Norfolk Vanguard Offshore Wind Farm

Onshore Ecology Clarification Notes - Position Statement

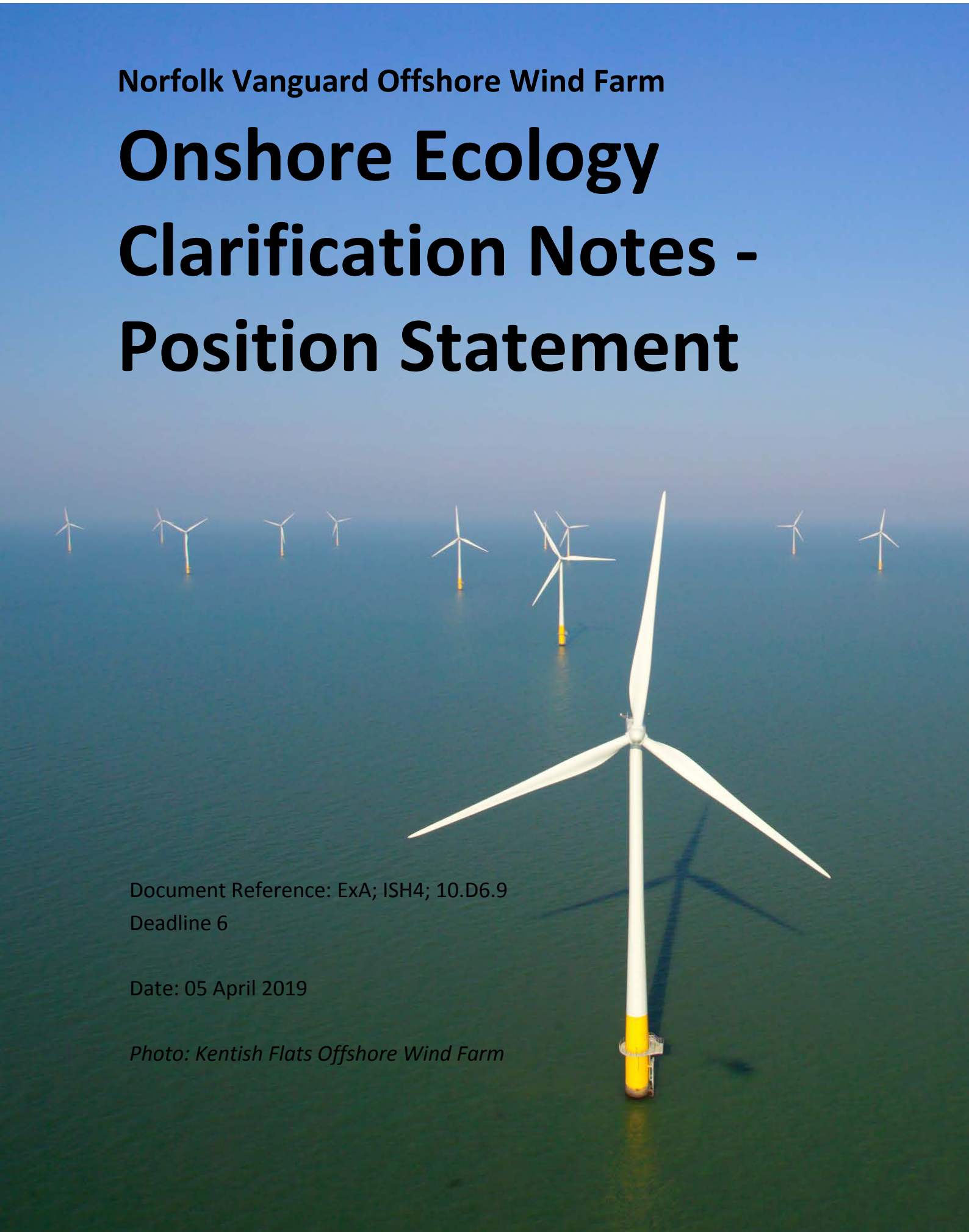

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Photo: Kentish Flats Offshore Wind Farm

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1 SUMMARY OF ONSHORE ECOLOGY CLARIFICATION NOTES

1.1 Introduction

1. During the Issue Specific Hearing on Environmental Matters (ISH4) on 27 March 2019, the Examining Authority (ExA) requested a position statement regarding outstanding issues following Natural England's response to four clarification notes produced by the Applicant in relation to onshore ecology (Action Point 13). This position statement sets out the process that will be undertaken to progress these remaining issues.

2. A copy of the four clarification notes are included as Appendix 1 and Natural England's responses are provided in Appendix 2.

1.2 Clarification Note – Water Dependent Designated Sites

- First version issued to Natural England – 30.11.2018
- Natural England's advice received – 08.01.2019
- Telecon to discuss Natural England's comments – 22.01.2018
- Second version issued to Natural England – 27.02.2019
- Telecon to discuss content of clarification note – 27.02.2019
- Natural England's advice received – 18.03.2019 (captured in Applicant's responses to Examiners second written questions)

1.2.1 Natural England's response

"Concerns withdrawn
Following receipt of further information on 27 February 2019 Natural England is satisfied that the specific issues we have raised in previous correspondence relating to the assessment of impacts to water dependant designated sites have been resolved."

1.2.2 Applicant's approach

3. No further action required.

1.3 Clarification Note – Bat Impact Assessment – Paston Great Barn Special Area of Conservation (SAC)

- First version issued to Natural England – 30.11.2018
- Natural England's advice received – 22.01.2019
- Telecon to discuss Natural England's comments – 22.01.2018
- Second version issued to Natural England – 27.02.2019
- Telecon to discuss content of clarification note – 27.02.2019
- Natural England's advice received – 20.03.2019 (captured in Applicant's responses to Examiners second written questions)

1.3.1 Natural England's response

"Concerns withdrawn
Following receipt of further information on 27 February 2019 Natural England is satisfied that the specific issues we have raised in previous correspondence relating to the assessment of bats at Paston Great Barn SAC have been resolved.

We advise that, as a requirement of the development, that prior to removal of hedgerows, an OLEM/EMP is developed in consultation with Natural England. The plan should include for the improvement of the hedgerows either side of the section to be removed including any gapping up, tree management and the development of scrub/rough grassland margins. The mitigation plan should be in place for 7 years or until the original hedgerow has recovered fully. Consideration could be given within the OLEM/EMP to the planting of more mature hedge plants, that could reduce the time required for these hedgerows to return to their original state/or better."

1.3.2 Applicant's approach

4. The Outline Landscape and Ecological Management Plan (OLEMS) will be updated to capture these commitments to affected hedgerows within 5km of Paston Great Barn SAC. The updated OLEMS will be submitted at Deadline 7.

5. No further action required.

1.4 Clarification Note – Sediment Management at the River Wensum crossing

- Note issued to Natural England – 27.02.2019
- Telecon to discuss content of clarification note – 27.02.2019
- Natural England's advice received – 18.03.2019 (captured in Applicant's responses to Examiners second written questions)

1.4.1 Natural England's response

"Most concerns withdrawn*.*
However further information is required regarding some elements. Following receipt of further information on 27 February 2019 Natural England is broadly satisfied that the specific issues we have raised in previous correspondence relating to the assessment of sediment management at the River Wensum crossing have been resolved. However, further clarification is still required with regards to:

1. ***Restoration plan outside of functional floodplain***
   We would expect the detailed design to demonstrate that reseeding of bare ground within the River Wensum catchment would not have a detrimental effect on water quality within the River Wensum SAC. If a negative impact on water quality cannot be ruled out at the detailed design stage then turf stripping may be necessary within a wider area of the catchment, not just the floodplain. Natural England look forward to commenting on the detailed design;
2. ***Reinstatement of work areas***

Whilst the clarification note states that 'any damage to ground conditions caused by vehicle tracking will be rectified prior to the reinstatement of topsoil/turf', there are no details on how this will be done. Natural England would request further information in this regard; and

3. ***Number of HDD's***
   Natural England expects confirmation on the exact number of HDD crossings to be provided in the detailed scheme and programme which will include site specific water course crossing. Please note that whilst this clarification note broadly allays Natural England's concerns with regards to impacts on River Wensum SAC / SSSI we would defer to the Environment Agency with regards to its suitability to allay any concerns regarding flood risk. Therefore, Natural England recommends that this clarification note is also provided to the Environment Agency for comment if this hasn't already been done."

1.4.2 Applicant's approach

1.4.2.1 Restoration plan outside of the functional floodplain

6. The Applicant is considering Natural England's suggestion that the approach to restoration of grassland (deep turf stripping and replacement – rather than re-seeding) may need to be applied to all grassland within the River Wensum catchment if it cannot be demonstrated that a negative impact on water quality can be ruled out.

7. The Applicant will provide further information to Natural England ahead of Issue Specific Hearing 6 on the approach to restoration outside of the functional floodplain. Subject to Natural England's acceptance this detail will be incorporated in an update to the OLEMS.

1.4.2.2 Reinstatement of work areas

8. The Applicant will provide further information to Natural England ahead of Issue Specific Hearing 6 on the methods that will be employed to rectify damage to ground conditions caused by vehicle tracking. Subject to Natural England's acceptance this detail will be incorporated into an update to the outline Code of Construction Practice (oCOCP).

1.4.2.3 Number of HDDs

9. The number of HDDs will be confirmed in a scheme of watercourse crossings to be submitted post-consent. This will include the design, mitigation and restoration of each watercourse crossing. The scheme will be submitted to and approved by the relevant planning authority in consultation with Natural England. This is secured through DCO Requirement 25.

10. The Sediment Management clarification note has also been provided to the Environment Agency (25.03.2019). The flood risk aspects outlined within the note have been captured within the Statement of Common Ground between the Applicant and The Environment Agency submitted at Deadline 4 (Rep2-SOCG-6.1) and all points related to flood risk are agreed between the two parties.

