

Norfolk Vanguard Offshore Wind Farm

Appendix 5.2

Habitats Regulations Assessment Onshore Screening

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For and on behalf of Norfolk Vanguard Limited

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Table of Contents

1	Introduction	1
1.1	Purpose of this document	1
1.2	Project Background.....	2
1.3	HRA Legislation, Policy and Guidance	7
1.4	The HRA Process.....	9
1.5	Process for the Identification of European and Ramsar Sites and Features Potentially Affected by the Project	12
1.6	HRA Stage 1 Screening Process.....	12
2	Designated Sites Potentially Affected by the Project.....	21
2.1	European and Ramsar sites included in the Screening Assessment	21
3	Baseline Environment	27
3.1	Data sources.....	27
3.2	Desk study data	31
3.3	Field survey data	32
4	Screening Assessment.....	41
4.1	Introduction	41
4.2	River Wensum SAC	41
4.3	Paston Great Barn SAC.....	44
4.4	Norfolk Valley Fens SAC	45
4.5	Broadland SPA.....	46
4.6	Broadland Ramsar site	48
5	Summary.....	50
6	References	53

Tables

Table 1.1 Suggested tiers for undertaking a staged cumulative impact assessment (JNCC and Natural England, 2013a)	11
Table 1.2 The ZOI of potential effects for relevant environmental parameters	13
Table 2.1 European and Ramsar sites within 5km of the onshore infrastructure	21
Table 2.2 River Wensum SAC qualifying features	22
Table 2.3 Paston Great Barn SAC qualifying features	23
Table 2.4 Norfolk Valley Fens SAC qualifying features	23
Table 2.5 Qualifying features of the Broadland SPA (population counts are derived from the SPA citation)	24
Table 2.6 Qualifying features of the Broadland Ramsar site (population counts are derived from the Ramsar Information Sheet)	26
Table 3.1 Data sources	28
Table 3.2 Agricultural fields in North Walsham District: Peak count of waterbird species across six visits (peak counts in yellow)	33
Table 3.3 Habitats along the Hundred Stream: peak count of waterbird species across six visits	33
Table 3.4 North Norfolk Coast between Eccles-on-Sea and Paston: peak count of waterbird species across six visits	34
Table 4.1 The ZOI of potential indirect effects on the River Wensum SAC boundary	43
Table 4.2 The ZOI of potential indirect effects on the River Wensum SAC ex-situ habitats	43
Table 4.3 The ZOI of potential indirect effects on the Paston Great Barn SAC boundary	44
Table 4.4 The ZOI of potential indirect effects on the Norfolk Valley Fens SAC boundary	46
Table 5.1 Screening summary	51

Figures

Figure 22.1 Norfolk Vanguard onshore project area

Figure 22.2 Designated sites and 5km buffer

Figure 22.3 Agricultural habitats within 5km of Broadland SPA

Figure 22.4 Coastal and wetland habitats within 5km of Broadland SPA

Figure 22.5 Habitats within 5km of designated sites

Glossary

HRA	Habitats Regulations Assessment
AA	Appropriate Assessment
AfL	Agreement for Lease
BCT	Bat Conservation Trust
cSAC	Candidate SAC
DCLG	Department for Communities and Local Government
DCO	Development Consent Order
Defra	Department for Environment, Food and Rural Affairs
EAOW	East Anglia Offshore Wind Limited
EC	European Commission
EEC	European Economic Community
EIA	Environmental Impact Assessment
ES	Environmental Statement
EU	European Union
HDD	Horizontal Directional Drilling
HRA	Habitats Regulations Assessment
HRGN	Habitats Regulations Guidance Note
IROPI	Imperative Reasons of Overriding Public Interest
JNCC	Joint Nature Conservation Committee
LSE	Likely Significant Effect
NBIS	Norfolk Biodiversity Information Service
NBSG	Norfolk Barbastelle Study Group
NSER	No Significant Effects Report
NV east	Norfolk Vanguard East
NVC	National Vegetation Classification
O&M	Operational and Maintenance
ODPM	Office of the Deputy Prime Minister
OWF	Offshore wind farm
PEIR	Preliminary Environmental Information Report
pSAC	Possible SACs
pSPA	Possible SPA
SAC	Special Area of Conservation
SCI	Sites of Community Importance
SNCB	Statutory Nature Conservation Bodies
SPA	Special Protection Area
SPR	Scottish Power Renewables (UK) Limited
SSSI	Site of Special Scientific Interest
TEU	Treaty of the European Union
VWPL	Vattenfall Wind Power Ltd
ZAP	Zone Appraisal and Planning
ZDA	Zone Development Agreement
ZOI	Zone of Influence

Glossary of Terminology

Cable Relay Station	A CRS would be required for a HVAC connection arrangement only and would not be included in a HVDC connection solution. The CRS would accommodate reactive compensation equipment required to absorb the capacitive currents generated by long HVAC power cables.
Landfall	Where the offshore cables come ashore.
Link boxes	Underground chambers or above ground cabinets next to the cable trench housing low voltage electrical earthing links.
Mobilisation zone	Area within which mobilisation areas, required for facilitating the duct installation, would be located.
National Grid substation extension	The proposed location for the National Grid substation extension.
Natura 2000 site / European site	A network of nature protection areas in the territory of the European Union. It is made up of Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) designated under the Habitats Directive and Birds Directive, respectively.
Necton National Grid substation	The grid connection location (Onshore Interface Point) for Norfolk Vanguard.
Onshore cables	The cables which transmit electricity from landfall to the onshore project substation.
Onshore cable corridor	200m wide onshore corridor within which the onshore cable route would be located.
Onshore infrastructure	The combined name for all onshore infrastructure associated with the project from landfall to grid connection.
Onshore project area	All onshore electrical infrastructure.
Onshore project substation	A compound containing electrical equipment to enable connection to the National Grid. In an HVAC solution the substation steps up the exported power from 220kV (export cable voltage) to 400kV (grid voltage). In an HVDC system the substation would convert the exported power from HVDC to HVAC, with a step up to 400kV (grid voltage). For both options this also contains equipment to help maintain stable grid voltage.
Overhead line modification zone	Area within which the work would be undertaken to complete the necessary modification to the existing 400kV overhead lines.
The project	Norfolk Vanguard Offshore Wind Farm, including the onshore and offshore infrastructure.
Ramsar sites	A Ramsar Site is a wetland site of international importance under the Convention on Wetlands, known as the Ramsar Convention.

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1 INTRODUCTION

1.1 Purpose of this document

1. This document provides the findings of the onshore screening of Natura 2000 sites for Habitats Regulations Assessment (HRA) in relation to the Norfolk Vanguard Offshore Wind Farm (herein 'the project'). This document covers those Natura 2000 sites designated for the terrestrial and freshwater habitats and species they support, as well as those Natura 2000 sites designated for bird species which utilise terrestrial habitats. The document provides the information that was used in stakeholder consultation as part of the Evidence Plan Process, to seek agreement on the designated sites which should be considered further. This document also forms Stage 1 of the HRA Process (discussed further in section 1.4). Any updates since screening in Q4 of 2017 are discussed in the main Information to Support HRA report. Impacts of the offshore project infrastructure on Natura 2000 sites are screened separately in Appendix 5.1.
2. Designated sites are proposed to be 'screened out' where no Likely Significant Effect (LSE) from the project is predicted. Where LSE cannot be ruled out at this stage the designated sites will be 'screened in' and assessed further. Information to support the HRA (both offshore and onshore) is provided in the Preliminary Environmental Information Report (PEIR) and the Development Consent Order (DCO) application documents.
3. The classes of Natura 2000 designations considered within this HRA Screening are:
 - Special Protection Areas (SPAs) (some of which are also Ramsar sites);
 - Potential SPA (pSPA);
 - SPAs that are approved by the UK Government but are still in the process of being classified.
 - Special Areas of Conservation (SACs);
 - Sites that have been adopted by the European Commission and formally designated by the government of each country in whose territory the site lies.
 - Possible SACs (pSACs);
 - A site which has been identified and approved to go out to formal consultation.
 - Candidate SACs (cSACs); and

- Following formal consultation on the pSAC, the site is then submitted to the European Commission (EC) for approval (referred to as adoption). At this stage the site it is called a cSAC.
- Sites of Community Importance (SCI).
 - Once adopted by the EC, the site it becomes a SCI, before the national government then designates it as a SAC.
- 4. Consideration is also given to impacts on Ramsar sites. Ramsar sites protect wetland areas and extend only to 'areas of marine water the depth of which at low tide does not exceed six metres'.
- 5. Screening of SPAs and SACs affected by the offshore project elements will be provided separately (see Norfolk Vanguard Offshore Wind Farm Habitats Regulations Assessment Offshore Screening Document Reference: PB4476-004-040).

1.2 Project Background

1.2.1 Background

6. In December 2009, as part of the UK Offshore Wind Round 3 tender process, The Crown Estate awarded the joint venture company, East Anglia Offshore Wind (EAOW) Ltd, the rights to develop Zone 5 (later called the 'East Anglia zone'). These rights were granted through a Zone Development Agreement (ZDA). EAOW Ltd. is a 50:50 joint venture owned by Vattenfall Wind Power Ltd (VWPL) and ScottishPower Renewables (UK) Limited (SPR).
7. In December 2014, a decision was taken to split the zone, with VWPL having development rights within the north of the former East Anglia Zone, and SPR continuing to develop the southern part. In agreement with The Crown Estate, the ZDA was effectively dissolved in 2016. New Agreement for Lease (Afl) areas have been awarded by The Crown Estate within the former Zone, separately to VWPL and its affiliate companies, and SPR and its affiliates.
8. Norfolk Vanguard Ltd (an affiliate company of VWPL) is now undertaking the EIA for Norfolk Vanguard and a Scoping Report was submitted to the Planning Inspectorate in October 2016 (Royal HaskoningDHV, 2016).
9. The offshore project area comprises two distinct offshore wind farm (OWF) areas, Norfolk Vanguard East (NV East) and Norfolk Vanguard West (NV West) ('the OWF sites'), and will be connected to the shore by offshore export cables installed within the offshore cable corridor.

1.2.2 Project description

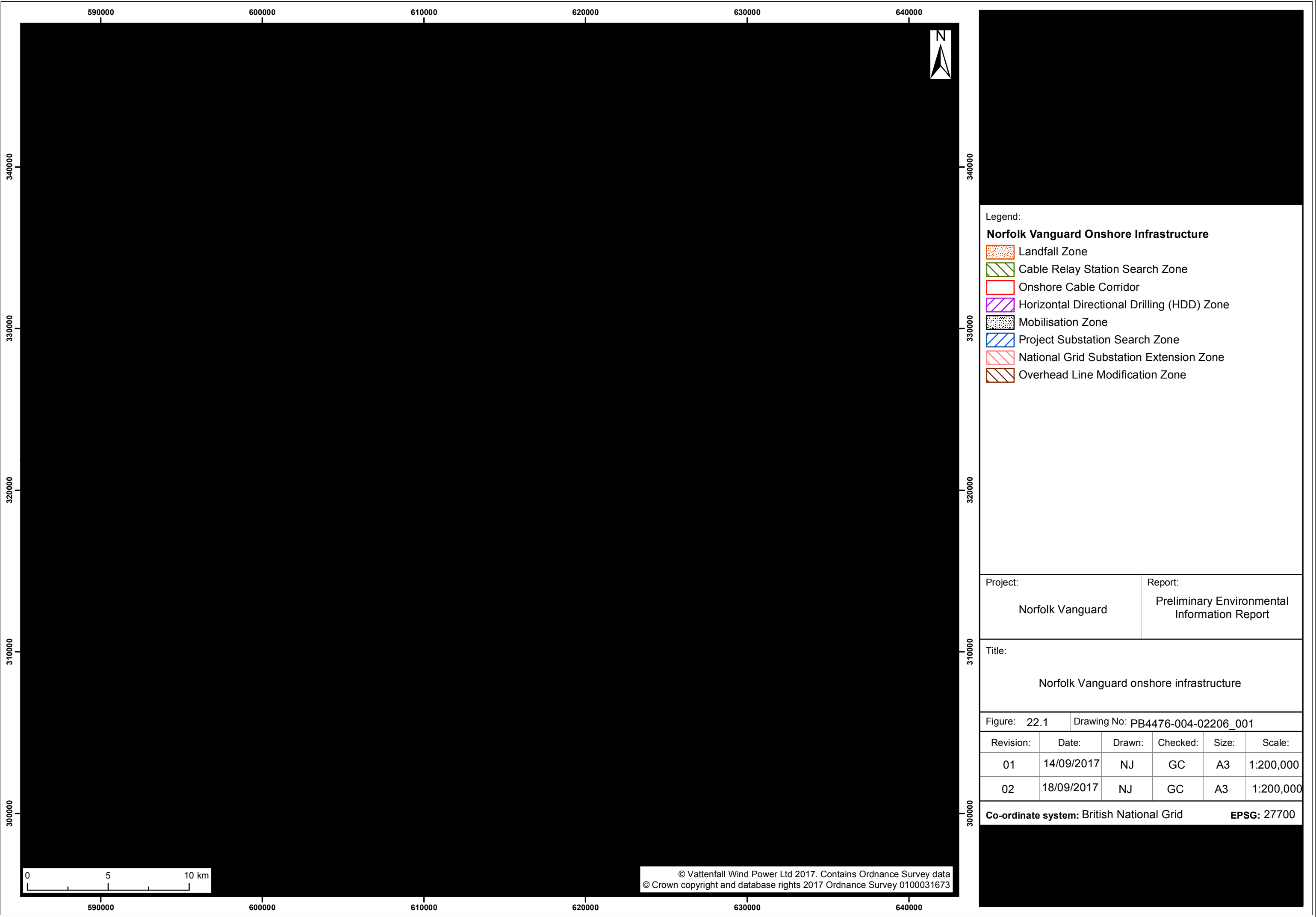
10. The onshore project area consists of the following key elements:

- Landfall;
- Cable relay station (if required);
- Onshore cable corridor;
- Onshore project substation; and
- Extension to the existing Necton National Grid substation and overhead line modifications.

The location of the onshore project area is shown on Figure 22.1

11. During the development of the project, the onshore Scoping Area that was initially defined has been refined, to identify three landfall options, associated cable relay station search zones, as well as an onshore project substation search zone in proximity to the Necton National Grid substation. A 200m wide onshore cable corridor has been identified, within which the cable will be located, and Horizontal Directional Drilling (HDD) zones and mobilisation zones have been identified along the onshore cable corridor. As the project design is further refined, these search zones will decrease in size, and the final options for the siting of infrastructure (i.e. one cable relay station, one landfall, one onshore substation) will be taken forward in the Norfolk Vanguard DCO application.

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1.2.3 Onshore project area site selection process

12. The project has undergone an extensive site selection process which has involved incorporating ecological constraints into the identification of the onshore project area. A constraints mapping exercise was undertaken prior to the publication of the Norfolk Vanguard EIA Scoping Report (Royal HaskoningDHV, 2016) in order to determine the route options for the onshore project area. This constraints mapping exercise identified international designated sites for nature conservation (SAC, SPA, Ramsar sites) to ensure that, where possible, these sites were avoided.
13. Where it was not possible to avoid the location of an internationally designated site, for example in the case of linear designated sites such as the River Wensum SAC, it is intended to use trenchless techniques (i.e. HDD) these locations in order to ensure that no above ground works occur within these designations. The River Wensum SAC is the only example where an internationally designated site needs to be crossed in this way.
14. Further details on the site selection process are set out in Chapter 4 Site Selection and Consideration of Alternatives in the PEIR.

1.3 HRA Legislation, Policy and Guidance

1.3.1 Legislation

15. The HRA process derives from the requirements of specific European Directives and the Regulations that implement their requirements into UK and devolved national law.
16. The UK has triggered article 50 of the Treaty on European Union (TEU) and is in a two year process of negotiating a withdrawal agreement for the UK to leave the EU. Following withdrawal from the EU, the UK government plans to enact the Great Repeal Bill. In its White Paper, the UK Government has confirmed that it plans to transpose all current European environmental regulation (e.g. the Habitats Directive and Birds Directive) into UK law after leaving the European Union.

1.3.1.1 The Birds Directive

17. The EU Directive on the Conservation of Wild Birds (2009/147/EC) (hereafter called the Birds Directive) provides a framework for the conservation and management of wild birds in Europe. The relevant provisions of the Directive are the identification and classification of SPAs for rare or vulnerable species listed in Annex I of the Directive and for all regularly occurring migratory species (required by Article 4). The Directive requires national Governments to establish SPAs and to have in place mechanisms to protect and manage them. The SPA protection procedures originally

set out in Article 4 of the Birds Directive have been replaced by the Article 6 provisions of the Habitats Directive.

1.3.1.2 The Habitats Directive

18. The EU Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora (92/43/EEC) (hereafter called the Habitats Directive) provides a framework for the conservation and management of natural habitats, wild fauna (except birds) and flora in Europe. Its aim is to maintain or restore natural habitats and wild species at a favourable conservation status. The relevant provisions of the Directive are the identification and classification of Special Areas of Conservation (SAC) (Article 4) and procedures for the protection of SACs and SPAs (Article 6). SACs are identified based on the presence of natural habitat types listed in Annex I and populations of the species listed in Annex II. The Directive requires national Governments to establish SACs and to have in place mechanisms to protect and manage them.

1.3.1.3 The Conservation of Habitats and Species Regulations 2010

19. The Conservation of Habitats and Species Regulations 2010, (hereafter called the 'Habitats Regulations') transpose the Birds Directive and the Habitats Directive into UK law. The Habitats Regulations place an obligation on 'competent authorities' to carry out an appropriate assessment of any proposal likely to affect a SAC or SPA, to seek advice from Natural England and not to approve an application that would have an adverse effect on a SAC or SPA except under very tightly constrained conditions that involve decisions by the Secretary of State. The competent authority in the case of Norfolk Vanguard is the Secretary of State for Business, Energy and Industrial Strategy.

1.3.1.4 Application of the legislation to designated sites

20. As discussed in section 1.1 the HRA process also applies as a matter of law or policy to the following sites:
- SCI and cSAC: HRA process applied as a result of Article 4(5) and Article 6(2)(4) of the Habitats Directive.
 - pSPAs: HRA process applied as a result of UK Government policy - paragraph 118 of the National Planning Policy Framework (DCLG, 2012).
 - pSACs: HRA process applied as a result of UK Government policy - paragraph 118 of the National Planning Policy Framework (DCLG, 2012).
 - Listed and proposed Ramsar sites (internationally important wetlands designated under the Ramsar Convention 1971): HRA process applied as a result of UK Government policy (ODPM & Defra, 2005; DCLG, 2012).

