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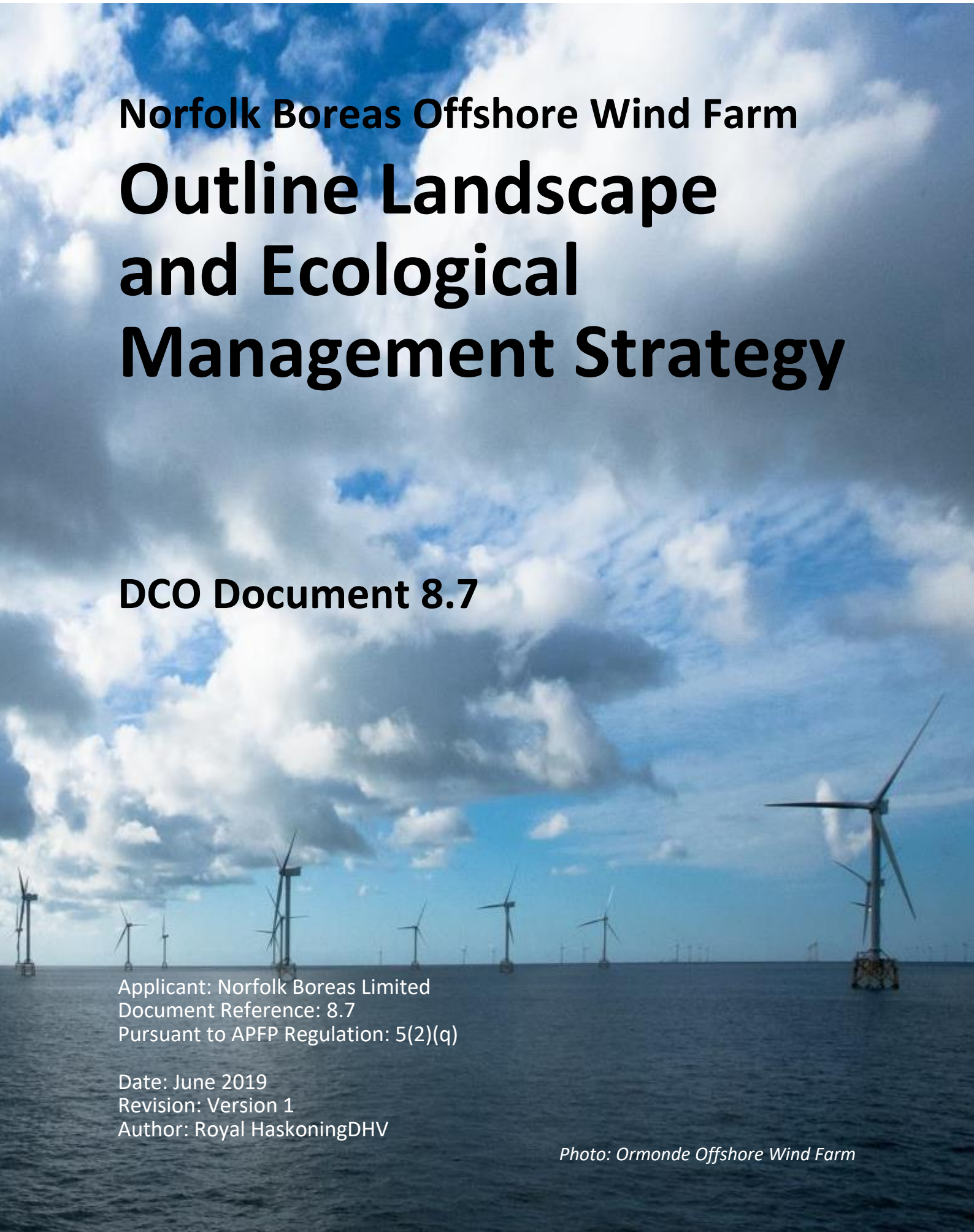

## Norfolk Boreas Offshore Wind Farm

# Outline Landscape and Ecological Management Strategy

## DCO Document 8.7

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# Glossary of Acronyms

| | |
|---|---|
| AONB | Area of Outstanding Natural Beauty |
| BAP | Biodiversity Action Plan |
| BCT | Bat Conservation Trust |
| CoCP | Code of Construction Practice |
| CWS | County Wildlife Site |
| DCO | Development Consent Order |
| Defra | Department for Environment, Food and Rural Affairs |
| EcIA | Ecological Impact Assessment |
| ECoW | Ecological Clerk of Works |
| EIA | Environmental Impact Assessment |
| EcoMP | Ecological Management Plan |
| EPS | European Protected Species |
| ES | Environmental Statement |
| ha | Hectare |
| HDD | Horizontal Directional Drilling |
| HSI | Habitat Suitability Index |
| HVAC | High Voltage Alternating Current |
| HVDC | High Voltage Direct Current |
| JNCC | Joint Nature Conservation Committee |
| LBAP | Local Biodiversity Action Plan |
| LNR | Local Nature Reserve |
| m | Metre |
| NBSG | Norfolk Barbastelle Study Group |
| NNR | National Nature Reserve |
| NPP | Norfolk Ponds Project |
| NWT | Norfolk Wildlife Trust |
| OLEMS | Outline Landscape Environmental Management Strategy |
| PMoW | Precautionary Method of Working |
| RNR | Roadside Nature Reserve |
| SAC | Special Area of Conservation |
| SPA | Special Protection Area |
| SSSI | Site of Special Scientific Interest |
| SuDS | Sustainable Drainage System |
| UKHPI | UK Habitat of Principal Importance |

# Glossary of Terminology

| | |
|---|---|
| Cable pulling | Installation of cables within pre-installed ducts from jointing pits located along the onshore cable route. |
| Ducts | A duct is a length of underground piping, which is used to house electrical and communications cables. |
| Jointing pit | Underground structures constructed at regular intervals along the onshore cable route to join sections of cable and facilitate installation of the cables into the buried ducts |
| Landfall | Where the offshore cables come ashore at Happisburgh South |
| Link boxes | Underground chambers or above ground cabinets next to the cable trench housing low voltage electrical earthing links. |
| Mobilisation area | Areas approx. 100 x 100m used as access points to the running track for duct installation. Required to store equipment and provide welfare facilities. Located adjacent to the onshore cable route, accessible from local highways network suitable for the delivery of heavy and oversized materials and equipment. |
| National Grid new / replacement overhead line tower | New overhead line towers to be installed at the National Grid substation. |
| National Grid overhead line modifications | The works to be undertaken to complete the necessary modification to the existing 400kV overhead lines. |
| National Grid overhead line temporary works | Area within which the work will be undertaken to complete the necessary modification to the existing 400kV overhead lines. |
| National Grid substation extension | The permanent footprint of the National Grid substation extension. |
| National Grid temporary works area | Land adjacent to the Necton National Grid substation which would be temporarily required during construction of the National Grid substation extension. |
| Necton National Grid substation | The grid connection location for Norfolk Boreas and Norfolk Vanguard |
| Norfolk Vanguard | Norfolk Vanguard offshore wind farm, sister project of Norfolk Boreas. |
| Onshore cable route | The up to 35m working width within a 45m wide corridor which will contain the buried export cables as well as the temporary running track, topsoil storage and excavated material during construction. |
| Onshore 400kV cable route | Buried high-voltage cables linking the onshore project substation to the Necton National Grid substation |
| Onshore cables | The cables which take power and communications from landfall to the onshore project substation. |
| Onshore infrastructure | The combined name for all onshore infrastructure associated with the project from landfall to grid connection. |
| Onshore project area | The area of the onshore infrastructure (landfall, onshore cable route, accesses, trenchless crossing zones and mobilisation areas; onshore project substation and extension to the Necton National Grid substation and overhead line modifications). |
| Onshore project substation | A compound containing electrical equipment to enable connection to the National Grid. The substation will convert the exported power from HVDC to HVAC, to 400kV (grid voltage). This also contains equipment to help maintain stable grid voltage. |
| Onshore project substation temporary construction compound | Land adjacent to the onshore project substation which would be temporarily required during construction of the onshore project substation. |

| | |
|---|---|
| Overhead Line | An existing 400kV power line suspended by towers. |
| Running track | The track along the onshore cable route which the construction traffic would use to access work areas. |
| The Applicant | Norfolk Boreas Limited |
| The Norfolk Boreas site | The redline boundary of Norfolk Boreas which will contain the wind turbines, offshore platforms and array cables (does not contain the export cable corridor) |
| The project | Norfolk Boreas Wind Farm including the onshore and offshore infrastructure. |
| Trenchless crossing compound | Pairs of compounds at each trenchless crossing zone to allow boring to take place from either side of the crossing. |
| Trenchless crossing zone | Areas within the onshore cable route which will house trenchless crossing entry and exit points. |
| Workfront | A length of onshore cable route within which duct installation works will occur, approximately 150m. |

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# 1 INTRODUCTION

## 1.1 Background

1. The Development Consent Order (DCO) for the Norfolk Boreas Offshore Wind Farm (herein 'the project') requires a number of plans to be prepared by the Applicant and approved by relevant authorities, prior to construction. The following DCO Requirements relate specifically to landscape and ecology:

   - Requirement 18 – Provision of landscaping;
   - Requirement 19 – Implementation and maintenance of landscaping; and
   - Requirement 24 – Ecological Management Plan.

2. This Outline Landscape and Ecological Management Strategy (OLEMS) is drafted to form the basis of the more detailed plans which will be provided under these set of DCO Requirements and is a certified plan under Requirement 18 of the DCO. The OLEMS has been drafted based on the landscape and ecological mitigation and enhancement measures contained within Chapter 22 Onshore Ecology, Chapter 23 Onshore Ornithology and Chapter 29 Landscape and Visual Impact Assessment of the Environmental Statement (ES) (document reference 6.1.22, 6.1.23 and 6.1.29 respectively). These measures are deemed necessary on the basis of the assessment of impacts of the construction, operation and decommissioning of the onshore project area.

3. In advance of construction, the plans under Requirements 18, 19 and 24 of the DCO will be developed in accordance with the information provided within this OLEMS and in consultation with and subject to agreement from Natural England and the relevant local authorities.

4. Norfolk Boreas Limited will work with the relevant local authorities to ensure appropriate resourcing is in place to monitor compliance with the provisions of the OLEMS, and the plans of which it forms the basis.

## 1.2 Development Scenarios

5. Vattenfall Wind Power Limited (VWPL), the parent company of Norfolk Boreas Limited, is also developing Norfolk Vanguard, a 'sister project' to Norfolk Boreas. The Norfolk Vanguard project is approximately one year ahead of Norfolk Boreas in its development programme having submitted its DCO application in June 2018. In order to minimise impacts associated with onshore construction works for the two projects, Norfolk Vanguard Limited are seeking consent to undertake the duct installation and some enabling works for both projects at the same time. This is the preferred option and considered to be the most likely however, Norfolk Boreas needs to consider the possibility that Norfolk Vanguard may not proceed to construction.

6. In line with the Norfolk Boreas ES (document reference 6.1) this OLEMS considers the following two alternative scenarios:

- **Scenario 1** – Norfolk Vanguard proceeds to construction and installs ducts and other shared enabling works for Norfolk Boreas.
- **Scenario 2** – Norfolk Vanguard does not proceed to construction and Norfolk Boreas proceeds alone. Norfolk Boreas undertakes all works required as an independent project.

7. Under Scenario 1, the following works would be undertaken by Norfolk Boreas:

- Installation of ducts and cables at the landfall;
- Cable pulling through pre-installed ducts, including reinstallation of up to approximately 12km of temporary running track;
- Construction of onshore project substation, including extension of the access road from the A47 (installed by Norfolk Vanguard);
- Extension of the Necton National Grid Substation in an easterly direction, with a footprint of approximately 135m by 150m; and
- Landscape mitigation planting.

8. The cable pulling works would not require trenches to be reopened. The cables would be pulled through the pre-installed ducts from jointing pits located along the onshore cable route. Access to and from the jointing pits would be required to facilitate the works and would require up to 12km of the temporary running track to be reinstalled. The exact location of the jointing pits and the associated temporary running track and their interactions with landscape and ecological receptors will not be determined until detailed design, post consent. The mitigation set out in the ES and subsequently in this document therefore assumes a worst case that the temporary running track may be required in any location along the cable route.

9. Under Scenario 2, the following works would be undertaken by Norfolk Boreas:

- Installation of ducts and cables at the landfall;
- Duct installation via open trenching and trenchless crossings, including installation of 60km of temporary running track;
- Installation of mobilisation areas and trenchless crossing compounds;
- Cable pulling through pre-installed ducts, including retaining or reinstalling up to approximately 12km of temporary running track (as set out above for Scenario 1);
- Construction of onshore project substation, including installation of new permanent access road from A47 and associated junction improvement works;

- Extension of the Necton National Grid Substation in a westerly direction, with a footprint of approximately 200m by 150m;
- Modifications to the existing National Grid overhead lines; and
- Landscape mitigation planting.

10. Full details of the scenarios are presented in Chapter 5 Project Description of the ES (document reference 6.1.5), including a further detailed comparison provided in Appendix 5.1 (document reference 6.3.5.1).

## 2 STRUCTURE OF OLEMS

11. This OLEMS presents a framework for the landscaping provisions and ecological mitigation which is to be delivered before, during and after the construction and operation of the onshore project area, and provides details of the outline landscaping provisions and of the ecological mitigation measures which have been committed to at this stage.

12. The assessments detailed within the ES are based on the inclusion of certain measures as 'embedded mitigation', which is defined in Chapter 6 EIA Methodology (document reference 6.1.6) as 'mitigation measures that were identified and adopted as part of the evolution of the project design'.

13. Where, after taking into account embedded mitigation, significant impacts were identified, then 'additional mitigation' was proposed in the ES and is captured in further detail in this OLEMS.

14. This OLEMS details mitigation and enhancement measures for each ecological receptor individually. Under the heading of each receptor, an overview of baseline and embedded mitigation is provided, followed by details of additional mitigation as necessary. The details of additional mitigation is structured chronologically to outline the mitigation / enhancement measures which would apply at each stage of the project:

    - Pre-construction;
    - During construction; and
    - Post-construction.

15. This OLEMS is structured as follows:

    - **Section 3** provides a summary of the **purpose** of this OLEMS, and provides details for how **compliance** with the plans which it will inform will be ensured;
    - **Section 4** provides a summary of the **embedded mitigation** which has been used on the project;
    - **Sections 5** sets out the details of **pre-construction surveys** which are required to complete the project's ecological baseline pre-construction;
    - **Section 6** provides details of the proposed **landscaping mitigation**;
    - **Sections 7, 8, 9** and **10** provides receptor-by-receptor details of the **ecological mitigation measures** which will be adhered to under each receptor;
    - **Section 11** provides a summary of the **timings** of any mitigation measures set out above;
    - **Section 12** provides details of how the success of the mitigation measures described in Sections 4, 5 and 6 will be **monitored**; and
    - **Section 13** provides details of the licensing requirements for the project.

## 2.1 Approach to Development Scenarios

16. This OLEMS is an outline strategy and takes account of both potential development scenarios for the project as discussed in section 1.2.

17. Where proposed mitigation measures would differ under Scenario 1 or Scenario 2, this is explicitly stated and mitigation measures are provided for both scenarios. Otherwise the mitigation detailed is applicable to both scenarios.

18. The final Landscaping Management Scheme(s) (LMS) and Ecological Management Plan(s) (EcoMP) for the project will be drafted post consent and based on the final development scenario which will be taken forward to construction.

## 3 AIMS AND OBJECTIVES

19. The aim of this OLEMS is to outline the requirement for landscape and ecological mitigation and enhancement measures that are reflective of the surveys and impact assessment carried out for the onshore project area. The final detail of the mitigation and enhancement measures will be provided through the LMS and EcoMP, to be agreed with the relevant authorities, pursuant to Requirements 18, 19 and 24 of the draft DCO. The LMS and EcoMP will be drafted in accordance with this document.

20. The OLEMS, as the basis for these more detailed future plans, has the following objectives:

- To clearly outline the framework for ecological management;
- To outline the provision of the details that would form both species protection and landscape mitigation planting schemes;
- To provide a framework for the project EcoMP, which will act as a single document for all ecological mitigation considerations on site e.g. a single reference for the Ecological Clerk of Works (ECoW);
- To ensure all reasonable precautions are taken by Norfolk Boreas Limited and their contractors to safeguard protected species. This OLEMS also acts as the basis for individual Species Protection Plans. A final detailed scheme of protection and mitigation measures for any European Protected Species (EPS) potentially affected during the construction and operation phases of the project, prior to construction, will be agreed with the relevant authorities and proposed as part of draft mitigation licence applications under Requirement 28 of the draft DCO;
- To provide the basis for the agreement of a detailed LMS under Requirement 18 of the draft DCO for the onshore project substation and National Grid substation extension, with an aftercare period of 5 years following implementation of the planting. One for one replacement planting of failed plants would be required for the first 5 years. Replacement planting after this date may be requested at the discretion of Norfolk County Council. This scheme will detail how ecological, landscape and Sustainable Drainage System (SuDS) requirements will be integrated at the onshore project substation site and National Grid substation extension site;
- To provide the basis for the agreement of a detailed LMS for the protection and restoration of impacted and replanted trees and hedges in the onshore cable route, with an aftercare period of 5 years;
- It is expected that the schemes of planting and aftercare for the onshore cable route would be delivered by contractors who can demonstrate appropriate experience and capacity to deliver effective and robust aftercare

and provide a consistent quality of work across the whole project. Norfolk Boreas Limited would seek to work collaboratively with Breckland Council, North Norfolk District Council, Broadland District Council and Norfolk County Council to develop planting specifications for tendering for this work; and

- To form the basis of a process of ongoing dialogue / forum with Local Authorities leading up to and during construction to ensure that Local Authorities are kept informed and satisfied of the implementation of the OLEMS (and the plans / schemes of which it forms the basis) and in order that they can also keep communities informed.

# 4 EMBEDDED MITIGATION

21. Norfolk Boreas Limited has committed to a number of techniques and engineering designs/modifications inherent as part of the project during the pre-application phase, in order to avoid or reduce impacts as far as possible. Embedding mitigation into the project design is a type of primary mitigation and is an inherent aspect of the EIA process.