11. No further action required.

1.5 Clarification Note – Other Outstanding Issues

- Note issued to Natural England – 27.02.2019
- Telecon to discuss content of clarification note – 27.02.2019
- Natural England's advice received – 18.03.2019 (captured in Applicant's responses to Examiners second written questions)

1.5.1 Natural England's response

***"Further information required to determine impacts on designated sites/landscapes**.*
Broadland SPA/Ramsar site: This site was scoped out of the HRA on the basis that there was evidence of low levels of wintering birds associated with the SPA/Ramsar using the study area. However, this may have been due to the cropping regime at the time of survey. We requested that this point was taken account of by including additional measures, e.g. survey and/or WeBS data and information about predicted crop patterns at the time of the proposed work. We suggested that the Outline Landscape and Ecological Management Strategy (OLEMS) is amended to include further survey and provide suitable mitigation measures if required.
Natural England would expect to see an assessment of cropping rotation and how this may impact bird species present across several years so as to assess whether or not the low numbers of birds was due to the cropping regime of that particular year or genuinely represents low usage of those areas. Until this has been done Natural England cannot agree with the conclusions regarding wintering birds at Broadland SPA / Ramsar."

1.5.2 Applicant's approach

12. The Applicant is considering Natural England's suggestion that further survey / assessment / mitigation may need to be identified in relation to wintering birds utilising arable land within 5km of Broadland SPA (and within 300m of the Norfolk Vanguard Order limits).

13. The Applicant will provide further information to Natural England ahead of Issue Specific Hearing 6 on this unresolved matter. Subject to Natural England's agreement any further commitments will be incorporated in an update to the OLEMS.

APPENDIX 1 – NORFOLK VANGUARD CLARIFICATION NOTES

Appendix 2 (version 2)
Clarification Note: Norfolk Vanguard Water Dependent Designated Sites

HaskoningDHV UK Ltd.

1 Introduction

Within their Relevant Representation to the Norfolk Vanguard Offshore Wind Farm Development Consent Order (DCO) application, Natural England stated:
"*From the information provided, we are not able to agree with this conclusion* [of no impact to Norfolk Valley Fens Special Area of Conservation (SAC) and The Broads SAC] *as all sites are dependent on groundwater supply. We advise that further information is obtained from Environment Agency and used in a detailed appraisal of groundwater effects, e.g. WetMex* [sic] *data showing the water supply mechanism for all the component sites and/or Environment Agency's groundwater modelling. If the installation of the cable route would affect the groundwater supply to these sites, then a detailed assessment should be undertaken and mitigation measures implemented to minimise any identified effects*."

"*Natural England notes that nationally designated sites over 500m from the project area have been screened out, however on that basis, Dereham Rush Meadow SSSI should have been screened in. We suggest the following wetland sites should be screened in for further consideration of impacts on groundwater supply and surface water quality:*

- *Dereham Rush Meadow SSSI (0.4km away);*
- *Holly Farm Meadow, Wendling SSSI (0.9km away);*
- *Whitwell Common SSSI (1.2 km away)*"

The information within this note provides clarification of the groundwater supply to the designated sites identified by Natural England above, and examines the potential for the installation of the onshore cables for Norfolk Vanguard to affect this groundwater supply. In addition, clarification is also provided with regards to the potential for impacts on surface water quality to affect these designated sites.

Following further consultation with Natural England on the 22nd January 2019, this note has been updated to include provision of a conceptual model of groundwater flows with respect to Norfolk Valley Fens SAC (Booton Common SSSI component), to provide further clarity regarding groundwater flows for this site.

2 Groundwater supply

The Environment Agency's WetMecs data has been reviewed in detail to identify the groundwater supply mechanism for each of the sites identified above. The WetMecs information for each site is summarised in **Table 1** below.

Table 1: Water dependent designated sites and their water supply mechanism

Designated site	Designated site water supply mechanism (WetMecs data)
Norfolk Valley Fens SAC (Booton Common component SSSI)	The following WetMecs are present at Booton Common: ***WETMEC 10a ('Type 1'):*** Localised Strong Seepage ***WETMEC 10b ('Type 1'):*** Diffuse Seepage ***WETMEC 11a ('Type 2'):*** Permeable Partial Seepage ***WETMEC 11b ('Type 2'):*** Slowly Permeable Partial Seepage ***WETMEC 13a ('Type 4'):*** Seepage Percolation Surface (small hollow) ***WETMEC 17a ('Type 1')***: Groundwater-Flushed Slope (part of slope). The site is an elongated mire developed on a narrow seepage slope above the Blackwater Drain. There are two main ecohydrological facets to the site: (i) near the west end there is a small, sloping permanent seepage face, occupying and adjoining a shallow, flushed gully, which supports the primary conservation interest (M13); (ii) East of this, and continuous with it, are various types of less rich fen vegetation (mainly fen meadow and tall herb fen) in locations where – for the most part – the water table scarcely reaches the surface, or does so only intermittently. Groundwater discharge to the site is considered to be predominantly artesian water from the Upper Chalk aquifer beneath the site, particularly in its western end. The water supply for the eastern site is less certain, and may either arise due to upward leakage from the chalk water, or intermittent lateral seepage from the drift deposits, or both. Surface water flows are considered to have little relevance to the site water balance. The main stream to the north of the site is Internal Drainage Board (IDB) managed, and does not regularly flood the site. ***Summary:*** Predominantly fed by artesian water from the semi-confined chalk aquifer (vertical flows), with the possibility of some additional lateral flows from the drift aquifer feeding the eastern site.
The Broads SAC (Broad Fen, Dilham component SSSI)	The exact WetMecs present at Broad Fen, Dilham have not been determined. The following WetMecs may be present (Wheeler & Shaw, 2000): ***WETMEC Type 4:*** Seepage Percolation Basins ***WETMEC Type 5:*** Summer 'Dry' Percolation Surfaces ***WETMEC Type 6:*** Surface Water Percolation Floodplains ***WETMEC Type 7:*** Summer 'Dry' Floodplains The site is a large area of fen, counting a series of ponds and terrestrialised turf ponds.

Designated site	Designated site water supply mechanism (WetMecs data)
	Access constraints in recent years mean that rather little is known about the characteristics of the site. It is possible that groundwater flows predominantly from the underlying Contorted Drift and Crag, contribute to the site's water supply. The fen is also regularly flooded, and although this is likely to be surface water the provenance of the water is not known. ***Summary:*** Water supply for this site has not been established with any certainty. It is likely that groundwater supply (predominantly from the underlying Drift and Crag) and surface water supply (predominantly from winter flooding from adjacent watercourses) are important, but no evidence is available as to what extent these play a role is maintaining site integrity.
Dereham Rush Meadow SSSI	Dereham Rush Meadow has not been assigned WetMecs following Wheeler & Shaw. The descriptive assessment of the water supply mechanism provided below is derived from the SSSI citation. The site is an area of winter-flooded meadowland and alder carr situated in the valley of a the Wendling Beck. The site is predominantly subject to seasonal water supply from wintering surface water flooding of the valley basin. The river now occupies a new cut on the valley side, and the old stream course in the bottom is subject to regular inundation. The northernmost (downstream) part of the site is likely subject to some groundwater influence giving rise to calcareous vegetation types including bird cherry *Prunus padus* and guelder rose *Viburnum opulus* in the shrub layer. Dog's mercury *Mercurialis perennis*. ***Summary:*** The site is predominately surface water fed from inundation from the Wendling Beck. Evidence of localised groundwater intrusion is apparent in the downstream end of the site.
Holly Farm Meadow, Wendling SSSI	The following WetMecs are present at Holly Farm Meadow: ***WETMEC Type 2:*** Intermittent Seepage The site consists mainly of moist marshy grassland, with a tiny area of true fen in the western part of the site. Geological data for the site indicates that the primary water supply mechanism for the site is weak upward flow from the semi-confined Chalk aquifer. The site only experiences minimal, localised flushes so the water supply at this site is marginal. Drains constructed for the nearby A47 / railway cutting have likely restricted water levels at the site. No surface water supply sources have been noted. ***Summary:*** Fed by weak upward leakage from underlying Chalk aquifer (vertical flows).
Whitwell Common SSSI	The following WetMecs are present at Whitwell Common: ***WETMEC Type 1:*** Permanent Seepage Slope

Designated site	Designated site water supply mechanism (WetMecs data)
	WETMEC Type 2: Intermittent Seepage ***WETMEC Type 4:*** Seepage Percolation Basins ***WETMEC Type 8:*** Valley Bottom Wetlands The site comprises a large valleyhead fen on the Blackwater Drain, downstream of Booton Common and upstream of the River Wensum. The water levels and supply varies across the site, and the site supports a number of habitats, including wet fen woodland, tall herb fen, fen meadow (in depression and seepage slopes), reedbed, but also dry oak woodland. Groundwater appears to be the main source of water supply to the site, arising from Chalk aquifer below 3-10m below the site and from lateral and vertical flows from the shallower Drift deposits sitting above the Chalk. Aquitards are present within the Drift which focus the vertical groundwater flow into discrete seepages within the site. No notable surface water input has been identified for the site. ***Summary:*** Groundwater appears to be the main source of water (vertical flows), arising through the Chalk and Drift hydrogeological unit beneath the site.

Table 2 provides details of each water dependent designated site, their proximity to the buried onshore cables (both shallow trenched installation and deeper trenchless installation). It also contains the depth of the water bearing strata in proximity to the construction works, sourced from British Geological Survey (BGS) borehole online data.

The locations of these designated sites are shown on Figure 22.2 of Environmental Statement (ES) Chapter 22 Onshore Ecology (DCO document 6.2) and Figure 5.5 of Information to Support Habitats Regulation Assessment (DCO document 5.3).

The underlying solid geology throughout the onshore project area is Chalk overlain by diamicton (boulder clay). The solid geology and drift geology are presented on Figures 19.1 and 19.2 of ES Chapter 19 Ground Conditions and Contamination (DCO document 6.2). The depth of the Chalk aquifer along the cable route is identified within **Table 2**.