1.3.2 Guidance on the HRA Process

21. In preparing this report, consideration has been given to the relevant guidance issued by a number of governmental, statutory and industry bodies.
22. In relation to guidance from government bodies this includes:
 - European Commission: Assessment of Plans and Projects Significantly Affecting Natura 2000 Sites;
 - European Commission: EU Guidance on wind energy development in accordance with EU nature directives;
 - Department of Communities and Local Government: Guidance on 'Planning for the Protection of European Sites: Appropriate Assessment';
 - The Planning Inspectorate Advice Note Nine: Rochdale Envelope; and
 - The Planning Inspectorate Advice Note Ten: Habitat Regulations Assessment relevant to nationally significant infrastructure projects.
23. In relation to guidance from the Statutory Nature Conservation Bodies (SNCBs) this includes:
 - English Nature: Habitats Regulations Guidance Note (HRGN 1): The Appropriate Assessment (Regulation 48) The Conservation (Natural Habitats &c) Regulations, 1994.
 - English Nature: Habitats Regulations Guidance Note (HRGN 3): The Determination of Likely Significant Effect under the Conservation (Natural Habitats &c) Regulations, 1994.
 - English Nature: Habitats Regulations Guidance Note (HRGN 4): Alone or in combination.

1.4 The HRA Process

24. The HRA process is carried out in a sequential manner and the stages of that sequence are described as follows in Planning Inspectorate Advice Note 10 (Planning Inspectorate, 2016):
 - Stage 1 –Screening (This report) for LSE;
 - European and Ramsar sites are screened for LSE, both effects from the project alone and in combination with other projects. The Planning Inspectorate advises that for those projects where no LSE is predicted then that should reported in the form of a No Significant Effects Report (NSER) and the Stage 2 assessment is not carried out (the Planning Inspectorate, 2016).
 - Stage 2 - Appropriate Assessment (AA);

- For those sites where LSE on a European or Ramsar site cannot be excluded at Stage 1, then further information to inform the assessment will be prepared and the test applied to determine whether the project alone or in-combination could adversely affect the integrity of the site in view of its conservation objectives. This assessment stage will be reported in the form of a HRA AA Report and the results of the assessment summarised in the form of a series of matrices.
- 25. In those cases where the conclusion of the HRA AA Report is that an adverse effect on the integrity of a European or Ramsar site has been identified then the assessment proceeds to two further stages:
 - Stage 3 - Assessment of Alternatives; and
 - The alternatives that have been considered will be assessed. The Planning Inspectorate advises that alternative solutions can include a proposal of a different scale, a different location and an option of not having the scheme at all – the ‘do nothing’ approach.
 - Stage 4 – Assessment of Imperative Reasons of Overriding Public Interest (IROPI).
 - If it is demonstrated that there are no alternative solutions to the proposal that would have a lesser effect or avoid an adverse effect on the integrity of the site(s), then a justified case will be prepared that the scheme must be carried out for IROPI.
- 26. If the conclusion of Stages 3 and 4 is that there is no alternative and that the project has demonstrated clear Imperative Reasons of Overriding Public Interest (IROPI) then the project may proceed with a requirement that appropriate compensatory measures are delivered.

1.4.1 In-combination Assessment

- 27. The Habitats Regulations require the consideration of the potential effects of a project on European sites and Ramsar sites both alone and in-combination with other plans or projects.
- 28. The identification of plans and projects to include the in-combination assessment will be based on:
 - Approved plans;
 - Constructed projects;
 - Approved but as yet unconstructed projects; and

- Projects for which an application has been made, those which are currently under consideration and those which will be consented before the project's consent decision.
29. The classes of projects that could potentially be considered for the in-combination assessment include:
- Construction or improvement of highways or roads;
 - Cycle tracks and other ancillary works;
 - Other major transport works;
 - Generating station development;
 - Above ground electrical line installation;
 - Pipeline development;
 - Water operations (abstraction or impounding); and
 - Major residential or commercial development.
30. The assessment will present relevant in-combination impacts of projects in the following tiered approach (Table 1.1) as advised by Natural England (Joint Nature Conservation Committee (JNCC) and Natural England, 2013a).

Table 1.1 Suggested tiers for undertaking a staged cumulative impact assessment (JNCC and Natural England, 2013a)

Tier description	Consenting or construction phase	Data availability
Tier 1	Built and operational projects should be included within the cumulative assessment where they have not been included within the environmental characterisation survey, i.e. they were not operational when baseline surveys were undertaken, and/or any residual impact may not have yet fed through to and been captured in estimates of 'baseline' conditions e.g. 'background' distribution or mortality rate for birds.	Pre-construction (and possibly post-construction) survey data from the built project(s) and environmental characterisation survey data from proposed project (including data analysis and interpretation within the Environmental Statement (ES) for the project).
Tier 2	Tier 1 + projects under construction.	As Tier 1 but not including post-construction survey data.
Tier 3	Tier 2 + projects that have been consented (but construction has not yet commenced).	Environmental characterisation survey data from proposed project (including data analysis and interpretation within the ES for the project) and possibly pre-construction.
Tier 4	Tier 3 + projects that have an application submitted to the appropriate regulatory body that have not yet been determined.	Environmental characterisation survey data from proposed project (including data analysis and interpretation within the ES for the project).

Tier description	Consenting or construction phase	Data availability
Tier 5	Tier 4 + projects that the regulatory body are expecting an application to be submitted for determination (e.g. projects listed under the Planning Inspectorate programme of projects).	Possibly environmental characterisation survey data (but strong likelihood that this data will not be publicly available at this stage).
Tier 6	Tier 5 + projects that have been identified in relevant strategic plans or programmes (e.g. projects identified in Round 3 wind farm zone appraisal and planning (ZAP) documents).	Historic survey data collected for other purposes/by other projects or industries or at a strategic level.

31. Projects will be included in the quantitative assessment where there is sufficient certainty and data confidence that they make a meaningful contribution to the assessment process.

1.5 Process for the Identification of European and Ramsar Sites and Features Potentially Affected by the Project

In order to identify relevant European and Ramsar sites that have the potential to be affected by the project, a 5km buffer zone around the onshore infrastructure has been applied (see Figure 22.2).

32. The 5km buffer was used to capture all of the designated sites that are considered to have the potential to be affected by the project.

1.6 HRA Stage 1 Screening Process

33. Screening has been based on a conceptual ‘source-pathway-receptor’ approach. The approach identifies likely environmental impacts resulting from the proposed construction, operation and maintenance (O&M) and decommissioning of the wind farm and its supporting transmission infrastructure. The parameters are defined as follows:

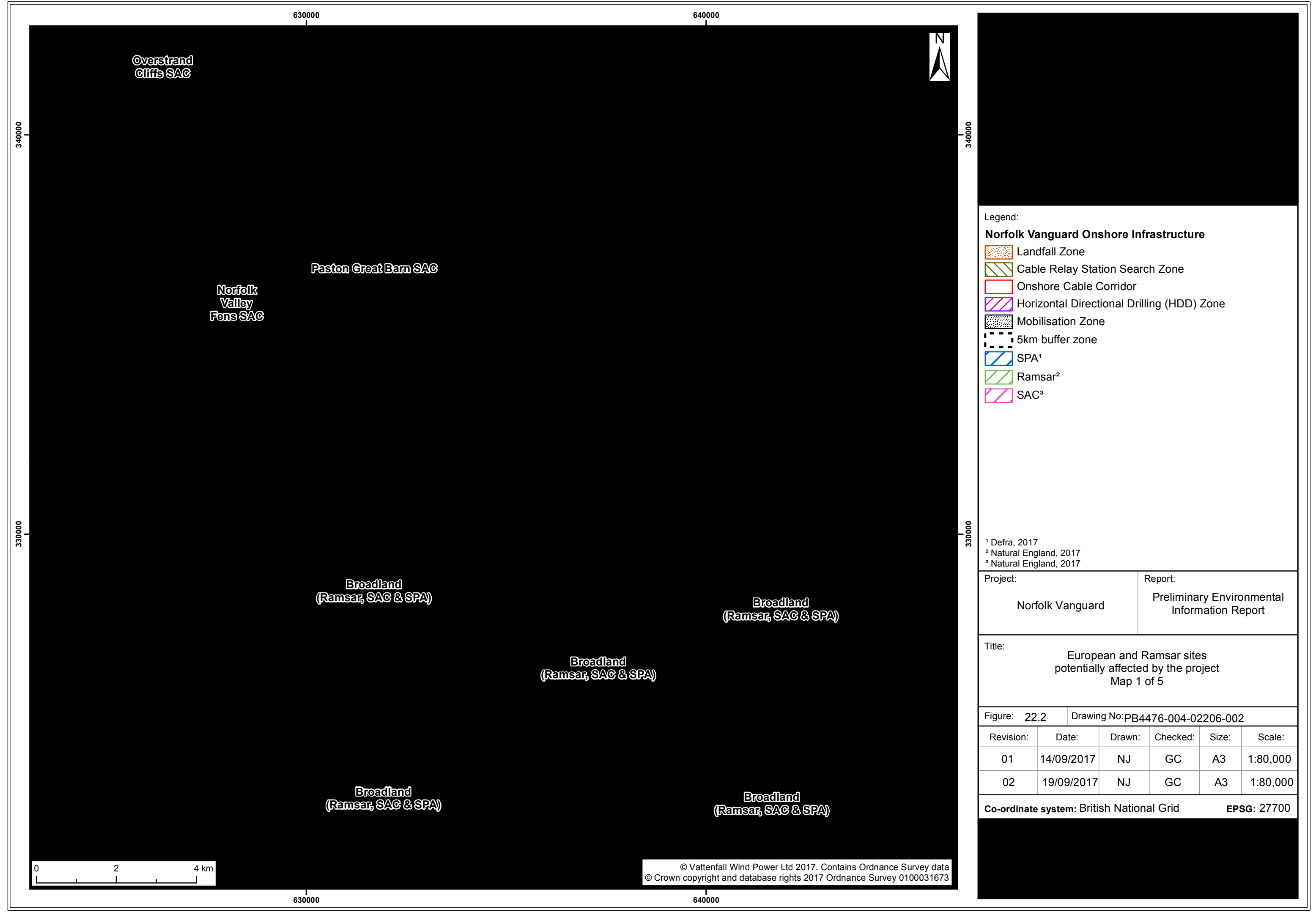
- Source – the origin of a potential impact (noting that one source may have several pathways and receptors).
 - Example: Site clearance works required for cable trenching.
- Pathway – the means by which the effect of the activity could impact a receptor.
 - Example: Loss of vegetation leading to severance of ecological networks.
- Receptor – the element of the receiving environment that is impacted.

- Example: Commuting / foraging routes for a bat species for which a site is designated are severed by vegetation removal.
34. Where there is no pathway or the pathway is so long that the effect from the source has dissipated to a negligible level before reaching the receptor, there is justification for the screening out of that particular receptor.
 35. It only requires one category of site interest feature to be identified in the process below for the European and / or Ramsar site to be screened in, along with all its associated interest features.
 36. Where there is insufficient information available at this stage to screen out a site, it is screened in for further consideration.
 37. The assessment of LSE in the context of these sites comprised expert assessment of the likely effects of the project during both the construction, operational and decommissioning phases. This includes the analysis of the maximum distance over which potential impacts could occur (known as the 'zone of influence' (ZOI)) for specific environmental parameters associated with the construction and operational phases of the project. This screening exercise considers whether the project ZOIs overlap with either of the following footprints:
 - The European and Ramsar site boundaries; and
 - Ex-situ habitats of the qualifying features of European and Ramsar sites.
 38. Ex-situ habitats are those which support qualifying features of the European or Ramsar site but are located outside of the designated site boundary.
 39. The ZOI for different environmental parameters is summarised Table 1.2. The environmental parameters and also ex-situ habitats relevant for the qualifying features of specific designated sites are set out within section 4 below. These ZOIs have been determined using expert judgement. An explanation of how each ZOI is derived is set out in Table 1.2.

Table 1.2 The ZOI of potential effects for relevant environmental parameters

Environmental parameter	Zone of Influence (Zoi) of potential effect	Explanation
Noise	1km from the onshore project area .	A precautionary buffer based on the sensitivity of ornithological receptors to noise disturbance (Whitfield, Ruddock & Bullman, 2008).
Air quality	50m from the onshore project area for construction dust. 1km from the onshore project area for project emissions.	Precautionary buffers based on the anticipated dispersion distances of emissions generated by the project (IAQM guidance considers receptors within 500m of a pollution source (IAQM, 2014)).

Environmental parameter	Zone of Influence (Zoi) of potential effect	Explanation
Light	50m from the onshore project area , the zone of potential (controlled) light spill.	Buffer based on the potentially effects of light upon sensitivity ecological features (e.g. bat commuting / foraging routes).
Visual disturbance	500m from the onshore project area .	A precautionary buffer based on the sensitivity of ornithological receptors to noise disturbance (Whitfield, Ruddock & Bullman, 2008).
Geology and land contamination	500m from the onshore project area .	A precautionary buffer based on the assumed maximum extent of release of contaminated material caused by the project.
Groundwater and Hydrology	Generally taken to be 1km from the onshore project area, although this could be larger where a groundwater connection exists.	A precautionary buffer based on the maximum extent of groundwater bodies' functional connectivity with a designated site.



Legend:

- Norfolk Vanguard Onshore Infrastructure**
- Landfall Zone
 - Cable Relay Station Search Zone
 - Onshore Cable Corridor
 - Horizontal Directional Drilling (HDD) Zone
 - Mobilisation Zone
 - 5km buffer zone
 - SPA¹
 - Ramsar²
 - SAC³

¹ Defra, 2017
² Natural England, 2017
³ Natural England, 2017

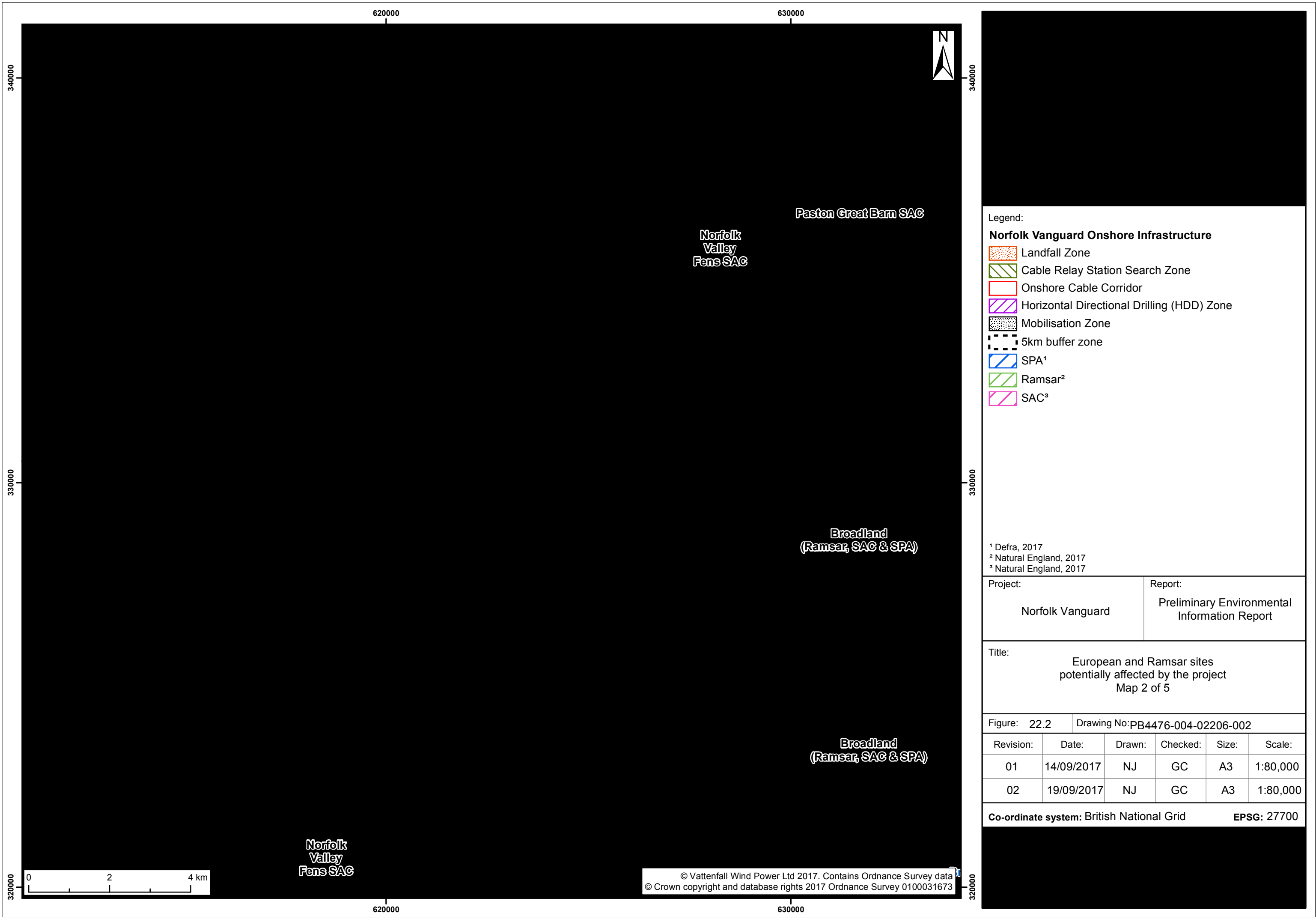
Project:	Report:
Norfolk Vanguard	Preliminary Environmental Information Report