22. A range of different information sources have been considered as part of embedding mitigation into the design of the project including engineering requirements, feedback from community and landowners, ongoing discussions with stakeholders and regulators, commercial considerations and environmental best practice. For further details see Chapter 5 Project Description, Chapter 4 Site Selection and Assessment of Alternatives of the ES and the Consultation Report (document references 6.1.5, 6.1.4 and 5.1 respectively).

23. The project has undergone an extensive site selection and design refinement process which has involved incorporating landscape and ecological considerations into the identification of the proposed onshore project area and into the project design. Table 4.1 summarises the project wide embedded mitigation and Table 4.2 outlines the embedded mitigation which is relevant to onshore ecological, ornithological and landscape and visual receptors. Where embedded mitigation is relevant to particular receptors, this is described under the relevant subsection in sections 6 to 10.

24. If significant impacts would be unavoidable after taking into account embedded mitigation, then additional mitigation is proposed. The same approach is also applied in instances where specific mitigation measures have been requested by stakeholders in relation to potential impacts upon specific receptors - Additional mitigation measures are provided under the relevant subsection in sections 6-10.

**Table 4.1 Embedded mitigation for the project**

| Parameter | Mitigation measures embedded into the project design | Notes |
|---|---|---|
| **Project Wide** | | |
| Commitment to HVDC technology | Commitment to HVDC technology minimises environmental impacts through the following design considerations;<br>• HVDC requires fewer cables than the HVAC solution. During the duct installation phase under Scenario 2 this reduces the cable route working width for Norfolk Boreas to 35m from the previously identified worst case of 50m. As a result, the overall footprint of the onshore cable | Norfolk Boreas Limited has reviewed consultation received and in light of the feedback, has made a number of decisions in relation to the project design. One of these decisions is to deploy |

| Parameter | Mitigation measures embedded into the project design | Notes |
|---|---|---|
| | route required for the duct installation phase is reduced from approx. 300ha to 210ha;<br>• The width of permanent cable easement is also reduced from 25m to 13m;<br>• Removes the requirement for a cable relay station as permanent above ground infrastructure;<br>• Reduces the maximum duration of the cable pulling phase from three years down to two years;<br>• Reduces the total number of jointing pits for Norfolk Boreas from 450 to 150; and<br>• Reduces the number of drills needed at trenchless crossings (including landfall). | HVDC technology as the export system. |
| Site Selection | The project has undergone an extensive site selection process which has involved incorporating environmental considerations in collaboration with the engineering design requirements. Considerations include (but are not limited to) adhering to the Horlock Rules (for explanation see ES Chapter 4 Site Selection and Alternatives) for onshore project substations and Necton National Grid extension and associated infrastructure, a preference for the shortest route length (where practical) and developing construction methodologies to minimise potential impacts.<br><br>Key design principles from the outset were followed (wherever practical) and further refined during the EIA process, including;<br>• Avoiding proximity to residential dwellings;<br>• Avoiding proximity to historic buildings;<br>• Avoiding designated sites;<br>• Minimising impacts to local residents in relation to access to services and road usage, including footpath closures;<br>• Utilising open agricultural land, therefore reducing road carriageway works;<br>• Minimising requirement for complex crossing arrangements, e.g. road, river and rail crossings;<br>• Avoiding areas of important habitat, trees, ponds and agricultural ditches;<br>• Installing cables in flat terrain maintaining a straight route where possible for ease of pulling cables through ducts;<br>• Avoiding other services (e.g. gas pipelines) but aiming to cross at close to right angles where crossings are required;<br>• Minimising the number of hedgerow crossings, utilising existing gaps in field boundaries;<br>• Avoiding rendering parcels of agricultural land inaccessible; and<br>• Utilising and upgrading existing accesses where possible to avoid impacting undisturbed ground. | Constraints mapping and sensitive site selection has been undertaken to avoid a number of impacts, or to reduce impacts as far as possible, is a type of primary mitigation and is an inherent aspect of the EIA process. Norfolk Boreas Limited has reviewed consultation received to inform the site selection process (including from local communities, landowners and regulators) and in response to feedback, has made a number of decisions in relation to the siting of project infrastructure. The site selection process is set out in Chapter 4 Site Selection and Assessment of Alternatives. |

| Parameter | Mitigation measures embedded into the project design | Notes |
|---|---|---|
| Long Horizontal Directional Drilling (HDD) at landfall | Use of long HDD at landfall to avoid restrictions or closures to Happisburgh beach and retain access to the beach during construction. Norfolk Boreas Limited have also committed to not using the beach car park at Happisburgh South. | Norfolk Boreas Limited has reviewed consultation received and in response to feedback, has made a number of decisions in relation to the project design. One of those decisions is to use long HDD at landfall. |
| **Scenario 1** | | |
| Strategic approach to delivering Norfolk Boreas and Norfolk Vanguard | Under Scenario 1, onshore ducts will be installed for both projects at the same time, as part of the Norfolk Vanguard construction works. This would allow the main civil works for the cable route to be completed in one construction period and in advance of cable delivery, preventing the requirement to reopen the land in order to minimise disruption. Onshore cables would then be pulled through the pre-installed ducts in a phased approach at later stages.<br>In accordance with the Horlock Rules, the co-location of Norfolk Boreas and Norfolk Vanguard onshore project substations will keep these developments contained within a localised area and, in so doing, will contain the extent of potential impacts. | The strategic approach to delivering Norfolk Boreas and Norfolk Vanguard has been a project commitment from the outset of each project. |
| **Scenario 2** | | |
| Duct Installation Strategy | The onshore cable duct installation strategy is proposed to be conducted in a sectionalised approach in order to minimise impacts. Construction teams would work on a short section (approximately 150m length) and once the cable ducts have been installed, the section would be back filled and the top soil reinstated before moving onto the next section. This would minimise the amount of land being worked on at any one time and would also minimise overall disruption. | This has been a very early project commitment. Chapter 5 Project Description provides a detailed description of the process. |
| Trenchless Crossings | Commitment to trenchless crossing techniques to minimise impacts to the following specific features;<br>• Wendling Carr County Wildlife Site;<br>• Little Wood County Wildlife Site;<br>• Land South of Dillington Carr County Wildlife Site;<br>• Kerdiston proposed County Wildlife Site;<br>• Marriott's Way County Wildlife Site / Public Right of Way (PRoW);<br>• Paston Way and Knapton Cutting County Wildlife Site;<br>• Norfolk Coast Path; | A commitment to a number of trenchless crossings at certain sensitive locations was identified at the outset. However, Norfolk Boreas Limited has committed to certain additional trenchless crossings as a direct |

| Parameter | Mitigation measures embedded into the project design | Notes |
|---|---|---|
| | • Witton Hall Plantation along Old Hall Road;<br>• King's Beck;<br>• River Wensum;<br>• River Bure;<br>• Wendling Beck;<br>• North Walsham and Dilham Canal;<br>• Network Rail line at North Walsham that runs from Norwich to Cromer;<br>• Mid-Norfolk Railway line at Dereham that runs from Wymondham to North Elmham; and<br>• Trunk Roads including A47, A140, A149 | response to stakeholder requests. |

**Table 4.2 Embedded mitigation for onshore ecology, ornithology and landscape and visual impact**

| Parameter | Mitigation measures embedded for onshore ecology, ornithology and landscape and visual impact | Notes |
|---|---|---|
| **Landscape and visual impact** | | |
| No overhead lines | The decision by Norfolk Boreas Limited to use underground cable systems for the onshore cable route, over the approximate 60km route between the landfall and electrical connection point, avoids the requirement to construct new overhead power transmission lines. The mitigation embedded in this approach will lead to notably reduced impacts on landscape and visual receptors during the construction phase and practically no impacts during the operational phase. It also notably reduces the potential for the onshore cable route to contribute to significant cumulative effects. Post construction the onshore cable route will have a negligible impact on landscape and visual receptors as the components will be buried under ground, with the exception of the small scale and intermittent link boxes. | n/a |
| Commitment to HVDC technology | This removes the requirement for a cable relay station as permanent above ground infrastructure and as a result eliminates all potential landscape and visual effects that would otherwise have been associated with this component of the project, in the relatively open landscape close to the east coast of Norfolk. | n/a |
| Strategic landscape mitigation | Mitigation measures associated with the onshore project substation, National Grid substation extension and site access from the A47 (under Scenario 2) form part of a strategic approach to enhancing landscape character and biodiversity in the local area. ES Figures 29.12 (Scenario 1) and 29.22 (Scenario 2), in ES Chapter 29 Landscape and Visual Impact Assessment, shows how mitigation planting | For further details on project landscaping, please refer to section 6 of this document and ES Chapter 29 |

| Parameter | Mitigation measures embedded for onshore ecology, ornithology and landscape and visual impact | Notes |
|---|---|---|
| | would contribute to the wider landscape structure of the area and help consolidate green corridors for wildlife.<br><br>Mitigation planting for the onshore project substation is shown in ES Figure 29.9 (Scenario 1) and Figure 29.19 (Scenario 2). This has been designed to screen the onshore project substation. Details of the mitigation planting are presented in section 6 of this document and section 29.7.1 in ES Chapter 29 Landscape and Visual Impact Assessment.<br><br>Mitigation planting for the National Grid substation extension is shown in ES Figure 29.10b (Scenario 1) and ES Figure 29.20b (Scenario 2). This has been designed to screen the National Grid substation extension in views from Necton. Details of the mitigation planting are presented in section 6 of this document and section 29.7.1 in ES Chapter 29 Landscape and Visual Impact Assessment. | Landscape and Visual Impact Assessment. |
| Landfall site selection | The selection of the shared landfall site at Happisburgh South followed a number of key design principles where practical, the following being relevant to LVIA:<br><br>• To avoid the Norfolk Coast AONB to the north and The Broads NP to the south;<br>• To avoid populated areas as far as possible; and<br>• To avoid areas of high amenity value.<br><br>The mitigation is embedded in a site selection which does not affect the nationally important landscape designations to the north and south and which is set back sufficiently from the coastal edge and adjacent residential areas.<br>The location of the transition pits, suitably set back from the coastal cliffs, would reduce visual impacts along the coastline.<br>The location of the transition pits, which would be buried below ground level, would ensure landscape and visual effects would only occur during the construction phase and not during the operational phase. | See section 6 of this document and section 29.7.4 in ES Chapter 29 Landscape and Visual Impact Assessment. |
| Onshore cable route site selection | The selection of the shared onshore cable route has followed a number of key design principles, where practical, the following being relevant to LVIA;<br><br>• Wherever possible to locate the onshore cable route through open agricultural land;<br>• To avoid landscape designations including RPGs;<br>• To avoid areas of woodland and trees;<br>• To minimise the number of hedgerow crossings and utilise existing gaps in field boundaries if possible; and<br>• To avoid proximity to residential dwellings and settlements. | See section 6 of this document and section 29.7.4 in ES Chapter 29 Landscape and Visual Impact Assessment. |

| Parameter | Mitigation measures embedded for onshore ecology, ornithology and landscape and visual impact | Notes |
|---|---|---|
| | The mitigation is embedded in the selection of a route which does not affect landscape designations, County Wildlife Sites or woodland, and minimises the effects on hedgerows. | |
| Onshore project substation site selection | National Grid's Guidelines on Substation Siting and Design (The Horlock Rules) have been taken into consideration during the site selection process. Those relevant to the LVIA include the following:<br>• To avoid landscape designations including National Parks and AONBs;<br>• To protect areas of local amenity value including ancient woodland and historic hedgerows; and<br>• To take advantage of screening provided by landform and existing features.<br><br>The Scenario 1 and Scenario 2 sites avoid all international, national, county and local landscape designations. They do not affect any ancient woodland or historic hedgerows and mitigation measures ensure hedgerow loss, which would occur, is compensated for in new planting around the onshore project substation and National Grid substation extension. The site benefits from existing natural screening provided by the extensive Great Wood to the east, Necton Wood to the north and a series of hedgerows surrounding the site. These landscape features provide screening from the north and east and create a wooded backdrop in views from other directions, and in so doing, contribute to the mitigation of landscape and visual effects. | See sections 29.7.4 and 29.7.5 in ES Chapter 29 Landscape and Visual Impact Assessment. |
| National Grid substation extension site selection | The location of Norfolk Boreas and Norfolk Vanguard National Grid substation extensions adjacent to the existing Necton National Grid substation would keep these developments contained within a localised area and, in so doing, would contain the extent of the landscape and visual effects in accordance with the Horlock Rules. | See section 29.7.4 and 29.7.5 in ES Chapter 29 Landscape and Visual Impact Assessment. |
| Hedgerow crossings | Under Scenario 2, through the selection of a HVDC electrical solution, this has reduced the maximum width of hedgerow gaps from 25m to 13m (or up to 16.5m where the cable route crosses a hedgerow at an oblique angle) at any one location during the two-year duct installation phase.<br><br>Where hedgerow gaps are required beyond the two-year duct installation phase (i.e. for the duration of the subsequent two-year cable pull phase), the number of gaps required will be minimised as far as possible and will be no wider than 6m. | n/a |

| Parameter | Mitigation measures embedded for onshore ecology, ornithology and landscape and visual impact | Notes |
|---|---|---|
| | The amount of hedgerow removed during construction of a HVDC design compared to a HVAC design is reduced by over 50%. These reduced widths would reduce the influence of the onshore cable route construction on landscape and visual receptors and reduce the area of hedgerows to be removed.<br><br>The minimum width assumes that the cable route bisects each hedgerow in a perpendicular fashion. In reality, some hedgerows would be crossed at an angle, therefore increasing the maximum width of the gap required up to a possible 16.5m. Where this is the case for a particular receptor, it is noted within this report.<br><br>Where hedgerow gaps are required beyond the two-year duct installation phase (i.e. for the duration of the subsequent two-year cable pull phase), the number of gaps required would be minimised as far as possible and the width would be no wider than 6m. | |
| Lighting | The onshore project substation has been designed so that it does not require permanent operational lighting. | n/a |
| **Onshore ecology and ornithology** | | |
| Designated sites | Constraints mapping was undertaken prior to the publication of the Norfolk Vanguard EIA Scoping Report (Royal HaskoningDHV, 2016). This constraints mapping exercise was used to determine the route options for the onshore project area. The following ecological receptors were considered as part of the constraints mapping process:<br><br>• International designated sites for nature conservation (SAC, SPA, Ramsar sites);<br>• National designated site for nature conservation (The Broads National Park, SSSI, NNR, LNR); and<br>• Ancient woodland.<br><br>These ecological receptors have been avoided during the onshore project area route selection process. | More information can be found in ES Chapter 4 Site Selection and Assessment of Alternatives. |
| Route Refinement | Route refinements have included consideration of more detailed ecological constraints, and the following principles have been applied when refining the onshore project area:<br><br>• Ancient woodland – following the Forestry Commission's Standing Advice on Ancient Woodland and Veteran Trees, a buffer of 15m around all ancient woodlands has been used (Forestry Commission, 2014);<br>• Woodland – areas of woodland have been avoided where possible during the route selection process; | Further information on the route refinement process can be found in ES Chapter 4 Site Selection and Assessment of Alternatives. |

| Parameter | Mitigation measures embedded for onshore ecology, ornithology and landscape and visual impact | Notes |
|---|---|---|
| | • Habitat – standing water bodies, trees, and agricultural ditches have been avoided where possible; and<br>• Hedgerows – the number of hedgerow crossings has been minimised as far as possible, taking other fixed constraints into account. | |
| Hedgerow and watercourse crossings | Under Scenario 2, through the selection of a HVDC electrical solution, this has reduced the maximum width of hedgerow gaps from 25m to 13m (or up to 16.5m where the cable route crosses a hedgerow at an oblique angle) at any one location during the two-year duct installation phase.<br><br>Where hedgerow gaps are required beyond the two-year duct installation phase (i.e. for the duration of the subsequent two-year cable pull phase), the number of gaps required will be minimised as far as possible and will be no wider than 6m. | Further information can be found in ES Chapter 5 Project Description. |
| Country Wildlife Sites | In response to comments from stakeholders raised as part of the Norfolk Vanguard Evidence Plan Process (EPP), Norfolk Boreas Limited is proposing to use trenchless crossing techniques (e.g. HDD) at all CWS and proposed CWS crossed by the onshore project area in order to minimise the impacts upon the habitats contained within these sites.<br><br>This includes proposed trenchless crossing techniques (e.g. HDD) at the following locations:<br><br>• Wendling Carr CWS (CWS no. 1013);<br>• Little Wood CWS (CWS no. 2024),<br>• Land South of Dillington Carr CWS (CWS no. 1025),<br>• Kerdiston proposed CWS (no CWS number);<br>• Marriott's Way CWS (CWS no. 2176) (in two locations); and<br>• Paston Way and Knapton Cutting CWS (CWS no. 1175).<br><br>At five of these six locations, no works will be undertaken within the CWS boundary. | Further information on trenchless crossing techniques can be found in ES Chapter 5 Project Description.<br><br>At one location, Wendling Carr CWS, only a temporary running track will be required to pass through the CWS. This will be a 6m by up to 180m track located within the CWS. This is shown on ES Figure 22.3. |
| Construction Programme | The construction programme for the onshore cables has been designed to minimise the duration and extent of impacts to ecological receptors at any given location along the onshore cable route.<br>Specifically:<br>• During the two-year duct installation phase (under Scenario 2 only), each duct installation team will work along a short section of the cable route, approximately 150m at a time. Where possible, each 150m workfront (approximately 0.7ha in area) will be reinstated | For further details on the construction approach and programme, please see ES Chapter 5 Project Description. |

| Parameter | Mitigation measures embedded for onshore ecology, ornithology and landscape and visual impact | Notes |
|---|---|---|
| | following duct installation, before works commence on the next section. The works at each section, including reinstatement, will take approximately one week (up to two in a worst case). Within each section, a 6m wide strip will be retained for the running track, for up to the remainder of the two-year duct installation phase (i.e. as a worst case a 60km by 6m strip along the onshore cable route will be lost for the duration of the cable duct installation);<br>• During the two year cable pulling phase, a reduced 12km by 6m strip along the onshore cable route is anticipated to be lost potentially for a further 16 weeks in any one area per annum for the running track, thus minimising the number of hedgerow gaps required for the duration of construction down to approximately 20%. The hedgerow gap has also been reduced to the width of the running track (6m) for the cable pull; and<br>• The majority of disturbance to watercourses will only occur during the two-year duct installation phase. Once the ducts are in the ground, subsequent cable pulling operations will not result in further disturbance to watercourses. There may be disturbance to a small number of watercourses (up to 10) which need to be crossed when the running track is reinstated to facilitate the cable pulling operations. | |
| Strategic landscape mitigation | Mitigation measures associated with the onshore project substation, National Grid substation extension and access from the A47 form part of a strategic approach to enhancing landscape character and biodiversity in the local area. ES Figure 29.11 (Scenario 1) and ES Figure 29.22 (Scenario 2) 2 in ES Chapter 29 Landscape and Visual Impact Assessment shows how mitigation planting will contribute to the wider landscape structure of the area and help consolidate green corridors for wildlife. | For further details on project landscaping, please see section 6 of this document and Chapter 29 Landscape and Visual Impact Assessment. |

# 5 ECOLOGICAL PRE-CONSTRUCTION SURVEYS

25. The Ecological Impact Assessment undertaken and presented in the ES has been informed by desk-based information and field survey data. The field survey data was collected through a suite of ecological surveys conducted in both 2017 and 2018.