Table 2: Water dependent designated sites and their proximity to the proposed Norfolk Vanguard onshore buried cables

Designated site	Distance to nearest trenching works	Distance to nearest trenchless crossing	Designated site water supply mechanism (*as detailed in in Table 1*)	Approximate depth of Chalk aquifer at nearest trenchless crossing (*based on BGS boreholes TG02SE14 and TG12SW11*)	Importance of groundwater flows to water supply
Norfolk Valley Fens SAC (Booton Common component SSSI)	0.6km	0.6km	Predominantly fed by artesian water from the semi-confined chalk aquifer (vertical flows), with the possibility of some additional lateral flows from the drift aquifer feeding the eastern site.	18m	Important
The Broads SAC (Broad Fen, Dilham component SSSI)	3.6km	4km	Water supply for this site has not been established with any certainty. It is likely that groundwater supply (predominantly from the underlying Drift and Crag) and surface water supply (predominantly from winter flooding from adjacent watercourses) are important, but no evidence is available as to what extent these play a role is maintaining site integrity.	40m	(Potentially) Important)
Dereham Rush Meadow SSSI	0.4km	0.4km	The site is predominately surface water fed from inundation from the Wendling Beck. Evidence of localised groundwater intrusion is apparent in the downstream end of the site.	18m	Not important
Holly Farm Meadow, Wendling SSSI	0.9km	0.9km	Fed by weak upward leakage from underlying Chalk aquifer (vertical flows).	17m	Important
Whitwell Common SSSI	1.2km	1.6km	Groundwater appears to be the main source of water (vertical flows), arising through the Chalk and Drift hydrogeological unit beneath the site.	24m	Important

The WetMecs data indicates that three of these designated sites are predominantly groundwater fed, with a lack of information available to confirm whether a fourth is also reliant on groundwater. In order to understand the groundwater flows between these sites and the Norfolk Vanguard project area, a conceptual model of groundwater flows has been developed.

3 Conceptual Model

A conceptual model has been developed in order to illustrate the likely risks to groundwater supply to these sites from the installation of the cable route and habitats most likely impacted by any changes to groundwater (see **Table 1**). This is shown in **Figure 1** and the pollutant linkages are described in more detail in **Table 3**. The risk ratings applied in **Table 3** are defined in **Table 4**.

The underlying geology of this part of Norfolk is Chalk overlain by diamicton (boulder clay), with crag and Quaternary (drift) deposits at the surface; therefore, the interactions between the project and the underlying geology is likely to be similar for all sites. A conceptual model has therefore been developed for Booton Common, as the closest site to the onshore project area (0.6km). This site has also been identified as the designated site of key concern through consultation with Natural England on this topic[1].

The key components of the conceptual model are discussed in more detail below.

Characteristics of the Chalk aquifer

Along the onshore cable route, the Chalk aquifer is present at depths of 18-40m below ground level and overlain by diamicton (boulder clay). Site investigations have been undertaken at the majority of the trenchless crossing locations along the onshore cable route and a description of the geological horizons is provided within ES Chapter 19 Ground Conditions and Contamination – section 19.6.2.1. BGS borehole data has also been included in **Table 1** for added context as the Chalk aquifer is deeper than most of the site investigation boreholes that were installed for the project.

Interactions between proposed cable installation and water supply mechanisms to designated sites

The onshore cable installation works comprise open cut trenching (to typical 1.5m trench depth) and a number of trenchless crossings (typically 6-8m below ground level) at key sensitive features. Based on the known depths of the Chalk aquifer, this would locate the installation of the cables at least 7m above the aquifer at its shallowest point. As such, direct impacts to underlying Chalk will not occur.

The groundwater flows supplying the designated sites, as identified in **Table 1**, are predominantly vertical, with typically only intermittent or weak localised lateral flows through the drift deposits. It is therefore assumed that the Chalk and/or Drift deposits located in the immediate vicinity of the sites are providing water supply to those sites which are predominantly groundwater-fed.

Figure 1 illustrates that the cable route will not extend beneath the diamicton (boulder clay) layer. This is lower permeability material than the overlying sand and gravel of the glaciofluvial deposits (where present) and the underlying Chalk.

Given that there will be no excavation into the Chalk aquifer across the onshore cable route, pollution of groundwater directly affecting the saturated Principal Aquifer as a result of installation of the onshore cables is not a consideration.

[1] Discussed at the meeting between the Applicant and Natural England on 22nd January 2019, as part of the Norfolk Vanguard Examination.

Interactions between proposed dewatering and water supply mechanisms to designated sites
It is likely that periodic dewatering within the onshore cable trenches (from rainfall and groundwater) will be required during the construction works. Construction teams will only work on a short length of cable route (approximately 150m section) at a time. Once the ducts have been installed in a 150m section the trenches would be back-filled with subsoils, and the stored topsoil re-distributed over the area of the 150m workfront. The time from topsoil strip to reinstatement would typically be two weeks in each 150m section.

Given that trenches will only be open for short stretches and for 1-2 weeks at a time this activity unlikely to comprise significant volumes of water (to dewater), and there is unlikely to be a significant impact to the Principal Chalk Aquifer. Moreover, the presence of the boulder clay aquiclude above the chalk means there is only weak connectivity between the chalk and the superficial deposits, and therefore any water supply generated is unlikely to make its way into the chalk aquifer.

A Surface Water Drainage Plan (SWDP) will be prepared post-consent which will require approval by the relevant planning authority in consultation with the Environment Agency and Norfolk County Council and Lead Local Flood Authority. The SWDP will be implemented to minimise water within the onshore cable trench and other working areas and ensure ongoing drainage of surrounding land prior to construction. This commitment is secured through Requirement 20(2)(i) (Surface Water Drainage Plan) of the draft DCO.

Pollutant linkages
No pollutant linkages have been identified for the proposed development during its operational phase, therefore, there is not considered to be a risk to groundwater during the operation of the proposed onshore cable route.

Watercourse crossings
Dereham Rush Meadow SSSI and Holly Farm Meadow SSSI are both located upstream of the watercourse crossing works associated with Norfolk Vanguard. On this basis, there would be no direct pathway for pollutants between these sites and the onshore construction works.

Surface water impacts to Booton Common SSSI are considered in detail within the Information to Support Habitats Regulation Assessment (DCO document 5.3) at Section 9.3.3.2, which concludes no adverse effect on integrity. Whitwell Common SSSI is fed by the Blackwater Drain downstream from Booton Common. The findings for Booton Common SSSI would be equally applicable to Whitwell Common SSSI, i.e. no adverse effect on integrity.

In addition, the Applicant has committed to develop a scheme and programme for each watercourse crossing, diversion and reinstatement, which will include site specific details regarding sediment management and pollution prevention measures. This scheme will be submitted to and approved by the relevant planning authority in consultation with Natural England. This commitment is secured through Requirement 25 (Watercourse Crossings) of the draft DCO.

With these commitments in place there will be sufficient control measures to safeguard designated sites in relation to sediment control, pollution prevention and reinstatement of all work areas at watercourse crossings.