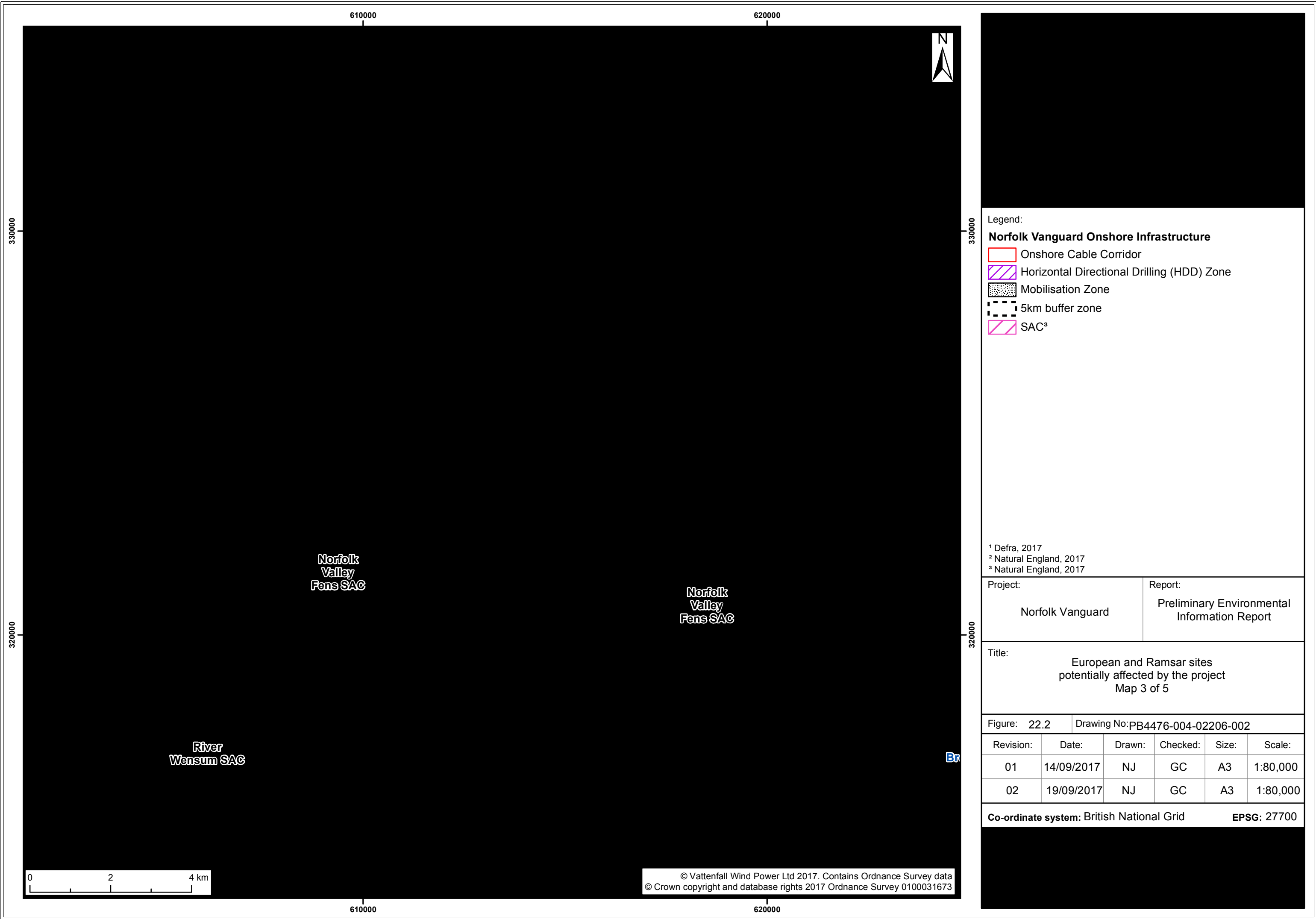
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Map 1 of 5

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Co-ordinate system: British National Grid EPSG: 27700





Legend:

Norfolk Vanguard Onshore Infrastructure

Onshore Cable Corridor

Horizontal Directional Drilling (HDD) Zone

Mobilisation Zone

5km buffer zone

SAC³

¹ Defra, 2017

² Natural England, 2017

³ Natural England, 2017

Project:

Norfolk Vanguard

Report:

Preliminary Environmental Information Report

Title:

European and Ramsar sites potentially affected by the project
Map 3 of 5

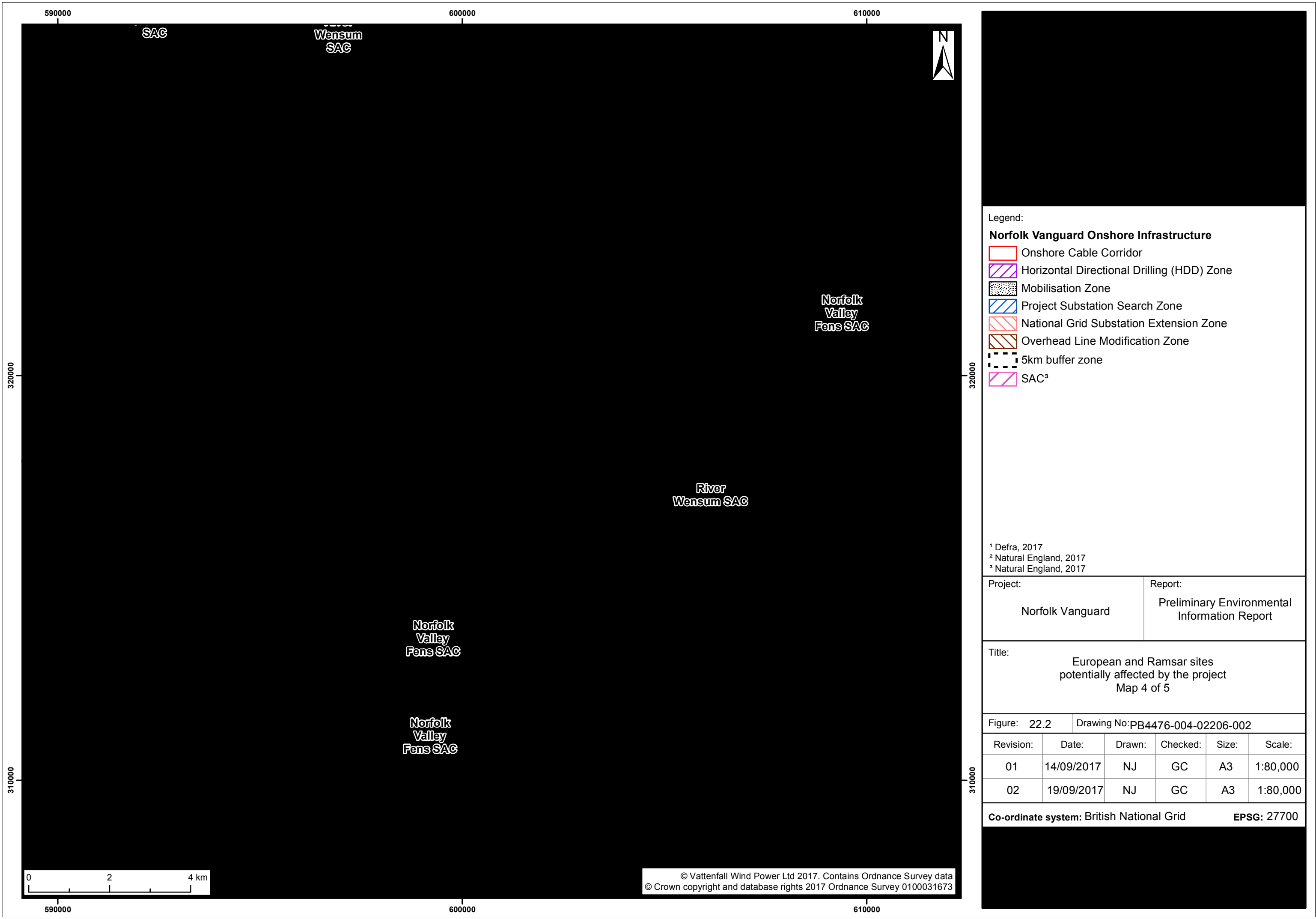
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02	19/09/2017	NJ	GC	A3	1:80,000

Co-ordinate system: British National Grid

EPSG: 27700



Legend:

Norfolk Vanguard Onshore Infrastructure

- Onshore Cable Corridor
- Horizontal Directional Drilling (HDD) Zone
- Mobilisation Zone
- Project Substation Search Zone
- National Grid Substation Extension Zone
- Overhead Line Modification Zone
- 5km buffer zone
- SAC³

¹ Defra, 2017
² Natural England, 2017
³ Natural England, 2017

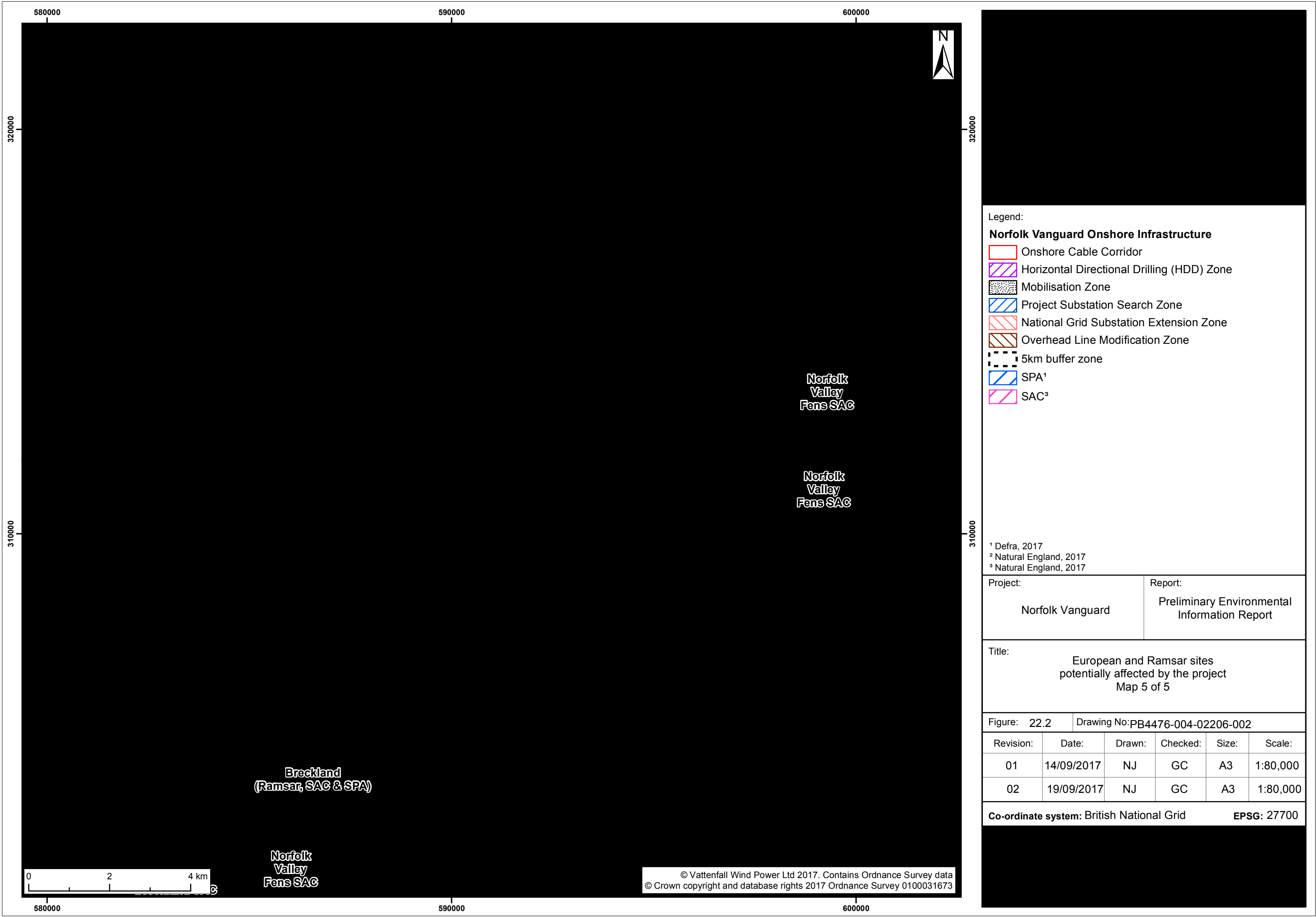
Project:	Report:
Norfolk Vanguard	Preliminary Environmental Information Report

Title:

European and Ramsar sites potentially affected by the project
Map 4 of 5

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Co-ordinate system: British National Grid EPSG: 27700



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2 DESIGNATED SITES POTENTIALLY AFFECTED BY THE PROJECT

2.1 European and Ramsar sites included in the Screening Assessment

40. There are four European sites and one Ramsar site within 5km of the onshore infrastructure. These are:
- River Wensum SAC;
 - Paston Great Barn SAC;
 - Norfolk Valley Fens SAC; and
 - Broadland SPA and Ramsar site.
41. The distances between the designated sites and the onshore infrastructure are shown in Table 2.1. Details of each designated site are provided below. The location of these sites is shown on Figure 22.2.

Table 2.1 European and Ramsar sites within 5km of the onshore infrastructure

European / Ramsar site	Closest point to the onshore infrastructure
River Wensum SAC	Lies within the onshore project area
Paston Great Barn SAC	2.9km (located north-east of the onshore project area)
Norfolk Valley Fens SAC	570m (located south of the onshore project area)
Broadland SPA and Ramsar site	3.6km (located south of the onshore project area)

2.1.1 River Wensum SAC

42. The River Wensum SAC¹ covers approximately 307ha and includes the river and certain adjacent floodplain habitats from its source near Fakenham to its confluence with the River Tud at Norwich. The river is a naturally enriched, calcareous lowland river. The upper reaches are fed by springs that rise from the chalk and by run-off from calcareous soils rich in plant nutrients. This gives rise to beds of submerged and emergent vegetation characteristic of a chalk stream. Lower down, the chalk is overlain with boulder clay and river gravels, resulting in aquatic plant communities more typical of a slow-flowing river on mixed substrate. Much of the adjacent land is managed for hay crops and by grazing, and the resulting mosaic of meadow and marsh habitats, provides niches for a wide variety of specialised plants and animals.
43. The qualifying features of the River Wensum SAC are summarised in Table 2.2.

¹ <http://jncc.defra.gov.uk/ProtectedSites/SACselection/n2kforms/UK0012647.pdf>

Table 2.2 River Wensum SAC qualifying features

Qualifying features/reasons for notification
<p>Annex I habitats that are a primary reason for selection of this site:</p> <ul style="list-style-type: none"> Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation.
<p>Annex II species that are a primary reason for selection of this site:</p> <ul style="list-style-type: none"> White-clawed (or Atlantic stream) crayfish <i>Austropotamobius pallipes</i>.
<p>Annex II species present as a qualifying feature, but not a primary reason for selection of this site:</p> <ul style="list-style-type: none"> Desmoulin's whorl snail <i>Vertigo moulinsiana</i> Brook lamprey <i>Lampetra planeri</i> Bullhead <i>Cottus gobio</i>

44. The River Wensum SAC conservation objectives are as follows:
45. Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:
- The extent and distribution of qualifying natural habitats and habitats of qualifying species;
 - The structure and function (including typical species) of qualifying natural habitats;
 - The structure and function of the habitats of qualifying species;
 - The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely;
 - The populations of qualifying species; and
 - The distribution of qualifying species within the site.

2.1.2 Paston Great Barn SAC

46. Paston Great Barn SAC² covers approximately 1ha and the only known example of a maternity roost of barbastelle bats *Barbastella barbastellus* in a building. The Barn is a 16th century thatched barn with associated outbuildings. A maternity colony of barbastelles utilises a range of cracks and crevices in the roof timbers for roosting.
47. The qualifying features of the Paston Great Barn SAC are summarised in Table 2.3.

² <http://jncc.defra.gov.uk/ProtectedSites/SACselection/n2kforms/UK0030235.pdf>

Table 2.3 Paston Great Barn SAC qualifying features

Qualifying features/reasons for notification
Annex II species that are a primary reason for selection of this site <ul style="list-style-type: none"> • Barbastelle

48. Paston Great Barn SAC's conservation objectives are as follows:
49. Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:
- The extent and distribution of the habitats of qualifying species;
 - The structure and function of the habitats qualifying species;
 - The supporting processes on which the habitats of the qualifying species rely;
 - The populations of qualifying species; and
 - The distribution of qualifying species within the site.

2.1.3 Norfolk Valley Fens SAC

50. Norfolk Valley Fens SAC³ comprises a series of valley-head spring-fed flush fens located throughout Norfolk. The fens collectively represent 616ha of fen habitat at 17 separate sites within the county. Such spring-fed flush fens are very rare in the lowlands. The spring-heads are dominated by the small sedge fen type, mainly referable to black-bog-rush – blunt-flowered rush (*Schoenus nigricans* – *Juncus subnodulosus*) mire, but there are transitions to reedswamp and other fen and wet grassland types. The individual fens vary in their structure according to intensity of management and provide a wide range of variation. There is a rich flora associated with these fens, including species such as grass-of-Parnassus *Parnassia palustris*, common butterwort *Pinguicula vulgaris*, marsh helleborine *Epipactis palustris* and narrow-leaved marsh-orchid *Dactylorhiza traunsteineri*.
51. The qualifying features of the Norfolk Valley Fens SAC are summarised in Table 2.4.

Table 2.4 Norfolk Valley Fens SAC qualifying features

Qualifying features/reasons for notification
Annex I habitats that are a primary reason for selection of this site: <ul style="list-style-type: none"> • Alkaline fens
Annex I habitats present as a qualifying feature, but not a primary reason for selection of this site: <ul style="list-style-type: none"> • Northern Atlantic wet heaths with <i>Erica tetralix</i> • European dry heaths

³ <http://jncc.defra.gov.uk/ProtectedSites/SACselection/n2kforms/UK0012892.pdf>

Qualifying features/reasons for notification

- Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites)
- Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinia caerulea*)
- Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* (Priority feature)
- Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*)(priority feature)

Annex II species that are a primary reason for selection of this site:

- Narrow-mouthed whorl snail *Vertigo angustior*
- Desmoulin's whorl snail *Vertigo moulinsiana*

52. Norfolk Valley Fens SAC's conservation objectives are as follows:

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

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

2.1.4 Broadland SPA

54. The Broadland SPA⁴ covers approximately 5508ha. Table 2.5 summarises the qualifying features of the Broadland SPA.

Table 2.5 Qualifying features of the Broadland SPA (*population counts are derived from the SPA citation*)

This site qualifies under Article 4.1 of the Directive (79/409/EEC) by supporting populations of European importance of the following species listed on Annex I of the Directive:

Over winter;

Bewick's Swan *Cygnus columbianus bewickii*, 495 individuals representing up to 7.1% of the wintering population in Great Britain (5 year peak mean 1987/8-1991/2)

Bittern *Botaurus stellaris*, 2-3 individuals representing up to 10-15% of the wintering population in Great Britain (5 year peak mean 1987/8-1991/2)

Hen Harrier *Circus cyaneus*, 22 individuals representing up to 3% of the wintering population in Great Britain (5 year peak mean 1987/8-1991/2)

⁴ <http://jncc.defra.gov.uk/pdf/SPA/UK9009253.pdf>

This site qualifies under Article 4.1 of the Directive (79/409/EEC) by supporting populations of European importance of the following species listed on Annex I of the Directive:

Ruff *Philomachus pugnax*, 96 individuals representing up to 6.4% of the wintering population in Great Britain (5 yr peak mean 1987/8-1991/2)

Whooper Swan *Cygnus cygnus*, 121 individuals representing up to 2% of the wintering population in Great Britain (5 yr peak mean 1987/8-1991/2)

Marsh Harrier *Circus aeruginosus*, 16 individuals representing up to 16% of the wintering population in Great Britain (5 year peak mean 1987/8-1991/2)

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

Over winter;

Gadwall *Anas strepera*, 486 individuals representing up to 4.0% of the wintering Northwestern Europe population (5 yr peak mean 1987/8-1991/2)

Shoveler *Anas clypeata*, 675 individuals representing up to 1.7% of the wintering Northwestern Europe population (5 yr peak mean 1987/8-1991/2)

Widgeon *Anas penelope*, 8,966 individuals representing up to 1.2% of the wintering Northwestern Europe population (5 yr peak mean 1987/8-1991/2)

The following species was also included under the SPA Review (Stroud et al. 2001):

Pink-footed Goose *Anser brachyrhynchus*, 3,290 individuals representing up to 1.5% of the wintering Eastern Greenland/Iceland/UK population (5 yr peak mean 1994/5-1998/9)

Under the SPA Review (Stroud et al. 2001), the area also 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 22,603 individual waterfowl (RSPB, Count 99/00) including:

Cormorant *Phalacrocorax carbo*, Bewick's Swan *Cygnus columbianus bewickii*, Whooper Swan *Cygnus cygnus*, Ruff *Philomachus pugnax*, Pink-footed Goose *Anser brachyrhynchus*, Gadwall *Anas strepera*, Bittern *Botaurus stellaris*, Great Crested Grebe *Podiceps cristatus*, Coot *Fulica atra*, Bean Goose *Anser fabalis*, White-fronted Goose *Anser albifrons albifrons*, Widgeon *Anas penelope*, Teal *Anas crecca*, Pochard *Aythya ferina*, Tufted Duck *Aythya fuligula*, Shoveler *Anas clypeata*.