26. The surveys undertaken in 2017 and 2018 covered approximately 65% of the field survey study area. The remaining 35% was not surveyed as landowner access was not available for these areas. The Norfolk Living Map data provided by Norfolk Biodiversity Information Service (NBIS) has been used to characterise the habitats for the remaining 35% of the study area, and other desk study data (e.g. Norfolk Barbastelle Study Group bat data) has been used to provide additional species information where possible. Despite field survey data not being available for all of the field survey study area, the data collected is considered to be sufficient to identify the nature and scale of impacts likely to arise as a result of the project in order to conduct a robust EcIA. Where there are gaps in the data collected due to landowner access restrictions, impenetrable habitat or other restrictions, by using detailed desk study data where available (e.g. using the Norfolk Living Map) and by assuming that species are present within these unsurveyed areas the EcIA presented in ES Chapter 22 Onshore Ecology and Chapter 23 Onshore Ornithology ensures that a worst case assessment of impacts upon ecological receptors has been adequately undertaken. Areas not surveyed in 2017 and 2018 will, where required, by subject to ecological surveys in advance of construction (see sections 7 - 10 for more details of pre-construction surveys).

## 5.1 Scenario 1

27. It is anticipated that all baseline data gaps will have been filled during the Norfolk Vanguard pre-construction baseline surveys and these surveys will inform the ecological mitigation presented within the final EcoMP. Therefore, under Scenario 1 Norfolk Boreas will not be required to undertake any further pre-construction baseline surveys (i.e. pre-construction surveys in unsurveyed areas) as there will be no unsurveyed areas remaining. All baseline data at the onshore project substation has been collected, therefore no further baseline surveys will be required in this area.

28. However, where mitigation measures require pre-construction surveys in advance of construction works to ensure the locations of species have not changed, then these will be required to be undertaken by Norfolk Boreas under Scenario 1.

## 5.2 Scenario 2

29. In areas where ecological surveys have not been possible during the 2017 and 2018 survey period, full surveys of these unsurveyed areas will be carried out post-consent. These pre-construction baseline surveys of unsurveyed areas will inform the ecological mitigation presented within the final EcoMP. These pre-construction baseline surveys will be carried at the optimum time of the year for each species.

30. The extent of the unsurveyed areas for specific receptors, and therefore the scope of the pre-construction baseline surveys required for each receptor, is set out within sections 7-10. The extent of the pre-construction baseline surveys required to complete the characterisation of the ecological baseline for each receptor is set out in Table 5.1 below.

31. As outlined above for Scenario 1, further pre-construction surveys may be required in advance of construction works to ensure the locations of species have not changed.

**Table 5.1 Extent of pre-construction baseline surveys required for each receptor**

| Receptor | Extent of unsurveyed area requiring pre-construction survey |
|---|---|
| Habitats | There will be post-consent surveys of all unsurveyed areas. This is approximately 35% of the onshore project area. |
| Badgers | There will be post-consent surveys of all unsurveyed areas. This is approximately 35% of the onshore project area. |
| Bats | 20 trees and structures were not surveyed during the Bat Activity Surveys. These trees and structures will require surveys post-consent.<br>Any further trees and structures recorded within the habitat and species study area during pre-construction baseline surveys will require assessment to determine suitability of trees to support roosting bats post-consent. |
| Water voles | Two watercourses were not surveyed during the Water Vole Surveys. These watercourses will require surveys post-consent. A further three watercourses have been identified by the Norfolk Living Map and aerial photography within the unsurveyed areas using the Norfolk Living Map and aerial photography which may be optimal habitat for water voles. These watercourses will require surveys post-consent. |
| Great crested newt | Six unsurveyed water bodies located within the onshore project area plus 114 water bodies located within the great crested newt study area (i.e. a total of 120 water bodies) have not been surveyed for great crested newts as landowner access could not be agreed. These waterbodies will require surveys post-consent. |
| Reptiles | Two areas of suitable habitat identified during the Extended Phase 1 Habitat Survey could not be surveyed for reptile presence / absence. These two areas will require surveys post-consent. |
| Invasive non-native species | There will be post-consent surveys of all unsurveyed areas. This is approximately 35% of the onshore project area. These areas will require surveys post-consent. |

# 6 LANDSCAPE MITIGATION

## 6.1 Introduction

32. As an outcome of the Landscape and Visual Impacts Assessment undertaken and presented in the ES, landscape planting is proposed to mitigate the effects relating to the onshore cable route and the onshore project substation, National Grid substation extension and the A47 site access (under Scenario 2).

33. In respect of the onshore cable route, landscape mitigation comprises the reinstatement of hedgerows, which would have been removed to facilitate construction works. Under Scenario 1, as the duct installation via open trenching and trenchless crossings would already have been undertaken and completed as part of the Norfolk Vanguard project, the majority of hedgerows removed during construction would be replaced as part of the DCO Requirements for the Norfolk Vanguard project. Therefore, the extent of additional hedgerow reinstatement to be undertaken as part of the Norfolk Boreas project would be limited, relating mostly to the reinstatement of hedgerows over some of the retained running tracks, at the end of the construction phase. Under Scenario 2, as duct installation via open trenching and trenchless crossings would be undertaken as part of this project, where practical, all hedgerows removed to facilitate the construction works would need to be replaced. Further detail on the reinstatement of hedgerows is presented in section 9.2.

34. In respect of the onshore project substation, National Grid substation extension and A47 site access (under Scenario 2), landscape mitigation comprises the implementation of a more extensive landscape framework comprising woodland planting, tree planting, hedgerows, grassland and attenuation ponds. The mitigation planting would be designed to comprise a mix of faster growing 'nurse' species and slower growing 'core' species. While mitigation planting forms part of both the Scenario 1 and Scenario 2 proposals, under Scenario 1, mitigation planting associated with the Norfolk Vanguard project would already be implemented as part of this project and the mitigation planting associated with the Norfolk Boreas project would be added to this, in order to increase the overall extent of mitigation planting relative to the increase in development. Under Scenario 2, Norfolk Vanguard would not proceed to construction and, therefore, there would be no previous mitigation planting and all new planting would be associated with the Norfolk Boreas project.

35. The landscape planting proposed for the onshore project substation, National Grid substation extension and the A47 site access (under Scenario 2) is contained within the red line boundary of the project, which has been designed specifically to ensure sufficient space is available to accommodate the proposed planting.

The inclusion of the landscape planting within the red line boundary will ensure that Norfolk Boreas Limited has control over the implementation and maintenance of the planting, as well as provide the opportunity to implement advanced planting in select locations, prior to and during project construction, where practical.

36. Mitigation measures for Scenario 1 and Scenario 2 are illustrated on the following figures in ES, Volume 2 Chapter 29 Landscape and Visual Impact Assessment Figures:

- Figure 29.9 Scenario 1 - Indicative Onshore Project Substation Mitigation Planting – Norfolk Boreas and Norfolk Vanguard
- Figure 29.10a Scenario 1 - Indicative National Grid Substation Extension Planting Removals
- Figure 29.10b Scenario 1 - Indicative National Grid Substation Extension Mitigation Planting - Norfolk Boreas and Norfolk Vanguard
- Figure 29.11 Scenario 1 - Strategic Plan of Indicative Mitigation Planting
- Figure 29.19 Scenario 2 - Indicative Onshore Project Substation Mitigation Planting
- Figure 29.20a Scenario 2 - Indicative National Grid Substation Extension Planting Removals
- Figure 29.20b Scenario 2 - Indicative National Grid Substation Extension Mitigation Planting
- Figure 29.21a Scenario 2 – Indicative A47 Planting Removals
- Figure 29.21b Scenario 2 – Indicative A47 Mitigation Planting
- Figure 29.22 Scenario 2 - Strategic Plan of Indicative Mitigation Planting

## 6.2 Baseline

37. The baseline condition in the context of the onshore project substation, National Grid substation extension and the new A47 site access junction, comprises arable farmland with some existing woodland blocks, field boundary hedgerows and hedgetrees, and young mitigation planting associated with the Dudgeon Offshore Wind Farm onshore substation (herein referred to as Dudgeon) and associated National Grid substation extension constructed in 2016. Under Scenario 1, the Norfolk Vanguard onshore project substation, National Grid substation extension and associated infrastructure would also form part of the baseline context.

### 6.2.1 Baseline - Onshore Project Substation

38. The site of the onshore project substation is located in an area of agricultural land, typified by open fields of arable farmland, with some enclosure from hedgerows. On the site there are existing hedgerows of variable condition. The hedgerow along the western site boundary is the most mature and complete. Other hedgerows occur to the south of where the onshore project substation would be located and to the east. A hedgerow runs south-west to north-east through the site, from Lodge Farm to the south-east corner of Necton Wood, while another hedgerow runs north-west to south east to connect the western boundary hedgerow with the central hedgerow. Necton Wood lies to the immediate north of the onshore project substation, while the larger woodland of Great Wood lies further to the east. The construction and operation of the onshore project substation would not extend into the woodland areas and therefore there would be no direct effects on their structure or content.

### 6.2.2 Baseline – National Grid Substation Extension

39. At the National Grid substation extension, the presence of the National Grid substation and Dudgeon substation means the character of this area has already been altered and loss of native hedgerows has occurred within the site boundaries during the construction of these developments. On-site mitigation planting has been implemented for these developments, which comprises a mix of new hedgerows, woodland strips and specimen trees. SuDS ponds have also been created along the eastern edge of the existing substations. In the farmland surrounding this site, hedgerows and occasional woodland blocks occur, creating some sense of enclosure.

### 6.2.3 Baseline – A47 Site Access Junction

40. Along the section of the A47, where the new site access junction for the project would be located, there is an existing mix of new planting and more mature planting. The new planting comprises a 10m band of deciduous and coniferous woodland whips, planted as part of the mitigation measures associated with Dudgeon substation. This woodland planting is off-site from the Dudgeon substation and extends along a considerable length of the A47. It has been implemented with the intention of bolstering the existing road-side planting in order to screen views of Dudgeon substation from the A47. The existing planting comprises mixed deciduous tree cover of variable height and density located adjacent to the road, mostly continuous but with some notable gaps and thin enough such that filtered views of the substation occur whilst the trees are bare of leaf in the winter months. Similar planting, albeit denser and often more mature, occurs on the northern side of the road, creating a more effective

screen. The Dudgeon mitigation planting is located to the south of the road, set behind the existing road-side planting. It currently comprises a mix of young woodland whips encased in protective tubes.

## 6.3 Removals

41. As part of the embedded mitigation, the project has been designed to avoid the loss of trees wherever practical and minimise the extent of hedgerow to be removed. This has been considered from an early stage in the site selection process, as well as during the siting and proposed layout of the onshore project substation, National Grid substation extension, and A47 site access junction.

### 6.3.1 Scenario 1

#### 6.3.1.1 Removals - Onshore Project Substation

42. The footprint of the onshore project substation would cover an area of 250m x 300m and would be positioned to the immediate east of the Norfolk Vanguard onshore project substation. This would give rise to the loss of sections of the eastern hedgerows that run through the eastern part of the permanent footprint.

43. Removals would be required to accommodate the construction of the onshore 400kV cables connecting to the National Grid substation extension, along a short section of the northern hedgerow boundary and a long section of the southern hedgerow boundary. It is anticipated that losses would comprise hedgerows, with either no hedgetree removals or a very small number of such removals. Losses would be reinstated using hedgerows planting post construction.

#### 6.3.1.2 Removal – National Gird Substation Extension

44. The National Grid substation extension would be located to the east of the existing Necton National Grid substation and would give rise to the loss of a section of the north to south hedgerow that runs through the western part of the permanent footprint. Also during the construction works and relocation of the attenuation pond, a short section of existing hedgerow along the northern boundary could be removed, however this would be reinstated post construction.

### 6.3.2 Scenario 2

#### 6.3.2.1 Removals - Onshore Project Substation

45. The footprint of the onshore project substation would cover an area of 250m x 300m. The onshore project substation has been positioned to the east of the existing more mature western boundary hedgerow to ensure that this important landscape feature and ecological resource would be retained, so far as possible.

Inevitably, owing to the scale of the footprint there would be some loss of hedgerows, although the hedgerows to be removed are comparatively smaller and form less prominent features in the landscape. These occur along the field boundary to the east of centre and the field boundary to the north. The field boundary to the south of the onshore project substation would be partly retained and, where removals would be required to accommodate the construction of the onshore 400kV cables connecting to the National Grid substation extension, hedgerow losses would be reinstated post construction. It is anticipated that losses would comprise only hedgerows, with either no tree removals or a very small number of losses.

#### 6.3.2.2 Removals – National Grid Substation Extension

46. In terms of the losses that would occur in relation to the National Grid substation extension, these would affect sections of the Dudgeon mitigation planting. Where the onshore 400kV cable route would cross the southern site boundary, a short section of the existing hedgerow, new hedgerow and small number of specimen trees would be removed. Where the footprint of the National Grid substation extension would be located, a section of the woodland belt would also be removed, along with a short section of the hedgerow to the north, where the modifications to the overhead line would occur. Along the southern boundary and northern boundary, the hedgerows removed would be replaced post construction, although the specimen trees could not be replanted over the cables owing to associated restrictions. On site, the loss of the woodland belt would be longer term as this is where the National Grid substation extension would be located. ES Figure 29.10a shows the planting removals at the National Grid substation extension.

#### 6.3.2.3 Removals – A47 Site Access Junction

47. In order to construct the A47 site access junction and ensure the required sightlines for road-users are accommodated, removal of road-side tree cover and Dudgeon mitigation planting would be required along select sections to the south of the A47. Over an approximate 300m section, the older road-side vegetation would need to be removed. The Dudgeon mitigation planting is located to the south of this and the majority would remain unaffected as it is further recessed from the A47 than the older road-side vegetation. Dudgeon mitigation planting would be removed to accommodate the junction for the A47 access road. ES Figure 29.11a shows the planting removals at the A47 site access junction.

## 6.4 Aims of landscape planting

48. Mitigation planting associated with the onshore project substation, National Grid substation extension and A47 site access junction (under Scenario 2) has been

designed with the principal aim of reducing the effects of the project on surrounding landscape and visual receptors. The design has been informed by the assessment of landscape and visual effects presented in Chapter 29 Landscape and Visual Impact Assessment. This has identified those receptors from which the project would be visible. Mitigation measures have been designed to screen the project from the most sensitive receptors.

49. With this principal aim in mind, the planting includes areas of fast growing woodland species as this would provide, most importantly the height required, as well as the density, to ensure effective screening. Other considerations for the design and layout of the planting, include the use of predominantly native species and those species indigenous to the area, to ensure that the planting integrates well with the local landscape character.

50. The mitigation planting is multi-functional and beyond the principal aim to screen the project it also serves other aims as follows;

- Local landscape character. The baseline character of the local landscape is predominantly rural with arable fields set within a landscape framework of hedgerows and woodlands. Mitigation planting would enhance the local landscape character, by strengthening the landscape framework around the onshore project substation, National Grid substation extension and access from the A47;
- Historic landscape character. The historic landscape would have been characterised by a greater extent of hedgerow and woodland enclosure and greater occurrence of common pasture. Enclosure in the local landscape has become eroded owing to more intensive agricultural practices over the past century. Mitigation planting would help restore enclosure following the character and form inherent in the historic landscape;
- Strategic landscaping. Mitigation planting aims to create a landscape framework that connects with existing woodland and hedgerows to improve the wider strategic green network. This is important for the movement of animals through the area, as well as increasing biodiversity across the local landscape. ES Figure 29.11 (Scenario 1) and Figure 29.22 (Scenario 2) show the strategic plans of the indicative mitigation planting;
- Biodiversity. The mitigation planting increases the area of land given over to wildlife. A mix of species would be included in the woodland planting and hedgerows and the integration of grass strips and wider species rich grassland areas have been included to provide a diversity of habitats and food sources for wildlife; and
- Hydrology. SuDS are included as part of the mitigation measures and will attenuate run-off from the onshore project substation and National Grid

substation extension. In combination with the wider areas of mitigation planting around these, water levels will be regulated to ensure there is no increased risk of flooding.

## 6.5 Landscape Planting

51. As part of the embedded mitigation, the project has been designed to integrate mitigation planting with older indigenous planting associated with the local landscape, and newer mitigation planting associated with the Dudgeon substation. Furthermore, under Scenario 1, mitigation planting proposed for the Norfolk Boreas project has been designed to integrate with the mitigation planting implemented as part of the Norfolk Vanguard project.

### 6.5.1 Scenario 1

#### 6.5.1.1 Landscape planting - Onshore Project Substation

52. The onshore project substation site benefits from some substantial existing hedgerows and woodland blocks within the local area. These would provide mitigation of some landscape and visual effects from the outset and would be enhanced through the integration of mitigation planting proposed as part of the Norfolk Vanguard and Norfolk Boreas projects under Scenario 1.

53. Under Scenario 1, mitigation planting would be implemented as part of the Norfolk Vanguard project along the western site boundary and along the southern boundary, to the west of Lodge Farm. On the western boundary, this would comprise the existing hedgerow, with a 7m band of nurse woodland and 7m band of core woodland, potentially set on an earth bund up to 2m in height with a band of understorey planting on the western side and band of species rich grassland on the eastern side. Planting along the southern boundary would comprise a 10m band of nurse woodland and 10m band of core woodland, with 3m species rich grassland on either side.

