the Entec surveyors by RSPB staff (again using walkie-talkies), further increasing likely detection rates.

Madders (in SNH, 2005), states that it is possible for an observer to effectively survey an arc of 180 degrees by 2km in width during a vantage-point watch^{8,9}, by scanning the target area continuously with binoculars. The selection of vantage-points for the bittern survey was therefore based on this principle, and with reference to **Figure 2.1**, it can be seen that the combination of vantage-points allowed excellent coverage of the land area surveyed (which is largely flat with no large areas in which a low flying large bird would be undetectable).

Two vantage points (VPs) were used during each survey. These were located at:

- VP1 TM 473 659; and
- VP2 TM 475 652.

Two watches were conducted at each point during each survey day, each being 3 hours in duration (the maximum duration of watch recommended by Madders). Between surveys the surveyors took a break of between 15 minutes and half an hour to rest their eyes and refocus. Dates and times of surveys are given in **Table 2.1**.

Two surveyors conducted 12 days (72 hours) of co-ordinated survey work between 15th May and 4th August 2008. The timing of these surveys was aimed to cover the peak provisioning period of nestlings by adult female bitterns¹⁰, which is likely to be between late April and mid-June. However, the surveys also continued into August to cover any second broods following nest failures (Snow & Perrins, 1998). This temporal coverage follows the RSPB monitoring scheme, which involves weekly watches from the beginning of May to 1st August, with a potential extension in the event of likely re-lays or second broods¹¹. A total of 10 of the Entec surveys (60 hours of survey work) were co-ordinated with RSPB surveys.

⁸ This survey methodology has been developed for use at wind farms, where species of particular concern are raptors such as eagles, kites and harriers and migratory wildfowl, particularly geese and swans. It follows that it is suitable for collecting data on flight lines of other large species including bittern.

⁹ Clearly the extent of land that can be surveyed effectively within this survey arc is dependent on topography, while built structures and planting can also create areas of dead ground.

¹⁰ The RSPB Monitoring Programme consisted of weekly watches to locate nesting females provisioning young. Under the programme, nests are defined based on observations of adult birds leaving and subsequently returning to the same discrete area (usually less than 20m x 20m in extent) on four or more occasions in the same day, or on two separate days if the nest is considered to be advanced and the female is away for long periods (Robin Harvey, *pers comm*). Any bird that returned to the nest for 15-20 minutes between feeding trips lasting between 1 and 4 hours was considered to be a nesting female.

Surveys did not generally begin very early in the morning e.g. at or around dawn, as female bittern do not tend to make many early morning flights (to reduce the chances of chick mortality through chilling [Robin Harvey, RSPB, *pers comm*]).

¹¹ RSPB did not extend their survey work beyond early August in 2008.

Table 2.1 Vantage-Point Information

Date	Times	Wind Direction and Speed
15/05/2008	8:00 - 11:00	Wind direction: E. Force: 2
	11:30 - 14:30	
22/05/2008	08:15 - 11:15	Wind direction: E. Force: 1
	12:15 - 15:15	
29/05/2008	8:20 - 11:50	Wind direction: E. Force: 3
	12:30 - 15:00	
04/06/2008	8:20 - 11:20	Wind direction: E. Force: 1
	12:00 - 15:00	
12/06/2008	8:30 - 11:30	Wind direction: N. Force: 3-4
	12:00 - 15:10	
19/06/2008	8:45 - 12:45	Wind direction: W. Force: 2-3
	13:05 - 15:05	
26/06/2008	8:00 - 11:00	Wind direction: S and W variable. Force: 1-3
	11:30 - 14:30	
03/07/2008	8:00 - 11:00	Wind direction: SSE. Force: 3-4
	11:30 - 14:30	
10/07/2008	8:30 - 11:50	Wind direction: SW. Force: 1-3
	12:10 - 15:00	
22/07/2008	9:00 - 12:00	Wind direction: N. Force: 1-2
	12:30 - 15:30	
24/07/2008	8:50 - 11:50	Wind direction: E. Force: 2-3
	12:20 - 15:20	
04/08/2008	7:30 - 10:30	Wind direction: SW. Force: 3-4
	11:00 - 14:00	

The bittern surveys ran concurrently with marsh harrier surveys also aimed at establishing whether birds from the SPA used the Sizewell Marshes as a foraging resource. As marsh harrier was known to fly over and forage in the Sizewell Marshes, these (marsh harrier) surveys were more aimed at understanding the frequency and nature of use of the marshes by the species. Therefore, some survey locations within, as well as remote from the Sizewell Marshes, were selected. The complete results of the marsh harrier surveys are reported in full in a separate report (Entec Doc. Reg. 19801cb174). However, any observations of bittern made during these surveys have been included here in order to provide further data and strengthen any conclusions.

3. Results

3.1 Desk Study

3.1.1 Bittern on the Sizewell Estate

- Hall (1984) reported a total of 21 sightings of bittern in freshwater marsh and reedbed habitats within the Leiston area between 1971 and 1984¹² (Hall, 1984). As no standardised methodology was used for data collection, frequency of occurrence cannot be assessed however, and this simply provides an indication of the length of time in which bittern have occurred locally;
- The Biological Survey of Abbey Farms conducted by Suffolk Wildlife Trust did not record bittern during breeding or winter bird surveys in 1996/97. However, incidental sightings suggested some level of use of the marshes in winter (Suffolk Wildlife Trust, 1996);
- Bittern was also recorded within the Sizewell Estate in 1997, when a bird was seen feeding in the northern dyke on Salt Marsh in June. Since 1997 there have been virtually annual sightings from the Sizewell Estate (in all probability reflecting more structured survey rather than any change in level of use). Bittern has been recorded in various areas including the Sizewell Belts (the main part of the Sizewell Marshes adjacent to the likely location of the new plant), Salt Marsh (Grid Ref. TM 473 648) and Lower Abbey Marsh (Grid Ref. TM 462 658). In 2002, 2003 and 2004, records indicate possible year-round use of the marshes by bittern. An RSPB radio tracking exercise has been carried out on bittern from the SPA population. This study has shown that the Sizewell Marshes are used by first winter birds from the SPA breeding population (G.Gilbert, *pers. comm.*). A first year, radio-tagged bird from Minsmere was also recorded commuting between Sizewell and Minsmere in winter 2000/01 (SWT / ADAS, 2001). A dead radio-tagged bird was also recovered from a ditch in the Sizewell Marshes by G. Gilbert during the radio tracking exercise (G. Gilbert, *pers. comm.*). In 2005 an individual ringed as an adult at Minsmere in 1998 was recorded using Lower Abbey marshes (SWT / ADAS, 1998-2007);
- The Sizewell Estate Integrated Land Management (ADAS [2006]) concluded that bittern was a relatively regular winter visitor to the Sizewell Estate;
- During breeding bird surveys undertaken by Entec in 2007 a bittern was heard 'booming',¹³ from an area of marsh approximately 450m due west of the preliminary works area (a field between Kenton Hills and Grimseys) on 16th April. The bittern had been recorded (independently) by Alan Miller of the Suffolk Wildlife Trust the previous day, and was present for a week (ADAS & SWT, 2008). Various functions have been attributed to booming, though it is thought that it is used in the defence of territory, mate attraction and for defending the feeding

¹² Hall's report covered a roughly rectangular area approximately 2,420ha: the northern edge of the area considered was formed by the Minsmere Level and the eastern edge by the Suffolk coast. The area covered extended to Thorpeness in the south-east and Knodishall in the south-west.

¹³ Boom vocalisations are a distinctive feature of male bittern. These consist of repetitive, low frequency calls, which in good conditions can be heard at distances of up to 3km.

habitat used by the females of the booming male (Puglisi *et al.*, 1997). It is highly unlikely that breeding occurred in this location, as bitterns tend to favour large reedbeds of over 200 hectares in extent (Gilbert *et al.*, 1998).

3.1.2 Bittern at Minsmere

The number of booming males and nests at Minsmere for each year between 2004 and 2008 are summarised in **Table 3.1**.

Table 3.1 Numbers of Booming Males and Nests Within the Minsmere Reserve from 2004 to 2008 (from RSPB, 2008; RSPB, 2007 and Suffolk Naturalists Society, 2007).

	2004	2005	2006	2007	2008
Booming males	9	10	9	10	11
Nests	9	8	9	9	7

Information provided by RSPB indicates that 11 booming male bittern and 7 nests were present at Minsmere in 2008¹⁴. Sections of the Minsmere reedbed suffered from severe flooding in April and May and this may have resulted in the loss of some nests at the egg stage. Of the 7 nests (indicatively) located, only 1 is thought to have been successful (Wotton *et al.*, 2008).

The data obtained from the RSPB (nest locations and take off and landing points recorded that have been used to infer these nest locations) are shown on **Figure 3.1**, together with the preliminary works area, the flights recorded during the surveys for this report (refer to section 3.2) and the SPA boundary.

The closest nest to the Sizewell Estate was thought to have been within a territory immediately to the north of the New Cut, approximately 600m west of the Sluice. This is approximately 1.7km from the preliminary works area and the likely location of the construction compounds.

An initial 3 year eel stocking project commenced at Minsmere in 2008 as part of a project managed jointly by the Environment Agency and RSPB. RSPB reserves have been selected as they have the potential to act as eel nurseries and allow the recovery of eel stocks (which are a food source for species such as bittern and otter).

3.1.3 Bittern Status at County, Regional and National Level

Additional information on current conservation initiatives relating to bittern, and details with regard to trends in the population at county, regional and national level are found in Appendix A.

3.2 Field Survey

During the 72 hours of survey work that was undertaken, bittern were recorded 10 times, equating to an encounter rate of 1 bird for every 7.2 hours of observation. A further bird that was noted outside timed survey work is included in the tabulated results. Most bittern were

¹⁴ The Bittern Monitoring Project surveys cover the entire Minsmere-Walberswick SPA. However this data and that summarised in **Table 3.1** refers only to the Minsmere Reserve.

noted in flight, with either a take off point, landing point or both being recorded for the majority of the flights. Several birds were also recorded on the ground, either foraging or moving through relatively open areas of reed bed. **Table 3.2** summarises the number of sightings for each day and can be cross referenced with **Figure 3.1** which shows all Entec data, nesting locations derived by the RSPB and the location of the Minsmere to Walberswick SPA for context.

Table 3.2 **Dates and Numbers of Bittern Sightings**

Date	Number of Sightings	References on Figure 3.1
15/05/2008	0	-
22/05/2008	0	-
29/05/2008	0	-
04/06/2008	5	1-5
10/06/08	1 ¹⁵	6
12/06/2008	2	7 & 8
19/06/2008	3	9-11
26/06/2008	0	-
03/07/2008	0	-
10/07/2008	0	-
22/07/2008	0	-
24/07/2008	0	-
04/08/2008	0	-

The majority of the bittern sightings recorded during the surveys were concentrated within an area immediately to the west of VP1 and south of the Minsmere New Cut. A summary of sightings from the Entec survey work is as follows:

There were 5 encounters on 4th June, probably consisting of 3 individuals, based on 2 individuals being seen simultaneously, the restricted area in which bitterns were recorded, and the directions of their respective movements:

- Sighting 1 (on **Figure 3.1**). A low flight lasting 45 seconds was recorded south of vantage point 1. This bird landed within a ditch, with the take off point likely to have been near the sea wall;
- Sighting 2. A direct flight after which the bird landed in dense reeds immediately to the north of the New Cut, in close proximity to one of the nest locations highlighted by the RSPB monitoring data;

¹⁵ An 'incidental' record, i.e. a record outside formal timed survey work.

- Sightings 3 and 4. Two individuals were standing in an area of open ground to the southwest of VP1. One of these flew south for a short distance then landed; the other commenced foraging and walked into cover;
- Sighting 5. A fifth observation of a bird on the ground (to the south-southwest of VP1), very close to where the first bird recorded during the survey had landed.

On 10th June a bittern (sighting 6) was recorded flying north to the North Minsmere Level from south of the New Cut during one of the marsh harrier surveys. The precise take off point of this bird was not recorded, but the flight height and the location where it was first observed would suggest that this was well to the north of Goose Hill.

On 12th June, a bird (sighting 7) was recorded in flight from the Minsmere levels, flying south over the New Cut then to the west, towards Dovehill Plantation. A further bird (sighting 8) was recorded in a ditch to the south of VP1.

On 19th June, there were 3 sightings of at least 2 individuals, based on the location of the landing and take off points (although a maximum of 3 individuals may have been observed):

- Sighting 9. This bird flew south from the Minsmere Level over the New Cut to a location west of VP1;
- Sighting 10. A bird was recorded (briefly) walking west along a ditch south of VP1;
- Sighting 11. This observation was of a bird flying north from the South Level, over the New Cut to the North Minsmere Level.

An incidental sighting of a bittern occurred on 23rd July 2008 during one of the marsh harrier surveys. The bird was recorded flying south from the Minsmere Level and landing about 300m due west of VP1. The exact flight line of this bird could not be plotted, and is not included in **Figure 3.1**.

With reference to **Figure 3.1** observations of birds during the Entec survey programme are indicated by a red star (which has been used to represent birds on the ground as well as landing and take off points of flying birds). The indicative locations of the 7 bittern nests provided by the RSPB are shown as solid circles. It follows that sightings 9 and 10 (and possibly 2 and 8) from the Entec surveys are likely to relate to a female provisioning the 'green nest'.

The work undertaken indicates that bittern were not commuting as far as the preliminary works area or the indicative location of the construction compounds. These areas are respectively at least 1km and 640m to the south of observed bittern activity respectively based on the current site layout.

3.3 Survey Limitations

Artificial stocking of eels to the Minsmere RSPB Reserve took place on 14th and 29th May 2008. It is unknown whether this increased prey availability resulted in less recorded flight activity than might have been recorded in previous years. Nevertheless, it is intuitive that management measures to increase the extent of potential foraging habitat at Minsmere have encouraged bittern to forage within the reserve, and the incentive for breeding females to forage further away from the nest sites than is necessary are unclear from an energetic perspective.

4. Conclusion

Surveys undertaken by Entec in 2008 indicated that female bittern breeding at Minsmere did not provision their young from the Sizewell Marshes. 72 hours of survey from 2 vantage-points overlooking the Minsmere South Levels, produced no evidence of bittern commuting to and from the Sizewell Marshes. Some use of the ditches within the South Levels was recorded, but no flight activity or feeding behaviour was noted within 1km of the likely location of the new plant or within 640m of the indicative location of associated infrastructure. This, combined with data on nesting locations provided by RSPB, suggests that disturbance to feeding, commuting and nesting female bittern is unlikely to occur as a result of new build if 2008 is considered typical.

The desk study element of the work has shown that there are relatively regular records of bittern using wetland areas within the Sizewell Estate over the past 10 years, despite the fact that there has been no structured bittern survey work undertaken. This reflects the fact that the Sizewell Estate is regularly surveyed by SWT staff and visited by recreational bird watchers. It also indicates that bittern are not deterred from foraging in the Sizewell Marshes by the proximity of the built nuclear plant.

Some interchange of bittern between the Sizewell Estate and Minsmere has previously been proven as a result of ringing studies and radio tracking undertaken by the RSPB in the late 1990s. It is possible that the stocking of Minsmere with eels during May 2008, and repeat stocking planned for subsequent years may alter the baseline picture with regard to ranging behaviour. Nevertheless, habitat management undertaken by RSPB within the reedbed habitats and on the South Minsmere Levels to increase the availability of foraging habitat for bittern suggest that the pattern of flight activity observed is likely to be a true reflection of ranging behaviour, as there appears little incentive for birds to fly as far as the Sizewell Marshes to forage.

The breeding bittern population at Minsmere is currently relatively stable, with only minor fluctuations in booming males and nesting attempts between years. Numbers have increased since the designation of the Minsmere to Walberswick SPA however, with a mean of 10 booming males and 9 nesting attempts over the past 5 years (as opposed to the 7 booming males for which the site was designated), reflecting local management and wider population trends. At regional and national level bittern numbers have responded positively to habitat management and creation, with a 4-fold increase in booming males and a 5-fold increase in sites with proven nesting attempts between 1996 and 2008. From a UK perspective the colonisation of areas of inland reedbed, such as the East Anglian Fens and the Somerset Levels represent an important step in ensuring the long term conservation of the species.

5. Recommendations

- Opportunities to integrate management undertaken at Sizewell with management measures undertaken for bittern at Minsmere should be explored following the consent and construction of a new nuclear plant. This should take full account of the qualifying features of the Sizewell Marshes SSSI.

6. References

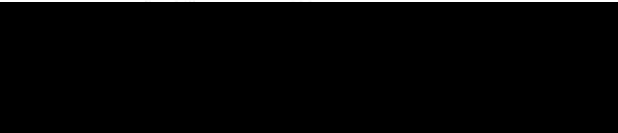
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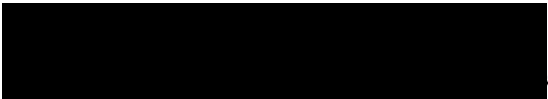
Author:

John Baker



Reviewer:

Owain Gabb

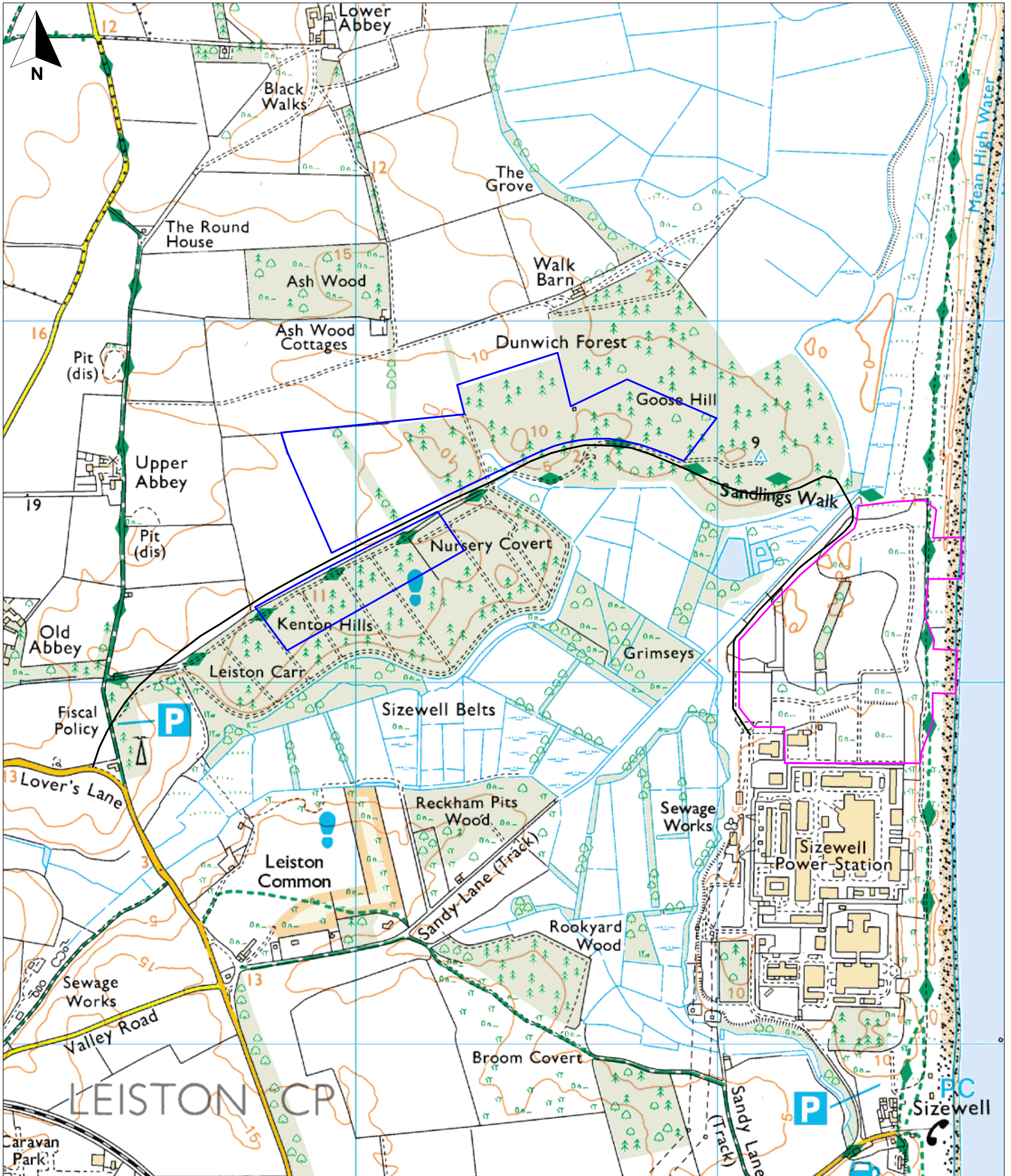


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- Key:**
- Preliminary Works Area
 - Indicative location of Construction Compounds
 - Proposed Access Route

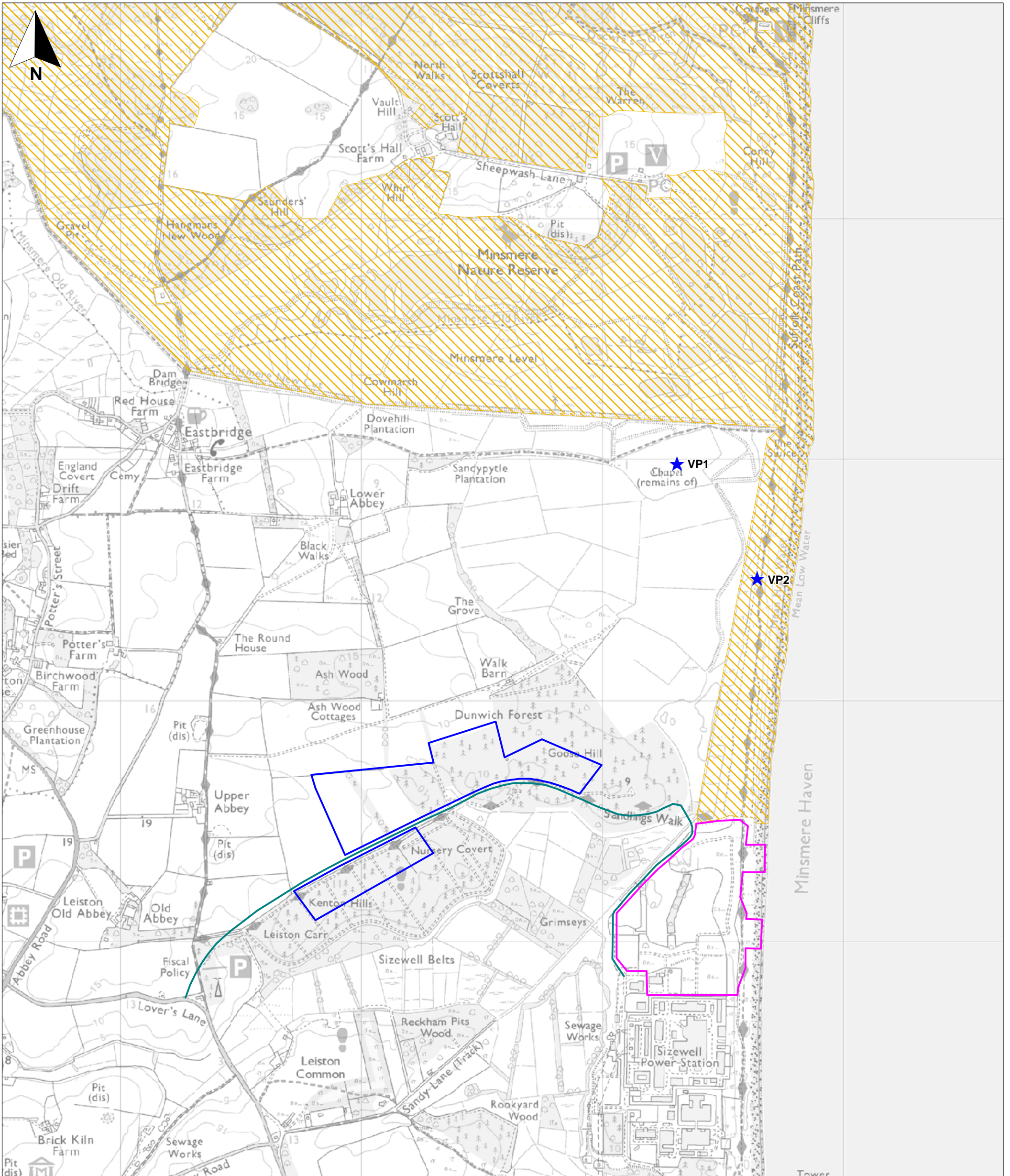


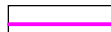




Sizewell Bittern Report 2008

Figure 1.1
Site location

November 2008
19801-R229 tugwc





- Key:**
-  Preliminary Works Area
 -  SPA
 -  Indicative location of construction compounds
 -  Proposed Access Road
 -  Vantage points



Sizewell Bittern Report 2008

Figure 2.1
Location of Vantage Points



January 2009
19801-R218a.WOR tugwc

Entec



Figure 3.1 has been removed as it contains confidential information. This figure is available on request to those who have legitimate need to view the information.

Appendix A Bittern Conservation Status, Distribution and Population Trends

Bittern Conservation

Bittern is a UK Biodiversity Action Plan (UK BAP) Priority Species, which has required a Species Action Plan (SAP) to be produced (www.ukbap.org.uk) to look at factors affecting the decline of the species and actions, objectives and targets to aid and monitor recovery. The resulting SAP for bittern included the following (summarised) principal means of ensuring the conservation of the species: conducting research into ecology and habitat requirements; encouraging restoration, management and re-creation of reedbed habitats by conservation organisations; improving the resolution of monitoring (primarily through voice pattern analysis), and the provision of grants to land owners for management and restoration measures aimed at benefiting bittern. The long term aim of this combination of measures was to increase the number of booming males to at least 100 by 2020 and the number of sites used by booming males to 22 by 2010 (www.ukbap.org.uk).

Summary of Bittern Distribution and Status

Bittern (*Botaurus stellaris*) is one of the UK's rarer breeding birds, with the breeding population confined to around 10 English reedbeds in recent years. A considerable contraction in range and decrease in numbers began in the late 1960s, at which point bittern bred in 8 counties and 70 booming males were present (Brown & Grice, 2005, www.ukbap.org.uk)¹⁶. By 1997, however, only 11-12 booming males were present in the UK, with only 5 sites in 3 counties (Norfolk, Suffolk and Lancashire) regularly used by breeding birds (<http://www.jncc.gov.uk/pdf/UKSPA/UKSPA-A6-13A.pdf>). Since the late 1990s co-ordinated species protection, habitat management and monitoring has been undertaken, however, and results provide cause for optimism (and suggest that bittern numbers may be returning to 1960s levels). The 2008 Bittern Monitoring Programme¹⁷ located 76 booming males in the UK, representing a rise of 49% on 2007. In addition, the number of sites with bittern nests in 2008 was the highest since the programme began in 1990 (RSPB & Natural England, 2008).

In 2008 the Suffolk coast was found to support almost 32% (24 birds) of booming male bittern in the UK, the highest number recorded in the county since the start of systematic monitoring. Despite this, there was no rise in the number of nests located, and in fact numbers of nesting attempts recorded were 25% lower than in 2003, the year with the highest count to date (Wotton *et al.*, 2008). East Anglia represents the national stronghold for bittern in recent history, with up to 35% of territorial males being found in the Minsmere to Walberswick SPA alone between 1993 and 1997 (jncc.gov.uk). In winter the English breeding population is supplemented by immigrants from Continental Europe, and the national population rises to approximately 150 individuals, spread across suitable sites in (mainly) southern Britain (Brown & Grice, 2005).

In global terms, bittern is relatively widely distributed, occurring in extensive reedbeds throughout Europe, north (and parts of south) Africa and central and eastern Asia¹⁸. It has

¹⁶ Bittern became extinct in the UK in the 1880s, primarily as a result of wetland drainage (for agricultural purposes); the remaining birds were persecuted by egg and skin collectors and by 'sportsmen'. Breeding was established again in the UK in 1911 through natural recolonisation, and the population grew to an estimated peak of 78-83 booming males in the mid-1950s (Day & Wilson 1978).

¹⁷ The Bittern Monitoring Programme is funded through *Action for Birds in England*, a conservation partnership between Natural England and the RSPB.

¹⁸ In Europe bittern fails to breed only in the hottest and coldest areas. Simulations of population distribution suggest that there will be a north-easterly shift in the bittern's European range by the end of the 21st century (Huntley *et al.*, 2007). The population in southern Africa is geographically isolated from the European and Asian populations.

suffered historical population declines across its entire range (primarily due to habitat loss), although between 1990 and 2000 the European population was stable, with increases noted in some countries¹⁹ (Birdlife International, 2004).

A more detailed review of information on bittern numbers at local, county and national level is found in Section 3 of this report.

Bittern at County and Regional Level

The drainage and reclamation of fenlands in Suffolk caused a major decline bittern numbers, which combined with persecution by hunters and egg collectors, resulted in the extinction of the bittern as a breeding species in Suffolk by 1868. The flooding of coastal marshes during the Second World War (as an anti-invasion measure) resulted in re-colonisation, and up to 14 pairs were breeding in Suffolk (at seven coastal sites) by the early 1950s. A peak of 20 booming males was recorded in the 1960s, prior to second period of sustained decline (Piotrowski, 2003).

Currently the East Anglian Region supports the vast majority of breeding bittern in Britain. The Suffolk and Norfolk coasts, Norfolk Broads and the Fens collectively supported at least 61 booming males (of the 76 recorded across the UK) and 32 nests in 2008. The 2008 counts of booming males and nests represent both a regional and national highpoint, despite the slight drop in proven nesting attempts at coastal sites in Suffolk in comparison to 2003.

In general terms, over the course of the Bittern Monitoring Scheme, a steady increase in numbers of booming males has been recorded in the Norfolk Broads and on the Suffolk Coast up to 2003, followed by a slight decline to 2007 (Wotton *et al.*, 2008).

The population on the Norfolk Coast has been less stable. Nesting was recorded between 1997 and 2000, but no nesting attempt was proven between 2001 and 2003 (although a booming male was recorded in 2001). Booming males were recorded again in 2004 and have been present on an annual basis since, with an increase to 4 individuals in 2008. Nesting was considered to have taken place between 2004 and 2006, but was not recorded in 2007. In 2008 a total of 4 nests (2 at 2 different sites) were recorded (Wotton *et al.*, 2008).

In the Fens, bittern was not recorded by the Monitoring Scheme until 2003, when 3 booming males were noted. Nesting was not confirmed until 2007, when 4 nests were located at 1 site. In 2008, 2 sites were known, though the number of nests remained constant (Wotton *et al.*, 2008).

National Context

Table A1 presents the total number of booming males, confirmed nesting attempts and the number of sites which held breeding bittern between 1996 and 2008.

¹⁹ The exception to this general pattern was in the Ukraine where the population continued to decline.

Table A1 Numbers of Booming Males and of Sites Used in the UK Between 1996 and 2008 (from RSPB, 2008).

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Number of booming males	22	11	13	19	22	30	31	43	55	46	44	51	76
(Number of sites)	(10)	(7)	(9)	(11)	(14)	(18)	(20)	(24)	(31)	(28)	(27)	(33)	(42)
Number of nests	6	12	13	20	19	22	26	34	31	27	27	27	39
(Number of sites)	(4)	(5)	(5)	(5)	(9)	(8)	(11)	(14)	(16)	(12)	(12)	(12)	(20)

As is apparent from Table 1, the increases in booming males and numbers of nests is mirrored by a national increase in the number of sites from which bittern have been recorded by the Monitoring Scheme. Booming males were recorded from 42 sites and nesting attempts from 20 sites in 2008, compared to 10 and 4 sites respectively in 1996 (Wotton *et al.*, 2008).

An expansion in range (attributed to habitat management) has been noted over the last couple of years, with sites such as the Fens and Ham Wall in the Somerset Levels colonised. This is particularly positive from the perspective of long term conservation of the species, as these areas are at less risk of habitat loss resulting from seawater encroachment (Wotton *et al.*, 2008).

EDF Energy

**Sizewell C New Nuclear Power Station:
Terrestrial and Freshwater Ecology, and
Ornithology**

DRAFT Breeding Bird Survey Report 2010

June 2012

AMEC Environment & Infrastructure UK Limited

Report forEDF Energy

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June 2012

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Document Revisions

No.	Details	Date
1	Draft Report	June 2012

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1. Introduction

1.1 Purpose of this Report

An area of land directly north of Sizewell B Nuclear Power Station, which is located near Leiston in Suffolk, has been identified as having the potential to accommodate the proposed development of one or more new nuclear reactors. This proposed development is known as Sizewell C. The site of the proposed development has an approximate central National Grid Reference (NGR) of TM473640.

AMEC Environment & Infrastructure UK Ltd (formerly Entec UK Ltd) was commissioned by EDF Energy in 2010 to undertake a breeding bird survey of the Strategic Site Area (SSA). The purpose of this report, which outlines the findings of survey work undertaken for breeding bird species in 2010, is to inform the design of Sizewell C and the Environmental Statement for the scheme.

It should be noted that this report contains information relating to the nest locations of species listed on schedule 1 of the Wildlife & Countryside Act 1981 (as amended). As such, the report should be treated as **confidential** and should not enter the public domain.

1.2 Scope

Breeding bird surveys were undertaken in 2007 within an area of land which could potentially accommodate a new nuclear facility and its associated infrastructure (covering 9km²). A desk study was also undertaken to provide contextual information about the bird interest of the area, including details of statutory designated sites of nature conservation interest within 5km of the proposed new build area. Results of the desk study and 2007 breeding bird surveys are provided in the Sizewell First Interim Bird Report (Entec, 2008).

Results from breeding bird surveys are generally considered by consultees (such as Natural England and RSPB) to remain valid for three years. Therefore, in order to provide an update on baseline conditions in the area, the breeding bird surveys were repeated in spring 2010.

The survey area and methodologies used in 2010 have been adopted following consultation with statutory and non-statutory consultees and other stakeholders, taking into account best practice guidelines, and site-specific and project-specific characteristics. The survey area adopted at the start of the surveys in March 2010 was the Strategic Site Area (SSA) and a 250m buffer around it, referred to as the 'initial survey area' in this report. The SSA incorporated the proposed locations of the new build area (directly north of Sizewell B) and the access road corridor as defined at the start of the survey work in March 2010. In addition, if the proposed new nuclear facility is consented, then other areas of land will be temporarily disturbed during the construction process (e.g. laydown areas).

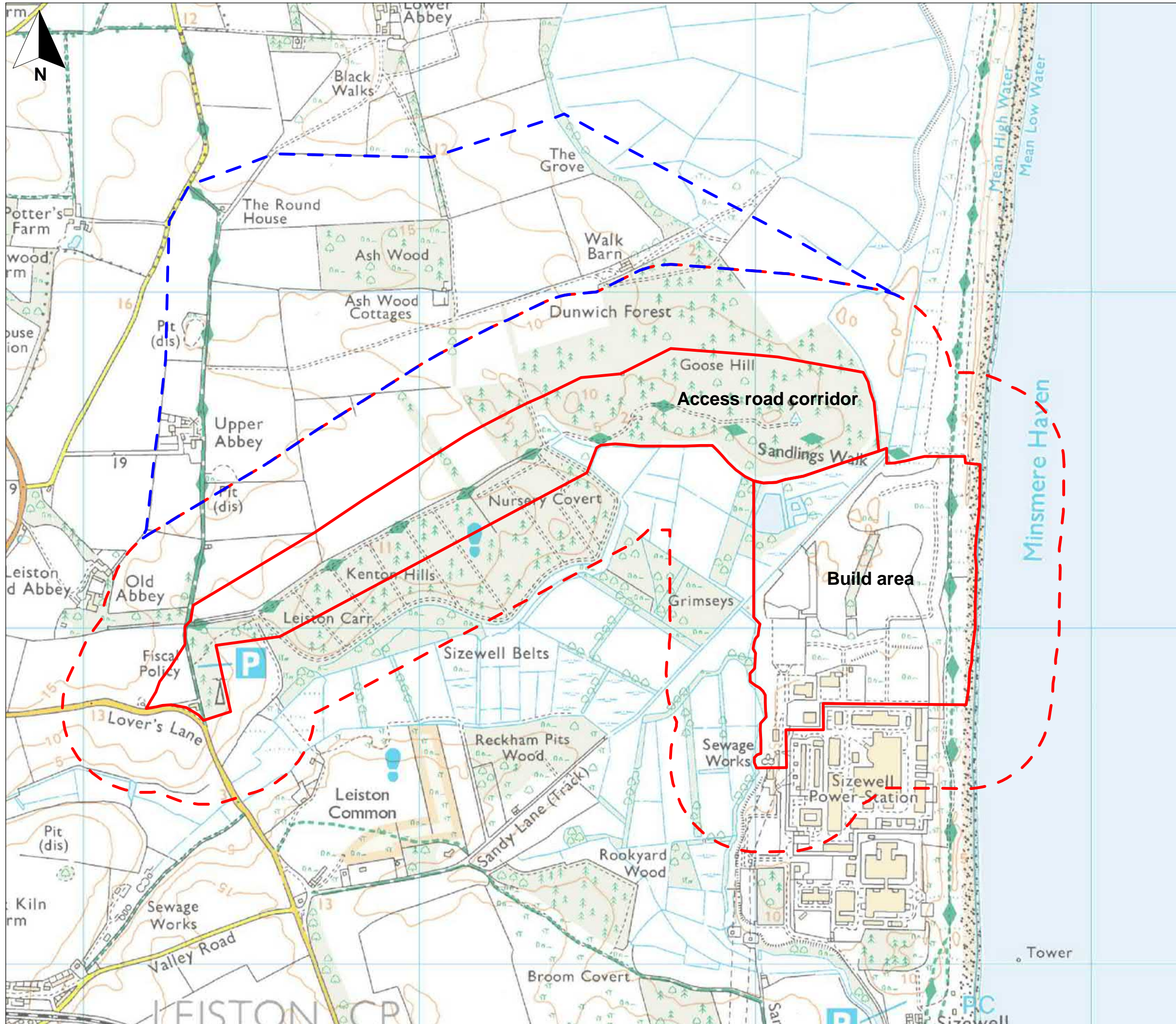
Further information on the potential location of these temporary facilities was made available in the Sizewell Site Plot Plan Review of 4th June 2010. In response to this, the survey area was extended northwards, to encompass an area within 250m of the location of these facilities (the initial survey area and extended survey area being referred to in this report as the amended



survey area). The precise location of these temporary facilities however have not been finalised and may be subject to change. At this stage, these temporarily facilities are likely to be located immediately north of the access road corridor. The boundaries of the SSA and survey areas are shown on **Figure 1.1**.

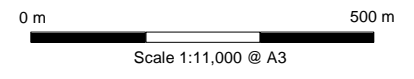
1.3 Survey Area Description

The initial survey area comprises a mixture of habitats, including woodland, arable farmland and wet meadows. The area includes a belt of woodland running west to east, from Leiston Carr to Goose Hill, which is primarily comprised of mature conifer plantation with open areas created by tree-felling (clear-fells) and a strip (of varying width) of wet, deciduous woodland and scrub running along the southern fringe of the plantations. The woodland at Old Abbey and east of the Fiscal Policy car park is also mature, but dry deciduous woodland. To the south of the woodland are the wet meadows that form part of the Sizewell Marshes SSSI. The meadows consist of numerous small fields of unimproved, seasonally flooded grassland, intersected by water-filled ditches, but there are also small blocks of reedbed and wet scrub, particularly to the north-east of Grimseys. To the north of the Leiston Carr to the Goose Hill belt of woodland (including much of the land in the extended survey area), the land is primarily given over to arable farmland, with the large fields divided by often intact hedgerows. In this area, there are also sizeable belts of woodland, including at Ash Wood (mature, mixed coniferous-deciduous woodland), and between Ash Wood Cottages and Walkbarn where there is a belt of more recently planted conifers (c.5-10 years old). **Figure 1.2** shows the habitats in the amended survey area (this information was collected during the extended Phase 1 habitat survey undertaken in March 2007).



Key

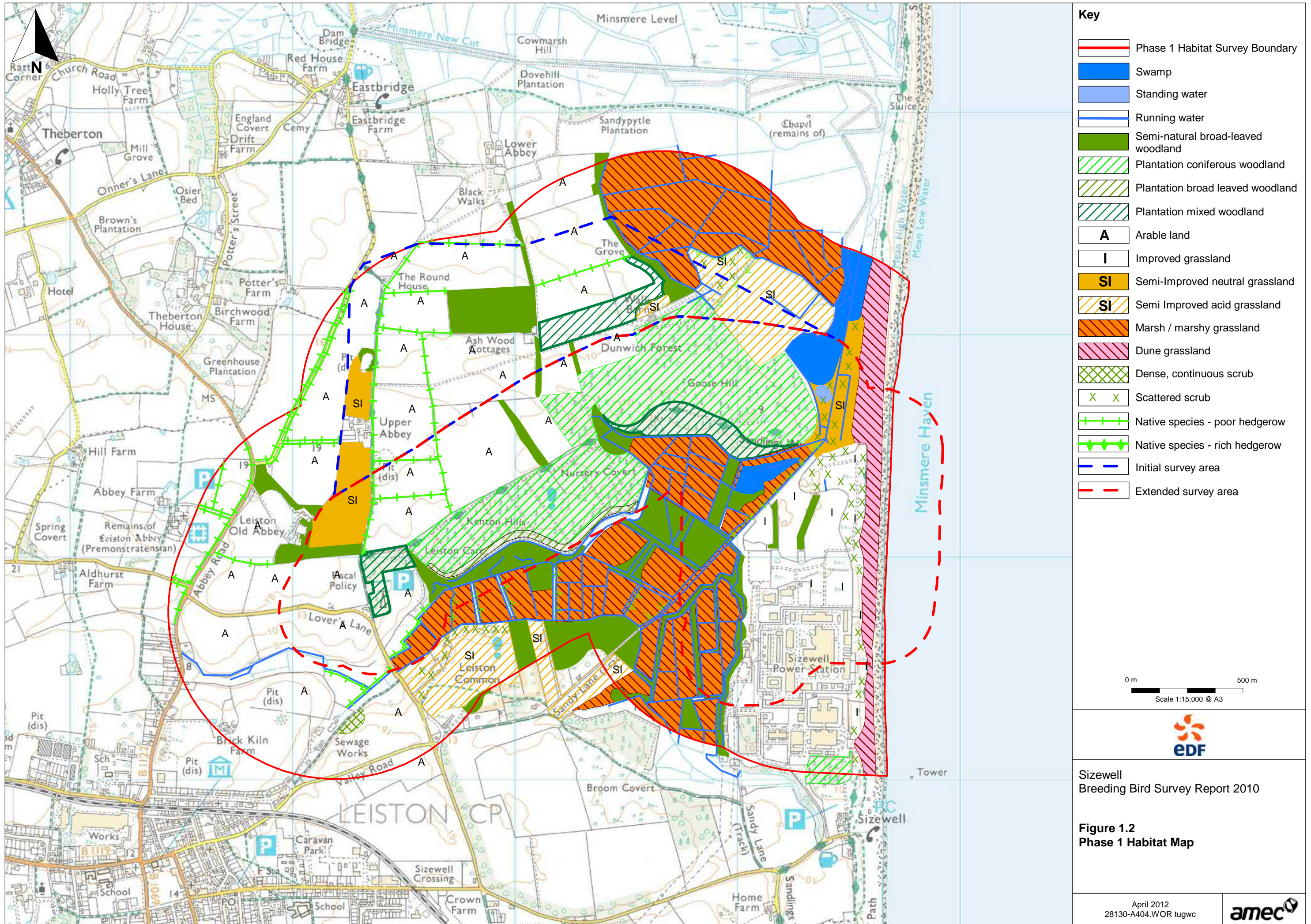
- SSA boundary
- Initial survey area
- Extended survey area



Sizewell
Breeding Bird Survey Report 2010

Figure 1.1
Survey Area





2. Methodology

2.1 Desk Study

A number of primary sources of data were identified and used to inform the work. These include:

- The results of annual breeding and wintering bird surveys conducted by the Suffolk Wildlife Trust on parts of the British Energy (BE) Estate (summarised in the annual land management review);
- Minsmere RSPB breeding bird survey reports for 2008 and 2009;
- Birds of Suffolk (Piotrowski, 2003);
- Suffolk Birds 2000-2008 inclusive (the county bird reports, published by the Suffolk Naturalists' Trust in collaboration with the Suffolk Ornithological Group), and
- The location and reasons for designation of statutory designated sites within 2km of the amended survey area was obtained in 2010 from the websites: www.magic.gov.uk and the www.jncc.gov.uk. The location of these statutory designated sites is shown in **Figure 2.1**.

2.2 Breeding Bird Surveys

The key objective of the bird surveys undertaken at Sizewell during the 2010 breeding season was to provide a suitable baseline for the evaluation of the potential effects of the construction and operation of a new nuclear power station and associated infrastructure on the breeding bird community present.

Territory mapping surveys based on the BTO's Common Bird Census (CBC) methodology were carried out in all areas within the amended survey area. All of this land is located within the Sizewell Estate, under EDF ownership¹, or within approximately 50m of it, and therefore unrestricted access was therefore possible. Within the Sizewell Estate, transects no further than 50m apart were walked across all open habitats, while all field boundaries, and the edges of the small reedbeds and belts of semi-natural woodland were also walked. In the coniferous plantation, all rides / firebreaks and tracks were walked, and all birds visible / audible from them were recorded.

While eight to ten visits are the norm for CBC sites being monitored over the long-term, where territory mapping is being used for the purpose of assessing potential environmental impacts it is generally accepted that three to four visits are sufficient to determine the numbers and densities of breeding birds with reasonable accuracy.

¹ EDF is responsible for the management of the Estate, which is undertaken in partnership with SWT.

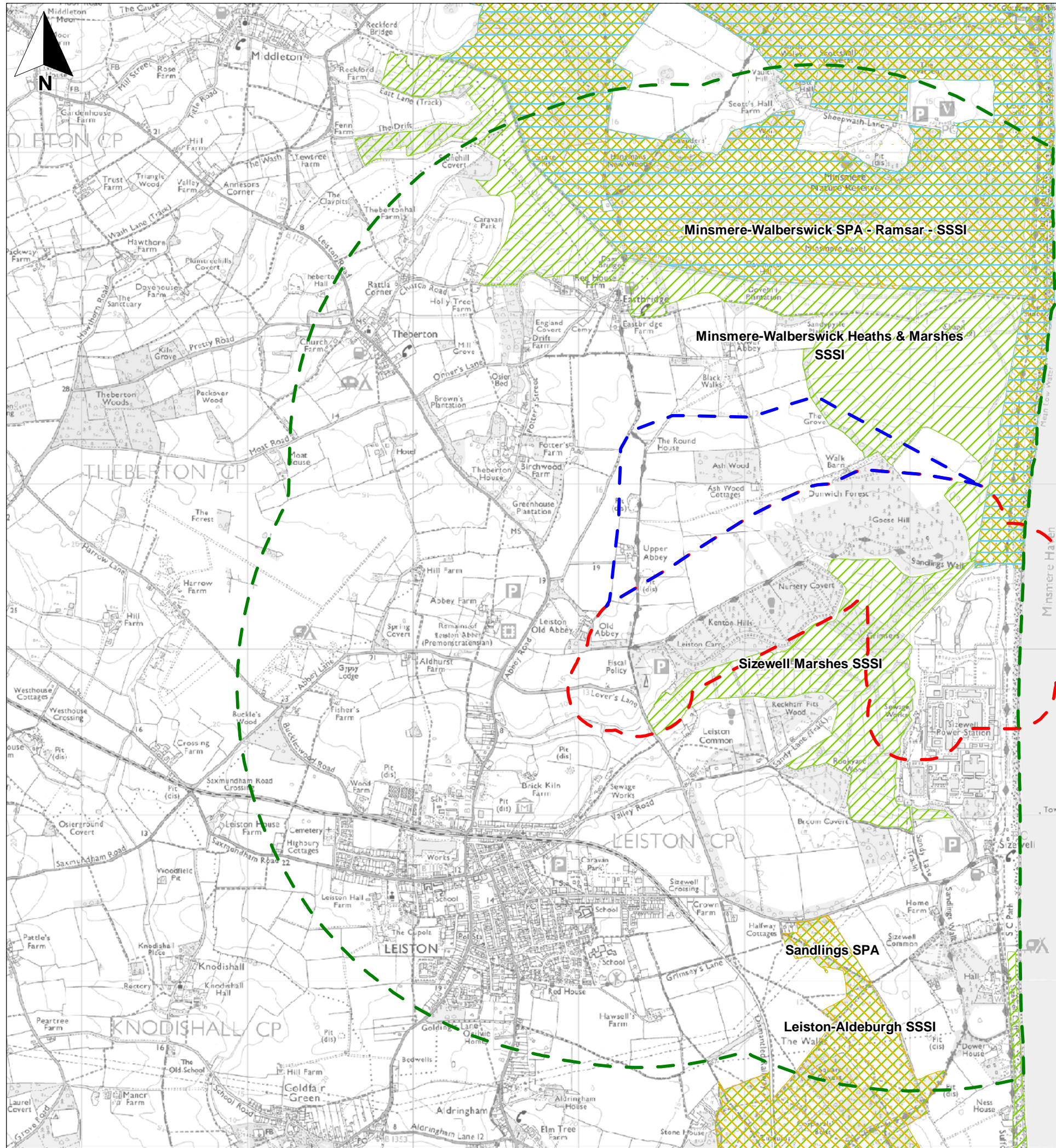
Four survey visits were therefore undertaken within the initial survey area from late March to June 2010 (one visit each month, with each visit taking 2-3 days to complete). The dates on which surveys were undertaken in this area were as follows:

- March (19, 23 and 25);
- April (23 and 28);
- May (19 and 20);
- June (15 and 16).

More precise information on the potential location of the temporary facilities was provided on 4th June 2010. In response to this, the survey area was extended north of the access road corridor to include all areas within 250m of the indicative location of these facilities (see **Figure 1.1** for the location of the initial and extended survey areas). Three visits were undertaken in the extended part of the survey area in June, each visit taking one day to complete and undertaken one week apart, on the following dates:

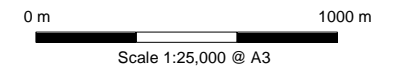
- June (2, 10 and 22).

Supplementary records of birds recorded outside timed surveys and during species-specific survey work (nightjar surveys were undertaken in the initial survey area in May-June 2010, and little tern surveys from the adjacent dunes in May-July 2010) were also used when compiling the final territory maps. Additional records were obtained from surveyors undertaking bat surveys in the Sizewell Belts area in spring 2010, and from the Suffolk Wildlife Trust warden for the Sizewell Estate, Carl Powell.