55. Following consultation with Natural England undertaken in September 2016, Natural England has supplied draft maps of functionally-linked (i.e. supporting) land for pink-footed goose outside of the Broadland SPA boundary (Natural England, pers. comm. 9th September 2016). This information provides additional baseline data on the key areas for this Broadland SPA qualifying species within the scoping area. A copy of these draft maps are provided in Appendix 1.
56. The maps indicate that, based on the 2008/9-2012/3 distribution, the key feeding areas for pink-footed geese within the study area are located in a triangle between

the villages of Happisburgh, Bacton and Witton Bridge, towards the east of the study area.

2.1.5 Broadland Ramsar Site

57. The Broadland Ramsar site shares a boundary with the Broadland SPA site and its reasons for designated are provided in Table 2.6.

Table 2.6 Qualifying features of the Broadland Ramsar site (*population counts are derived from the Ramsar Information Sheet*)

Ramsar criterion 6 – species/populations occurring at levels of international importance. Qualifying Species/populations (as identified at designation):
Species with peak counts in winter:
Tundra swan, NW Europe 196 individuals, representing an average of 2.4% of the GB population (5 year peak mean 1998/9- 2002/3)
Eurasian wigeon, NW Europe 6769 individuals, representing an average of 1.6% of the GB population (5 year peak mean 1998/9-2002/3)
Gadwall, NW Europe 545 individuals, representing an average of 3.1% of the GB population (5 year peak mean 1998/9- 2002/3)
Northern shoveler, NW & C Europe 247 individuals, representing an average of 1.6% of the GB population (5 year peak mean 1998/9- 2002/3)
Species/populations identified subsequent to designation for possible future consideration under criterion 6.
Species with peak counts in winter:
Pink-footed goose, Greenland, Iceland/UK 4263 individuals, representing an average of 1.7% of the population (5 year peak mean 1998/9-2002/3)
Greylag goose, <i>Anser anser anser</i> , Iceland/UK, Ireland 1007 individuals, representing an average of 1.1% of the population (Source period not collated)

3 BASELINE ENVIRONMENT

3.1 Data sources

58. Desk-based and field survey data has been collected from July 2016 onwards and will be continued to be collected through 2017 in order to inform the EIA process which is being undertaken for the project. The ecological baseline which is generated from this data collection programme will be used to inform the HRA process. The data sources used to inform this HRA screening are summarised in Table 3.1.
59. As field surveys are ongoing, full ecological survey data with respect to the qualifying features of the European and Ramsar sites within 5km of the onshore infrastructure are not available at this time. Where data have already been collected, they are presented in the remainder of this section.
60. All data sources upon which the ecological baseline is based are considered to be compliant with the relevant survey guidance and to provide robust evidence of the ecological receptors present with the study area.

Table 3.1 Data sources

Data source	Date	Data contents	Coverage	Status
Desk study data				
JNCC	July 2016	European designated sites (SPA, SAC, Ramsar sites)	Onshore infrastructure plus a 5km buffer	Data obtained
Norfolk Biodiversity Information Service (NBIS)	July 2016	Protected and notable species records including: <ul style="list-style-type: none"> The Conservation of Habitats & Species Regulations 2010 Schedules 2 & 5; Habitats Directive Annex I, IV & V; 	Onshore infrastructure plus a 2km buffer (5km for bats)	Data obtained
NBIS	March 2017	Norfolk 'Living Map' remote sensing habitat mapping data	Onshore infrastructure plus a 50m buffer	Data obtained
Norfolk Barbastelle Study Group (NBSG)	June 2017	Barbastelle <i>Barbastella barbastellus</i> : <ul style="list-style-type: none"> Radio tracking data for maternity colonies, to show roost locations and home ranges; Barbastelle roosts (summer and winter), commuting routes (at hedgerow level as far as possible), core foraging areas; Additional acoustic data for later summer/autumn. 	Radiotracking data and other species roost data: Onshore infrastructure plus a 5km buffer	Data obtained
Natural England	August 2016	Sensitivity maps for the following Broadland SPA species from 1986/87 to 2012/13: <ul style="list-style-type: none"> Bewick's Swan; Whooper swan; and Pink-footed goose 	Up to 5km from the Broadland SPA (<i>NB: records from up to 20km from the Broadland SPA also provided</i>)	Data obtained
Field survey data				
Extended Phase 1 Habitat Survey	February 2017	An Extended Phase 1 Habitat Survey following 'Extended Phase 1' methodology as set out in <i>Guidelines for Baseline Ecological Assessment</i> (Institute of Environmental Assessment, 1995). Habitats were classified and mapped following JNCC's <i>Handbook for Phase 1 habitat survey: A technique for environmental audit</i> (2010). Included a search for:	Great crested newts: Onshore infrastructure plus 250m buffer (temporary works) and 500m buffer (permanent works)	Full survey results available

Data source	Date	Data contents	Coverage	Status
		<ul style="list-style-type: none"> Assessment of roost suitable of trees and structures for bats; Assessment of commuting / foraging suitability of all linear features for bats; Assessment of suitability of habitats to notable invertebrates. 	<p>All other habitats and species: Onshore infrastructure plus a 50m buffer)</p> <p>Coverage of approx. 50% of survey area.</p>	
Bat Emergence / Re-entry Surveys	April - October 2017 (in progress)	Bat emergence / re-entry surveys of all trees and structures identified during the Extended Phase 1 Habitat Survey as providing moderate or high suitability to support roosting bats.	Onshore infrastructure plus a 50m buffer	Survey ongoing. No results available yet.
Bat Activity Surveys	May - August 2017 (in progress)	Bat activity surveys of all linear features (hedgerows, watercourses scrub patches and woodland edges, coastline) identified during the Extended Phase 1 Habitat Survey as providing moderate or high suitability to support commuting or foraging bats.	Onshore infrastructure plus a 50m buffer	Survey ongoing. No results available yet.
Aquatic Invertebrate Survey	July 2017 (in progress)	A survey for the Desmoulin's whorl snail within floodplain habitats adjacent to the River Wensum.	Floodplain habitats of the River Wensum	Survey ongoing. No results available yet.
Botanical National Vegetation Classification (NVC) Survey	July 2017 (in progress)	A NVC survey searching for the qualifying flora species (Stream water-crowfoot <i>R. penicillatus</i> ssp. <i>Pseudofluitans</i> , thread-leaved water-crowfoot <i>R. trichophyllus</i> and fan-leaved water-crowfoot <i>R. circinatus</i>) of the River Wensum SAC.	Floodplain habitats of the River Wensum	Survey ongoing. No results available yet.
Wintering bird surveys	June 2017	<p>A survey of ex situ habitats of the Broadland SPA, and of those SSSI within 1km of the cable route which support wintering bird interest features. This includes surveys of the following areas:</p> <ul style="list-style-type: none"> Agricultural fields in North Walsham District; Dereham Rush Meadows SSSI; 	Habitats within 300m of the onshore infrastructure and 5km of the Broadland SPA;	Full survey results available

Data source	Date	Data contents	Coverage	Status
		<ul style="list-style-type: none"> • Hundred Stream; and • North Norfolk Coast between Eccles-on-Sea and Paston. 	SSSI within 300m of the onshore infrastructure.	

3.2 Desk study data

3.2.1 Barbastelle

61. Approximately 4km of the onshore cable corridor is within the known home ranges of the Paston Great Barn barbastelle home ranges, based on NSBG radio-tracking data. Within this 4km, the following areas have been identified by NSBG as core foraging areas:
- Dilham Canal;
 - Hedgerows along North Walsham Road from Edingthorpe Green to Edingthorpe Heath;
 - Witton Hall Plantation along Old Hall Road;
 - Road from Bacton Wood to Witton;
 - Two hedgerows between Witton and North Walsham Road; and
 - Drains and hedgerows at Ridlington Street.
62. The location of these core foraging areas are shown in Appendix 2.

3.2.2 Bewick's Swan, whooper swan and pink-footed goose sensitivity maps

63. Natural England has supplied draft maps of functionally-linked (i.e. supporting) land for pink-footed goose outside of the Broadland SPA boundary (up to 5km from the site boundary) (Natural England, pers. comm. 9th September 2016). This information provides additional baseline data on the key areas for this Broadland SPA qualifying species within the onshore infrastructure area. These maps are provided in Appendix 1.
64. The maps indicate that, based on the 2008/9-2012/3 distribution, the key feeding areas for pink-footed geese within the study area are located in a triangle between the villages of Happisburgh, Bacton and Witton Bridge, towards the east of the study area.

3.2.3 White-clawed crayfish, bullhead, brook lamprey

65. NBIS holds no records for white-clawed crayfish, bullhead, brook lamprey within 2km of the study area. Advice received from the Environment Agency indicated that white-clawed crayfish are not known to be present in any reaches located within the study area (Environment Agency, pers. comm. 24th March 2017).

3.3 Field survey data

3.3.1 Wintering / passage bird surveys

66. A desk-based scoping exercise was undertaken in August 2016 to identify those habitats which may support wintering / passage bird species associated with statutory designated sites for nature conservation (Onshore Winter / Passage Bird Survey Scoping Report. Document Reference: PB4476-003-024 (Royal HaskoningDHV 2016b)). This assessment identified both in situ and ex situ habitats that have the potential to support the ornithological interest features of all internationally designated sites within 5km of the project scoping area. As such a suite of wintering birds surveys focussing on these habitats and areas, in order to describe the nature of the ornithological resource at these habitats, were recommended, the scope and methodology of which was agreed with Norfolk County Council and Natural England in August 2016 and February 2017 (Natural England, pers. comm. 9th September 2016; Natural England, pers. comm. 5th September 2016; Natural England, pers. comm. 21st February 2017). The results of these surveys are summarised here, are presented in full in Appendix 23.2 of Chapter 23 Onshore Ornithology.
67. Following the ongoing site selection process for the project, the scoping area was revised into an onshore infrastructure area in December 2016. Following this, the scope of the planned wintering bird surveys were revised to only include those habitats with the potential to support the ornithological interest features of the internationally designated sites within 5km of the revised onshore infrastructure area. Therefore data for the full survey period, October – March, was collected for the following habitats:
 - Agricultural land within 5km of the Broadland SPA and Ramsar site, and also within – or within a precautionary 1km disturbance buffer of – the onshore infrastructure;
 - Coastal habitats within 5km of the Broadland SPA and Ramsar site, and also within – or within a precautionary 1km disturbance buffer of – the onshore infrastructure; and
 - Lowland fen, rivers and lakes and lowland heathland habitats of the Hundred Stream within 5km of the Broadland SPA and Ramsar site, and also within – or within a precautionary 1km disturbance buffer of – the onshore infrastructure.
68. The findings of the wintering bird surveys of these habitats is summarised in the following section.

3.3.1.1 Agricultural fields in North Walsham District

69. All agricultural habitats (i.e. pasture and arable) within 5km of the Broadland SPA and Ramsar site were surveyed for their potential to support wintering populations of qualifying features of the Broadland SPA. These habitat areas were identified by the Onshore Wintering / Passage Bird Survey Scoping Report, and are shown on Figure 22.3.

Table 3.2 Agricultural fields in North Walsham District: Peak count of waterbird species across six visits (peak counts in yellow)

Importance	Visit 1	Visit 2	Visit 3	Visit 4	Visit 5	Visit 6
Golden plover	-	-	-	-	-	120
Lapwing	-	-	-	-	-	197
Black-headed gull	-	-	-	-	28	192
Common gull	-	-	-	-	23	74

70. The recorded waterbird counts are considered to not be of a scale of national or greater importance or to be a significant component of the Broadland SPA.
71. Flocks of pink-footed geese were observed in flight during the surveys, but no evidence to confirm their roosting, foraging or loafing was noted within the study area. The peak size of these mobile flocks was approximately 2,000 individuals.

3.3.1.2 Hundred Stream

72. Reedbed, Lowland fen, Rivers and Lakes and Lowland heathland within 5km of the Broadland SPA and Ramsar site were surveyed for their potential to support wintering populations of qualifying features of the Broadland SPA. These habitat areas were identified along the Hundred Stream by the Onshore Wintering / Passage Bird Survey Scoping Report, and are shown on Figure 22.4.

Table 3.3 Habitats along the Hundred Stream: peak count of waterbird species across six visits

Species	Visit 1	Visit 2	Visit 3	Visit 4	Visit 5	Visit 6
Pink-footed Goose	-	-	75	-	-	-
Mallard	-	2	-	4	-	3
Black-headed Gull	-	-	47	1	4	2

73. Flocks of pink-footed geese were observed in flight during the surveys, but no evidence of them roosting, foraging or loafing was noted.
74. The recorded waterbird counts are considered to not be of a scale of national or greater importance or to be a significant component of the Broadland SPA.

North Norfolk Coast between Eccles-on-Sea and Paston

75. Coastal habitats within 5km of the Broadland SPA and Ramsar site were surveyed for their potential to support wintering populations of qualifying features of the Broadland SPA. These habitats areas were identified along the coast between Eccles-on-Sea and Paston by the Onshore Wintering / Passage Bird Survey Scoping Report, and are shown on Figure 22.4.

Table 3.4 North Norfolk Coast between Eccles-on-Sea and Paston: peak count of waterbird species across six visits

Species	Visit 1	Visit 2	Visit 3	Visit 4	Visit 5	Visit 6
Red-throated Diver	5	11	3	16	14	17
Black-throated Diver	-	-	1	1	2	-
Great Northern Diver	-	-	-	1	-	-
Great Crested Grebe	-	1	-	-	-	-
Cormorant	15	-	-	-	-	6
Gannet	2	1	-	2	7	70
Dark-bellied Brent Goose	4	-	1	-	-	-
Wigeon	-	-	11	-	-	-
Teal	14	-	-	-	-	-
Mallard	-	2	4	-	-	-
Shoveler	-	-	1	-	-	-
Eider	-	11	-	-	-	-
Common Scoter	14	53	-	3	15	-
Goldeneye	4	-	-	-	-	-
Red-breasted Merganser	-	4	-	-	-	-
Kestrel	-	1	-	-	-	-
Oystercatcher	-	-	-	2	-	3
Ringed Plover	-	8	12	1	5	3
Sanderling	-	7	2	3	2	-
Dunlin	-	2	-	-	-	-
Purple Sandpiper	-	1	-	-	-	-
Turnstone	30	38	26	26	29	49
Mediterranean Gull	1	2	2	1	2	2
Little Gull	-	-	-	1	-	-
Black-headed Gull	1,479	1,269	3,530	189	143	664
Common Gull	256	500	1,106	26	54	207
Lesser Black-backed Gull	4	7	1	1	2	3
Herring Gull	150	355	172	125	110	218
Great Black-backed Gull	110	568	79	41	16	47
Glaucous Gull	-	-	-	-	2	-
Kittiwake	-	-	-	-	-	8
Guillemot	10	7	16	20	10	1
Razorbill	-	2	2	2	2	-
Puffin	-	-	-	1	-	-
Auk sp.	1	-	-	1	-	-
Great Skua	1	2	-	-	-	1
Kingfisher	-	2	-	-	-	-
Carrion Crow	13	3	11	8	8	8

Species	Visit 1	Visit 2	Visit 3	Visit 4	Visit 5	Visit 6
Jackdaw	8	-	1	-	-	-
Pied Wagtail	1	2	8	5	2	11
Meadow Pipit	-	2	3	-	-	3
Rock Pipit	-	-	-	-	-	2
Wren	-	-	1	-	-	-
Stonechat	-	1	-	-	-	-
Black Redstart	1	-	-	-	-	-
Starling	-	42	8	16	27	48
Snow Bunting	1	7	-	-	-	-
House Sparrow	-	-	1	-	-	1

76. The recorded waterbird counts are considered not to be of a scale of national or greater importance or to be a significant component of the Broadland.