54. The extent of mitigation planting incorporated into the design as part of the Norfolk Boreas project, under Scenario 1, is presented on ES Figure 29.9. This would extend mitigation planting to reflect the location of the onshore project substation to the east, with woodland planting wrapping around the northern, eastern and southern aspects of the Norfolk Boreas onshore project substation. Planting would comprise a mix of nurse woodland and core woodland based on indigenous woodland species. The woodland bands would be set along the boundaries and would enclose a broad band of species rich grassland in the east and north-east of the site.

#### 6.5.1.2 Landscape planting – National Grid Substation Extension

55. Under Scenario 1, Norfolk Boreas mitigation planting would be added to mitigation planting already implemented as part of the Norfolk Vanguard project, which is mostly concentrated along the southern site boundary – this being the most sensitive boundary, other than the A47, owing to the presence of the village of Necton in this direction. Additional planting would comprise a mix of nurse woodland and core woodland which would wrap around the eastern boundary, to largely enclose the National Grid substation extension. The extent of mitigation planting incorporated into the design under Scenario 1, is presented on ES Figure 29.10b.

### 6.5.2 Scenario 2

#### 6.5.2.1 Landscape planting - Onshore Project Substation

56. Scenario 2 mitigation planting would not benefit from any existing mitigation planting but would benefit from existing hedgerows and woodland blocks within the local area, with which the proposed planting would integrate, to form a strategic and robust landscape framework. Mitigation planting would comprise bands of nurse woodland and core woodland down the western field boundary and also the closer range western edge of the permanent footprint. Species rich grassland would fill the north-west corner of the site adjacent to Necton Wood.

57. Woodland planting would be introduced to the south of the onshore project substation, both extending west and east of Lodge Farm and offset to accommodate the onshore 400kV cable route that would egress the onshore project substation along this boundary. The screening of views from the south is important as this is where the closest settlement, Ivy Todd is located. The woodland planting would wrap around the eastern edge of the permanent footprint and extend to enclose the north-east corner, where an area of species rich grassland is proposed. On the northern boundary, planting would be limited to hedgerows over the onshore cable route and an easement of 6 to 10m either side. Scenario 2 mitigation planting is presented in ES Figure 29.19.

58. The site benefits from requiring only minimal earthworks to provide a level platform, an any excess material produced could be used to create earthwork bunds. There is potential to include a subtle earthwork bund of up to 1.5 along the western side of the permanent footprint. This would help to give an incremental increase to the overall height of screening along this sensitive boundary, which is not constrained by planting restrictions associated with underground cables across other parts of the site.

#### 6.5.2.2 Landscape planting – National Grid Substation Extension

59. Mitigation planting associated with the National Grid substation extension would be concentrated along the southern boundary, this being the most sensitive boundary, other than the A47, owing to the presence of the village of Necton in this direction. This would comprise a band of woodland planting to bolster the existing hedgerow and tree planting implemented as part of the Dudgeon mitigation measures and would ensure a more effective screen over the long term. The extent of mitigation planting incorporated into the design of the National Grid substation extension under Scenario 2 is presented on ES Figure 29.20b.

60. Mitigation relating to views of road-users on the A47 has already been addressed through the Dudgeon mitigation planting of a substantial band of woodland adjacent to the road and to the immediate north-west of the National Grid substation extension (see ES Figures 29.20b and 29.21b). This supplements existing older planting along the roadside and will create an effective screen when established. Dudgeon mitigation planting continues further north-east along the A47 and this will create an effective screen over the wider range.

#### 6.5.2.3 Landscape planting – A47 Site Access Junction

61. The principal purpose of the planting around the A47 site access junction is to screen views of the onshore project substation and National Grid substation extension from road-users on the A47. Mitigation planting associated with the A47 site access junction is presented in ES Figure 29.21b. The removal of the road-side vegetation during the construction of the junction would create a notable opening and open up views across the agricultural landscape to the onshore project substation and National Grid substation extension. Planting along the road-side, around the new junction and along the new access road would grow to screen these views and re-enclose this section of the A47.

## 6.6 Landscape Planting Species and Growth

62. The mitigation planting would be designed to comprise a mix of faster growing ‘nurse’ species and slower growing ‘core’ species. The core species would comprise a mix of preferred native, canopy species that would outlive the nurse species and characterise the woodland structure over the longer term. It is anticipated that the growth rate of these species would be on average 250mm per annum. The nurse species would be faster growing and shorter-lived, providing shelter to bring on the canopy species. The mix would contain nurse species such as alder, birch, and pine, with average growth rates of 350mm per annum and core species such as oak, beech and horse chestnut, with average growth rates of 250mm per annum. These growth rates are considered

conservative and have been used to ensure a worst-case assumption. It is anticipated that the planting would grow at a faster rate.

63. Under the worst-case assumption, it is anticipated that 5m to 7m growth would take 20 years and by 30 years the heights would be approximately 8.5m to 11.5m (assuming planting height of 1m). The nurse species would be sufficiently fast growing to provide partial screening of the onshore project substation after 20 years.

64. It is anticipated that the construction of the project would commence in 2020 at the earliest. In locations where it is possible to achieve advanced planting this would be implemented at the start of the pre-construction phase in 2021 in respect of Scenario 2 and 2022 under Scenario 1. In addition, under Scenario 1 Norfolk Boreas would benefit from any advance planting installed by Norfolk Vanguard, which could be planted from 2020. This would mean these areas would already have had approximately three or four years of growth prior to completion of construction and commencement of operation in 2025. This equates to an additional growth of approximately 1 to 1.4m, with overall heights after 20 years post construction (24 years in total) being approximately 7m to 9.4m and after 30 years 9.5m to 12.9m.

## 6.7 Landscape Management Scheme(s)

65. In fulfilment of Requirement 18 of the DCO, prior to construction, a Landscape Management Scheme for each stage of the works would be produced to include details of all proposed hard and soft landscaping works, including:

- Location, number, species, size and density of any proposed planting, including any trees;
- Cultivation, importing of materials, protection, and weed control to ensure plant establishment;
- Proposed finished heights, form and gradient of earthworks.
- Hard surfacing materials;
- Details of existing trees and hedges to be retained with measures for their protection during the construction period;
- Retained historic landscape features such as ditches and banks and proposals for restoration, where relevant;
- Implementation timetables for all landscaping works.
- Soil retention, handling and protection;
- The provision of a scheme of sustainable drainage will be integrated into the details of hard and soft landscaping works at the substation; and.
- Integration of guidance on the use of materials and colour relating to the substation design.

66. All landscaping works would be carried out in accordance with the Landscape Management Scheme, unless otherwise agreed in writing by the relevant planning authorities, and to a reasonable standard in accordance with the relevant recommendations of appropriate British Standards or other recognised codes of good practice. The specific standards are to be agreed with Breckland District Council and Norfolk County Council prior to commencement.

67. A specific Landscape Management Scheme would be developed for the onshore project substation, National Grid substation extension and A47 junction. Indicative mitigation plans have been taken into account in the assessment in the ES as part of embedded mitigation. Final details of the planting and earthworks for the project would be developed prior to construction, as part of the Landscape Management Scheme under Requirement 18 of the DCO. These details would be agreed with the relevant planning authorities. The Landscape Management Scheme for the substation would include:

- Drawings indicating cross-section with long cross-sections to include typical elevations of the substation. These drawings would also indicate proposed floor levels and proposed contours;
- A detailed scheme of tree and shrub planting and aftercare. This would include details of soil restoration and ground preparation, species choice, stock size, spacing, protection and a program of weed control and aftercare to cover a period of 5 years;
- A scheme of protection to demonstrate how new tree and hedge planting would be protected against deer, rabbits, hares etc. The detail would also indicate a variety of access gates within the detail for badgers or other creatures that may have, for instance, established routes through the restored areas;
- A process to deal with incidents of ash die back, including removal of diseased specimens and replanting of replacement native species (non-ash species);
- Details of local provenance suppliers of plant material for inclusion within the specification; and
- Recommendations to landowners, for management of trees and hedgerows in the longer term.

## 6.8 Relationship with National Grid Substation Infrastructure

68. Cognisance of the mitigation planting associated with the National Grid substation and Dudgeon Substation has been taken into account in the proposals for mitigation planting associated with the National Grid substation extension. This is in order to ensure there is a degree of continuity between the separate

proposals and that collectively a comprehensive approach to screening this area of development would be achieved.

### 6.8.1 Pre-construction

69. The roots of retained trees along the edge of the cable route would be protected from soil compaction by using appropriate measures (e.g. fencing off sensitive areas, use of ground protection matting etc.) within the trees' Root Protection Areas (the extent of which would be calculated using guidance from BS5837: 2012).

70. Where possible, the location of pre- and post-construction land drains would also be adjusted to avoid or minimise damage to tree roots.

### 6.8.2 During Construction

71. The typical mitigation measures that would be employed during construction to minimise the impacts upon trees and woodland are as follows:

- Facilitation pruning may be recommended where tree crowns are at risk from impact by machinery or high sided vehicles; and
- Where possible removal of vegetation would be timed to avoid the bird breeding season (March to August inclusive). Where tree or scrub removal during the breeding season is unavoidable, a check by the ECoW would be undertaken immediately prior to habitat removal to confirm that there are no occupied nests. Should any occupied nests be identified, an appropriate buffer zone (determined on the basis of the species concerned and the location of the nest in the context of the surrounding vegetation, but no less than 5m) would be implemented until the chicks have fledged.

72. For trees in which bat roosts have been identified or which are identified as having bat roost potential, then the measures set out in section 9.7 would be followed.

### 6.8.3 Post Construction

73. Post-construction the following measures would be taken:

- Where compliant with landscape objectives, replanting would be on a one for one basis with native species, preferably of local origin;
- If required, drawings would be produced to show where replacements for trees lost within the onshore cable route would be provided to reflect and maintain local landscape character. This would also include details of species. Where possible trees would be replanted in the appropriate season.

- The mitigation strategy, if required, for the loss of any veteran trees or trees with veteran characteristics, would be implemented;
- Where possible, the location of pre- and post-construction land drains would also be adjusted to avoid or minimise damage to tree roots;
- To ensure development of the planting to a satisfactory standard, there would be an agreed procedure for joint annual inspection of all planting areas by representatives of the relevant Local Authorities and Norfolk Boreas Limited at the end of each growing season and for each year of the aftercare period, (five years at the substation and along the onshore cable route) following implementation. Areas found not to be thriving should be treated to such additional works as are required to rectify the situation within the next growing season;
- Any tree or shrub planted as part of an approved Landscape Management Scheme that, within the first five years of the aftercare period, is removed, dies or becomes, in the opinion of the relevant Local Authorities, seriously damaged or diseased, must be replaced in the first available planting season with a specimen of the same species and size as that originally planted, unless otherwise agreed in writing by the relevant Local Authorities; and
- Suspension of the aftercare period for any part of the scheme at the substation and the onshore cable route may occur in the event that in the opinion of the relevant Local Planning Authorities there was a significant failure of the planting scheme that could not be satisfactorily remedied in the following planting season, and or part of the planting scheme was failing to progress to the extent that it would not achieve the objectives of the scheme within the specified aftercare period.

# 7 STATUTORY DESIGNATED SITES

74. This OLEMS considers both potential development scenarios for the project as discussed in section 1.2. Where proposed mitigation measures would differ under Scenario 1 or Scenario 2, this is explicitly stated, and mitigation measures are provided for both scenarios. Otherwise the mitigation detailed is applicable to both scenarios.

## 7.1 River Wensum SAC and SSSI

### 7.1.1 Baseline

75. The River Wensum has been designated as a Special Area of Conservation (SAC). The Annex I habitats which are a primary reason for the selection of this site are watercourses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation. The Annex II species that are a primary reason for the selection of this site are white-clawed (or Atlantic stream) crayfish *Austropotamobius pallipes*. There are other Annex II species present as qualifying features which are not the primary reason for selection of the site.

76. The River Wensum is also designated as a Site of Special Scientific Interest (SSSI). It has been selected as one of a national series of rivers of special interest as an example of an enriched, calcareous lowland river.

77. Due to the sensitivity of the SAC, there is the potential for water quality impacts related to surface water drainage and soil management during construction.

### 7.1.2 Embedded Mitigation

78. Under Scenario 2 as part of the embedded mitigation, the River Wensum will be crossed using trenchless crossing techniques (e.g. HDD), in order to minimise direct impacts upon this site and the habitats/species for which it is designated.

79. Under Scenario 1 these works will have been completed by Norfolk Vanguard.

### 7.1.3 Additional Mitigation

#### 7.1.3.1 Pre-Construction

80. Under Scenario 2 prior to construction a Code of Constriction Practice (CoCP) will be developed, the details and content of which will be agreed with stakeholders (including the Environment Agency and Natural England) in advance of construction. An outline CoCP has been submitted alongside the DCO application (document reference 8.1).

#### 7.1.3.2 During Construction

81. Under Scenario 2, the additional mitigation measures will be put in place to minimise the risk of sediment or pollutant release into the watercourses which are functionally connected to the River Wensum, including protocols for managing bentonite breakout. These mitigation measures are set out in section 11.1 of the outline CoCP submitted alongside the DCO application (document reference 8.1), and will be included in the final CoCP, the details and content of which will be agreed with stakeholders (including the Environment Agency and Natural England) in advance of construction.

82. Under Scenario 1, although no running track will be required within the River Wensum floodplain, a small area of 6m wide running track will be required within other areas of the River Wensum catchment. The sediment management measures detailed in the outline CoCP for Scenario 2 would also be applied for Scenario 1 and would be secured through the final CoCP post-consent (document reference 8.1).

## 7.2 Paston Great Barn SAC and SSSI

### 7.2.1 Baseline

83. The Paston Great Barn has been designated as a SAC for Annex II species Barbastelle *Barbastella barbastellus*. It is designated as a SSSI for the same reason, because it supports the only barbastelle bat maternity roost in Norfolk and is one of only three known in the UK. Paston Great Barn is located approximately 3km north of the onshore cable route.

84. Due to the sensitivity of the SAC, there is the potential for impacts to commuting / foraging habitats of the barbastelle maternity colony it supports during construction.

### 7.2.2 Embedded Mitigation

85. Under Scenario 2 there will be trenchless crossing techniques (e.g. HDD) at Witton Hall Plantation along Old Hall Road (deciduous woodland habitat) in order to minimise impacts upon the woodland habitat and the sensitive ecological features it supports.

86. Under Scenario 1 these works will have been completed by Norfolk Vanguard.

### 7.2.3 Additional Mitigation

#### 7.2.3.1 Pre-Construction

87. Under Scenario 2, pre-construction habitat assessment surveys of the 18 hedgerows located within 5km of Paston Great Barn to confirm the habitat

condition prior to removal and pre-construction activity surveys of all of the 18 hedgerows which remain suitable for supporting commuting and foraging bats following the updated habitat assessment will be undertaken to provide an updated baseline for these features in advance of construction. This includes activity surveys of the six hedgerows for which data was not collected in in 2017 and 2018. These pre-construction surveys will be carried at the optimum time of the year.

88. A Hedgerow Mitigation Plan will be developed in consultation with Natural England prior to the removal of hedgerows. This mitigation plan will be included within the EcoMP (DCO Requirement 24). This mitigation plan will detail the reinstatement approach for hedgerows removed during construction and the monitoring and maintenance requirements following hedgerow planting.

89. Subject to landowner permissions prior to construction, the 16 hedgerows that are important for foraging and commuting bats would be left to become overgrown either side of the section to be removed prior to construction. Hedgerows would be allowed to become overgrown within the onshore cable route width, therefore at each hedgerow a total of up to 22m will be left to become overgrown in this manner. This would be undertaken to improve the quality of the surrounding hedgerow as a resource for commuting and foraging bats (Bat Conversation Trust, 2015).

90. During detailed design undertaken post-consent, Norfolk Boreas will seek to avoid mature trees within hedgerows through the micro-siting of individual cables, in order to retain as many mature trees as possible given the benefits they provide within linear commuting / foraging features (following Boughley *et al.*, 2011).

91. Hedgerow removal will be programmed for winter (November to February) where possible, to allow bats time to adjust to the change prior to their maternity period. Hedgerows will be removed as close to the onset of works as possible, and works will not commence after nights of poor weather (in case of bad weather roosts being used). The criteria for determining 'poor weather' will be stipulated in the final CoCP the outline version of which will be submitted as part of the DCO application (Document reference 8.1).

92. Under Scenario 1 this mitigation will have been completed by Norfolk Vanguard.

#### 7.2.3.2 During construction

93. Construction phase lighting for cable duct installation will be used between 7am-7pm, only if required (i.e. in low light conditions). Lighting will not be used overnight, except at trenchless crossing locations. In these instances, lighting

may be needed for eight weeks at North Walsham and Dilham Canal and land to the east. Any lighting used will be directional i.e. angled downwards and a cowl provided for the light to minimise light spill.

#### 7.2.3.3 Post-Construction

94. Under Scenario 2 replanting will where possible follow in the first winter after duct installation (with the exception of the 6m gap required for the running track, which will be replanted following the cable pull phase where required) (BCT, 2012).

95. Under Scenario 1 and Scenario 2 replanting will follow guidance within the Norfolk hedgerow BAP and will include appropriate species for north-east Norfolk (NBP, 2009), including ground flora planting designed to encourage insect biomass (BCT, 2012). Future hedgerow management to include allowing standard trees to develop to improve quality of the hedgerow as a foraging resource. Hedges will be double-planted with 2m grassland strips on both sides so there is always a leeward side to forage. Replanting will also include hedgerow improvements works within the onshore cable route where required. These include gapping-up and tree management. Monitoring of replacement hedgerows should be in place for 7 years or until the original hedgerow has recovered fully.

## 7.3 Norfolk Valley Fens SAC and Booton Common SSSI

### 7.3.1 Baseline

96. The Norfolk Valley Fens has been designated as a Special Area of Conservation (SAC). The primary reason for the selection of this site are alkaline fens (Annex I habitat). The Annex II species which are also the primary reason for selection of this site include narrow-mouthed whorl snail *Vertigo angustior* and Desmoulin's whorl snail *Vertigo moulinsiana*. There are several other Annex I habitats present as qualifying features which are not primary reasons for the selection of the site.