Key

- 2km of the initial/extended survey boundary
- Initial survey area
- Extended survey area
- SPA
- Ramsar
- SSSI



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Figure 2.1
Statutory Sites within 2km of the
Amended Survey Area

May 2012
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3. Results

A total of 58 species were recording breeding or holding territory within the amended survey area in 2010, including: five species listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended), 13 UK Biodiversity Action Plan (BAP) Priority Species (of which eight also feature on the Suffolk BAP), nine species that appear on the Birds of Conservation Concern red list² and a further 16 species that are on the amber list³.

The location of breeding territories is shown on **Figure 3.1** (separated into four more detailed maps shown on **Figures 3.1a-d**). Results from the breeding bird surveys are provided in **Table 3.1**, including estimates of the number of breeding pairs/territories in the amended survey area.

It should be remembered when considering the figures that the two letter registrations refer to the apparent centre of territorial activity rather than nest sites. It should also be noted that the aim of this survey was to characterise the bird community rather than derive exact densities, something which would require a considerably more involved survey programme. It is inevitable that the densities of some mobile, vocal species have therefore been overestimated due to the precautionary approach that has been taken in interpreting the data. Where potential overestimation is considered likely, this is acknowledged in the text.

² The criteria for assigning species to the red list include: if they are globally threatened; if they have declined by 50% or more over the past 25 years; if they have experienced severe declines historically or if their range in the UK has contracted by over 50% in the past 25 years. Both wintering and breeding species are considered. All red-listed species recorded in the survey area at Sizewell appear on the list due to considerable range contractions or rapid declines in their breeding populations.

³ Amber-listed species are those which have experienced moderate recent declines or range reductions (between 25 and 49%) over the past 25 years, that are rare breeders (with a population of 1-300 pairs in the UK), that have 50% or more of the breeding population occurring at 10 or fewer sites, or for which 20% or more of the European population breed (or winter in the case of wildfowl) within the UK.

Table 3.1 Numbers of Breeding Bird Territories Recorded in the Amended Survey Area

BTO Code	Species	Scientific name	Number of Territories in Amended Survey Area	Annex I ⁴	WCA (Sch1) ⁵	UK BAP ⁶	Suffolk BAP	NERC S(41) ⁷	BoCC ⁸
MS	Mute Swan	<i>Cygnus olor</i>	1						
MA	Mallard	<i>Anas platyrhynchos</i>	8						Amber
RL	Red-legged Partridge	<i>Alectoris rufa</i>	8						
PH	Pheasant	<i>Phasianus colchicus</i>	37						
K.	Kestrel	<i>Falco tinnunculus</i>	1						Amber
HY	Hobby	<i>Falco subbuteo</i>	1		Yes				
WA	Water Rail	<i>Rallus aquaticus</i>	1						
MH	Moorhen	<i>Gallinula chloropus</i>	14						
CO	Coot	<i>Fulica atra</i>	1						

⁴ Certain endangered, rare, or vulnerable bird species, which warrant special protection, are included on Annex 1 of the European Communities Council Directive on the Conservation of Wild Birds (79/409/EEC)

⁵ It is an offence to disturb any wild bird listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended) Act while it is nest building, or is at a nest containing eggs or young, or to disturb the dependent young of any such bird

⁶ UK BAP list published 2007 (Biodiversity Reporting and Information Group, 2007)

⁷ In May 2008, Natural England and Defra published the Section 41 list of habitats and species of principal importance for the conservation of biodiversity in England. The list contains all UK Biodiversity Action Plan (BAP) priority habitats and species known to occur in England in addition to species of particular conservation significance in England. The production of the list is a requirement of the Natural Environment & Rural Communities (NERC) Act 2006 and it will be used to guide and prioritise future conservation action in England.

⁸ Red and Amber List birds: those listed as being of high or medium conservation concern in Eaton et al., (2008)

BTO Code	Species	Scientific name	Number of Territories in Amended Survey Area	Annex I ⁴	WCA (Sch1) ⁵	UK BAP ⁶	Suffolk BAP	NERC S(41) ⁷	BoCC ⁸
L.	Lapwing	<i>Vanellus vanellus</i>	3			Yes		Yes	Red
SD	Stock Dove	<i>Columba oenas</i>	9						Amber
WP	Woodpigeon	<i>Columba palumbus</i>	83						
CD	Collared Dove	<i>Streptopelia decaocto</i>	4						
TD	Turtle Dove	<i>Streptopelia turtur</i>	1			Yes	Yes	Yes	Red
CK	Cuckoo	<i>Cuculus canorus</i>	1			Yes		Yes	Red
TO	Tawny Owl	<i>Strix aluco</i>	1						
G.	Green Woodpecker	<i>Picus viridis</i>	10						Amber
GS	Great Spotted Woodpecker	<i>Dendrocopos major</i>	11						
WL	Woodlark	<i>Lullula arborea</i>	1	Yes	Yes	Yes	Yes	Yes	Amber
S.	Skylark	<i>Alauda arvensis</i>	19			Yes	Yes	Yes	Red
SL	Swallow	<i>Hirundo rustica</i>	1						Amber
PW	Pied Wagtail	<i>Motacilla alba</i>	2						
WR	Wren	<i>Troglodytes troglodytes</i>	87						
D.	Dunnock	<i>Prunella modularis</i>	39			Yes		Yes	Amber
R.	Robin	<i>Erithacus rubecula</i>	73						
BX	Black Redstart	<i>Phoenicurus ochruros</i>	2		Yes				Amber
B.	Blackbird	<i>Turdus merula</i>	31						
ST	Song Thrush	<i>Turdus philomelos</i>	9			Yes	Yes	Yes	Red
M.	Mistle Thrush	<i>Turdus viscivorus</i>	3						Amber
CW	Cetti's Warbler	<i>Cettia cetti</i>	5		Yes				

BTO Code	Species	Scientific name	Number of Territories in Amended Survey Area	Annex I ⁴	WCA (Sch1) ⁵	UK BAP ⁶	Suffolk BAP	NERC S(41) ⁷	BoCC ⁸
SW	Sedge Warbler	<i>Acrocephalus schoenobaenus</i>	1						
RW	Reed Warbler	<i>Acrocephalus scirpaceus</i>	11						
BC	Blackcap	<i>Sylvia atricapilla</i>	37						
GW	Garden Warbler	<i>Sylvia borin</i>	15						
LW	Lesser Whitethroat	<i>Sylvia curruca</i>	1						
WH	Whitethroat	<i>Sylvia communis</i>	14						Amber
CC	Chiffchaff	<i>Phylloscopus collybita</i>	28						
WW	Willow Warbler	<i>Phylloscopus trochilus</i>	1						Amber
GC	Goldcrest	<i>Regulus regulus</i>	37						
FC	Firecrest	<i>Regulus ignicapilla</i>	2		Yes				Amber
SF	Spotted Flycatcher	<i>Muscicapa striata</i>	1			Yes	Yes	Yes	Red
LT	Long-tailed Tit	<i>Aegithalos caudatus</i>	26						
BT	Blue Tit	<i>Cyanistes caeruleus</i>	53						
GT	Great Tit	<i>Parus major</i>	34						
CT	Coal Tit	<i>Pariparus ater</i>	55						
MT	Marsh Tit	<i>Poecile palustris</i>	5			Yes		Yes	Red
TC	Treecreeper	<i>Certhia familiaris</i>	25						
J.	Jay	<i>Garrulus glandarius</i>	5						
MG	Magpie	<i>Pica pica</i>	21						
JD	Jackdaw	<i>Corvus monedula</i>	10						
C.	Carrion Crow	<i>Corvus corone</i>	22						

BTO Code	Species	Scientific name	Number of Territories in Amended Survey Area	Annex I ⁴	WCA (Sch1) ⁵	UK BAP ⁶	Suffolk BAP	NERC S(41) ⁷	BoCC ⁸
CH	Chaffinch	<i>Fringilla coelebs</i>	148						
GR	Greenfinch	<i>Carduelis chloris</i>	10						
GO	Goldfinch	<i>Carduelis carduelis</i>	13						
LI	Linnet	<i>Carduelis cannabina</i>	8			Yes	Yes	Yes	Red
BF	Bullfinch	<i>Pyrrhula pyrrhula</i>	3			Yes	Yes	Yes	Amber
Y.	Yellowhammer	<i>Emberiza citrinella</i>	6			Yes		Yes	Red
RB	Reed Bunting	<i>Emberiza schoeniclus</i>	1			Yes	Yes	Yes	Amber

Results from the territory mapping survey showed that the commonest species in the amended survey area were those with wide ranging habitat preferences. Of these, chaffinch was by far the most numerous, with 148 territories, while wren (with 87 territories), wood pigeon (83) and robin (73) were also well represented. Other common generalist species were dunnoek, blackbird, great tit, blue tit and carrion crow, while the amount of deciduous woodland and woodland edge, hedgerow and scrub habitats within the survey area resulted in relatively high numbers of green woodpecker, great spotted woodpecker, blackcap, garden warbler, chiffchaff and long-tailed tit. Areas of coniferous plantation held considerable numbers of goldcrest, coal tit and treecreeper.

The highest densities of breeding birds were generally recorded in areas of deciduous scrub and wet woodland, including red-listed species such as song thrush, bullfinch and marsh tit. High densities were noted in the mosaic of wet scrub, semi-natural woodland and reedbed located within the north-east corner of the SSSI, to the north of Sizewell B. Species that were particularly associated with the reedbed and wet scrub habitat here included: reed warbler, water rail and Cetti's warbler. Elsewhere in this area, north of Sizewell B, a pair of lapwings attempted to breed in the open meadowland and there was a concentration of chaffinch territories in the planted conifers adjacent to the Power Station. Also in this area, the scrub held linnet, whitethroat and long-tailed tit and the open areas supported the occasional pair of skylark. A pair of stonechats was also present, south of the amended survey area in the coastal scrub adjacent to the built power stations.

The scrub and wet deciduous woodland that fringed much of the southern edge of the Leiston Carr to Goose Hill plantations held high densities of typical woodland species including: wood pigeon, wren, dunnoek, robin, blackbird, song thrush, garden warbler, blackcap, chiffchaff, blue tit, great tit, marsh tit, long-tailed tit, chaffinch and goldfinch. Much of the Leiston Carr to Goose Hill woodlands are comprised of mature pine plantation which held high densities of woodpigeon, goldcrest, coal tit and chaffinch, and smaller numbers of green woodpecker, great spotted woodpecker, mistle thrush and treecreeper.

Relatively low numbers of birds were found in open arable farmland (including red listed lapwing, skylark and yellowhammer) and the wet meadows that form part of the Sizewell Marshes SSSI. The arable farmland to the north of the Leiston Carr to Goose Hill woodland held low densities of birds, and included species typical of open habitats, such as red-legged partridge, skylark, whitethroat and yellowhammer, and a single singing male woodlark. A turtle dove was also seen at Upper Abbey Farm in June, although was not heard singing.

The ditches that traverse the wet meadows to the south of the woodland (part of the Sizewell Marshes SSSI) supported mallard and moorhen, and single pairs of coot and mute swan. Two gadwall were seen in the Sizewell Marshes SSSI on 23 April, but were not recorded subsequently. Gadwall were also seen in the SSSI by SWT wardens but they could not confirm any breeding in 2010. Other species that probably bred in the survey area included: little owl (the SWT warden reported a pair at Ash Wood Cottages and another in Kenton Hills).

3.1 Highly protected species

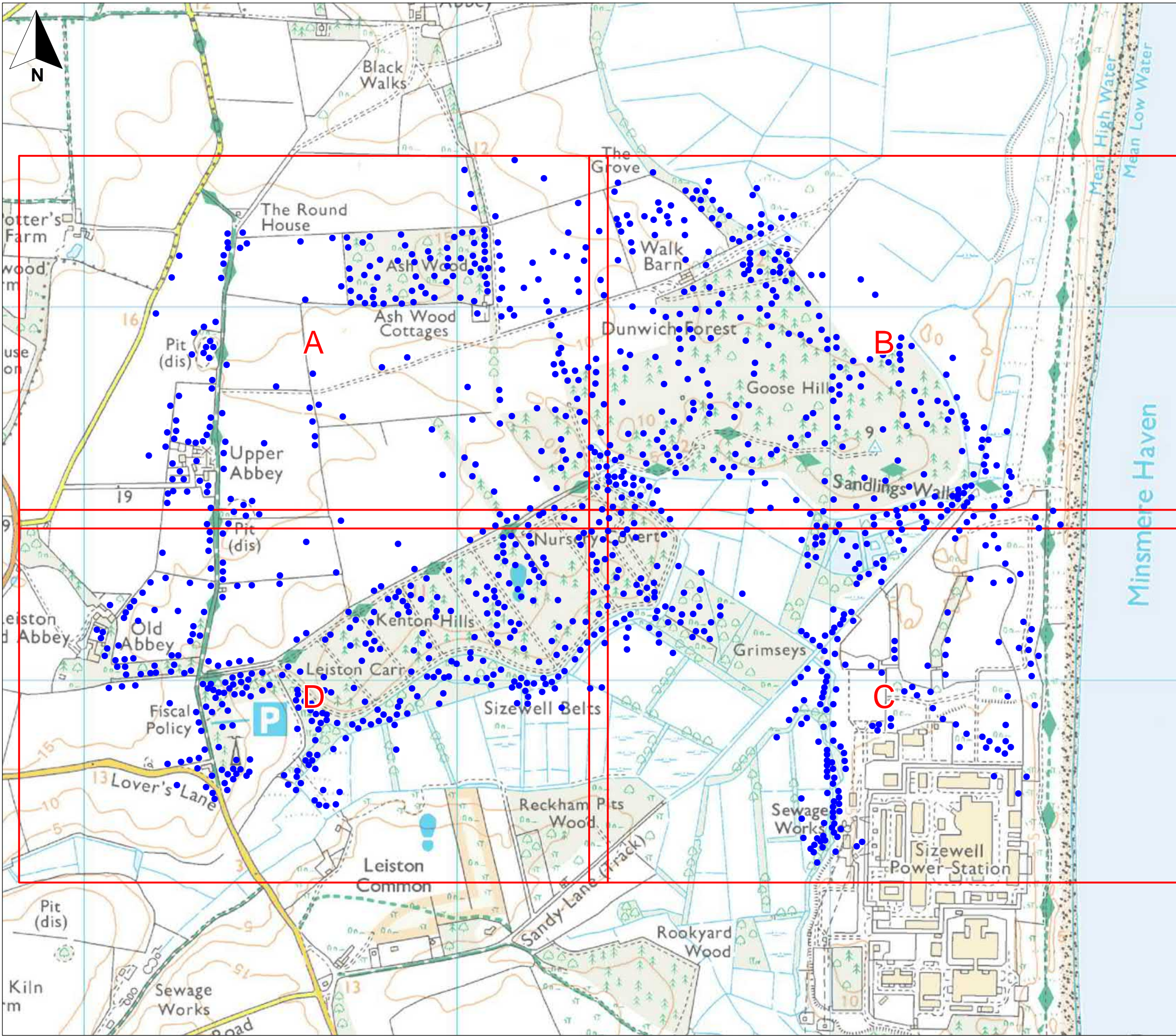
Highly protected species that bred or held territory within the amended survey area were hobby, woodlark, Cetti's warbler, black redstart and firecrest. A hobby was seen carrying food into Ash Wood on 2 June, indicating that a pair was probably present. Birds were also seen by SWT wardens in the vicinity of another regular breeding site in Goose Hill, although nesting was not


confirmed (pers. Comm. Carl Powell, SWT warden). A single woodlark was seen flying northwest over the area immediately to the north of Sizewell B on 19 March, and a male was heard singing on 23 April in fields south of Ash Wood Cottages, but was not heard subsequently. Two black redstarts were heard singing on the northern boundary of Sizewell B in 2010. A further two singing males were heard (out with the amended survey area) along the eastern boundary of Sizewell B and Sizewell A Power Stations respectively. Four Cetti's warblers were heard singing in the reedbeds and wet scrub in the north-east corner of the Sizewell Marshes SSSI and a further singing male was present near Walk Barn. Two singing male firecrests were heard: one by the 'Fiscal Policy' car park at the western end of the amended survey area, and another on the southern fringes of Goose Hill plantation. Neither bird was heard on subsequent visits, indicating that these records may have related to individuals on migration rather than attempting to breed.

A further three Schedule 1 species that could potentially breed in the amended survey area were recorded but not thought to have bred. Barn owls were seen hunting over open ground in the survey area by surveyors undertaking bat surveys in the Sizewell Belts area during April-June 2010. A barn owl box is present on the southern edge of Goose Hill plantation, but there was no sign of recent or previous occupancy during the survey period. Barn owls were not thought to have bred in the amended survey area in 2010 but were known to be roosting in Upper Abbey Farm (pers. Comm. Carl Powell, SWT warden).

A female marsh harrier was seen flying low over reedbeds in the northeast corner of Sizewell Marshes SSSI on 22 June, and a male bird was seen hunting over the same area on 16 June. Other birds were seen hunting over the Sizewell Marshes area by bat surveyors in 2010. Breeding was not thought to have occurred on the Sizewell Marshes in 2010 (pers. Comm. Carl Powell, SWT warden). A flock of six crossbills was seen flying low over Goose Hill plantation on 23 March. Crossbills breed very early in the year and there is potentially suitable nesting habitat present in the conifer plantations. This species was considered by the SWT warden to have possibly bred on the Sizewell Estate in early 2010.

A more detailed discussion of the importance of the amended survey area at Sizewell to breeding birds is presented in **Section 4**.



Key
 Bird territory locations

0 m 500 m
 Scale 1:10,000 @ A3



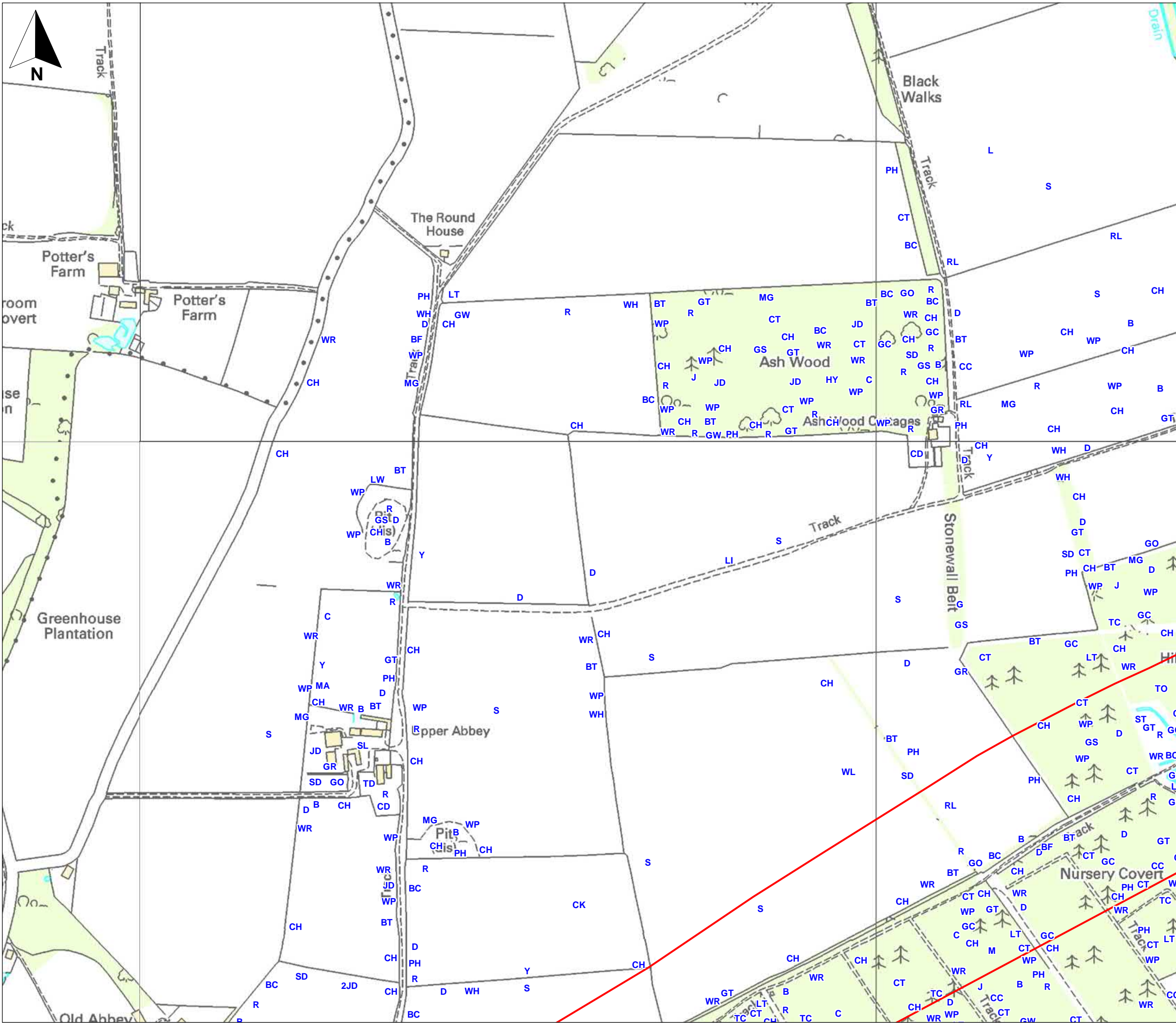
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 Breeding Bird Survey Report 2010

Figure 3.1
 Breeding bird territory key map

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Key

SSA boundary

- Bird species codes
- B - Blackbird
 - BC - Blackcap
 - BF - Bullfinch
 - BT - Blue Tit
 - C - Carrion Crow
 - CC - Chiffchaff
 - CD - Collared Dove
 - CH - Chaffinch
 - CT - Coal Tit
 - D - Dunnock
 - G - Green Woodpecker
 - GC - Goldcrest
 - GO - Goldfinch
 - GR - Greenfinch
 - GS - Great Spotted Woodpecker
 - GT - Great Tit
 - GW - Garden Warbler
 - HY - Hobby
 - J - Jay
 - JD - Jackdaw
 - L - Lapwing
 - LI - Linnet
 - LT - Long-tailed Tit
 - LW - Lesser Whitethroat
 - M - Mistle Thrush
 - MA - Mallard
 - MG - Magpie
 - PH - Pheasant
 - R - Robin
 - RL - Red-legged Partridge
 - S - Skylark
 - SD - Stock Dove
 - SL - Swallow
 - ST - Song Thrush
 - TC - Treecreeper
 - TD - Turtle Dove
 - WH - Whitethroat
 - WL - Woodlark
 - WP - Wood Pigeon
 - WR - Wren
 - Y - Yellowhammer

0 m 250 m
Scale 1:5,000 @ A3



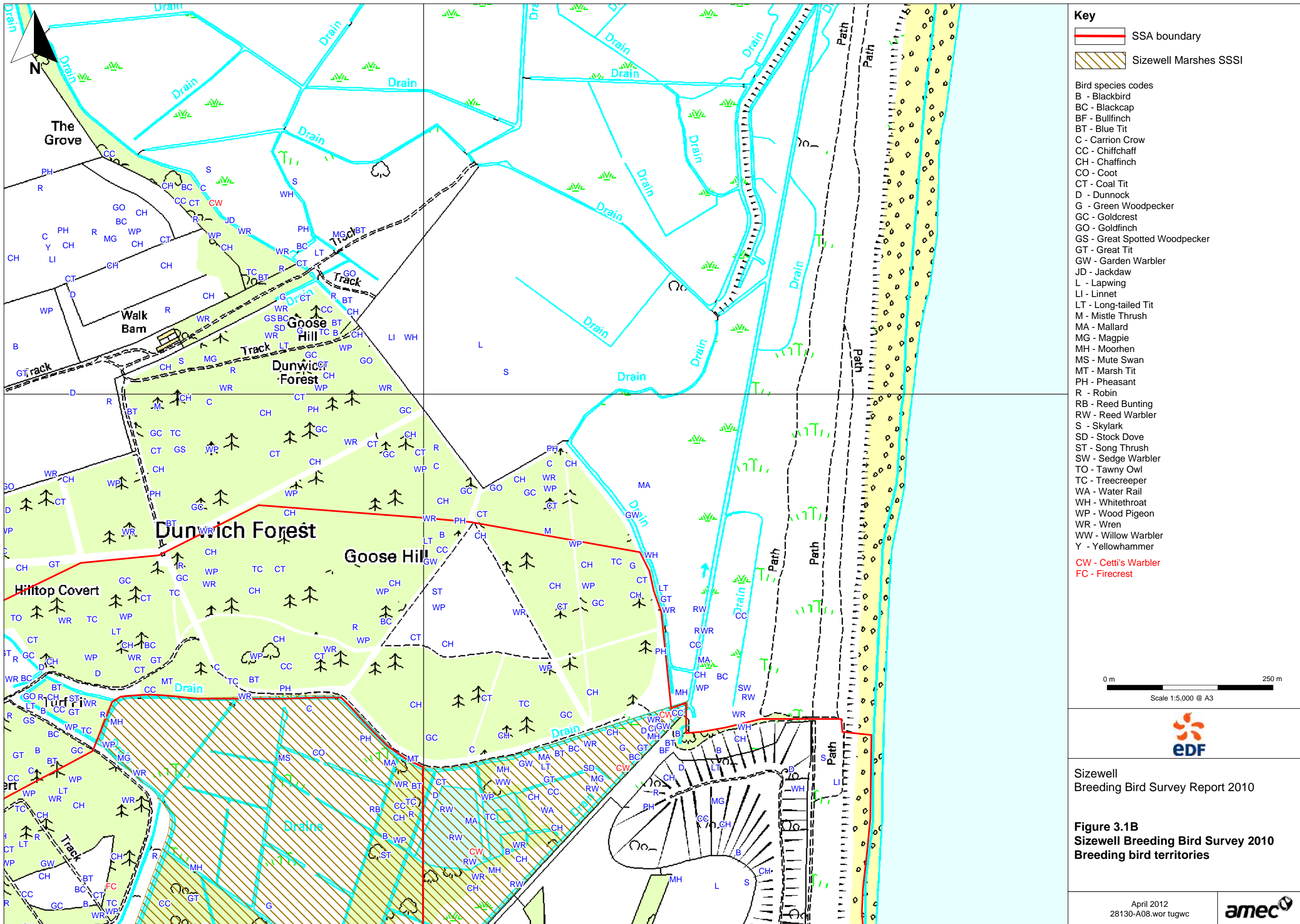
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Figure 3.1A
Sizewell Breeding Bird Survey 2010
Breeding bird territories

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- Key**
- SSA boundary
 - Sizewell Marshes SSSI
- Bird species codes
- B - Blackbird
 - BC - Blackcap
 - BF - Bullfinch
 - BT - Blue Tit
 - C - Carrion Crow
 - CC - Chiffchaff
 - CH - Chaffinch
 - CO - Coot
 - CT - Coal Tit
 - D - Dunnock
 - G - Green Woodpecker
 - GC - Goldcrest
 - GO - Goldfinch
 - GS - Great Spotted Woodpecker
 - GT - Great Tit
 - GW - Garden Warbler
 - JD - Jackdaw
 - L - Lapwing
 - LI - Linnet
 - LT - Long-tailed Tit
 - M - Mistle Thrush
 - MA - Mallard
 - MG - Magpie
 - MH - Moorhen
 - MS - Mute Swan
 - MT - Marsh Tit
 - PH - Pheasant
 - R - Robin
 - RB - Reed Bunting
 - RW - Reed Warbler
 - S - Skylark
 - SD - Stock Dove
 - ST - Song Thrush
 - SW - Sedge Warbler
 - TO - Tawny Owl
 - TC - Treecreeper
 - WA - Water Rail
 - WH - Whitethroat
 - WP - Wood Pigeon
 - WR - Wren
 - WW - Willow Warbler
 - Y - Yellowhammer
 - CW - Cetti's Warbler
 - FC - Firecrest

0 m 250 m
 Scale 1:5,000 @ A3



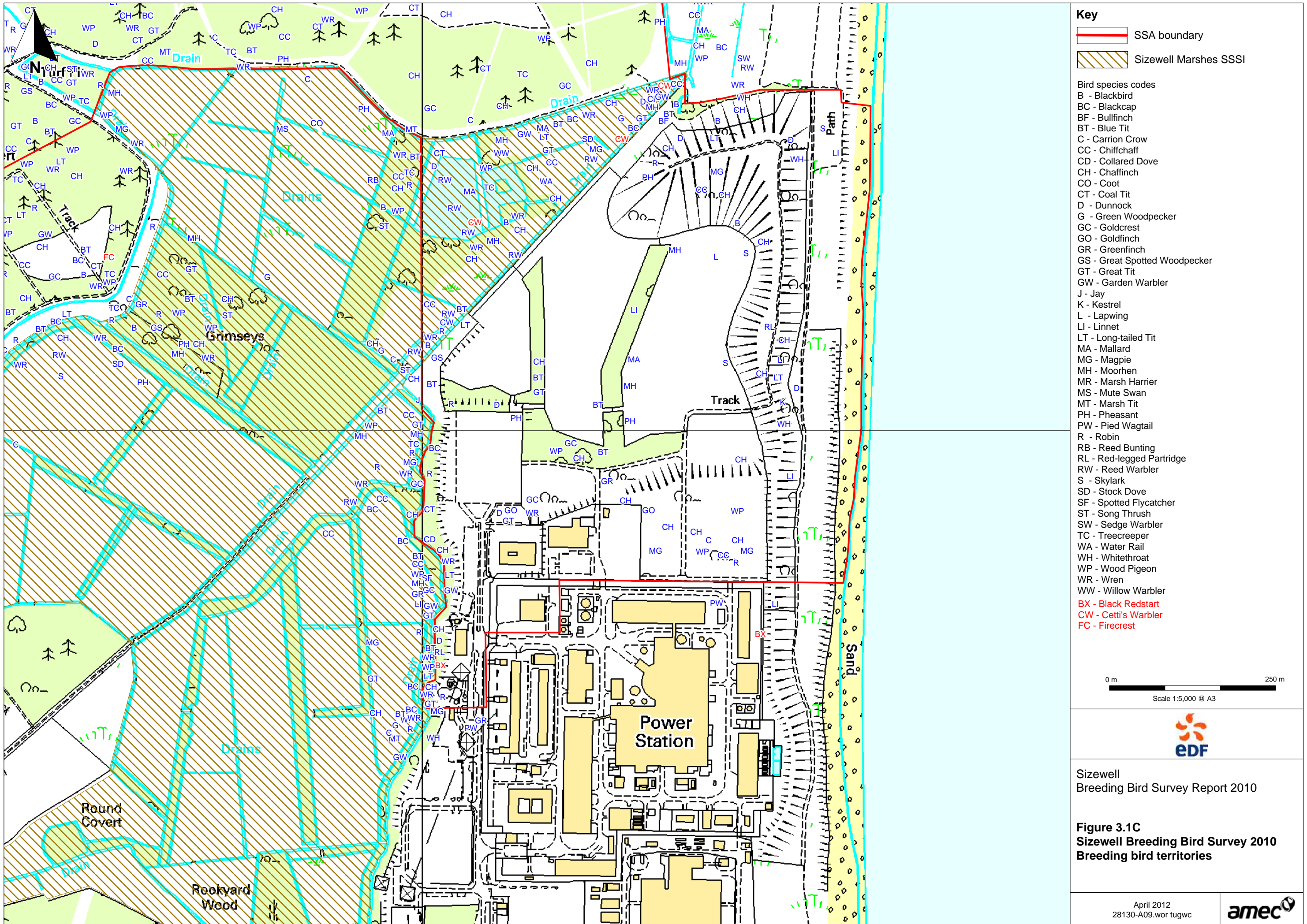
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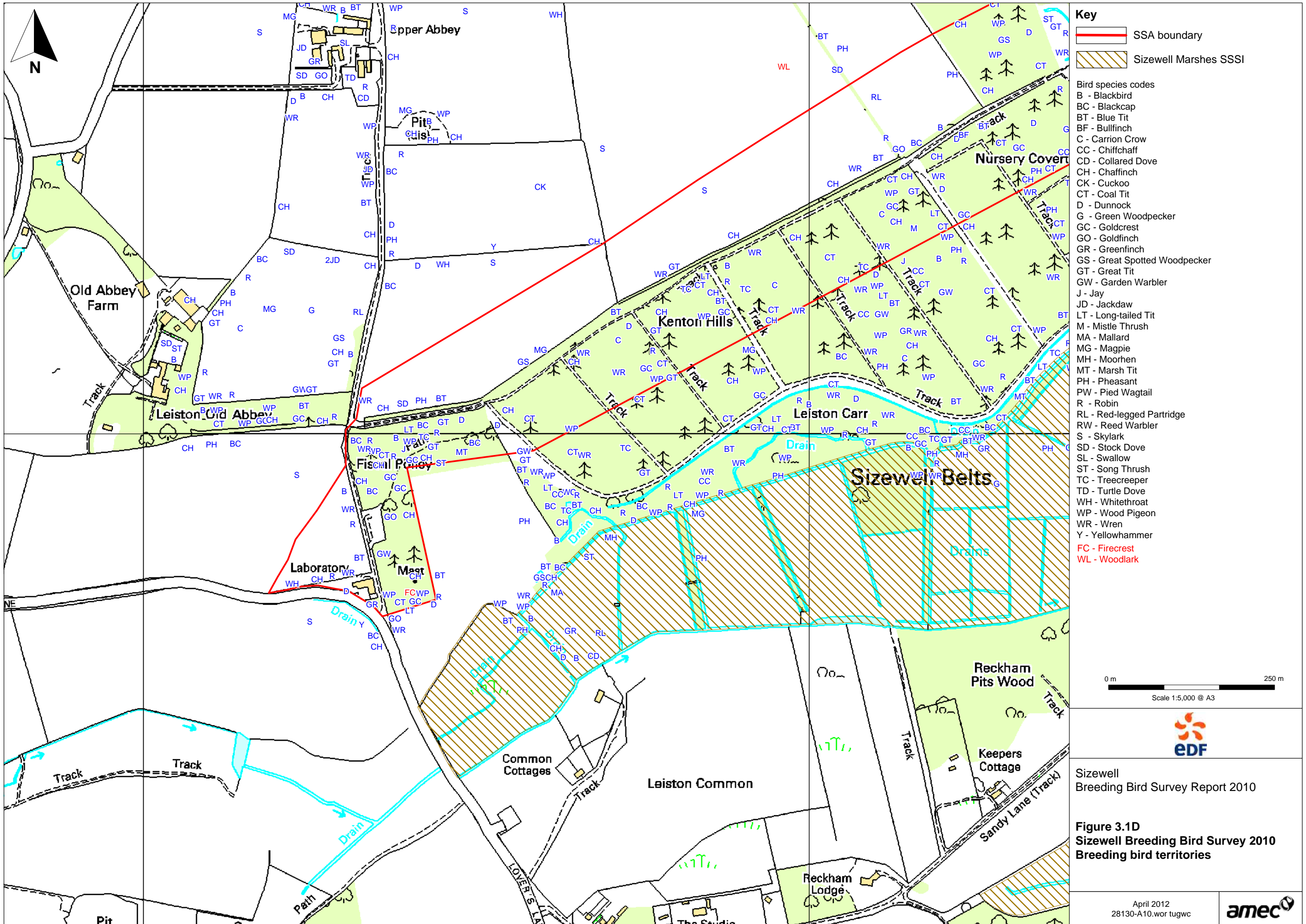
Figure 3.1B
 Sizewell Breeding Bird Survey 2010
 Breeding bird territories

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4. Discussion

Results from the breeding bird surveys undertaken in 2010 indicate that the amended survey area supports a varied community of breeding bird species, typical of the mosaic of different habitats present, including coniferous and deciduous woodland, reedbed, scrub and arable farmland. The greatest densities of territories were found in the areas of scrub and wet, semi-natural woodland. Relatively low densities of breeding birds were located in open arable farmland and in the open areas of wet meadows in the Sizewell Marshes SSSI. The diversity of breeding bird species within the area immediately to the north of Sizewell B was low in comparison to that along much of the woodland belt between Leiston Carr and Goose Hill, with the most productive area being the wet scrub and woodland in the northeast corner of the Sizewell Marshes SSSI.

It should be noted, that the extended survey area was surveyed very late in the breeding season, in June 2010, and not during April and May when the peak of territory holding activity (singing) is recorded. Results from the surveys carried out between April and July 2007, indicate that the 2010 survey results are likely to under-estimate of the bird populations in this area. The population estimates for the initial survey area for which breeding bird surveys were undertaken between March and June 2010 broadly reflect those obtained during the 2007 surveys.

4.1 Highly Protected Breeding Species

Five species listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended) were recorded as breeding/holding territory within the survey area in 2010: hobby, woodlark, black redstart, Cetti's warbler and firecrest. The results for these species are discussed further below.

Hobby

A hobby was seen carrying food into Ash Wood in June 2010 indicating that breeding was likely to have been taking place. Hobby does not require extensive areas of mature woodland for nesting (Hardey *et al.*, 2006) and they tend to appropriate the nests of corvids (in particular, carrion crow in England) rather than building their own. Habitat within the survey area provides suitable nest sites for hobby, and the adjoining extensive areas of wetlands to the north and south, excellent opportunities for hunting. Two pairs of hobby were recorded breeding in the survey area in 2007, in Ash Wood and Goose Hill plantation (Entec, 2008). Hobbies are very secretive at the nest site and breeding is difficult to prove, and therefore, a second pair could have been present within the survey area (at Goose Hill) in 2010. Goose Hill plantation is a regular breeding site although nesting was not confirmed by SWT wardens in 2010 (pers. Comm. Carl Powell). An estimated 15-25 pairs of hobby were thought to be breeding in Suffolk between 1995 and 1998 (Wright, 2001). However, the present population is likely to be larger, as indicated by the 50 pairs recorded in 2006 (Holling, 2009) and 56 pairs in 2005 (Holling, 2008), and even these totals are considered to underestimate the likely true population. Locally, three pairs of hobby were recorded breeding at RSPB Minsmere (covering approx. 1000 hectares) in 2009. Allowing for a county population of 50-100 pairs, 2 pairs in the survey area would represent between 2-4% of the county population. The population in the amended survey area represents a very small proportion of the national total, however, as Brown & Grice

(2005) estimated that between 1,000 and 2,000 pairs of hobby now breed in England, and the range of the species is continuing to expand.

Woodlark

A singing male woodlark was heard on one date in April 2010, in broadly the same area, as a territory was recorded in 2007; 100-200m south of Ash Wood Cottages. A second woodlark territory was recorded in 2007, in arable fields adjacent to the northern edge of Leiston Carr. Surveys for woodlark are best carried out between February and June, with a three visit strategy adopted for the national survey in 1997 (Wotton, 1997). During the Entec surveys, four visits were carried out between mid-March and June within the initial survey area. In the extended part of the survey area, three visits were undertaken in June, towards the end of the recommended period for surveying woodlarks. It is therefore feasible that some territories were not detected in this area in 2010 (the males may have already stopped singing). In addition, song perches and foraging areas are often 200-400m from nesting locations (Gilbert *et al.*, 1998); therefore there is a greater potential margin for error in the plotting of registrations for this species than for many others. However, no birds were known to have bred on the Sizewell Estate in 2010 and numbers there have declined in recent years (pers. Comm. Carl Powell). Between 2005 and 2007, the number of woodlark territories in monitored areas on the Sizewell Estate has varied between two and five, with the most consistently occupied areas being Leiston Common and Black Walks, both of which lie outside the 2010 amended survey area, although a number of other locations have been used. The territories recorded during the 2007 and 2010 Entec surveys were located in open arable farmland.

The UK woodlark population was estimated at being 1,633 occupied territories in 1997 (Conway *et al.*, 2009). At that time, it was estimated that almost 30% of woodlark territories (403-457) were in Suffolk, with 209-245 territories being located in the Suffolk Sandlings. A repeat of the national survey in 2006 produced a much increased total of 3,064 territories (Conway *et al.*, 2009).

The woodlark population in Suffolk is located in two broad areas: on the Suffolk coast (Sandlings) and in the Breckland (North-west Suffolk, extending into Norfolk). Despite a substantial increase in numbers recorded nationally between the two national surveys, numbers in Suffolk have declined (Conway *et al.*, 2009) and a total 370 territories were located in the county during the 2006 survey (Holling, 2009). The one and two territories recorded in the amended survey area in 2010 and 2007 respectively, represent 0.27-0.54% of the county population (on the basis of the 2006 figure).

In coastal Suffolk, results from the two national surveys in 1997 and 2006 indicate that there has been a substantial decline in numbers and shift in habitat use by breeding woodlarks. This decline has been linked to the maturation of existing plantations combined with unsuitable forest management practices and a lack of new planting. In 2006, a total of 163 woodlark territories were located on the Suffolk coast, of which only 16 were in conifer plantations (113 in 1997). In contrast, there was an increase of woodlarks on heathland (70 territories in 1996, and 111 in 2006) and on set-aside and arable farmland (17 territories in 1997 and 41 in 2006), Conway *et al.*, 2009. The increased use of arable farmland is likely to be due to the less suitable age structure of conifer plantations in the area, which were an important habitat for the species in the late 1990s (supporting 46% of the coastal population in 1997, compared to only 11% in 2006). The total population on the Suffolk coast was estimated to be 209 territories in 2006 (Conway *et al.*, 2009). The survey area population of 1-2 pairs represents 0.48-0.96% of the Suffolk Coastal population (predominantly found within the Sandlings SPA).

To conclude, the open farmland within the amended survey area provides some (albeit suboptimal) breeding opportunities for woodlark.

Black Redstart

Two singing male black redstarts were recorded holding territory on the northern boundary of Sizewell B in 2010. A further two birds were heard singing along the seaward frontage of Sizewell A and B Power Stations respectively. The Sizewell Power Stations provide one of the most important and regular breeding sites for black redstart in Suffolk, and the East of England Region. Numbers vary greatly between years, with none recorded during the breeding bird surveys undertaken in 2007 but potentially four pairs in 2010. In 2008, the only breeding record in the county was of a pair at Sizewell (Mason [ed] 2009), and in 2007, two pairs bred in Lowestoft and another at Felixstowe (Mason [ed] 2008). However, in recent years, the recording of black redstart at Sizewell has been done by Tony Howe, an employee of Magnox at Sizewell A. Recording at Sizewell B has been more sporadic, and therefore there is the possibility that pairs of breeding black redstart have gone undetected there (pers. comm. Tony Howe).

The black redstart is unusual in its breeding habits in that it is predominantly associated with urban or industrial sites in the UK, and therefore is often under-recorded due to the unattractive nature of these areas to visiting birdwatchers (Holling, 2008). However, Holling (2008) also suggests that numbers have declined from at least 100 pairs in the UK during the late 1980s to 60 pairs in 2005. In view of this, the two pairs recorded in the amended survey area in 2010 represent 3.3% of the UK population and a substantial proportion of the Suffolk total in most years. It is likely that areas of short grassland within the amended survey area, and adjacent to the power stations provide foraging habitat for black redstarts that are nesting in the nearby built area.

Cetti's warbler

Results from the breeding bird surveys undertaken in 2010 indicate that there was four Cetti's warbler territories located in the north-east corner of the Sizewell Marshes SSSI: five territories were recorded in this area in 2007 (Entec, 2008). Another territory was located 200m northeast of Walk barn in 2010 (one territory here in 2007). The most extensive area of suitable breeding habitat for Cetti's warbler within the amended survey area is located in the area of wet scrub and reedbed to the north of Sizewell B, in the north-east corner of the SSSI. Other suitable areas are found in the wetlands adjoining and to the east of Goose Hill plantation.

Results from the Entec surveys indicate that the Cetti's warbler population within the amended survey area declined from seven territories in 2007 to five in 2010, possibly as a result of two relatively cold winters in 2008/09 and 2009/10. However, in contrast, numbers at Minsmere increased from 83 to 95 pairs between 2008 and 2009 (RSPB, 2009). The numbers of Cetti's warblers in Suffolk have increased substantially since the late 1990s, when only two singing males were recorded at Minsmere in 1999 (RSPB, 2009). At least 150 singing males were reported in the county in 2008 (Mason [ed] 2009), with the population most concentrated along the coast between North Warren and Lowestoft. The species has become so numerous in north-east Suffolk that it is being under-recorded (Mason [ed] 2009). In 2006, a total of 141 singing males were reported in Suffolk, 397 in the East of England Region and 1,422 in the UK (Holling, 2009). The amended survey area population of five pairs in 2010 represents 3.3% of the current Suffolk population (as of 2008), and 1.3% of the East of England population (as of 2006). Results from the 2007 and 2010 Entec surveys indicate that a population of 4-5 pairs

breeds in the wet scrub and reeds that are located within the north-east corner of the Sizewell Marshes SSSI, immediately to the north of Sizewell B.

Firecrest

Two male firecrests were heard singing in the amended survey area on 23 April 2010, but were not heard on subsequent visits in May and June. The firecrest is described in Piotrowski (2003) as an uncommon passage migrant and rare resident. Most migrating firecrests are recorded between late March and early April (Mason [ed] 2009) and therefore the late April records from the amended survey area occurred after this main migratory period. Firecrests are extremely vocal where they occur at higher densities, but less so at low densities, and therefore some birds are likely to be overlooked (Holling, 2009). In view of this, it is possible that the firecrests recorded in the amended survey area in April 2010 (and not subsequently in May and June) did attempt to breed. Firecrests were not recorded during the breeding bird surveys undertaken in 2007 (Entec, 2008).

A total of 341 pairs of firecrest were recorded in the UK in 2006, including nine in Suffolk (Holling, 2009). In 2008, eight pairs held territory on the Suffolk coast (all but one at Minsmere), with a further pair or two in the Suffolk Breckland. This species is likely to be under-recorded (particularly in the Breckland) where the population is thought to exceed 50 pairs in some years (pers. Comm. Neil Calbrade, British Trust for Ornithology). However, the amended survey area population of two pairs is still likely to represent more than 1%⁹ of the county (Suffolk) and East of England populations.

A further three Schedule 1 species were recorded in the survey area in 2010, for which there was no evidence of breeding: marsh harrier, barn owl and crossbill.

Marsh harrier

Marsh harriers were seen hunting over the Sizewell Marshes SSSI during the Entec breeding bird surveys in 2010, and recorded by bat survey workers and SWT wardens in 2010. Marsh harriers have not been recorded breeding on the Sizewell Estate in the past and were not thought to have bred there in 2010 (pers comm. Carl Powell, SWT warden). There are a number of relatively small blocks of reedbed (none, more than 10 hectares in extent) located in the northeast corner of the Sizewell Marshes SSSI and just south of Grimseys, much of which is either quite dry, and/or overgrown with encroaching scrub. These reedbeds are however very secluded from human presence and partly enclosed by belts of wet semi-natural woodland, and provide potentially suitable habitat for nesting marsh harrier. The adjoining wet meadows and water-filled ditches to the south and west, and the extensive areas of marsh and reedbed to the north (within Minsmere RSPB) provide excellent habitat for hunting marsh harriers. To conclude, the habitat present within the amended survey area provides some (albeit rather limited) nesting and foraging opportunities for marsh harrier.

⁹ There is no fundamental biological reason to take 1% of a population as the threshold level for establishing the level of importance of a site. Nevertheless, this percentage is widely considered to be of value in developing measures that give an appropriate level of protection to populations, and has gained acceptance on this basis throughout the world. The criterion was, for example, adopted by parties involved in the Ramsar Convention 1971. Thereafter, the 1% level of national species totals has been taken as the basis of assessment in various countries, including Britain (Stroud, Mudge & Pienkowski, 1990).

Barn owl

Barn owl was not recorded during the breeding bird survey or nightjar survey carried out in 2010, and there was no evidence of recent or past occupancy in a pole-mounted nest box located on the southern edge of Goose Hill plantation. However, barn owls were reported by survey workers undertaking bat surveys in the Sizewell area on a number of occasions, hunting in open habitat within the amended survey area in spring and summer 2010. Barn owls are a primarily nocturnal or crepuscular species that is not readily detected during the morning visits undertaken for the breeding bird surveys. Barn owls are known to breed on the Sizewell Estate from information provided by SWT wardens, and there is likely to be suitable nest sites for this species within or close to the amended survey area. Barn owls were roosting in barns in Upper Abbey Farm in 2010 (pers. Comm. Carl Powell, SWT warden).

The Suffolk barn owl population is concentrated in the eastern half of the county. Evidence suggests that densities in east Suffolk are relatively high, at approximately five breeding pairs per 10km square, indicating a county population of 100-125 pairs (Piotrowski, 2003). Barn owls appear to be benefiting from the provision of nest boxes in many areas (Mason [ed] 2009) and therefore the population may now be above the 2003 estimate. To summarise, the wet meadows and ditches within the survey area are likely to be used for hunting by the local barn owl breeding population, and there is potential habitat within the amended survey area for nesting (such as the nest box at Goose Hill, and farm buildings and old trees).

Crossbill

Crossbill, which has been recorded breeding on the Sizewell Estate, was seen in Goose Hill plantation in April 2010, when a small party of birds was recorded. As crossbills are likely to have completed breeding by this time, it was not possible to conclude whether the species was likely to have bred within the amended survey area in 2010. However, crossbills have bred sporadically along the Suffolk coast in the past, and there is plenty of suitable breeding habitat for this species within the amended survey area, such as that in the Leiston Carr to Goose Hill conifer plantations.

4.2 UK BAP Priority and Red-Listed Species

A total of 13 UK BAP Priority species were recorded holding territory within the amended survey area during the breeding bird surveys carried out in 2010: lapwing, turtle dove, cuckoo, woodlark, skylark, dunnock, song thrush, spotted flycatcher, marsh tit, linnet, bullfinch, yellowhammer and reed bunting. Of these, woodlark, dunnock, bullfinch and reed bunting are Amber Listed and the remaining species Red Listed in BoCC (Eaton *et al.*, 2009) the latter due to declines in UK breeding populations of at least 50% over the past 25 years. Use of the amended survey area to these species (excluding woodlark, which has been discussed previously) is examined further below.

Lapwing

Three pairs of lapwing were recorded in the amended survey area in 2010, including a pair on damp grassland immediately to the north of Sizewell B. Pairs were also seen in arable fields north of Ash Wood Cottage and in dry grassland adjacent to the northeast of Goose Hill plantation. Lapwings were not recorded breeding in the amended survey area in 2007.