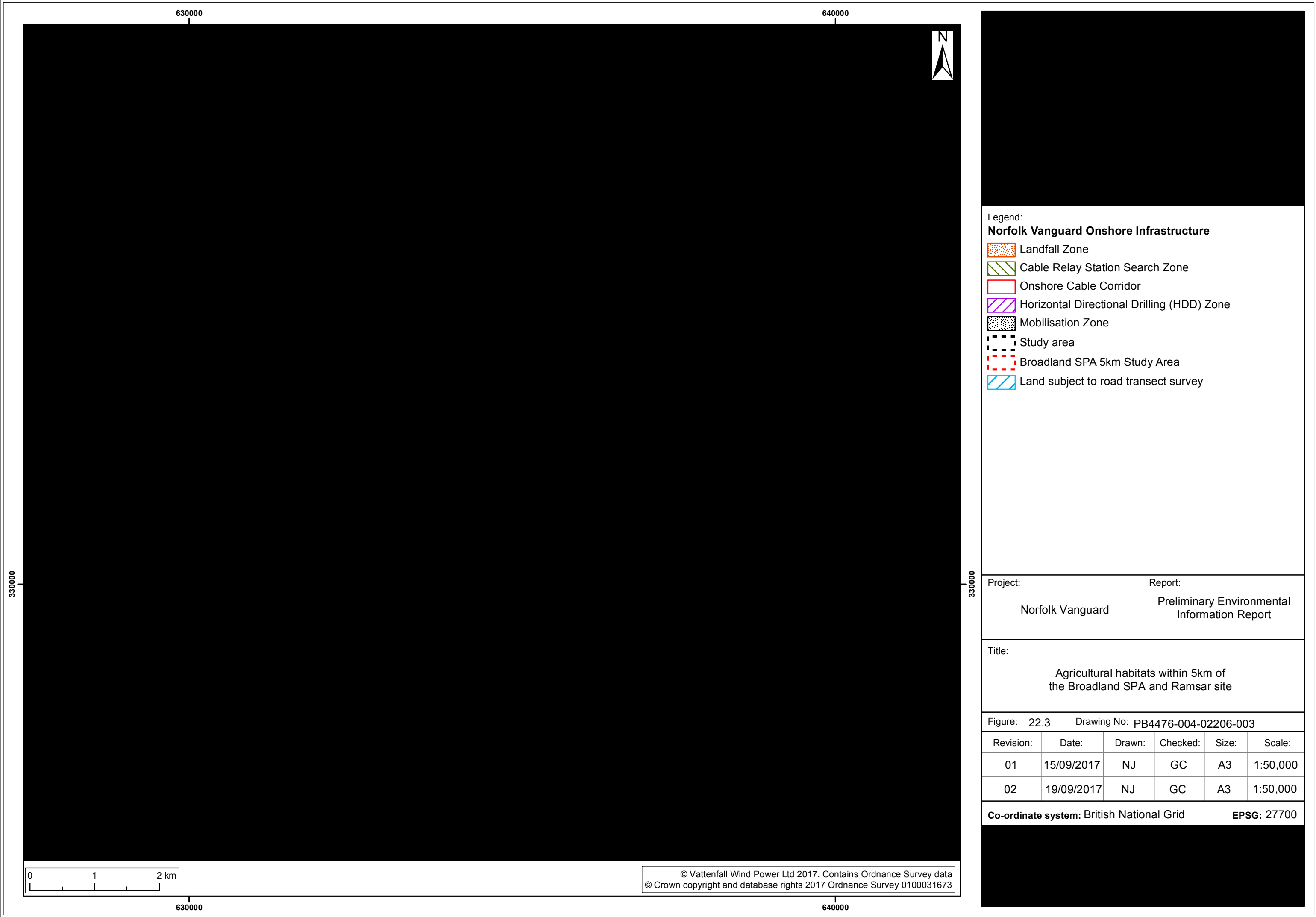
3.3.2 Extended Phase 1 Habitats Survey

77. The Extended Phase 1 Habitat Survey conducted in February 2017 identified habitats and protected species potential within the onshore infrastructure. The full results of the Extended Phase 1 Habitat Survey are presented in Appendix 22.5 of Chapter 22 Onshore Ecology.
78. Figure 22.5 shows those habitats recorded within 5km of the designated sites which have been screened in for further assessment.

3.3.2.1 Bats

79. All trees and structures (a total of 358 features) noted during the Extended Phase 1 Habitat Survey were assessed from the ground using binoculars (following the Bat Conservation Trust's (BCT) guidance (2016)) for their suitability to support roosting bats. Of these 358 features, 300 were assessed as providing low suitability for roosting bats, 52 as having moderate suitability and 1 as having high suitability. The locations of these commuting and foraging features are shown on Figure 22.5. As emergence / re-entry surveys are not yet completed, more detailed information regarding the roosting bat resource is not yet known.
80. In addition to trees and structures, all linear features (e.g. watercourses, hedgerows) were categorised in terms of their suitability to support commuting or foraging bats following BCT guidance (2016). This categorisation was based on the habitat type and their connection to the surrounding habitat. The categorisation used was:
- Defunct hedgerows and field drains typically provided low suitability for commuting and foraging bats;
 - Intact species-rich hedgerows, areas of scrub and small watercourses typically provided moderate suitability for commuting and foraging bats; and

- Species-rich hedgerows with trees and large watercourses well connected to the wider landscape typically provided moderate suitability for commuting and foraging bats.
81. In total, 266 linear features were assessed for their suitability to support commuting or foraging bats. Of these, 99 were assessed as providing low suitability to support commuting or foraging bats, 78 as providing moderate suitability and 89 as providing high suitability. The locations of these commuting and foraging features are shown on Figure 22.5.



Legend:

Norfolk Vanguard Onshore Infrastructure

- Landfall Zone
- Cable Relay Station Search Zone
- Onshore Cable Corridor
- Horizontal Directional Drilling (HDD) Zone
- Mobilisation Zone
- Study area
- Broadland SPA 5km Study Area
- Land subject to road transect survey

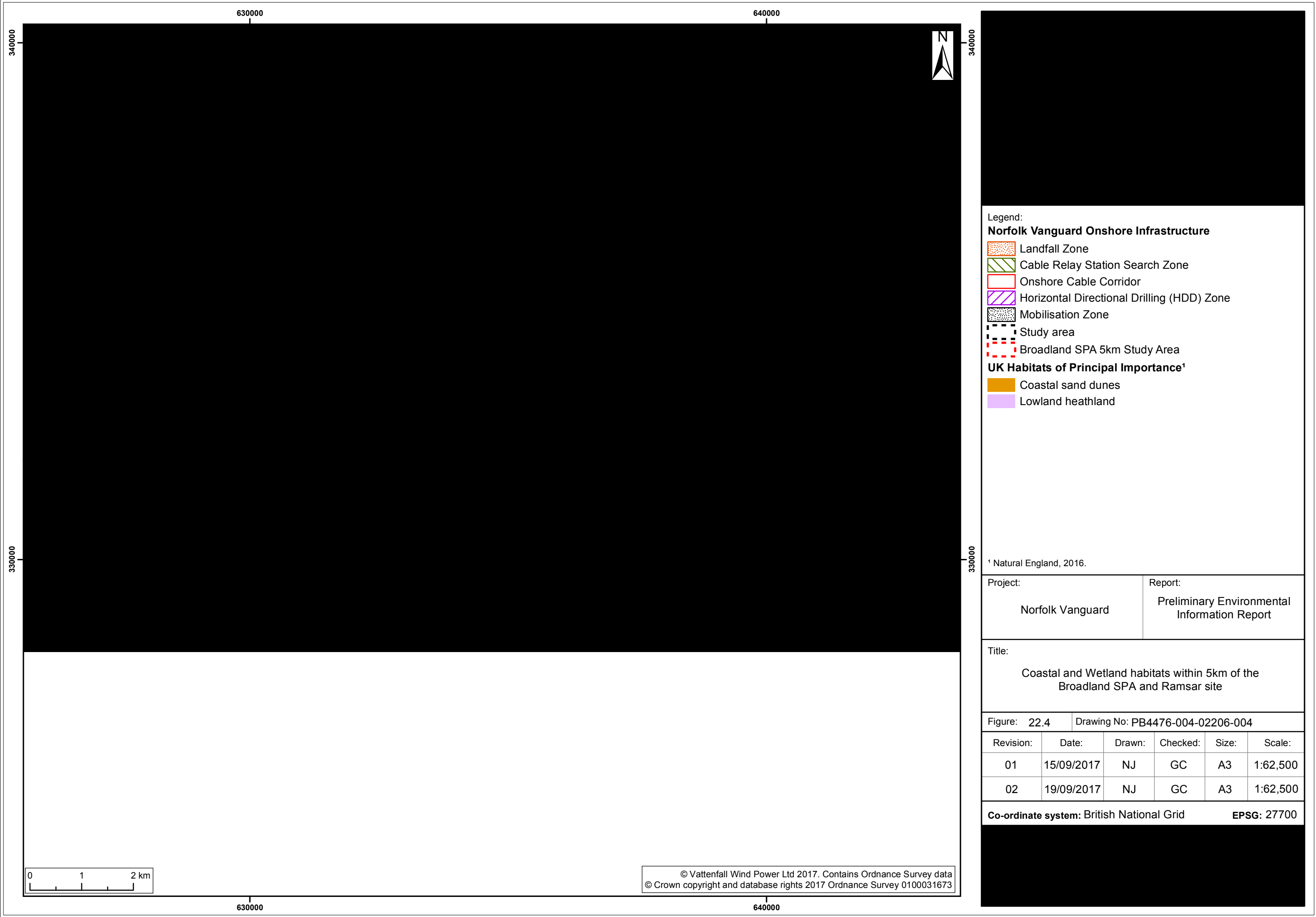
Project:	Report:
Norfolk Vanguard	Preliminary Environmental Information Report

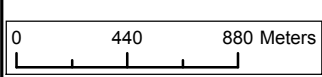
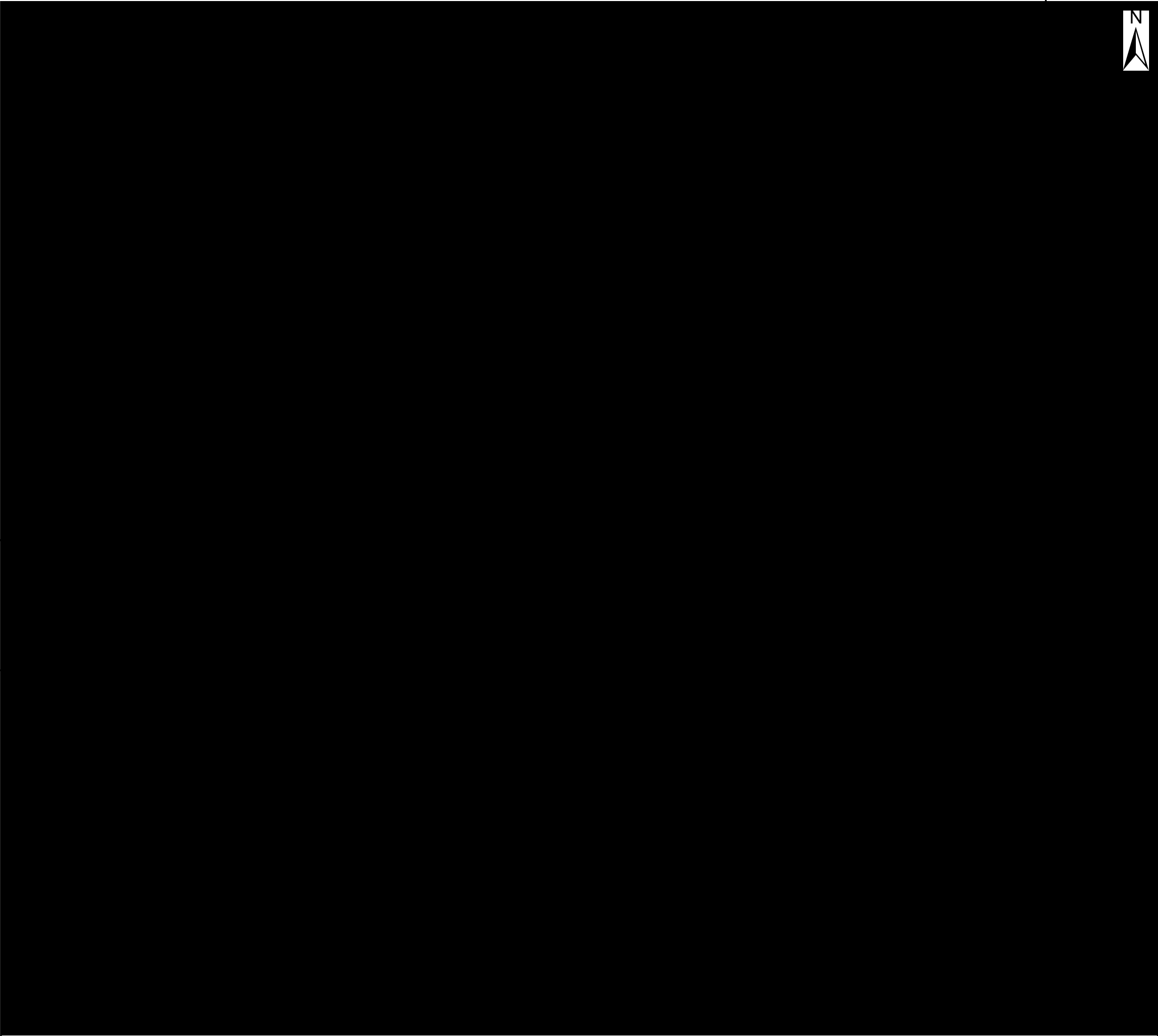
Title:

Agricultural habitats within 5km of the Broadland SPA and Ramsar site

Figure: 22.3		Drawing No: PB4476-004-02206-003			
Revision:	Date:	Drawn:	Checked:	Size:	Scale:
01	15/09/2017	NJ	GC	A3	1:50,000
02	19/09/2017	NJ	GC	A3	1:50,000

Co-ordinate system: British National Grid EPSG: 27700





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Legend:

Norfolk Vanguard Onshore Infrastructure

- Landfall Zone
- Cable Relay Station Search Zone
- Onshore Cable Corridor
- Horizontal Directional Drilling (HDD) Zone
- Study area
- Broadland SPA 5km Study Area

Norfolk Living Map¹

- Arable
- Beach
- Coastal Sand Dunes
- Dune Grassland
- Gardens
- Hedgerow or Field Margin
- Improved Grassland
- Lowland Mixed Deciduous Woodland
- Maritime Cliff and Slopes
- Scrub
- Semi-improved (poor condition)
- Semi-improved grassland
- Urban
- Waterbodies

Phase 1 Habitat Classification

- Scrub - dense/continuous
- Scrub - scattered
- Improved grassland
- Poor semi-improved grassland
- Intertidal - mud/sand
- Dune grassland
- Coastal grassland
- Cultivated/disturbed land - arable
- Cultivated/disturbed land - amenity grassland
- Buildings
- Bare ground
- Intact hedge - Native species-rich
- Intact hedge - Species-poor
- Defunct hedge - Native species-rich
- Defunct hedge - Species-poor
- Hedge with trees - Native species-rich
- Hedge with trees - Species-poor
- Fence
- Dry ditch

¹ Natural England, 2016.

Project:	Report:
Norfolk Vanguard	Preliminary Environmental Information Report

Title:
Habitats within 5km of the Broadland SPA and Ramsar site

Figure: 22.5		Drawing No:PB4476-004-02206-005			
Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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02	19/09/2017	NJ	GC	A3	1:30,000

Co-ordinate system: British National Grid EPSG: 27700

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4 SCREENING ASSESSMENT

4.1 Introduction

82. This section presents the screening for LSE (Stage 1 of the HRA process). The qualifying features of each European or Ramsar site is considered against the ZOI of the different environmental parameters to determine whether an LSE may occur. Where the ZOI overlaps with either (i) the European or Ramsar site boundary or (ii) the ex-situ habitats associated with the European or Ramsar site, it will be noted that a LSE may occur and further assessment at the AA stage of the HRA process (Stage 2) will be required for that qualifying feature. Where no pathway to LSE is identified, it will be recommended that potential LSE upon that qualifying feature will not be considered further. If there is any uncertainty as to whether or not a LSE could arise, the precautionary principle has been applied and LSE concluded to ensure that the potential implications for the site are assessed further at the AA stage.
83. Potential effects upon each European or Ramsar site have been considered in the following four categories:
- **Direct effects within the site boundary** (i.e. onshore infrastructure located within the site boundary);
 - **Direct effects on ex-situ habitats of site** (i.e. onshore infrastructure located within habitats located outside the site boundary but which have the potential to support its interest features);
 - **Indirect effects within the site boundary** (i.e. the site boundary falls within the ZOI of an environmental parameter associated with the onshore infrastructure); and
 - **Indirect effects on ex-situ habitats of site** (i.e. habitats located outside the site boundary but which have the potential to support its interest features falls within the ZOI of an environmental parameter associated with the onshore infrastructure).

4.2 River Wensum SAC

84. The River Wensum supports the following qualifying features:
- Water courses of plain to montane levels with the *Ranunculus fluitantis* and *Callitriche-Batrachion* vegetation;
 - White-clawed (or Atlantic stream) crayfish;
 - Desmoulin's whorl snail;
 - Brook lamprey; and
 - Bullhead.

85. In the absence of more detailed information being available as to the location of these features, it has been assumed that they are present throughout the River Wensum SAC.

4.2.1 Direct effects within SAC boundary

86. The River Wensum is located within the onshore project area. The onshore cable corridor crosses the River Wensum at Elsing. As part of the embedded mitigation for the project, a trenchless technique (e.g. HDD) will be used when crossing the River Wensum. This technique will ensure that there are no direct effects upon any of the qualifying features of the SAC within the site boundary, and therefore potential direct effects upon the SAC boundary are **screened out** from any further assessment.

4.2.2 Direct effects upon ex-situ habitats

87. The following interest features of the River Wensum may also be present in habitats functionally connected to the River Wensum, including coastal floodplain and grazing marsh habitat:
- *Ranunculus fluitantis* and *Callitriche-Batrachion* vegetation; and
 - Desmoulin's whorl snail.
88. The HDD activities required for the project will involve activities located within coastal floodplain grazing marsh adjacent to the River Wensum at Elsing. In light of this, there is the potential for direct effects upon these qualifying features to occur, and therefore these potential effects been **screened in** for further assessment.
89. The ditches present within the coastal and floodplain grazing marsh habitats were assessed during the Extended Phase 1 Habitat Survey (Royal HaskoningDHV, 2017) as being sub-optimal habitat for white-clawed crayfish and freshwater fish species. These ditches are separated from the River Wensum by water control structures and are static water bodies with silty beds, and do not possess suitable gravel beds for spawning. Consequently these habitats do not provide a suitable habitat for the remaining qualifying features of the River Wensum SAC, specifically:
- White-clawed (or Atlantic stream) crayfish;
 - Brook lamprey; and
 - Bullhead.
90. As such, potential effects upon these qualifying features have been **screened out** of further assessment.

4.2.3 Indirect effects within SAC boundary

91. Table 4.1 summarises the potential indirect effects upon the qualifying features of the River Wensum SAC.

Table 4.1 The ZOI of potential indirect effects on the River Wensum SAC boundary

Environmental parameter	Zone of influence of potential effect
Noise	The qualifying features of the River Wensum SAC are not sensitive to noise, visual, air quality or light disturbance, so indirect effects upon these qualifying features will not occur and these effects have been screened out of further assessment.
Air quality	
Light	
Visual disturbance	
Geology and land contamination	The HDD activities will involve construction activities within 500m of the River Wensum SAC. This will include HDD beneath the River Wensum SAC, excavation at HDD receptor sites and cable trenching within the River Wensum floodplain. As a consequence, potential indirect effects arising as a result of land contamination encountered during construction have been screened in for further assessment.
Groundwater and Hydrology	HDD activities will involve construction activities within 1km of the River Wensum SAC. This will include HDD beneath the River Wensum SAC, excavation at HDD receptor sites and cable trenching within the River Wensum floodplain. As a consequence, potential indirect effects arising as a result of changes to the groundwater / hydrology regime have been screened in for further assessment.