### 7.3.2 Embedded Mitigation

97. Constraints mapping was undertaken prior to the publication of the Norfolk Vanguard EIA Scoping Report (Royal HaskoningDHV, 2016). This constraints mapping exercise was used to determine site selection for the onshore project area. The following ecological receptors were considered as part of the constraints mapping process:

- International designated sites for nature conservation (SAC, SPA, Ramsar sites);

- National designated sites for nature conservation (The Broads National Park, SSSI, NNR, LNR); and
- Ancient woodland.

98. These ecological receptors have been avoided during the onshore project area site selection process.

### 7.3.3 Additional Mitigation

99. Under Scenario 2, a scheme and programme for each watercourse crossing, diversion and reinstatement, which will include site specific details regarding sediment management and pollution prevention measures will be developed in advance of construction. This scheme will be submitted to and, approved by the relevant planning authority in consultation with Natural England, Norfolk County Council, the Environment Agency and relevant drainage authorities. This commitment is secured through Requirement 25 (Watercourse Crossings) of the DCO.

100. A Construction Surface Water and Drainage Plan (Requirement 20 (2)(i) of Schedule 1) will be developed, agreed with the relevant regulators and implemented to minimise water within the cable trench and other working areas and ensure ongoing drainage of surrounding land. This typically includes interceptor drainage ditches being temporarily installed parallel to the trenches and soil storage areas to provide interception of surface water runoff and the use of pumps to remove water from the trenches during duct installation. Drainage would remain in place for the duration of the construction period, including during the cable pulling phase.

## 7.4 The Broads SAC

### 7.4.1 Baseline

101. The Broads has been designated as a SAC. The component sites of the SAC include a range of important habitat types, including naturally nutrient-rich lakes containing one of the richest assemblages of rare and local aquatic species in the UK, the richest area for stoneworts (charophytes) in Britain, the largest blocks of alder *Alnus glutinosa* wood in England, and the largest example of calcareous fens in the UK. The site is also designed for the Annex II species Desmoulin`s whorl snail *Vertigo moulinsiana*, Fen orchid *Liparis loeselii*, Ramshorn snail *Anisus vorticulus*, and otter *Lutra lutra*.

### 7.4.2 Embedded Mitigation

102. Constraints mapping was undertaken prior to the publication of the Norfolk Vanguard EIA Scoping Report (Royal HaskoningDHV, 2016). This constraints

mapping exercise was used to determine site selection for the onshore project area. The following ecological receptors were considered as part of the constraints mapping process:

- International designated sites for nature conservation (SAC, SPA, Ramsar sites);
- National designated sites for nature conservation (The Broads National Park, SSSI, NNR, LNR); and
- Ancient woodland.

103. These ecological receptors have been avoided during the onshore project area site selection process.

### 7.4.3 Additional Mitigation

- As a precaution, while works are taking place within 100m of North Walsham and Dilham Canal, all excavations will be either covered overnight or left with escape ramps to allow otters to escape if they enter, and all vehicles wheels / tracks will be checked in morning for the presence of sleeping otter.
- Where overnight lighting is required for trenchless crossing works near Dilham Canal, any lighting used will be directional i.e. angled downwards and a cowl provided for the light to minimise light spill.

104. The precautionary mitigation measures detailed for the Norfolk Valley Fens SAC under section 7.3.3 will also apply for The Broads SAC.

## 7.5 Dillington Carr, Gressenhall SSSI

### 7.5.1 Baseline

105. The Dillington Carr is designated as a SSSI and is an extensive area of carr woodland and open water occupying the valley floor and sides of a small tributary of the River Wensum. It is located approximately 550m downstream of the cable route on the Wendling Beck watercourse. The site includes sump alder and extensive stands of the nationally rare lowland bird cherry alder woodland.

106. Due to the sensitivity of the SSSI, there is the potential for water quality impacts related to surface water drainage and soil management during construction.

### 7.5.2 Embedded Mitigation

107. This site has been avoided during the onshore project area site selection process.

108. Under Scenario 2 as part of the embedded mitigation, the Wendling Beck will be crossed using trenchless crossing techniques (e.g. HDD), in order to minimise direct impacts upon this site and the habitats/species for which it is designated.

109. Under Scenario 1 these works will have been completed by Norfolk Vanguard.

### 7.5.3 Additional Mitigation

110. The mitigation measures outlined with respect to the River Wensum would be applied for all works at Wendling Beck and are considered suitable for minimising the risk of sediment / pollutant release into the Wendling Beck (see section 7.1.3).

## 7.6 Pigney's Wood LNR

### 7.6.1 Baseline

111. Pigney's Wood LNR is a woodland site with reedbeds, a scrape, and wildflowers, butterflies, trees and birds, located adjacent to the onshore cable route.

112. Due to the sensitivity of the LNR, there is the potential for indirect impacts arising from disturbance effects generated during construction.

### 7.6.2 Embedded Mitigation

113. General embedded mitigation measures will apply as shown in Table 4.1 and Table 4.2.

### 7.6.3 Additional Mitigation

114. No additional mitigation is proposed.

## 7.7 Other statutory designated sites

115. The following statutory designated sites for nature conservation are located within 2km of the onshore project area (shown on ES Figure 22.2):

- Beetley & Hoe Meadows SSSI
- Dereham Rush Meadow SSSI
- Foxley Wood SSSI, NNR
- East Ruston Common SSSI
- Holly Farm Meadow, Wendling SSSI
- Honeypot Wood, Wendling SSSI.
- Whitwell Common SSSI
- Bryant's Heath Felmingham SSSI
- Cawston and Marsham Heaths SSSI
- Felmingham Cutting LNR
- Knapton Cutting LNR

116. These sites have all been avoided during the onshore project area site selection process.

117. General embedded mitigation measures will apply as shown in Table 4.1 and Table 4.2.

## 7.8 Ancient Woodlands

### 7.8.1 Baseline

118. There are eight ancient woodlands located within 500m of the onshore cable route (shown on ES Figure 22.3):

- Old Lane Carr (330m south of the onshore cable route);
- Bacton Wood (180m south of the onshore cable route);
- The Leaselands (30m west of the onshore cable route);
- Sparham Grove (450m east of the onshore cable route);
- Old Carr (Dillington) (adjacent to the onshore cable route);
- North Grove (130m west of the onshore cable route);
- Great Wood (250m south of the onshore cable route); and
- Necton Wood (adjacent to the onshore cable route).

119. Due to the sensitivity of these sites, there is the potential for indirect impacts of severance of connecting habitats between ancient woodland sites during construction.

### 7.8.2 Embedded Mitigation

120. The onshore cable route will not encroach to within 15m of the above woodlands.

121. All ancient woodlands have been avoided during the onshore project area site selection process, either through route selection or through the use of trenchless techniques.

122. General embedded mitigation measures will apply as shown in Table 4.1 and Table 4.2.

### 7.8.3 Additional Mitigation

#### 7.8.3.1 Pre- and Post–Construction

123. The mitigation measures listed under Paston Great Barn SAC and SSSI (section 7.2.3) will also be applied to the two species-rich hedgerows between Necton Wood and Great Wood, to mitigate for impacts to connectivity between these ancient woodlands.

#### 7.8.3.2 Post-Construction

124. The landscaping proposals described in section 6 have been designed to ensure that any ecological connections severed by construction of the onshore project

substation are recreated to ensure that ecological corridors connect Necton Wood to other woodlands to the east and south.

# 8 NON-STATUTORY DESIGNATED SITES

## 8.1 County Wildlife Sites and Roadside Nature Reserves

### 8.1.1 Baseline

125. There is a total of 95 non-statutory designated sites (CWS) and Roadside Nature Reserves (RNR) within and up to 2km of the designated sites study area (as defined in ES Chapter 22 Onshore Ecology, document reference 6.3.22). Five of these sites are located directly within the onshore project area. These sites are Wendling Carr CWS (CWS no. 1013), Little Wood CWS (CWS no. 2024), Land South of Dillington Carr CWS (CWS no. 1025), Marriott's Way CWS (CWS no. 2176) (crossed twice) and Paston Way and Knapton Cutting CWS (CWS no. 1175). In addition, there is a proposed CWS which, if it is designated, will be located within the onshore project area at Kerdiston between Kerdiston Hall and the Marriott's Way ('Kerdiston Old Hall Meadows').

126. There is potential for direct loss of these sites, and due to the sensitivity of these sites, there is the potential for indirect impacts arising from noise and dust emissions during construction.

### 8.1.2 Embedded Mitigation

127. The project is proposing to use trenchless crossing techniques (e.g. HDD) at all CWS and proposed CWS crossed by the onshore project area in order to minimise the impacts upon the habitats contained within these sites. This includes proposed trenchless crossing techniques (e.g. HDD) at the following locations:

- Wendling Carr CWS (CWS no. 1013);
- Little Wood CWS (CWS no. 2024),
- Land South of Dillington Carr CWS (CWS no. 1025),
- Kerdiston proposed CWS (no CWS number);
- Marriott's Way CWS (CWS no. 2176) (in two locations); and
- Paston Way and Knapton Cutting CWS (CWS no. 1175).

128. Under Scenario 1 these works will have been completed by Norfolk Vanguard.

129. Under both scenarios at five of these six locations, no works will be undertaken within the CWS boundary. At one location, Wendling Carr CWS, a running track will be required to pass through the CWS in order for the trenchless crossing works (Scenario 2 only) and cable pulling works (both scenarios) to take place. This will be a 6m by up to 180m road located within the CWS.

### 8.1.3 Additional Mitigation

#### 8.1.3.1 Pre-construction

130. Following advice received by Norfolk Wildlife Trust (NWT) (during the Norfolk Vanguard Evidence Plan Process), the management proposals for Wendling Carr CWS have been taken into account when considering mitigation. The management proposals for the site state that control of the young (pioneer) species of the broadleaved woodland parcel on the site should be prevented from establishing within the grazed meadow where possible. Methods other than grazing should be used to achieve this.

131. Under Scenario 2, a pre-construction botanical survey of Wendling Carr CWS will be undertaken at the optimum time of the year. Following the botanical survey and consultation with NWT, if required, manual clearance of any pioneer woodland species establishing themselves within the meadow would be undertaken within the grazed meadow prior to construction of the running track.

132. Under Scenario 1 the botanical survey and any clearance will have been completed by Norfolk Vanguard.

#### 8.1.3.2 During construction

133. Best practice construction mitigation measures would be in place to minimise dust and noise emissions during construction. These will be captured within the CoCP, an outline draft of which has been submitted as part of the application (document reference 8.1).

# 9 HABITATS AND SPECIES

134. As detailed, in section 5 of this OLEMS, the pre-construction surveys of unsurveyed areas to complete the characterisation of the ecological baseline, are only required under Scenario 2, as under Scenario 1 these surveys would have been completed by Norfolk Vanguard.

135. Where mitigation measures require pre-construction surveys in advance of construction works, to ensure the locations of species have not changed, then these will be required to be undertaken by Norfolk Boreas under both scenarios. However, under Scenario 1 the extent of these pre-construction surveys on the onshore cable route will be dependent on and limited to where jointing pit locations and temporary running track are required during the cable pulling works (which will be determined post-consent).

## 9.1 Woodland and Trees

### 9.1.1 Baseline

136. A detailed baseline relating to woodland is provided in Chapter 22 Onshore Ecology of the ES, section 22.6.3.1. In summary, there is approximately 8.3ha of woodland habitat located within the onshore project area (1.9% of the onshore project area), the majority of which comprises broadleaved and coniferous plantation woodland and broadleaved semi-natural woodland, with several UK Habitat of Principal Importance (UKHPI) woodland habitats. Isolated trees were located throughout the habitats and species study area. Two veteran trees were noted during the 2017 field survey. Neither will be lost during the construction phase of the project.

137. There is the potential for direct loss of isolated mature trees during construction and indirect effects upon these habitats.

### 9.1.2 Embedded Mitigation

138. Areas of woodland have been avoided where possible during the site selection process.

139. Under Scenario 2 trenchless crossing techniques (e.g. HDD) are proposed to be used where possible at any areas of mixed lowland deciduous woodland which cannot be avoided during route selection. This includes woodland at the following locations:

- Witton Hall Plantation along Old Hall Road;
- King's Beck; and
- Old Carr (Dillington).

140. Under Scenario 1 these works will have been completed by Norfolk Vanguard.

### 9.1.3 Additional Mitigation

#### 9.1.3.1 Pre-construction survey

141. Under Scenario 2 a pre-construction walkover survey would be undertaken by a suitably qualified arboriculturalist. This survey would define specific mitigation measures to protect trees situated adjacent to the onshore cable route working width, including defining Root Protection Areas. The arboricultural report would be submitted to and approved by the local authority prior to the commencement of any construction works. Under Scenario 1 the survey will have been completed by Norfolk Vanguard, however all identified mitigation for Norfolk Vanguard will be adopted for Norfolk Boreas.

142. In addition, the following mitigation measures would also be undertaken under both scenarios:

- The roots of retained trees along the edge of the working width would be protected from soil compaction by using appropriate measures (e.g. fencing off sensitive areas, use of ground protection matting etc.) within the trees' Root Protection Areas (the extent of which would be calculated using guidance from BS5837: 2012);
- Facilitation pruning may be recommended where tree crowns are at risk from impact by machinery or high sided vehicles;
- Where possible, removal of vegetation would be timed to avoid the bird breeding season (March to October inclusive); and
- If bat roosts are found in the trees, then the measures set out for bat mitigation (outlined in section 9.7) would be followed.

## 9.2 Hedgerows

### 9.2.1 Baseline

143. A detailed baseline relating to hedgerows is provided in Chapter 22 Onshore Ecology of the ES, section 22.6.3.4. There were 143 hedgerows located within the surveyed sections of the onshore project area. An additional 53 hedgerows were identified within the unsurveyed areas from the Norfolk 'Living Map', totalling approximately 2.5km in length of hedgerow in total. Out of the 143 recorded hedgerows, there were 88 species-rich hedgerows and 55 species poor.

### 9.2.2 Embedded Mitigation

144. The number of hedgerow crossings has been minimised as far as possible, taking other hard constraints into account. Under Scenario 2 when crossing hedgerows,

the width of the cable easement will be reduced to the running track and cable trenches only to minimise the amount of hedgerow removal. The maximum size of the hedgerow gap created during the two-year duct installation phase would be 13m (or up to 16.5m where the cable route crosses a hedgerow at an oblique angle) at any one location during duct installation under Scenario 2.

145. Where hedgerow gaps are required for the cable pulling phase (Scenario 1 and Scenario 2), the number of gaps required will be minimised as far as possible and the retained gap will be no wider than 6m.

### 9.2.3 Additional Mitigation

#### 9.2.3.1 Pre-construction

146. Under Scenario 2 all unsurveyed hedgerows within the onshore project area will be subject to an Extended Phase 1 Habitat Survey prior to construction at the optimum time of year.

147. During detailed design, the project will seek to avoid mature trees within hedgerows through the micro-siting of individual cables, in order to retain as many mature trees as possible.

148. Hedgerow removal will be undertaken outside of the bird nesting season whenever possible (which is typically from March to August, although can commence earlier or later depending on the weather conditions). Hedgerows will be reinstated during early winter where possible when they have the greatest chance of taking root.

149. A Hedgerow Mitigation Plan will be developed in consultation with Natural England prior to the removal of hedgerows. This mitigation plan will be included within EcoMP, secured through Requirement 24 of the DCO. This mitigation plan will detail the reinstatement approach for hedgerows removed during construction and the monitoring and maintenance requirements following hedgerow planting.

150. Under Scenario 1 these mitigation measures will have been completed by Norfolk Vanguard.

#### 9.2.3.2 Post construction

151. Hedgerows which are temporarily removed to enable the project will be reinstated where possible. Under Scenario 2 replanting of all except the 6m gap required for the running track, where required, will where possible follow in the first winter after completion of the duct installation phase works. Under Scenario 1 the replanting will have been completed by Norfolk Vanguard.

152. Under both scenarios the 6m gap will be replanted following the cable pulling phase.

153. Replanting will follow guidance within the Norfolk hedgerow BAP, i.e. species composition for north-east Norfolk (if on an existing line, and that line is straight: mostly hawthorn, with blackthorn, field maple; if curving or on a roadside or parish boundary: hawthorn, with blackthorn, field maple and occasional crab apple, hazel, spindle, ash and holly) (NBP, 2009). Ground flora planting designed to encourage insect biomass will be included (BCT, 2012). Where possible, future hedgerow management will include allowing standard trees to develop and hedges will be double-planted with 2m grassland strips on both sides so there is always a leeward side to forage.

154. The landscaping proposals described in section 6 of this OLEMS have been designed to ensure that new planting is created to compensate for the permanent loss of species-rich hedgerow at the onshore project substation. New hedgerow is proposed along the western margin of onshore project substation, and existing hedgerow will be enhanced with adjacent woodland and species-rich grassland planting. Please see section 6 for full details of the proposed landscape mitigation planting.

## 9.3 Grassland

### 9.3.1 Baseline

155. A detailed baseline is provided in Chapter 22 Onshore Ecology, section 22.6.3.5. There were no areas of unimproved or species rich grassland in the habitats and species study area recorded in the 2017 and 2018 Extended Phase 1 Habitat Survey. Semi-improved grassland was recorded within the onshore project area during the habitat surveys covering approximately 3.3ha. The semi-improved grassland areas comprise coarse, ruderal grass and herb species. There is also one area of semi-improved grassland identified within the unsurveyed areas from the Norfolk 'Living Map'.

156. Nine locations of marshy grassland were recorded within the onshore project area, covering an area of 12.8ha (2.9% of the onshore project area). Selected areas of marshy grassland classified as coastal and floodplain grazing march, which is a UKHPI and Norfolk LBAP priority habitat.

157. There were 11 separate locations within the onshore project area of improved grassland subject to regular grazing, and a further seven areas from the Norfolk 'Living Map' totalling approximately 2.1% of the onshore project area. There were localised areas of tall ruderal habitat recorded during the Extended Phase 1 Habitat Surveys. Lowland fen (UKHPI and Norfolk Biodiversity Action Plan (BAP)

priority habitat) was noted within the habitats and species study area from data received as part of the desk study.

158. There is the potential for direct loss of these habitats during construction.

### 9.3.2 Embedded Mitigation

159. There are no specific embedded mitigation measures for grasslands, however the general embedded mitigation measures will apply, as shown in Table 4.1.