The population of breeding lapwing in Suffolk was estimated to be 1,840 pairs in 1987 and 860 pairs in 1998 (Piotrowski, 2003). Results from the Breeding Bird Survey (Risley *et al.*, 2010),

indicate that there was no statistically significant change in numbers of breeding lapwing between 1995 and 2008. Numbers on the neighbouring RSPB reserve of Minsmere have also remained relatively stable since 2005 at 32-38 pairs (RSPB, 2009). This suggests that the Suffolk population is likely to be at a similar level to that of 1998 and the three pairs of lapwing recorded in the amended survey area are therefore likely to represent a very small proportion of the county total.

Turtle dove

A single turtle dove was seen on buildings at Upper Abbey Farm on 2 June 2010 (400m northwest of the access road corridor), but was not heard singing on that, or subsequent visits to the area in June. One turtle dove territory was recorded in the amended survey area in 2007, again near Upper Abbey Farm. The turtle dove, is described as a declining summer visitor in Mason [ed] 2009 and was recorded in 816 tetrads [2km by 2km squares] during the Suffolk breeding bird survey of 1987-1992 (Piotrowski, 2003). The population on RSPB Minsmere has declined from 18 pairs in 2005 to only eight pairs in 2009 (RSPB, 2009). Results from the breeding bird survey indicate that nationally, numbers declined by 70% between 1995 and 2008, and by 73% in the East of England Region (Risely *et al.*, 2010). Even allowing for such a decline, the single territory recorded in the amended survey area in 2007 and 2010, is unlikely to represent more than 1% of county population.

Cuckoo

A male cuckoo was heard singing immediately north of the Leiston Carr to Goose Hill belt of woodland on one survey date in June 2010. Two cuckoos were holding territory within the amended survey area in 2007, one near Walk Barn and the other to the north of Sizewell B. The cuckoo is described as a declining summer visitor in Mason [ed] 2009 and was recorded in 633 tetrads during the Suffolk breeding bird survey of 1987-1992 (Piotrowski, 2009). Results from the breeding bird survey indicate that nationally, numbers declined by 44% between 1995 and 2008, and by 64% in the East of England Region (Risely *et al.*, 2010). Even if the national and regional declines have been mirrored in Suffolk, the single territory recorded in the survey area in 2010, is unlikely to represent more than 1% of the county population.

Skylark

A total of 18 skylark territories were recorded in the amended survey area during the breeding bird surveys undertaken in 2010, of which two were immediately to the north of Sizewell B with another in the adjacent dunes. A total of 24 skylark territories were recorded within the amended survey area in 2007, including two to the north of Sizewell B and 18 in the arable fields in the extended part of the survey area. In the wider local area, this compares to 48 pairs on heathland and arable land within Minsmere RSPB in 2008 and 195 pairs on the North Warren RSPB reserve (comprising approximately 440 hectares) in 2008 (Mason [ed] 2009). The skylark is described as a common resident in Mason [ed] 2009 and was recorded in 937 tetrads during the Suffolk breeding bird survey of 1987-1992 (Piotrowski, 2003). Results from the breeding bird survey indicate that nationally, numbers declined by 11% between 1995 and 2008, and by 27% in the East of England Region (Risely *et al.*, 2010). Even if the national and regional declines have been mirrored in Suffolk, the county population is likely to be in excess of 2,000 pairs and therefore the 18 territories recorded in the amended survey area in 2010, are unlikely to represent more than 1% of the county population.

Dunnock

A total of 39 territories of dunnock were recorded in the amended survey area in 2010, including eight immediately to the north of Sizewell B. These birds were primarily found in areas of scrub bordering the Goose Hill and Kenton Hills plantations, but also in hedgerows within the extended part of the survey area and scrub to the north of Sizewell B. In 2007, 48 territories were recorded in the amended survey area, including six to the north of Sizewell B and 21 in the extended part of the survey area (compared to nine territories in this area in 2010). The dunnock is described as a very common resident in Mason [ed] 2009 and was recorded in most of the 1,000 or so tetrads during the Suffolk breeding bird survey of 1987-1992 (Piotrowski, 2003). Results from the breeding bird survey indicate that nationally, numbers have increased by 21% between 1995 and 2008, and were up by 17% in the East of England Region (Risely *et al.*, 2010). Locally, a total of 278 pairs were recorded at North Warren RSPB (in approx. 400 hectares), and 43 pairs on the Sizewell Estate in 2007 (Mason [ed] 2008). The Suffolk population of this common and widespread species is likely to be well in excess of 5,000 pairs and therefore the amended survey area population will represent a very small proportion of the county total.

Song thrush

A total of nine song thrush territories were recorded in the amended survey area in 2010, of which two were immediately to the north of Sizewell B. In 2007, 12 territories were recorded in the amended survey area, including three to the north of Sizewell B and three in the extended part of the survey area (none here in 2010). The song thrush is described as a fairly common resident in Mason [ed] 2009 and was recorded in 940 tetrads during the Suffolk breeding bird survey of 1987-1992 (Piotrowski, 2003). Results from the breeding bird survey indicate that nationally, numbers have increased by 27% between 1995 and 2008, although there was little change in numbers in the East of England Region during this period (Risely *et al.*, 2009). In view of this, and the number of tetrads this species was recorded, the county population is likely to be well in excess of 2,000 pairs (a total of 40 pairs were recorded on the RSPB's North Warren reserve in 2008, Mason [ed] 2009). The nine territories recorded in the amended survey area in 2010 are therefore likely to represent less than 1% of the county population.

Spotted flycatcher

A single male spotted flycatcher was heard singing in wet woodland on the eastern boundary of the amended survey area, adjacent to the Sizewell Power Stations in 2010. In 2007, two territories were located in the amended survey area, both at the western end of the area (none were recorded in this area in 2010). The spotted flycatcher is described as a declining summer visitor in Suffolk (Mason [ed] 2009) and was recorded in 566 tetrads during the Suffolk breeding bird survey of 1987-1992 (Piotrowski, 2003). Results from the breeding bird survey indicate that nationally, numbers declined by 39% between 1995 and 2008 (Risley *et al.*, 2010). Even if the national decline has been mirrored in Suffolk, the one territory recorded in the amended survey area in 2010, is unlikely to represent more than 1% of the county population.

Marsh tit

A total of five pairs of marsh tit were recorded in the amended survey area in 2010, of which, two pairs were in the wet woodland along the western boundary of the built area of power stations, two pairs on the southern fringes of Kenton Hills and another pair near the Fiscal Policy car park. In 2007, five pairs were also recorded in the amended survey area. All of the pairs seen in 2010 were associated with the wet woodland areas. The marsh tit is described as a

fairly common resident in Suffolk (Mason [ed] 2009) and was recorded in 256 tetrads during the Suffolk breeding bird survey of 1987-1992 (Piotrowski, 2003). Results from the breeding bird survey indicate that nationally, numbers declined by 18% between 1995 and 2008 (Risley *et al.*, 2010). Even if the national decline has been mirrored in Suffolk, the county population is likely to be well in excess of 500 pairs (there are extensive areas of suitable woodland habitat along the Suffolk coast and in the Brecklands). Therefore, the five pairs recorded in the amended survey area in 2010 are unlikely to represent more than 1% of the county population.

Linnet

A total of eight pairs of linnet were recorded in the amended survey area in 2010, including five pairs in coastal scrub in the north-east corner of the area, to the north of Sizewell B. The other three pairs were located in open farmland between Ash Wood and Goose Hill. In 2007, ten pairs were recorded in the amended survey area, including three to the north of Sizewell B and four in the extended part of the survey area. The linnet is described as a common summer visitor in Suffolk (Mason [ed] 2009) and was recorded in 738 tetrads during the Suffolk breeding bird survey of 1987-1992 (Piotrowski, 2003). A total of 63 pairs were recorded on North Warren RSPB (including Aldringham Walks) in 2008 (Mason [ed] 2009). Results from the breeding bird survey indicate that nationally, numbers declined by 23% between 1995 and 2008, and by 35% in the East of England Region (Risely *et al.*, 2010). However, even allowing for a decline in Suffolk, the county population is likely to be well in excess of 1,000 pairs, and therefore the population in the amended survey area is likely to represent a small (less than 1%) proportion of this.

Bullfinch

A total of three pairs of bullfinch were located in the amended survey area in 2010, with single pairs recorded in scrub immediately to the north of Sizewell B; in Kenton Hills plantation, and near Upper Abbey Farm. In 2007, four pairs were recorded in the amended survey area, including three in the Leiston Carr to Goose Hill belt of woodland, but none to the north of Sizewell B. The bullfinch is described as a common but declining resident in Suffolk (Mason [ed] 2009) and was recorded in 557 tetrads during the Suffolk breeding bird survey of 1987-1992 (Piotrowski, 2003). Locally, 32 pairs were recorded at North Warren RSPB, mostly in tall, thick scrub along woodland edges (Mason [ed] 2009). Results from the breeding bird survey indicate that nationally, there has been no statistically significant change in numbers since 1995 (Risely *et al.*, 2010). The Suffolk population is therefore likely to be well in excess of 300 pairs and the population within the amended survey area is likely to represent less than 1% of the county total.

Yellowhammer

A total of six pairs of yellowhammer were located in the amended survey area in 2010, all of which were located in open farmland to the north of the Leiston Carr to Goose Hill belt of woodland. In 2007, 14 pairs were recorded in the amended survey area, including nine in the extended part of the survey area, but as in 2010, none immediately to the north of Sizewell B. The yellowhammer is described as a common resident in Suffolk (Mason [ed] 2009) and was recorded in 942 tetrads during the Suffolk breeding bird survey of 1987-1992 (Piotrowski, 2003). Locally, 52 pairs were recorded at North Warren RSPB in 2008 (Mason [ed] 2009), and 18 pairs at Minsmere RSPB in 2009. Both of these populations have undergone decline, with 72 pairs at North Warren in 2007, and 38 pairs at Minsmere in 2006.

Results from the breeding bird survey indicate that nationally, numbers declined by 16% between 1995 and 2008, and by 22% in the East of England Region (Risely *et al.*, 2010). Even if the national and regional declines have been mirrored in Suffolk, the county population is still likely to be well in excess of 600 pairs. Therefore, the six territories recorded in the amended survey area in 2010 are likely to represent less than 1% of the county population.

Reed Bunting

A single territory-holding male reed bunting was located in a ditch south of Goose Hill plantation in 2010. In 2007, four pairs were located in the amended survey area, including one in the extended part of the survey area and three in the wet meadows within Sizewell Marshes SSSI. The reed bunting is described as a common resident in Suffolk (Mason [ed] 2009) and was recorded in 292 tetrads during the Suffolk breeding bird survey of 1987-1992 (Piotrowski, 2003). Locally, 41 pairs were recorded at North Warren RSPB and 73 pairs at Minsmere RSPB in 2008 (Mason [ed] 2009). In view of this, a single pair is likely to represent a very small proportion of the county population.

In addition, starling and house sparrow were recorded in the amended survey area in 2007 (a colony of 16 pairs at Upper Abbey Farm) and starling (one pair in the woodland near Old Abbey Farm). Neither species was recorded in 2010, although surveys were undertaken only in June in the Old and Upper Abbey Farm areas and therefore both species could have been present but not detected.

4.3 Other Notable Species

A diverse range of common and widespread breeding bird species were recorded in the amended survey area in 2010. Of these, the mature conifer plantations of Kenton Hills and Goose Hill and the adjacent wet deciduous woodland held high densities of the following species: (the number of territories in the amended survey area is shown in parenthesis): green woodpecker (10), great spotted woodpecker (11), goldcrest (37), treecreeper (25), coal tit (55) and chaffinch (138). All of these species are described as being common or very common in Suffolk by Mason [ed] 2009. Population estimates do not exist for Suffolk for most common and widespread breeding bird species. However, Suffolk is a well-wooded county, particularly along the coast and in the Breckland, and these areas are likely to support large populations of woodland species, including all those mentioned above in this paragraph.

A single nightingale territory was recorded in the survey area in 2007 (near Upper Abbey farm) but was not heard during the 2010 surveys, although this area was visited only in June, outside the main period when this species sings. Two nightingale territories were recorded by SWT wardens in the Sizewell Estate in 2010, both outside the amended survey area.

The wetland habitats within the amended survey area are primarily located within the Sizewell Marshes SSSI, and include areas of reedbed and wet scrub (particularly in the northeast corner of the SSSI) and larger areas of open wet grassland to the south and west. The surveys undertaken in 2010 indicate that these areas held relatively low numbers of wetland species, including: eight pairs of mallard, 14 pairs of moorhen and a pair of mute swan. Gadwall was not recorded breeding in the amended survey area, and breeding was not confirmed by SWT wardens in 2010 (pers comm. Carl Powell). This compares to four pairs of gadwall recorded in the amended survey area in 2007, all of which were in the Sizewell Marshes SSSI.



Four pairs of gadwall represent 4.8% of the 145 pairs recorded in Suffolk in 2007 (Mason [ed] 2008). The mallard population was estimated to be in the region of 1,000 pairs in Suffolk (Piotrowski, 2003) and therefore the eight pairs recorded in the amended survey area in 2010 would represent less than 0.8% of this. Moorhen is described as an abundant resident, recorded in 799 tetrads during the 1987-1992 Suffolk breeding bird survey (Piotrowski, 2003). The 14 pairs recorded in the amended survey area in 2010 are therefore likely to represent a small proportion of the county total. A single pair of mute swan represents less than 1% of the estimated 131 pairs recorded during the 1990 Census undertaken by the Suffolk Ornithologists' Group (Wright, 1991).

Water rail, whose breeding distribution is much more restricted in Suffolk than the other wetland species recorded, was heard calling from reedbeds located in the northeast corner of the Sizewell Marshes SSSI in April 2010, indicating that a bird was holding territory in the area (two territories were recorded in this area in 2007). In Suffolk, water rails primarily breed in extensive areas of reedbed and recent data from Suffolk Birds indicates that the county population is concentrated at a small number of sites where suitable habitat exists, including: Westwood Marshes (100 pairs), Benacre (75 pairs), North Warren (40-60 pairs), Minsmere (40-80 pairs), Hen Reedbeds (16) and Lakenheath Fen RSPB (32). However, this secretive species is best detected by undertaking evening surveys with the use of recordings of calling water rail, from which the male birds respond. It is likely that the single pair recorded during the 2010 surveys is an underestimate of the true population in the amended survey area.

5. Conclusions

Results from the breeding bird surveys, and additional records obtained from Carl Powell (SWT warden) and bat surveyors, indicate that the amended survey area supports a diverse range of birds species associated with the habitats present, including deciduous and coniferous woodland, scrub, wetlands and arable farmland. Five species listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended) were recorded breeding or holding territory in the amended survey area in 2010: hobby, woodlark, black redstart, Cetti's warbler and firecrest. In addition, barn owl, crossbill and marsh harrier were recorded within the amended survey area, although there was no evidence of breeding in 2010.

The diversity of breeding birds found in the area immediately to the north of Sizewell B was low compared to that elsewhere within much of the amended survey area. However, the area of wet scrub, woodland and reeds in the north-east corner of the Sizewell Marshes SSSI held Cetti's warbler as well as relatively high densities of other notable species, including marsh tit, bullfinch and reed warbler. Two territories of black redstart were located on the northern boundary of Sizewell B, and it is likely that adjacent short grassland (within the amended survey area) is used for foraging. This area also held nine UK BAP Priority species: lapwing, skylark, dunnoek, song thrush, spotted flycatcher, marsh tit, linnet, bullfinch and reed bunting.

The habitat within the remainder of the amended survey area supported high densities of species associated with deciduous and coniferous woodland and scrub, including hobby and firecrest (2 territories). The wet meadows and ditches that form part of the Sizewell Marshes SSSI to the south of the Leiston Carr to Goose Hill belt of woodland held relatively low numbers of wetland bird species but were used by hunting barn owl and marsh harrier. The open arable farmland to the north of the woodland belt (much of which is in the extended survey area) held relatively low densities of species associated with this habitat, such as skylark and yellowhammer. The mature hedgerows and scrub along the track north to Upper Abbey Farm and pockets of recently planted conifer woodland (at Great Mount Wood, between Ash Wood and Walkbarn) and more mature mixed woodland at Ash Wood and Walk Barn held higher densities of typical woodland and scrub species, including turtle dove, bullfinch and linnet. It is likely that some of these species were under-represented in this area due to the late start of the 2010 surveys. Of the highly protected species, single pairs of Cetti's warbler were located at Walk Barn and woodlark and hobby were in or near Ash Wood.

Qualifying species of the Minsmere-Walberswick SPA that are known to occur within the Sizewell Estate are bittern and marsh harrier. None of these species as well as avocet, little tern and nightjar (which are also qualifying species) were recorded breeding in the amended survey area in 2010. Historical evidence from SWT and other sources suggests that breeding has not occurred for any of these species in the recent past. However, suitable nesting habitat exists for marsh harrier within the amended survey area, and birds were seen hunting over the Sizewell Marshes during the 2010 breeding season.

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EDF Energy

**Sizewell C New Nuclear Power Station:
Terrestrial and Freshwater Ecology, and
Ornithology**

DRAFT Harrier and Bittern Survey Report 2011-12

June 2012

AMEC Environment & Infrastructure UK Limited

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Sizewell C New Nuclear Power Station: Terrestrial and Freshwater Ecology, and Ornithology

DRAFT Harrier and Bittern Survey Report
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1. Introduction

1.1 Purpose of this Report

An area of land directly north of Sizewell B Nuclear Power Station, which is located near Leiston in Suffolk, has been identified as having the potential to accommodate the proposed development of one or more new nuclear reactors. This proposed development is known as Sizewell C. The site of the proposed development has an approximate central National Grid Reference (NGR) of TM473640.

AMEC Environment & Infrastructure UK Ltd ('AMEC') was commissioned by EDF Energy to undertake surveys for bittern and harriers in relation to Sizewell C. The purpose of this report, which details the findings of survey work undertaken for bittern (*Botaurus stellaris*), marsh harrier (*Circus aeruginosus*) and hen harrier (*Circus cyaneus*) in the period 2011-12, is to inform the design of Sizewell C and the Environmental Statement for the scheme.

1.2 Survey Area and Scope

The survey area and methodologies used have been adopted following consultation with statutory and non-statutory consultees and other stakeholders, taking into account best practice guidelines, and site-specific and project-specific characteristics. The survey area adopted is precautionary in that it allows for the iterative development of the scheme design by covering a larger area than is likely to be affected by the proposals. The survey area is illustrated on **Figure 1.1** and primarily covers the Minsmere Levels, Sizewell Marshes and the land in between. The Sizewell Marshes and woodland to the north (Kenton Hills and Goose Hill plantations) are located within the Sizewell Estate. Much of the Minsmere Levels is located within the Minsmere RSPB nature reserve although some small areas of land in the far south of the Levels are within the Sizewell Estate and managed by the Suffolk Wildlife Trust. Based on the information available at the time the survey was undertaken, it was assessed that the relevant Zones of Influence of the proposed development would be likely not to extend further than the defined study area.

The extensive reedbeds within the Minsmere RSPB reserve (north of the Levels) provide breeding habitat for bittern and marsh harrier, and foraging habitat for these species throughout the year. The reedbeds and marshes in the reserve also provide foraging habitat for hen harrier during winter (which primarily occurs from October-March). The Minsmere Levels also provide foraging habitat throughout the year for marsh harrier, and to a lesser degree bittern.

The Sizewell Marshes comprise a mosaic of wet meadows interspersed by water-filled ditches and small blocks of wet deciduous woodland. There are also a number of small blocks of reedbed (none more than 3 hectares in extent), which at the time of the surveys in 2011-12 were rather dry and contained few areas of open water. The ditches and reedbeds provide foraging opportunities for marsh harrier and potentially bittern throughout the year. However, these habitats are small and patchy in extent and distribution and therefore provide very limited and suboptimal habitat for breeding.

Results from the surveys will provide further information on the type and level of use in the study area by bittern, marsh harrier and hen harrier. The primary purpose of this work is to gather information that will be used to identify any potential impacts on the populations of these species due to the development of Sizewell C. This report details the findings from surveys undertaken from April 2011 to March 2012.

Potential effects on breeding bittern and harriers due to the proposed development will include the following:

- the potential for the construction and operation of the new nuclear build to disturb or displace foraging bittern, marsh harrier and hen harrier. The development may also disrupt the movements of bittern and harriers commuting between breeding and foraging areas, by creating a barrier to such movements;
- the loss of potential foraging areas due to the construction of the new nuclear build may lead to reduced breeding success and a decline in the breeding populations of bittern and marsh harrier. The loss of foraging areas could also lead to a decline in the wintering populations of marsh harrier, bittern and hen harrier.

1.3 Background

1.3.1 Marsh Harrier

Marsh harrier is afforded enhanced protection at European level under Annex 1 of the EC Directive 2009/147/EC on the conservation of wild birds (codified version)¹ and in the UK, under Schedule 1 of the Wildlife and Countryside Act 1981 (as amended), which makes it an offence to disturb or otherwise interfere with nesting birds. The Minsmere-Walberswick SPA (the location of which is shown in **Figure 1.1**) is designated for a breeding population of marsh harrier of European importance (16 pairs). The UK population has increased dramatically since a single pair bred in the country in the early 1970s, with an estimated 360 breeding female² marsh harriers present in 2005. The majority of the UK population is concentrated in the eastern coastal counties of England, particularly Lincolnshire, Norfolk, Suffolk and Kent (Eaton *et al.*, 2006). In 2008, a total of 374-392 breeding females were recorded, most of which were located in Eastern England in Lincolnshire (90 breeding females), Kent (90), Norfolk (83), Suffolk (52), Cambridgeshire (21) and Essex (15). However, due to under-recording in some of these core areas, the UK population was estimated at 450 pairs (Holling, 2010). In 2010, at least 50 pairs bred in Suffolk, of which 10 were in the Minsmere RSPB nature reserve (Mason [ed], 2011). Outside the breeding season, an increasing number of marsh harrier now over-

¹ The European Union meets its obligations for bird species under the Bern Convention and Bonn Convention and more generally by means of Directive 2009/147/EC (Birds Directive) on the conservation of wild birds (the codified version of Council Directive 79/409/EEC as amended). This obliges national governments to identify and designate areas of critical importance to the conservation of the species – these areas are known as Special Protection Areas (SPAs).

² Given that this species is often polygynous, the number of nesting females provides a more accurate description of the breeding population than numbers of territorial males.

winter in Suffolk, with a minimum of 80 birds present in the county in the early months of 2011, including a peak count of 15 birds at Minsmere (Mason [ed], 2011).

The First Interim Bird Report for the Sizewell Estate produced and issued by Entec UK Ltd in February 2008³ (Entec Doc. Reg. 19801cr080) identified that marsh harrier used parts of the Estate with relative regularity. As marsh harrier has never been recorded breeding within the Estate boundary, it was considered likely that these birds were part of the nearby Minsmere-Walberswick SPA population.

In order to determine the frequency with which marsh harriers were flying between the reedbeds of the Minsmere RSPB nature reserve (part of the Minsmere-Walberswick SPA) and the Sizewell Estate, a desk study (to identify any historical records of marsh harrier in the Sizewell area) and surveys were conducted during the 2008 breeding season using vantage-points (VPs) overlooking land between the two areas. In addition, VPs within the Sizewell Estate were used to determine the nature and frequency of marsh harrier use on the Sizewell Marshes. A total of twelve VP surveys (totalling 72 hours of survey) were completed, from 5 May to 26 July 2008, each involving two surveyors working in tandem for two three-hour watches. Observations were carried out from seven VPs, two of which were located on the northern fringes of the Minsmere Levels, one by Ash Wood (within the Sizewell Estate) and four in the Sizewell Marshes SSSI.

Marsh harriers were recorded on 11 of the 12 survey dates, and there were 119 sightings in total during the survey period. The results of these surveys were reported in the Sizewell Harrier Survey Report (Entec, 2008a). The majority of flights were recorded over the Minsmere Levels within the RSPB Reserve, adjacent and to the north of the Sizewell Estate. The number of sightings peaked in early May and mid-June 2008. A total of 26 flights were identified that were of birds flying to and from the Sizewell Estate area. Results from these surveys indicated that only a small percentage of the total foraging activity carried out by breeding individuals derived from the Minsmere-Walberswick SPA took place south of the Minsmere Levels, in the Goose Hill and Sizewell Marshes area.

In 2010, RSPB recommended that further surveys for marsh harrier be undertaken to provide information on the use of the study area by this species throughout the year. In response to this, a programme of marsh harrier surveys was undertaken from April 2011 to March 2012 inclusive, the results of which are presented in this report below.

1.3.2 Bittern

Bittern is afforded enhanced protection at European level under Annex 1 of the EC Directive 2009/147/EC on the conservation of wild birds (codified version), and in the UK, under Schedule 1 of the Wildlife and Countryside Act 1981 (as amended), which makes it an offence to disturb or otherwise interfere with nesting birds. The Minsmere-Walberswick SPA is designated for a breeding population of bittern of European importance. The Natura 2000 Data Form indicates that the site supported 35% of the UK breeding bittern population (equating to 7 territorial males, 5 year mean, 1993-1997). There were no updates to this assessment suggested by the SPA Review (Stroud *et al.*, 2001), although it was considered in this document that bittern should be added to the winter qualifying interest of the SPA (a wintering population of 14 individuals). JNCC states that individual site accounts in the 2001 Review should be taken

³ Entec UK Ltd became part of AMEC Environment & Infrastructure UK Ltd in 2011.

as the definitive list of qualifying species at the SPAs concerned (see <http://jncc.defra.gov.uk/page-5485>). Bittern is also included on the list of species of principal importance for biodiversity, under Section 41 of the Natural Environment and Rural Communities Act (2006). Amongst other things, this requires local authorities to take steps to ensure the conservation of the species through the planning process.

The UK population of bittern has increased slowly from a low point in the 1990s (when the population fell to only 11 males in 1997) and is probably now at its highest level since the 19th century. In 2008, at least 75 booming males were recorded in the UK, of which Minsmere RSPB held 11 (Holling, 2010). By 2010, this figure had increased to 87 males, of which 32 were in Suffolk, located at seven coastal and one inland site (Mason [ed], 2011). At Minsmere, five bittern nests were located in 2010 (Mason [ed], 2011).

Breeding bird surveys undertaken by Entec in 2007 recorded bittern using the Sizewell Estate during April (Entec, 2007). It was also apparent from an initial literature search that bittern had been recorded on the Sizewell Estate in the recent past.

During a consultation meeting with Adam Rowlands and Kirsty Coutts of RSPB (in September 2007) to discuss the results of the Sizewell breeding bird surveys, concerns were raised about the potential value of the Sizewell Marshes as a foraging resource (as breeding habitat is lacking) for the Minsmere-Walberswick SPA bittern population. The SPA is located adjacent to the north of the Sizewell Marshes, so any changes in the level or nature of use by bittern at Sizewell could effect the SPA population. It was suggested that survey work be undertaken to investigate this further. Of chief concern to the RSPB was the potential effect of disturbance associated with construction, as this was considered to have the potential to result in the displacement of females preferentially foraging in the Sizewell Marshes in order to provision nests within the SPA. Therefore, surveys were undertaken during the 2008 breeding season to establish whether there were flight lines between the SPA and the Sizewell Marshes suggesting a direct ecological link between the areas.

A total of twelve VP surveys (totalling 72 hours) were completed, from 15 May to 8 August 2008, each involving two surveyors working in tandem for two three-hour watches. Observations were carried out from two vantage points overlooking the Minsmere Levels. During these surveys, bitterns were seen on eleven occasions (on four survey dates from 4 June to 19 June) all on the Minsmere Levels (Entec 2008b). None were seen flying to and from the direction of the Sizewell Marshes.

The Surveys undertaken by Entec in 2008 indicate that female bittern breeding at Minsmere do not provision their young from the Sizewell Marshes, and there was no evidence of bitterns commuting to and from the Sizewell Marshes. Some use of the ditches within the Minsmere Levels was recorded, but no flight activity or feeding behaviour was noted within 500m of the Sizewell Marshes.

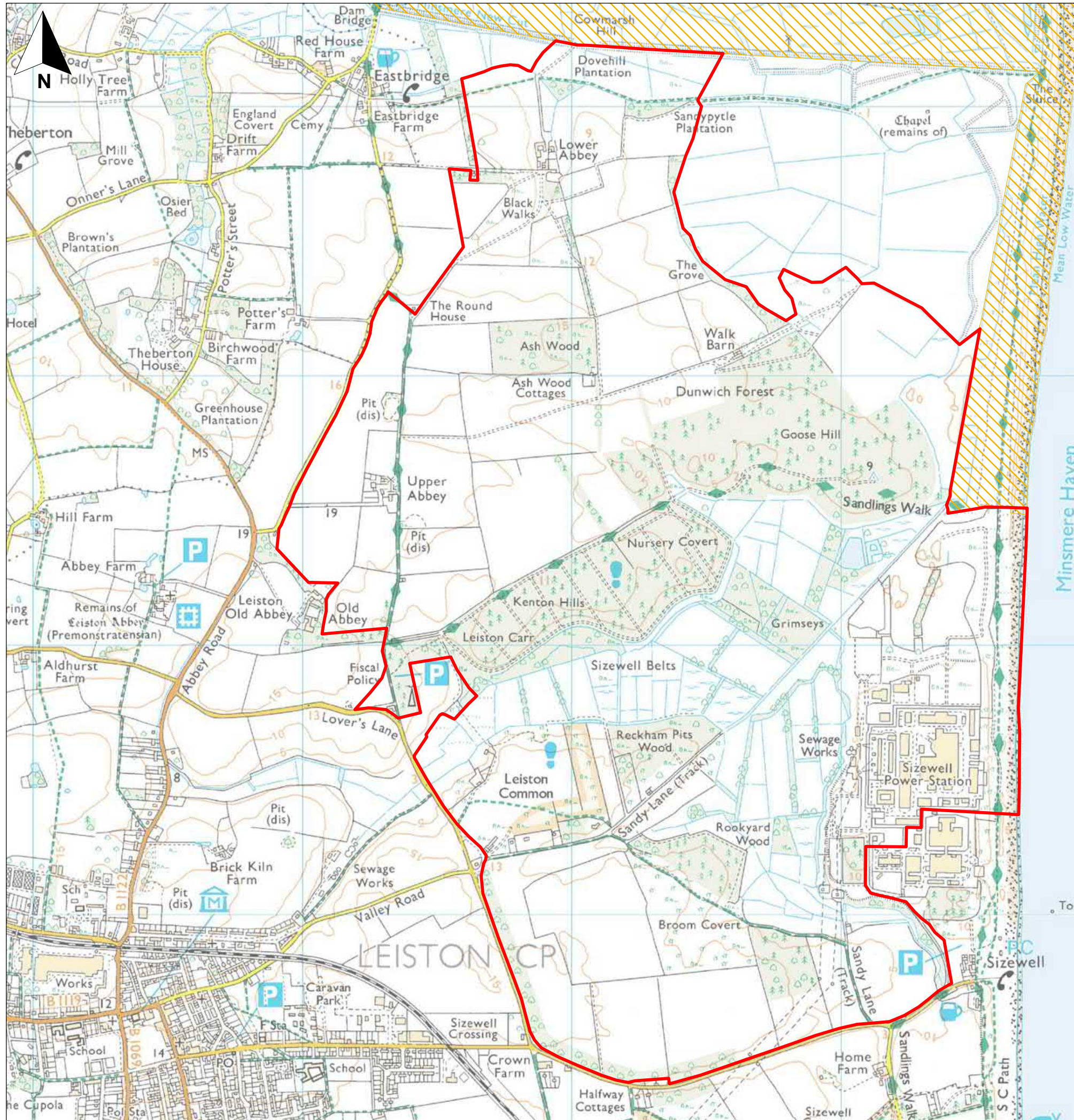
In 2010, RSPB recommended that further surveys for bittern be undertaken to provide information on the use of Sizewell Marshes by this species throughout the year. In response to this, a programme of bittern surveys was undertaken from April 2011 to March 2012 inclusive, the results of which are presented in this report below.

1.3.3 Hen harrier

The Minsmere-Walberswick SPA is designated for its wintering population of hen harrier of European importance (15 individuals, 5 year peak mean, 1985/6-1989/90). The hen harrier is a



winter visitor to Suffolk, primarily present from late September to the end of March (Piotrowski, 2003). The number of hen harriers wintering in Suffolk varies greatly between years, and the county population has ranged between 4 and 15 birds since 2004, primarily centred along the coast and inland in the Breckland (Mason [ed], 2011). Hen harriers are known to regularly hunt over the Minsmere marshes, and there is some historical evidence to indicate that the Sizewell Estate is also used by hunting birds. There is therefore the potential for hen harriers derived from the Minsmere-Walberswick SPA to hunt over the Sizewell Estate, and be potentially affected by the development of Sizewell C, due to the loss of foraging habitat and disturbance. In view of this, hen harrier was included in the programme of survey work for marsh harrier and bittern, to be undertaken in 2011-12.



Key

- Sizewell Estate boundary
- Minsmere-Walberswick SPA

0 m 700 m
Scale 1:15000 @ A3



Harrier and Bittern Surveys
Report 2011-12

Figure 1.1
Study Area

April 2012
28132-A402.wor tugwc



2. Methodology

2.1 Surveys

Two types of survey were employed: (i) a walkover survey to locate any bittern foraging in ditches, and harriers hunting over the Sizewell Marshes, and (ii) Vantage Point (VP) surveys to determine the frequency at which bittern and harriers are flying between the Minsmere-Walberswick SPA and potentially suitable foraging/hunting areas in Sizewell Marshes.

2.1.1 Walkover Surveys

There is the potential for bittern to forage throughout the year in the ditches within Sizewell Marshes. Bitterns are very secretive birds that remain hidden deep in reedbeds for much of the time. It was therefore decided that a walkover survey would be the best method of detecting any bitterns present. These walkover surveys would also provide sightings of any marsh and hen harriers hunting over Sizewell marshes, plus details of any potential nesting attempts by bittern and marsh harrier.

A programme of bi-monthly walkover surveys was undertaken from April 2011 to March 2012 inclusive. The surveyor walked along the ditches within the Sizewell Marshes area (and where possible entered the reedbeds using any well-defined deer runways) and recorded any sightings of bittern or harriers (including details of activity, and for harriers, sex and age where possible). During the breeding season (April-July), any potential reedbed nesting habitat was not entered. The dates, times and weather conditions of the surveys are presented in **Table 2.1** and the walkover survey area shown in **Figure 2.1**.

Table 2.1 Dates, Times and Weather Conditions on Walkover Surveys

Date	Time (from)	Time (to)	Wind direction	Wind force	Cloud cover (of 8)	Precipitation	Visibility
06/04/11	07:30	14:30	SW	3-4	8	None	Very good (3km+)
20/04/11	07:30	14:25	ESE	2-3	0	None	Very good (3km+)
09/05/11	07:30	15:00	S	3-4	1	None	Very good (3km+)
18/05/11	08:45	15:00	SW	4	8	None	Very good (3km+)
06/06/11	07:30	16:00	NW	2-3	8	Heavy rain	Good
30/06/11	08:00	16:00	NW	2-4	4	None	Very good (3km+)
05/07/11	07:00	14:00	SE	4-5	8	None	Very good (3km+)
07/07/11	07:10	15:15	SE	4-5	7-8	Showers	Very good (3km+)
21/07/11	08:00	16:00	NNE	2-5	4-8	None	Very good (3km+)
10/08/11	08:00	16:00	S	2-6	6-8	Spitting rain	Very good (3km+)
27/07/11	08:00	16:00	NNW	4-5	6-8	None	Very good (3km+)
15/08/11	09:00	15:30	W	2-3	0-4	None	Very good (3km+)
12/09/11	08:10	15:30	SW	6-8	0-8	Raining until 1030hrs	Fair
30/09/11	07:30	15:20	SSE	0-1	0	None	Misty until 0900 then very good (3km+)
05/10/11	09:00	16:15	SW	4-5	6	None	Very good (3km+)
26/10/11	08:00	16:00	SW	2-4	3-5	Showers	Very good (3km+)
01/11/11	08:00	16:15	W	2-3	7	None	Very good (3km+)
29/11/11	09:00	15:40	SSW	5-6	8	None	Very good (3km+)

Date	Time (from)	Time (to)	Wind direction	Wind force	Cloud cover (of 8)	Precipitation	Visibility
05/12/11	08:30	15:30	SW	4-5	0	None	Very good (3km+)
09/12/11	09:30	16:00	W	0-1	0	None	Very good (3km+)
16/01/12	08:10	15:00	SE	3	1	None	Very good (3km+)
30/01/12	08:00	16:30	E	1-4	8	Raining	A little misty
08/02/12	09:00	16:30	ENE	4-5	8	Patchy snow cover to 10cm	Very good (3km+)
27/02/12	08:20	16:00	SW	4	7-8	None	Very good (3km+)
06/03/12	08:00	15:00	N	1-3	8	None	Very good (3km+)
23/03/12	08:04	15:10	NE	2-3	0	None	Very good (3km+)

NB: Wind is given as a force in the Beaufort scale. Force 0 = calm, 0-1 miles per hour; force 1 = light air, 1-3 mph; force 2 = light breeze, 4-7 mph; force 3 = gentle breeze, 8-12 mph; force 4 = moderate breeze, 13-18 mph; force 5 = fresh breeze, 18-24 mph; force 6 = strong breeze, 25-30 mph; force 7 = high wind, 31-38 mph; force 8 = 39-46 mph, fresh gale

2.1.2 Vantage Point Surveys

In order to determine the frequency with which marsh harrier, hen harrier and bittern were flying between the reedbeds of the Minsmere-Walberswick SPA and Sizewell Estate, surveys were conducted using vantage-points (VPs) overlooking land between the two areas. In addition, VPs within the Sizewell Estate were used to determine the nature and frequency of use within this area. On each survey day, two AMEC surveyors stationed at complementary vantage-points undertook co-ordinated watches, communicating any observed flights to each other with mobile telephones, and mapping any flight lines and flight characteristics as well as recording the age, sex and plumage characteristics of individual birds (where apparent).

Best practice guidance (Madders in SNH⁴, 2005), states that it is possible for an observer to effectively survey an arc of 180 degrees by 2km in width during a VP watch^{5,6}, by scanning the target area continuously with binoculars. The selection of VP locations for the survey was therefore based on this principle and aimed to allow maximum coverage of the meadows and marshes within the areas to the south of Goose Hill. In this area, visibility is limited by the trees and scrub running along some sections of ditch, and a number of local VPs were used in order to achieve a snapshot of any harrier/bittern activity.

Bi-monthly VP surveys were undertaken from April 2011 to March 2012 inclusive. Each survey day initially involved the two surveyors undertaking two 3-hour watches (the maximum duration of watch recommended by Madders) from two VPs (6 hours of survey per day) This allowed watches to be undertaken from four VPs on each VP survey date. Between each watch, the surveyors took between 15 minutes and an hour to rest their eyes and refocus.

Broadly the same VP locations were used in 2011-12 as in 2008 (numbered VP1-7). The only changes to the location of the VPs from the ones used in 2008, were that VP2 was moved 100m to the east to provide a better view over the Minsmere main reedbed, and VP7 was moved south to a high point on the northern fringe of Leiston Common to provide a better view over the western part of Sizewell Marshes.

In addition, in early April 2011, a male bittern was heard booming in reedbeds just south of Grimseys (pers. comm. SWT⁷ wardens). In response to this, an additional six hours of survey was undertaken, targeting the main reedbed areas in Sizewell Marshes to determine whether the male was holding territory. The additional survey day was undertaken on 21 April 2011 from three new VPs (8, 9 and 10) overlooking the main reedbed areas in Sizewell Marshes, where bittern could potentially breed.

Due to the lack of sightings of target species (in particular hen harrier and bittern), the survey approach was modified in November 2011 for the Sizewell Marshes area though not for the VPs (1 and 2) overlooking the Minsmere Levels. The modification involved an increase in the number of VPs (adding VPs 3a, 4a and 5a) with the duration of each watch decreased from 180

⁴ Scottish Natural Heritage

⁵ This survey methodology has been developed for use at wind farms, where species of particular concern are raptors such as eagles, kites and harriers and migratory wildfowl, particularly geese and swans.

⁶ Clearly the extent of land that can be surveyed effectively within this survey arc is dependent on topography, while built structures and planting can also create areas of dead ground.

⁷ Suffolk Wildlife Trust

to 60 or 90 minutes at all VPs located in the Sizewell Estate. This enabled the surveyor to cover a greater part of the Sizewell Estate in a day with the aim of increasing the chance of detecting a target species. **Table 2.2** lists the grid references for the VPs used, the locations of which are shown on **Figure 2.2**.

Table 2.2 Grid References of Vantage Points Used

Vantage Point Number	Grid Reference	Period used during survey
1	TM 473 659	Used throughout survey
2	TM 466 660	Used throughout survey
3	TM 468 645	Used throughout survey
3a	TM 471 644	Used from November 2011 onwards
4	TM 461 652	Used throughout survey
4a	TM 457 648	Used from November 2011 onwards
5	TM 462 637	Used throughout survey
5a	TM 463 637	Used from November 2011 onwards
6	TM 466 632	Used throughout survey
7	TM 458 636	Used throughout survey
8	TM 464 640	April 21 survey only
9	TM 468 640	April 21 survey only
10	TM 471 643	April 21 survey only

The dates, times and vantage points used during the surveys are detailed in **Table 2.3**.

Table 2.3 Dates, time and weather conditions of VP surveys

Date	VP	Matching VP(S)	Time (from)	Time (to)	Wind direction	Wind speed	Cloud cover (of 8)	Precipitation	Visibility
05/04/11	1	5	09:55	12:55	SW	5	8	None	Very good (3km+)
05/04/11	2	3	13:15	16:15	SW	5	8	Light drizzle	Very good (3km+)
05/04/11	3	1	09:45	12:45	SW	3-5	8	None	Good
05/04/11	5	2	13:00	16:00	SE	2-4	8	Light drizzle	Good
18/04/11	7	2	11:05	14:05	NE	2-3	0	None	Very good (3km+)
18/04/11	5	4	14:20	17:20	NE	3	0	None	Very good (3km+)
18/04/11	2	7	11:10	14:10	NE	3	1	None	Heat haze at distance
18/04/11	4	5	14:25	17:25	NE	3	1	None	Heat haze at distance
21/04/11	8	None	07:20	09:20	E	2	4	None	Very good (3km+)
21/04/11	9	None	09:40	11:40	E	2	4	None	Very good (3km+)
21/04/11	10	None	12:35	14:05	E	2-3	1	None	Very good (3km+)
10/05/11	1	5	14:30	17:30	SSE	4-5	0-1	None	Heat haze at distance
10/05/11	2	6	17:50	20:50	SSE	5	6	None	Slight heat haze
10/05/11	5	1	14:30	17:30	SW	3	1-3	None	Very good (3km+)
10/05/11	6	2	17:50	20:50	SW	3	3-4	None	Very good (3km+)
25/05/11	1	7	06:20	09:20	SE	0-1	0	None	Very good (3km+)
25/05/11	4	3	10:25	13:25	SE	3-4	0	None	Heat haze at distance
25/05/11	7	1	06:15	09:15	SSW	1	0	None	Heat haze at distance

Date	VP	Matching VP(S)	Time (from)	Time (to)	Wind direction	Wind speed	Cloud cover (of 8)	Precipitation	Visibility
25/05/11	3	4	09:45	12:45	SE	3	0	None	Very good (3km+)
14/06/11	7	1	07:20	10:20	SE	2-3	0-2	None	Very good (3km+)
14/06/11	3	2	10:55	13:55	SE	3	3-4	None	Very good (3km+)
14/06/11	1	7	07:30	10:30	SE	2	0	None	Very good (3km+)
14/06/11	2	3	10:45	13:45	SSE	2	2	None	Slight heat haze
28/06/11	1	7	08:25	11:25	NE	2	7-8	None	Slight heat haze
28/06/11	2	3	11:40	14:40	NE	4-5	3	None	Heat haze at distance
28/06/11	7	1	08:15	11:15	SW	2	2-3	None	Very good (3km+)
28/06/11	3	2	12:15	15:15	SW	2	4-5	None	Very good (3km+)
01/07/11	4	5	08:20	11:20	NE	3-4	0-4	None	Slight heat haze
01/07/11	1	6	12:20	15:20	NE	3-4	4	None	Slight heat haze
01/07/11	5	4	08:20	11:20	SW	1-3	0-1	None	Very good (3km+)
01/07/11	6	1	12:00	15:00	S	1-3	4-5	None	Very good (3km+)
11/07/11	7	1	09:20	12:20	SE	1-3	0-3	None	Very good (3km+)
11/07/11	6	2	12:40	15:40	SE	2-3	5	None	Very good (3km+)
11/07/11	1	7	09:15	12:15	SE	1-2	2-3	None	Very good (3km+)
11/07/11	2	6	12:25	15:25	SE	1-2	2-3	None	Very good (3km+)
03/08/11	1	7	08:00	11:00	NW	2	1-2	None	Very good (3km+)
03/08/11	2	3	11:10	14:10	SE	3-4	4-5	None	Very good (3km+)
03/08/11	7	1	08:30	11:30	SE	0-1	1	None	Very good (3km+)

Date	VP	Matching VP(S)	Time (from)	Time (to)	Wind direction	Wind speed	Cloud cover (of 8)	Precipitation	Visibility
03/08/11	3	2	12:30	15:30	SE	0-1	1	None	Very good (3km+)
26/08/11	7	1	08:00	11:00	ENE	3-4	8	Heavy rain	Average
26/08/11	4	2	11:40	14:40	NE	3	8	Raining until 1200hrs	Average-good
26/08/11	1	7	08:00	11:00	E	3-5	8	Heavy rain	Average
26/08/11	2	4	11:15	14:15	ENE	3-4	4-8	Raining until 1200hrs	Average-good
05/09/11	2	5	13:35	16:35	SW	5-6	6-7	None	Very good (3km+)
05/09/11	1	7	16:45	19:45	WSW	6	3	None	Very good (3km+)
05/09/11	7	2	12:00	15:00	NW	5-6	6-7	None	Very good (3km+)
05/09/11	5	1	15:05	18:05	W	6	4	None	Very good (3km+)
15/09/11	3	1	08:25	11:25	NE	1-2	0	None	Very good (3km+)
15/09/11	6	2	12:10	15:10	NE	2-3	4	None	Very good (3km+)
15/09/11	1	3	08:00	11:00	E	4-5	7-8	None	Very good (3km+)
15/09/11	2	6	11:10	14:10	E	4-5	6-7	None	Very good (3km+)
12/10/11	1	5	08:15	11:15	W	2-4	7-8	None	Very good (3km+)
12/10/11	2	6	11:25	14:25	W	4-5	7-8	None	Very good (3km+)
12/10/11	5	1	08:00	11:00	NW	2-3	7-8	None	Very good (3km+)
12/10/11	6	2	11:10	14:10	NW	2-4	6	None	Very good (3km+)
25/10/11	4	2	11:40	14:40	SE	4	8	Raining until 13:30hrs	Very good (3km+)
25/10/11	3	1	15:00	18:00	SE	3-4	2-7	None	Very good (3km+)
25/10/11	2	4	10:30	13:30	S	4-6	7-8	Raining until 13:30hrs	Very good (3km+)

Date	VP	Matching VP(S)	Time (from)	Time (to)	Wind direction	Wind speed	Cloud cover (of 8)	Precipitation	Visibility
25/10/11	1	3	13:30	16:40	S	4-6	6-7	None	Very good (3km+)
03/11/11	1	5	08:05	11:05	SSE	5	8	Occasional drizzle	Very good (3km+)
03/11/11	2	7	11:20	14:20	SE	5-6	8	Occasional drizzle	Very good (3km+)
03/11/11	5	1	07:30	10:30	S	4-5	6-7	Occasional drizzle	Very good (3km+)
03/11/11	7	2	10:40	13:40	S	5-6	6	Occasional drizzle	Very good (3km+)
16/11/11	7	2	09:20	12:20	SE	4	0-3	None	Very good (3km+)
16/11/11	5a	1	12:25	14:05	SE	3-4	4	None	Very good (3km+)
16/11/11	6	1	14:25	15:55	SE	3-4	5	None	Very good (3km+)
16/11/11	2	7	09:30	12:30	SE	2-4	7	None	Very good (3km+)
16/11/11	1	5a & 6	12:45	15:45	E	4-5	6	None	Some heat haze
02/12/11	1	5, 7 & 3a	08:30	11:30	SW	2-4	0	None	Sun glare in SE
02/12/11	2	3a, 3, 4a & 4	11:40	14:40	SW	3-4	0-6	None	Sun glare in SE
02/12/11	5	1	08:30	09:30	SW	1-3	3-4	None	Very good (3km+)
02/12/11	7	1	09:35	10:35	SW	1-3	3-4	None	Very good (3km+)
02/12/11	5a	1 & 2	10:45	11:45	SW	1-3	3-4	None	Very good (3km+)
02/12/11	3	2	11:55	12:55	SW	1-3	3-4	None	Very good (3km+)
02/12/11	3a	2	13:05	14:05	SW	1-3	3-4	None	Very good (3km+)
02/12/11	4	2	14:20	15:20	SW	1-3	3-4	None	Very good (3km+)
13/12/11	3	2	09:45	11:15	SW	3-4	0	None	Sun glare in SE
13/12/11	3a	2	11:20	12:50	SW	4-5	0	None	Sun glare in SSE

Date	VP	Matching VP(S)	Time (from)	Time (to)	Wind direction	Wind speed	Cloud cover (of 8)	Precipitation	Visibility
13/12/11	4	1	13:20	14:50	SW	5	0-1	None	Very good (3km+)
13/12/11	4a	1	15:00	16:30	SW	6	4	Light rain	Very good (3km+)
13/12/11	2	3 & 3a	09:30	12:30	SW	5	1	None	Sun glare in SE
13/12/11	1	4 & 4a	12:40	15:40	SW	5-6	1	None	Sun glare
09/01/12 ⁸	1	None	09:45	12:45	SW	4	8	None	Very good (3km+)
09/01/12	2	None	13:00	16:00	SW	3-4	8	None	Very good (3km+)
10/01/12	7	None	09:00	10:00	NNW	1	2	None	Very good (3km+)
10/01/12	5	None	10:05	11:05	NNW	1	2	None	Very good (3km+)
10/01/12	5a	None	11:10	12:10	NNW	1	2	None	Very good (3km+)
10/01/12	3	None	12:20	13:20	NNW	1	2	None	Very good (3km+)
10/01/12	3a	None	13:25	14:25	NNW	1	2	None	Very good (3km+)
10/01/12	4	None	14:40	15:40	NNW	1	2	None	Very good (3km+)
24/01/12	7	2	09:05	10:35	SW	1	8	Raining	Good
24/01/12	5a	2	10:40	12:10	SW	1	8	Raining	Good
24/01/12	4a	1	12:45	14:15	SW	2	8	Raining	Good
24/01/12	4	1	14:25	15:55	SW	2-3	8	Raining	Good
24/01/12	2	7 & 5a	09:30	12:30	SSE	2	8	Raining	Moderate to poor

⁸ One of the surveyors was unable to undertake his survey at very short notice, and therefore in order to complete a full set of surveys, it was decided to carry out the surveys on separate days, on 9 and 10 January 2012 respectively.