4.2.4 Indirect effects on ex-situ habitats

92. Table 4.2 summarises the potential indirect effects upon the qualifying features of the River Wensum SAC.

Table 4.2 The ZOI of potential indirect effects on the River Wensum SAC ex-situ habitats

Environmental parameter	Zone of influence of potential effect
Noise	The qualifying features of the River Wensum SAC are not sensitive to noise, visual, air quality or light disturbance, so indirect effects upon these qualifying features will not occur and these effects have been screened out of further assessment.
Air quality	
Light	
Visual disturbance	
Geology and land contamination	HDD activities will involve construction activities within 500m of the coastal floodplain grazing marsh ex-situ habitats of the River Wensum SAC. This will include excavation at HDD receptor sites and cable trenching within 500m of the River Wensum floodplain. As a consequence, potential indirect effects arising as a result of land contamination encountered during construction have been screened in for further assessment.
Groundwater and Hydrology	HDD activities will involve construction activities within 1km of the coastal floodplain grazing marsh ex-situ habitats of the River Wensum SAC. This will include excavation at HDD receptor sites and cable trenching within 500m of the River Wensum floodplain. As a consequence, potential indirect effects arising as a result

Environmental parameter	Zone of influence of potential effect
	of changes to the groundwater / hydrology regime have been screened in for further assessment.

4.3 Paston Great Barn SAC

93. Paston Great Barn supports a colony of Barbastelle bats.

4.3.1 Direct effects within the SAC boundary

94. Paston Great Barn is located 2.9km from on onshore infrastructure. Therefore direct effects upon the boundary are **screened out** from further assessment.

4.3.2 Direct effects on ex-situ habitats

95. Six areas within the onshore infrastructure are known to be core foraging areas for the barbastelle colony at Paston Great Barn. As these habitats will be directly affected by the project construction and operation phases, potential impacts on ex situ habitats have been **screened in** for further assessment.

4.3.3 Indirect effects within the SAC boundary

96. Paston Great Barn is located 2.9km from on onshore infrastructure. This is outside of the ZOI of any of the environmental parameters associated with the construction and operation of the project. Therefore direct effects upon the boundary are **screened out** from further assessment.

4.3.4 Indirect effects on ex-situ habitats

97. Table 4.3 summarises the potential indirect effects upon the qualifying features of the Paston Great Barn SAC.

Table 4.3 The ZOI of potential indirect effects on the Paston Great Barn SAC boundary

Environmental parameter	Zone of influence of potential effect
Noise	The qualifying features of the Paston Great Barn SAC are not sensitive to noise, visual or air quality disturbance, so indirect effects upon these qualifying features will not occur and these effects have been screened out of further assessment.
Air quality	
Visual disturbance	
Light	There are hedgerows which are identified barbastelle core foraging areas located within the ZOI of the onshore infrastructure, therefore lighting has been screened in for further assessment.
Geology and land contamination	Barbastelle bats are associated with hedgerow, scrub, woodland and watercourse habitats which will not be affected by changes to the geology or land contamination regime. Therefore these effects have been screened out of further assessment.

Environmental parameter	Zone of influence of potential effect
Groundwater and Hydrology	Watercourses identified as core foraging areas for the Paston Great Barn barbastelle colony (i.e. drains at Ridlington Street) will be subject to trenching works during the project construction phase, and as such there may be effects upon this ex-situ habitat. These effects have been screened in for further assessment.

4.4 Norfolk Valley Fens SAC

98. The Norfolk Valley Fens support the following qualifying features:

- Alkaline fens;
- Northern Atlantic wet heaths with *Erica tetralix*;
- European dry heaths;
- Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*);
- Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*);
- Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae*;
- Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*);
- Narrow-mouthed whorl snail; and
- Desmoulin's whorl snail.

99. The Norfolk Valley Fens are comprised of a 17 separate sites, spread across more than 70km of the county. The qualifying features of the SAC have not been recorded at every site.

100. Five of the 17 sites of the Norfolk Valley Fens falls within 5km of the onshore infrastructure, but only one of these is located within 1km, the maximum extent of the ZOIs identified in section 1.6. This site is Booton Common, also a Site of Special Scientific Interest (SSSI). Following a review of the SSSI citation and accompanying condition assessment, the qualifying features that are present at this site include:

- Alkaline fens;
- Northern Atlantic wet heaths with *Erica tetralix*; and
- Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae*.

101. The screening assessment in this section will consider possible effects on these qualifying features only.

4.4.1 Direct effects within the SAC boundary

102. All sites which comprise Norfolk Valley Fens are located 570m or more from onshore infrastructure. Therefore direct effects upon the boundary are **screened out** from further assessment.

4.4.2 Direct effects on ex-situ habitats

103. The relevant qualifying features of the Norfolk Valley Fens SAC are all habitats and not mobile species. As such, ex-situ habitats have not been identified for this site. Direct effects upon ex-situ habitats are **screened out** from further assessment.

4.4.3 Indirect effects within the SAC boundary

104. Table 4.4 summarises the potential indirect effects upon the qualifying features of the Norfolk Valley Fens SAC.

Table 4.4 The ZOI of potential indirect effects on the Norfolk Valley Fens SAC boundary

Environmental parameter	Zone of influence of potential effect
Noise	The qualifying features of the Norfolk Valley Fens SAC are not sensitive to noise, visual, or light disturbance, so indirect effects upon these qualifying features will not occur and these effects have been screened out of further assessment.
Light	
Visual disturbance	
Air quality	Potential nitrogen and acid sensitive habitats (Alkaline fens, Northern Atlantic wet heaths with <i>Erica tetralix</i> , Calcareous fens with <i>Cladium mariscus</i> and species of the <i>Caricion davallianae</i>) are located within 1km of the onshore infrastructure. Therefore potential effects upon these sensitive habitats have been screened in for further assessment.
Geology and land contamination	The onshore infrastructure is located outside of 500m from the SAC boundary and outside the ZOI for geology and land contamination effects. As such effects from these environmental parameters have been screened out of further assessment.
Groundwater and Hydrology	Cable trenching will take place within 1km of the Norfolk Valley Fens SAC. As a consequence, potential indirect effects arising as a result of changes to the groundwater / hydrology regime have been screened in for further assessment.

4.4.4 Indirect effects on ex-situ habitats

105. The relevant qualifying features of the Norfolk Valley Fens SAC are all habitat types and not mobile species. As such, ex-situ habitats have not been identified for this site. Indirect effects upon ex-situ habitats are **screened out** from further assessment.

4.5 Broadland SPA

106. The Broadland SPA support the following qualifying features over winter:

- Bewick's Swan;
- Bittern;
- Hen Harrier;

- Ruff;
- Whooper Swan;
- Gadwall;
- Shoveler;
- Widgeon;
- Pink-footed Goose; and
- A waterfowl assemblage, including:
 - Cormorant, Bewick's Swan, Whooper Swan, Ruff, Pink-footed Goose, Gadwall, Bittern, Great Crested Grebe, Coot, Bean Goose, White-fronted Goose, Widgeon, Teal, Pochard, Tufted Duck.

4.5.1 Direct effects within the SPA boundary

107. All sites which comprise the Broadland SPA are located 3.6km or more from on onshore infrastructure. Therefore direct effects upon the boundary are **screened out** from further assessment.

4.5.2 Direct effects on ex-situ habitats

108. The wintering qualifying features of the Broadland SPA are likely to utilise a range of supporting habitats outside the boundary of the SPA over the winter months. Hen Harrier are likely to utilise a range of habitats, including lowland farmland, heathland, coastal marshes, fenland and river, whereas bittern are associated solely with lowland fen during winter. The various qualifying species of wildfowl use predominantly reedbeds and rivers and lakes, although the qualifying geese species also rely on winter crop waste associated with arable agriculture. Cormorants and grebes are more firmly associated with coastal habitats or sizeable inland waterbodies over winter.
109. In summary, the qualifying species are likely to use the following supporting habitats:
- Reedbed;
 - Lowland fen;
 - Rivers and Lakes;
 - Lowland heathland;
 - Coastal habitats; and
 - Farmland (pasture and arable).

The locations of these habitats within 5km of the Broadland SPA are shown in Figures 22.3 and 22.4.

110. . It should be noted that in particular the geese and swan species may travel up to 10km to forage over winter, however the main focus of foraging is likely to be at

distances closer to the SPA. Therefore 5km is considered a reasonable study area. This study area was agreed with Natural England in September 2016 (Natural England pers. comm. 9th September 2016).

111. Wintering bird surveys of these ex-situ habitats were undertaken over six months between October 2016 and March 2017, as set out in section 3 and presented in full in Appendix 23.2 of Chapter 23 Onshore Ornithology. These surveys recorded waterbird counts that are considered to not be of a scale of national or greater importance or to be a significant component of the Broadland SPA. As a consequence, these ex-situ habitats are not considered to be important habitats for the qualifying features of the Broadland SPA, and potential effects upon these habitats are **screened out** from further assessment.

4.5.3 Indirect effects within the SPA boundary

112. The Broadland SPA is located 3.6km from on onshore infrastructure. This is outside of the ZOI of any of the environmental parameters associated with the construction and operation of the project. Therefore direct effects upon the boundary are **screened out** from further assessment.

4.5.4 Indirect effects on ex-situ habitats

113. As set out in section 4.5.2 above, qualifying features of the Broadland SPA have not been recorded within ex-situ habitats within 5km of the Broadland SPA and as such potential effects upon these habitats are **screened out** from further assessment.

4.6 Broadland Ramsar site

114. The Broadland Ramsar site supports the following qualifying features over winter:

- Tundra swan;
- Eurasian wigeon;
- Gadwall;
- Northern shoveler;
- Pink-footed goose; and
- Greylag goose.

4.6.1 Direct effects within the Ramsar site boundary

115. All sites which comprise the Broadland Ramsar site are located 3.6km or more from on onshore infrastructure. Therefore direct effects upon the boundary are **screened out** from further assessment.

4.6.2 Direct effects on ex-situ habitats

116. The wintering qualifying features of the Broadland Ramsar site are likely to utilise a range of supporting habitats outside the boundary of the Ramsar site over the winter. The various qualifying species use predominantly reedbeds and rivers and lakes, although the qualifying geese species also rely on winter crop waste associated with arable agriculture.
117. In summary, the qualifying species are likely to use the following supporting habitats:
- Reedbed;
 - Lowland fen;
 - Rivers and Lakes; and
 - Farmland (pasture and arable).
118. The locations of these habitats within 5km of the Broadland Ramsar site are shown in Figure 22.2 and Figure 22.4.
119. Wintering bird surveys of these ex-situ habitats were undertaken over six months between October 2016 and March 2017, as set out in section 3 and presented in full in Appendix 23.2 of Chapter 23 Onshore Ornithology. These surveys recorded waterbird counts that are considered to not be of a scale of national or greater importance or to be a significant component of the Broadland Ramsar site. As a consequence, these ex-situ habitats are not considered to be important habitats for the qualifying features of the Broadland Ramsar site, and potential effects upon these habitats are **screened out** from further assessment.

4.6.3 Indirect effects within the Ramsar site boundary

120. The Broadland Ramsar site is located 3.6km from on onshore infrastructure. This is outside of the ZOI of any of the environmental parameters associated with the construction and operation of the project. Therefore direct effects upon the boundary are **screened out** from further assessment.

4.6.4 Indirect effects on ex-situ habitats

121. As set out in section 4.5.2 above, qualifying features of the Broadland Ramsar site have not been recorded within ex-situ habitats within 5km of the Broadland Ramsar site and as such potential effects upon these habitats are **screened out** from further assessment.

5 SUMMARY

122. Following the initial screening process, three sites will be considered further at Stage 2 within the HRA process to determine whether any LSE may occur. These are:
- River Wensum SAC;
 - Norfolk Valley Fens SAC; and
 - Paston Great Barn SAC.
123. The Broadland SPA and Ramsar site has been screened out from further assessment.
124. Table 5.1 provides a summary of the HRA screening assessment that has been presented in section 4. Those potential effects which have been screened in for further assessment, and those which have been screened out, are summarised and the list of sites screened in for further assessment is also presented.

Table 5.1 Screening summary

Site name	Potential effects screened in	Potential effects screened out	Site screened in for further assessment?
River Wensum SAC	<ul style="list-style-type: none"> Direct effects on ex-situ habitats for <i>Ranunculon fluitantis</i> and <i>Callitriche-Batrachion</i> vegetation and Desmoulin's whorl snail qualifying features due to suitable ex-situ habitats for these features being present. Indirect effects within SAC boundary arising from geology / contamination and groundwater / hydrology effects due to lying within the ZOI for these parameters. Indirect effects upon ex-situ habitats arising from geology / contamination and groundwater / hydrology effects due to lying within the ZOI for these parameters. 	<ul style="list-style-type: none"> Direct effects within SAC boundary due to distance from onshore infrastructure. Direct effects on ex-situ habitats for white-clawed (or Atlantic stream) crayfish, brook lamprey and bullhead qualifying features due to no suitable ex-situ habitats for these features being present. Indirect effects within SAC boundary arising from noise, air quality, visual or light effects due to no pathway being present. Indirect effects upon ex-situ habitats arising from noise, air quality, visual or light effects due to no pathway being present. 	Yes
Paston Great Barn SAC	<ul style="list-style-type: none"> Direct effects upon ex-situ habitats due to known ex-situ habitats of barbastelle (hedgerows / watercourses) being present within the onshore infrastructure. Indirect effects upon ex-situ habitats arising from light and groundwater/hydrology effects due to lying within the ZOI for these parameters. 	<ul style="list-style-type: none"> Direct effects within SAC boundary due to distance from onshore infrastructure. Indirect effects within SAC boundary due to lying outside the ZOI or due to no pathway being present. Indirect effects upon ex-situ habitats arising from noise, air quality, visual, or geology / contamination effects due to lying outside the ZOI or due to no pathway being present. 	Yes
Norfolk Valley Fens SAC	<ul style="list-style-type: none"> Indirect effects within SAC boundary arising from air quality and groundwater/hydrology due to lying within the ZOI for these parameters. <p>[Effects on Alkaline fens, Northern Atlantic wet heaths with <i>Erica tetralix</i> and Calcareous fens with <i>Cladium mariscus</i> and species of the <i>Caricion davallianae</i> only screened in]</p>	<ul style="list-style-type: none"> Direct effects within SAC boundary due to distance from onshore infrastructure. Direct effects upon ex-situ habitats due to no mobile qualifying features present. Indirect effects within SAC boundary arising from noise, light, visual, or geology / contamination effects due to lying outside the ZOI or due to no pathway being present. 	Yes

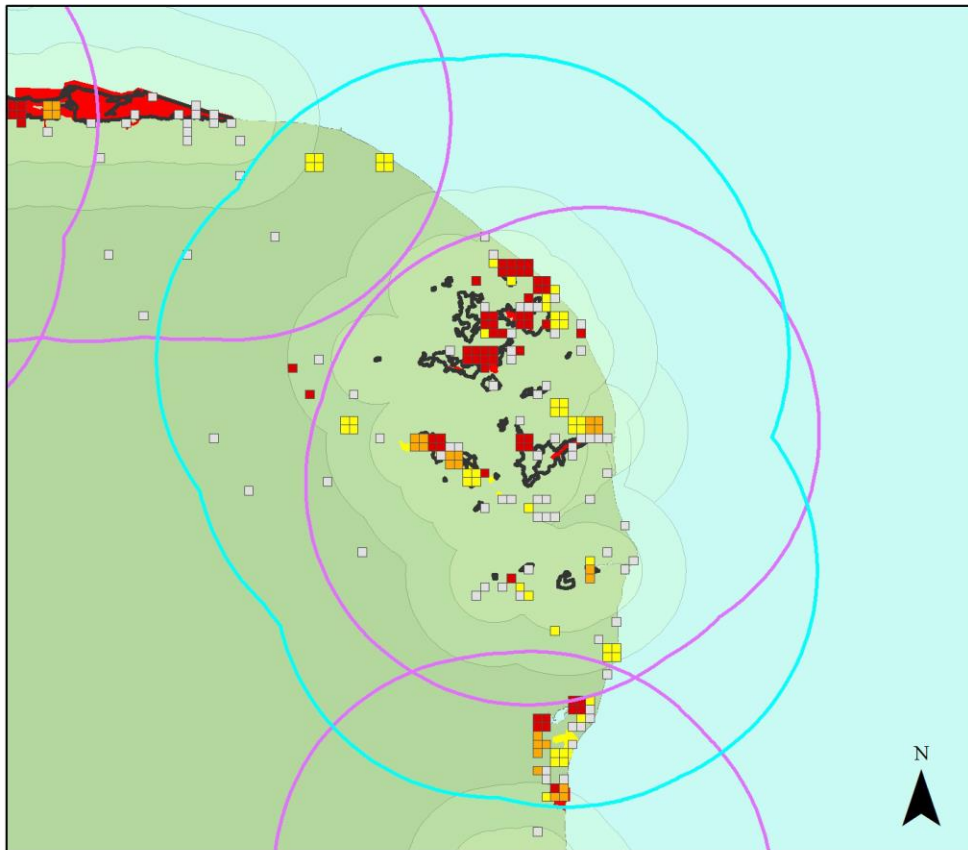
Site name	Potential effects screened in	Potential effects screened out	Site screened in for further assessment?
		<ul style="list-style-type: none"> • Indirect effects upon ex-situ habitats due to no mobile qualifying features present. 	
Broadland SPA	None	<ul style="list-style-type: none"> • Direct effects within SPA boundary due to distance from onshore infrastructure • Direct effects upon ex-situ habitats due to survey evidence indicating that qualifying features are not present in significant numbers within the ex-situ habitats. • Indirect effects within SPA boundary due to distance from onshore infrastructure (outside of ZOIs) • Indirect effects upon ex-situ habitats due to survey evidence indicating that qualifying features are not present in significant numbers within the ex-situ habitats. 	No
Broadland Ramsar site	None	<ul style="list-style-type: none"> • Direct effects within Ramsar site boundary due to distance from onshore infrastructure • Direct effects upon ex-situ habitats due to survey evidence indicating that qualifying features are not present in significant numbers within the ex-situ habitats. • Indirect effects within Ramsar site boundary due to distance from onshore infrastructure (outside of ZOIs) • Indirect effects upon ex-situ habitats due to survey evidence indicating that qualifying features are not present in significant numbers within the ex-situ habitats. 	No