### 9.3.3 Additional Mitigation

#### 9.3.3.1 Pre-construction

160. Under Scenario 2 all unsurveyed areas within the onshore project area will be subject to an Extended Phase 1 Habitat Survey prior to construction at the optimum time of the year. Under Scenario 1 these surveys will have been completed by Norfolk Vanguard.

#### 9.3.3.2 During construction

161. The mitigation measures set out with respect to the River Wensum SAC and SSSI (outlined in section 7.1.3 and detailed in section 11.1 of the outline CoCP (document reference 8.1)) will be adhered to during all works undertaken within the UKHPI coastal and floodplain grazing marsh. These measures are good construction working practices.

#### 9.3.3.3 Post construction

162. All grassland habitats will be reinstated following the completion of works (either following completion of duct installation phase or following completion of cable pull phase where relevant), including UKHPI coastal and floodplain grazing marsh. Reinstatement of these grasslands will be by natural regeneration following demobilisation.

## 9.4 Watercourses and Ponds

### 9.4.1 Baseline

163. A detailed baseline for watercourses and ponds can be found in Chapter 22 Onshore Ecology, sections 22.6.3.10 and 22.6.3.11. There is a total of 220 standing water bodies, i.e. ponds, lakes and selected ditched located within the great crested newt study area, of which 19 are located within or adjacent to the onshore project area, of which 17 will be potentially temporarily lost during construction. Ponds are a UKHPI and Norfolk LBAP priority habitat. There are five main rivers located within the habitats and species study area, and additional

minor watercourses and field drains. Rivers are a UKHPI, but not a Norfolk LBAP priority habitat.

164. There is the potential for direct impacts to these habitats during construction.

### 9.4.2 Embedded Mitigation

165. Main rivers and standing water bodies have been avoided where possible during the site selection process.

166. Under Scenario 2 trenchless crossing techniques (e.g. HDD) are proposed to be used to cross the following watercourses:

- River Wensum;
- River Bure;
- King's Beck;
- Wendling Beck; and
- North Walsham and Dilham Canal.

167. Under Scenario 1 these works will have been completed by Norfolk Vanguard, and no further works will be required, with the exception of the Wendling Beck within Wendling Carr CWS, which although duct installation works will be complete, will require a running track to be reinstated across it to facilitate cable pulling.

### 9.4.3 Additional Mitigation

#### 9.4.3.1 Pre-construction

168. Under Scenario 2 all unsurveyed areas within the onshore project area will be subject to an Extended Phase 1 Habitat Survey prior to construction at the optimum time of the year. Under Scenario 1 these surveys will have been completed by Norfolk Vanguard.

169. Pre-construction mitigation for great crested newts will be adhered to in all locations where pond removal is required. Please refer to section 9.10 for a description of the mitigation for great crested newts.

#### 9.4.3.2 During construction

170. Mitigation measures to reduce the potential direct and indirect effects on watercourses during watercourse crossing activities are set out in the outline CoCP submitted as part of the DCO application (Document Reference 8.1).

#### 9.4.3.3 Post construction

171. All pond habitats lost during construction will be reinstated as far as possible following the completion of works (either following completion of duct installation phase, or following completion of cable pull phase where relevant). All pond restoration will follow the guidelines set out in the Norfolk Ponds BAP (NBP, 2010). Where possible, the project will also consider recreating a greater number of ponds than is lost during project construction (17) or restoring new ponds outside the onshore project area (see section 9.10).

## 9.5 Arable Land

### 9.5.1 Baseline

172. A detailed baseline of arable land is found in Chapter 22 Onshore Ecology, section 22.6.3.13 Arable land is the largest habitat by area, covering 382ha, and equates to approximately 87% of the habitats and species study area. Although comprising small parcels of land within the onshore project area only, it should be noted that cereal field margins are a UKHPI and Norfolk LBAP priority habitat.

173. There is the potential for direct loss of cereal field margin habitat during construction.

### 9.5.2 Embedded Mitigation

174. There are no specific embedded mitigation measures for arable land, however the general embedded mitigation measures will apply, as shown in Table 4.1.

### 9.5.3 Additional Mitigation

#### 9.5.3.1 Pre-construction

175. Under Scenario 2 all unsurveyed areas within the onshore project area will be subject to an Extended Phase 1 Habitat Survey prior to construction. Under Scenario 1 these works will have been completed by Norfolk Vanguard.

176. The locations of all arable field margins identified during the Extended Phase 1 Habitat Surveys or during pre-construction baseline surveys of the unsurveyed areas will be recorded, to inform reinstatement.

#### 9.5.3.2 Post construction

177. All cereal field margin habitat within the onshore project area will be reinstated post-construction (either following completion of duct installation phase or following completion of cable pull phase where relevant).

## 9.6 Badgers

### 9.6.1 Baseline

178. A detailed baseline for badgers is found in Chapter 22 Onshore Ecology, section 22.6.5.1. Badgers are protected under the Protection of Badgers Act 1992. Badgers have been recorded at 13 locations within 2km of the onshore project area according to NBIS records.

179. The field surveys found three active setts (one main sett and two annex setts) within the onshore project area, plus a further 12 active setts (five main setts and seven subsidiary and outlier setts) within the wider habitat and species study area. A further 23 active setts were also found outside the wider habitat and species study area in the Extended Phase 1 Habitat surveys. Approximately 35% of the survey area has not been surveyed for badgers as landowner access could not be agreed.

180. There is the potential for disturbance of this species during the construction phase of the project.

### 9.6.2 Embedded Mitigation

181. Key habitats for badger setts (woodland) have been avoided where possible during the site selection process.

182. The length of hedgerows to be removed during construction, another key habitat for badger setts, has been reduced to 13m (up to 16.5m where the cable route crosses hedgerows at an oblique angle) at any one location during duct installation under Scenario 2.

183. General embedded mitigation measures will apply, as shown in Table 4.1 and Table 4.2.

### 9.6.3 Additional Mitigation

#### 9.6.3.1 Pre-construction

##### *9.6.3.1.1 Surveyed areas*

184. Under both scenarios a pre-construction badger survey of all active badger setts (of any category) found within the habitat and species study area will be undertaken in advance of construction to ensure that the location of setts have not changed. If setts are found to have moved closer to the onshore project area, a suitably qualified ecologist would review the situation and a disturbance licence may be required (or alternatively works under a badger class licence). The

details of this licence would need to be agreed with Natural England in advance of the proposed works.

185. Under Scenario 1 the extent of the pre-construction surveys on the onshore cable route will be dependent on where jointing pit locations and temporary running track are required during the cable pulling works (to be determined post-consent).

*9.6.3.1.2 Unsurveyed areas*

186. Approximately 35% of the habitat and species study has not been surveyed for badgers. For all unsurveyed areas of the onshore cable route, a full badger pre-construction baseline survey will be undertaken to search for field signs of badgers within the habitat and species study area. Under Scenario 1 the pre-construction baseline survey will be undertaken by Norfolk Vanguard, under Scenario 2 it will be completed by Norfolk Boreas.

187. If active setts (of any category) are found within the onshore project area, they would need to be closed and destroyed. This would require the preparation and submission of a licence application to Natural England and would follow their Standing Advice (Natural England, 2015a) on sett closure and destruction. An artificial sett would also be required for all main setts that are to be closed and destroyed.

188. The exact details of sett closure would be agreed in advance with Natural England through the licensing process and would follow Natural England's Standing Advice (Natural England, 2015a) on sett closure and destruction.

### 9.6.3.2 During construction

189. In order to minimise the potential disturbance effects on badger during the construction phase, mitigation measures will be agreed in advance of any works within 30m of an active badger sett (following Natural England's Standing Advice on the impact of development on badgers (Natural England, 2015a; English Nature, 2002)), which will include consideration of habitat manipulation, buffer zones for different construction activities within 30m of known badger setts, timing of construction works and construction lighting.

190. Adherence to mitigation measures agreed in advance with Natural England would be considered sufficient that a licence to disturb a badger sett would not be required.

### 9.6.3.3 Post-construction

191. All hedgerow habitat removed will be reinstated in line with the Norfolk Hedgerow BAP (NBP, 2009).

## 9.7 Bats

### 9.7.1 Baseline

192. A detailed baseline for bats is found in Chapter 22 Onshore Ecology, section 22.6.5.2 There are records of nine species of bat within 5km of the onshore project area as held by NBIS and NBSG. NBSG also hold records of 29 bat roosts located within 5km of the onshore project area, including the Paston Great Barn and Old Hills Wood barbastelle maternity colonies. However, none of these bat roosts are located within the habitat and species study area.

193. The 2017 and 2018 Extended Phase 1 Habitat Surveys found 46 trees and structures located within the habitat and species study area which provided moderate suitability for roosting bats. Bat emergency / re-entry surveys on 26 of the 46 trees and structures recorded no roosts present within these trees and structures located within the onshore project area, although three confirmed bat roosts were recorded within trees and structures located within the wider habitat and species study area. The remaining 20 trees and structures were not surveyed due to landowner restrictions, plus a further 11 areas of the onshore project area were also identified as potentially containing suitable habitat for supporting roost bats following a review of the Living Map dataset.

194. Linear features (hedgerows and watercourses) were assessed for their suitability to support foraging bats, of the 143 features assessed within the habitat and species study area, 88 were found to provide moderate or high suitability. These features were subject to bat activity surveys in 2017 and 2018, with a notable assemblage of bats found across all linear features surveyed.

195. Within the unsurveyed areas of the onshore project area, approximately 53 linear features were identified by the Norfolk Living Map and aerial photography for their potential suitability to support commuting or foraging bats. These features were not surveyed during 2017 or 2018 surveys as access was not agreed.

196. There is the potential for habitat loss for and disturbance of this species during construction.

### 9.7.2 Embedded Mitigation

197. Key habitats for roosting bats (woodland) have been avoided where possible during site selection. Watercourses, key habitats for commuting and foraging bats, have been avoided through site selection where possible, or through the use of trenchless techniques. The length of hedgerows to be removed for construction, a key habitat for commuting and foraging bats, has been reduced to 13m (or up to

16.5m where the cable route crosses hedgerows at an oblique angle) at any one location during duct installation under Scenario 2.

198. General embedded mitigation measures will apply, as shown in Table 4.1 and Table 4.2.

### 9.7.3 Additional Mitigation

#### 9.7.3.1 Pre-construction

##### *9.7.3.1.1 Surveyed areas*

199. The three trees which support bat roosts located within the habitat and species study area, will be subject to the following mitigation measures to ensure that the construction works do not affect tree health and therefore risk the existence of these roosts:

- A tree survey of the trees will be undertaken prior to works (see section 9.1);
- The trees' Root Protection Areas will be calculated and roots of retained trees will be protected from soil compaction by using appropriate measures (e.g. fencing off sensitive areas, use of ground protection matting etc.) within the trees' Root Protection Areas.

200. Hedgerow removal will be programmed for winter (November to February) where possible, to give bats time to adjust to the change prior to their maternity period. Hedgerows will be removed as close to the onset of works as possible, and unless unavoidable works will not commence after nights of poor weather (in case of bad weather roosts being used). Under Scenario 1 the removals will be undertaken by Norfolk Vanguard, under Scenario 2 it will be completed by Norfolk Boreas.

201. Subject to landowner permissions, the 16 hedgerows that are important for foraging and commuting bats of the Paston Great Barn / Old Hills Wood maternity colonies would be left to become overgrown either side of the section to be removed prior to construction. Hedgerows would be allowed to become overgrown within the onshore cable route width, therefore at each hedgerow a total of up to 22m will be left to become overgrown in this manner. This would be undertaken to improve the quality of the surrounding hedgerow as a resource for commuting and foraging bats (Bat Conservation Trust, 2015).

202. A Hedgerow Mitigation Plan will be developed in consultation with Natural England prior to the removal of hedgerows. This mitigation plan will be included within the EcoMP, secured through Requirement 24 of the DCO. This mitigation plan will detail the reinstatement approach for hedgerows removed during

construction and the monitoring and maintenance requirements following hedgerow planting.

*9.7.3.1.2 Unsurveyed areas*

203. 20 trees and structures were not surveyed during the 2017 and 2018 bat emergence / re-entry survey and therefore they will need to be surveyed during the pre-construction baseline surveys to confirm whether they support roosting bats. These surveys will be conducted at the optimum time of the year. Under Scenario 1 the surveys will be undertaken by Norfolk Vanguard and under Scenario 2 they will be completed by Norfolk Boreas. Any other suitable trees identified during the Extended Phase 1 Habitat Survey of the remaining 35% of the onshore project area pre-construction baseline survey will also be subject to pre-construction baseline surveys to confirm whether they support roosting bats.

204. If bats or signs of bats are found in any of the features, appropriate mitigation measures would be developed adhering to Natural England Standing Advice (Natural England, 2015b), which may include blocking up features, soft felling and timing of works. A European Protected Species (EPS) licence may be necessary to work on or remove the trees.

### 9.7.3.2 During construction

205. Where possible, under Scenario 2 Norfolk Boreas Limited will seek to avoid mature trees within hedgerows through the micro-siting of individual cables, in order to retain as many mature trees as possible given the benefits they provide within linear commuting / foraging features (following Boughley *et al*., 2011). Under Scenario 1 the micro-siting will have been completed by Norfolk Vanguard.

206. To avoid indirect effects arising from the works undertaken during the construction phase, the following mitigation measures will be adhered to:

- Construction phase lighting will be used between 7am-7pm in low light conditions, with lower-level security lighting outside of these times; and
- All temporary lighting to be designed in line with the BCT and ILP *Bats and Artificial Lighting in the UK* guidance (BCT and ILP, 2018). This will include the use of directional lighting during construction.

### 9.7.3.3 Post construction

207. Hedgerow replanting will where possible follow in the first winter after construction, with the exception of the 6m gap required for the running track

(BCT, 2012). Replanting will follow guidance within the Norfolk hedgerow BAP and will include appropriate species for north-east Norfolk (NBP, 2009), including ground flora planting designed to encourage insect biomass (BCT, 2012). Future hedgerow management to include allowing standard trees to develop to improve quality of the hedgerow as a foraging resource. Hedges will be double-planted with 2m grassland strips on both sides so there is always a leeward side to forage. Replanting will also include hedgerow improvements works within the onshore cable route where required. These include gapping-up and tree management.

208. Mitigation planting at the onshore project substation has been designed to replace and improve all ecological connections currently located within the onshore project substation footprint. This includes creation of new woodland strips connecting the commuting / foraging resources severed by the construction phase works. The location of this mitigation planting is described in more detail in section 6.

209. A lighting scheme will be designed for the final design of the permanent infrastructure, which will include measures to minimise light spill and be designed in line with the 'Bats and Artificial Lighting in the UK' guidance (BCT and ILP, 2018).

## 9.8 Water Voles

### 9.8.1 Baseline

210. Full details of the baseline for water voles are found in Chapter 22 Onshore Ecology of the ES, section 22.6.5.3 Water voles are protected under the Wildlife and Countryside Act 1981 (as amended) and are a Norfolk LBAP priority habitat. 38 watercourses fell within the refined habitat and species study area. A water vole survey undertaken for 34 of these watercourses (the other four were inaccessible at the time). This study recorded water voles being present within nine of these, eight of which were located within the onshore project area. A high population density of water voles was recorded in one watercourse, the River Wensum.

211. A further three watercourses were identified within the unsurveyed areas using the Norfolk Living Map as suitable for the water vole.

212. There is the potential for habitat loss for and disturbance of this species during construction.

### 9.8.2 Embedded Mitigation

213. Under Scenario 2 trenchless crossing techniques (e.g. HDD) are proposed to be used to cross three of the nine watercourses where water voles have been recorded; the River Wensum, the River Bure and the Wendling Beck at Dillington. Under Scenario 1 these works will have been completed by Norfolk Vanguard.

214. General embedded mitigation measures also apply, as shown in Table 4.1 and Table 4.2.

### 9.8.3 Additional Mitigation

#### 9.8.3.1 Pre-construction

##### *9.8.3.1.1 Surveyed areas*

215. Under both scenarios a pre-construction survey will be undertaken of all watercourses suitable for supporting water voles prior to work to confirm the current distribution of water voles within the habitat and species study area.

216. For works at watercourses WV14 and WV15 (both Penny Spot Beck), NV-WB01, NV-WB07 and NV-WB10 (see ES Figure 22.7), displacement under licence of the width of the cable route (i.e. 35m) will be conducted prior to works. Displacement will follow the protocol set out in Appendix 1 of the Water Vole Mitigation Handbook (Dean *et al*., 2016).

217. Under Scenario 1 the extent of the pre-construction surveys and mitigation will be dependent on where jointing pit locations and temporary running track are required during the cable pulling works (to be determined post-consent).

218. For works to habitats immediately adjacent to WV05 (see ES Figure 22.7), if no field signs of water voles are found within 50m of the proposed works during the pre-construction survey, no further mitigation is required.

##### *9.8.3.1.2 Unsurveyed areas*

219. Under Scenario 2 a pre-construction baseline survey of the two inaccessible watercourses plus the potential additional three watercourses located within the unsurveyed areas will be undertaken post-consent, at the optimum time of the year. Under Scenario 1 the baseline survey will be undertaken by Norfolk Vanguard and under Scenario 2 it will be completed by Norfolk Boreas.

220. For all watercourses where signs of water vole activity are found during the surveys, the mitigation set out above in the form of displacement under licence will be adhered to.

#### 9.8.3.2 Post construction

221. Habitats will be fully reinstated following completion of construction. The guidelines for habitat restoration set out in Water Vole Mitigation Handbook (Dean *et al*., 2016) will be adhered to.

222. Post-construction monitoring will be undertaken to determine the status of the water vole population during the breeding season one year after completion of construction.

## 9.9 Otter

### 9.9.1 Baseline

223. Full baseline information for otter is presented in Chapter 22 Onshore Ecology of the ES, section 22.6.5.4. Otter are an EPS and Norfolk LBAP priority species. NBIS holds two records for otter within 2km of the onshore project area.

224. Seven of 59 watercourses accessed within the habitat and species study area were assessed as being suitable for commuting and foraging otter during the 2017 and 2018 Extended Phase 1 Habitat Surveys. During the 2017 and 2018 water vole surveys, field signs of otter (spraints) were found in two locations within the onshore project area, Penny Spot Beck (a tributary of the River Wensum) and the River Bure. Otter have also been confirmed on the North Walsham and Dilham Canal upstream of the onshore project area.