Figure 1: Conceptual Model

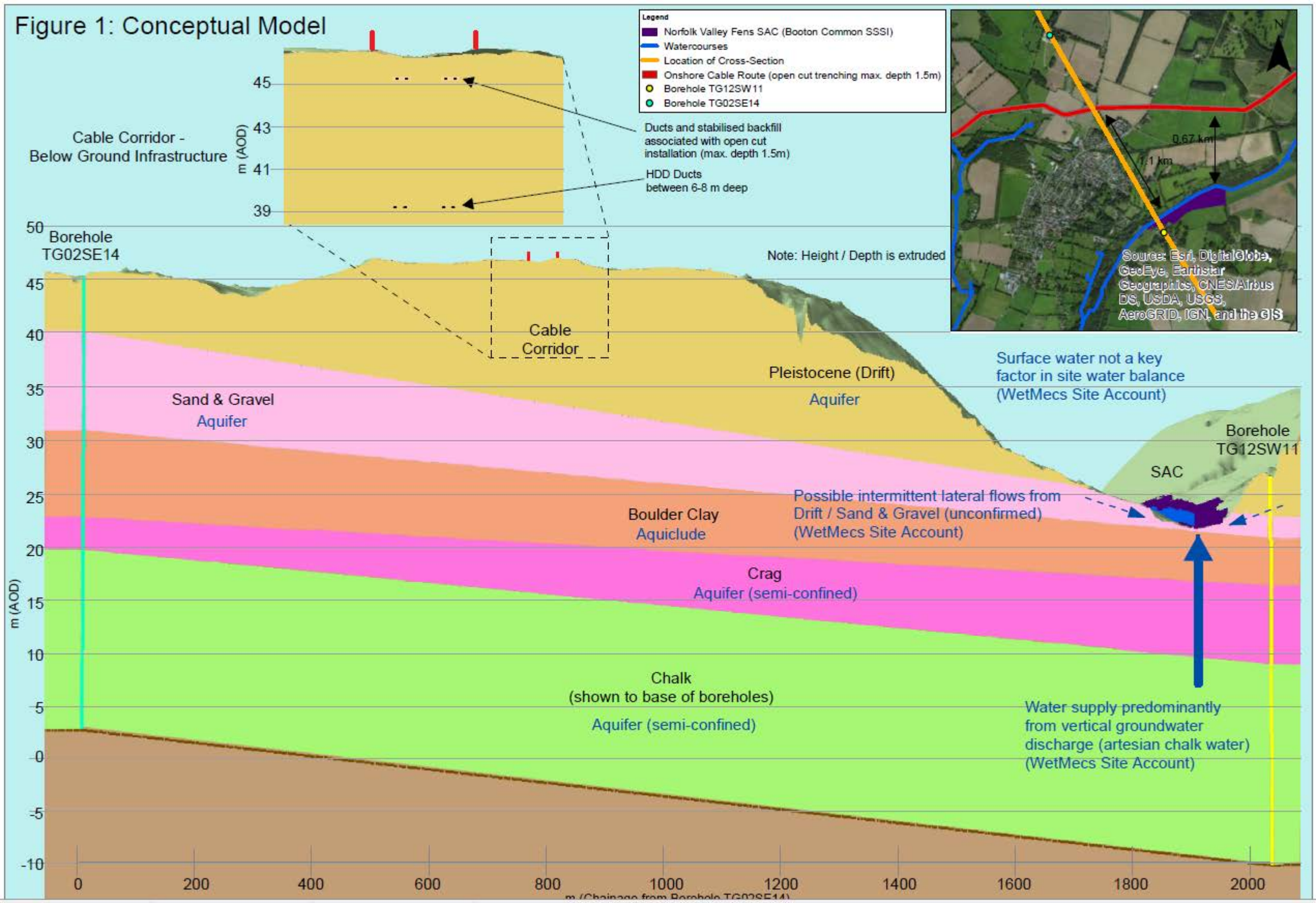

Table 3: Summary of Conceptual Model – Pollutant Linkages

Source	Pathway	Receptor	Risk rating	Mitigation proposed	Risk rating following mitigation
Fuel or oil spills from machinery on site	Excavation of trench for cable route and surface water run-off	Groundwater in superficial aquifer (where present) Groundwater in Chalk aquifer	High	• No refuelling in or in proximity to designated sites. • No storage of any potentially contaminative materials in or in proximity to designated sites. • No welfare facilities in or in proximity to designated sites. Mitigation secured within the project's post-consent Code of Construction Practice, which Natural England will be consulted on prior to discharge.	Low
Sediment fines	Open trench through small drainage channels	None likely – not a pollutant linkage. The sediment fines will be trapped by superficial aquifer and will not travel through the silty clay layer	Negligible	Prevent silt generation through use of silt trapping devices when working in crossing areas. Mitigation secured within the project's post-consent Surface Water Drainage Plan, which Natural England will be consulted on prior to discharge.	Negligible
Contaminated surface water	Over-pumping during open trenching and discharge to ground. Dewatering excavations	Groundwater in superficial aquifer (where present) Groundwater in Chalk aquifer	Medium	Any dewatering would be restricted to pumping direct to interceptor drains within our surface water drainage system (as set out in the Surface Water Drainage Plan). These would include sediment traps. Water would recharge to the surrounding land from the interceptor drains.	Negligible
Contaminated groundwater from superficial aquifer	Dewatering during trenching	Groundwater in superficial aquifer (where present) Groundwater in Chalk aquifer	Medium	Any dewatering would be restricted to pumping direct to interceptor drains within our surface water drainage system (as set out in the Surface Water Drainage Plan). These would include sediment traps. Water would recharge to the surrounding land from the interceptor drains.	Negligible

Table 4: Risk rating terminology

Risk Rating	Description
High risk	• Contaminants very likely to represent an unacceptable risk to identified receptors • Site probably not suitable for current/future use • Enforcement action possible • Urgent action required
Medium risk	• Contaminants likely to represent an unacceptable risk to identified receptors • Site probably not suitable for current/future use • Action required in the medium term
Low risk	• Contaminants may be present but unlikely to create unacceptable risk to identified receptors • Site probably suitable for current/future use • Action unlikely to be needed whilst site remains in current use
Negligible risk	• If contamination sources are present they are considered to be minor in • nature and extent • Site suitable for current/future use • No further action required

4 Conclusion

Following the information provided in Wheeler & Shaw (2000), of the five sites considered within this clarification note, four are either predominately groundwater-fed of have not had their water supply provenance established. Of these, all are predominantly fed by vertical upflow from the underlying chalk aquifer. Although intermittent lateral flows from local drift deposits are apparent at some sites, these are not the primary source of water supply for any of the sites identified. A conceptual model has been developed for Booton Common, as the closest site to the onshore project area. The model demonstrates that the onshore cable trenching and HDD activities associated with the onshore project construction phase will remain at least 7m above the Chalk aquifer at any point, and will be separated from the chalk aquifer by the boulder clay aquiclude. As such, no pathway between the onshore project area and any of the designated sites identified within this clarification note has been identified. As the installation of the cable route cannot be demonstrated to affect the groundwater supply to these sites, further detailed assessment is not deemed necessary.

5 References

Wheeler, B.D. and Shaw, S.C. (2000) A Wetland Framework For Impact Assessment At Statutory Sites In Eastern England: Site Accounts. R&D Technical Report W6-068/TR2. Environment Agency, Bristol.

Wheeler, B.D. and Shaw, S.C. (2006) Ecohydrological site accounts for East Anglia. Appendix 3A Booton Common.

Appendix 3
Clarification Note: Norfolk Vanguard
Bat Impact Assessment – Paston Great Barn Special Area of Conservation (SAC)

HaskoningDHV UK Ltd.

1 Introduction

Within their Relevant Representation to the Norfolk Vanguard Offshore Wind Farm Development Consent Order (DCO) application, Natural England stated:
"*From the information provided, we consider that there is likely to be an impact on the SAC due to loss and severance of foraging and commuting habitat over at least 7 years…. As requested previously, in order to fully assess the impact we would like more information about each hedgerow to be removed in Table 9.10 plus an accurate estimation of the timescale for recovery to previous condition (or better) following installation of the cable trench. The assessment should provide an indication of hedgerow quality for bats, as well as the potential long term effects on quality with estimated timescales. Quality factors likely to be of relevance to bats include height, gaps/solid hedge ratio, aspect, species composition of hedgerow shrubs and non-woody plants, width of hedge etc.*

"Also, we would like to see an estimation of the importance to bats from Paston Great Barn of the 11ha of woodland that will be fragmented by the hedgerow removal.

"We advise that, as a requirement of the development, that prior to removal of hedgerows, a mitigation plan should be drawn up and agreed with Natural England. The plan should include for the improvement of the hedgerows either side of the section to be removed including any gapping up, tree management and the development of scrub/rough grassland margins. The mitigation plan should be in place for 7 years or until the original hedgerow has recovered fully."

This note provides clarification in relation to queries raised by Natural England in their Relevant Representation regarding the information provided for Norfolk Vanguard Offshore Wind Farm (the project) to support a Habitats Regulations Assessment (HRA) for the Paston Great Barn Special Area of Conservation (SAC) and the barbastelle bat maternity colony for which it is designated.

This note sets out the following:

- A summary of the approach to survey and assessment of the Paston Great Barn SAC undertaken for the project;
- A summary of the status of the commuting and foraging bat habitat both directly and indirectly affected by the project during construction as a result of habitat fragmentation;
- A summary of the mitigation proposed; and
- Links to where further detail on the points summarised here are presented within the Information to support Habitats Regulations Assessment and Environmental Impact Assessment (EIA).

Following further consultation with Natural England on the 22nd January 2019, this note has been updated to include additional information regarding the extent of available alternative foraging habitat for barbastelles of the Paston Great Barn colony, the location of habitat potentially temporarily fragmented as a result of the construction of the project, and the locations of hedgerows temporarily affected during the construction works.

2 Approach to survey and assessment for the Paston Great Barn SAC

The following steps were undertaken to identify the potential impacts of the project upon the barbastelle bats of the Paston Great Barn SAC maternity colony:

1. **Bat study area** - An initial bat study area of all land within the onshore project footprint and within 5km from Paston Great Barn SAC was identified as an appropriate study area for potential effects upon barbastelle bats of the Paston Great Barn SAC colony. The 5km buffer was agreed through consultation with Natural England and Norfolk County Council.

2. **Habitat assessment** – An Extended Phase 1 Habitat Survey was undertaken pre-application of all habitats located within the bat study area. This survey identified 18 hedgerows (and associated habitats) that were present within the bat study area. Landowner access was not granted to survey 5 of these 18 hedgerows. The limitations of survey access were discussed as part of the associated Expert Topic Group and it was agreed that a precautionary approach could be adopted where access was not granted. In addition, aerial photography was reviewed where access was not granted.

   A habitat assessment of the accessible hedgerows was undertaken, and the quality of each hedgerow for supporting commuting or foraging bats was assessed against the criteria set out in Table 4.1 of the Bat Conservation Trust (BCT) bat surveys guidance (Collins, 2016). Through this exercise, 12 of the 13 accessible hedgerows surveyed were identified as providing moderate or high suitability for supporting commuting or foraging bats. The remaining five hedgerows which could not be surveyed were also assumed to be of moderate / high suitability for supporting commuting or foraging bats (adopting a precautionary principle), therefore 17 of the 18 hedgerows identified were classed as having moderate or high suitability.

3. **Radio-tracking data** – The Norfolk Barbastelle Study Group (NBSG) radio-tracking dataset – a dataset tracking three females of the Paston Great Barn SAC colony over a period from 2013 – 2015 – was then used to identify whether any of these hedgerows were located within known important features for barbastelles of the Paston Great Barn SAC colony. The data identified five important barbastelle features within the bat study area. These five broad features included 11 of the 17 hedgerows identified as providing moderate or high suitability.

4. **Bat activity survey data** – Bat activity survey data was collected monthly for 6 months during the 2018 bat activity season to provide a further dataset alongside the habitat assessment and radio-tracking data. Where survey access was possible, activity transects were walked to cover all the hedgerows identified as moderate or high suitability. The transects covered five of the 17 hedgerows identified. Barbastelle were recorded on all five of these hedgerows, confirming that all suitable hedgerows are likely being used by commuting / foraging barbastelle.

5. **Assessment** *(Please refer to **Table 3** for the location of key assessment information and application documentation)* – Potential direct and indirect effects on barbastelle of the Paston Great Barn SAC maternity colony using the commuting and foraging habitat within the bat study area were considered. This included quantifying the following key effects:
   a. The length / area of suitable commuting / foraging habitat temporarily lost during construction (i.e. total hedgerow loss before reinstatement), and the duration of this loss, in the context of the available resource for the Paston Great Barn SAC colony.

b. The fragmentation of the commuting / foraging habitat, and the length / area of habitat isolated by severance to linear features, in the context of the available resource for the Paston Great Barn SAC colony.
c. Indirect effects (e.g. from construction lighting).