Date	VP	Matching VP(S)	Time (from)	Time (to)	Wind direction	Wind speed	Cloud cover (of 8)	Precipitation	Visibility
24/01/12	1	4a & 4	12:45	15:45	SSE	3	8	Raining	Moderate to poor
01/02/12	1	7 & 5	08:20	11:20	NE	4-5	3	None	Sun glare in SE
01/02/12	2	5a, 3, 3a & 4	11:30	14:30	NE	5	0	None	Very good (3km+)
01/02/12	7	2	09:30	10:30	NE	5	0	None	Very good (3km+)
01/02/12	5	2	10:35	11:35	NE	5	0	None	Very good (3km+)
01/02/12	5a	1	11:40	12:40	NE	5	0	None	Very good (3km+)
01/02/12	3	1	12:55	13:55	NE	5	0	None	Very good (3km+)
01/02/12	3a	1	14:05	15:05	NE	5	0	None	Very good (3km+)
01/02/12	4	1	15:15	16:15	NE	5	0	None	Very good (3km+)
14/02/12	4a	1	10:15	11:45	WNW	3	8	Light rain	Very good (3km+)
14/02/12	4	2	12:00	13:30	WNW	3-4	8	None	Very good (3km+)
14/02/12	3	2	13:45	15:15	WNW	3	8	None	Very good (3km+)
14/02/12	3a	2	15:45	16:45	W	3	8	None	Very good (3km+)
14/02/12	1	4a	08:30	11:30	W	3	8	None	Very good (3km+)
14/02/12	2	4, 3 & 3a	11:45	14:45	W	3	8	None	Very good (3km+)
01/03/12	1	7, 5 & 5a	08:30	11:30	W	1-2	7-8	None	A little misty
01/03/12	2	3, 3a & 4	11:45	14:45	W	1	3	None	Very good (3km+)
01/03/12	7	1	08:15	09:15	W	1-2	7-8	None	A little misty
01/03/12	5	1	09:20	10:20	W	1-2	7-8	None	A little misty
01/03/12	5a	1	10:25	11:25	W	1-2	7-8	None	A little misty

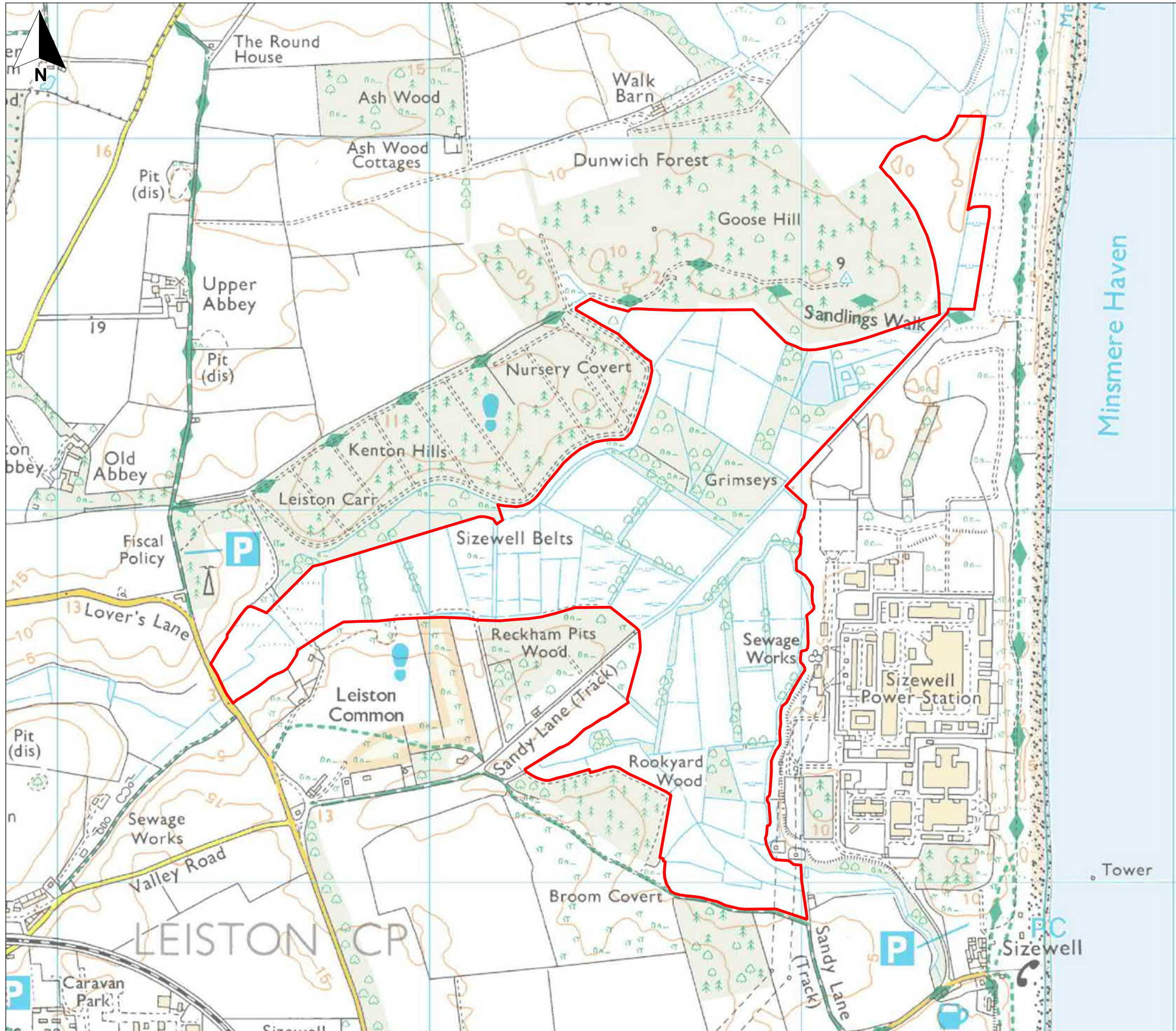
Date	VP	Matching VP(S)	Time (from)	Time (to)	Wind direction	Wind speed	Cloud cover (of 8)	Precipitation	Visibility
01/03/12	3	2	11:35	12:35	W	1	3	None	Very good (3km+)
01/03/12	3a	2	12:40	13:40	W	1	3	None	Very good (3km+)
01/03/12	4	2	13:55	14:55	W	1	3	None	Very good (3km+)
16/03/12	7	2	08:25	09:25	W	2-3	8	None	Very good (3km+)
16/03/12	5a	2	09:35	10:35	W	1-2	8	None	Very good (3km+)
16/03/12	6	2	10:55	11:55	W	1-2	8	None	Very good (3km+)
16/03/12	4a	2 & 1	12:25	13:25	WSW	3	7-8	None	Very good (3km+)
16/03/12	4	1	13:35	14:35	WSW	3	8	None	Misty at 3km+
16/03/12	3	1	14:50	15:50	SW	4	8	None	Misty at 3km+
16/03/12	2	7, 5a & 6	08:10	11:10	W	2-3	8	None	Very good (3km+)
16/03/12	1	6, 4a & 4	11:20	14:20	WSW	3	7-8	None	Very good (3km+)

2.2 Survey Limitations


Due to the enclosed nature of the fields within the Sizewell Marshes, a single VP could not be used to accurately record all activity within this area. This may have resulted in some degree of under-recording of marsh harrier activity during low level flight or if birds were on the ground. In addition, during the walkover surveys, access into some areas of reedbed was difficult due to the dense, tall vegetation and care was needed not to damage the habitat through trampling. However, there seems no reason to assume that the data collected is unrepresentative. SWT wardens for the Sizewell Estate reported similar encounter rates for bittern, marsh and hen harriers during the survey period, and encounter rates for marsh harrier were similar for VPs located inside and outside of the Sizewell Marshes, within the Estate.

2.3 Personnel

The survey team was led by Mike Raven, a suitably experienced surveyor (a Senior Consultant Ecologist for AMEC, specialising in Ornithology). Other surveyors included Alastair Miller (a Senior Consultant Ecologist for AMEC, also specialising in Ornithology) and AMEC Associate, Steve Haynes (a freelance bird-surveyor).



Key
 Survey boundary

0 m  500 m
 Scale 1:10000 @ A3



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Figure 2.1
 Walkover Survey Area

April 2012
 28132-A396.wor tugwc





Key
 ● VP locations

0 m 600 m
 Scale 1:12000 @ A3



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Figure 2.2
 VP Survey, VP Locations

April 2012
 28132-A397.wor tugwc



3. Results

3.1 Walkover Surveys

Between April 2011 and March 2012 twenty six walkover surveys were undertaken, each one generally taking 7-9 hours to complete. Marsh harriers were recorded flying over Sizewell Marshes on eleven occasions with nine of these records occurring from late September to late January. Observations involved single male, female and juvenile birds hunting low over the marshes. Bittern and hen harrier were not recorded during the walkover surveys. Details of the flight lines of marsh harriers recorded over Sizewell Marshes are presented in **Table 3.1**, and the flight lines shown on **Figure 3.1**.

Table 3.1 Walkover surveys, Flights of Marsh Harrier

Flight No.	Date	Time	Count of birds	Age/sex	Notes
1	06/06/11	14:22	1	Adult male	Adult male hunting just north of new build area
2	07/07/11	07:55	1	Adult male	Adult male hunting on Sizewell Marshes, flying west
3	30/09/11	11:25	1	Juvenile	Young bird flying over Rookyard Wood, heading south
4	26/10/11	11:18	1	Female	Female commuting north over Sizewell Marshes towards new build area
5	26/10/11	12:04	1	Adult female	Adult female hunting over Sizewell Marshes (adjacent to the power stations), heading south
6	26/10/11	15:00	1	Male	Male hunting over Sizewell Marshes (within new build area), heading southwest
7	01/11/11	09:24	1	Female	Female hunting over Sizewell Marshes (within new build area), heading southwest
8	05/12/11	11:58	1	Adult male	Male flying over Reckham Pits Wood heading west
9	09/12/11	12:05	1	Female	Female flying over Grimseys and Sizewell Marshes heading southwest
10	30/01/12	11:08	1	Female	Female hunting over Sizewell Marshes (just southwest of the new build area), heading west
11	30/01/12	14:17	1	Adult female	Adult female hunting over Goose Hill Marshes, then flew north over Goose Hill plantation

3.2 Vantage Point Surveys

3.2.1 Marsh Harrier

Marsh harriers were seen on all 26 VP survey dates, but only those flights recorded over the Sizewell Estate have been included for discussion here. A total of 43 flights of marsh harrier were recorded, either hunting over the Sizewell Estate or flying between the Minsmere-Walberswick SPA and the Sizewell Estate. Of these, there were 26 flights of birds moving to and from Minsmere and the Sizewell Marshes or Walkbarn/Ash Wood areas. These flights took place throughout much of the survey period and involved male, female and juvenile birds. During the majority of visits, at least 3-4 marsh harriers were seen hunting over the main Minsmere reedbed throughout much of the day. These birds would periodically fly south to hunt over the adjacent Minsmere Levels. More infrequently, these birds would then fly further south or south-west (often over the Goose Hill plantation) towards Sizewell Marshes or the Ash Wood/Walkbarn area.

Adult male and female marsh harriers were also seen hunting over Sizewell Marshes, with 11 flights recorded in this area during the survey period. Of these, much of the marsh harrier activity was seen from VPs located in the west of the marshes (marked as Sizewell Belts on the map), including six flights from VPs 5/5a, one flight from nearby VP8 and two flights from VP7. Two flights were also seen over Goose Hill Marshes south of VP3, but no birds were seen entering or leaving the reedbed area south of VP3a. No marsh harriers were seen from VP6 in the south-east of Sizewell Marshes, the area adjacent to the built area of power stations (Sizewell A and B).

During the breeding season (April to July 2011) adult male and female marsh harriers were seen hunting over Sizewell Marshes on seven occasions (on five survey dates), including a male carrying prey between Walkbarn and Minsmere on 11 July (flight number 30 in Table 3.2a). There was an additional 12 sightings of birds commuting to and from the direction of the Sizewell Estate.

Table 3.2a details the 43 flights of marsh harrier seen either over, or flying to and from the direction of the Sizewell Marshes and Walkbarn/Ash Wood areas. The flight lines of these birds are shown on **Figure 3.2a**.

Table 3.2a VP Surveys, Flights of Marsh Harrier

VP	Flight No.	Date	Time	Count of birds	Age/sex	Notes
5	12	05/04/11	15:20	1	Adult Female	Adult female hunting over Goose Hill Marshes, heading south
5	13	05/04/11	15:55	1	Adult Male	Adult male hunting over Sizewell Marshes, heading west
1	14	05/04/11	14:35	1	Female	Female soaring over Goose Hill Plantation

VP	Flight No.	Date	Time	Count of birds	Age/sex	Notes
8	15	21/04/11	08:10	1	Female	Female hunting over Sizewell Marshes heading west
2	16	10/05/11	18:40	1	Adult Male	Adult male flew over Minsmere Levels and over fields towards Ash Wood
4	17	25/05/11	10:58	1	Male	Male hunting over Sandpytle Plantation and then back to Minsmere reedbed
4	18	25/05/11	11:19	1	Male	Male hunting from Sandpytle Plantation back to Minsmere reedbed
4	19	25/05/11	12:09	1	Male	Male hunting past Lower Abbey Farm, heading northwest
4	20	25/05/11	13:24	1	Female	Female hunting by Walk Barn, going south
2	21	14/06/11	13:20	1	Male	Male commuting from Minsmere reedbed southwest towards Ash Wood
2	22	28/06/11	14:35	1	Adult Male	Adult male commuting from Minsmere reedbed south towards Walk Barn
4	23	01/07/11	10:51	1	Adult Male	Adult male soaring high over Black Walks
4	24	01/07/11	10:54	1	Adult Male	Adult male displaying very high over Sandpytle Plantation
5	25	01/07/11	09:50	1	Adult Female	Adult female hunting over Sizewell Marshes heading west
7	26	11/07/11	09:27	1	Adult Male	Male hunting low over Sizewell Marshes heading west
2	27	11/07/11	12:40	1	Male	Male circling over Walk Barn area before flying over Minsmere Levels
2	28	11/07/11	12:45	1	Male	Male hunting over Minsmere Levels, and then flew south to Walk Barn
2	29	11/07/11	13:45	1	Male	Male commuting from Walk Barn area to Minsmere Levels
2	30	11/07/11	14:35	1	Male	Male carrying prey from Walk Barn area across Minsmere Levels to the main Minsmere reedbed
2	31	03/08/11	12:20	1	Male	Male displaying high over Sandpytle Plantation and then over Minsmere reedbed
5	32	05/09/11	17:45	1	Female	Female hunting low over Sizewell Marshes heading east

VP	Flight No.	Date	Time	Count of birds	Age/sex	Notes
3	33	15/09/11	08:38	1	Juvenile	Juvenile hunting low over Goose Hill Marshes before heading south
1	34	12/10/11	09:36	1	Adult Male	Adult male hunting over Minsmere Levels and then flew south towards Goose Hill Marshes
1	35	12/10/11	11:04	1	Juvenile	Juvenile commuting south across Minsmere Levels and over Goose Hill
2	36	12/10/11	12:52	2	Not determined	Two birds soaring over Goose Hill plantation
2	37	12/10/11	14:16	1	Male	Male soaring over Goose Hill plantation, heading east
4	38	25/10/11	13:45	1	Male	Male commuting north over Goose Hill
2	39	25/10/11	13:55	1	Female	Female hunting in far south of Minsmere Levels before flying southwest over Goose Hill
1	40	03/11/11	10:03	1	Male	Male hunting in far south of Minsmere Levels before flying southwest over Goose Hill
7	41	16/11/11	10:02	1	Juvenile	Juvenile hunting briefly over Sizewell Belts, before flying east
1	42	02/12/11	09:35	1	Juvenile	Juvenile hunting south across Minsmere Levels and then over Goose Hill towards Sizewell Marshes
1	43	02/12/11	11:05	1	Female	Female hunting, heading south across Minsmere Levels and then over Goose Hill towards Sizewell Marshes
1	44	02/12/11	11:28	1	Female	Female soaring high over Goose Hill, then north across Minsmere Levels
5A	45	02/12/11	11:05	1	Female	Female hunting over Grimseys and adjacent reedbeds, then flew east
3	46	02/12/11	11:55	1	Female	Female hunting over new build area, then flew north
1	47	13/12/11	15:15	1	Female	Female flew over Goose Hill north and onto Minsmere Levels, hunting, and then onto main reedbed
1	48	09/01/12	10:01	1	Female	Female hunting over Minsmere Levels and then flew over Goose Hill plantation
2	49	09/01/12	15:58	1	Female	Female flew high over Goose Hill and into Minsmere reedbed

VP	Flight No.	Date	Time	Count of birds	Age/sex	Notes
5A	50	01/02/12	12:05	1	Female	Female hunting over the Sizewell Belts and then north over Nursery Covert
3	51	14/02/12	14:34	2	Not determined	Two birds commuting north over Goose Hill Marshes
3	52	14/02/12	15:11	1	Not determined	Bird commuting north over Goose Hill Marshes
3A	53	14/02/12	16:44	1	Female	Female commuting high north over Goose Hill Marshes
1	54	14/02/12	12:27	1	Female	Female commuting north from the Walk Barn area to Minsmere main reedbed

3.2.2 Hen Harrier

Hen harriers were recorded on two occasions (on 25 October and 3 November 2011), both involving ringtail⁹ birds hunting over the Minsmere Levels. No male birds were seen, and none were seen hunting over the Sizewell Estate during the survey period. **Table 3.2b** details the two flights of hen harrier, and the flight lines of these birds are shown on **Figure 3.2b**.

Table 3.2b VP Surveys, Flights of Hen Harrier

VP	Flight No.	Date	Time	Count of birds	Age/sex	Notes
2	1	25/10/11	11:15	1	Ringtail	Ringtail hunting over Minsmere Levels, flying south
2	2	03/11/11	14:11	1	Ringtail	Ringtail hunting low over Minsmere reedbed and then onto the Levels

⁹ Ringtail hen harrier refers to either a female bird or juvenile male bird

3.2.3 Bittern



Bittern were recorded on five occasions (on four survey dates) during the survey period in the study area (not including sightings over the main Minsmere reedbed). Two of the flights were of birds flying from the Minsmere main reedbed south onto the Minsmere Levels (flight numbers 3 and 5 in Table 3.2c) and there were a further two records of birds on the levels (flights 1 and 2). There was also a record of a bittern seen flying south of Goose Hill Plantation and Marshes and into the reedbed area to the north east of Grimseys (flight 4). None of the flights were recorded in the breeding period. In addition, bittern were seen on most visits, undertaking brief flights over the main Minsmere reedbed. **Table 3.2c** details the sightings of bittern, and the flight lines of these birds are shown on **Figure 3.2c**.

Table 3.2c VP Surveys, Flights/sightings of Bittern

VP	Flight No.	Date	Time	Count of birds	Age/sex	Notes
2	1	25/10/11	12:15	1	Could not determined	Bird flew briefly along a ditch in Minsmere Levels, after which it landed in reeds
2	2	24/01/12	10:30	1	Could not determined	Bird walking slowly between reeded ditches on Minsmere Levels
2	3	01/02/12	11:50	1	Could not determined	Bird flew from Minsmere main reedbed onto Levels, where landed
3	4	01/02/12	13:30	1	Could not determined	Bird flew south over Goose Hill plantation and marshes and into reeds north-east of Grimseys
2	5	01/03/12	14:42	1	Could not determined	Bird flew from main Minsmere reedbed and onto Levels, where landed



Key

-  Flight lines
-  Flight line number

0 m 500 m
 Scale 1:10000 @ A3

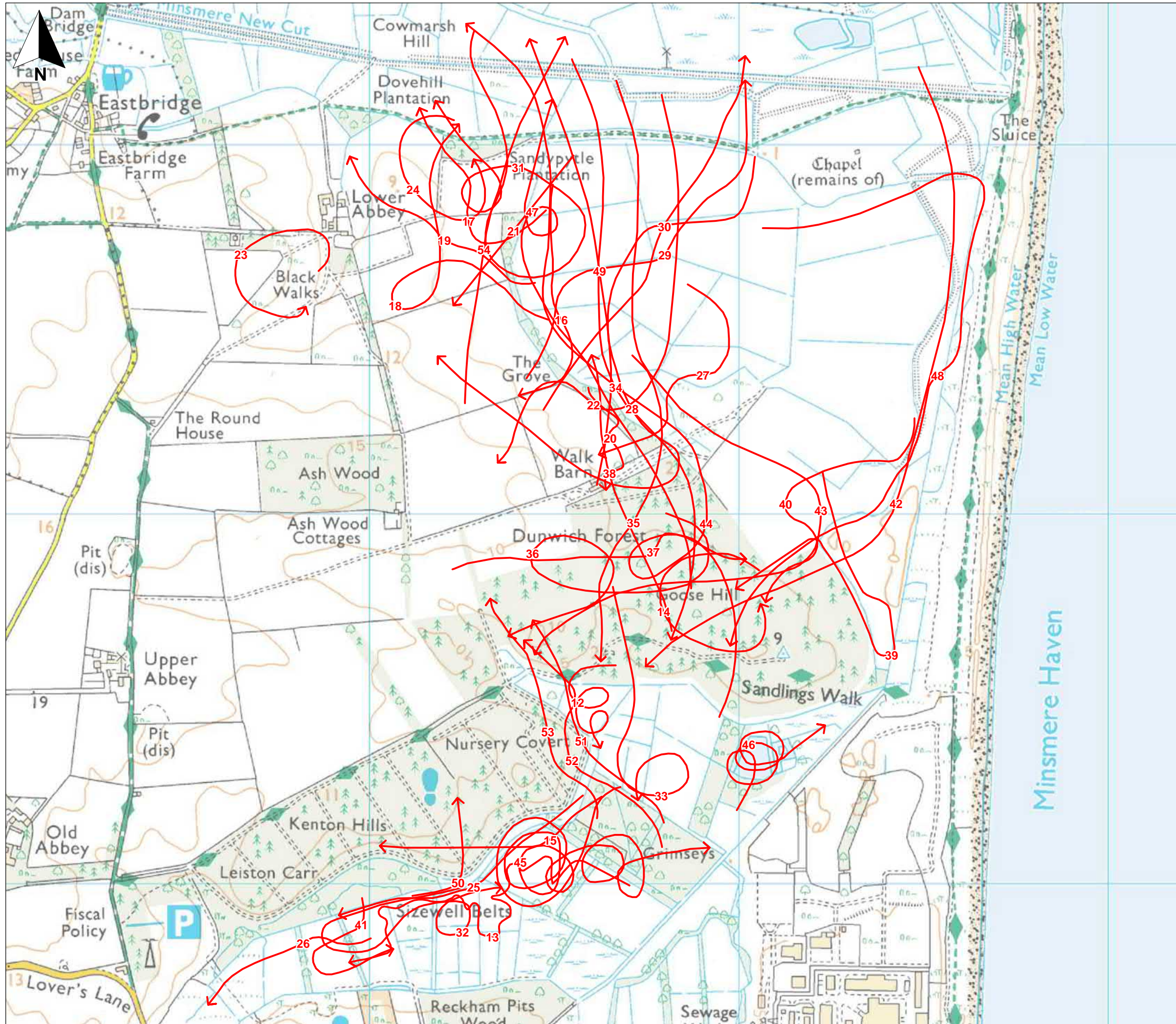


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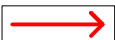

Figure 3.1
Walkover Survey:
Marsh Harrier Flight Lines

April 2012
 28132-A398.wor tugwc





Key

-  Flight lines
-  Flight line number

0 m 500 m
 Scale 1:10000 @ A3



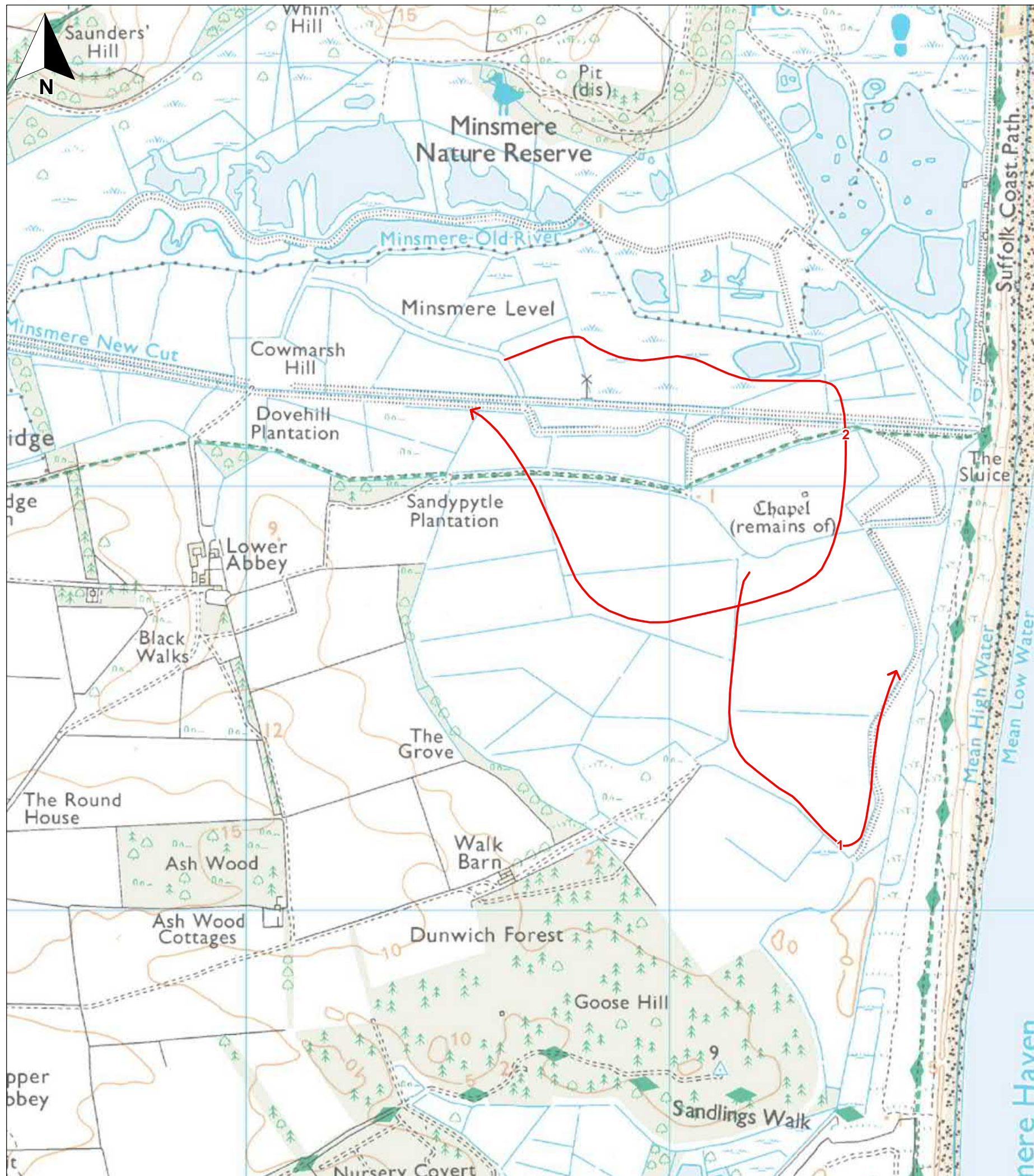
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Figure 3.2a
 VP Survey
 Marsh Harrier Flight Lines

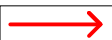

April 2012
 28132-A399.wor tugwc

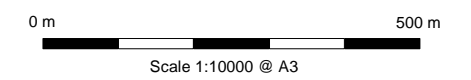


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Key

-  Flight lines
-  Flight line number

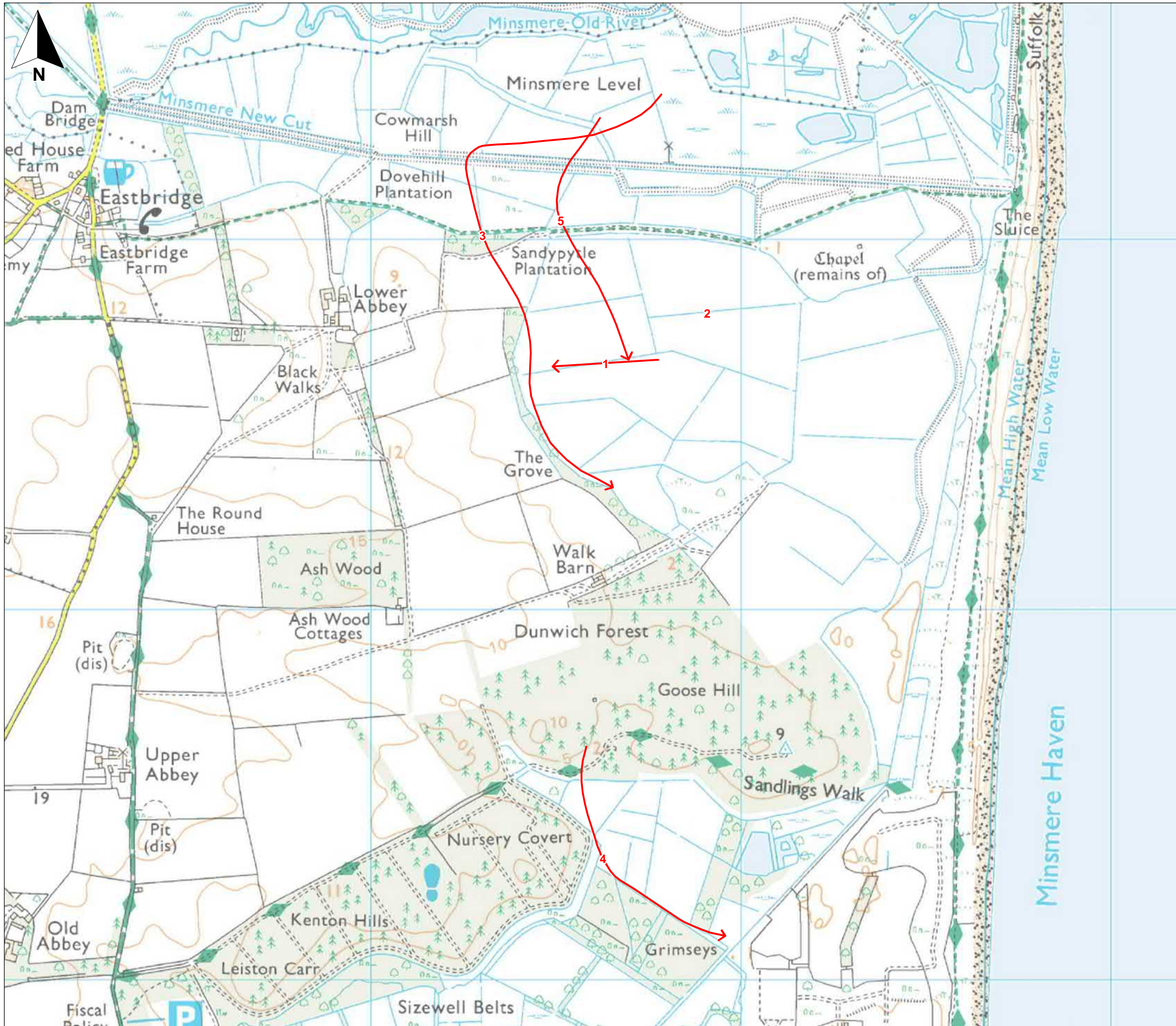


Harrier and Bittern Surveys
Report 2011-12

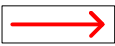

Figure 3.2b
VP Survey
Hen Harrier Flight Lines

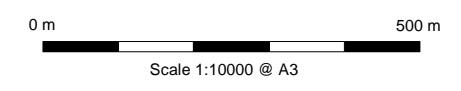
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Key

-  Flight lines
-  Flight line number



Harrier and Bittern Surveys
Report 2011-12

Figure 3.2c
VP Survey
Bittern Flight Lines

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4. Conclusion

Results from the VP surveys undertaken from April 2011 to March 2012 indicate that marsh harriers commute from the Minsmere-Walberwick SPA to hunt over the Sizewell Marshes SSSI on a reasonably regular basis throughout much of the year. There is some evidence to indicate that birds are using the marshes to hunt and provision their young with food. However, the level of use of the Sizewell Marshes by hunting birds appears to be low in comparison to that on the Minsmere RSPB reserve, including the Minsmere Levels. Taking only those flights that were seen coming to and from the vicinity of Sizewell Marshes (and the adjacent Ash Wood/Walkbarn areas) and those seen hunting over the Sizewell Marshes, a total of 43 flights were recorded during a combined 156 hours of VP survey (6 hours of survey was completed on 26 survey dates). This equates to a marsh harrier visit to the Sizewell Marshes area every 3.6 hours, or approximately 3-4 visits per day. This compares well with the results obtained from the 2008 Entec surveys, when a marsh harrier flight was recorded every 4.8 hours.

No hen harriers were seen flying to and from the direction of Sizewell Marshes, or were seen hunting over the marshes during either the VP or walkover surveys. Very few birds were seen over Minsmere (on only two occasions) indicating that winter 2011-12 was probably a poor 'season' for the species. Thus, the surveys provided no evidence to suggest that the Sizewell Marshes, or surrounding arable land within the Sizewell Estate are being used on a regular basis by hunting hen harriers.

Bittern were not seen in the Sizewell Marshes during the walkover surveys, and there was only one sighting of a bird commuting south over the marshes during the VP surveys. Much of the bittern activity recorded during the VP surveys was of birds flying briefly over the main Minsmere reedbed, and there were four sightings of individuals flying in and out of the Minsmere Levels, or feeding in that area. In support of the findings from the 2008 Entec surveys, results from the 2011-12 surveys provide no evidence to indicate that the Sizewell Marshes are being used on a regular basis by bittern, either in the breeding season (to provision their young) or during winter.

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Sizewell

Little Tern Report

28 January 2011

Entec UK Limited

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1. Introduction

1.1 Purpose and Scope of this Report

Entec UK Ltd was commissioned by EDF Development Company Ltd (EDF) to complete a desk study and ornithological surveys in order to identify any potential impacts on little tern populations due to the development of a new nuclear facility at Sizewell, Suffolk. The information gathered will be used within both the Environmental Impact Assessment and Habitats Regulations Assessment processes as little tern are a qualifying feature of the Minsmere & Walberswick Special Protection Area (SPA).

Following the issue of a scoping report for the development by Royal Haskoning in March 2010 a response by the RSPB identified potential impacts on little tern. The potential impacts highlighted by the RSPB were;

- The potential for construction and operation of the new nuclear build and offshore facilities to disturb or displace foraging little terns (or their movements to and from breeding and foraging areas); and
- The effects of temperature increase caused by warm water emitted from the proposed outtake facility on the availability of little tern prey.

At the time of writing this report, the final location of the warm water outfall was not known, and therefore no modelling results showing the extent of the thermal plume were available. At the time of designing and undertaking the little tern survey programme (April-August 2010), results obtained from the initial options stages indicated that the discharge would drift to the south of Sizewell towards the shallow waters off Thorpeness. Subsequent to this, further modelling work (made available after the completion of the 2010 survey season) indicates that the cooling water discharge has the potential to extend as far south as Orford Ness.

1.2 Background

The Minsmere and Walberswick SPA qualifies under Article 4.1 of the Birds Directive by supporting a little tern population of European importance during the breeding season. The SPA qualifying population of 28 pairs (5 year mean, 1992-1996), represents at least 1.2% of the breeding population in Great Britain. Within the SPA there are currently two little tern colonies, located on Minsmere beach and on the beach between Dunwich and Walberswick. There are also further colonies located along the Suffolk coast to the north and south of the SPA.

Little tern is described as a common summer visitor and passage migrant in Suffolk (Piotrowski, 2003). Birds breed on sand and shingle beaches in a number of colonies located along the Suffolk coast, including at Minsmere beach and between Dunwich and Walberswick (referred to in this report as the Minsmere and Dingle colonies respectively). Both of these colonies are located on the upper reaches of shingle ridges, backed by reedbeds and lagoons that comprise the Minsmere and Dingle RSPB reserves respectively. However, these sites are not used every

year and there is a considerable interchange of birds between colonies. Mason [ed] 2010 lists seven little tern colonies in Suffolk in 2009 as follows (with the approximate distance and direction from the Sizewell new build area in parenthesis):




- Minsmere (3km north): 1 pair present in 2009, but failed to breed;
- Dingle Marshes (9km north): 11 pairs present in 2009, outcome not reported;
- Dunwich beach (6km north, and also within the Minsmere and Walberswick SPA): 20 pairs present in 2009, raised 3 young;
- Kessingland (22km north): none present in 2009;
- Benacre (20km north): none present in 2009;
- Slaughden (8km south): none present in 2009;
- Languard (35km south): none present in 2009.

Breeding was attempted at three of these sites in 2009 (all within the SPA), and young were reported at one (Dunwich beach). In 2008, breeding was reported from three sites (Dingle, Minsmere and Kessingland) and was successful only at Minsmere (Mason [ed] 2009). Breeding has also been reported from other locations along the Suffolk coast between 2005 and 2008, including: Bawdsey (25km south of Sizewell), Havergate Island (16km south), Covehithe (19km north) and Trimley (33km south). The numbers breeding at each colony between these years varies considerably as colonies are established based on both habitat suitability and prey availability; individuals also often move to another colony after a breeding failure to attempt nesting again within the same year.

Results from radio-tracking work on little terns in Norfolk by Perrow *et al.* (2005) found that the average home range of nesting birds was 4km² (i.e. birds that were feeding chicks were primarily foraging within 2km of the colony). However, in 2004 the radio-tagged colony failed to breed primarily due to a shortage of food, after which the terns were recorded foraged up to 25km from the colony (Perrow *et al.*, 2005). Langston (2009) gives a foraging distance of 5km from the breeding colony for little tern and states that terns generally make numerous relatively short flights to catch fish for chicks. These data indicate that Sizewell is within the regular foraging range for little terns derived from the Minsmere colony (3km to the north) but is likely to be visited on a more occasional basis by birds from the Dingle and Dunwich colonies (respectively, 9km and 6km to the north of the SSA).

Figure 1.1 shows the approximate location of little tern colonies reported along the Suffolk coast between 2005 and 2009, and the likely main foraging area for birds derived from each colony (i.e. within 5km of the colony).




- Key:**
-  Main foraging area
 -  SSA boundary
 -  Location of little tern colony



Sizewell Little Tern Report

Figure 1.1
Little Tern Colonies in Suffolk,
2005-2009

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2. Methodology

In order to identify whether there are likely to be any impacts on little tern due to disturbance during construction of the new nuclear build and associated facilities, and/or from the cooling waters discharged from the outfall, a desk study exercise and programme of surveys was carried out, the details of which are provided below.

2.1 Desk Study

In order to provide some indication on how little terns might be affected by the cooling water discharge, it is firstly important to identify where the birds are foraging, or where they are likely to forage. It is also important to have an understanding of what the birds are likely to be feeding on in the Sizewell area, and how that prey might be affected by an increase in water temperature. To achieve this, a desk study exercise was undertaken that included:

- Use of bathymetry maps to identify obvious shallow areas within 10km of the Minsmere and Dingle breeding sites where little terns might forage. Consultation with local experts (Adam Rowlands at RSPB Minsmere and Alan Miller who co-ordinates the tern colony protection work at Dingle) was also carried out to identify potential places where little terns might be foraging;
- A literature search to identify the likely foraging distances and the main food sources of little tern and other behavioural and biological traits of the species and its prey; and
- A study to identify how an increase in water temperature might affect the abundance and distribution of the main prey species that little terns depend upon.

2.2 Surveys

In order to provide further information on where little terns from breeding colonies within the Minsmere & Walberswick SPA are feeding, a programme of surveys was undertaken in 2010. These surveys focussed on two broad areas:

- Colony surveys: to identify the direction of flight of little terns when leaving or returning to the two SPA colonies (Minsmere and Dingle) used on a regular basis (Dunwich beach was used in only one year between 2005-2009), and whether there was much feeding activity close inshore adjacent to the colonies; and
- Foraging surveys: to identify whether terns were foraging in the close inshore waters between the site for new nuclear build at Sizewell south to the shallow waters off Thorpeness.

At the time of designing and undertaking the little tern surveys, the initial options stages indicated that the discharge would drift to the south of Sizewell towards the shallow waters off Thorpeness. Thus the little tern foraging surveys were concentrated in the area between

Sizewell and Thorpeness. Details of the methods employed for the colony and foraging surveys are provided below:

2.2.1 Colony Surveys

Surveys for little terns were undertaken at two colonies, located on Minsmere beach (O.S Grid Reference TM 477 666) and Dingle marshes (O.S. Grid Reference TM 489 733). **Figure 2.1** shows the location of the two colonies. Agreement was reached with Alan Miller (SWT) and Adam Rowlands (RSPB) that 100 metres would be a suitable distance to watch the terns from to avoid disturbing them. The surveys involved watching little tern movements in and out of the colonies; recording the direction of incoming and outgoing flights. Birds leaving the colony were followed until out of sight, with the aid of a telescope. Details of the broad category of prey being returned to the colonies were noted (e.g. fish or invertebrates) and any foraging activity in inshore waters adjacent to the colonies was also recorded. Two hour watches were conducted at each colony site, approximately twice each week between early May and early August. It became apparent by the end of June that the Minsmere site was not going to be used by little tern for breeding, after which survey effort was concentrated at Dingle, with occasional visits made to Minsmere. The dates, time and weather conditions during the surveys are shown in **Table A1, Appendix A**.

The start and finish times of both surveys were varied over the course of the survey period to ensure that all aspects of the diurnal activity patterns of the species were covered (for example: foraging activity may be concentrated in the morning). The timing of the surveys was also varied to ensure that watches were undertaken through the full range of the tidal cycle.

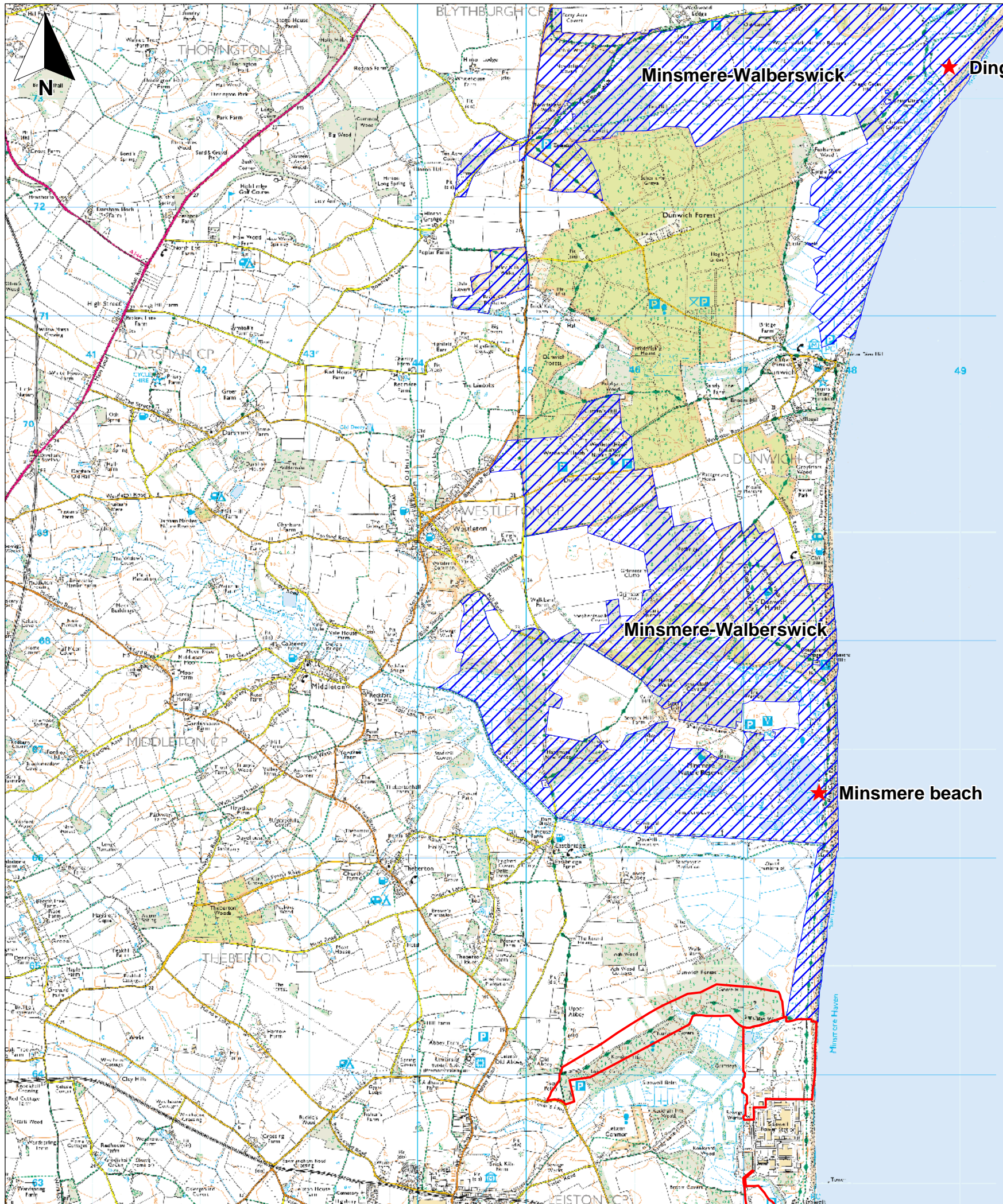
2.2.2 Foraging Surveys

Surveys of foraging little terns were carried out within a study area extending along the Sizewell coast from approximately 500m north of the proposed new build area, south to Thorpeness, where an area of shallow water extends offshore providing a potentially suitable foraging area. The study area also extended approximately 600m offshore (the likely maximum distance at which little terns could reliably be detected from the raised beach between Sizewell and Thorpeness).

A complete survey of the study area was undertaken (usually on one day) every fortnight between early May and late July. During each visit, a series of 45 minute watches was undertaken from six different locations (observation points) along the Sizewell to Thorpeness beach; each observation point being spaced approximately 1km apart. A suitable (minimum 15 minute) break was taken between each 45 minute watch to allow the surveyor to rest their eyes and move to the next observation point. Survey timings were varied during the survey period to ensure that as full a range of tidal states as possible were covered from each observation point. **Figure 2.2** shows the location of the study area and observation points. **Figure 2.3** shows the bathymetry within 5km of the Minsmere and Dingle colonies.

During each watch, details of any flight-lines or hunting activity of little terns were drawn onto maps. Details of the numbers and type of activity were also recorded, including the type of foraging activity (dives, surface feeding, etc) and any prey caught. The type of foraging activity can often determine what type of prey has been caught (e.g. diving for fish, surface pick-ups for invertebrates). Searches were also be made for little terns resting along the shoreline between

Sizewell and Thorpeness. The dates, time and weather conditions during the surveys are shown in **Table A2, Appendix A**.