6 REFERENCES

- | |
|---|
| Department for Communities and Local Government (2012). Guidance on 'Planning for the Protection of European Sites: Appropriate Assessment'. DCLG, London. |
| Dierschke, V., Furness, R.W. & Garthe, S. (2016). Seabirds and offshore wind farms in European waters: Avoidance and attraction. <i>Biological Conservation</i> 202, 59-68. |
| Institute of Air Quality Management (IAQM) (2014). Guidance on the Assessment Dust from Demolition and Construction. |
| Joint Nature Conservation Committee (2009). Selection Criteria And Guiding Principles For Selection Of Special Areas Of Conservation (SACs) For Marine Annex I Habitats And Annex II Species In The UK. JNCC, Peterborough. |
| Joint Nature Conservation Committee (and Natural England (2013). <i>Suggested Tiers for Cumulative Impact Assessment, 12 September 2013</i> . JNCC, Peterborough. |
| Office of the Deputy Prime Minister and Department for Environment, Food and Rural Affairs (2005). Government Circular: Biodiversity and Geological Conservation - Statutory Obligations and their Impact within the Planning System. (ODPM Circular 06/2005 & Defra Circular 01/2005). ODPM, London. |
| The Planning Inspectorate (2016). Advice Note Ten: Habitat Regulations Assessment relevant to nationally significant infrastructure projects (Version7, January 2016). Planning Inspectorate, Bristol. |
| The Planning Inspectorate (2016b). Norfolk Vanguard Scoping Opinion |
| Royal HaskoningDHV (2016). Norfolk Vanguard Offshore Wind Farm Environmental Impact Assessment Scoping Report |
| Whitfield DP, Ruddock M & Bullman R (2008) Expert opinion as a tool for quantifying bird tolerance to human disturbance, <i>Biological Conservation</i> , 141 (11), pp. 2708-2717. |

Annex 1 Swan and Goose Sensitivity Maps

Bewick's Swan - Broadland



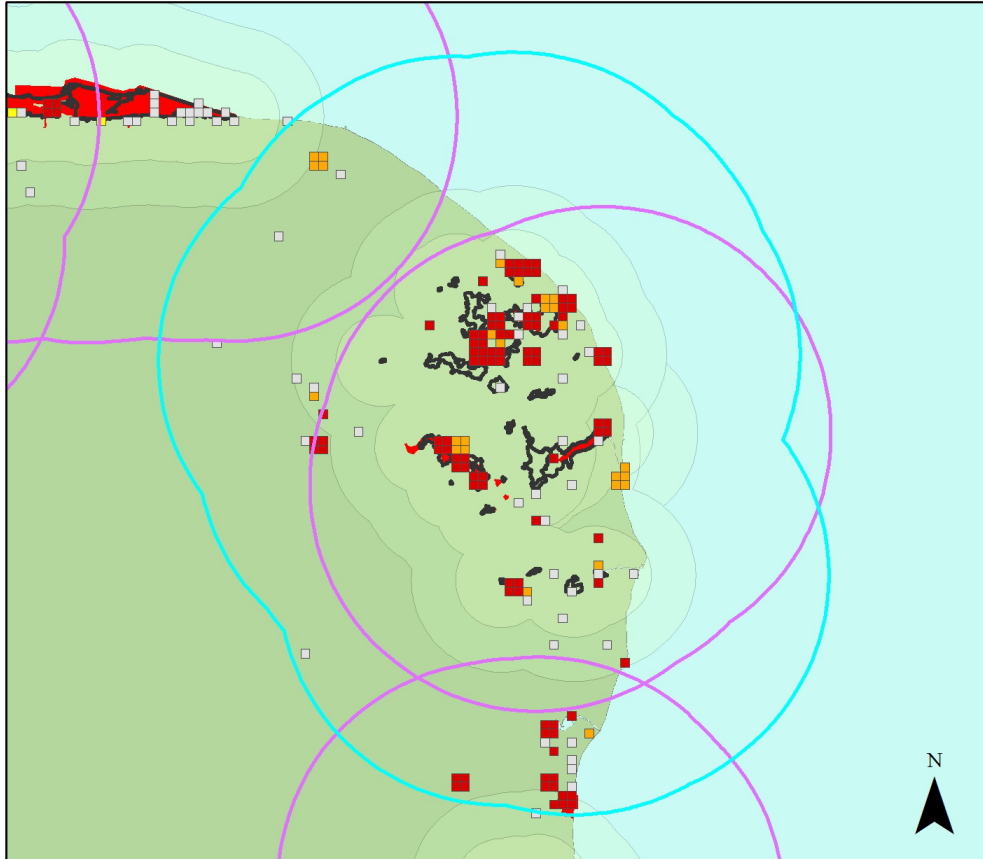
Legend

Sensitivity of 1-km square (or WeBS site)

- HIGH
- MEDIUM
- LOW
- VERY LOW

Other BirdTrack records (location of birds may be imprecise)

Whooper Swan - Broadland



Legend

Sensitivity of 1-km square (or WeBS site)

- HIGH
- MEDIUM
- LOW
- VERY LOW

Other BirdTrack records (location of birds may be imprecise)

Appendix 3. Sensitivity maps.

For each SPA for which the site is designated and selected important roost sites, two maps are presented; one showing the distribution of all feeding records (from the period 1986/87 to 2012/13) and one showing the distribution of feeding records from the most recent five years (2008/09 to 2012/13).

Key:

For Figures 7 to 26, the following symbols were used:

- 1) Sensitivity Index represented by four graduated dark blue symbols (dots) (see 2.3.4 above).
- 2) 1km squares for which no quantitative data exists but geese were known to be present (see 2.3.1 above) represented by small red symbols (dots).
- 3) The SPA boundary (thick red line).
- 4) Important roosts either within the SPA boundary (if known) or other nearby waterbodies (see 2.5 and appendix 2) represented by green symbols (dots).
- 5) 20km line surrounding the SPA boundary (black line).

Interpreting the maps

The maps show the distribution of feeding geese based on available data. There are fewer records from the most recent period (from 2008/09 to 2012/13) partly due to the shorter time period (five years) and partly due to the reduction in the number of geese being ringed in recent years and a subsequent reduction in the number of sightings.

However, at some sites, a reduction in feeding records may also represent an absence, or reduction in number of geese. The maps should therefore be interpreted in conjunction with results from any available local surveys, recent roost count data, annual IGC reports (e.g. Mitchell 2011), a review of goose use of SPAs (Mitchell & Hall 2012) and the Waterbird Review Series reports for Pink-footed Goose (Mitchell & Hearn 2004).

1) Broadland (UK9009253):

Roost locations and feeding distribution

The two main Pink-footed Goose roosts within Broadland are Horsey Mere and Berney Marshes (Figure 7). Birds from there generally remain close to the roost sites when feeding, moving mainly along the coast rather than inland. The main concentration is around Horsey Mere, though some move as far south as north Suffolk.

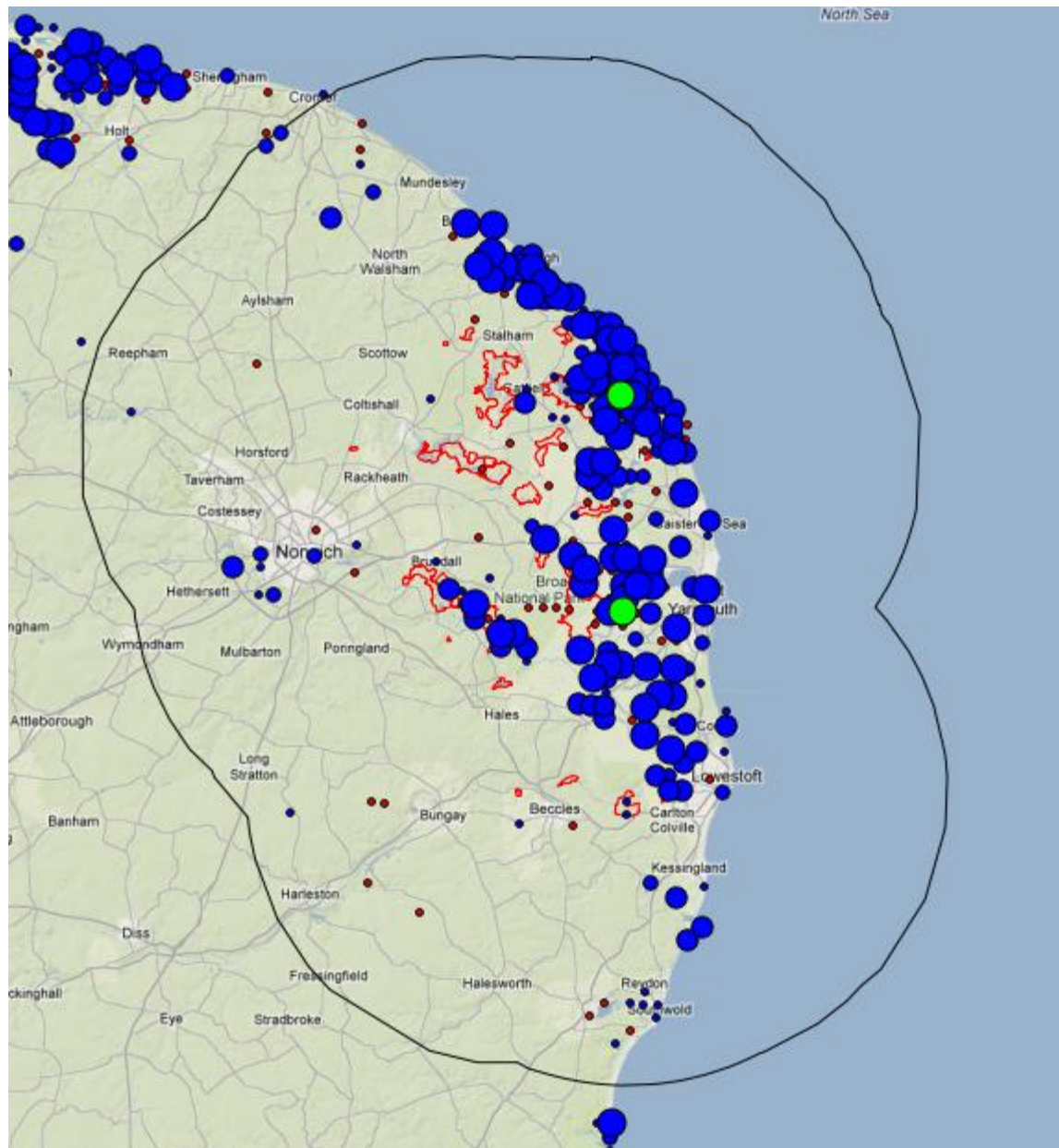


Figure 7. Feeding distribution (1986/87 to 2012/13 - all records) of Pink-footed Geese in relation to the Broadland SPA. For key see page 25.

The data for the most recent five years (Figure 8) show that during this period little change has taken place in the main feeding areas of birds roosting within Broadland.

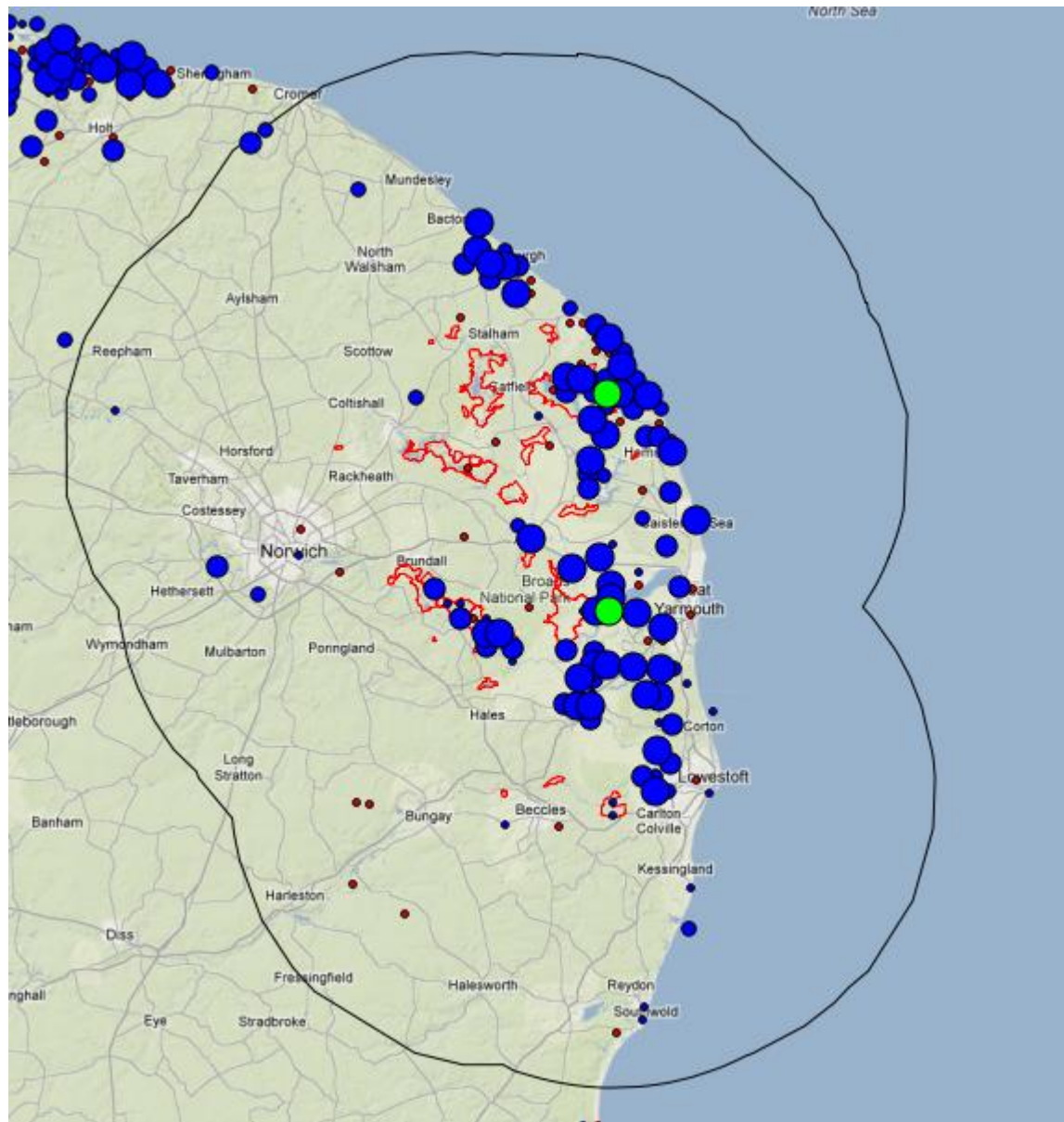


Figure 8. Feeding distribution (2008/09 to 2012/13 - new records) of Pink-footed Geese in relation to the Broadland SPA. For key see page 25.

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Annex 2: Paston Great Barn SAC barbastelle core foraging areas