3 Status of hedgerow resource affected by the project

Table *1* below provides a summary of the 18 hedgerows located within the bat study area that may be affected by the project. The locations of these hedgerows are shown on **Figure 1**. It includes details of the quality of the habitat, and its suitability for supporting commuting / foraging bats, based on Table 4.1 of the BCT bat survey guidelines (Collins, 2016).

Table 1: Hedgerows potentially affected by the project (hedgerow numbering as shown on Important Hedgerows Plan (DCO document 2.11 (Version 2 Jan 2019)) (see Figure 1 for locations)

Hedgerow	Habitat assessment[1]	Assessed potential for support commuting / foraging bats[2]	Length potentially affected (m)	Quality factors					Further comments
				Height	Width	Gaps/Solid hedge ratio	Aspect	Species composition	
151	Species-poor	Moderate - High	20	5-10	4	0% gappy	E-W facing	Intact species poor.	Hedgerow connected to drainage ditch and rank grassland network foraging habitat at Ridlington Street, which also provides good connectivity in the wider area.
162	Species-poor with trees	Moderate - High	15	3-5	7	0% gappy	E-W facing	Species poor hedgerow with mature trees; hawthorn, oak, bramble, ivy and dry ditch.	As above
1814	N/A	Moderate - High	25	1-2	2	5% gappy	NW-SE facing	[No information available]	No assessment conducted as access was not granted. Under a precautionary principle, these hedgerows are assumed to be of moderate – high suitability for supporting commuting foraging bats.
195	N/A	Moderate - High	23	2-3	3	5% gappy	NE-SW facing	[No information available]	
2117	N/A	Moderate - High	23	2-3	3	5% gappy	NE-SW facing	[No information available]	
2218	N/A	Moderate - High	25	2-3	3	5% gappy	NW-SE facing	[No information available]	
2319	Species-poor with trees	Moderate - High	23	1	3	5% gappy	E-W facing	Intact species poor.	Hedgerows with trees providing minimum shelter and isolated from higher quality areas of foraging habitat. May be important as part of wider commuting / foraging routes.
240	Species-poor with trees	Moderate - High	20	1	3	10% gappy	E-W facing	Intact species poor. Common oak, bramble, hawthorn.	As above

[1] Based on Extended Phase 1 Habitat Surveys conducted in February 2017 and February 2018.
[2] Based on Extended Phase 1 Habitat Surveys conducted in February 2017 and February 2018.

Hedgerow	Habitat assessment[1]	Assessed potential for support commuting / foraging bats[2]	Length potentially affected (m)	Quality factors					Further comments
				Height	Width	Gaps/Solid hedge ratio	Aspect	Species composition	
251	N/A	Moderate - High	20	3-5	4	0% gappy	E-W facing	Intact species poor with trees. Common oak, bramble, hawthorn.	No assessment conducted as access was not granted. Under a precautionary principle, this hedgerow was assumed to be of moderate – high suitability for supporting commuting foraging bats.
262	Species-rich with trees	Moderate - High	25	3-5	4	10% gappy	N-S facing	Intact species-rich with trees. Hawthorn, blackthorn, holly, ash, common oak. Ground flora: red dead nettle, cleavers, herb robert, nipplewort, ground ivy, ribwort plantain, fern sp.	Mature hedgerow with occasional gaps and mature trees. Provides good shelter between large open fields.
Unnamed	Species-rich with trees (woodland)	Moderate - High	N/A	N/A	N/A	N/A	N/A	N/A	80m wide plantation woodland block at Witton. Provides connectivity with Bacton Wood (coniferous plantation) to the south, and Northern Plantation (broadleaved plantation woodland) to the north.
295	Species-rich	Moderate - High	21	1-2	2	20% gappy	E-W facing	Intact species-rich with trees.	Narrow, low hedgerow surrounded by open arable landscapes. Provides connectivity between Bacton Wood and species-rich hedgerows at Edingthorpe.
3026	Species-poor with trees	Moderate - High	20	2-3	3	10% gappy	NW-SE facing	Intact species poor.	Semi-mature hedgerow with gaps and trees running along North Walsham Road. Provides some connectivity with the wider hedgerow network.
3127	Species-poor with trees	Moderate - High	20	5-10	4	10% gappy	NW-SE facing	Intact species poor.	As above.

Hedgerow	Habitat assessment[1]	Assessed potential for support commuting / foraging bats[2]	Length potentially affected (m)	Quality factors					Further comments
				Height	Width	Gaps/Solid hedge ratio	Aspect	Species composition	
3~~4~~0a	Species-poor with trees	Moderate - High	25	15-20	8	10% gappy	NW-SE facing	Intact species poor with trees. Hawthorn, ash, common oak; bramble, nettle, ferns, dog rose, cocks foot.	Mature hedgerow with gas adjacent to wider network for semi-improved grassland for foraging.
3~~4~~0b	Species-poor with trees	Moderate - High	25	5-10	7	10% gappy	NW-SE facing	Intact species poor with trees. Hawthorn, ash, common oak; bramble, nettle, ferns, dog rose, cocks foot.	Hedgerow with gaps adjacent to good network of superior hedgerows (species-rich with trees) and for semi-improved grassland for foraging.
Unnamed	Defunct hedgerow	Low	25	1	2	60% gappy	NW-SE facing	Defunct, species-poor. Hawthorn; ground flora ivy, bramble and nettle.	Defunct hedgerow, with low vegetated bank and occasional shrubs only.
3~~7~~1	Species-poor with trees	Moderate - High	23	2-3	3	20% gappy	NE-SW facing	Intact species-poor. Hawthorn with scattered ash and common oak, bramble.	Mature hedgerow with gaps adjacent to wider network for semi-improved grassland for foraging.

4 Status of habitat fragmented by temporary hedgerow loss

An 11ha~~.~~ habitat mosaic of broadleaved woodland, rank grassland, hedgerows and drainage ditches is present at the edge of the 5km buffer from Paston Great Barn SAC, in proximity to the village of Witton. This habitat mosaic is shown on **Figure 2** of this clarification note. This 11ha~~.~~ will potentially be fragmented due to temporary crossings by the onshore cable route of two hedgerows located along the road from Bacton Wood to Witton (25 and 26), i.e. temporary gaps in the hedgerows that maintain connectivity to this 11ha habitat. The potential suitability of these 11ha~~.~~ has been assessed using aerial photography and using the NBSG bat radio-tracking data. This habitat mosaic feature has been assessed for its potential suitability as a foraging resource as follows:

Table 2: Suitability of habitat mosaic as a potential foraging resource (as shown on Figure 2 of this clarification note (and Figure 9.3 of the Information for the Habitats Regulations Assessment (DCO document 5.3))~~.~~)

Location	Habitat assessment	Assessed potential for support foraging bats	% of all suitable habitats located within barbastelle home range[3]
Witton	Mosaic of habitats associated within the upper reaches of the Hundred Stream. Habitats include semi-natural broadleaved woodland (approximately 7ha) and semi-improved grassland (approximately 4ha) and an intersecting drainage ditch network associated with the Hundred Stream, plus approximately 1km of species-rich hedgerow with trees.	Moderate - High	0.6%

Bats have not been confirmed using this habitat to date and, therefore, a precautionary approach has been applied, and it has been assumed that this mosaic potentially supports foraging barbastelle bats.

5 Extent of alternative foraging habitat within the study area

The 11ha of habitat fragmented during construction of the project represents approximately 0.6% of the potentially suitable habitats for supporting commuting / foraging bats located within the Paston Great Barn study area. The extent of the potentially suitable habitats for supporting commuting / foraging bats located within the Paston Great Barn study area is shown on Figure 2. These include the following habitats:

- grassland,
- riparian habitats,
- woodlands,
- hedgerows,
- coastal cliffs.

[3] Calculated using aerial imagery to identify all potentially suitable habitats for supporting commuting / foraging bats (grassland, riparian habitats, woodlands, hedgerows). It should be noted that the key foraging area identified by the radio-tracking data is the coastal cliffs at Mundesley. The inland foraging areas (including all of those listed above) were recorded during inclement weather conditions along the coast, making foraging at the cliffs unfavourable. Inland foraging was therefore also predominantly recorded in spring and autumn (NBSG, 2017).

It should be noted that the key foraging area identified by the radio-tracking data is the coastal cliffs at Mundesley (NBSG, 2017). Bats were only recorded using the inland foraging areas (including all of those listed above) during inclement weather conditions along the coast, when foraging at the coastal cliffs was unfavourable. Inland foraging was predominantly recorded in spring and autumn (NBSG, 2017). Given the very small percentage of the available habitat which will be potentially fragmented, and the fact that this is both not part of the key foraging area along the coast near Mundesley and is on the edge of the study area, fragmentation of these 11ha are not considered to give rise to likely significant effects on the integrity of the Paston Great Barn SAC.

~~5~~6 Construction Methodology and Mitigation

The onshore cable duct installation strategy will be conducted in a sectionalised approach in order to minimise impacts. Construction teams would work on a short length (approximately 150m section) at a time. Topsoil would be stripped and temporarily stored within each 150m section and subsoils stored separately also within the same 150m section. Where the 150m section crosses a hedgerow, the working width will be reduced from 45m to 20m to minimise the length of hedgerow that is temporarily removed.

Once the ducts have been installed in a 150m section the trenches would be back-filled with subsoils, and the stored topsoil re-distributed over the area of the 150m workfront, with the exception of the running track and any associated drainage retained for the cable pulling phase (the retained running track would be 6m wider and will only be retained for the cable pull for approximately 20% of the cable route). The time from topsoil strip to reinstatement would typically be two weeks in each 150m section (with the exception of the 6m wide running track where this is retained).

Hedgerows, which are temporarily removed to enable the project, will also be reinstated as soon as possible. Replanting will be implemented, where possible, in the first winter after they have been removed, with the exception of any 6m gap required for the running track, where this need to be retained for cable pulling phase. Any remaining 6m hedgerow gaps will be replanted following the completion of the cable pull phase.