225. There is the potential for habitat loss for and disturbance of this species during construction.

### 9.9.2 Embedded Mitigation

226. Under Scenario 2 the seven watercourses suitable to support commuting otter will be subject to trenchless crossing techniques to avoid potential impacts at these locations. Under Scenario 1 these works will have been completed by Norfolk Vanguard.

### 9.9.3 Additional Mitigation

#### 9.9.3.1 During construction

227. In order to minimise the indirect effects upon otters during the construction phase, the following mitigation measures will be implemented:

- Wherever possible, night-time working near watercourses would be avoided or else minimised; and
- Exit ramps from excavations would be provided at night near watercourses with confirmed presence, so that otters can escape if they fall in.

## 9.10 Great Crested Newts

### 9.10.1 Baseline

228. Full baseline for great crested newts is found in Chapter 22 Onshore Ecology of the ES, Section 22.6.5.5 Great crested newts are an EPS and a Norfolk LBAP priority species. Of the 220 standing water bodies located within the great crested newt study area, 121 of these were subject to a Habitat Suitability Index (HSI) assessment during 2017 and 2018 Extended Phase 1 Habitat Surveys and 49 were identified as suitable for supporting great crested newts. A further 99 were not surveyed due to access restrictions.

229. Of the 49 identified as suitable for supporting great crested newts 28 were surveyed during 2017 and 2018 great crested newt surveys. Great crested newt presence was recorded in four of the 28 standing water bodies surveyed. None of these are within the onshore project area. Three of them are within 250m of the onshore cable route, and one within 500m of the onshore project substation. 21 standing water bodies were not surveyed, meaning a total of 120 water bodies have not been subject to full great crested newt surveys.

230. There is the potential for habitat loss for and disturbance of this species during construction.

### 9.10.2 Embedded Mitigation

231. Key habitats for great crested newts, including standing water bodies, have been avoided where possible during site selection.

232. General embedded mitigation measures will apply, as shown in Table 4.1 and Table 4.2.

### 9.10.3 Additional Mitigation

#### 9.10.3.1 Pre-construction

*9.10.3.1.1 Surveyed areas*

233. Under both scenarios a pre-construction presence / absence survey of all water bodies located within 250m of onshore project area and 250m of each confirmed breeding pond will be undertaken post-consent, approximately one year in advance of construction to ensure that the local great crested newt population distribution has not changed. As a presence / absence survey, eDNA methods will be suitable.

234. Under Scenario 1 the extent of the pre-construction surveys on the onshore cable route will be dependent on where jointing pits and temporary running

track are required during the cable pulling works (to be determined post-consent).

#### *9.10.3.1.2 Unsurveyed areas*

235. Six waterbodies located within or adjacent to the onshore project area, plus 114 waterbodies located within the great crested newt study area (i.e. a total of 120 water bodies) were not surveyed during the 2017 or 2018 great crested newt surveys and therefore will need to be surveyed during pre-construction baseline surveys to confirm whether they support breeding populations of great crested newts. This survey will be conducted at the optimum time of the year. Under Scenario 1 the survey will be undertaken by Norfolk Vanguard, under Scenario 2 it will be completed by Norfolk Boreas.

236. Should great crested newts be found within these water bodies, then mitigation will be required. Potential mitigation measures which might be required are set out within the Norfolk Boreas draft great crested newt mitigation licence application, which has been drafted and submitted to Natural England. The measures outlined within the draft licence application are in accordance with the Great Crested Newt Mitigation Guidelines (English Nature, 2001) and include:

- A capture and release programme under licence, including the use of exclusion fencing, receptor sites for translocation;
- Terrestrial and aquatic habitat reinstatement;
- Ecological supervision of the works; and
- A programme of post-construction monitoring.

237. Based on the draft great crested newt mitigation licence application, a Letter of No Impediment is being sought from Natural England so there is no impediment to issuing a licence in the future (following submission of a final updated licence application). The need for a final great crested newt mitigation licence application following post-consent surveys of the 120 unsurveyed water bodies will be agreed with Natural England via consultation post-consent. The agreed approach would be in accordance with the Great Crested Newt Mitigation Guidelines (English Nature, 2001).

### 9.10.3.2 During construction

#### *9.10.3.2.1 Surveyed areas*

238. As the likelihood of encountering great crested newts during construction is low, but a risk of killing or injuring great crested newts exists, a precautionary method of working (PMoW) will be followed during the construction phase under both scenarios in areas within 250m of all confirmed breeding ponds (TF9614-154, TF9614-155, TG0721-256 and TF9010-50). The PMoW will be agreed with

Natural England prior to construction, and would include details of the locations of terrestrial habitat affected surrounding identified great crested newt breeding ponds, habitat manipulation and reinstatement required, and ecological supervision of the works.

*9.10.3.2.2 Unsurveyed areas*

239. If mitigation is required for the unsurveyed areas following receipt of the survey results for these areas, this is likely to include ecological supervision to supervise and monitor the success of construction mitigation. The details of any construction mitigation will be agreed with Natural England through consultation post-consent.

### 9.10.3.3 Post construction

*9.10.3.3.1 Unsurveyed areas*

240. If mitigation is required for the unsurveyed areas following receipt of the pre-construction baseline survey results for these areas, this is likely to include post-construction population monitoring. The details of any post-construction mitigation will be agreed with Natural England through consultation post-consent.

241. Terrestrial and aquatic habitats known to support great crested newts affected during construction will be reinstated either following completion of duct installation phase or following completion of cable pull phase where relevant.

### 9.10.3.4 Alternative mitigation options (for potential impacts within unsurveyed areas)

242. Following consultation with Natural England held in March 2018, the project has discussed retaining the option to use 'alternative' approaches to deliver great crested newt mitigation under Natural England's new licensing policies (Policies '1' and '2') which have been in place since December 2016 (Natural England, 2016). These policies allow for the opportunity to undertake habitat creation or restoration both onsite and offsite (i.e. away from the development site boundary), subject to landowner consent, as alternative to trapping, translocating and excluding newts, provided it can be proven that this action is more likely to improve the conservation status of the species, and that other criteria set out in the policies can be met. Following these discussions, the project has included the option of using alternative approaches to delivering great crested newt mitigation under Natural England's new licensing policies alongside the 'traditional' approach outlined earlier in this section. At this stage, only the principles of such an alternative approach have been proposed. In summary, these are:

- **Breeding ponds**: Where direct impacts on confirmed breeding ponds (of any population size) are anticipated, traditional mitigation methods including fencing and trapping (ring-fencing) will be undertaken. However, rather than recreating the ponds within the onshore project area, it is proposed that habitat enhancement / pond restoration measures are undertaken within 500m of those breeding ponds affected. Further surveys will be required to support this approach;
- **Terrestrial habitats:** Where direct impacts upon terrestrial habitats are anticipated, it is recommended that unless a medium or high population has been recorded, or the pond is located within 50m of the onshore project area, exclusion fencing is not required. Where this is identified, instead habitat enhancement / pond restoration measures are undertaken within 500m of those breeding ponds affected. Further surveys will be required in order to support this approach; and
- The location of all offsite mitigation will be identified in partnership with the Norfolk Ponds Project (NPP) and Norfolk Farming and Wildlife Advisory Group (Norfolk FWAG). Where habitat creation is considered, the location of 'ghost pond' sites will be considered (Alderton et al., 2017).

## 9.11 Reptiles

### 9.11.1 Baseline

243. There is detailed baseline information provided for reptiles in Chapter 22 Onshore Ecology of the ES, section 22.7.3.14. Reptiles are protected under the Wildlife and Countryside Act 1981 (as amended). 21 areas of suitable habitat mosaic were identified as potentially being suitable to support common species of reptiles within the onshore project area. The 2017 reptile presence / absence survey recorded a small number of common reptiles (1-7 no.) (slow worm and grass snakes) in seven of the reptile habitat mosaics within the onshore project area and habitat and species study area.

244. Two locations which were identified during the 2017 and 2018 Extended Phase 1 Habitat Surveys as suitable for reptiles could not be surveyed for reptile presence / absence as landowner access could not be agreed.

245. There is the potential for habitat loss for and disturbance of this species during construction.

### 9.11.2 Embedded Mitigation

246. There is no specific embedded mitigation for reptiles, but the general embedded mitigation measures will be applied, as detailed in Table 4.1 and Table 4.2.

### 9.11.3 Additional Mitigation

#### 9.11.3.1 Pre-construction

##### *9.11.3.1.1 Surveyed areas*

247. The numbers of reptiles potentially affected is small, but a risk of killing or injuring these reptiles exists. As such, a PMoW will be followed during the construction phase under both scenarios in those locations where reptiles have been recorded. The PMoW will be included within EcoMP and will agreed with Natural England prior to construction, and will include details of pre-construction habitat manipulation, ecological supervision, and post-construction habitat reinstatement.

##### *9.11.3.1.2 Unsurveyed areas*

248. An additional two areas were identified during the 2017 and 2018 Extended Phase 1 Habitat Surveys as potentially providing suitable habitat for but were unable to be surveyed due to access restrictions.

249. If small populations of reptiles are found within the unsurveyed areas of suitable habitat mosaics, then the PMoW referred to above would also be implemented for these sites. If high populations of reptiles are found, then in addition to the adherence to the PMoW, a capture and release programme would also be implemented. The details of a capture and release programme will be drafted following the Reptile Mitigation Guidelines (Natural England, 2011) and agreed with Natural England in advance of the works.

#### 9.11.3.2 During construction

250. The PMoW agreed with Natural England would include measures to be adhered to during construction, including ecological supervision. The details of this will be agreed with Natural England in advance of the works.

#### 9.11.3.3 Post construction

251. Habitats suitable for supporting common reptiles would be fully reinstated either following completion of duct installation phase or following completion of cable pull phase where relevant.

## 9.12 White-clawed crayfish

### 9.12.1 Baseline

252. A detailed baseline of white-clawed crayfish is provided in Chapter 22 Onshore Ecology of the ES, Section 22.6.5.7. White-clawed crayfish are an EPS and Norfolk LBAP priority species. NBIS holds no records for white-clawed crayfish within 2km of the onshore project area. The Environment Agency indicated that white-

clawed crayfish are not known to be present in any reaches located within the habitat and species study area (Environment Agency, 2017). The River Wensum and River Bure are known to support populations of white-clawed crayfish in other reaches (Environment Agency, 2017).

### 9.12.2 Embedded Mitigation

253. Both the River Wensum and the River Bure will be subject to trenchless crossing techniques (e.g. HDD) as part of embedded mitigation to avoid potential impacts at these locations.

### 9.12.3 Additional Mitigation

254. No additional mitigation is proposed.

## 9.13 Other invertebrates

### 9.13.1 Baseline

255. The detailed baseline for other invertebrates is found in Chapter 22 Onshore Ecology of the ES, Section 22.6.5.8. The NBIS holds records for 64 notable invertebrates within 2km of the onshore project area, including notable bee, dragonfly, butterfly, moth, cricket and beetle species. Targeted surveys of the Desmoulin's whorl snail were undertaken in 2017 and 2018 along the banks of the River Wensum and in the ditches of the River Wensum floodplain on the river's southern and northern banks within the habitat and species study area, however this species was not recorded during any survey. The Norfolk hawker dragonfly was recorded at one location along a drainage ditch adjacent to the River Bure during the 2017 reptile surveys. The Norfolk hawker is protected under the Wildlife and Countryside Act 1981 (as amended) and is listed as 'Endangered' in the Odonata Red Data List and is a Norfolk LBAP priority species.

256. There is the potential for habitat loss for and disturbance of Desmoulin's whorl snail during construction.

### 9.13.2 Embedded Mitigation

257. Under Scenario 2 as part of the embedded mitigation, the River Wensum will be crossed using trenchless crossing techniques (e.g. HDD), in order to minimise direct impacts upon this site and the habitats/species for which it is designated.

258. Under Scenario 1 these works will have been completed by Norfolk Vanguard.

### 9.13.3 Additional Mitigation

259. The mitigation measures proposed for the River Wensum SAC and SSSI will apply, as described in section 7.1.3.

## 9.14 Fish

### 9.14.1 Baseline

260. A detailed baseline for fish is provided in Chapter 22 Onshore Ecology, Section 22.6.5.9 of the ES. NBIS returned no records of notable fish species within 2km of the onshore project area. The National Fish Population Database has recorded Bullhead and Brown Trout within the habitat and species study area in Wendling Beck and Penny Spot Beck and upstream and downstream of the species study area in the River Wensum and River Bure. Bullhead has also been recorded upstream of the habitats and species study area in Reepham Stream (western branch) and upstream and downstream of the habitats and species study area of King's Beck. Brown Trout is also recorded upstream and downstream of the habitats and species study area in Booton watercourse. In addition, Brook Lamprey has been recorded upstream and downstream of the habitat and species study area in River Wensum, River Bure and King's Beck.

261. There is the potential for habitat loss for and disturbance of bullhead, brook lamprey and brown trout during construction.

### 9.14.2 Embedded Mitigation

262. There are no specific embedded mitigation measures for fish, but the general embedded mitigation measures will apply, including trenchless crossing techniques (e.g. HDD) at Main rivers (see Table 4.1 and Table 4.2).

### 9.14.3 Additional Mitigation

#### 9.14.3.1 Pre-construction

263. Prior to construction, a baseline survey of the onshore project area within Reepham Stream (eastern branch), the Reepham Stream (western branch) and Booton watercourse will be undertaken to assess the suitability of the substrate at these locations for supporting spawning bullhead and brown trout. Under Scenario 1 the survey will be undertaken by Norfolk Vanguard, under Scenario 2 it will be completed by Norfolk Boreas.

#### 9.14.3.2 During construction

264. If suitable habitat for these species is identified, appropriate mitigation (such as ecological supervision during works, timing of works to avoid sensitive seasons or micrositing) would be agreed with Natural England post-consent.

265. The mitigation measures proposed for the River Wensum SAC and SSSI (as shown in section 7.1.3) will applied when working adjacent to this watercourse.

## 9.15 Protected Flora

### 9.15.1 Baseline

266. A detailed baseline of protected flora is in Chapter 22 Onshore Ecology of the ES and Section 22.6.5.10. During a detailed botanical survey of the River Wensum and the aquatic and terrestrial habitats located within the floodplain adjacent to the River Wensum (within the habitat and species study area) undertaken in 2017 and 2018, no evidence of species associated with the River Wensum SAC habitat were recorded.

267. NBIS returned records of the notable plant species holly-leaved naiad *Najas marina* has been recorded within 2km of the onshore project area.

### 9.15.2 Embedded Mitigation

268. Under Scenario 2 the River Wensum will be crossed using trenchless crossing techniques (e.g. HDD) as part of embedded mitigation to avoid potential impacts at these locations. Under Scenario 1 these works will have been completed by Norfolk Vanguard.

### 9.15.3 Additional Mitigation

269. The mitigation measures proposed for the River Wensum SAC and SSSI will apply, as shown in section 7.1.3.

## 9.16 Invasive Non-Native Species

### 9.16.1 Baseline

270. A detailed baseline of invasive non-native species is found in Chapter 22 Onshore Ecology, Section 22.6.5.11. NBIS recorded several invasive non-native species within 2km of the onshore project area. These included Japanese Knotweed *Fallopia japonica*, American mink *Neovison vison* and signal crayfish *Pacifastacus leniusculus*. During the 2017 and 2018 Extended Phase 1 Habitat Surveys Japanese Knotweed was found established in one area and there was one patch of giant hogweed. There was also a signal crayfish recorded in the River Wensum during the 2017 botanical survey and along the River Bure (as otter feeding remains) during the 2018 Extended Phase 1 Habitat Survey within the habitat

and species study area. This species has also been recorded along three other watercourses within the habitat and species study area.

271. There is the potential to spread invasive species throughout the onshore project area during construction.

### 9.16.2 Embedded Mitigation

272. The invasive species American mink has also been recorded along the River Wensum. There is no risk of releasing American mink into other locations. The invasive signal crayfish have been recorded on the River Wensum, River Bure, Blackwater Drain, Reepham Stream, and Wendling Beck. Under Scenario 2 the River Wensum and River Bure will be crossed using trenchless crossing techniques (e.g. HDD) as embedded mitigation, and as such there is no risk of releasing signal crayfish into other areas of the habitats and species study area at these locations. Under Scenario 1 these works will have been completed by Norfolk Vanguard.

### 9.16.3 Additional Mitigation

#### 9.16.3.1 Pre-construction

*9.16.3.1.1 Surveyed areas*

273. Under both scenarios prior to construction, an Invasive Species Management Plan will be developed. This plan will be agreed with the Environment Agency and Natural England in advance of construction, and will include the following:

- A plan of all invasive species locations and extents;
- A protocol for removing the Japanese knotweed stand east of the River Bure and for managing the waste generated;
- Good site practice measures for managing the spread of invasive species;
- Good site practice measures for managing the spread of invasive species during works at watercourses (in particular the Reepham Stream, Blackwater Drain and Wendling Beck); and
- A requirement for an ECoW and details of their responsibilities with respect to non-native invasive species.

274. Details of the Invasive Species Management Plan are provided within the outline CoCP provided with the DCO application (document reference 8.1).

*9.16.3.1.2 Unsurveyed areas*

275. The unsurveyed areas within the onshore project area will be surveyed at the optimum time of the year as part of the pre-construction baseline surveys, and the locations of all stands of invasive species will be recorded and their extent

mapped. Under Scenario 1 the survey will be undertaken by Norfolk Vanguard, under Scenario 2 it will be completed by Norfolk Boreas. The mitigation measures in the Invasive Species Management Plan will be adhered to under both scenarios, where invasive species are recorded.

#### 9.16.3.2 During construction

276. An ECoW will be required to ensure compliance with the Invasive Species Management Plan. Details of their responsibilities will be set out in the Invasive Species Management Plan provided within the outline CoCP provided with the DCO application (document reference 8.1). Good site practice measures for managing the spread of invasive species will be implemented.

# 10 BIRDS

## 10.1 Baseline

277. Detailed baseline information relating to birds is provided in Chapter 23 Onshore Ornithology of the ES, Section 23.6.5. The baseline uses information provided by NBIS and Natural England, findings of the 2017 and 2018 Extended Phase 1 Habitat Surveys and findings of the Wintering Bird Survey (October 2016- March 2017) and of the Breeding Bird Survey (May 2017- August 2017).

278. Within the internationally designated site study area there is one international statutory designated site for nature conservation with ornithological interest or qualifying features:

- Broadland SPA and Ramsar site.