Key

- ★ Little tern colony locations
- SPA
- Sizewell SSA boundary

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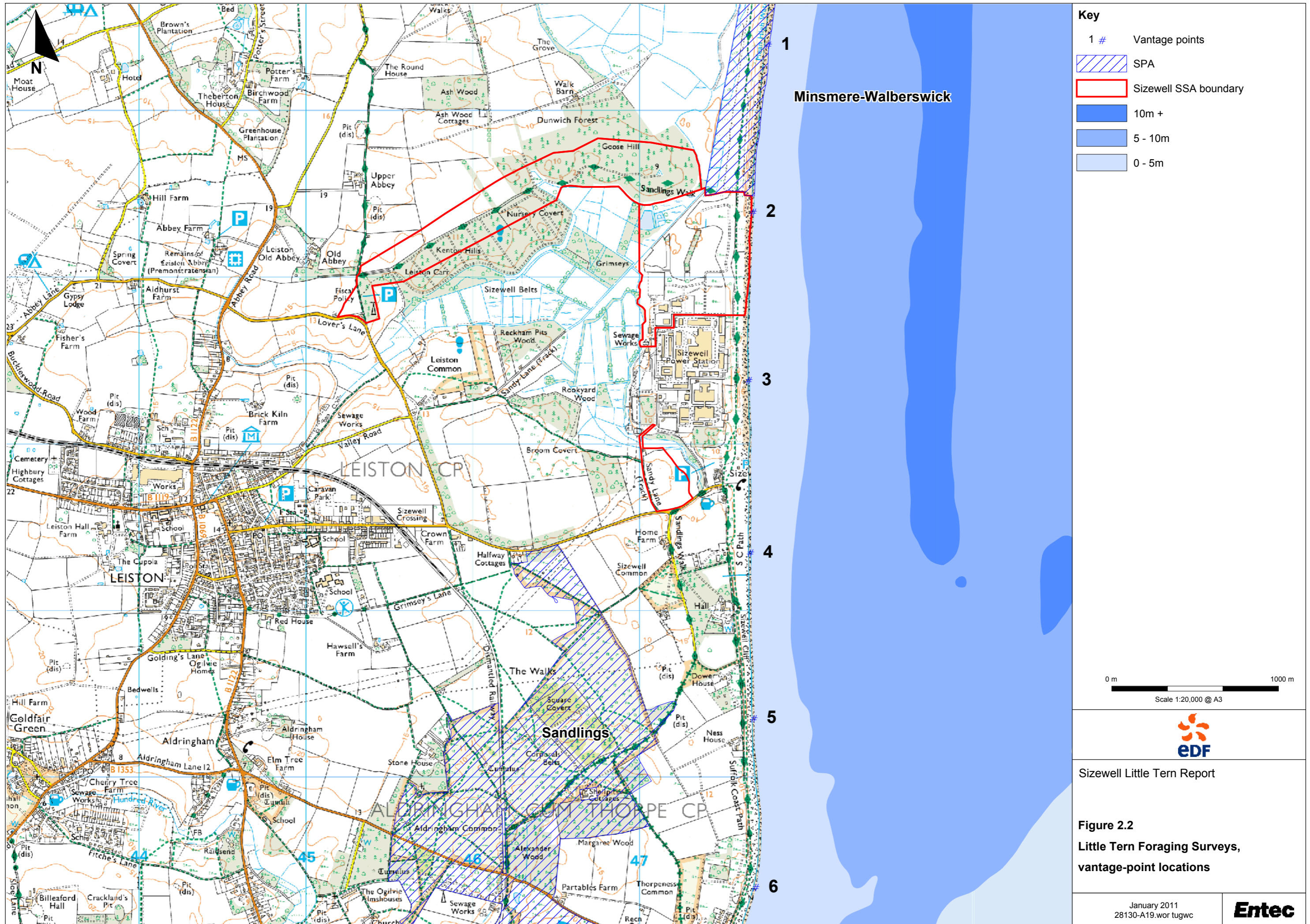


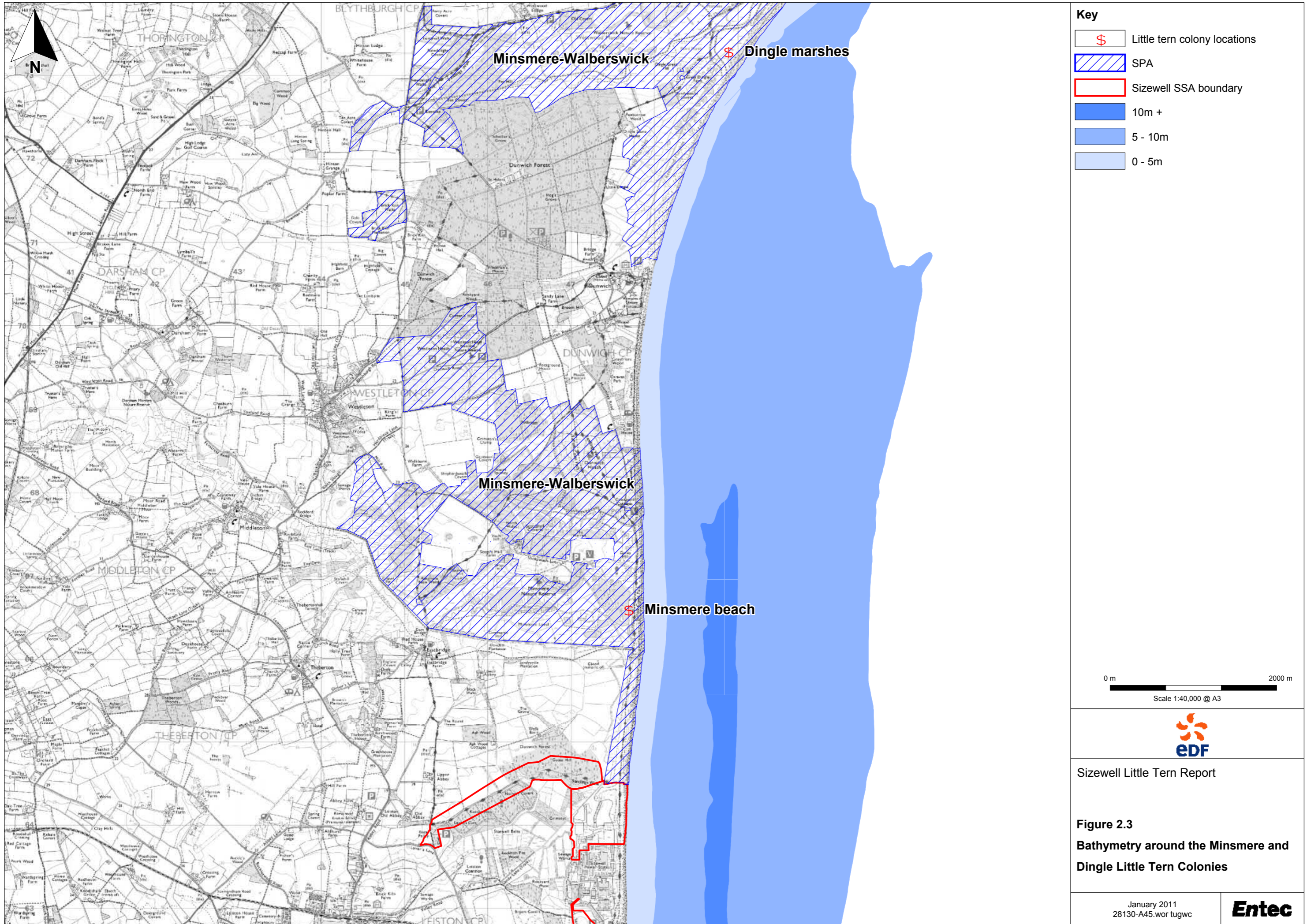
Sizewell Little Tern Report

Figure 2.1
 Little Tern Colony Locations

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3. Results, Little Tern Prey Study

3.1 Introduction

The cooling water discharge from a proposed new nuclear development at Sizewell in Suffolk has the potential to impact the local little tern population through possible effects on their prey. Changes in water temperature could result in an alteration of the distribution of adult and juvenile fish and crustaceans on which the little terns feed. Additionally, changes in water temperature may also disrupt the spawning activity of these species.

The location of little tern colonies are closely tied to the location of suitable food sources (Perrow *et al.*, 2005), and hence a change in prey availability may lead to the demise or relocation of a colony. In addition, breeding timing and success are all known to be affected by prey availability (Perrow *et al.*, 2005).

According to Perrow *et al.* (2005) the most important prey species to little terns in this area of the North Sea are clupeids; namely Atlantic herring (*Clupea harengus*) and sprat (*Sprattus sprattus*). When these fish are scarce, the isopod crustacean *Idotea linearis* and the ghost shrimp *Schistomysis spiritus* are also important, particularly to adult little terns. Although little terns are not thought to be particularly fussy regarding their prey, the high energy, protein and fat content of the clupeid fish mean that they are likely to be the preferred food type. Young-of-the-Year (YOY or 0-group) clupeids are the dominant item in the chick's diet. Their use during courtship rituals and extravagant flight displays are suggested to act as visual signals to other little terns reflecting the quality of the foraging area and help initiate colony formation (Perrow *et al.*, 2005). Previous failures in herring recruitment events in this area of the North Sea have played a major part in the total loss of breeding success in little terns in those years (Perrow *et al.*, 2005).

3.1.1 The Proposed Development and Level of Warming Expected

At this stage there is very little information on the level of warming expected due to the operation of Sizewell C, however model outputs from similar modelling work undertaken for the Hinkley Nuclear Power station suggests that the immediate area around the outfall could warm by as much as 4°C; although the greatest areas will probably be warmed by 1°C or less. This assessment has therefore been based on the effect on the prey species of an increase in water temperature of between 1 and 4°C.

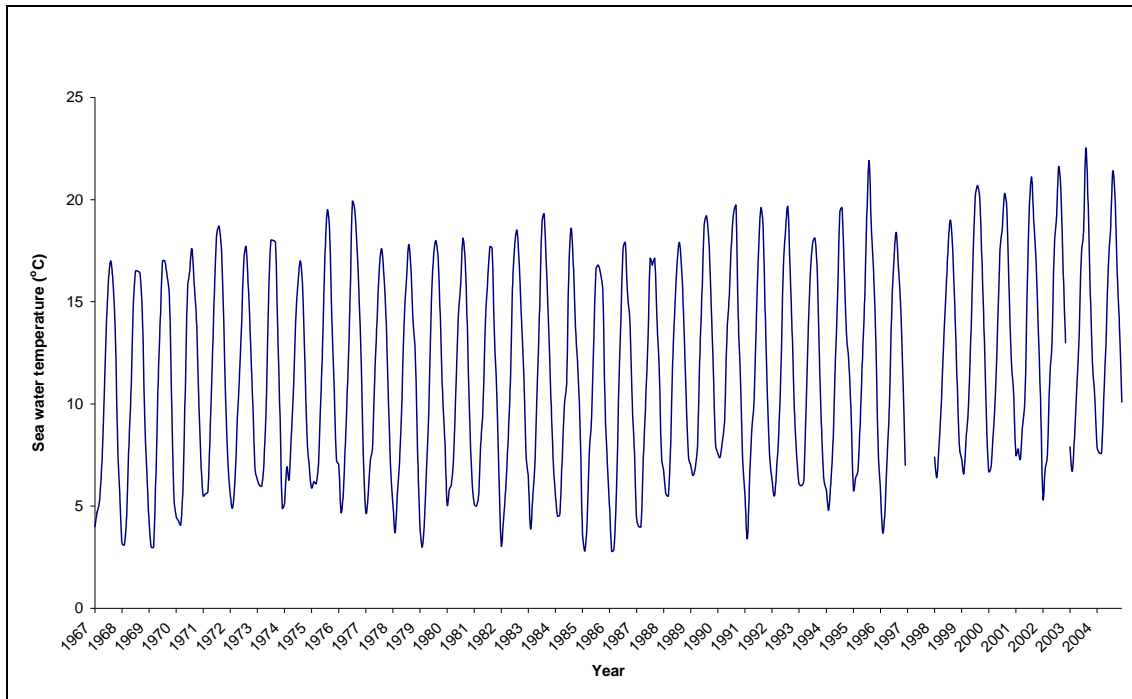
3.1.2 Current and Predicted Water Temperatures

In the North Sea, the sea surface temperature closely follows the air temperature, with the former having a mean 1-2°C above the latter (Lane and Paddle, 1994). The mean sea surface temperature has been monitored at Sizewell since 1967 through the coastal temperature network, ferry route programme and long-term temperature and salinity observations¹. Mean

¹<http://www.cefas.co.uk/data/sea-temperature-and-salinity-trends/presentation-of-results/station-10-sizewell-ps.aspx>

temperatures vary from 4.3°C in February to 18.2 in August, although in exceptional years the monthly average in August has been as high as 22.5°C (**Figure 3.1**). The high sea temperatures in summer 2003, coincided with no young being fledged from the Minsmere and Dingle colonies, and there was very poor breeding success at all colonies along the Suffolk coast in that year. However, human disturbance (rather than reduced food availability) was given as the main contributing factor to the failures at most Suffolk colonies at this time (Wright [ed], 2004).

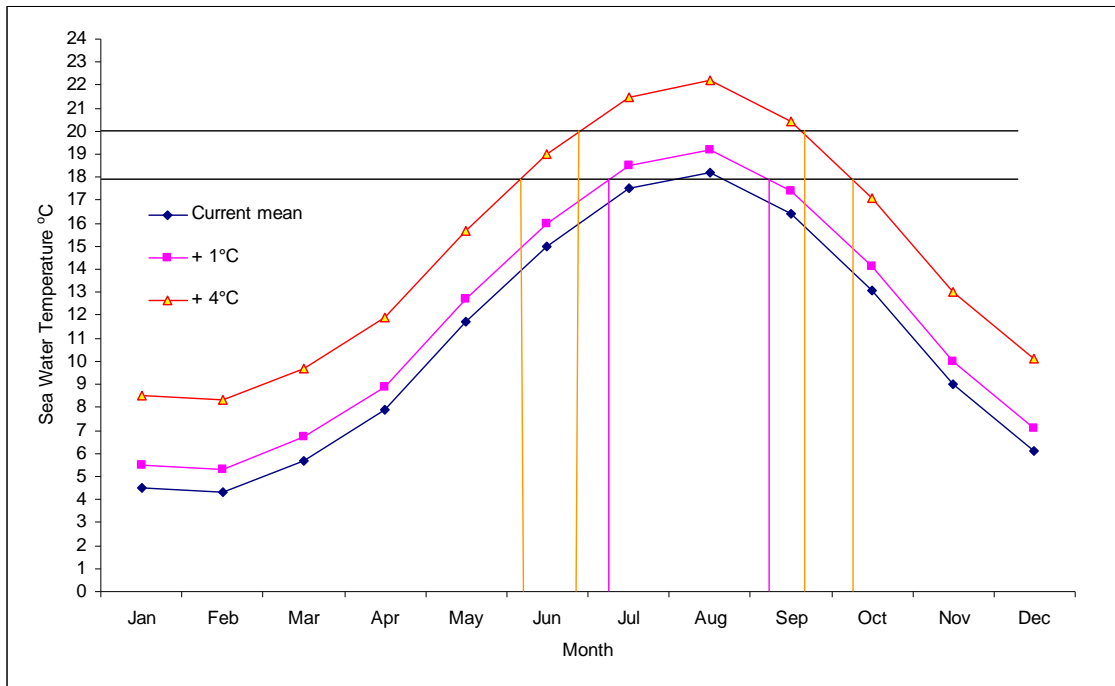
Figure 3.1 Mean monthly sea surface water temperature from Sizewell 1967-2004



Sea water temperature declines with increasing depth, a process reinforced by thermal stratification that exists between March and October in deeper waters. Thermal stratification is however extremely unlikely in the shallow, well mixed waters off the Suffolk coast, where in water depths of less than 20m, sea bed water temperature is likely to be almost as high, if not the same, as surface water temperature.

With the exception of particularly hot years, mean monthly seawater temperature at Sizewell only exceeds 18°C in mid August (**Figure 3.2**). An increase of 1°C is likely to lead to the seawater in the vicinity of the outfall being over 18°C from early July to early September (**Figure 3.2**). An increase of 4°C is likely to increase the sea temperature in the immediate vicinity of the outfall to over 18°C from early June to early October and to over 20°C from late June to late September.

As previously stated, there is no current information on the size of the area likely to be affected by increased temperatures. This will depend on a multitude of factors (such as volume of water discharged, coastal currents, tidal dynamics etc) and would require complex plume dynamic modelling.

Figure 3.2 Potential sea temperature increases in vicinity of cooling water discharge

3.2 Little Terns

3.2.1 Life Cycle and Migratory Pattern

In order to assess the potential impact of temperature increase on both little terns and their prey, an appreciation of their life cycle and migratory patterns is required in order to assess if and when they will be in contact with the cooling water and its impacts.

Little terns are strongly migratory and arrive in Suffolk from late April (Anon, 2006). The timing of breeding is highly synchronised so that the period of peak prey demand (i.e. when raising chicks) coincides with the peak in density of 0-group clupeids in the surrounding waters (Perrow *et al.*, 2005). Nesting activity begins in mid to late May, with the peak in feeding activity (for the provisioning of chicks) generally occurring in early July (Allen Navarro *et al.*, 2004). Eggs are incubated for 18-22 days, with hatching in an average year usually starting around mid June. The chicks are fledged to maturity around 20 days later, hence are independent of their parents in terms of feeding by late July in an average year (Anon, 2006). Once the chicks are fledged, after a period of time they join the adults on the autumn migration back to West Africa which takes place between August and early October.

3.2.2 Prey

Little terns are present in Suffolk and dependant on the food resource in the area, only from April to October (primarily early May to early September). However, the impact of increased water temperatures on the various life history stages of the prey species throughout the whole year must be considered, as a failure in recruitment in a prey species will have obvious

implications for little terns. Details of the life cycles of the four main prey items are provided below and summarised in **Table 3.1**.

Table 3.1 Summary of when cooling water may impact prey species at different life history stages

Species	Life history stage	Months when found inshore	Notes
Herring	Adult	Nov - Jan	Adults move into inshore waters to spawn
	Juveniles (0 – 2 years)	All year	Juveniles spend first 2 years of life in inshore nursery areas. May move to deeper inshore waters in August when sea temperatures are higher in shallow waters.
	Larvae	All year	Larvae found inshore
	Eggs	Nov- Feb	Laid inshore
Sprat	Adult	Oct- Mar	Adult sprat migrate inshore in autumn and offshore in spring
	Juveniles (0- 2 years)	All year	Juveniles spend first 1-2 years in inshore nursery areas including along Suffolk coast
	Larvae	n/a	Larvae are offshore
	Eggs	n/a	Spawning grounds are offshore
<i>Idotea linearis</i>	All stage	All year	No eggs/planktonic phase, spends whole life in one place
Ghost shrimp	All stages	All year	No eggs/planktonic phase, spends whole life in one place

The four main prey items of little terns in Suffolk have a wide geographical distribution and are found in more southerly waters than those of the North Sea off Suffolk (see **Table 3.2**). However, in the case of herring and ghost shrimp, the mean summer temperatures experienced at Sizewell are already close to or exceed their stated upper temperature ranges.

Table 3.2 Prey species distribution and temperature tolerance

Species	Temperature range	Distribution
Atlantic herring	1 - 18°C (Whitehead, 1985)	Northern Bay of Biscay, Iceland, southern Greenland, Norway, Baltic Sea. (Whitehead, 1985)
Sprat	Not known	North east Atlantic, North sea, Baltic sea, Morocco, Mediterranean sea, Adriatic sea, Black Sea (Whitehead, 1985)
<i>Idotea linearis</i>	Not known	All UK waters, and the Mediterranean (Poore & Schotte, 2009)
Ghost shrimp	Will inhabit waters <18°C (Boscarino <i>et al.</i> , 2007). Upper lethal temp 20°C.	All UK coasts, the European coast of the North Sea and the Baltic Sea (WoRMS, 2009). The French Atlantic, Azores, Portuguese Atlantic (<i>Schistomysis</i> spp; Vasconcelos <i>et al.</i> , 2004).

Within the marine environment predicting changes to populations as a result of environmental impacts on predators, prey or competitors are often difficult owing to the numerous life history stages of marine organisms. For example, cod are one of the main predators of sprat, whilst sprat also feed on cod eggs (Köster & Möllmann 2000). Hence a decline in the numbers of predators may not be an advantage as this will lead to a decrease in food availability for the prey.

Any assessment of competitors requires an understanding of the prey species favoured. The main sources of food for the four little tern prey items are shown in **Table 3.3**.

Table 3.3 Prey species food sources

Species	Food source
Atlantic herring	Zooplankton (Copepods)
Sprat	Zooplankton
<i>Idotea linearis</i>	Phytoplankton
Ghost shrimp	Detritus

In order to assess the impact of a 1-4°C increase in water temperature on the prey species of little terns, several questions must be asked:

- Does the prey species occur in warmer waters than those found on the East England coast (e.g. in the Mediterranean) and if so, what is the temperature range in which the species occurs?
- Is spawning activity or viability of gametes likely to be impacted by warmer waters?
- Are warmer waters likely to attract more predators/competitors of the prey species and therefore displace them?
- Will the warming of the water impact upon the habitats and/or food chain on which each prey species depends?

These questions have been answered below in relation to each of the four main prey species of the little terns in this area of the North Sea, namely herring (*Clupea harengus*), sprat (*Sprattus sprattus*), the isopod *Idotea linearis*, and ghost shrimp (*Schistomysis spiritus*).

3.3 Herring

3.3.1 Life Cycle and Migratory Pattern

Adult herring are pelagic, occurring in large shoals and found mostly in continental shelf seas to depths of 200m (Whitehead, 1986). Maturing herring travel towards the spawning grounds between November and January as the milt and roe begin to develop, congregating in huge

shoals in coastal waters. The North Sea stock is dominated by autumn spawning fish but there are also some small discrete groups of coastal spring spawning herring in areas such as The Wash and the Thames Estuary (Anon, 2009). The herring population around Sizewell are thought to be autumn spawners. UK nursery grounds in the southern North Sea are found around the Wash and also run south along the coast of Norfolk and Suffolk (see **Figure 3.3**).

Herring eggs are laid on the sea bed, usually in water 10-80 m deep, on hard ground covered with small stones, shells or seaweed to which the eggs can attach. The eggs incubate for 10-30 days depending on sea temperature, with 14-20 days being typical for the North Sea. Herring larvae are solitary and pelagic, drifting with the current. When the larvae reach a length of about 40mm, they begin to develop scales and move to inshore nursery grounds. Herring nursery grounds are found along the entire Suffolk coast. After spending their first two years in coastal nurseries the two-year old herring move offshore into deeper waters (Mackenzie, 1985) eventually joining the adult population in the feeding and spawning migrations offshore.

3.3.2 Predicted Impacts on Distribution in Relation to Water Temperature

According to the literature, Atlantic herring only inhabit waters between 1 and 18°C. However, summer surface water temperatures in the Sizewell area regularly exceed 18°C and can exceed 20°C. During the summer months, adult herring migrate offshore (into cooler waters), although juveniles are known to inhabit inshore nursery areas throughout the summer until they are two years old. There is some evidence from catch data along the Norfolk coast that young herring may move into deeper and cooler waters within the nursery grounds during the warmer months. At Scroby Sands, Perrow *et al.* (2005) found that catch rates of young herring declined dramatically during August, which coincides with the warmest sea water temperatures in this area (above 18°C). An increase in sea water temperature (as a result of the cooling water discharge) of just 1°C could result in temperatures being elevated to over 18°C from July to September (i.e. an extra six weeks of the year). This may result in young herring seeking deeper waters earlier in the year, thus making them unavailable to little terns as prey items for a substantial part of the breeding season.

3.3.3 Predicted Impacts on Spawning Activity or Gamete Viability

Herring spawn along the east coast of northern Suffolk between November and January (Coull *et al.*, 1998). Spawning events are correlated with water temperature. In the western Atlantic, spawning occurs in water temperatures ranging from 5-15°C (Anderson & Karas, 1990). A study in the Baltic Sea of spawning activity of Atlantic herring in areas of cooling water discharge, noted that in areas of warmer water, spawning occurred up to a month earlier than in the reference sites (Anderson & Karas, 1990).

A 1°C increase in water temperature (due to the cooling water discharge) would result in the waters in the affected area being above 5°C throughout the winter. This could potentially lead to a change in the spawning periods in that instead of having discrete autumn and spring spawning periods, spawning might occur throughout the winter.

Development duration of herring eggs is inversely related to the temperature. Development takes 40 days to complete at 4-5°C, 15 days at 6-8°C, 11 days at 10-12°C and 6-8 days at 14.4-16°C (Reid *et al.*, 1999). In laboratory experiments, no development was observed in waters below 5°C, and at temperatures greater than 20°C, rapid development was followed by 100% mortality (Reid *et al.*, 1999). Because of the close relationship between development and

temperature, a rise of only 1°C could cause herring eggs in the area to develop considerably faster.

In general, however, relatively small increases in seawater temperature may favour herring recruitment, speeding up their development and providing more zooplankton for food although mismatches in timing between the herring emergence and the increase in zooplankton can be very bad for recruitment. The failure of herring recruitment is most likely to be due to reduced egg survival and/or reduced population size of spawning individuals. There are naturally high levels of variability in these factors and therefore attributing recruitment failure to a single cause is often very difficult.

The International Council for the Exploration of the Sea (ICES) concluded that the poor recruitment of herring in 2002 (possibly due to high sea temperatures) had a knock on effect to recruitment in 2003-05. Other studies have suggested that low survivorship of the larvae is due to a general warming of the North Sea, causing the herring larvae to emerge at a time when food availability is not at its highest.

In addition, herring larvae which develop within the area of the cooling water discharge may be at increased risk of thermal shock once transported into the surrounding colder waters (Anderson & Karas, 1990). The risk of thermal shock may be increased due to the decreased development time which would occur in the warmer waters, causing larvae to emerge during the coldest months.

Studies in the Baltic Sea provide direct evidence of a negative effect on the spawning activity of Atlantic herring due to cooling water discharge. Large numbers of Atlantic herring spawned in a very restricted area in the vicinity of a cooling water discharge in the Baltic Sea, resulting in very thick egg layers (Anderson & Karas, 1990). The herring which spawned in the immediate vicinity of the outfall experienced high mortality through gas bubble disease caused by gas supersaturation of the water in this area (Anderson & Karas, 1990). In addition, egg mortality was higher in areas where egg layers were thick, and the overall recruitment from these areas of high spawning density was no greater than that from the reference sites (Anderson & Karas, 1990). This extreme situation is unlikely to arise at Sizewell as the outfall would be located on an open coast, as opposed to the restricted situation in the Baltic Sea study. In open coast situations, discharges are likely to be more quickly dispersed.

3.3.4 Predicted Predator/Competitor Changes

Atlantic herring is preyed upon by many species during all stages of its life history (see **Table 1.4**).

Table 1.4 Predators of the Atlantic herring during various stages of its life

Stage	Predators
Eggs	Eggs are utilised as a prey source by many species, including bottom dwelling flat fishes (e.g. Flounder <i>Platichthys flesus</i>), cod (<i>Gadus morhua</i>), haddock (<i>Melanogrammus aeglefinus</i>), dogfish (<i>Scyliorhinus caniculus</i>), and cannibalised by adult herring as well as many others. Eggs are also eaten by a number of mobile invertebrates including starfish and mysid shrimps.
Larvae	Atlantic herring larvae are solitary and pelagic and are thus vulnerable to a wide range of planktonic feeding species; this includes jellyfish, Chaetognaths (Arrow worms), larger copepods, Euphasids (Krill) and pelagic fishes.
Juvenile	Juvenile Atlantic herring are preyed upon by almost all pelagic predators including fishes, marine birds, cephalopods and marine mammals.
Adult	Adults are preyed upon by almost all pelagic predators including fishes, marine birds, cephalopods and marine mammals. Predation by other fish species is very intense during spawning.

Littoral mysid shrimps predate on Atlantic herring eggs and yolk sac larvae and will do so preferentially even when other food sources are available (Torniainen & Lehtiniemi, 2008). Studies have shown that mysid shrimps can have local effects on populations of Atlantic herring through heavy egg and larvae predation especially if large numbers are present within the spawning areas (Torniainen & Lehtiniemi, 2008). Increases in temperatures may lead to greater numbers of mysid shrimps which breed all year round producing greater numbers of offspring in the warmer months (Mauchline, 1967). Development is also faster in warmer waters (Winkler & Greeve, 2002).

The moon jellyfish *Aurelia aurita* acts as both predator (of larvae) and competitor (both feed on zooplankton) to Atlantic herring and can tolerate temperatures up to 31°C. The main predator of *Aurelia aurita* is the lion's mane jellyfish *Cyanea capillata*, which is a cold water species and will not tolerate warmer waters. In theory this could release populations of *Aurelia aurita* from predation pressure and subsequently negatively impact the Atlantic herring populations, however given the localised impact of this cooling water this would be unlikely to be significant.

Any increase in phytoplankton production as a result of warmer water (in the absence of chlorination) is likely to increase the abundance of zooplankton available for adult herring to eat in the vicinity of the outfall. However any increase in zooplankton may be accompanied by an increase in other zooplankton predators, which may consume herring larvae. Given that larvae have a wide distribution (inshore and offshore) this is unlikely to have an impact on their local population.

3.3.5 Conclusion

The shallow waters offshore of Suffolk support nursery grounds for young herring in the first two years of their life. These young herring are likely to provide a very important food resource for the provisioning of little tern chicks at colonies in Suffolk during much of the breeding season (June, July and early August). An increase in sea water temperature during this period may result in young herring seeking deeper waters earlier in the year, thus making them unavailable to little terns as prey items for a substantial part of the breeding season. An increase

in sea temperature also has the potential to change the seasonal timing of herring spawning, which may result in young herring being present when their main food source is absent. This may ultimately lead to a failure in herring recruitment, which would also reduce the amount of food available to little terns at the SPA colonies (Minsmere and Dingle).

3.4 Sprat

3.4.1 Life Cycle and Migratory Pattern

It is generally assumed that sprat living in the North Sea undertake large seasonal migrations, migrating inshore in autumn and offshore in spring (Bailey, 1980). Sprats spawn offshore between May and August, with peak spawning occurring in May and June. In the autumn, the fish return to the inshore over-wintering areas, along with the incoming 0-group recruits (ICES, 1990).

Both the eggs and larvae of sprat are pelagic. Juveniles migrate inshore to nursery areas which are extensive and extend all along the North Sea coast including the Suffolk coast around Sizewell (**Figure 3.4**). The majority of sprat remain as juveniles until their second year, when they will migrate offshore and participate in their first spawning. Some sprat however can obtain adulthood after just one year (Peck & Möllmann, 2008).

3.4.2 Predicted Impacts on Distribution in Relation to Water Temperature

No direct information has been found on the temperature tolerance of sprats, although it would appear that this species is capable of inhabiting water temperatures higher than those tolerated by herring, as they are found much further south than herring (e.g. the Mediterranean). Therefore elevated water temperatures could favour young sprat over herring. How this might affect the little terns is not known.

3.4.3 Predicted Impacts on Spawning Activity or Gamete Viability

Sprat spawn offshore, hence any change in sea water temperature as a result of this localised cooling water discharge is unlikely to affect spawning.

3.4.4 Predicted Predator/Competitor Changes

The jellyfish *Aurelia aurita* acts as both predator and competitor to sprat, as it does with herring, however given the localised impact of this cooling water any increased predation/competition is unlikely to significantly affect the population.

Herring and sprat are known to compete for the same food resource, this is especially apparent in the Baltic Sea where food competition with Atlantic herring has led to growth changes in both fish species (Möllmann *et al.*, 2005, Casini *et al.*, 2006). Competition in the waters off Suffolk will occur throughout the year with juveniles inhabiting the inshore waters all year round and both adult sprats and herrings migrating inshore in the winter months. Warmer water temperatures in the summer (+18°C) around the vicinity of the cooling water discharge is likely to drive juvenile herring into deeper cooler water, hence decreasing the competition for zooplankton for sprats.

3.4.5 Conclusion

Young sprat are found in the shallow waters off the Suffolk coast and are likely to provide an important food resource for the provisioning of little tern chicks during the breeding season. The evidence suggests that sprat are able to tolerate higher sea temperatures than herring and the two species are known to compete for the same food source. Therefore, higher sea temperatures due to the cooling water discharge could potentially lead to an increase in sprat if herring numbers in inshore waters decline.

3.5 *Idotea Linearis*

3.5.1 Life Cycle and Migratory Pattern

No specific life history information could be found for this species of isopod. Isopods however have no planktonic phase and the young are released as juveniles (manicas) which resemble the adults. Therefore the entire life history of this species is likely to occur within a very limited home range.

3.5.2 Predicted Impacts on Distribution in Relation to Water Temperature

Little information on temperature tolerances for this species was found. However, its southerly distribution (e.g. the Mediterranean) indicates its ability to tolerate increased water temperatures.

3.5.3 Predicted Impacts on Spawning Activity or Gamete Viability

Very little information was found on this species. However, reproductive activity in other temperate isopods is closely linked to temperature, with maximum reproductive effort occurring when water temperatures are between 5-12°C (Leifsson, 1999). A 1°C increase in temperature would lead to the water temperature exceeding 12°C between the months of May and October, an extension of roughly two weeks over the current situation.

3.5.4 Predicted Predator/Competitor Changes

An increase in sea temperatures may lead to competition from another species of isopod, *Idotea metallica*. *I. metallica* is a warm water species of isopod which is occasionally found in the southern North Sea. It is not a resident species (it does not survive the winter) but individuals are introduced each year by currents from the Atlantic (Gutow & Franke, 2001). Warming seas are expected to contribute to a larger summer population of this species as the critical temperature for reproduction (13°C) is exceeded for longer periods (Gutow & Franke, 2001). With even a small temperature increase of 1°C the critical temperature will be exceeded for a further 3 weeks (mid May to late October). Therefore, a population of *Idotea metallica* will be able to breed for a longer period, contributing to a greater population. The impact of this on little terns however is likely to be minimal, as they are not thought to be particularly choosy in their prey selection, unless its behaviour makes catching it more difficult.

3.5.5 Conclusion

The isopod (*Idotea linearis*) is likely to form part of the food resource available to foraging adult little terns from the SPA colonies. Increased sea temperatures have the potential to increase the numbers of this isopod in the shallow waters offshore of Suffolk. However, other species of isopod (which compete with this species for food) may also increase in numbers due to the cooling water discharge. However, it is likely that the overall impact of any changes in the abundance of different isopod species on little terns at the SPA colonies will be minimal.

3.6 Ghost Shrimp

3.6.1 Life Cycle and Migratory Pattern

Ghost shrimps breed throughout the year (Mauchline, 1967). There is no larval stage, with early development taking place within the brood pouch (marsupium). Juveniles and adults commonly inhabit the same areas, and display similar habits (Makings, 1977).

3.6.2 Predicted Impacts on Distribution in Relation to Water Temperature

The ghost shrimp is only found within waters of 18°C and below and is likely to have an upper lethal temperature tolerance of 20°C and therefore may be susceptible to temperature increases. An increase in temperature of just 1°C could result in temperatures being elevated to above 18°C from July to September. This species is not migratory and is found throughout the year on the Norfolk coast. Therefore, this may indicate a greater tolerance to elevated temperatures than reported. However, given the species' upper lethal limit of only 20°C, it is likely that an increase in temperature would result in a decline in the population in the areas affected.

3.6.3 Predicted Impacts on Spawning Activity or Gamete Viability

In Scottish waters, spawning occurs year round, with differences in the timing of breeding events between separate ghost shrimp populations (Mauchline, 1967). Breeding is more intense during the warmer months, and the number of young is also greater at this time (Mauchline, 1967). Laboratory studies of other mysid shrimps have shown that egg incubation time is considerably reduced with higher temperatures, and incubation time was halved when the ambient temperature changed from 10 to 15°C (Winkler & Greeve, 2002). Winkler & Greeve (2002) also found that the minimum size of breeding females decreased with increasing temperature and the number of eggs per female also decreased with size. A 1°C increase in temperature, would lead to the water temperature exceeding 15°C between the months of June and October, an extension of roughly four weeks over the current situation.

3.6.4 Predicted Predator/Competitor Changes

Mysid shrimps such as the ghost shrimp are an important dietary component of many fish species. In UK waters the most important predator of mysid shrimps is likely to be the brown shrimp *Crangon crangon* (Hostens and Mees, 1999). This species has a similar temperature tolerance to mysid shrimps (Wear, 1974) and therefore *Crangon crangon* numbers are likely to decline along with ghost shrimp numbers in the vicinity of the cooling water discharge.

Clupeid fishes have also been known to feed on mysid shrimps, and therefore any increases in the abundance of sprat due to warmer temperatures is likely to result in an increase in predation pressure on this species (Moore & Moore, 1974; Casini *et al.*, 2004). However any increase in sprat is also likely to be accompanied by a decline in herring, hence predation pressure is likely to remain the same. It has also been suggested that top down control is a relatively minor factor in controlling abundance (Hostens & Mees, 1999), and therefore other factors (food availability, environmental suitability etc) may be the dominant forces controlling mysid numbers.

3.6.5 Conclusion

Ghost shrimps (*Schistomysis spiritus*) are likely to form part of the food resource available to foraging adult little terns from the SPA colonies. Sea water temperatures off Sizewell are near to the upper limit that this species can tolerate and therefore increased temperatures due to the cooling water discharge have the potential to result in a decline in the ghost shrimp population in the shallow waters offshore of Suffolk. How this might impact on the SPA populations of little tern is not known.

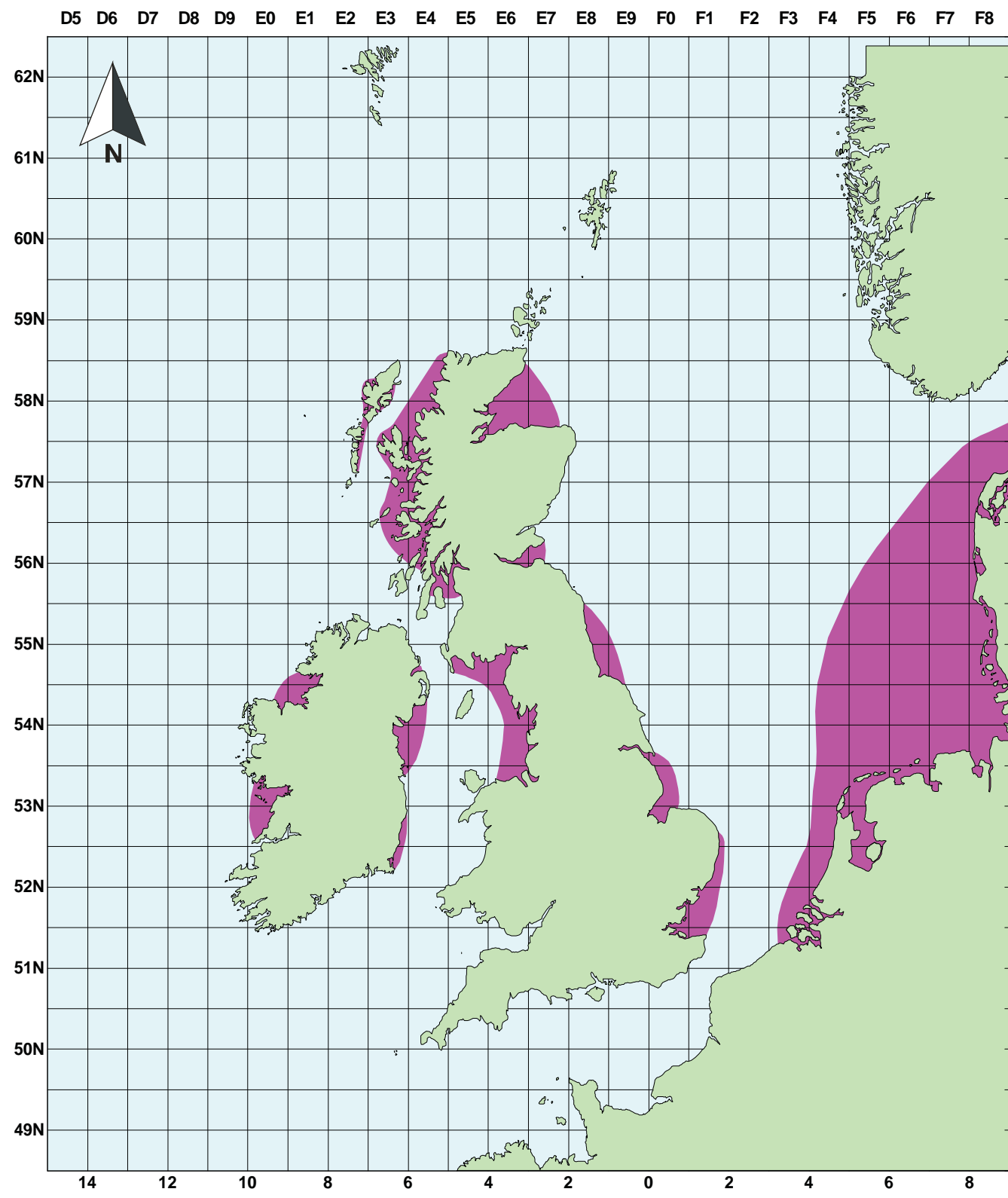
3.7 Predicted Impacts on Habitats and Food Chains of Prey Species

Herring, sprat and *Idotea linearis* all feed on plankton while the ghost shrimp feeds on detritus. Therefore the impact on the prey of these species by the cooling waters is not dependent on the effects on benthic (infauna and epifaunal) community. The main concern in terms of prey supply depends on the availability of plankton in the water column.

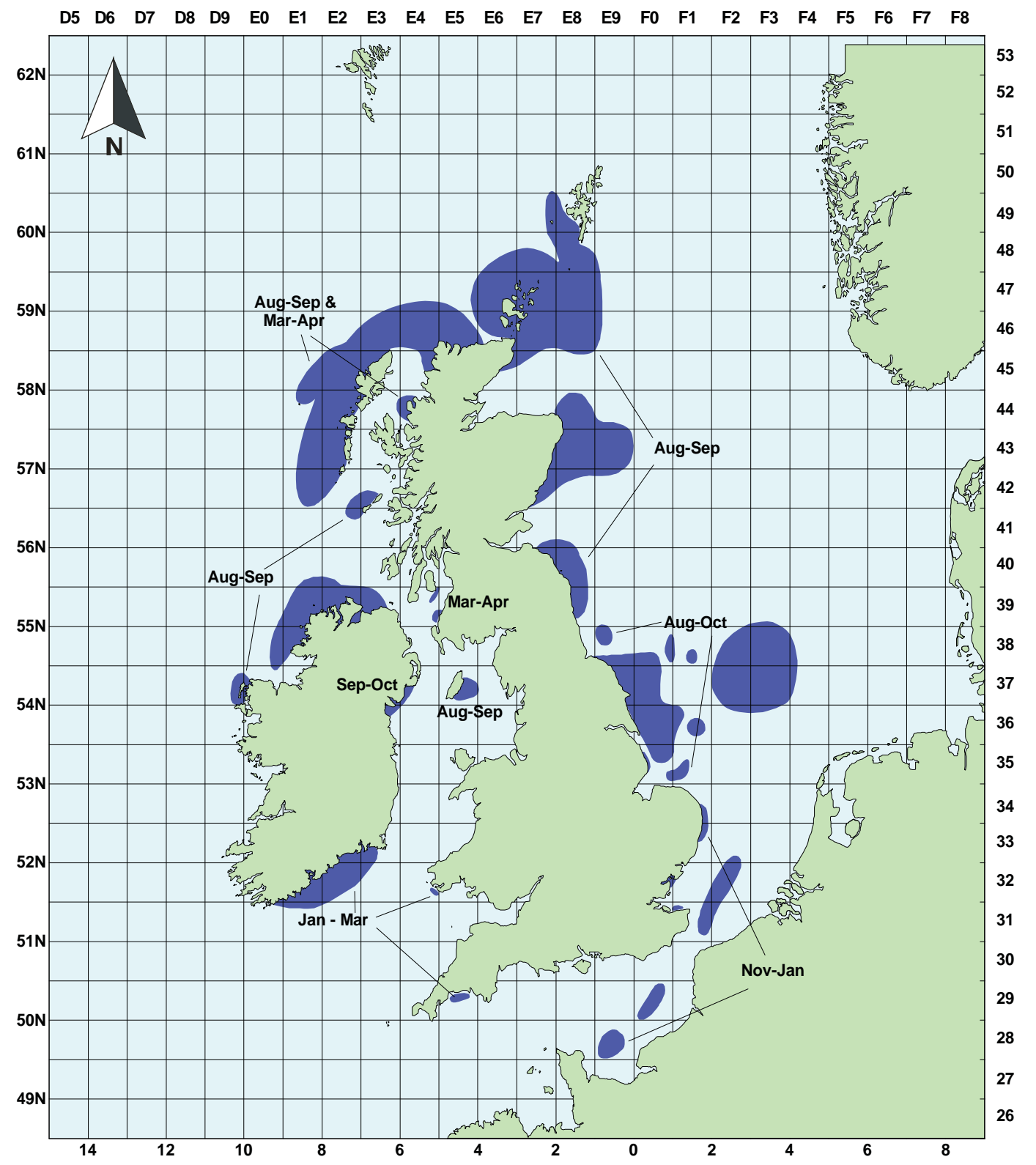
The extent to which cooling water discharge affects the plankton depends on whether the cooling water will be chlorinated, as phytoplankton production is negatively correlated with increasing chlorination of the water. Reduced phytoplankton production will also result in a subsequent decrease in zooplankton abundance (Poornima *et al.*, 2005; Chuang *et al.*, 2009). This effect has been shown to be quite localised and that the overall coastal productivity is not significantly reduced (Poornima *et al.*, 2005; Chuang *et al.*, 2009), however shifts in local abundances may occur.

In the absence of chlorination in temperate waters, localised warming will result in an increase in phytoplankton production, i.e. a longer season and greater production (Ilus & Keskitalo, 2008), and can result in the formation of algal blooms. These increases however, are limited by the nutrient availability in the system. Any increase in the phytoplankton biomass will allow a greater zooplankton production and thus greater food availability for herring, sprat and ghost shrimp.

Increases in phytoplankton biomass caused by localised warming will result in a greater zooplankton biomass and subsequently a greater level of detritus for organisms such as *Idotea linearis*.

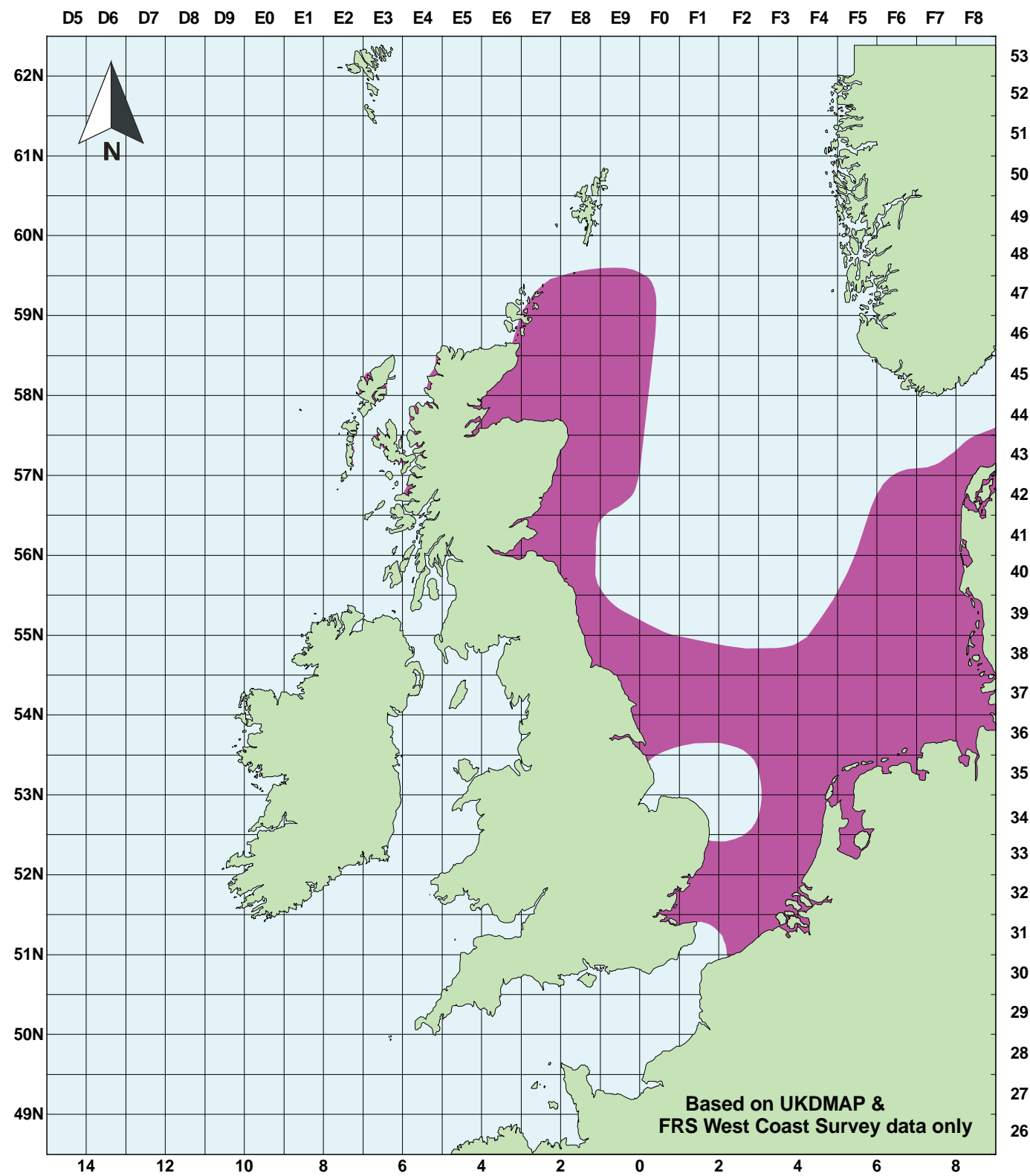


Nursery Areas

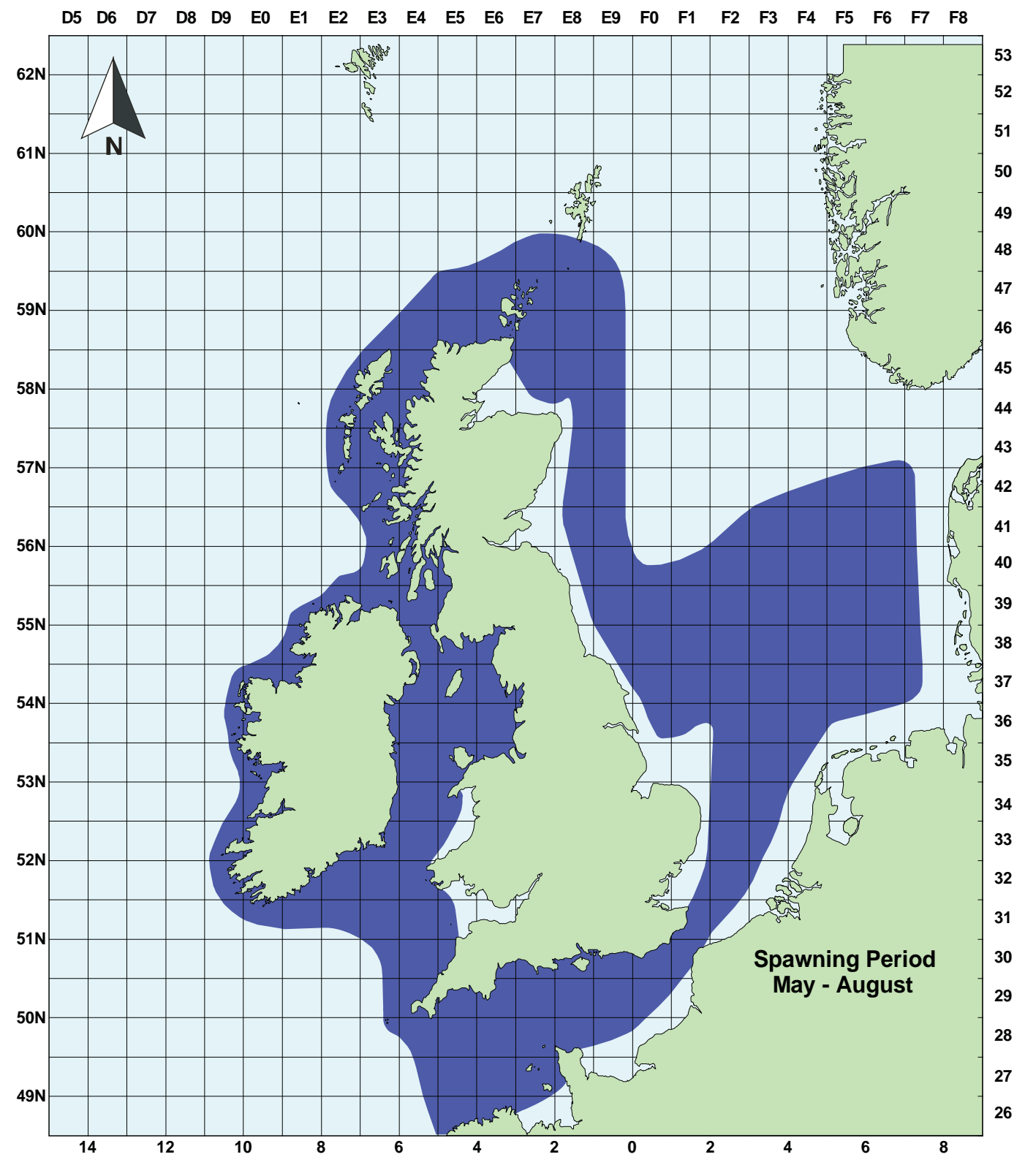


Spawning Areas

Sizewell Little Tern Report
Figure 3.3
Known Spawning and Nursery Areas
of Atlantic Herring Around the British
Coast. Source, Coull et al., (1998)



Nursery Areas



Spawning Areas

Sizewell Little Tern Report
Figure 3.4
Known Spawning and Nursery Areas
of Sprat Around the British Coast.
 Source, Coull et al., (1998)

4. Results, Little Tern Surveys

4.1 Little Tern Colony Surveys

A total of 17 and 31 two-hour watches were undertaken at the Minsmere and Dingle little tern colonies respectively, between 4 May and 6 August 2010. **Table 4.1** provides an overview of little tern activity at the two colonies on each survey date.