Following reinstatement, hedgerows are anticipated to take between 3-7 years to mature back to a standard whereby the hedgerow is providing value for commuting and foraging barbastelle bats (provision of shelter and invertebrate assemblage). Where the hedgerow lost is a species-rich hedgerow with trees, recovery is expected to be take the full seven years for the replacement hedgerow to reach the full value of the lost hedgerow. However, only two of the 18 hedgerows affected were identified as species rich with trees. Taking this recovery time into account, given the localised loss of hedgerow within habitats in the edge of the study area the anticipated the removal and subsequent reinstatement of hedgerow is not considered to give rise to likely significant effects on the integrity of the Paston Great Barn SAC.

The following mitigation will be implemented at the important hedgerow features (a summary only is provided below – further detail is provided within Section 9.3.2.1.1 of the Information for the Habitats Regulations Assessment (DCO document 5.3) and within the Outline Landscape and Ecology Strategy (DCO document 8.7), an is secured through Requirement 24 - Ecological Management Plan (EMP):

- The width of the working corridor has been reduced from 4~~50~~m to 20m[4] at hedgerow crossings to minimise impacts from hedgerow removal as far as possible.
- Mature trees in hedgerows will be avoided where possible during micrositing.
- Hedgerow removal will be programmed for winter where possible, to give bats time to adjust to the change prior to maternity period (a hedgerow removal plan will form part of the submitted EMP).
- Replanting will follow guidance within the Norfolk Hedgerow Biodiversity Action Plan and will include appropriate species for northeast Norfolk, including ground flora planting designed to encourage insect biomass (BCT, 2012). Replanting will take place within the full extent of the cable easement. Future hedgerow management to include allowing standard trees to develop (taking into account the restrictions on tree planting~~.~~ immediately above the cable easement).
- Subject to landowner permissions, for each hedgerow that is important for foraging and commuting bats up to 25m either side of the section to be removed prior to construction would be left to become overgrown to improve the quality of the surrounding hedgerow as a resource for commuting and foraging bats (Bates, 2010). These permissions are being sought as part of the ongoing landowner agreement discussions.
- Pre-construction activity surveys will be undertaken to cover any gaps within the baseline data presented within the Information for the Habitats Regulations Assessment (DCO document 5.3).

Five years of hedgerow aftercare will be delivered to ensure the establishment and development of the replacement hedgerows. Any replacement hedgerow planted as part of an approved Landscape Management Scheme that, within the first five years of the aftercare period, is removed, dies or becomes, 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.

-

~~Following reinstatement, hedgerows are anticipated to take between 3-7 years to mature back to a standard whereby the hedgerow is providing value for commuting and foraging barbastelle bats (provision of shelter and invertebrate assemblage). Where the hedgerow lost is a species-rich hedgerow with trees, recovery is expected to be take the full seven years for the replacement hedgerow to reach the full value of the lost hedgerow. However, only two of the 18 hedgerows affected were identified as species rich with trees.~~

~~6~~7 Conclusion

17 predominantly species poor hedgerows with gaps have been identified with moderate-high potential to support foraging barbastelle bats associated with the Paston Great Barn SAC. During construction, these hedgerows will be crossed and a temporary 20m gap will be created. In addition, connectivit~~el~~y to an 11ha mosaic of woodland and grassland will be temporarily severed by crossing one of these 17 hedgerows. However, the hedgerows are at the edge of the assumed 5km range of the Paston Great Barn SAC and the effects are considered temporary and small-scale. With mitigation in place hedgerows are expected to fully recover within 3-7 years and efforts will be taken to improve the quality of the adjacent hedgerows prior to construction (allowing them to overgrow). As such, **no potential adverse effect on the integrity** of the Paston Great Barn SAC, in relation to the conservation objectives for the site are anticipated.

[4] This is at perpendicular crossings – this value can be up to 25m where the project crosses hedgerows at an oblique angle.

~~7~~8 Further information

Table 3 provides a signpost to where further details of the information presented in this note can be found within the information submitted to date as part of the project DCO application.

Table 3: Further information

Topic	Document	Document Reference	Section
Conservation objectives for Paston Great Barn SAC	Information for the Habitats Regulations Assessment	5.03	9.1.2.3.
Methodology used for characterising hedgerows	Information for the Habitats Regulations Assessment	5.03	9.1.2.2.2, 9.3.2.1.1 9.3.2.1.2
Location of hedgerows	Important Hedgerows Plan	2.11	-
	Appendix 22.1 Extended Phase 1 Habitat Survey Report	6.2.22.1	Figure 4 (Pages 19-20, 23-24)
Habitat assessment of hedgerows	Appendix 22.1 Extended Phase 1 Habitat Survey Report	6.2.22.1	Annex C: Target Notes
Location of important barbastelle features	Information for the Habitats Regulations Assessment	5.03	Figure 9.4
Location of Verona Planation	Information for the Habitats Regulations Assessment	5.03	Figure 9.4
Bat activity survey results	Appendix 22.4 Bat Activity Survey Report	6.2.22.4	BACT 19 BACT 21 BACT 22 BACT 24 BACT 34
Results of NBSG radio-tracking data	Information for the Habitats Regulations Assessment	5.03	Figure 9.4

89 References

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Norfolk Living Map² - Within habitats and species study area

- Hedgerow or field margin
- Improved grassland
- Lowland mixed deciduous woodland
- Scrub
- Semi-improved grassland

Phase 1 Habitat Classification - Within habitats and species study area

- Broadleaved woodland - plantation
- Scrub - scattered
- Coniferous Parkland/scattered trees
- Improved grassland
- Marsh/marshy grassland
- Poor semi-improved grassland

- Intact hedge - Native species-rich
- Intact hedge - Species-poor
- Defunct hedge - Native species-rich
- Defunct hedge - Species-poor
- Hedge with trees - Native species-rich
- Hedge with trees - Species-poor

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Legend:

- Norfolk Vanguard onshore red line boundary
- Paston Great Barn Special Area of Conservation (SAC) 5km buffer

Onshore cable route

- Onshore cable route
- Mobilisation zone
- Indicative mobilisation area compound

Access

- Construction access
- Operation access

Environmental Designations¹

- Special Area of Conservation (SAC)

Study area

- Habitats and species study area
- Commuting / foraging features within the study area
- 11 Hedgerow number (following important hedgerow Plan Document Reference 2.11)

¹ Natural England, 2018.
² NBIS, 2018.

Project:	Report:
Norfolk Vanguard	Examination: For Information Only

Title: Paston Great Barn SAC – Location of features of particular importance for barbastelle (Map 1 of 4)

Figure: 1 | Drawing No: PB4476-008-006-002

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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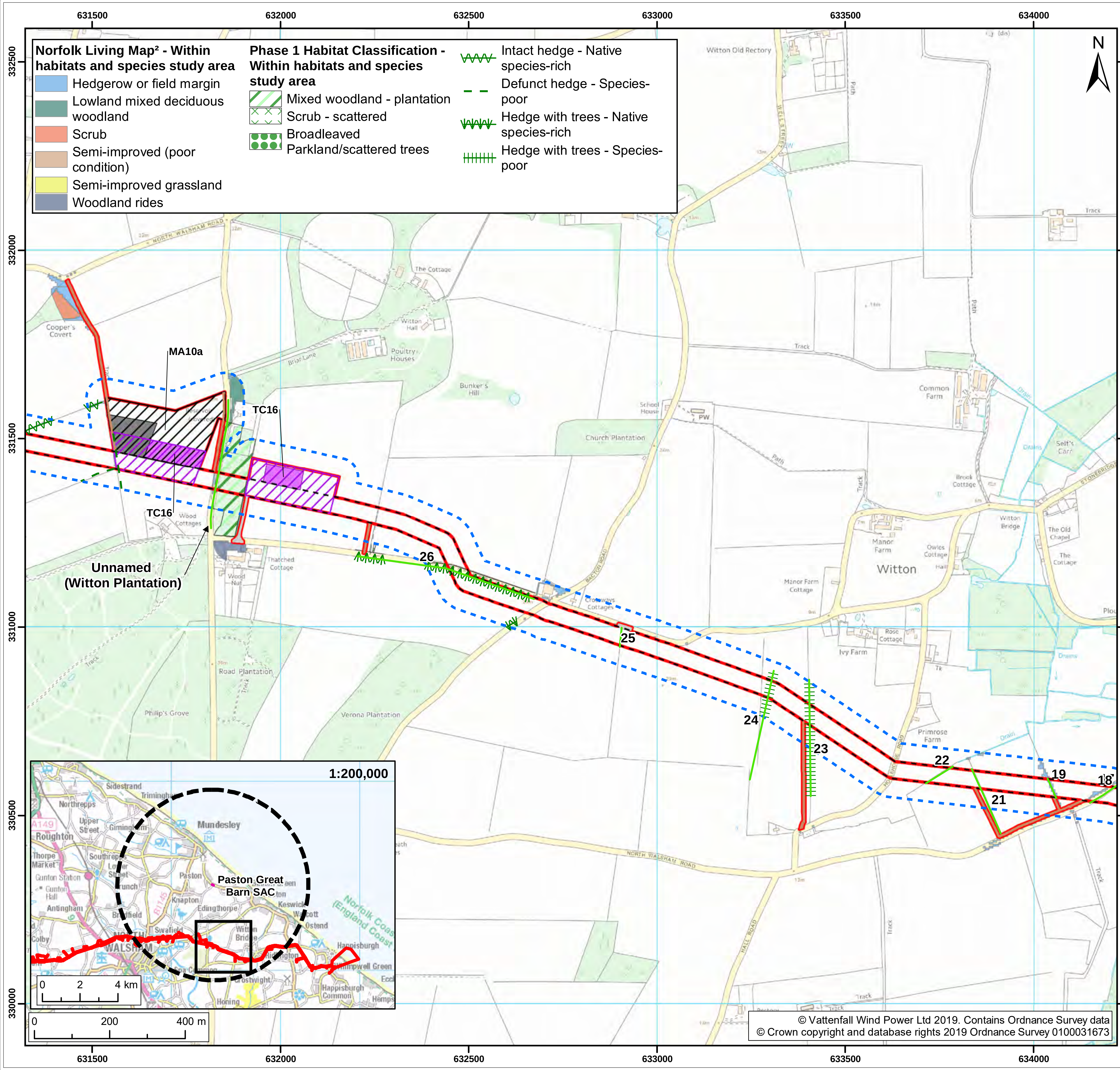
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Norfolk Living Map² - Within habitats and species study area
Hedgerow or field margin
Lowland mixed deciduous woodland
Scrub
Semi-improved (poor condition)
Semi-improved grassland
Woodland rides
Phase 1 Habitat Classification - Within habitats and species study area
Mixed woodland - plantation
Scrub - scattered
Broadleaved Parkland/scattered trees
Intact hedge - Native species-rich
Defunct hedge - Species-poor
Hedge with trees - Native species-rich
Hedge with trees - Species-poor
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Unnamed (Witton Plantation)
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Paston Great Barn SAC
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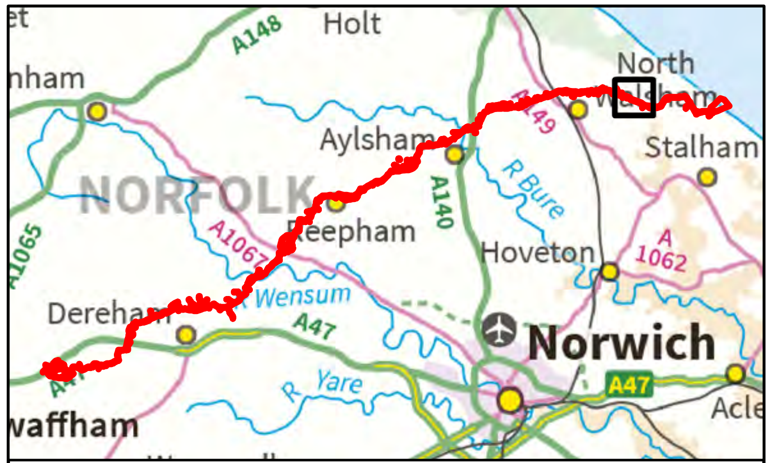