279. There are six national statutory designated sites for nature conservation which are notified or designated in part due to the breeding or wintering bird species they support. These sites are:

- River Wensum SSSI;
- Dereham Rush Meadow SSSI;
- Dillington Carr, Gressenhall SSSI;
- Cawston and Marsham Heaths SSSI;
- Booton Common SSSI; and
- Pigney's Wood LNR.

280. There are five non-statutory designated sites (CWS and RNR) located directly within the onshore project area and are of potential ornithological interest, plus one proposed CWS (see section 8). These sites are:

- Wendling Carr CWS (CWS no. 1013);
- Necton Wood CWS (CWS no. 2024);
- Land South of Dillington Carr CWS (CWS no. 1025);
- Marriott's Way CWS (CWS no. 2176) (crossed twice); and
- Paston Way and Knapton Cutting CWS (CWS no. 1175); and
- Kerdiston Old Hall Meadows proposed CWS (no CWS no.).

281. Habitats suitable for supporting breeding or wintering / on passage bird species are located within the onshore project area, as shown in Table 10.1.

**Table 10.1 Habitat footprints within the onshore project area**

| Habitat type | Area (ha) | % of onshore project area | Potential to support common or notable breeding birds | Potential to support common or notable wintering / on passage birds |
|---|---|---|---|---|
| Lowland mixed deciduous woodland | 0.6 | 0.1% | Yes | No |
| Broadleaved semi-natural woodland | 3.6 | 0.8% | Yes | No |
| Broadleaved plantation woodland | 0.6 | 0.1% | Yes | No |
| Coniferous plantation woodland | 3.0 | 0.7% | Yes | No |
| Mixed plantation woodland | 0.5 | 0.1% | Yes | No |
| Dense/continuous scrub | 0.7 | 0.2% | Yes | No |
| Scattered scrub | 0.1 | <0.1% | Yes | No |
| Broadleaved parkland / scattered trees | <0.1 | <0.1% | Yes | No |
| Improved grassland | 9.1 | 2.1% | Yes | Yes |
| Marshy grassland | 12.8 | 2.9% | Yes | Yes |
| Coastal and floodplain grazing marsh | 0.1 | <0.1% | Yes | Yes |
| Semi-improved grassland | 3.3 | 0.8% | Yes | Yes |
| Poor semi-improved grassland | 6.4 | 1.4% | Yes | Yes |
| Tall ruderal | 0.1 | <0.1% | Yes | Yes |
| Standing water | 0.7 | 0.2% | Yes | Yes |
| Running water | 0.7 | 0.2% | Yes | Yes |
| Cultivated / disturbed land - arable | 382.1 | 86.7% | Yes | Yes |
| Cultivated / disturbed land - amenity grassland | 0.7 | 0.2% | No | Yes |
| Gardens | 0.5 | 0.1% | Yes | Yes |
| Bare ground | 1.3 | 0.3% | No | No |
| Urban | 6.5 | 1.5% | No | No |
| Other habitat | <0.1 | <0.1% | No | No |
| Intertidal mud / sand | 6.3 | 1.4% | No | Yes |
| Dune grassland | 0.8 | 0.2% | No | Yes |
| Beach | <0.1 | <0.1% | No | Yes |
| Maritime Cliff and Slopes | <0.1 | <0.1% | No | Yes |

282. Habitats suitable for supporting wintering / on passage bird species were surveyed. Surveys of the agricultural fields in the North Walsham district, Dereham Rush Meadow SSSI, Hundred Stream and the North Norfolk coast between Eccles-on-Sea and Paston, recorded a small number of water birds, but not of a scale to be of national (or greater) importance (i.e. less than 1% of the Great Britain or international population).

283. Selected areas were identified during the 2017 Extended Phase 1 Habitat Survey as being suitable to support populations of notable breeding birds, and were therefore surveyed:

- At Rush Meadows a total of 35 species were recorded including, bullfinch *Pyrrhula pyrrhula*, dunnock *Prunella modularis*, reed bunting *Emberiza schoeniclus*, reed warbler *Acrocephalus scirpaceus*, song thrush *Turdus philomelos* and willow warbler *Phylloscopus trochilus*;
- At Dillington Carr, 47 species were recorded including the notable species, coot *Fulica atra*, cuckoo *Cuculus canorus*, dunnock, gadwall *Anas strepera*, great-crested grebe *Podiceps cristatus*, little grebe *Tachybaptus ruficollis*, mallard *Anas platyrhynchos*, mistle thrush *Turdus viscivorus*, moorhen *Gallinula Chloropus*, mute swan *Gallinula Chloropus*, reed bunting *Emberiza schoeniclus,* song thrush *Turdus philomelos* and stock dove *Columba oenas*;
- There were 29 species recorded at Booton Common, including notable species dunnock, marsh tit *Poecile palustris* and song thrush;
- At Pigney's Wood, there were records of 38 species including notable species cuckoo, dunnock, mute swan, reed bunting, song thrush and stock dove;
- The land south of Dillington Carr has 41 species recorded including bullfinch, dunnock, reed bunting, reed warbler *Acrocephalus scirpaceus*, song thrush and willow warbler *Phylloscopus trochilus*; and
- River Wensum Floodplain had a total of 42 recorded species including barn owl *Tyto alba*, bullfinch, cuckoo, dunnock, great spotted woodpecker *Dryobates major*, kestrel *Falco tinnunculus*, linnet *Carduelis cannabina*, mallard, mute swan, reed bunting, skylark *Alauda arvensis*, song thrush and stock dove.

284. However, no birds listed on Schedule 1 of the Wildlife and Countryside Act (as amended) (1981) have been recorded as nesting within the breeding bird survey area. Following refinement of the onshore project area (since the 2017 Breeding Bird survey was undertaken), Booton Common SSSI, Dillington Carr SSSI and Dereham Rush Meadows SSSI are now located more than 300m from the onshore project area.

285. In addition, there were suitable habitats for common breeding birds found throughout the survey area.

286. There is potential to disturb wintering and breeding birds during construction.

## 10.2 Embedded Mitigation

287. General embedded mitigation will apply to birds as described in Table 4.1 and Table 4.2.

## 10.3 Additional Mitigation

288. The additional mitigation measures outlined below will be applied under both scenarios.

### 10.3.1 Construction

289. The following mitigation will be applied in relation to statutory designated sites under both scenarios:

- Adherence to JNCC's scheme to reduce disturbance to waterfowl during severe winter weather (available on the JNCC website (http://jncc.defra.gov.uk/page-2894)) during construction works at the landfall and along the onshore cable route in areas within 5km of the Broadland SPA and Ramsar site, including ceasing operations when temperatures drop below agreed criteria[1] during the period 9th November to 20th February; and
- Best practice construction mitigation measures will be in place to minimise dust, noise and light emissions during construction. These measures are detailed in the outline CoCP (Document reference 8.1) which is secured by Requirement 20 of the DCO.

290. The following mitigation is proposed in relation to wintering / on passage birds:

- To minimise the potential effects upon lapwing and other species using arable land within the onshore project area, it is proposed that these habitats are only subject to works for one winter period in any one area in consecutive years (for example, if works occur during the winter period 2021-2022 (November to February), no winter works are undertaken in the same location in winter 2022-2023;
- Habitats which are temporarily lost during construction will be reinstated where possible following completion of construction. All hedgerows which

[1] When more than half of these meteorological stations (in Scotland and/or England/Wales) (as listed on JNCC website http://jncc.defra.gov.uk/page-2894) have recorded frozen conditions (determined from minimum air and grass temperatures) for seven consecutive days (but allowing short periods of thaw).

are removed to enable the project will be reinstated following guidance within the Norfolk hedgerow BAP and will include appropriate species for north-east Norfolk (NBP, 2009). Future hedgerow management will include allowance for standard trees to develop; and

- The project is aiming for a construction scenario whereby construction works within the River Wensum floodplain (i.e. land north of Penny Spot Beck) are not required, and a trenchless crossing technique (e.g. HDD) at the River Wensum would run beneath this area. However, in advance of a more detailed assessment of ground conditions, this cannot be confirmed at this stage. If land north of Penny Spot Beck within the River Wensum floodplain is used during construction, then works will take place outside of the winter period (October – February inclusive). If this is not possible, an area of the floodplain habitat will be left undisturbed to provide wintering habitat for waders / wildfowl using this site for the duration of the works in this area.

291. The following mitigation is proposed in relation to breeding birds:

- Construction methodologies proposed for site vegetation clearance include the removal of all nesting habitat for common breeding birds outside of the bird breeding season (typically March-August inclusive, temperature and weather dependant). As such, risk of damaging, destroying or disturbing the nest of any wild bird (either during construction or whilst in use) during the onshore project area works has been removed. If for any reason vegetation is not removed outside of the bird breeding season, a pre-construction check for nesting birds will be undertaken at most 48 hours in advance of construction, and any nests identified will be protected and left undisturbed until the young have fledged;
- Keeping the winter crop stubble within the onshore project area low during the bird breeding season (which is typically from March to August, although can commence earlier or later depending on the weather conditions) in order to minimise the chance of notable ground nesting birds (i.e. skylarks, corn bunting and stone curlew) nesting prior to work on arable land. If for any reason winter crop stubble is not kept low and should works commence within the bird breeding season (March - August inclusive), a pre-construction check for nesting skylarks will be undertaken at most 48 hours in advance of construction, and any nests identified will be protected and left undisturbed until the young have fledged;
- Set aside ground-nesting bird areas outside of 50m of the cable route prior to construction works. The locations for these set-aside mitigation areas would be agreed in consultation with Natural England post-consent, and would follow the RPSB's Skylark: Advice for Farmers in creating skylark habitat;

- The landscaping proposals described in section 6 have been designed to ensure that new planting is created to compensate for the permanent loss of species-rich hedgerow at the onshore project substation. New hedgerow is proposed along the margin of onshore project substation, and existing hedgerows will be enhanced with adjacent woodland and species-rich grassland planting. Please see section 6 for full details of the proposed landscape mitigation planting; and
- Bat Conservation Trust's (BCT) Artificial lighting and wildlife guidance (2014) will be adhered to when designing lighting during temporary works at trenchless crossing locations.

### 10.3.2 Post Construction

292. All habitats which are temporarily lost during construction will be reinstated following completion of construction.

293. Due to the disturbance of operational lighting from the onshore project substation and National Grid substation, a lighting scheme will be designed for the final design for the permanent infrastructure, which will include measures to minimise light spill following the Bat Conservation Trust's (BCT) Artificial lighting and wildlife guidance (2014) (see also section 9.7.3.3). This will be included within the project Design and Access Statement (document reference 8.3).

# 11 TIMINGS

294. The timings of the mitigation outlined in this document, and any further mitigation which is proposed following receipt of pre-construction baseline survey data, will be provided within the project EcoMP (DCO Requirement 24), and the details of which will be approved by the relevant planning authority in consultation with Natural England prior to construction. No timing information is provided at this stage.

# 12 MONITORING AND COMPLIANCE

## 12.1 Ecological Clerk of Works

295. An ECoW would be present on site where required during construction in order to ensure compliance with the project EcoMP under both scenarios. The ECoW will be responsible for ensuring implementation of the agreed ecological mitigation measures on site during construction. The ECoW will monitor and record the success of the delivery of these ecological mitigation measures.

296. If protected species are unexpectedly found, or trees and hedges specified to be retained are damaged during construction, the following action would take place:

- Works would cease immediately;
- The ECoW and the Construction Manager would be informed;
- The relevant area would be demarcated and access would be restricted if necessary;
- A way forward would be established and agreed and if necessary licences and authorisations would be sought; and
- Works would restart once the ECoW, Natural England, Norfolk County Council and or North Norfolk, Broadland or Breckland Council (as appropriate) are satisfied with the works proposed.

297. Norfolk Boreas Limited will work with the relevant local authorities to ensure appropriate resourcing is in place to monitor compliance with the provisions of the OLEMS, and the plans and schemes of which it forms the basis.

## 12.2 Post-Construction Monitoring

298. The following post-construction monitoring will be undertaken under both scenarios.

### 12.2.1 Water voles

299. Post-construction monitoring during breeding seasons one year after completion of construction will be undertaken to determine the status of the water vole population.

### 12.2.2 Great crested newts

300. If mitigation for great crested newts is proposed for the unsurveyed areas following receipt of the survey results for these areas, this is likely to include post-construction population monitoring. The details of any post-construction mitigation will be agreed with Natural England via consultation post-consent.

# 13 LICENSING REQUIREMENTS

## 13.1 Introduction

301. In instances where European and certain UK protected species have been recorded within the study area for the project, in order to carry out some elements of the proposed mitigation for that species, a UK or EPS licence will be required. These licences will allow the project to undertake otherwise prohibited activities in order to ensure that favourable conservation status of the species in question is maintained.

302. A summary of the licences anticipated to be required for the project, the information required within each licence, when each licence will need to be obtained and what activities each licence will cover is provided below. Under Scenario 1 the location of the jointing pits, and the construction activities, will not be confirmed until post-consent. As such the requirement for licences cannot be determined at this stage, therefore it is assumed the licence will be required under both scenarios.

303. The final EcoMP will provide full details of the licences to be sought, once full post-consent survey data has been obtained and the development scenario has been confirmed.

## 13.2 Great Crested Newt Mitigation Licence

304. Although great crested newts have been recorded within four water bodies within 250m of the temporary works and 500m of the permanent works of the onshore infrastructure, given the barriers between these water bodies and the onshore project area, presence of great crested newts within the onshore project area has been considered unlikely and a great crested newt mitigation licence is not considered necessary.

305. There are a further 120 water bodies located within or within 250m of the temporary works and 500m of the permanent works of the onshore infrastructure which could not be surveyed during the 2017 and 2018 surveys. Although at this stage it is not known whether or not these water bodies support great crested newts, given the scale of the unsurveyed areas and the existing desk-based information regarding the extent of great crested newts within the study area, it is considered likely that great crested newt presence will be encountered during full baseline surveys conducted post-consent, and therefore that a great crested newt mitigation licence will need to be sought from Natural England.

306. To this end, a draft great crested newt mitigation licence was prepared which contained the following information:

- Details of the surveys conducted to date;
- A draft assessment of the potential impacts of the project should great crested newts be found in all unsurveyed areas; and
- A draft proposed approach to mitigation should great crested newts be found in all unsurveyed areas.

307. In addition, a proposal for undertaking mitigation using Natural England's new licensing policies (Policies '1' and '2') which have been in place since December 2016 (Natural England, 2016) was also considered.

308. In line with this OLEMS the draft great crested newt mitigation licence application considers both scenarios. The decision on which of the two scenarios will be taken forward to construction will be made post-consent and the final licence application will be drafted based on the final selected scenario.

309. The draft great crested newt mitigation licence application has been submitted to Natural England and Norfolk Boreas Limited are seeking a Letter of No Impediment from Natural England so that there is no impediment to issuing a licence in the future.

## 13.3 Bat Mitigation Licence

310. During the surveys conducted to date, no active bat roosts have been found within trees which will need to be removed for construction of the project, and therefore no bat mitigation licence is considered to be required at this stage.

311. 20 trees and structures – plus any further suitable trees and structures identified during pre-construction baseline surveys – were not surveyed during the 2017 and 2018 surveys, therefore the possibility of encountering roosting bats during construction cannot be ruled out at this stage. If roosting bats are found following full baseline survey data collected post-consent, then a bat mitigation licence would need to be sought from Natural England. Details of this licence, if required, would be included within the EcoMP.

## 13.4 Licence to Interfere with a Badger Sett

312. During the surveys conducted to date, three active badger setts were found within the onshore project area, and therefore a licence to interfere with a badger sett for the purpose of development is considered to be required at this stage. This would require the preparation and submission of a licence application to Natural England and would follow their Standing Advice (Natural England, 2015a) on sett closure and destruction.

## 13.5 Water Vole Mitigation Licence

313. As outlined in section 9.8, in order to minimise the potential impacts upon water voles at Penny Spot Beck (WV14 and WV15) and drains NV-WB01, NV-WB07, NV-WB10 during construction, displacement under licence is proposed.

314. Unlike the licences described above, where a specific project mitigation licence is required, it is proposed that water vole displacement is carried out by a registered person (and their assistants) under a class licence for intentional disturbance of water voles and damage/destruction of water vole burrows by means of 'Displacement'. The methodology for displacement would be devised under the conditions of the class licence by the licence holder, and details of the licence holder and the methodology to be employed would be included within the EcoMP.

315. A further seven watercourses along the cable route could not be surveyed during the 2017 and 2018 surveys. When full baseline data is collected for these surveys post-consent, if water vole presence is found then displacement under licence will also be required for these watercourses.

# 14 SUMMARY

316. This OLEMS has been drafted in order to provide a framework for the following plans proposed to be submitted prior to construction of the project under the Requirements of the project DCO:

- Requirement 18 – Provision of landscaping.
- Requirement 19 – Implementation and maintenance of landscaping.
- Requirement 24 – Ecological management plan.

317. This OLEMS is an outline strategy and takes account of both potential development scenarios for project as discussed in section 1.2. The final Landscaping Management Scheme and Ecological Management Plan for the project will be drafted post consent and based on the final development scenario which will be taken forward to construction.

318. This OLEMS has summarised the landscape and ecological mitigation and enhancement measures which have been proposed within the ES and associated documents. The OLEMS also details the procedures which have been proposed for ensuring monitoring of and compliance with these measures.

319. The key embedded mitigation measures summarised in this OLEMS are:

- HVDC solution to reduce the footprint of the onshore project area;
- Route refinement of the onshore project area; and
- Trenchless crossing techniques (e.g. HDD) at woodlands, watercourses and County Wildlife Sites (CWS).

320. Additional mitigation measures are provided for the following receptors within the onshore project area:

- River Wensum SAC and SSSI;
- Paston Great Barn SAC and SSSI;
- Norfolk Valley Fens SAC and Booton Common SSSI;
- The Broads SAC;
- Dillington Carr SSSI;
- Pigney's Wood LNR;
- Ancient woodlands;
- County Wildlife Sites;
- Woodland and trees;
- Hedgerows;
- Grassland;
- Watercourses and ponds;
- Arable land;
- Badgers;
- Bats;
- Water voles;
- Otter;
- Great crested newts;
- Reptiles;
- Fish;
- Invasive non-native species; and
- Birds.

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