Table 4.1 Overview of tern activity at the Dingle and Minsmere Colonies

Date	Colony	Peak little tern count	Overview of activity
04-May	Dingle	0	None seen
04-May	Minsmere	1	Single bird commuting south
05-May	Dingle	3	Three birds roosting on the beach
05-May	Minsmere	5	A few birds on Minsmere wader scrape ²
15-May	Dingle	8	A minimum of 8 birds catching fish close offshore
15-May	Minsmere	2	A minimum of 2 birds commuting south which then landed on wader scrape
16-May	Dingle	12	A minimum of 12 birds foraging close offshore and loafing on the beach, with courtship behaviour observed by at least 1 pair
16-May	Minsmere	7	A minimum of 7 birds foraging offshore, with 2 showing courtship activity in the tern sanctuary
20-May	Dingle	17	A flock of 17 birds commuting south distantly offshore. Also 1 pair showing courtship display with fish, seen on the beach.
20-May	Minsmere	6	A minimum of 6 birds foraging close offshore
24-May	Dingle	4	A minimum of 4 birds foraging close offshore
24-May	Minsmere	2	Two birds foraging offshore then onto wader scrape
29-May	Dingle	14	Fourteen birds on the shingle, including pairs tending nest scrapes, and courting
29-May	Minsmere	0	None seen
30-May	Dingle	12	Twelve birds in the colony on the shingle, including birds sitting on nest scrapes. Six birds were seen roosting on the beach and 1-4 foraging offshore.
30-May	Minsmere	2	One roosting on the scrape, and 1-2 birds foraging offshore

² The wader scrape refers to the complex of shallow lagoons within the Minsmere RSPB nature reserve, located immediately inland from Minsmere beach.

Table 4.1 (continued) Overview of tern activity at the Dingle and Minsmere Colonies

Date	Colony	Peak little tern count	Overview of activity
05-Jun	Dingle	2	Only two birds in the colony, and none seen on nest scrapes
05-Jun	Minsmere	3	Two birds loafing on the wader scrape and another foraging offshore. No breeding activity observed in the tern sanctuary area on the beach.
06-Jun	Dingle	16	Two nesting pairs and a further three courting pairs in the colony. Up to three birds foraging offshore.
06-Jun	Minsmere	3	Three birds loafing on the wader scrape, with some courtship behaviour observed, but no breeding
11-Jun	Dingle	9	Nine birds loafing on the beach. Several birds showing courtship behaviour and 1 pair on a nest scrape in the colony.
12-Jun	Dingle	4	Four birds loafing on beach, but none seen on nest scrapes in colony
12-Jun	Minsmere	6	Four birds commuting north and 2 birds loafing on the wader scrape
21-Jun	Dingle	14	Very few birds foraging offshore, but up to 14 birds loafing on beach or prospecting nest scrapes in the colony
21-Jun	Minsmere	0	None seen
22-Jun	Dingle	13	Very little foraging activity. Up to 13 birds loafing on beach, or showing courtship behaviour in the colony.
22-Jun	Minsmere	2	No foraging birds noted. Two birds flying over the beach.
29-Jun	Dingle	66i	An influx of birds to the area (presumably failed breeders from another colony). Many birds foraging within 500m of the shoreline or loafing on the beach.
29-Jun	Minsmere	2	Two birds foraging close offshore, which then flew onto the wader scrape
30-Jun	Dingle	100	A minimum of 100 birds foraging within 500m of the shoreline, or loafing on the beach. A few birds also prospecting in the colony.
05-Jul	Dingle	45	Large numbers of birds foraging within 700m offshore and loafing on the beach by the colony. Seven birds on nest scrapes in the colony.
05-Jul	Minsmere	2	Two birds foraging close offshore, which then flew onto the wader scrape
07-Jul	Dingle	70	Large numbers of birds foraging within 700m offshore and loafing on the beach by the colony. Ten birds on nest scrapes or loafing in the colony.
07-Jul	Minsmere	11	Eleven birds foraging 300m offshore from Minsmere Sluice
13-Jul	Dingle	75	Very little foraging activity, with at least 64 birds loafing on the beach. Four birds on nest scrapes in the colony, plus another 6 loafing nearby.
14-Jul	Dingle	10	The influx of birds had gone. Four birds on nest scrapes and a further 5 loafing in the colony. Very little foraging activity.
24-Jul	Dingle	7	Two pairs in the colony, plus another 4 birds loafing nearby. Very little foraging activity.

Table 4.1 (continued) Overview of tern activity at the Dingle and Minsmere Colonies

Date	Colony	Peak little tern count	Overview of activity
25-Jul	Dingle	8	Two pairs breeding in the colony, plus a further 2 birds loafing nearby. Very little foraging activity, involving 1-2 birds.
05-Aug	Dingle	1	Colony abandoned. One bird was seen foraging offshore from Dunwich beach car park.
06-Aug	Dingle	3	None in colony, and up to 3 birds foraging close offshore
06-Aug	Minsmere	0	None seen

Results from the colony surveys indicate that little tern did not breed at Minsmere in 2010, either on the wader scrape or the fenced off 'tern sanctuary area' on the beach. Some courtship behaviour was seen but no serious attempts at breeding were made. Between Dunwich beach and Walberswick, a small breeding colony of little terns was established on the upper reaches of the shingle beach adjacent to Dingle Marshes (located at national grid reference TM489733). Up to 7-8 pairs attempted to breed in the colony, with birds sat on nest scrapes by the end of May and present until the end of July. No successful breeding was observed (no young or fledged birds were seen).

Figures 4.1a-c show the flight lines of little terns recorded from the Dingle colony during May, June and July-August respectively, and **Figure 4.2** show the flight lines from Minsmere during the entire survey period. At Dingle, a large influx of little tern occurred between 22-29 June and birds were present until 13 July. At least 100 birds were present on 30 June, with birds foraging for fish close offshore (generally within 700m of the shoreline) or loafing on the shingle beach. It is likely that these birds were failed breeders from the Kessingland colony, located approximately 15km to the north of the Dingle colony (pers. comm. Robin Harvey, RSPB warden).

During the survey period, birds were seen heading south from both the Dingle and Minsmere colonies, although at both colonies, much of the foraging activity occurred in the shallow waters close offshore (generally within 700m of the shoreline). The pattern of movement at Dingle was primarily of birds moving between the shingle beach and breeding colony to waters close offshore. Birds were also seen commuting and feeding along the shoreline, moving in a north-south and south-north direction. Likewise at Minsmere, birds were seen (albeit in smaller numbers) commuting and foraging along the shoreline or close offshore, moving north and south. The flight line data indicates that birds were moving between Dingle and Minsmere, and were also heading further south along the shoreline and close inshore towards Sizewell. The flight line data provides no clear evidence that terns were heading further out to sea to forage on offshore sandbanks. Much of the foraging activity involved birds diving and catching small fish, with surface feeding also observed. Birds were seen to catch small fish in the close inshore waters off Dingle, and then return to the colony. Results from the surveys provided no evidence to suggest that little terns were experiencing problems in locating fish in the waters close to the Dingle colony, with numerous successful foraging attempts observed.

At Minsmere, some successful foraging activity was observed, both diving for fish and surface feeding for invertebrates, although generally, the level of activity was low compared to that at

Dingle due to the small number of individuals involved. Some courtship behaviour was seen on the wader scrape and beach during May and early June, but by the end of June occurrence had become sporadic with no serious attempts at breeding noted. Most of the sightings at Minsmere from mid-June to the end of July were of birds foraging briefly offshore, after which they would frequently fly onto the wader scrape on the reserve (South scrape) to rest.

4.2 Little Tern Foraging Surveys

A total of six 45 minute watches were undertaken from each VP between 10 May and 20 July 2010 (two watches each month). **Table 4.2** lists each record of little tern activity noted during the surveys. **Figure 4.3** shows the flight lines of little terns recorded during the surveys, and where foraging activity was observed.

Table 4.2 Flights of Little Terns during foraging surveys

Survey date	VP	Count of birds	Flight direction	Activity	Distance offshore(m)
27-May	2	4	South	Commuting	0-100
08-Jun	1	4		Foraging (diving)	200-400
08-Jun	1	2		Foraging (diving)	200-500
08-Jun	2	1		Foraging (diving)	0-100
08-Jun	2	1	South	Foraging (diving)	50-200
08-Jun	2	1	South	Commuting	0-100
08-Jun	3	1	North	Commuting	300-400
08-Jun	5	2		Foraging (diving)	0-50
08-Jun	6	3	South	Foraging (diving)	0-100
24-Jun	6	2	North	Foraging (diving)	0-200
05-Jul	2	3	North	Foraging (diving)	500
20-Jul	1	3		Foraging (diving)	0-200
20-Jul	1	1		Foraging (diving)	0-200
20-Jul	1	28	North	Foraging (diving & surface pickup)	500-700
20-Jul	1	6		Foraging (diving)	200-400
20-Jul	1	10	North	Foraging (diving)	0-100
20-Jul	1	2	North	Commuting	500
20-Jul	1	1		Foraging (diving)	400
20-Jul	1	6	North	Commuting	0-100
20-Jul	1	1		Foraging (diving)	0-50
20-Jul	1	2		Foraging (diving)	600-800

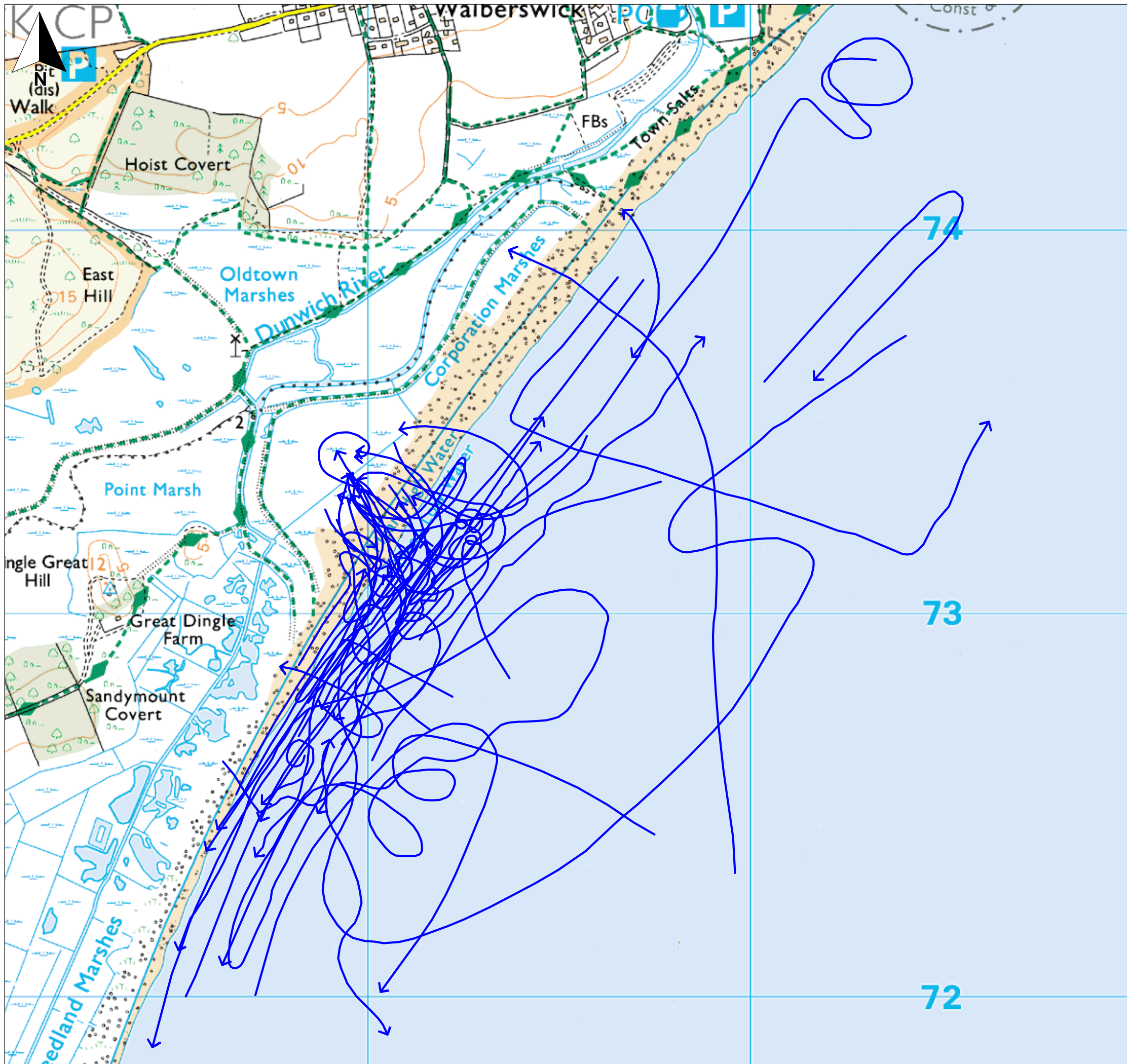
Table 4.2 (continued) Flights of Little Terns during foraging surveys


Survey date	VP	Count of birds	Flight direction	Activity	Distance offshore(m)
20-Jul	1	2		Foraging (diving)	300-400
20-Jul	1	3		Foraging (diving)	400-500
20-Jul	1	2		Foraging (diving)	600-800
20-Jul	2	1	North	Commuting	400-600
20-Jul	3	8	South	Commuting	400
20-Jul	6	2		Foraging (surface pickup)	500

The data presented in **Table 4.2** shows that much of the little tern activity was recorded on two survey dates: 8 June and 20 July. Most of the records of foraging terns were from VPs 1 and 2, located between Sizewell and Minsmere. The largest numbers of birds were recorded foraging offshore from VP1 on 20 July, including a peak count of 28 birds foraging and heading north towards Minsmere. Birds were also seen as far south as Thorpeness (VPs 5 and 6), although activity in this area was generally brief and involved small numbers of birds (2-3 birds seen on three survey dates). Apart from the activity noted on 20 July, very few birds were seen foraging offshore from Sizewell.

Much of the foraging activity between VPs 1 and 6 was in the shallows waters within 500m of the shore and involved birds diving to catch small fish. Results from the surveys provided no evidence to indicate that birds were flying further out to sea to forage. Figure 2.2 shows that potential feeding areas for little tern in the survey area and largely confined to shallow waters within 500m of the low water mark, apart from at Thorpeness, where a sand bank extends further offshore.

Sizewell B Power Station did however remain offline from 27 May until after the end of the survey period. As a consequence, fish numbers around the outfall were likely to be at much lower levels than normal (the warm water emitted from Sizewell B outfall attracts large numbers of fish to the area), and consequently the number of terns (particularly common tern) and gulls were likely to be much lower than normal. At least 15 common terns and 30 black-headed gulls were seen feeding around the outfall on 27 May (the last day it was operational during the survey period) after which very few were noted. Large numbers of common terns did however continue to forage offshore from Minsmere during June and early July.



Key
 Flight line

0 m 500 m
 Scale 1:10,000 @ A3

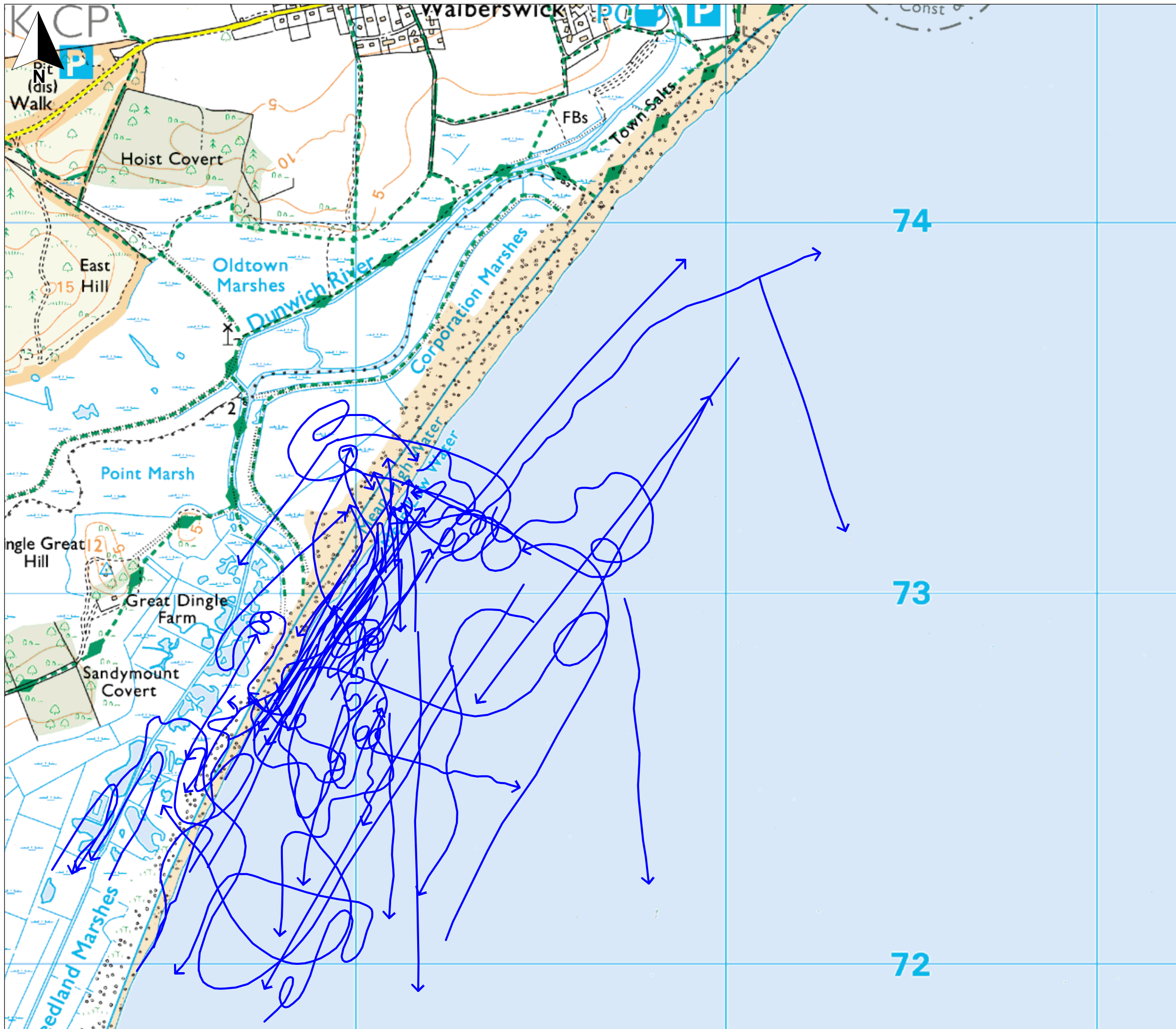



Sizewell Little Tern Report

Figure 4.1a
Flight lines of little terns at the Dingle colony in May 2010

October 2010
 28130-A14.wor tugwc

Entec



Key
 Flight line

0 m 500 m
 Scale 1:10,000 @ A3

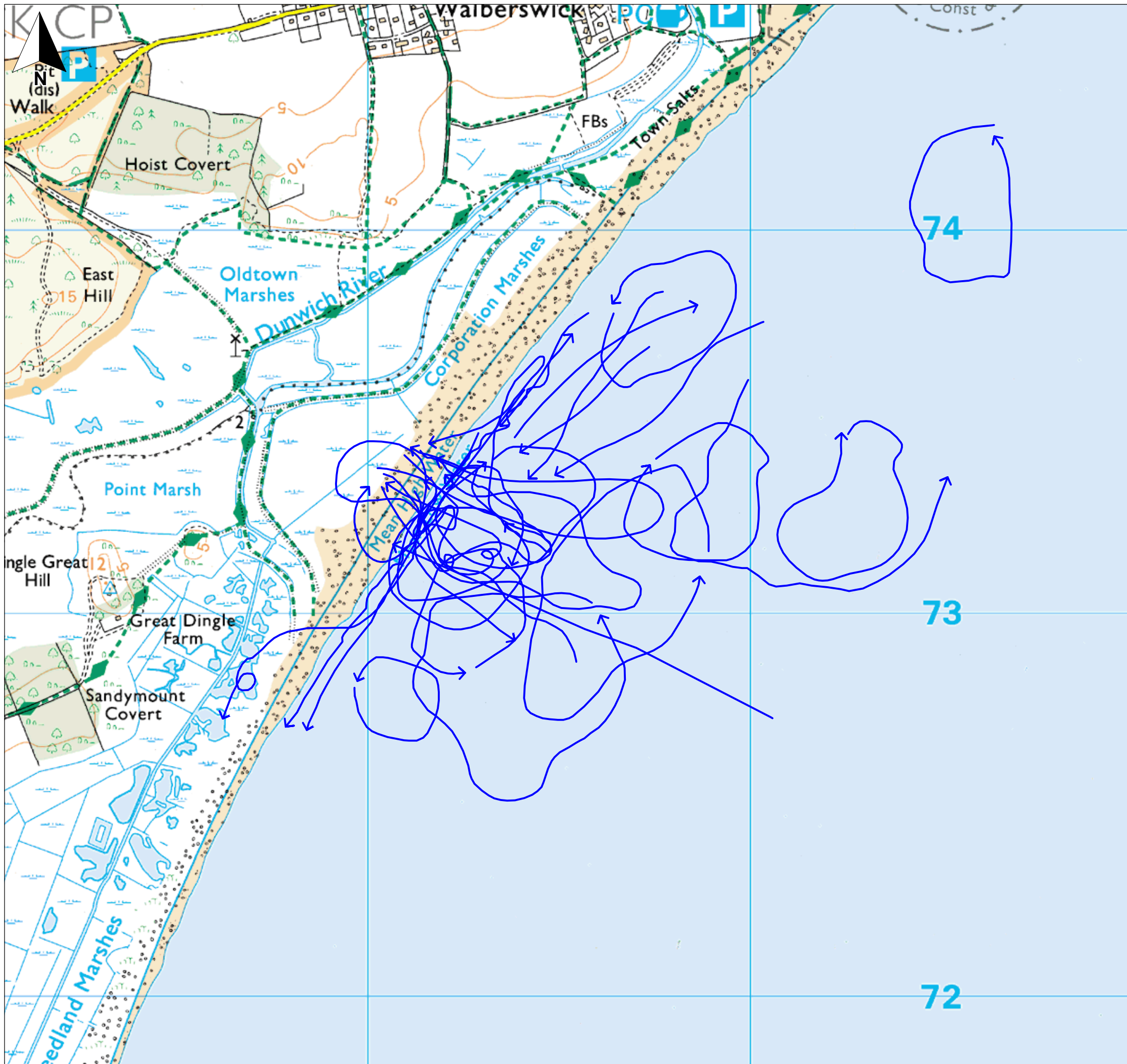



Sizewell Little Tern Report

Figure 4.1b
Flight lines of little terns at the Dingle colony in June 2010

October 2010
 28130-A15.wor.tugwc

Entec



Key
 Flight line

0 m 500 m
 Scale 1:10,000 @ A3

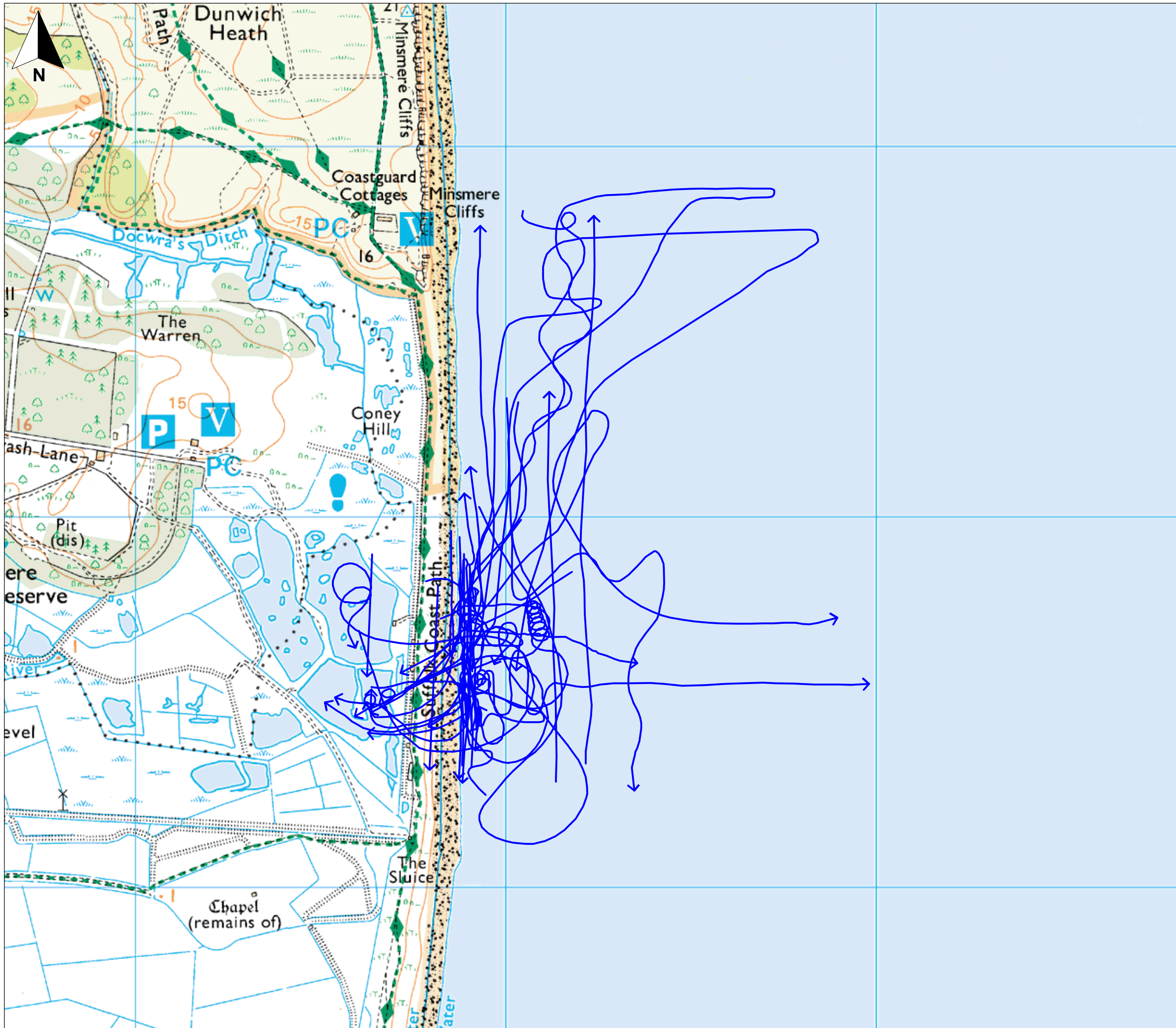



Sizewell Little Tern Report

Figure 4.1c
Flight lines of little terns at the Dingle colony in July and August 2010

October 2010
 28130-A16.wor tugwc





Key
 Flight line

0 m 500 m
 Scale 1:10,000 @ A3

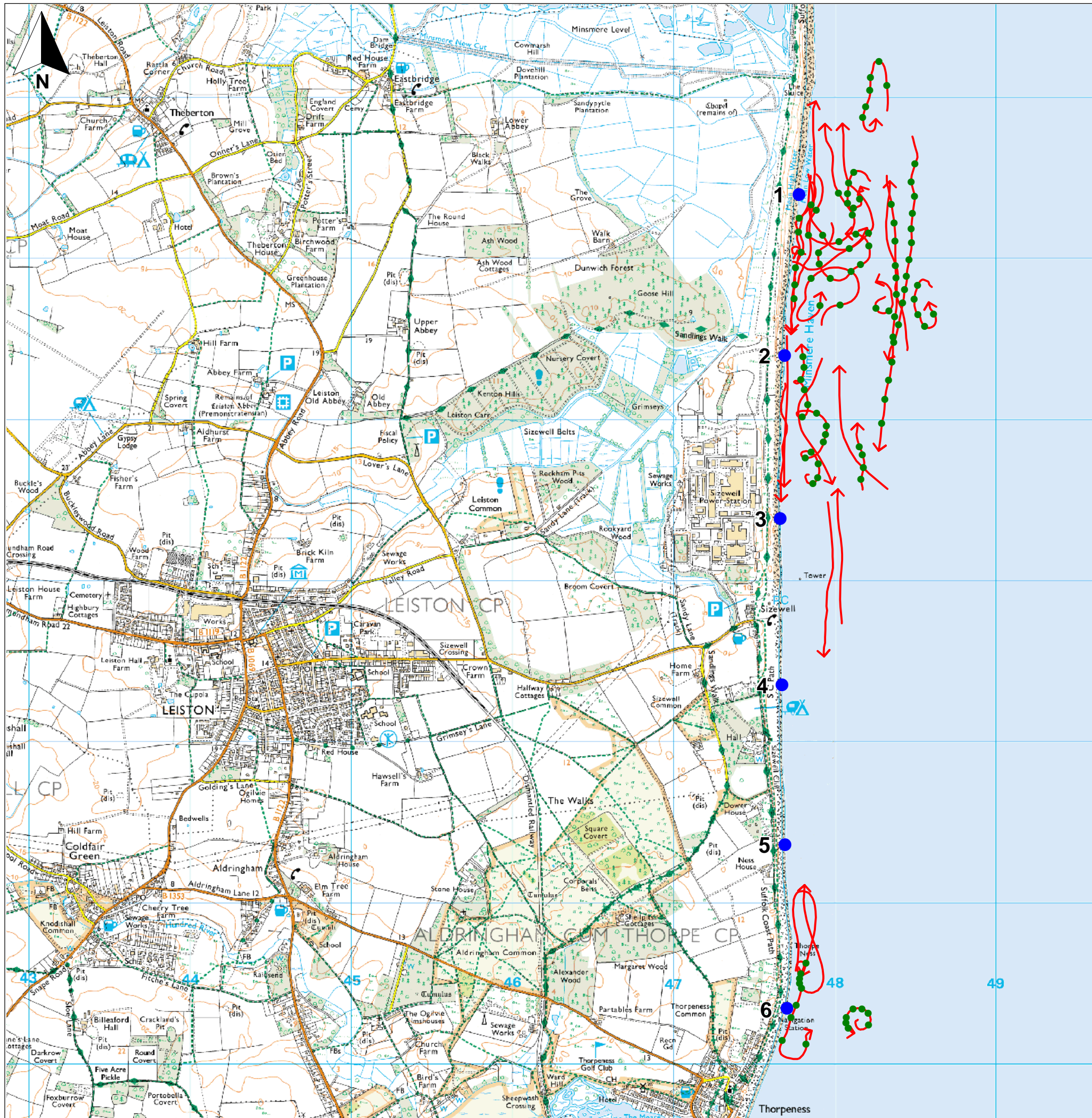


Sizewell Little Tern Report

Figure 4.2
Flight lines of little terns at the Minsmere colony between May and August 2010

October 2010
 28130-A17.wor.tugwc





Key

- 1 ● Vantage points
- Feeding observed
- Flight line

0 m 1000 m
Scale 1:25,000 @ A3



Sizewell Little Tern Report

Figure 4.3
Flight lines of little terns at
Sizewell and Thorpeness

October 2010
28130-A20.wor.tugwc



5. Discussion

5.1 Little Tern Prey Study

Before any conclusions can be reached regarding the likely impact of cooling water discharge on the main prey of little terns on the Suffolk coast, it must be emphasised that the potential area affected by water temperature increase is likely to be relatively small. In open coast conditions, such as those at Sizewell, the dispersal potential from any outfall is much greater than in a restricted bay. Prior to any assessment of impacts taking place, modelling of the plume would be required in order to evaluate the scale of the area which would be affected by waters of elevated temperatures. This would then need to be related to the size of the foraging area.

Despite uncertainties in the size of the area which would be affected, it is clear that even a 1°C rise in temperature would take the ambient sea water temperatures above the range tolerated by both herring and ghost shrimps (18°C) for a longer period of the year (up to 6 weeks more). Although juvenile herring inhabit inshore waters, there is evidence from further up the coast (Scroby Sands) that their numbers drastically decline in August (Perrow *et al.*, 2005), corresponding with water temperatures exceeding 18°C. Juvenile herring remain in the inshore nursery areas for the first two years of their lives, and hence it would seem that they have simply moved to deeper waters within the nursery area where water temperatures would be lower. Juvenile herring are particularly important for little tern chicks, due to their high protein and fat content. Any decline in juvenile herring numbers, or movement into deeper water (thus making them unavailable to the little terns) earlier in the year may affect the breeding success of little terns.

Sprat, however, are tolerant of warmer water conditions, and compete with herring for the same food (zooplankton), hence any reduction in the number of herring may be accompanied by an increase in sprat. Little terns are known to be 'non-fussy' in their diet, and hence may simply switch to sprat instead of herring. However the juvenile sprat present during the summer months will be 1 year olds, as the young of the year (YOY) do not migrate to the inshore nursery grounds until autumn (ICES, 1990). One year old sprat are the same size, or smaller than 0-group herring, and therefore a switch to sprat should not present a problem to little terns, in terms of prey size. In terms of numbers, it is predicted that the majority of the sprat stock biomass is made up of 0-group individuals, so it is possible that there would be less food available to little terns (i.e. the one-year old sprat would provide a smaller quantity of food to little tern, than the 0-group herring). However, sprats are abundant in the southern North Sea, and their relative abundance in the waters around Scroby sands has been recorded as equal to or greater than that of herring over a number of years (Perrow *et al.*, 2005). Another potential problem for little terns, is that if herring are not available and sprat have a bad year (as with herring, stock is annually variable), there would be fewer options to them in terms of prey.

Warmer sea temperature could also affect the spawning and reproductive success of some of the little tern prey species. Sprat spawn offshore, hence would not be affected by increased water temperatures along the coast. Herring on the other hand, spawn inshore and their spawning is temperature dependant (Anderson & Karas, 1990). One possible impact of elevated water temperatures would be to prolong the autumn spawning period into winter. The impact of an

extended spawning period is not known, however given the small area that would be affected, compared to the size of herring spawning areas, is unlikely to impact the herring population as a whole.

Spawning in ghost shrimps and *Idotea linearis* are also dependant on temperature and an increase of ambient water temperature of just 1°C would take the temperature over their optimum reproductive range for several extra weeks per year. As these crustacean species are none-migratory and have small home ranges, this affect could potentially impact their populations on a small spatial scale.

In terms of the potential for greater predation and/or competition with increased water temperatures, this is particularly difficult to assess in the marine environment owing to the numerous life history stages and complex food webs of marine organisms. Given the limited area likely to be affected by the cooling water, any changes in rates of predation or competition are unlikely to affect the populations of little tern prey species.

The extent to which the cooling water discharge will affect the habitat and food webs of the four prey species, primarily depends on whether the cooling water will be chlorinated. Herring, sprat and *Idotea linearis* all feed on zooplankton and the ghost shrimp feeds on detritus. Both these food sources ultimately depend on phytoplankton, the production of which is negatively affected by chlorination of the water.

In the absence of chlorination, localised warming may result in an increase in phytoplankton production, if sufficient nutrients are available. Any increase in the phytoplankton biomass will allow a greater zooplankton production and thus greater food availability for herring, sprat and ghost shrimp, and ultimately *Idotea linearis*. Hence these species may congregate to feed within the area of the cooling waters, so long as the maximum temperature they can tolerate is not exceeded.

5.2 Little Tern Surveys

Data provided by Alan Miller (SWT Warden) indicates that at least 3-4 pairs of little tern attempted to breed at Dingle in 2010, but failed to fledge any young. Nearby, at Dunwich, 10 pairs also attempted to breed but again failed to rear any young, due to predation by gulls. North of Dingle, birds at Kessingland also failed, but 30 pairs at Benacre managed to fledge 15 young. Results from the Entec colony surveys undertaken in 2010 support the findings from SWT in that there was no evidence of successful breeding at Dingle. Results from the Entec surveys indicated that breeding was not attempted at the Minsmere colony (3km north of Sizewell) in 2010. Breeding numbers at colonies along the Suffolk coast have varied considerably between years (see **Table 5.1**).

Table 5.1 Numbers of Little Tern at colonies in Suffolk (2005-08)³

Colony	Approx. Distance from Sizewell	2009	2008	2007	2006	2005
Bawdsey	25km south	0	0	0	0	4
Benacre	20km north	0	N/a	N/a	40	9
Covehithe	19km north	0	0	0	0	4
Dingle Marshes	9km north	11	2	2	2	1
Dunwich	6km north	20	0	0	0	0
Havergate Island	16km south	0	0	0	3	0
Kessingland	22km north	0	0	0	0	N/a
Minsmere	3km north	1	41	12	7	36
Slaughden	8km south	0	0	5	0	7
Trimley Marshes	33km south	0	0	0	0	10

Results from the foraging and colony surveys indicate that much of the foraging activity by little terns is concentrated close inshore (i.e. within 500-700m of the shoreline) around the colonies. Birds were however seen commuting along the shoreline and close inshore waters to forage further afield. Foraging activity was recorded off Sizewell beach and as far south as Thorpeness (12km south of the Dingle colony). Preliminary modelling work to assess where the cooling water discharge might flow (from a potentially suitable location for the new outfall facility), indicates that close inshore waters to the south of Sizewell will be potentially most effected (at least as far south as Thorpeness).

Sizewell is located 3km south of the Minsmere little tern colony and therefore is within the regular foraging range of 5km for this species (Langston, 2008). The cooling waters emitted from the proposed outfall at Sizewell will spread south and therefore away from the Minsmere (and Dingle and Dunwich) tern colony. Shallow waters that are suitable for foraging little tern that could be potentially effected by the cooling water discharge are located adjacent to the beach between Sizewell and Thorpeness. These foraging grounds are located 3-6km south of Minsmere and therefore are partly within the regular foraging range for little terns provisioning chicks with small fish. Perrow *et al.*, (2005) found that most foraging activity for the provisioning of chicks around the Norfolk colonies at Winterton and Great Yarmouth occurred within approximately 2km of the breeding sites. Results from the colony surveys also indicate that much of the foraging activity around the Minsmere and Dingle colonies occurs close by (i.e. within 500-700m). Results from the foraging surveys between Sizewell and Thorpeness indicate that little terns also make occasional (albeit relatively infrequent) forays into the shallow waters south of Sizewell to hunt for fish. There was no evidence from either the colony or foraging surveys to indicate that little terns were routinely heading further out to sea to hunt over any offshore sandbanks.

³ Data derived from Suffolk Birds 2005-2008 respectively

The Sizewell B outfall was not operational during much of the 2010 survey period (it remained offline from 27 May until after the end of the survey period), although little terns (unlike common terns) are not known to concentrate in this area for feeding (pers. Comm. Robin Harvey, Minsmere RSPB warden).

Overall, evidence from the desk study and 2010 surveys indicates that little tern foraging activity is likely to be concentrated in shallow waters close to the breeding colonies (see Figures 2.2 and 2.3), with occasional forays by birds further along the coast into the area potentially affected by the cooling water discharge. However, the situation in 2010 was complicated by the absence of operational Sizewell B outfall facility throughout much of the survey period, the lack of breeding at Minsmere and by the presence of large numbers of failed breeding birds (from a colony or colonies to the north of Dingle) during late June and early July. The increase in sightings of little tern foraging between Sizewell and Thorpeness on 20 July could also have been due to the presence of failed breeders from colonies outside Dingle/Minsmere. It is likely that the foraging grounds to the south of Sizewell are used occasionally by little terns from the Minsmere and Dingle colonies. The Dingle colony is however located 9-12km north of this area and is therefore well outside the usual foraging range for birds provisioning chicks (see Figure 1.1). Larger numbers of little terns may occur in this area, due to breeding failure at Dingle or Minsmere, but also from other colonies along the Suffolk and Norfolk coast.

6. Conclusions

The most likely and potentially significant affect is that warmer water temperatures (+18°C) in summer (June – September) may prompt avoidance behaviour by herring and ghost shrimp. Sprat and *Idotea linearis* are more tolerant of warmer water conditions and may take advantage of the lack of competition and increase in numbers in this area. How this will affect little terns is unknown.

Results from the desk study and surveys undertaken at the Minsmere and Dingle colonies, and between Sizewell and Thorpeness indicate that much of the foraging activity (for the provisioning of chicks) is concentrated close (i.e. within 2km) to the colonies, and that the suitable foraging areas between Sizewell and Thorpeness that could be potentially effected by the cooling water discharge are not important hunting grounds for this species. This suggests that the proposed development at Sizewell is unlikely to adversely effect the Minsmere and Walberswick SPA little tern population.

However, breeding did not occur at Minsmere in 2010, a colony which is located within the regular foraging distance of the potentially effected feeding grounds south of Sizewell. During years when large numbers of little tern breed at Minsmere (for example, in 2008), greater use maybe made of foraging grounds around and to the south of Sizewell (i.e. those that might be potentially effected by the cooling water discharge). The interchange of birds between the Dingle and Minsmere colonies is most likely due to prey availability close to the colony locations, but also due to the suitability of the nesting habitat and colony site (Robin Harvey, RSPB warden, email dated 13 December 2010). Robin Harvey also notes that the beach at Minsmere has been eroded in the last two years to such an extent that it is now relatively narrow. As a consequence of this, the effects of disturbance by humans on nesting little terns have become greater. In contrast, the beach at Dingle is widening and becoming flatter, providing a greater area of suitable nesting ground for little tern. In the medium to long-term, Minsmere beach may cease to provide a suitable location for nesting little terns.

There also remain uncertainties about the extent of the plume of cooling water (i.e. how far it will extend along the coast), and the degree of warming predicted. Recent modelling work indicates that the plume may extend south of Thorpeness, as far south as Orfordness. If this were to happen, there would be the potential for the cooling waters to affect little terns breeding at Slaughden (part of the Alde-Ore Estuary SPA). A breeding population of little tern of European importance (48 pairs, Stroud *et al.*, 2001) is a qualifying feature for the Alde-Ore Estuary SPA, and therefore there is the potential for the development to effect the integrity of the SPA.

In light of these uncertainties, further work to determine where little terns are foraging along the coast may need to be undertaken. It is also recommended that once modelling work has been completed to determine where the plume is predicted to spread, the overlap between the plume and shallow waters is mapped, and the proportion of the Minsmere colony's foraging area (potentially lost) calculated.

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Appendix A

Survey Dates and Times

5 Pages

Table A1 **Dates and time of Little Tern colony surveys**

Date	Time (from)	Time (to)	Colony surveyed	Low tide	High tide	Wave height (cm)	Wind direction	Wind strength (Beaufort Scale)	Cloud cover (of 8)	Precipitation	Visibility
04-May-10	13:20	15:20	Minsmere	07:55	14:09	150	NE	5	8	Raining	Moderate to good
04-May-10	16:40	18:40	Dingle	07:55	14:09	120	NE	4	7	Light rain	Good
05-May-10	08:30	10:30	Dingle	08:37	14:56	50	S	3	4	None	Good
05-May-10	12:45	14:45	Minsmere	08:37	14:56	50	S	2-3	2	None	Good
15-May-10	11:45	13:45	Dingle	17:26	23:33	5	NE	1	3	None	Good
15-May-10	16:00	18:00	Minsmere	17:26	23:33	5	NE	1	7	None	Very good
16-May-10	11:25	13:25	Minsmere	05:40	11:53	5	W	1-4	8	None	Very good
16-May-10	16:15	18:15	Dingle	18:10	00:19	5	W	3	5	None	Very good
20-May-10	08:55	10:55	Minsmere	08:42	14:57	30	SW	2	4	None	Very good
20-May-10	12:00	14:00	Dingle	08:42	14:57	30	S	2-3	6	Light rain	Very good
24-May-10	11:20	13:20	Minsmere	13:22	19:17	10	SE	1	1	None	Very good
24-May-10	14:40	16:40	Dingle	13:22	19:17	10	SE	2	2	None	Very good
29-May-10	07:45	09:45	Minsmere	06:09	12:29	50	SE	3	7	Showers	Very good
29-May-10	10:50	12:50	Dingle	06:09	12:29	50	SE	3	8	None	Very good
30-May-10	10:25	12:25	Minsmere	06:51	13:09	10	W	3	7-3	Light rain	Very good
30-May-10	14:45	16:45	Dingle	13:09	19:08	10	W	3-5	4	None	Very good
05-Jun-10	15:45	17:45	Dingle	11:55	18:18	10	N-W	1-2	5-8	None	Very good

Table A1 (continued) Dates and time of Little Tern colony surveys

Date	Time (from)	Time (to)	Colony surveyed	Low tide	High tide	Wave height (cm)	Wind direction	Wind strength (Beaufort Scale)	Cloud cover (of 8)	Precipitation	Visibility
05-Jun-10	18:50	20:50	Minsmere	11:55	18:18	20	NNE	3	8	None	Moderate to good (fog offshore)
06-Jun-10	09:10	11:10	Dingle	07:12	13:01	20	NNE	3-4	8	None	Moderate to good (fog offshore)
06-Jun-10	12:40	14:40	Minsmere	13:01	19:13	20	NE	3	8	None	Good
11-Jun-10	12:00	14:00	Dingle	10:47	16:38	30	Variable	1	8	None	Good
11-Jun-10	15:40	17:40	Dingle	16:38	23:08	20	E	2	1	None	Very good
12-Jun-10	08:15	10:15	Dingle	05:07	11:32	10	W	2	8-5	None	Very good
12-Jun-10	12:25	14:25	Minsmere	11:32	17:30	20	W	2-3	4-2	None	Very good
21-Jun-10	13:45	15:45	Dingle	13:00	19:12	30	E	1-2	8-2	None	Very good
21-Jun-10	16:50	18:50	Minsmere	13:00	19:12	20	E	1	2	None	Very good
22-Jun-10	09:20	11:20	Minsmere	08:50	14:50	20	NE	2-3	0	None	Very good
22-Jun-10	13:45	15:45	Dingle	14:50	21:13	20	ENE	2	1	None	Very good
29-Jun-10	09:10	11:10	Minsmere	07:57	14:16	20	SE	3	3	None	Good
29-Jun-10	15:40	17:40	Dingle	14:16	20:25	50	SE	4-5	6	None, but heavy rain nearby	Good
30-Jun-10	09:15	11:15	Dingle	08:31	14:52	50	SE	3	4	None	Very good
30-Jun-10	16:00	18:00	Dingle	14:52	21:00	50	SE	3-4	6	None	Very good
05-Jul-10	07:50	09:50	Dingle	08:58	15:22	60	W	4	2	None	Very good
05-Jul-10	11:20	13:20	Minsmere	08:58	15:22	60	W	4	2	None	Very good

Table A1 (continued) Dates and time of Little Tern colony surveys

Date	Time (from)	Time (to)	Colony surveyed	Low tide	High tide	Wave height (cm)	Wind direction	Wind strength (Beaufort Scale)	Cloud cover (of 8)	Precipitation	Visibility
07-Jul-10	07:10	09:10	Dingle	00:00	06:48	120	S	6	7	None	Very good
07-Jul-10	10:40	12:40	Minsmere	12:18	18:36	80	S	6-4	8	Light rain	Good
13-Jul-10	12:35	14:35	Dingle	12:44	18:52	50	NE	3	8	None	Very good
13-Jul-10	15:30	17:30	Dingle	12:44	18:52	50	ENE	2	8	None	Very good
14-Jul-10	11:00	13:00	Dingle	07:12	13:31	50	SE	3	8	Light rain	Good
14-Jul-10	13:50	15:50	Dingle	13:50	15:50	50	S	3	8	Light rain	Good
24-Jul-10	16:30	18:30	Dingle	16:35	23:11	20	S-W	2-3	4	None	Good
24-Jul-10	19:00	21:00	Dingle	16:35	23:11	20	W	2	4	None	Good
25-Jul-10	08:00	10:00	Dingle	04:52	11:13	10	NW	2	8	Light rain	Good
25-Jul-10	11:15	13:15	Dingle	11:13	17:20	10	NW	2	8	Light rain	Good
05-Aug-10	16:15	18:15	Dingle	12:31	19:02	5	E	1	2	None	Good
05-Aug-10	19:00	20:30	Dingle	19:02	01:21	5	E	0-1	3	None	Good
06-Aug-10	10:20	12:20	Dingle	07:51	13:51	30	SE	4	0	None	Good
06-Aug-10	14:00	15:30	Minsmere	13:51	20:29	30	SE	4	0	None	Good

Table A2 Dates and times of Little Tern foraging surveys

Date	Time (from)	Time (to)	VP	Low tide	High tide	Wave height (cm)	Wind direction	Wind strength (Beaufort Scale)	Cloud cover (of 8)	Precipitation	Visibility
10-May-10	08:45	09:20	1	01:51	08:34	60	NNE	4-5	6	None	Very good
10-May-10	09:50	10:35	2	01:51	08:34	90	NNE	4-5	3	None	Very good
10-May-10	10:55	11:40	3	01:51	08:34	100	NNE	5	2	None	Very good
10-May-10	12:00	12:45	4	14:07	19:57	80	NNE	4-5	6	None	Very good
10-May-10	13:05	13:50	5	14:07	19:57	60	NE	4	6	None	Very good
10-May-10	14:35	15:20	6	14:07	19:57	90	NE	4	6	Light rain	Very good
27-May-10	15:10	15:55	1	16:06	22:07	80	SSE	5-6	4	Light rain	Very good
27-May-10	14:10	14:55	2	16:06	22:07	90	SSE	4-5	2	None	Good, light heat haze
27-May-10	13:10	13:55	3	16:06	22:07	60	SSE	3-4	8	Light rain	Misty
27-May-10	12:05	12:50	4	16:06	22:07	60	SE	2-3	8	Light rain	Very good
27-May-10	10:20	11:05	5	16:06	22:07	60	SE	2	8	None	Good, light heat haze
27-May-10	09:15	10:00	6	16:06	22:07	100	S	1	8	None	Moderate, some heat haze
08-Jun-10	08:15	09:00	3	00:59	07:40	90	ESE	5-6	8	None	Very good
08-Jun-10	09:15	10:00	2	00:59	07:40	100	SE	5	8	Light rain	Moderate, some mist
08-Jun-10	10:15	11:00	1	13:11	19:14	90	ESE	5	8	None	Misty offshore at 1.5km
08-Jun-10	11:55	12:40	4	13:11	19:14	60	SE	4	7	Showers	Misty offshore at 1km
08-Jun-10	13:40	14:25	6	13:11	19:14	100	SE	3-4	2	None	Very good
08-Jun-10	14:40	15:25	5	13:11	19:14	60	SE	3-4	4	None	Very good

Table A2 (continued) Dates and times of Little Tern foraging surveys

Date	Time (from)	Time (to)	VP	Low tide	High tide	Wave height (cm)	Wind direction	Wind strength (Beaufort Scale)	Cloud cover (of 8)	Precipitation	Visibility
24-Jun-10	20:15	21:00	1	15:05	21:11	20	N	3	3	None	Very good
24-Jun-10	19:15	20:00	2	15:05	21:11	20	NNW	3-4	7	None	Very good
24-Jun-10	18:15	19:00	3	15:05	21:11	30	NNW	4	8	None	Very good
24-Jun-10	17:15	18:00	4	15:05	21:11	20	NW	2	7	None	Very good
24-Jun-10	16:15	17:00	5	15:05	21:11	30	S	3	7	None	Good, a little heat haze
24-Jun-10	15:15	16:00	6	15:05	21:11	40	S	3	6	None	Very good
05-Jul-10	17:55	18:40	1	08:58	15:22	70	E	5-6	2	None	Very good
05-Jul-10	17:00	17:45	2	08:58	15:22	60	NE	5	5	None	Very good
05-Jul-10	15:55	16:40	3	08:58	15:22	40	SE	5-6	5	None	Very good
05-Jul-10	14:55	15:40	4	08:58	15:22	40	S	4-5	4	None	Very good
07-Jul-10	14:50	15:35	5	08:58	15:22	90	S	4-5	6	None	Very good
07-Jul-10	13:50	14:35	6	08:58	15:22	100	S	5	8	None	Very good
20-Jul-10	08:15	09:00	1	11:00	17:34	20	SE	3	7	None	Very good
20-Jul-10	09:55	10:40	2	11:00	17:34	15	SE	3	8	None	Very good
20-Jul-10	11:00	11:45	3	11:00	17:34	20	SE	3	7	None	Moderate heat haze
20-Jul-10	11:55	12:40	4	11:00	17:34	20	SE	3	8	None	Moderate heat haze
20-Jul-10	15:00	15:45	5	11:00	17:34	25	SE	4	8	None	Misty at 1km
20-Jul-10	14:00	14:45	6	11:00	17:34	15	SE	2	7	None	Moderate heat haze

EDF Energy

**Sizewell C New Nuclear Power Station:
Terrestrial and Freshwater Ecology, and
Ornithology**

DRAFT Arable Reversion Areas, Breeding Bird Survey Report 2012

September 2012

AMEC Environment & Infrastructure UK Limited



Report for

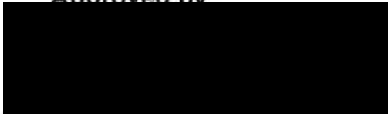
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Sizewell C New Nuclear Power Station: Terrestrial and Freshwater Ecology, and Ornithology

DRAFT Arable Reversion Areas, Breeding
Bird Survey Report 2012

September 2012

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Document Revisions

No.	Details	Date
1	First draft to Client	Sept 2012

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1. Introduction

1.1 Purpose of this Report

An area of land directly north of Sizewell B Nuclear Power Station, which is located near Leiston in Suffolk, has been identified as having the potential to accommodate the proposed development of one or more new nuclear reactors. This proposed development is known as Sizewell C. The site of the proposed development has an approximate central National Grid Reference (NGR) of TM473640.