Legend:

- Norfolk Vanguard onshore red line boundary
- Paston Great Barn Special Area of Conservation (SAC) 5km buffer

Onshore cable route

- Onshore cable route
- Trenchless crossing zone (e.g. HDD)
- Indicative trenchless crossing compound
- Mobilisation zone
- Indicative mobilisation area compound

Access

- Construction access
- Operation access

Environmental Designations¹

- Special Area of Conservation (SAC)

Study area

- Habitats and species study area
- Commuting / foraging features within the study area
- 11 Hedgerow number (following important hedgerow Plan Document Reference 2.11)

¹ Natural England, 2018.
² NBIS, 2018.

Project:	Report:
Norfolk Vanguard	Examination: For Information Only

Paston Great Barn SAC – Location of features of particular importance for barbastelle (Map 2 of 4)

Figure: 1 Drawing No: PB4476-008-006-002

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British National Grid EPSG: 27700

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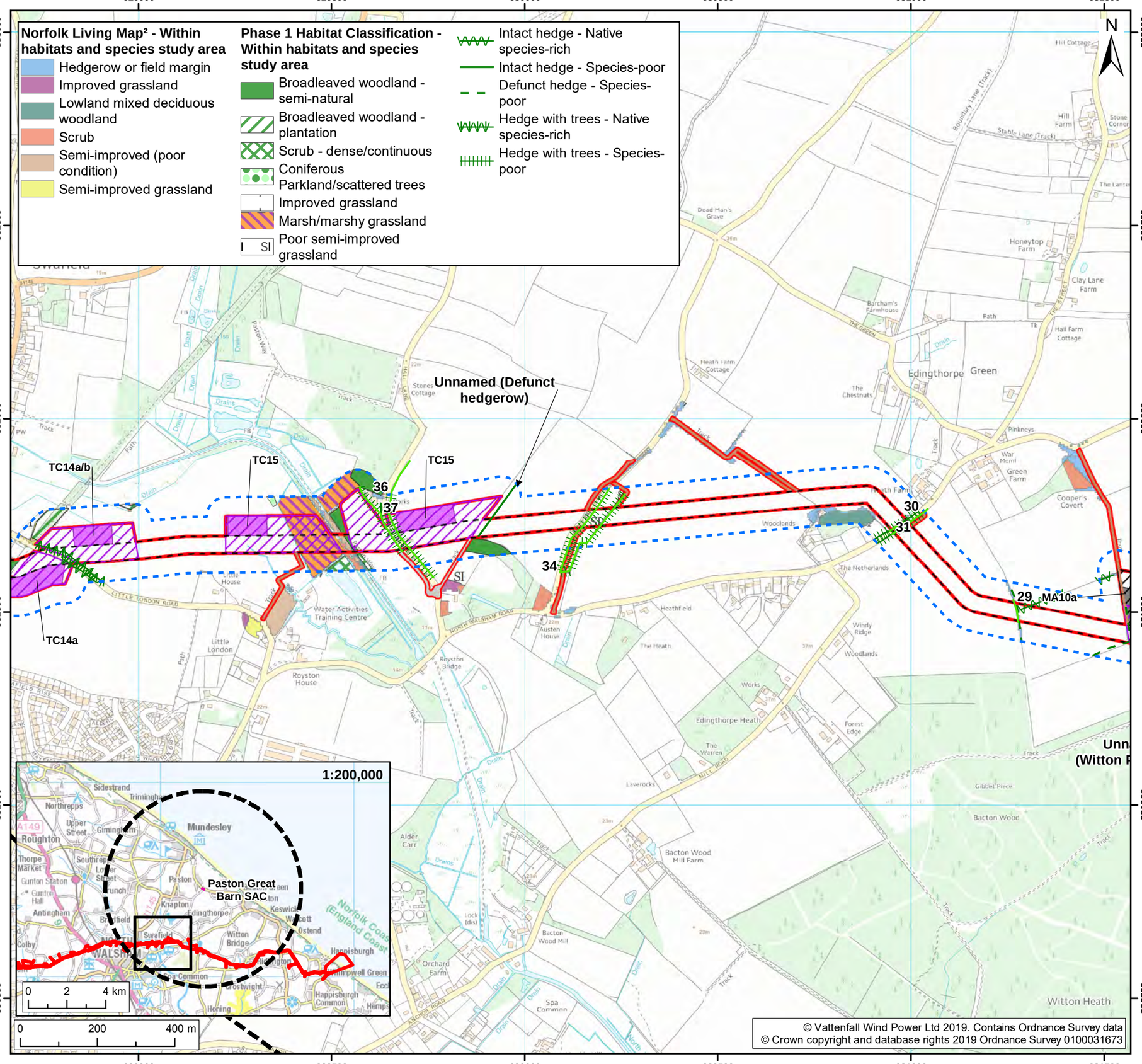
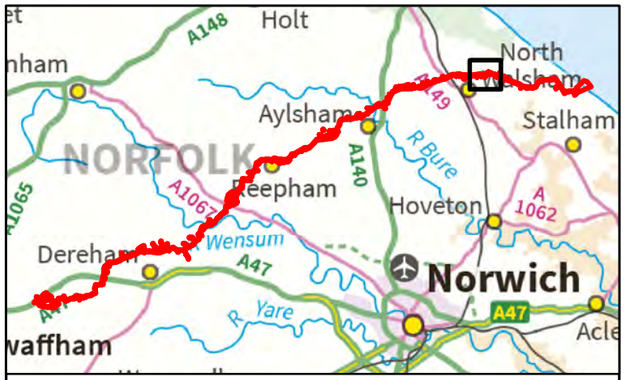
Norfolk Living Map² - Within habitats and species study area

- Hedgerow or field margin
- Improved grassland
- Lowland mixed deciduous woodland
- Scrub
- Semi-improved (poor condition)
- Semi-improved grassland

Phase 1 Habitat Classification - Within habitats and species study area

- Broadleaved woodland - semi-natural
- Broadleaved woodland - plantation
- Scrub - dense/continuous
- Coniferous Parkland/scattered trees
- Improved grassland
- Marsh/marshy grassland
- Poor semi-improved grassland (SI)
- Intact hedge - Native species-rich
- Intact hedge - Species-poor
- Defunct hedge - Species-poor
- Hedge with trees - Native species-rich
- Hedge with trees - Species-poor





Legend:

- Norfolk Vanguard onshore red line boundary
- Paston Great Barn Special Area of Conservation (SAC) 5km buffer

Onshore cable route

- Onshore cable route
- Trenchless crossing zone (e.g. HDD)
- Indicative trenchless crossing compound
- Mobilisation zone
- Indicative mobilisation area compound

Access

- Construction access
- Operation access

Environmental Designations¹

- Special Area of Conservation (SAC)

Study area

- Habitats and species study area
- Commuting / foraging features within the study area
- 11 Hedgerow number (following important hedgerow Plan Document Reference 2.11)

¹ Natural England, 2018.
² NBIS, 2018.