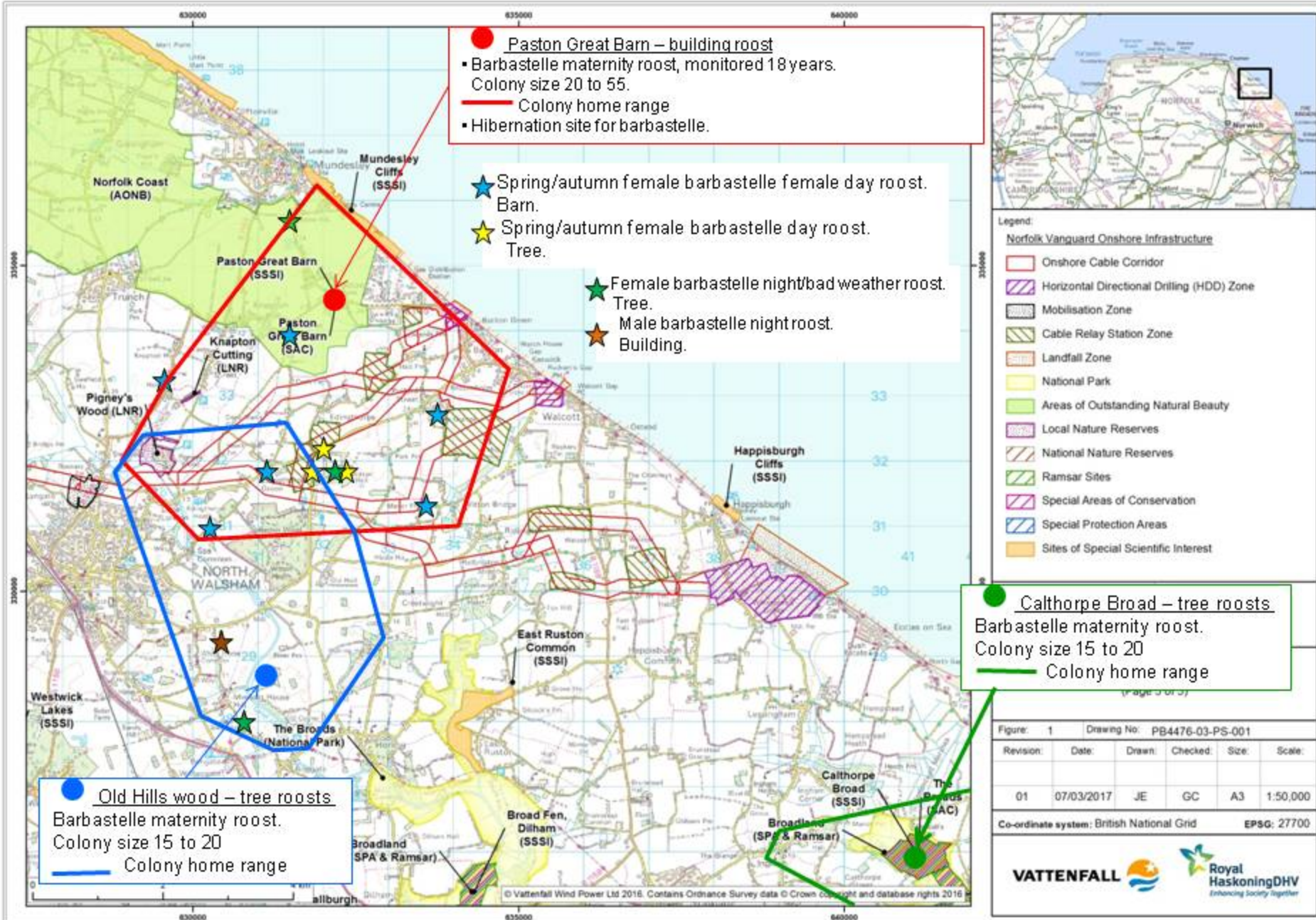
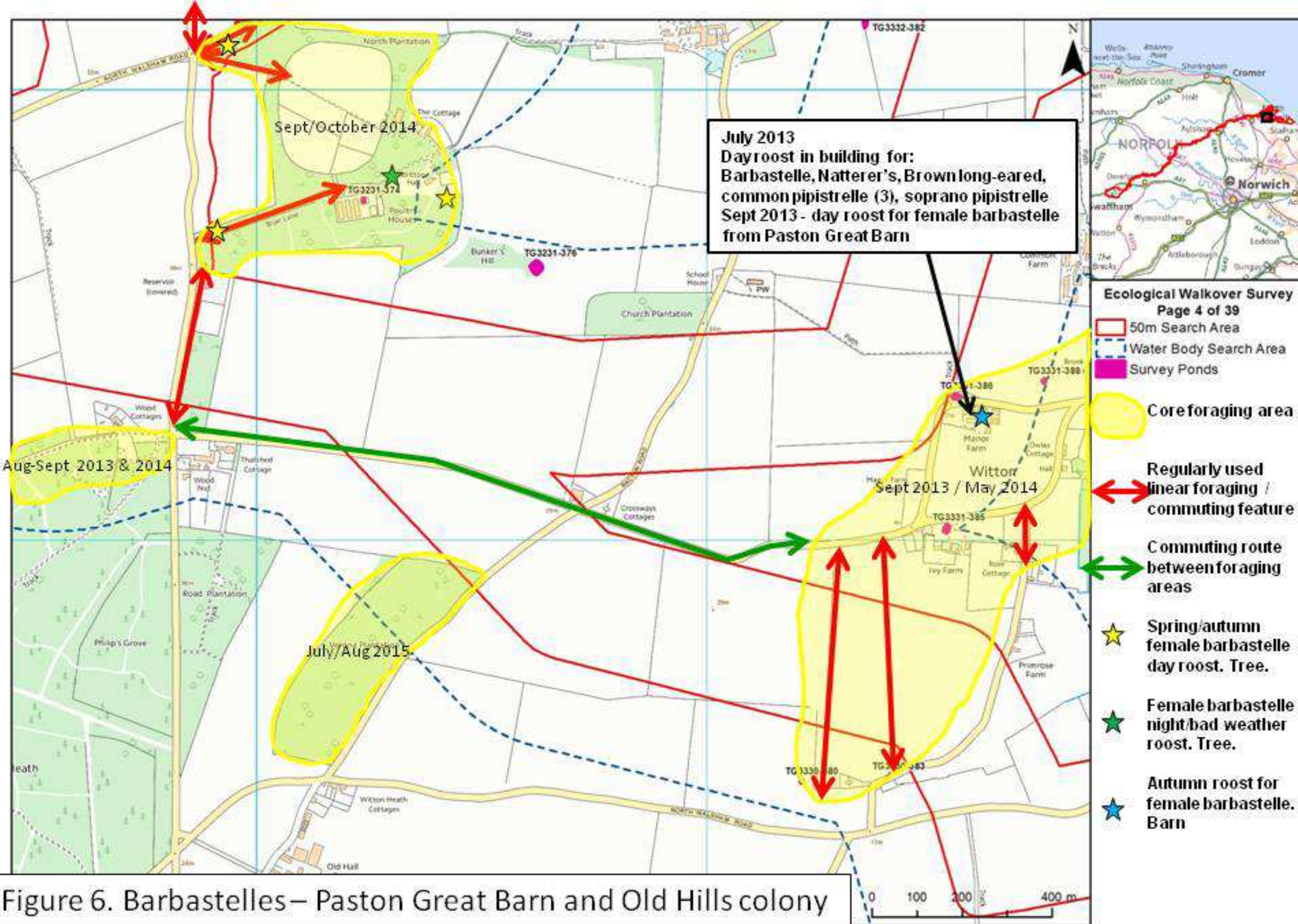
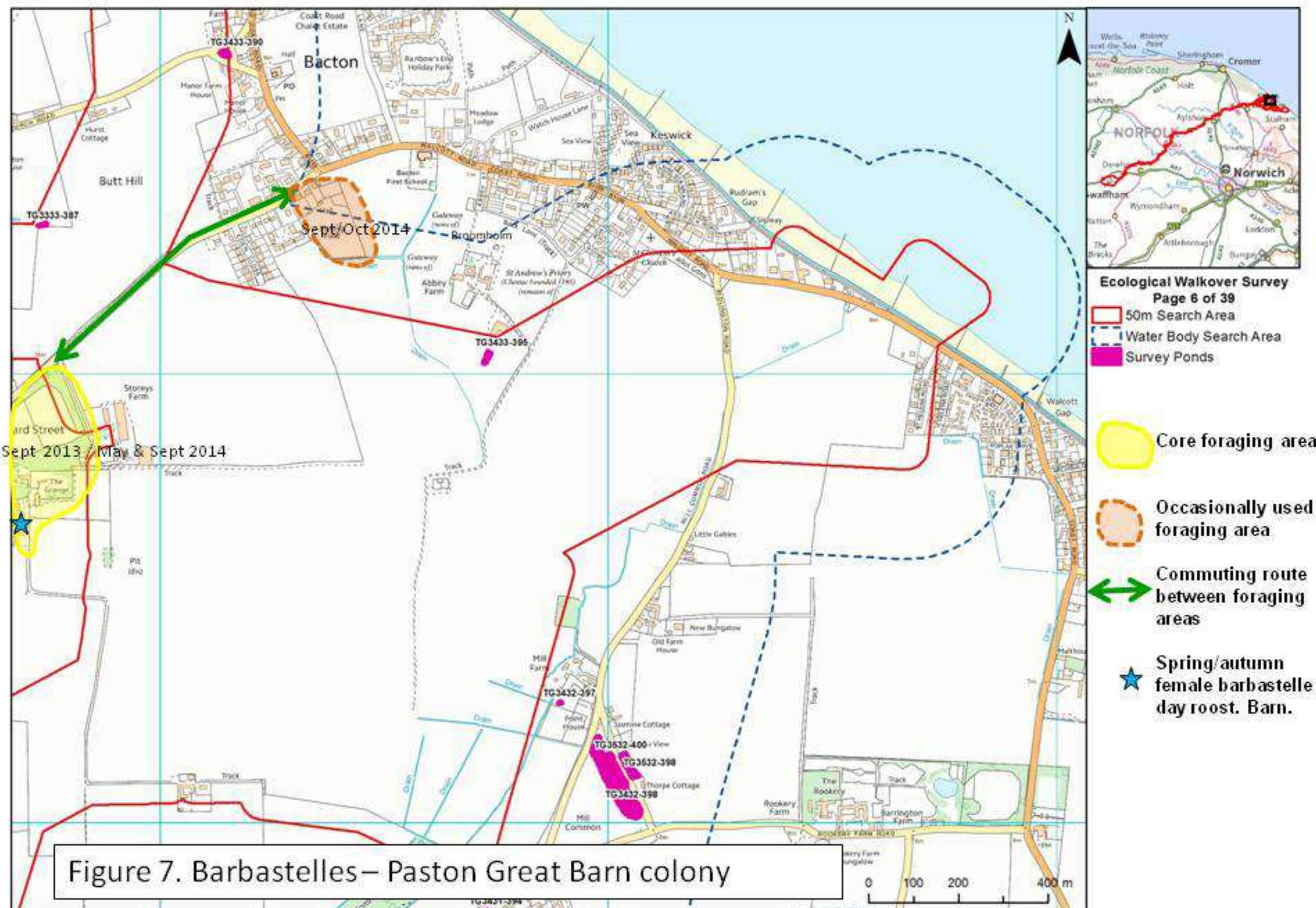


Figure 3. Paston Great Barn NNR, Calthorpe Broad NNR and Old Hills (Honing estate) – barbastelle maternity colonies







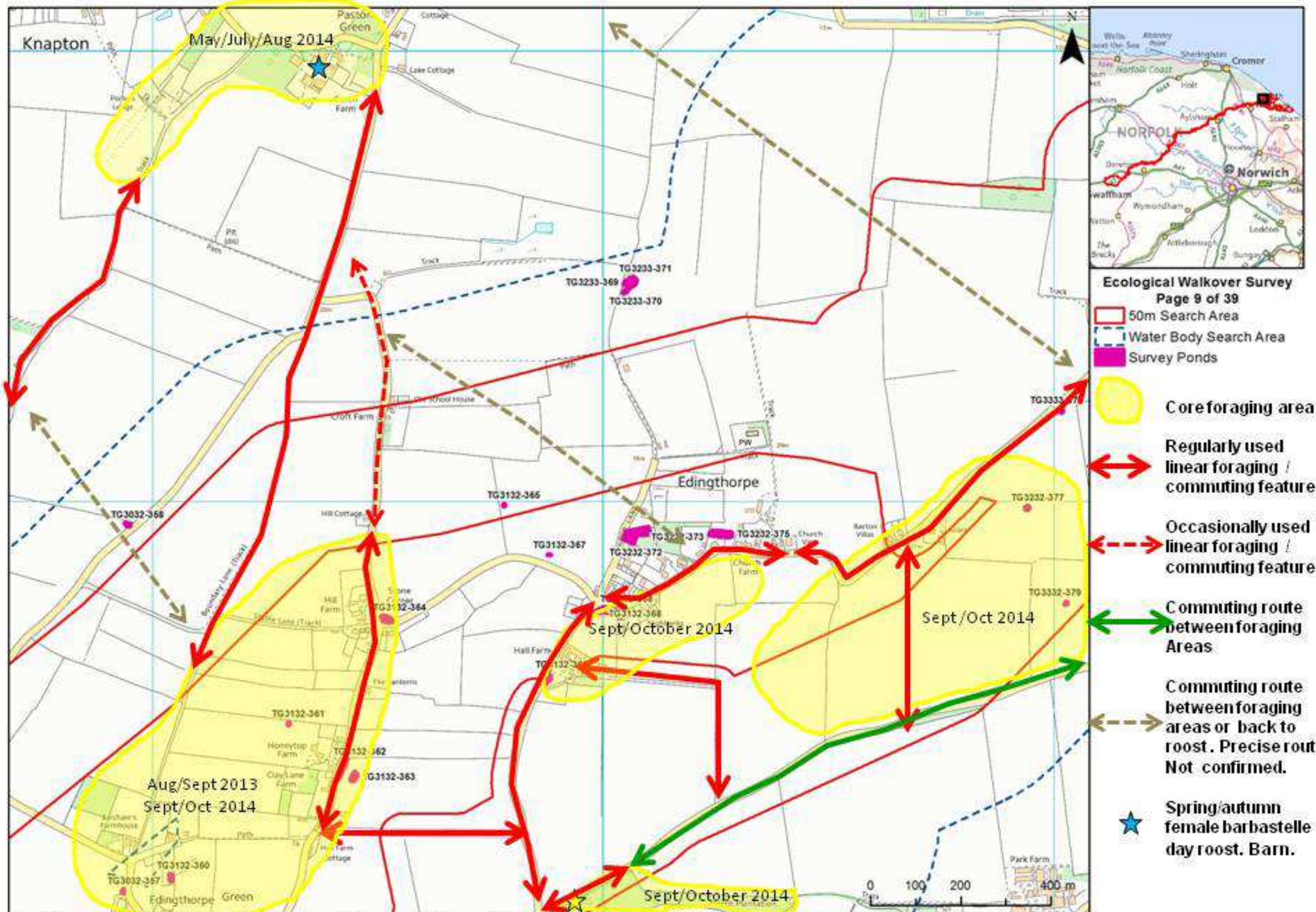
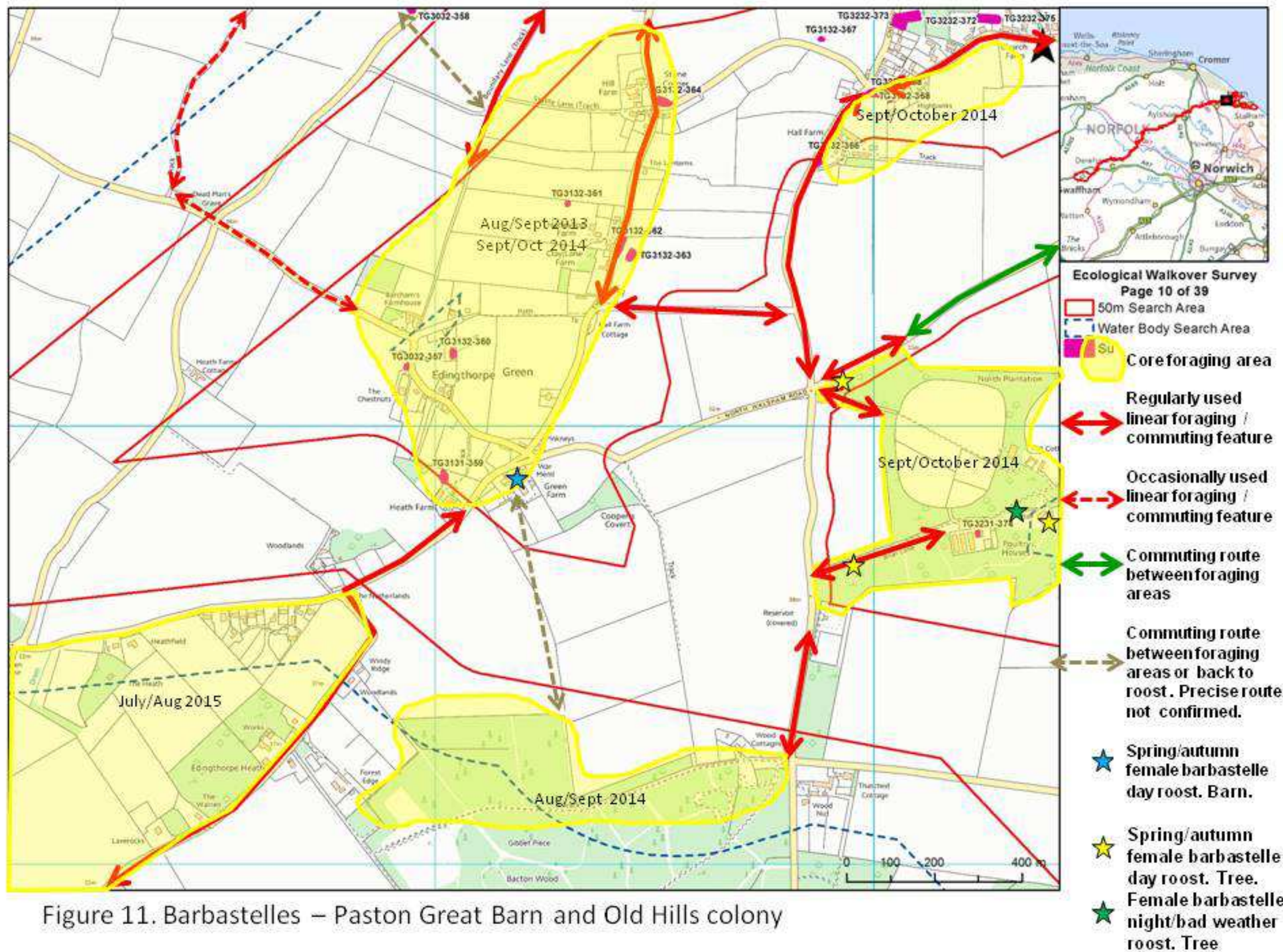


Figure 10. Barbastelles – Paston Great Barn colony



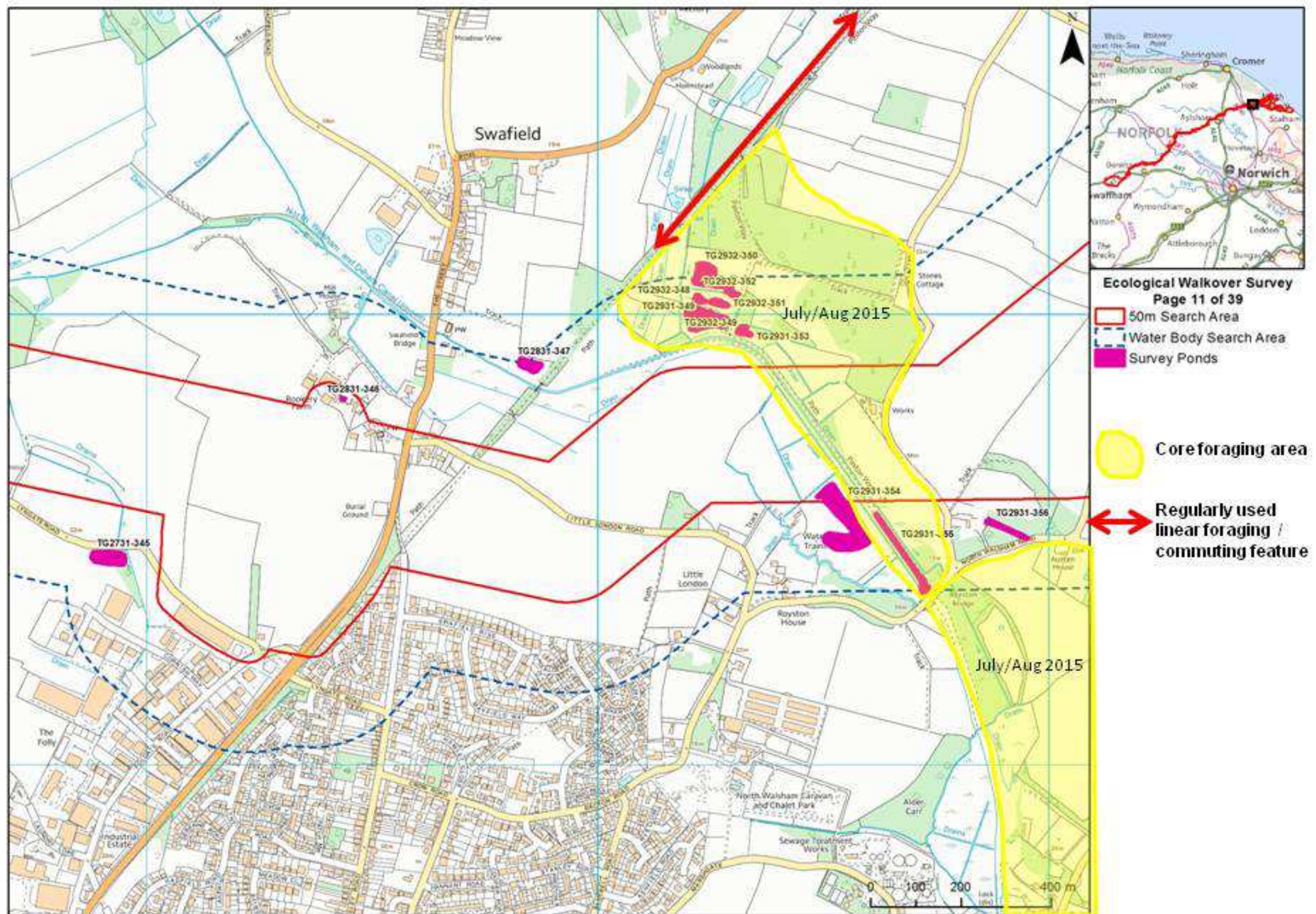


Figure 12. Barbastelles – Paston Great Barn and Old Hills colony

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