AMEC Environment & Infrastructure UK Ltd (formerly Entec UK Limited) was commissioned by EDF Energy in 2012 to undertake a breeding bird survey of two blocks of land (referred to in this report as the North Site and South Site respectively) that have been identified as having the potential to be converted from agricultural use to heathland (recreation and/or conservation use). The purpose of this report, which outlines the findings of survey work undertaken for breeding bird species in 2012, is to provide baseline information on the value of the two sites to breeding birds to inform the design of Sizewell C and the Environmental Statement for the scheme.

It should be noted that this report contains information relating to the nest locations of species listed on schedule 1 of the Wildlife & Countryside Act 1981 (as amended). As such, the report should be treated as **confidential** and should not enter the public domain.

1.2 Scope

Breeding bird surveys were undertaken in much of the Sizewell Estate in 2007 (the survey area included all but the northern third of the North Site and all of the South Site). In 2007, a desk study was also undertaken to provide contextual information about the bird interest of the area, including details of statutory designated sites of nature conservation interest within 5km of the proposed new build area. Results of the desk study and 2007 breeding bird surveys are provided in the Sizewell First Interim Bird Report (Entec, 2008).

Results from breeding bird surveys are generally considered by consultees (such as Natural England and RSPB) to remain valid for three years. Therefore, in order to provide an update on baseline conditions at the two sites, the breeding bird surveys were repeated in spring 2012.

The survey area and methodologies used in 2012 have been adopted following consultation with statutory and non-statutory consultees and other stakeholders, taking into account best practice guidelines, and site-specific and project-specific characteristics.

The survey area adopted includes all land within the boundaries of the two sites, and that land where access permission was available within 100m of the site. The location of the survey areas are shown on **Figure 1.1**.

1.3 Survey Area Description

1.3.1 North Site

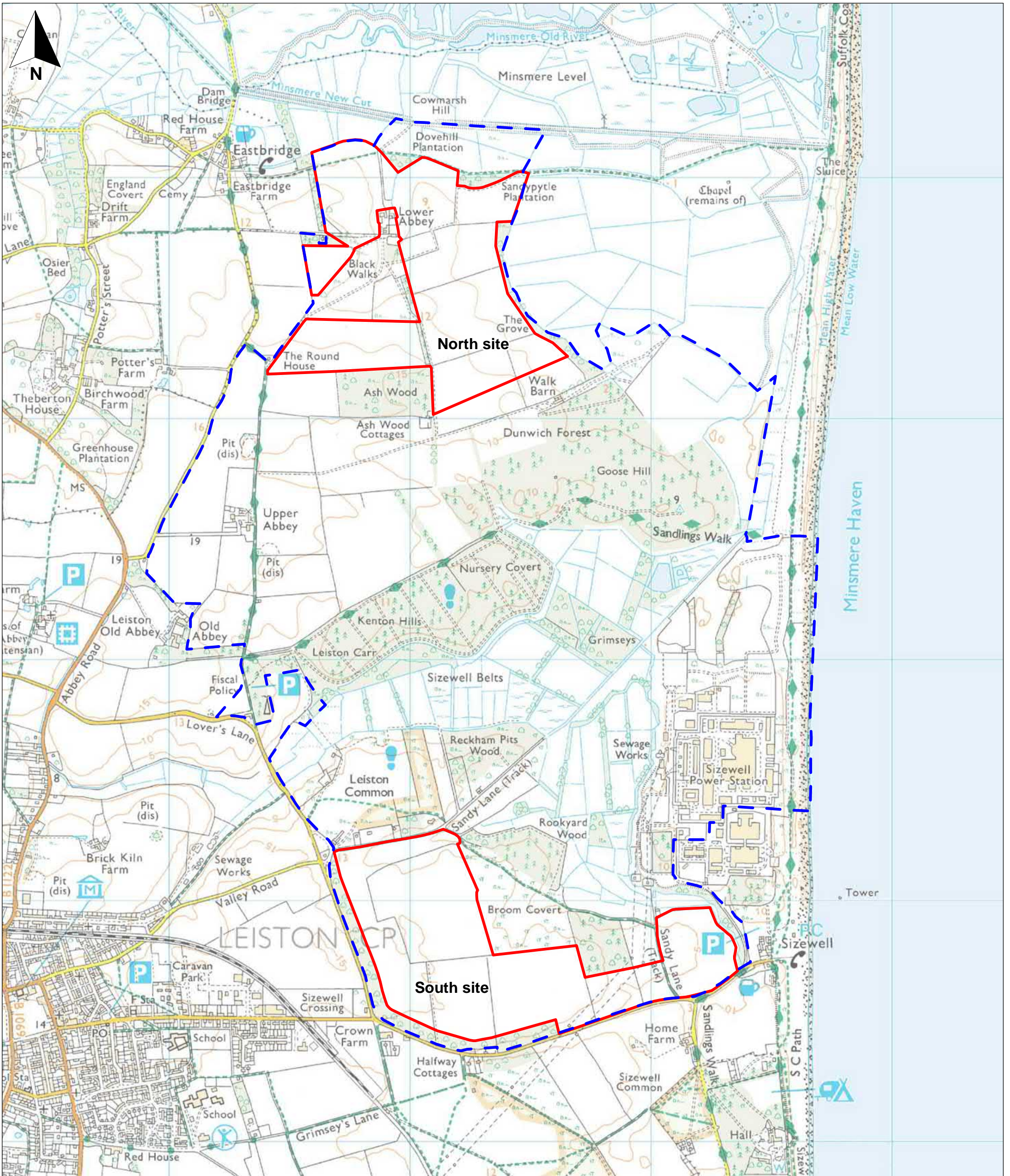
The North Site (which covers approximately 67ha) is located in the northern most part of the Sizewell Estate. Land within the site boundary primarily comprises arable farmland, which at

the time of the survey was given over to the cultivation of winter wheat, onions and potatoes. There are eight fields of varying size within the site whose boundaries were made up of hedgerows and belts of trees and woodland.

The north of the site is bounded by two blocks of deciduous woodland (Doveshill and Sandpyrtle plantations) and a footpath running east-west from the Minsmere sluice to Eastbridge village. North of this is Cowmarsh Hill (an area of wet grassland with water and reed-filled ditches) to the north of which is the main reedbed of the Minsmere RSPB nature reserve (200-300m north of the North Site boundary). The west of the site is bounded by hedgerows, arable farmland and a belt of coniferous plantation and scrub in the north, south of which (also bounding the site) is Lower Abbey Farm (an area of farm buildings, gardens and scrub) and Black Walks (an area of short, rabbit-grazed unimproved grassland and scrub). To the south of the site is more arable farmland, a block of mixed coniferous-deciduous woodland (Ash Wood), and a recently planted (less than 10 years ago) belt of coniferous plantation. The east of the site is bounded by a narrow belt (20-100m wide) of deciduous woodland (The Grove), to the east of which are the Minsmere Levels, an extensive area of seasonally flooded grazing marsh, dissected by reed-lined ditches.

1.3.2 South Site

The South Site (which covers approximately 68ha) is located at the far southern end of the Sizewell Estate. The site itself comprises seven moderate-large fields of arable farmland and grassland. The arable fields are open in character, either with no boundary feature or with gappy hedgerows. At the time of the surveys, the seven fields (from west-east and north-south) contained: onions, fallow land/uncultivated, sugar beet, parsnips, potatoes and two fields of rough, semi-improved grassland respectively. Along the southern and western boundaries of the site (adjacent to Lover's Lane) there is a narrow belt (50-60m wide) of coniferous trees and scrub behind which (on the opposite side of the road) are Crown Farm and Halfway Cottages. The north of the site is bounded by Sandy Lane where in the northwest are a number of residential properties with large gardens. North of this is Leiston Common, an area of short, rabbit and stock grazed unimproved grassland, part of which is the Leiston Common County Wildlife Site. The east of the site is bounded by Broom Covert (an area of short semi-improved grassland and scrub, grazed by cattle in winter) and to the south of this by a block of mature conifer plantation. East of this (50-150m east of the site) is the Sizewell Marshes SSSI, an area of wet unimproved grassland lined by water-filled ditches. The south east of the site is bounded by a belt of wet deciduous woodland, to the east of which is Sizewell village and beach and Sizewell A Power Station.

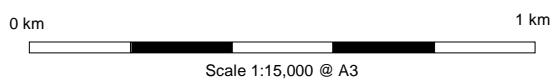


- Key:**
- Site Boundaries
 - Sizewell Estate boundary



Sizewell Arable Reversion Areas
Breeding Bird Survey Report 2012

Figure 1.1
Site Locations



July 2012
28130-A461.wor tugwc



2. Methodology

The key objective of the bird surveys undertaken at the two arable conversion sites at Sizewell in 2012 is to provide a suitable baseline for the evaluation of the effects on birds of turning the arable land to semi-natural habitats that are more typical of the Suffolk Sandlings, which in this case, is likely to include a mixture of heathland, acid grassland and scrub.

Territory mapping surveys based on the BTO's Common Bird Census (CBC) methodology (Marchant, 1983, Gilbert *et al.*, 1998) and as used in the 2007 surveys, were carried out by Mike Raven (AMEC, Senior Ornithologist) across both sites and in all areas within approximately 100m of them (where access permitted). Full access was obtained to all areas within the Sizewell Estate boundary and within most areas within the 100m buffer zone. The methods used were the same as those used in the 2007 survey.

Transects (no further than 50m apart) were walked across all open habitats, while all field boundaries and woodland/shelter belt edges were also walked. Surveys were undertaken from approximately 30-60 minutes after sunrise until midday (at the latest), and in appropriate weather conditions (not during periods of strong wind and/or heavy rain).

While eight to ten visits are the norm for CBC sites being monitored over the long-term, where territory mapping is being used for the purpose of assessing potential environmental impacts it is generally accepted that three to four visits are sufficient to determine the numbers and distribution of breeding bird territories with reasonable accuracy. In the analysis of the survey data collected, the presence of a singing/displaying bird, a pair of birds or an adult male or female bird in potential nesting habitat (on a single survey date) were all treated as a breeding territory being present. The term territory (as used within this report) denotes that a pair of breeding birds was present, or that a male was holding territory in that area; the survey does not aim to confirm breeding at any location. Surveys were completed at the North Site on 26 March, 19 April, 15 May and 20 June, and at the South Site on 29 March, 2 May, 16 May and 25 June.

3. Results

A total of 51 species were recording breeding or holding territory within the combined North and South Site survey areas (46 and 40 species respectively), including:

- one species listed on Schedule 1 of the Wildlife and Countryside Act 1981 as amended (Cetti's warbler);
- 10 UK Biodiversity Action Plan (BAP) Priority Species (all of which are listed in Section 41 of the NERC Act 2006): lapwing, cuckoo, skylark, dunnoek, song thrush, marsh tit, house sparrow, linnet, yellowhammer and reed bunting;
- four priority species listed in the Suffolk Local Biodiversity Action Plan: skylark, song thrush, linnet and reed bunting;
- nine species that appear on the Birds of Conservation Concern (BoCC) red list¹ (lapwing, cuckoo, skylark, song thrush, marsh tit, starling, house sparrow, linnet and yellowhammer); and
- and a further 11 species that are on the BoCC amber list² (mallard, oystercatcher, redshank, stock dove, green woodpecker, swallow, dunnoek, nightingale, whitethroat, willow warbler and reed bunting).

No species listed on Annex 1 of the Birds Directive³ were recorded. The location of breeding territories in the survey areas for the North and South Sites are shown on **Figures 3.1 and 3.2** respectively. Results from the breeding bird surveys are provided in **Table 3.1**, including estimates of the number of breeding pairs/territories in the survey areas for the North and South Sites.

It should be remembered when considering the figures that the two letter registrations refer to the apparent centre of territorial activity rather than nest sites. It should also be noted that the aim of this survey was to characterise the bird community rather than derive exact densities, something which would require a considerably more involved survey programme. It is inevitable that the densities of some mobile, vocal species have therefore been overestimated

¹ The criteria for assigning species to the red list include: if they are globally threatened; if they have declined by 50% or more over the past 25 years; if they have experienced severe declines historically or if their range in the UK has contracted by over 50% in the past 25 years. Both wintering and breeding species are considered. All red-listed species recorded in the survey area at Sizewell appear on the list due to considerable range contractions or rapid declines in their breeding populations (Eaton *et al.*, 2009).

² Amber-listed species are those which have experienced moderate recent declines or range reductions (between 25 and 49%) over the past 25 years, that are rare breeders (with a population of 1-300 pairs in the UK), that have 50% or more of the breeding population occurring at 10 or fewer sites, or for which 20% or more of the European population breed (or winter in the case of wildfowl) within the UK.

³ Certain endangered, rare, or vulnerable bird species, which warrant special protection, are included on Annex 1 of Directive 2009/147/EC of The European Parliament and of The Council of 30 November 2009 on the conservation of wild birds (codified version).

Table 3.1 Numbers of Breeding Bird Territories Recorded in the Survey Areas in 2012

BTO Code	Species – Common Name	Species - Scientific Name	Number of Territories in South Site Survey Area	Number of Territories in North Site Survey Area	Annex I ⁴	WCA (Sch1) ⁵	UK BAP ⁶	Suffolk BAP	NERC S(41) ⁷	BoCC ⁸
MS	Mute swan	<i>Cygnus olor</i>	P	1						
MA	Mallard	<i>Anas platyrhynchos</i>	P	4						Amber
RL	Red-legged partridge	<i>Alectoris rufa</i>	1	5						
PH	Pheasant	<i>Phasianus colchicus</i>	6	10						
BZ	Buzzard	<i>Buteo buteo</i>	0	1						
MH	Moorhen	<i>Gallinula chloropus</i>	1	2						
OC	Oystercatcher	<i>Haematopus ostralegus</i>	P	1						Amber
L.	Lapwing	<i>Vanellus vanellus</i>	0	1			Yes		Yes	Red
RK	Redshank	<i>Tringa totanus</i>	0	1						Amber

⁴ Species listed on Annex I of the Birds Directive.

⁵ It is an offence to disturb any wild bird listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended) while it is nest building, or is at a nest containing eggs or young, or to disturb the dependent young of any such bird.

⁶ UK BAP list published 2007 (Biodiversity Reporting and Information Group, 2007).

⁷ In May 2008, Natural England and Defra published the Section 41 list of habitats and species of principal importance for the conservation of biodiversity in England. The list contains all UK Biodiversity Action Plan (BAP) priority habitats and species known to occur in England in addition to species of particular conservation significance in England. The production of the list is a requirement of the Natural Environment & Rural Communities (NERC) Act 2006 and it will be used to guide and prioritise future conservation action in England.

⁸ Red and Amber List birds: those listed as being of high or medium conservation concern in Eaton *et al.*, (2009)

BTO Code	Species – Common Name	Species - Scientific Name	Number of Territories in South Site Survey Area	Number of Territories in North Site Survey Area	Annex I ⁴	WCA (Sch1) ⁵	UK BAP ⁶	Suffolk BAP	NERC S(41) ⁷	BoCC ⁸
SD	Stock dove	<i>Columba oenas</i>	1	6						Amber
WP	Woodpigeon	<i>Columba palumbus</i>	17	22						
CD	Collared dove	<i>Streptopelia decaocto</i>	2	1						
CK	Cuckoo	<i>Cuculus canorus</i>	1	0			Yes		Yes	Red
G.	Green woodpecker	<i>Picus viridis</i>	1	2						Amber
GS	Great spotted woodpecker	<i>Dendrocopos major</i>	1	4						
S.	Skylark	<i>Alauda arvensis</i>	15	8			Yes	Yes	Yes	Red
SL	Swallow	<i>Hirundo rustica</i>	3	P						Amber
PW	Pied wagtail	<i>Motacilla alba</i>	P	1						
WR	Wren	<i>Troglodytes troglodytes</i>	20	28						
D.	Dunnock	<i>Prunella modularis</i>	20	12			Yes		Yes	Amber
R.	Robin	<i>Erithacus rubecula</i>	22	26						
N.	Nightingale	<i>Luscinia megarhynchos</i>	1	0						Amber
B.	Blackbird	<i>Turdus merula</i>	10	12						
ST	Song thrush	<i>Turdus philomelos</i>	3	1			Yes	Yes	Yes	Red
CW	Cetti's warbler	<i>Cettia cetti</i>	0	6		Yes				
SW	Sedge warbler	<i>Acrocephalus schoenobaenus</i>	0	3						
RW	Reed warbler	<i>Acrocephalus scirpaceus</i>	0	4						
BC	Blackcap	<i>Sylvia atricapilla</i>	15	15						
GW	Garden warbler	<i>Sylvia borin</i>	5	7						

BTO Code	Species – Common Name	Species - Scientific Name	Number of Territories in South Site Survey Area	Number of Territories in North Site Survey Area	Annex I ⁴	WCA (Sch1) ⁵	UK BAP ⁶	Suffolk BAP	NERC S(41) ⁷	BoCC ⁸
LW	Lesser whitethroat	<i>Sylvia curruca</i>	3	0						
WH	Whitethroat	<i>Sylvia communis</i>	6	9						Amber
CC	Chiffchaff	<i>Phylloscopus collybita</i>	9	9						
WW	Willow warbler	<i>Phylloscopus trochilus</i>	1	0						Amber
GC	Goldcrest	<i>Regulus regulus</i>	3	4						
LT	Long-tailed tit	<i>Aegithalos caudatus</i>	5	4						
BT	Blue tit	<i>Cyanistes caeruleus</i>	15	17						
GT	Great tit	<i>Parus major</i>	8	15						
CT	Coal tit	<i>Pariparus ater</i>	5	9						
MT	Marsh tit	<i>Poecile palustris</i>	1	1			Yes		Yes	Red
TC	Treecreeper	<i>Certhia familiaris</i>	4	6						
J.	Jay	<i>Garrulus glandarius</i>	1	5						
MG	Magpie	<i>Pica pica</i>	7	7						
JD	Jackdaw	<i>Corvus monedula</i>	2	3						
C.	Carrion crow	<i>Corvus corone</i>	3	4						
HS	House sparrow	<i>Passer domesticus</i>	4	6			Yes		Yes	Red
CH	Chaffinch	<i>Fringilla coelebs</i>	33	35						
GR	Greenfinch	<i>Carduelis chloris</i>	6	3						
GO	Goldfinch	<i>Carduelis carduelis</i>	6	4						
LI	Linnet	<i>Carduelis cannabina</i>	4	3			Yes	Yes	Yes	Red

BTO Code	Species – Common Name	Species - Scientific Name	Number of Territories in South Site Survey Area	Number of Territories in North Site Survey Area	Annex I ⁴	WCA (Sch1) ⁵	UK BAP ⁶	Suffolk BAP	NERC S(41) ⁷	BoCC ⁸
Y.	Yellowhammer	<i>Emberiza citrinella</i>	5	2			Yes		Yes	Red
RB	Reed bunting	<i>Emberiza schoeniclus</i>	0	1			Yes	Yes	Yes	Amber
Other species recorded, for which no evidence of breeding was obtained										
GJ	Greylag goose	<i>Anser anser</i>		P						Amber
CG	Canada goose	<i>Branta canadensis</i>		P						
SU	Shelduck	<i>Tadorna tadorna</i>		P	Yes					Amber
GA	Gadwall	<i>Anas strepera</i>		P						Amber
T.	Teal	<i>Anas crecca</i>	P	P						Amber
TU	Tufted duck	<i>Aythya fuligula</i>		P						Amber
ET	Little egret	<i>Egretta garzetta</i>		P	Yes					Amber
H.	Grey heron	<i>Ardea cinerea</i>		P						
MR	Marsh harrier	<i>Circus aeruginosus</i>		P	Yes	Yes				Amber
SH	Sparrowhawk	<i>Accipiter nisus</i>		P						
K.	Kestrel	<i>Falco tinnunculus</i>		P						Amber
HY	Hobby	<i>Falco subbuteo</i>	P			Yes				
SN	Snipe	<i>Gallinago gallinago</i>		P						Amber
BH	Black-headed gull	<i>Chroicocephalus ridibundus</i>	P	P						Amber
HG	Herring gull	<i>Larus argentatus</i>	P	P			Yes		Yes	Red
FP	Feral Pigeon	<i>Columba livia</i>	P							
BO	Barn owl	<i>Tyto alba</i>	P	P		Yes				Amber

BTO Code	Species – Common Name	Species - Scientific Name	Number of Territories in South Site Survey Area	Number of Territories in North Site Survey Area	Annex I ⁴	WCA (Sch1) ⁵	UK BAP ⁶	Suffolk BAP	NERC S(41) ⁷	BoCC ⁸
SI	Swift	<i>Apus apus</i>	P	P						Amber
HM	House martin	<i>Delichon urbicum</i>		P						Amber
M.	Mistle thrush	<i>Turdus viscivorus</i>	P	P						Amber
RE	Redwing	<i>Turdus iliacus</i>	P			Yes				Red
RO	Rook	<i>Corvus frugilegus</i>	P							
SK	Siskin	<i>Carduelis spinus</i>		P						
CR	Common crossbill	<i>Loxia curvirostra</i>	P	P		Yes				

A 'P' denotes that the species was recorded in the survey area, but that no evidence for breeding was recorded

The species with the most number of territories recorded in the survey areas (combined) was chaffinch (with 68 territories) followed by other species with wide ranging habitat preferences including: robin (48 territories), wren (48), wood pigeon (39), blue tit (32) and dunnock (32). Other common generalist species were well represented including blackbird, great tit and carrion crow, while the deciduous woodland and woodland edge, hedgerow and scrub habitats within the survey areas supported relatively high numbers of green woodpecker (3 territories), great spotted woodpecker (5), blackcap (30), garden warbler (12), chiffchaff (18), goldcrest (7), long-tailed tit (9), coal tit (14) and treecreeper (10). The highest densities of breeding birds were generally recorded in areas of deciduous scrub and woodland, including red-listed species such as song thrush (4 territories) and marsh tit (2 territories).

Few species were recorded in the arable fields within both sites, the bird community here comprising relatively high numbers of skylark (a total of 23 territories), and smaller numbers of pheasant (16) and red-legged partridge (6). Lapwings were seen in the fields within the North Site on a number of occasions although breeding appeared not to have been attempted as no alarm calls were heard, and a pair of oystercatchers was present in fields throughout the survey period (which were assumed to be breeding nearby). The surrounding hedgerows also held low densities of birds, including yellowhammer (7 territories), linnet (7) and whitethroat (15). Other notable species included a male nightingale singing in thick scrub at the entrance of the Sizewell Power Stations on 2 May and 16 May and three lesser whitethroat territories located in hedgerows within the survey area for the South Site.

Species associated with wetland habitats were recorded in the north of the North Site survey area (this area was not surveyed in 2007), where there are fields of wet grassland lined with water and reed-filled ditches (part of Cowmarsh Hill, located immediately to the south of the Minsmere RSPB nature reserve). Also, part of the survey area (in the north east) is located in the Minsmere Levels (an extensive area of wet grassland). The small area of Cowmarsh Hill and the Minsmere Levels within the North Site survey area held a wide range of wetland species including: four pairs each of mallard and moorhen and a pair of mute swan, plus other birds associated with the wet scrub and reeds, including Cetti's warbler (6 territories), reed warbler (4), sedge warbler (3) and reed bunting (1). A number of other species typically associated with wetlands were recorded for which there was no evidence of breeding, as follows:

- Greylag goose: 2 birds on Cowmarsh Hill on 19 April;
- Shelduck: 2 birds on Cowmarsh Hill on 20 June;
- Gadwall: a pair flew from Lower Abbey on 26 March, and a male was on Cowmarsh Hill on 19 April;
- Teal: 2 birds flushed from Cowmarsh Hill on 26 March;
- Tufted duck: a pair was present on Cowmarsh Hill on 19 April, but birds were not seen on subsequent visits in May and June;
- Grey heron: 1 bird on Cowmarsh Hill on 19 April;
- Little egret: 1 foraging in Cowmarsh Hill on 26 March;
- Marsh harrier: a female hunting over Cowmarsh Hill on 15 May and 20 June, and a female hunting over Ash Wood Cottages on 20 June; and

- Snipe: 2 flushed from Cowmarsh Hill on 26 March, and 3 flushed from there on 19 April.

Marsh harrier, greylag goose, teal, gadwall and tufted duck breed in the reedbeds and marshy pools in the neighbouring RSPB Minsmere nature reserve; grey heron and shelduck also breed in the local area, and the remaining species are either non-breeding visitors (little egret) or lingering winter visitors/passage migrant birds (snipe).

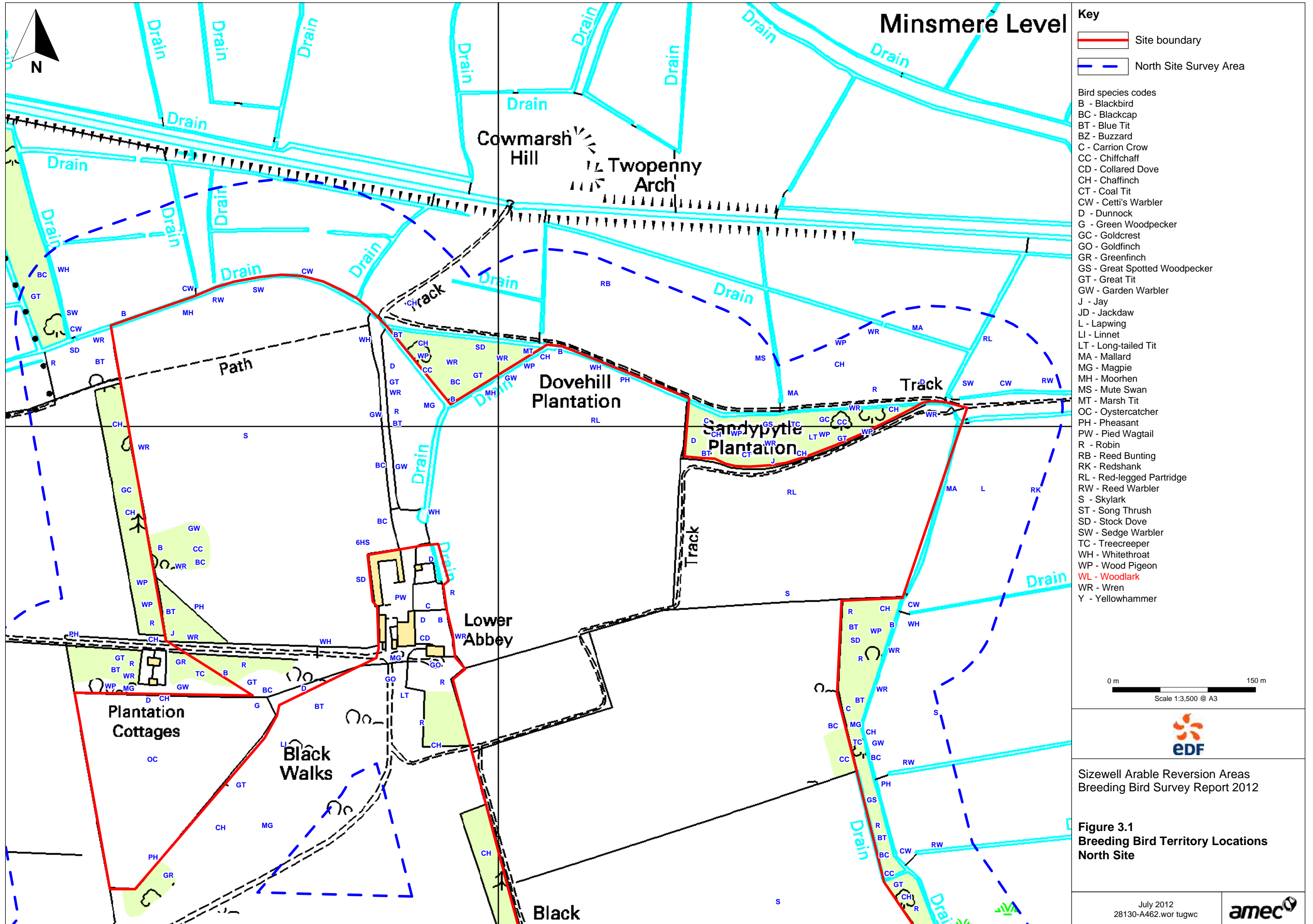
In addition, a barn owl (a Schedule 1 species that breeds in the local area) was seen hunting over Cowmarsh Hill on 20 June and two mistle thrush were feeding on the grassland of Black Walks on 20 June (again, likely to breed nearby). Crossbills were recorded on two dates, with 15 over Lower Abbey on 15 May and a single bird over Black Walks on 20 June. Although no suitable habitat exists for crossbill within the site, the extensive area of coniferous plantation less than 1km to the south between Kenton Hills and Goose Hill provides suitable areas for nesting (this species breeds very early in the year, and therefore may breed before the start of the surveys in March).

A kestrel was seen hunting over the North Site on 26 March and a sparrowhawk was displaying over Walkbarn on 26 March, with another seen hunting over Lower Abbey on 20 June. Just outside the survey area, a woodlark was singing 100-200m south-west of Walkbarn on 19 April. This bird was not recorded on subsequent survey visits or recorded by SWT wardens working in the area from March to June 2012 (pers. comm. Dane West, SWT warden). Lapwings were noted on several occasions, with birds seen displaying over the marshes immediately to the north of the North Site survey area. Within the North Site survey area, two pairs of lapwing were in a field south of Sandpytle Plantation on 26 March and a bird was in a field west of The Grove on 15 May, although breeding was not recorded at either location. A mixed flock of house martin, swallows and swifts were feeding over Cowmarsh Hill on 15 May, and a swallow was seen flying around Lower Abbey farmstead (a potentially suitable nest site) on the same date. Of these species, there is potentially suitable breeding habitat within the North Site survey area for gadwall and tufted duck (in the wet ditches), mistle thrush and sparrowhawk (in woodland) and swallow, swift and house martin (in buildings, such as at Lower Abbey). The buildings and old trees on site may also provide nest sites for barn owl and kestrel.

Within the survey area for the South Site, two barn owls were flushed from a tree on the edge of Rookyard Wood on 29 March. Barn owls were not seen in this area on subsequent survey visits, or during the marsh harrier vantage point surveys undertaken close to this area in February and March 2012. Adjacent to the South Site, a flock of up to 30 rooks were feeding on Leiston Common during the survey period, these birds probably being derived from the breeding colony near Leiston Old Abbey, 700-800m north east of the common. Mistle thrush (which likely breeds nearby) were also seen feeding on the common but were not heard singing within the survey area. Mallard (2 males on Sizewell Marshes on 29 March), teal (2 along Sizewell Power Stations entrance road on 29 March) and mute swan (1 on Sizewell Marshes on 2 May) were also recorded, but for which there was no evidence of breeding within the survey area for the South Site. A flock of 14 redwings (lingering winter visitors) were on Broom Covert on 29 March and a flock of 16 linnet were feeding on the adjacent fallow field on 2 May (this flock probably contained at least some local breeding birds). A Crossbill flew over the Sizewell Power Stations entrance road on 16 May, and a male cuckoo was calling from Leiston Common on 16 May (just outside the survey area); a species which has large territories and was therefore assumed to be holding territory within the survey area. A hobby was seen hunting over Broom Covert on 16 May, and during the 2007 surveys, hobby bred in the plantation to the east of Rookyard Wood, and in Ash Wood (Entec, 2008). Around the Sizewell beach village



were pied wagtail on 16 May and at least 6 swifts in May and June (these birds were presumed to be breeding in the house roofs). An oystercatcher was in a field of rough grassland adjacent to Sizewell entrance road on 25 June (there was no alarm calling by the bird and no evidence of breeding in the field). At least 3 pairs each of swifts and starlings were seen on and flying around the houses adjacent to Sizewell beach (150m east of the South Site survey area) throughout much of the survey periods, and were probably breeding there (juvenile starlings were seen there in June).



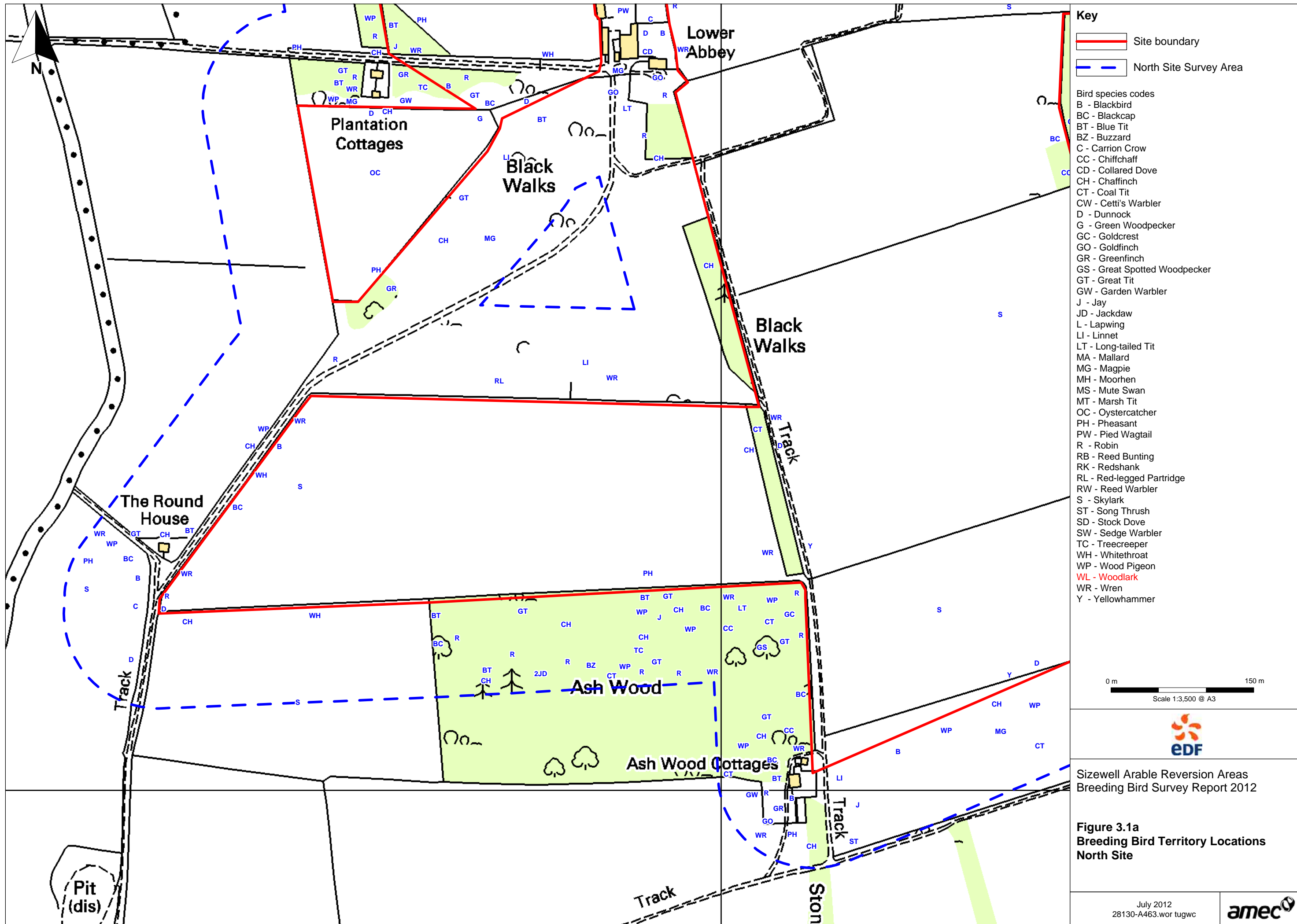
- Key**
- Site boundary
 - North Site Survey Area
- Bird species codes
- B - Blackbird
 - BC - Blackcap
 - BT - Blue Tit
 - BZ - Buzzard
 - C - Carrion Crow
 - CC - Chiffchaff
 - CD - Collared Dove
 - CH - Chaffinch
 - CT - Coal Tit
 - CW - Cetti's Warbler
 - D - Dunnock
 - G - Green Woodpecker
 - GC - Goldcrest
 - GO - Goldfinch
 - GR - Greenfinch
 - GS - Great Spotted Woodpecker
 - GT - Great Tit
 - GW - Garden Warbler
 - J - Jay
 - JD - Jackdaw
 - L - Lapwing
 - LI - Linnet
 - LT - Long-tailed Tit
 - MA - Mallard
 - MG - Magpie
 - MH - Moorhen
 - MS - Mute Swan
 - MT - Marsh Tit
 - OC - Oystercatcher
 - PH - Pheasant
 - PW - Pied Wagtail
 - R - Robin
 - RB - Reed Bunting
 - RK - Redshank
 - RL - Red-legged Partridge
 - RW - Reed Warbler
 - S - Skylark
 - ST - Song Thrush
 - SD - Stock Dove
 - SW - Sedge Warbler
 - TC - Treecreeper
 - WH - Whitethroat
 - WP - Wood Pigeon
 - WL - Woodlark
 - WR - Wren
 - Y - Yellowhammer

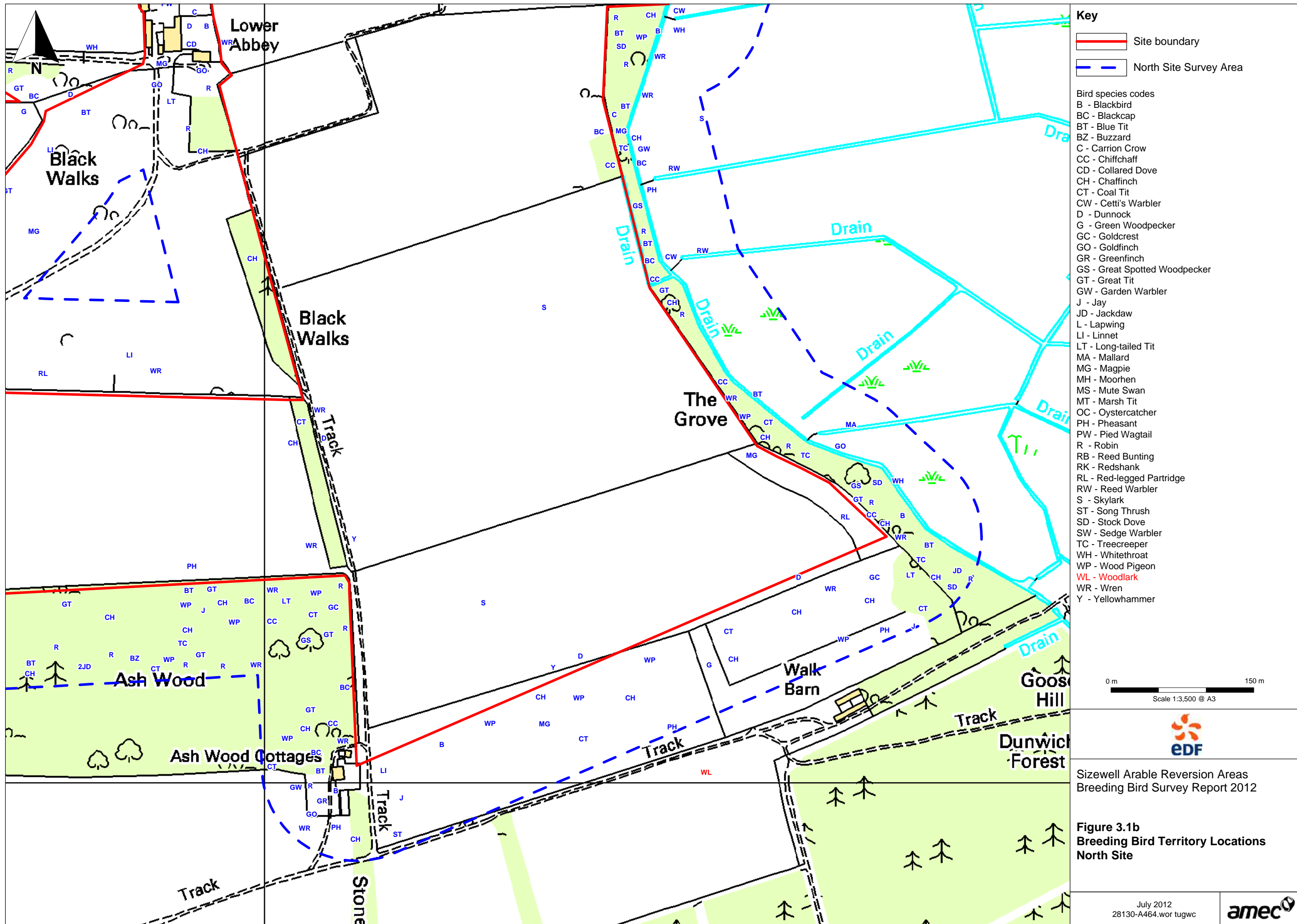


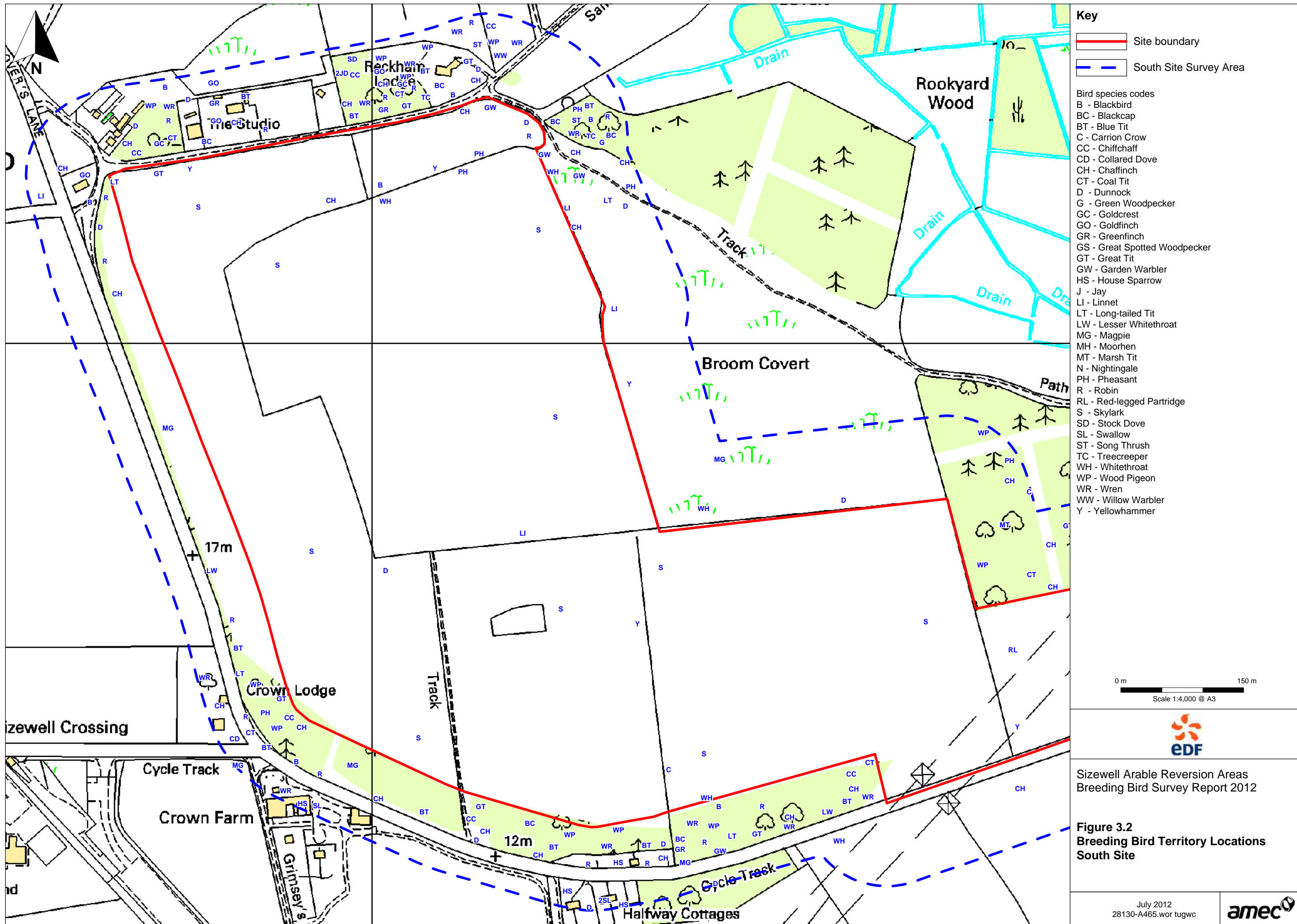
Sizewell Arable Reversion Areas
Breeding Bird Survey Report 2012

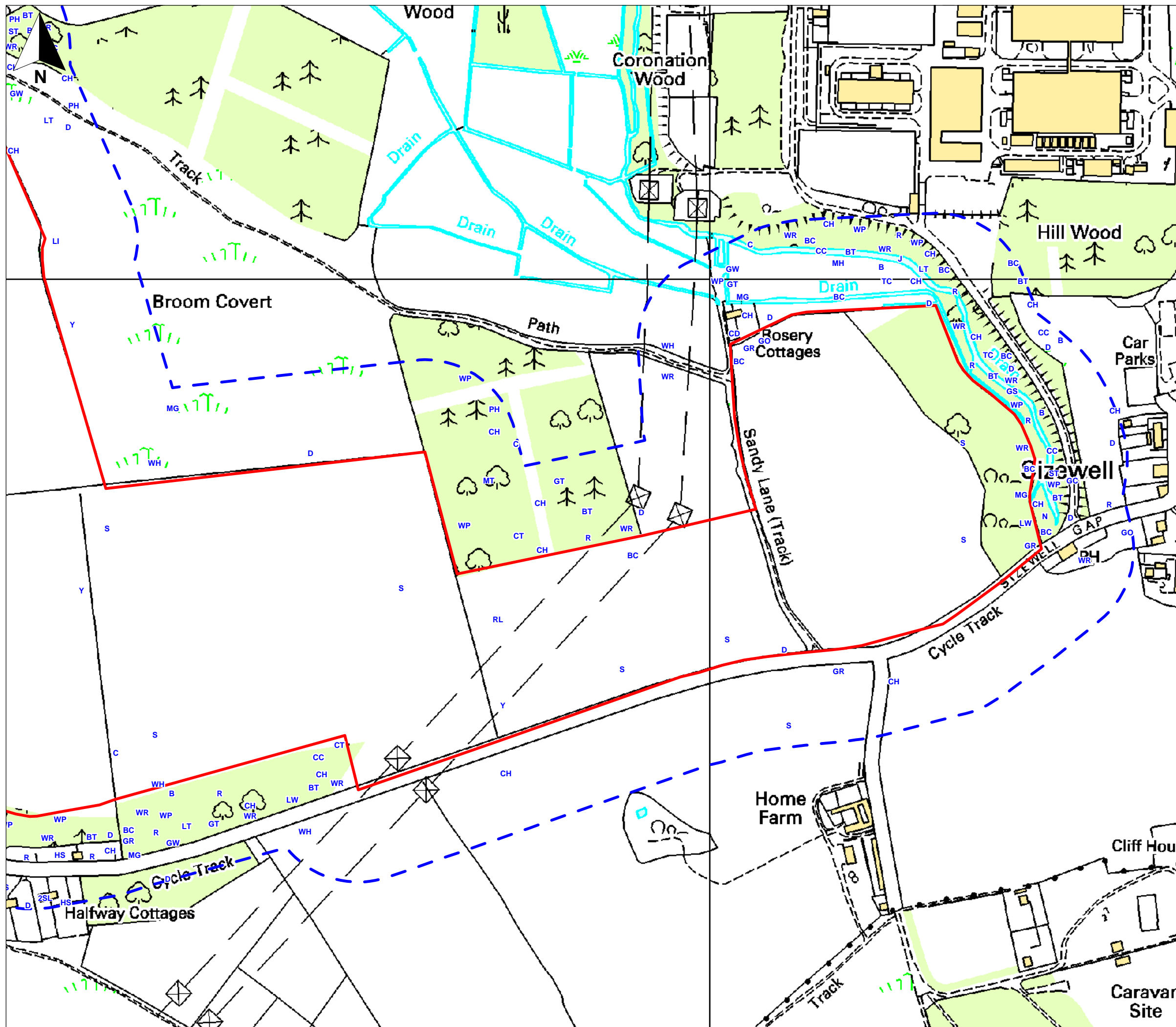
Figure 3.1
Breeding Bird Territory Locations
North Site

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- Key**
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 - GO - Goldfinch
 - GR - Greenfinch
 - GS - Great Spotted Woodpecker
 - GT - Great Tit
 - GW - Garden Warbler
 - HS - House Sparrow
 - J - Jay
 - LI - Linnet
 - LT - Long-tailed Tit
 - LW - Lesser Whitethroat
 - MG - Magpie
 - MH - Moorhen
 - MT - Marsh Tit
 - N - Nightingale
 - PH - Pheasant
 - R - Robin
 - RL - Red-legged Partridge
 - S - Skylark
 - SD - Stock Dove
 - SL - Swallow
 - ST - Song Thrush
 - TC - Treecreeper
 - WH - Whitethroat
 - WP - Wood Pigeon
 - WR - Wren
 - WW - Willow Warbler
 - Y - Yellowhammer

0 m 150 m
Scale 1:4,000 @ A3



Sizewell Arable Reversion Areas
Breeding Bird Survey Report 2012

Figure 3.2a
Breeding Bird Territory Locations
South Site

July 2012
28130-A466.wor tugwc



4. Conclusions

Results from the breeding bird surveys undertaken in 2012 indicate that the areas of arable farmland within the survey areas for the South Site and North Site support relatively low densities of a limited range of common and widespread species. Other than skylark, very few species held territory in the arable fields, with whitethroat, linnets and yellowhammers breeding in the surrounding hedgerows. In 2007, broadly similar numbers of skylark (21 territories), yellowhammer (11), linnets (10) and whitethroat (27) were recorded in the same area (Entec, 2008). The number of territories of each of these species recorded within the survey areas is likely to be very small in relation to the county totals. For example, the skylark population in Norfolk was estimated at 25,000-30,000 pairs in 1997-2007 (Taylor & Marchant, 2011) and the numbers in Suffolk (a county of similar size, and habitats) are likely to be comparable. The 26 pairs of skylark recorded within the survey areas in 2012 will therefore represent a very small proportion (less than 1%) of the total in Suffolk. In addition, all of these species (skylark, linnets, whitethroat and yellowhammers) will also nest and forage in the habitats that the arable farmland is proposed to be converted to, including heathland with associated areas of acidic grassland and scrub.

In contrast, the other habitats present within the survey areas for the North and South Sites supported a varied community of breeding bird species, typical of the mosaic of different habitats present, including deciduous woodland, scrub and wet grassland. The greatest densities of territories and number of species were found in the areas of scrub and woodland (including three territories of lesser whitethroat and a single nightingale territory). In 2007, similar numbers of lesser whitethroat were recorded but a total of four nightingale territories were recorded within 100m of South Site, including three in Rookyard Wood and one in the conifer plantation adjacent to the east of the Greater Gabbard sub-station (Entec, 2008).

A number of species were also present in the wet grassland and ditches to the north and north east of North Site (Cowmarsh Hill and the Minsmere Levels respectively) and to the north east of South site (within the Sizewell Marshes SSSI). Some of these birds will occasionally use the adjacent arable farmland although it is likely that the greatest foraging opportunities will be found within the semi-natural habitats in which they breed (i.e. in areas of woodland, scrub and wet meadows located outside the proposed areas for conversion to heathland).

A number of highly protected species (that appear on Schedule 1 of the Wildlife & Countryside Act 1981) were recorded, of which one (woodlark) was associated with arable farmland. Barn owls were recorded at both sites (and are known to breed nearby), and although this species is likely to hunt over the arable fields, much greater foraging opportunities will be found in the areas of wet grassland and marshes (these habitats will support higher densities of their small mammal prey). Marsh harrier and hobby were also seen hunting over the farmland within the North and South Sites respectively, although again, the wet meadows and marshes are likely to provide the main hunting grounds for these birds. Cetti's warblers were breeding at high densities in the wet scrub to the north and north east of the North Site but these birds are very unlikely to utilise the arable farmland and surrounding hedgerows on a regular basis. Use of the arable fields by waders was confined to a pair of oystercatchers with lapwing being present but no breeding attempts recorded.



To conclude, the arable farmland within the North and South Site survey areas provides limited opportunities for foraging and nesting birds, and supports low numbers of a limited range of species. The numbers of each species recorded in the arable fields is likely to be very small in relation to their county populations.

5. References

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British Energy Group PLC

Sizewell Marsh Harrier Survey Report 2008

1. Introduction

1.1 Background

British Energy (BE) is currently investigating the feasibility of building a new nuclear power station within their landholding at Sizewell, Suffolk. An area of land directly north of the Sizewell 'B' Power Station has been identified as having potential to accommodate nuclear new build. This area, which covers approximately 0.32km²/33ha and has an approximate central grid reference of TM473640, is referred to in this document as 'the preliminary works area'. The proposed position of the new power station, the indicative access road and construction compound (accounting for a potential further 0.35km²/35ha of land take) are shown in **Figure 1.1**. The position of the proposed access road and the construction compounds in particular are subject to change.

1.2 Preliminary Works Area Description and Context

The preliminary works area comprises open sheep grazed pasture, fringed by reinstated coastal dune vegetation, parts of which have been planted with trees and scrub. The hydrology and pedology of the preliminary works area were irreversibly altered as a result of works associated with the building of the Sizewell 'A' and 'B' Stations (adjacent to its southern boundary), and as a result the area has lost much of its botanical merit. Habitats adjoining or in close proximity to the preliminary works area are of considerable ecological interest however. These include wet meadows (and associated wetland habitats and ditch systems), dune systems, shingle plant communities and wet semi-natural woodland. The quality of the shingle, grazing marsh and associated wetland habitats have led to substantial areas of these in close proximity to the preliminary works area being designated for their ecological interest.

The likely route of any new access associated with the new build would pass through or over the north-east corner of the Sizewell Marshes, then through the extensive conifer plantation at Goose Hills / Dunwich Forest and along the northern edge of Kenton Hills before linking to the existing road network near the pocket of broad-leaved woodland known as Fiscal Policy. The location and extent of the construction compounds has not been fixed, but these are likely to take in areas of both Kenton and Goose Hills as well as adjacent arable land.

The Sizewell Estate lies within the Suffolk Coast and Heaths Natural Area. This covers the land extending as far as Great Yarmouth in the north, and Harwich in the south. The area is generally very flat with land-use dominated by arable farming, particularly for root crops, although cattle farming is common on the low-lying land adjacent to the coast. Whilst heathlands were extensive throughout the area in the eighteenth and nineteenth centuries, only a small fraction of these remain with most being taken over for arable and forestry. The estuary habitats present along the coastline are considered to be of international importance for nature conservation (Natural England, 2008).

1.3 Aim of the Survey

The First Interim Bird Report for the Sizewell Estate by Entec (Entec Doc. Reg. 19801cr080) identified that marsh harrier (*Circus aeruginosus*) used parts of the Estate with relative regularity. As marsh harrier has never been recorded breeding within the Estate boundary, it was considered likely that these birds were part of the nearby Minsmere – Walberswick Special Protection Area (SPA) population.

The aim of this survey work was therefore to characterise the nature and extent of use of the Sizewell Estate by marsh harriers breeding in the Minsmere-Walberswick SPA (and forming part of its cited interest). This was accomplished through a study of flight lines and foraging behaviour undertaken during the 2008 breeding season.

It is intended to use the information collected as a result of the surveys to inform the EcIA process, and to ensure that impacts on the SPA population are mitigated or minimised.

1.4 Species Information

1.4.1 Distribution and Status

Marsh harrier is an Amber Listed Species of Conservation Concern¹ as the population suffered a historic decline during the period from 1800 to 1995 but is recovering (the UK population has more than doubled over the last 25 years).

Marsh harrier became extinct in Britain early in the 20th century due to large scale loss of wetland habitat (Génsbøl, 2008), but re-colonisation had occurred by 1911 and the population slowly grew to around 15 known nests by 1958. A second sharp decline occurred as a result of the widespread use of organochlorine pesticides (Eaton *et al.*, 2006), with the population reduced to a single known pair at Minsmere in 1971 (Underhill-Day, 1984, Piotrowski, 2003).

The mid-1970s saw a very rapid growth in marsh harrier numbers in many countries across its European range. This was due to decreased persecution and lower levels of pollution of the habitat preferred by this species (Génsbøl, 2008). In 2004 the European breeding population, was estimated at between 53,000 and 80,000 pairs (Robinson, 2005), while it is estimated that there are currently between 70,000 and 90,000 pairs in Europe, mainly in the eastern part of the continent (Génsbøl, 2008). The initial marked increase in numbers in Britain is likely to have been due to recruitment (e.g.) from the large population in the Netherlands (Underhill-Day, 1984).

The British marsh harrier population continues to increase: in 1995, Britain supported 156 breeding females (Ogilvie *et al.*, 2001); by 2003, the UK population² had increased to between

¹ The background to the establishment of a 'traffic light system' of conservation concern for UK birds is discussed in Gregory *et al.* (2002). 'Red listed' species include those that are globally threatened, have suffered an historical population decline (between 1800 and 1995) or which have experienced rapid declines in their UK breeding population or contractions in their UK range of more than 50% over the past twenty-five years. The criteria of Amber listed species include: the species has suffered moderate (25-49%) declines in its UK breeding population or range over the past 25 years, has an unfavourable conservation status in Europe (and is therefore of European concern), breeds in very low numbers (five year mean of 1-300 pairs), breeds at 10 or fewer UK sites, or occurs in relatively high numbers in the UK (exceeding 20% of the European breeding, migratory or non-breeding populations). Other species have 'green' status, as they do not fulfil these criteria. This implies that the population of a species is either stable or increasing or that too little is known about the population to allow the species to be included on the red or amber list.

² The Rare Breeding Birds Panel reports refer to the 'UK population' of marsh harrier, though this species does not occur in Northern Ireland (Clarke, 1995).

205 and 233 pairs; in 2004, this number rose to between 249 and 284 pairs. The marsh harrier population is centred on Eastern England³, which was estimated to hold 72% of the UK population in 2003 and 76% of the UK total in 2004 (Holling & The Rare Breeding Birds Panel, 2007).

In 2005, a repeat of the 1995 survey was carried out by the RSPB. This estimated that 360 female⁴ marsh harriers bred in Britain. This is thought to be the largest total in at least 200 years, with a minimum of 813 young being fledged. Although some range expansion was noted between 1995 and 2005, the majority of the population was found to be concentrated in eastern coastal counties of England, particularly Lincolnshire, Norfolk, Suffolk and Kent (Eaton *et al.*, 2006). The colonisation of inland sites has been much slower with only occasional breeding recorded (Clarke, 1995).

Though there is no UK Biodiversity Action Plan (UK BAP) for marsh harrier, the species has benefited from the Priority Habitat Action Plan prepared for reedbed⁵, which is both a UK and Suffolk BAP Priority Habitat. Details of UK BAP targets for reedbed are found in **Appendix A**.

1.4.2 Legislative Protection

Marsh harrier is afforded enhanced protection at European level under Annex 1 of the Birds Directive (1979)⁶, and in the UK under Schedule 1 of the Wildlife and Countryside Act (1981), which makes it an offence to disturb or otherwise interfere with nesting birds.

1.4.3 Breeding Ecology

Marsh harrier generally breeds in large, dense reed beds with good habitat for foraging and little disturbance, usually around lake margins, river floodplains and margins or in fenland (Gønsbøl, 2008). This species is often monogamous, though bigamy is also common. On the east coast of England, males start holding territory from mid-March (Clarke, 1995). Courtship lasts from mid-March to early May. The eggs are laid between late April and mid-May and are incubated for between 30 and 38 days. After hatching, the dependent young usually remain in the nest for around 28 days until late July (Hardey *et al.*, 2006).

Both parents provision the young and defend the area immediately adjacent to the nest (Snow & Perrins, 1998). However in the first 2 weeks after hatching, the females rarely ventures far from the nest with the male doing the majority of the hunting. Once the young have developed juvenile plumage (having moulted their down), the females will start to forage, and typically catch larger prey than the male (Clarke, 1995). The typical home range size of a male in East Anglia varies through the breeding cycle, from 569ha during the courtship stage to 1,407ha during the post-fledging period. Females generally have a smaller home range than the males, though this does increase from 100 to 1300ha when young are being provisioned (Hardey *et al.*, 2006). The distances individuals travel from the nest to forage vary according to habitat types

³ This comprises the following counties: Cambridgeshire, Lincolnshire, Norfolk and Suffolk.

⁴ Given that this species is often polygynous, the number of nesting females provides a more accurate description of the breeding population than numbers of territorial males.

⁵ The full Action Plan is available at:
<http://www.ukbap.org.uk/library/UKBAPPriorityHabitatDescriptionsfinalAllhabitats20081022.pdf#R>

⁶ This obliges national governments to identify and designate areas of critical importance to the conservation of the species.

and food availability; although a maximum distance of 2.5km was recorded by a study which compared this species to other sympatric harriers (Schipper, 1977, in Simmons, 2000). Other studies in Holland and France have recorded maximum distances of 1.5km to 3.1km respectively (Clarke, 1995). Radio-tagging studies on birds in western France have shown maximum foraging distances of 5km (Simmons, 2000). Anecdotal evidence includes males recorded up to 7km from known nest site (John Underhill-Day, RSPB, *pers comm*, 2009) and over 12km from the nest site (Clarke, 1995). Therefore, although some studies have identified indicative maximum distances within which the majority of the foraging activity is carried out, these should be treated with caution.

As well as breeding individuals, non-breeding birds often occur around breeding sites. These birds include non breeding juveniles and adults, and failed breeders. The number of non breeding birds present is variable, though these have increased with a similar trend to the breeding population recorded (John Underhill-Day, *pers comm.*, 2009). On average 6.8 non breeding birds were recorded in Britain between 1972 and 1982 inclusive, although the breeding population was relatively low at the time. A peak of 16 non-breeding birds was recorded in 1979, when the national breeding population stood at around 16 females and 11 males. The previous year however, the number of non-breeding individuals was as low as 4, with about 14 breeding males and 14 breeding females recorded (Underhill-Day, 1984). Therefore, the best available data indicates that non-breeding birds may represent between 12.5 and 37% of the total population. The total number of non-breeding birds is likely to have risen significantly, given the growth of the population as a whole (John Underhill-Day, *pers comm.*, 2009).

Hunting habitat regularly includes reed beds, open water and any farmland adjoining the breeding territories. The hunting technique usually consists of low quartering flights and the prey items taken include small mammals and birds (Snow & Perrins, 1998). It has been shown that a difference exists in foraging habitat preference between male and female marsh harrier. While both sexes hunt over marginal habitats such as wet reedbeds, males tend to extend their foraging range to neighbouring habitats with shorter vegetation, including farmland and meadows, more often than females. A study at Titchwell showed that foraging on farmland areas adjacent to the main reedbed areas resulted in prey being caught in a shorter time than over marshes and that the prey item was usually heavier (young rabbits and pheasants as opposed to fledgling passerines) (Clarke, 1995). The level of use of farmland at other sites is likely to vary according to factors such as farmland type, cropping regime, time in the season and distance from the breeding site.

The frequency with which food is brought to the nest will depend both on prey availability and brood size. Studies have shown that around 11 and 12 prey items per day are provisioned to an active nest, though one study showed a range of between 3 and 20 items (studies cited in Clarke, 1995).

2. Methods

2.1 Desk Study

Contextual information regarding marsh harrier population trends and some aspects of ecology was obtained from the following individuals, groups and published sources:

Alan Miller, Suffolk Wildlife Trust (SWT)

Robin Harvey, RSPB (Minsmere).

John Underhill-Day, RSPB

ADAS & SWT via the Sizewell Land Management Annual Reviews;

ADAS (2006). Sizewell Estate – Integrated Land Management Plan.

Hall, M. A. (1984). An Ecological Survey of the Birdlife of Sizewell and its immediate surrounding area (1971 to 1984);

Hardey *et al.* (2006). Raptors a field guide to survey and monitoring;

Piotrowski, S. (2003). The Birds of Suffolk.

Suffolk Naturalists Society (2007). Suffolk Birds 2006. Suffolk Naturalist's Society, Ipswich; and

2.2 Field Surveys

The most likely effect of nuclear new build at Sizewell on marsh harrier is disturbance during the construction process. This could lead to displacement of birds from the footprint of the new plant, and from the vicinity of the plant access road and construction compounds. As such, surveys attempted to establish the frequency of foraging in these (indicative) areas, as well as the Sizewell Marshes which are adjacent to the proposed development footprint.

In order to determine the frequency with which marsh harrier were flying between the reedbeds of the Minsmere to Walberswick SPA and the Sizewell Estate, surveys were conducted using vantage-points overlooking land between the two areas. In addition, vantage-points within the Sizewell Estate were used to determine the nature and frequency of marsh harrier use of the marshes. On each survey day, 2 Entec surveyors stationed at complementary vantage-points undertook co-ordinated watches, communicating any observed flights to each other with walkie-talkies, and mapping any marsh harrier flight lines and flight characteristics as well as the age, sex and plumage characteristics of individual birds (where apparent).

Madders (in SNH, 2005), states that it is possible for an observer to effectively survey an arc of 180 degrees by 2km in width during a vantage-point watch^{7,8}, by scanning the target area continuously with binoculars. The selection of vantage-points for the marsh harrier survey was therefore based on this principle and aimed to allow maximum coverage of the meadows and marshes within the areas to the south of Goose Hill. In this area visibility is limited by the trees and scrub running along some sections of ditch, and a number of local vantage-points were used in order to achieve a snapshot of marsh harrier activity. **Table 2.1** lists the grid references for the vantage points used. These are also shown on **Figure 2.1**.

⁷ This survey methodology has been developed for use at wind farms, where species of particular concern are raptors such as eagles, kites and harriers and migratory wildfowl, particularly geese and swans.

⁸ Clearly the extent of land that can be surveyed effectively within this survey arc is dependent on topography, while built structures and planting can also create areas of dead ground.

Table 2.1 Grid References of Vantage Points Used

Vantage Point Number	Grid Reference
1	TM 47313 65983
2	TM 46500 66000
3	TM 46862 64558
4	TM 46089 65229
5	TM 46183 63743
6	TM 46656 63243
7	TM 45709 63755

Two surveyors conducted 12 days (a combined total of 72 hours) of co-ordinated survey work between 5th May and 26th July 2008. The timing of these surveys was aimed to cover the provisioning period of nestlings by adult marsh harrier, which is likely to be between late May and late July. During the first two surveys in early May, VP 1 and 2 were used to establish whether one or both of these locations were suitable for recording rates of flight activity between the two areas. As VP1 was found to be suitable, as the survey work progressed a combination of this vantage point and a second vantage-point within the Sizewell Marshes was used.

Two watches were conducted at each point during each survey day, each being 3 hours in duration (the maximum duration of watch recommended by Madders). Between surveys the surveyors took between 15 minutes and an hour to rest their eyes and refocus. Dates, times and vantage points used during the surveys are included in **Table 2.2**.

Table 2.2 Summary of Dates, Times and Vantage Points Used.

Date	Times	Vantage Point Number
05/05/2008	8:30 - 11:30	1 & 2
	12:30 - 15:30	
11/05/2008	8:30 - 11:30	1 & 2
	12:30 - 15:30	
23/05/2008	8:10 - 11:10	1 & 3
	12:00 - 15:00	
01/06/2008	8:30 - 12:00	1 & 3
	12:30 - 15:00	
10/06/2008	7:30 - 10:30	1 & 3
	11:00 - 14:00	

Table 2.2 (continued) Summary of Dates, Times and Vantage Points Used.

Date	Times	Vantage Point Number
16/06/2008	8:40 - 11:40	1 & 3
	12:20 - 15:20	
24/06/2008	14:45 - 17:45	1 & 3
	18:15 – 21:15	
28/06/2008	07:00 - 10:00	1 & 3
	10:30 – 13:30	
07/07/2008	8:00 - 11:00	1 & 4
	11:45 - 14:45	
12/07/2008	8:05 - 11:05	1 & 5
	11:35 – 14:35	
19/07/2008	8:15 - 11:15	1 & 6
	11:45 - 14:45	
26/07/2008	7:00 – 10:00	1 & 7
	10:30 - 13:30	

2.3 Survey Limitations

Due to the enclosed nature of fields within the grazing marsh, a single vantage point could not accurately record all activity within the Sizewell Marshes. This may have resulted in some degree of under-recording of marsh harrier activity during low level flight or on the ground. There seems no reason to assume the data is unrepresentative, however, and encounter rates were remarkably similar between the VPs located outside of the Sizewell Marshes (where a filter had been applied to exclude birds recorded to the north of Goose Hills) and the marshes themselves.

3. Results

3.1 Desk Study

3.1.1 Marsh Harrier on the Sizewell Estate

- Hall (1984) reported a total of 72 sightings of marsh harrier in freshwater marsh and reedbed habitats, as well as arable farmland and brackish marshland in the Leiston area between 1971 and 1984⁹ (Hall, 1984). As no standardised methodology was used for data collection, frequency of occurrence cannot be

⁹ Hall's report covered a roughly rectangular area of approximately 2,420ha: the northern edge of the area considered was formed by the Minsmere Level and the eastern edge by the Suffolk coast. The area covered extended to Thorpeness in the south-east and Knodishall in the south-west.

assessed. This report also states that 188 young were reared at Minsmere between 1955-1982;

- Two ornithological studies were undertaken by Henderson Ecological Consultants¹⁰; in 1992-93 and 1988-89. The winter and breeding bird surveys carried out in 1992-93 did not record marsh harrier, though a bird was recorded on the South Minsmere Levels during the 1988-89 winter surveys (Henderson Ecological Consultants, 1993);
- The Biological Survey of Abbey Farms conducted by Suffolk Wildlife Trust recorded marsh harrier regularly during the breeding season using the Lower Abbey Marshes, Retsoms Heath (immediately to the north of Goose Hill) and South Marsh, which lies to the east of Goose Hill and to the north of the preliminary works area. A female bird was also recorded at Retsoms Heath during the winter surveys in 1996/97 (Suffolk Wildlife Trust, 1996);
- Marsh harrier was regularly recorded on the Sizewell Estate during 1996 and 1997. Individuals were noted during three of the 7 Sizewell WeBS counts and on 1 of the 7 farmland winter bird counts at Upper Abbey Farm, Leiston in 2007/2008. (SWT / ADAS, 1998-2007);
- The frequency of marsh harrier observations in arable and marshland habitats on the Sizewell Estate is now such that the species is no longer considered notable, and not routinely reported in annual land management reports (Alan Miller [SWT], pers comm., 2009).

3.1.2 Marsh Harrier at Minsmere

Marsh harrier is a qualifying species of the Minsmere-Walberswick SPA. Upon designation the SPA supported 16 pairs of marsh harrier, representing at least 10.0% of the breeding population in Great Britain based on a 5 year mean between 1993 and 1997¹¹. No change in the population was noted as part of the SPA Review (Stroud *et al.*, 2001). However in 2006, a total of 22 nests were recorded between the Minsmere Reserve and Walberswick NNR (Suffolk Naturalists' Society, 2007). This represents an increase of almost 30% in the numbers of breeding marsh harrier in the SPA since its designation (although inter-annual some fluctuation in numbers is expected to take place).

The Minsmere RSPB Reserve was considered to have supported up to 15 marsh harrier nests presenting 2008. From these, a total of 23 young were fledged successfully (Robin Harvey, *pers comm* 2008). The majority of the nests were located to the north of the Minsmere Old River, which runs west to east immediately to the north of the Minsmere Levels. A total of 4 nests were located within the Minsmere North Levels.

3.1.3 Marsh Harrier at County and Regional Level

In Suffolk, marsh harrier is a local breeder, summer visitor, uncommon passage migrant and winter visitor (34 wintering birds were counted in 2006-07 (Suffolk Naturalists' Society,

¹⁰ This report covered an approximately rectangular area of 717ha: the northern edge was formed by the New Cut, the eastern edge by the coast, the southern boundary ran east-west just to the south of the existing Power Station and the western boundary ran north-south immediately to the west of Kenton Hills.

¹¹ Information gained from Minsmere-Walberswick SPA Natura 2000 Form. Available online: <http://www.jncc.gov.uk/pdf/SPA/UK9009101.pdf>.

2007)). The recent countrywide increase in numbers has been mirrored by a rise in the Suffolk population. In the early 1990s, 20-40 nests produced 50-70 young per year, with breeding sites concentrated along the coast and only one or two pairs breeding inland (Piotrowski, 2003). In 2003, marsh harrier bred in 13 sites in Suffolk and a total of 43 breeding pairs fledged at least 120 young. In 2004, 44 breeding pairs fledged at least 107 young from 11 sites (Holling & the Rare Breeding Birds Panel, 2007).

The east of England (Suffolk, Cambridgeshire, Lincolnshire and Norfolk) remains the stronghold for marsh harrier in the UK, with 147 pairs proved to have bred in 2003 and 190 in 2004 (Holling & the Rare Breeding Birds Panel, 2007).

3.2 Field Survey

Marsh harrier were recorded on 11 of the 12 survey dates (not recorded on 26th June 2007), and there were 119 sightings in total during the survey period. The majority of flights recorded were located within the Minsmere Levels, including the RSPB Reserve and the area immediately to the south of the New Cut. The number of sightings peaked in early May and mid-June. No marsh harrier sightings were recorded on the final survey day.

In order to obtain a detailed picture of usage of the preliminary works area and adjacent habitats, only sightings of marsh harriers to the south of Goose Hill have been considered in detail in this report. A total of 26 flights were identified that passed over the Goose Hills area. These are described in **Table 3.1** and shown on **Figure 3.1** (sightings 1 - 13) and **Figure 3.2** (sightings 14 – 26).

Table 3.1 Marsh Harrier Flight Descriptions.

Flight Number	Date	Sex	Number of Individuals	Activity
1	05/05/08	Male	1	Low flight at first over Minsmere Levels, then flying high south along the Grove and over Goose Hill.
2	11/05/08	Male	1	Started hunting along ditches heading south from Minsmere Reserve. Was then mobbed by a crow and flew over The Grove then south over Goose Hill.
3	11/05/08	Male	1	Hunting in low flight over Minsmere Levels, with occasional stops before crossing Goose Hill.
4	23/05/08	Male	2	Slow, lazy flight by two males in open areas to the east of Nursery Covert.
5	23/05/08	Male	1	Initially cruising south at about 50m above the Grove, then dropped to 20m probably to hunt before rising again and passing south over Goose Hill.
6	23/05/08	Male	1	Slow flight over meadow to the east of Nursery Covert, apparently hunting.
7	23/05/08	Male	1	Male bird detected moving north over the south-east corner of Goose Hill in direct flight and carrying food. Landed in reeds within Minsmere Reserve to the north of the Old River

Table 3.1 (continued) Marsh Harrier Flight Descriptions.

Flight Number	Date	Sex	Number of Individuals	Activity
8	23/05/08	Male	1	Observed hunting south of Chapel then flew directly south along the sea wall passing to the east of Goose Hill.
9	01/06/08	Female	1	Direct flight at height moving south.
10	01/06/08	Male	1	High, direct flight heading north from sea wall east of Goose Hill to the Minsmere Reserve, with a brief display before landing in reed bed.
11	10/06/08	Male	1	This bird was detected high over the south-east corner of Goose Hill and continued to move south over Grimseys.
12	10/06/08	Male	1	Low flight detected over the meadow to the east of Nursery Covert and between trees then continued higher to the south to the Sizewell Marshes.
13	16/06/08	Male	1	Hunting along sea wall from the Sluice south past Goose Hill.
14	16/06/08	Male	1	Initially detected to the south of Goose Hill moving north, it was then noted hunting to the north of this woodland by the other surveyor. It then soared higher and moved back south of Goose Hill.
15	16/06/08	Male	1	Passing through the meadows to the east of Nursery Covert, probably hunting, then moved south over Grimseys.
16	16/06/08	Male	1	Swooped into scrub and landed to the south of Goose Hill, before patrolling the edges of the meadow east of Nursery Covert and moving north.
17	28/06/08	Male	1	Only seen briefly flying low north towards the south-east corner of Goose Hill
18	28/06/08	Male	1	Probably same bird as sighting 17, then seen circling high over meadow to the east of Nursery Covert, before moving north. Here it was recorded dropping to 10m over reed bed and continued north to the North Minsmere Level.
19	28/06/08	Male	1	This bird was observed flying low, before landing in trees on the eastern edge of Nursery Covert, after which it took off, circled the meadow to the east and moved south.
20	07/07/08	Male	1	This bird was observed moving south from the Minsmere Reserve and passed the western edge of Goose Hill.
21	07/07/08	Female	1	Observed hunting within the RSPB Reserve before moving south over Goose Hill.
22	12/07/08	Female	1	Observed hunting over Minsmere Level before landing for 3 minutes. It then continued hunting and moved south over Goose Hill.

Table 3.1 (continued) Marsh Harrier Flight Descriptions.

Flight Number	Date	Sex	Number of Individuals	Activity
23	12/07/08	Male	1	Direct, fast flight north from Sizewell Marshes to the New Cut on Minsmere Level, where it was met by a female. No food was seen to be carried by this bird and there was no prey pass observed.
24	12/07/08	Unknown	1	Only brief glimpses of this bird were possible during a direct flight heading north-west from Grimseys.
25	12/07/08	Male	1	Long hunting flights along the field boundaries within the Sizewell Marshes (generally moving west).
26	19/07/08	Male	1	Initially observed hunting and moving south along the sea wall and ditches, then occasionally flying into the eastern edge of Goose Hill woodlands.

Marsh harrier was recorded throughout the entire survey period. Most birds noted were males (24), with only 3 females seen. The flights observed consisted of a combination of slow hunting flights and direct flights.

Several of the hunting flights started within or adjacent to the Minsmere Reserve with birds heading south and foraging over the western areas of the South Minsmere Levels and in the areas immediately to the north of Goose Hill (including Retsoms). Further foraging activity was recorded along the western edge of the sea wall, with birds quartering and moving south. Flights 8, 12 and 36 consisted of males hunting in this area, passing the eastern edge of Goose Hill along the sea wall and the eastern edge of the woodland. Hunting birds were recorded to the south of Goose Hill, where the majority of the foraging was concentrated around the meadows adjacent to the eastern edge of Nursery Covert. A male (Flight 25) was also recorded hunting along the ditches in the Sizewell Belts.

The direct commuting flights recorded were birds heading north to the Minsmere Reserve. Flights 7, 10, 18 and 23 all consisted of males moving north. The birds recorded as flights 7 and 10 were observed landing within the Reserve to the north of the Minsmere North Levels. The bird recorded as flight 7 was also observed carrying a food item. Flight 10 ended in a brief aerial display prior to landing. Flight 9 consisted of a female heading south from immediately to the south of the New Cut and was recorded flying to the west of Goose Hill as far as Kenton Hill.

4. Discussion

The 2008 survey recorded a total of 119 marsh harrier sightings of which 26 involved flights to the south of Goose Hill, and were therefore within the Sizewell Estate (for at least part of their observed flight). A minimum of one female and two male birds were recorded using the area. It was generally not possible to distinguish individual birds (particularly between survey days).

Observed activity included foraging flights in open habitats (during which birds generally moved south from the RSPB Reserve), foraging flights along woodland edges, and more direct

commuting flights of birds moving north. The frequency with which birds were encountered from the vantage points in the Sizewell Marshes was calculated at 1 sighting every 4.8 hours (approximately 0.2 sightings per hour). The encounter rate of birds seen moving to / from the areas to the south of Goose Hill from the remaining vantage points (1 and 2) was calculated as 1 sighting every 6 hours (approximately 0.16 sightings per hour)¹². This provides some indication that few birds entering the marshes were missed. When compared to likely provisioning rates (approximately 11-12 prey items per day) and numbers of breeding (and likely numbers of non breeding) birds, this encounter rate would suggest that only a small percentage of the totalling foraging activity carried out by breeding individuals from within the Minsmere to Walberswick SPA¹³ takes place south of Goose Hill.

The Sizewell Marshes lie within the published foraging distances of breeding marsh harriers involved in provisioning nest sites, being within 2.5km of the southernmost nests in the Minsmere RSPB Reserve and within 3.5km of the majority of the nests north of the Minsmere Old River. One sighting of a commuting male bird carrying prey in late May indicated the provisioning of a female or young nestlings inside the SPA boundary, while a second observed flight terminated in a display over the Minsmere Reserve. The likely number of breeding marsh harrier foraging south of Goose Hill is not possible to determine without a wing-tagging or radio tracking study, however, and any conclusions with regard to the importance of the Sizewell Marshes as a foraging resource for breeding SPA birds, must be made with caution. The best available data suggests that non-breeding birds may account for between approximately 12% and 35% of the total number of individuals within the SPA, and it would be reasonable to assume that as these birds are less tied to nest sites, they may range further and spend longer away from the breeding population.

5. Conclusions

The surveys have established that there is some use of the Sizewell Marshes by breeding marsh harrier from the Minsmere to Walberswick SPA. Overall, however, encounter rates were low, and given that a proportion of observed flights are likely to have been made by non breeding birds, there is no evidence to suggest that the Sizewell Marshes or other parts of the Sizewell Estate are of key importance to the breeding population of the SPA. The marshes and wider estate may represent an important secondary foraging resource given their distance from the SPA, particularly (perhaps) to non breeding birds, but as there will be no direct land take from the marshes as a result of development, the main effect that will need to be evaluated as part of any Environmental Impact Assessment will be localised disturbance leading to displacement. Given the extent of the marshes, the foraging potential of the wider Sizewell Estate and the areas in and adjacent to the SPA, this seems unlikely to be a key issue.

6. References

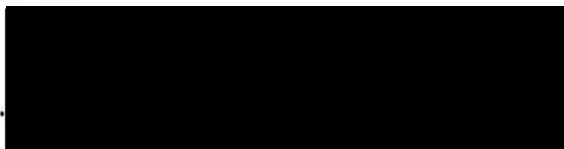
Clarke, R. (1995). *The Marsh Harrier*. Hamlyn, London.

¹² A filter was applied to the data, such that only birds passing over or to the south of Goose Hills were considered with regard to the encounter rate from VPs 1 & 2. Therefore flight activity restricted to the Minsmere South Levels has been excluded (93 flights). This allows a direct comparison between the northern VP and the VPs located in the Sizewell Marshes.

¹³ More specifically, reed bed habitats within the SPA. The SPA extends almost as far as the Sizewell Marshes, but habitats suitable for supporting breeding marsh harrier are generally limited south of the Minsmere Level.

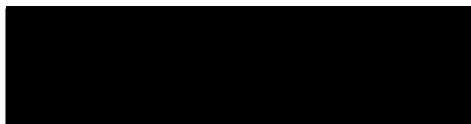
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John Baker

Reviewer:



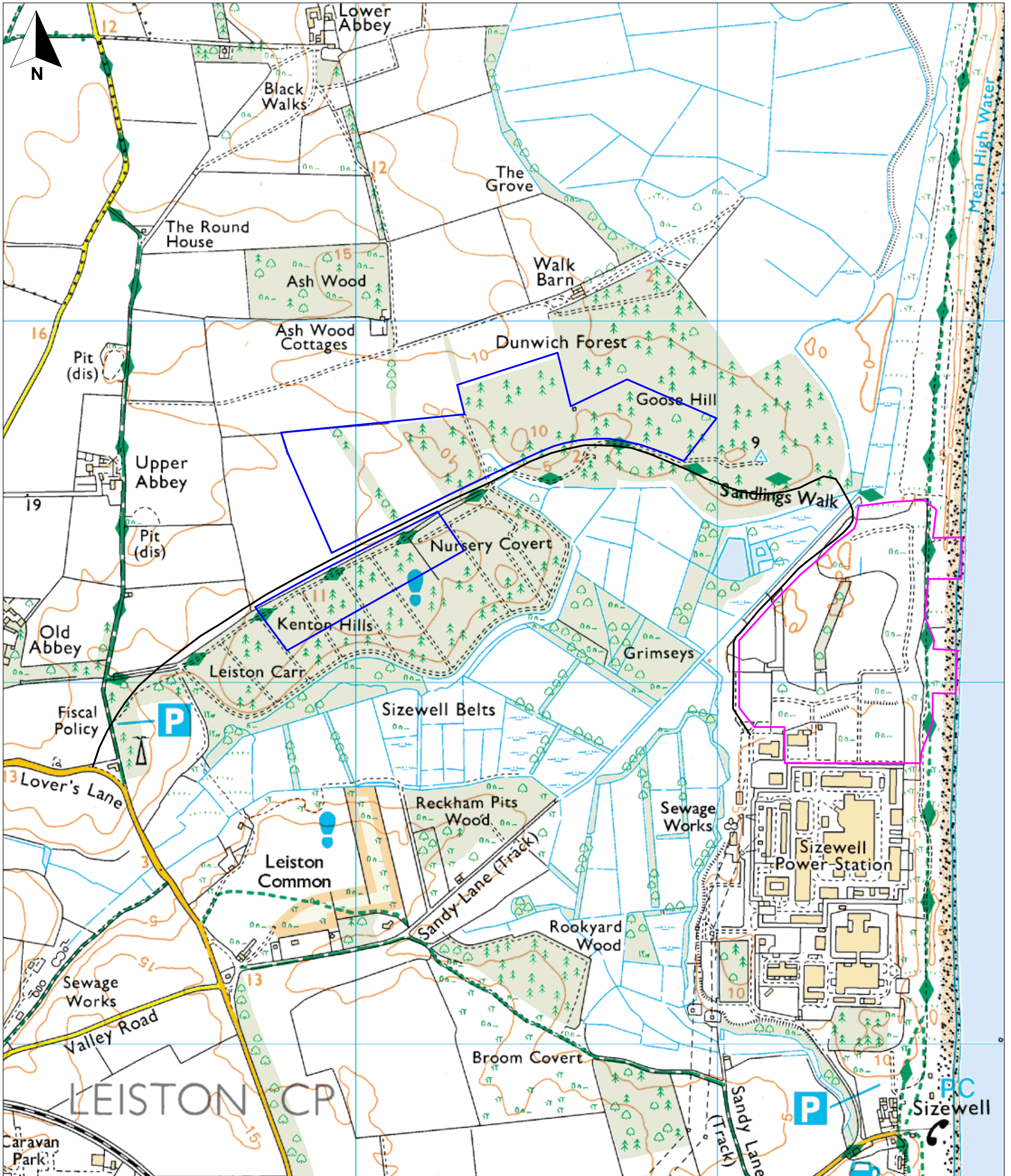
Swain Gabb

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- Key:**
- Preliminary Works Area
 - Indicative location of Construction Compounds
 - Proposed Access Route

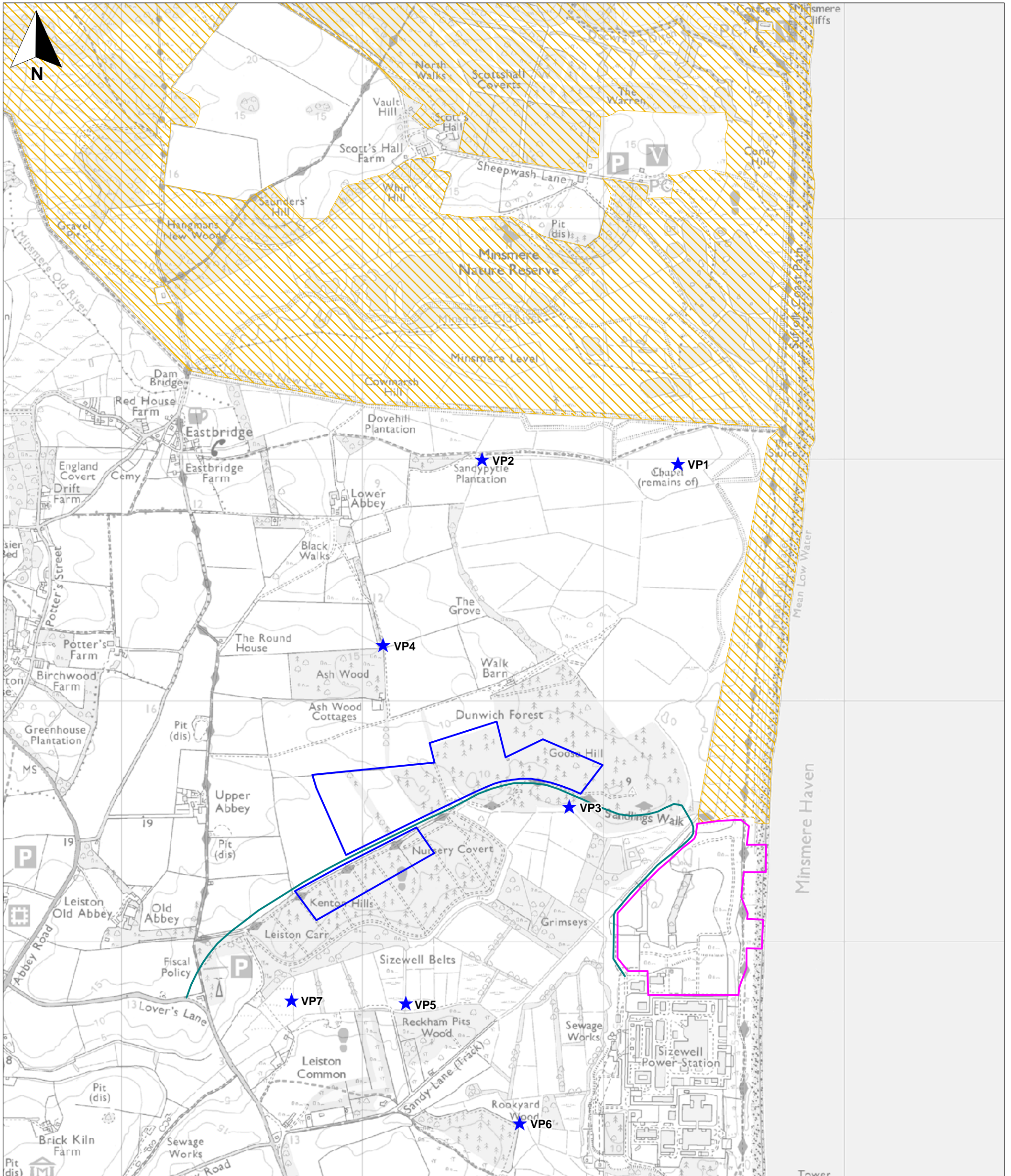


Sizewell Marsh Harrier Report 2008

Figure 1.1
Site location

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19801-R254.WOR tugwc





- Key:**
- Preliminary Works Area
 - SPA
 - Indicative location of construction compounds
 - Proposed Access Road
 - ★ Vantage points



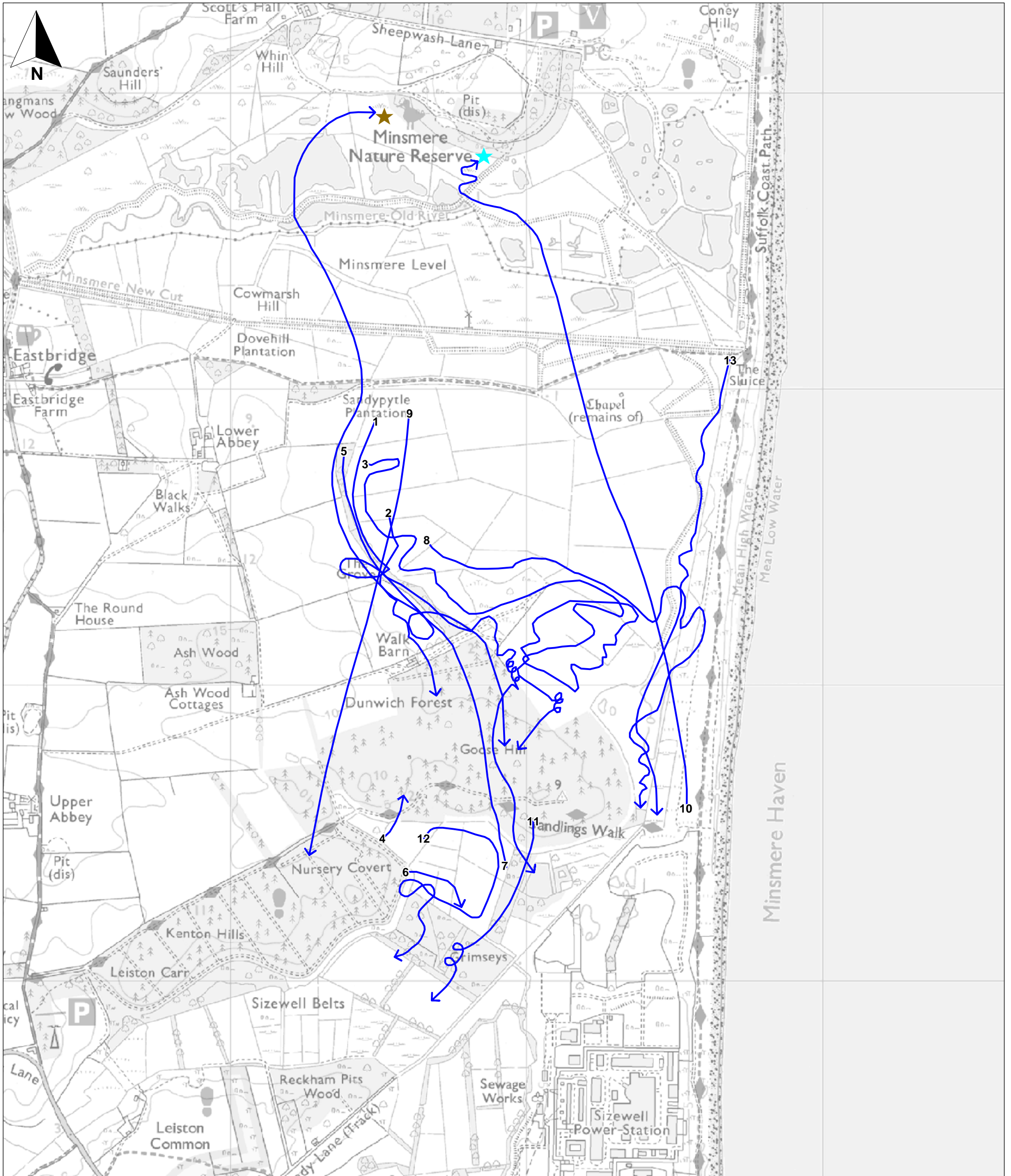
Sizewell Marsh Harrier Report 2008




Figure 2.1
Location of Vantage Points

0 m 500 m

January 2009
19801-R255.WOR tugwc





- Key:**
-  Marsh Harrier flight path
 -  Landing spot for flight 7
 -  Landing spot for flight 10



Sizewell Marsh Harrier Report 2008




Figure 3.1
Marsh harrier flights
Flights 1 - 13

0 m 500 m

January 2009
19801-R219.WOR tugwc





- Key:**
-  Marsh Harrier flight path
 -  Landing spot for flight 16
 -  Landing spot for flight 22



Sizewell Marsh Harrier Report 2008

Figure 3.2
Marsh harrier flights
Flights 14 - 26



January 2009
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Appendix A

Summary of UK BAP Targets and Initiatives for the Conservation of Reedbed

Marsh harrier has benefited from the Priority Habitat Action Plan prepared for reedbed¹⁴, which is both a UK and Suffolk BAP Priority Habitat. The ornithological interest of reedbeds¹⁵ is given as a major reason for the preparation of the national Habitat Action Plan. The targets published in 2006 for this plan are as follows:

- i. Maintain the extent of the existing reedbed resource through active management and ensure no net loss (priority will be to maintain blocks of greater than 2ha, where appropriate);
- ii. Maintain the condition of wet reedbed habitat where already favourable and establish (by 2010) management to secure favourable condition for all areas of targeted reedbed currently judged as unfavourable. The target condition for all such areas should be favourable or unfavourable recovering by 2020;
- iii. Continue creating reedbed from land of low nature conservation interest with the objective of expanding the BAP resource by 3,000 ha across the UK by 2020;
- iv. Establish 8 new landscape scale wetland complexes by 2020, at least 1 in each country in which reedbed is a major component along other wetland types.

Marsh harrier is also likely to have benefited from the Species Action Plan for bittern. The targets of this Plan include increasing the number of sites supporting booming male bittern in the UK to 32 by 2010 and increasing the number of booming male bittern on inland sites. To achieve this, the creation of new wet reedbed in blocks that average 80ha has been proposed.

¹⁴ The full Action Plan is available at:

<http://www.ukbap.org.uk/library/UKBAPPriorityHabitatDescriptionsfinalAllhabitats20081022.pdf#R>

¹⁵ The habitat supports a distinctive breeding bird assemblage including 6 nationally rare Red Data Birds: bittern (*Botaurus stellaris*), marsh harrier, crane (*Grus grus*), Cetti's warbler (*Cettia cetti*), Savi's warbler (*Locustella luscinioides*) and bearded tit (*Panurus biarmicus*). Reedbeds also provide roosting and feeding sites for migratory species (including the globally threatened aquatic warbler, *Acrocephalus paludicola*) and are used as roost sites for several raptor species in winter.