Project:	Report:
Norfolk Vanguard	Examination: For Information Only

Paston Great Barn SAC – Location of features of particular importance for barbastelle (Map 3 of 4)

Figure: 1 | Drawing No: PB4476-008-006-002

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Norfolk Living Map² - Within habitats and species study area

- Coniferous plantation
- Hedgerow or field margin
- Improved grassland
- Lowland mixed deciduous woodland
- Scrub
- Semi-improved (poor condition)
- Semi-improved grassland

Phase 1 Habitat Classification - Within habitats and species study area

- Broadleaved woodland - semi-natural
- Broadleaved woodland - plantation
- Mixed woodland - plantation
- Scrub - dense/continuous
- Improved grassland
- Poor semi-improved grassland
- Cultivated/disturbed land - amenity grassland
- Intact hedge - Native species-rich
- Intact hedge - Species-poor
- Defunct hedge - Native species-rich
- Hedge with trees - Native species-rich
- Hedge with trees - Species-poor

N

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Paston Great Barn SAC

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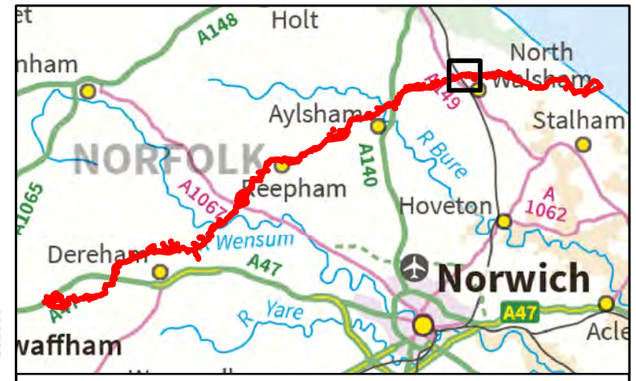

Legend:

- Norfolk Vanguard onshore red line boundary
- Paston Great Barn Special Area of Conservation (SAC) 5km buffer

Onshore cable route

- Onshore cable route
- Trenchless crossing zone (e.g. HDD)
- Indicative trenchless crossing compound
- Mobilisation zone
- Indicative mobilisation area compound

Access

- Construction access
- Operation access

Environmental Designations¹

- Special Area of Conservation (SAC)

Study area

- Habitats and species study area
- Commuting / foraging features within the study area
- 11 Hedgerow number (following important hedgerow Plan Document Reference 2.11)

¹ Natural England, 2018.
² NBIS, 2018.

Project:	Report:
Norfolk Vanguard	Examination: For Information Only

Paston Great Barn SAC – Location of features of particular importance for barbastelle (Map 4 of 4)

Figure: 1 Drawing No: PB4476-008-006-002

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	25/02/2019	JT	GC	A3	1:10,000
01	22/02/2019	JT	GC	A3	1:10,000

British National Grid **EPSG:** 27700

VATTENFALL

Royal HaskoningDHV
Enhancing Society Together

625000 627500 630000 632500 635000 637500

340000 337500 335000 332500 330000

N

Key good weather foraging zone

Paston Great Barn SAC

MA9 TC13 TC14a TC15 TC15 MA10a TC14a/b TC14a/b MA10 TC13 TC12 TC16 TC16 MA11

1:20,000

TC16 MA10a TC16

0 200 400 Metres

0 1 2 Km

Legend:

- Norfolk Vanguard onshore red line boundary
- Paston Great Barn Special Area of Conservation (SAC) 5km buffer

Environmental Designation

- Special Area of Conservation (SAC)[1]

Landfall

- Landfall zone
- Landfall compound zone
- Indicative landfall compound

Onshore cable route

- Onshore cable route
- Trenchless crossing zone (e.g. HDD)
- Indicative trenchless crossing compound
- Mobilisation zone
- Indicative mobilisation area compound

Access

- Construction access
- Operation access

Suitable habitats for foraging barbastelle'

- Coastal sediment
- Fen, Marsh and Swamp
- Hedgerow or field margin
- Improved grassland
- Lowland mixed deciduous woodland
- Scrub
- Semi-improved (poor condition)
- Semi-improved (scrub)
- Semi-improved grassland
- Waterbodies
- Woodland rides
- Habitat fragmented during construction
- Key good weather foraging zone

[1] NBIS, 2018

Project:	Report:
Norfolk Vanguard	Examination: For Information Only

Title: Bat foraging areas within the study area

Figure: 2 | Drawing No: PB4476-008-006-001

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
02	20/02/2019	JT	GC	A3	1:50,000
01	19/02/2019	JT	GC	A3	1:50,000

Co-ordinate system: British National Grid **EPSG:** 27700

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Clarification Note: Norfolk Vanguard
Sediment Management at the River Wensum crossing

HaskoningDHV

1 Introduction

The purpose of this note is to clarify the Applicant's approach to onshore construction works within functional floodplains, with particular reference to the crossing of the River Wensum Special Area of Conservation (SAC) and Site of Special Scientific Interest (SSSI). This is in response to queries raised by Natural England and the Environment Agency within Relevant Representations and Written Representations to the Norfolk Vanguard Offshore Wind Farm Development Consent Order (DCO) application.

1.1 Background

1.1.1 Natural England

Natural England within its Relevant Representation and Written Representation to the Norfolk Vanguard DCO application has stated:

"*Works to facilitate the trenchless crossing of the River Wensum may take place within the River Wensum floodplain north of Penny Spot Beck, restoration of this site should be undertaken sensitively: deep turf stripping and reinstatement is more appropriate than natural regeneration or reseeding. We would be happy to agree a restoration plan when more information is known.*

There is insufficient detail in the Code of Construction Practice (CoCP) for measures to safeguard the designated site in relation to sediment control and reinstatement of all work areas. In addition, detailed management and monitoring procedures should be provided in the CoCP in case of 'breakout' (where the drilling fluid leaves the bore and escapes into the surrounding substrate).

Details of actual methods employed are needed in relation to sediment control, and reinstatement of all work areas.

Further detail on the ongoing management of silt traps and screens and decommissioning/disposal of retained sediment is required.

Location of permanent access tracks is not provided and is needed. These would require the retention and maintenance of sediment and surface water control measures

Interceptor drains are an important part of sediment control and therefore need to be combined with sediment management measures

It is unclear whether there would be 2 HDD's or 1 if the location north of Penny Spot Beck is used."

1.1.2 Environment Agency

The Environment Agency within its Relevant Representation and Written Representation to the Norfolk Vanguard Offshore Wind Farm DCO application has stated:

"The applicant has proposed that spoil can be stored in the floodplain in separate piles to enable floodwater to pass through the floodplain. This issue is a matter of concern to the Environment Agency because of its potential effects in relation to flood risk and the ecology of waterbodies.

The storage of spoil in the floodplain is unacceptable in respect of ecology and water quality, this is because in a flood event or periods of heavy rainfall sediment or soil could be mobilised.

To overcome our concerns, any proposal to store spoil in the floodplain would need to be assessed for each individual location. We will require an assessment to be undertaken for each site where it is proposed to store spoil in a floodplain to determine the impact of spoil piles on flood storage and flood flow; without this we will not permit. In addition, it will be necessary for the landscape and ecological management plan to include procedures to monitor and mitigate for effects during heavy rainfall events when runoff or mobilisation is likely to occur."

2 Potential works within the functional floodplain

The presence of a functional floodplain (Flood Zone 3b) is shown on Figure 20.5 of Environmental Statement (ES) Chapter 20 Water Resources and Flood Risk. There are 13 instances where the onshore cable route crosses Flood Zone 3b, as shown on Figure 20.5 and these are also detailed within Appendix 20.4 of Chapter 20. The 13 crossings are described below in Table 1.

Table 1 – Instances where the onshore cable route crosses the functional floodplain

Watercourse	Shown on Figure 20.5 of Chapter 20	Crossing method	Construction presence within the functional floodplain?
North Walsham and Dilham Canal (Main River)	Map 2	Trenchless	No. Trenchless crossing compounds located outside of Flood Zone 3b
Suffield Beck (IDB drain)	Map 3	Open cut	No. Flood Zone 3 does not extend beyond the channel edge in this location
Blackwater Beck	Map 3	Trenchless	No. Trenchless crossing compounds located outside of Flood Zone 3b
River Bure (Main River)	Map 4	Trenchless	No. Trenchless crossing compounds located outside of Flood Zone 3b
Booton Watercourse	Map 5	Open cut	**Yes**. Flood Zone 3b approximately 100m wide where cable route crosses the watercourse
Reepham Stream (east) (IDB drain)	Map 5	Open cut	No. Flood Zone 3 does not extend beyond the channel edge in this location
Reepham Stream (west) (IDB drain)	Map 6	Open cut	**Yes**. Flood Zone 3b approximately 30m wide where cable route crosses the watercourse
Unnamed (Sparham House) (Main River)	Map 6	Open cut	No. Flood Zone 3 does not extend beyond the channel edge in this location
River Wensum (Main River)	Map 7	Trenchless	**Yes**. There are three trenchless crossing compounds in this location. Two of these are located within Flood Zone 3b

Penny Spot Beck	Map 7	Trenchless	**Yes**. There are three trenchless crossing compounds in this location. Two of these are located within Flood Zone 3b
Penny Spot Beck (second crossing 1.2km south of the confluence with the River Wensum)	Map 7	Open cut trench	**Yes**. Flood Zone 3b approximately 120m wide where cable route crosses the watercourse
Wendling Beck (Main River)	Map 8	Trenchless	No. Trenchless crossing compounds located outside of Flood Zone 3b
Wendling Beck (Main River)	Map 8	Trenchless	**Yes**. One of the two trenchless crossing compounds is partially located within Flood Zone 3b

Table 1 indicates that there are six instances where construction activity may be required along the onshore cable route within the functional floodplain. The remainder of this note will focus on the River Wensum / Penny Spot Beck crossings, but the approach to sediment management within the functional floodplain would be delivered for all six instances where works are required in the functional floodplain.

3 River Wensum / Penny Spot Beck crossings

3.1 Construction methodology

Trenchless crossing (e.g. HDD) at the River Wensum and Penny Spot Beck is proposed to avoid direct interaction with the channel habitats. The preferred crossing is a single trenchless crossing from the north of the River Wensum to the south of both the River Wensum and Penny Spot Beck TC5a/b to TC5a/b (white dashed line shown on Figure 1), which would avoid the floodplain habitats north of Penny Spot Beck.

Prior to detailed design there remains the possibility that a third compound (TC5a) may be required within the River Wensum floodplain north of Penny Spot Beck if two trenchless crossings are required due to local ground conditions (i.e. one to cross the Wensum north of the Penny Spot Beck, and a second one to cross the Penny Spot Beck; see the yellow dashed lines on Figure 1). The assessment included within the application (Information to Support Habitats Regulations Assessment - document reference 5.3) assumed that works to facilitate the trenchless crossing of the River Wensum may require both crossings as a worst case, i.e. works would take place within the River Wensum floodplain north of Penny Spot Beck.

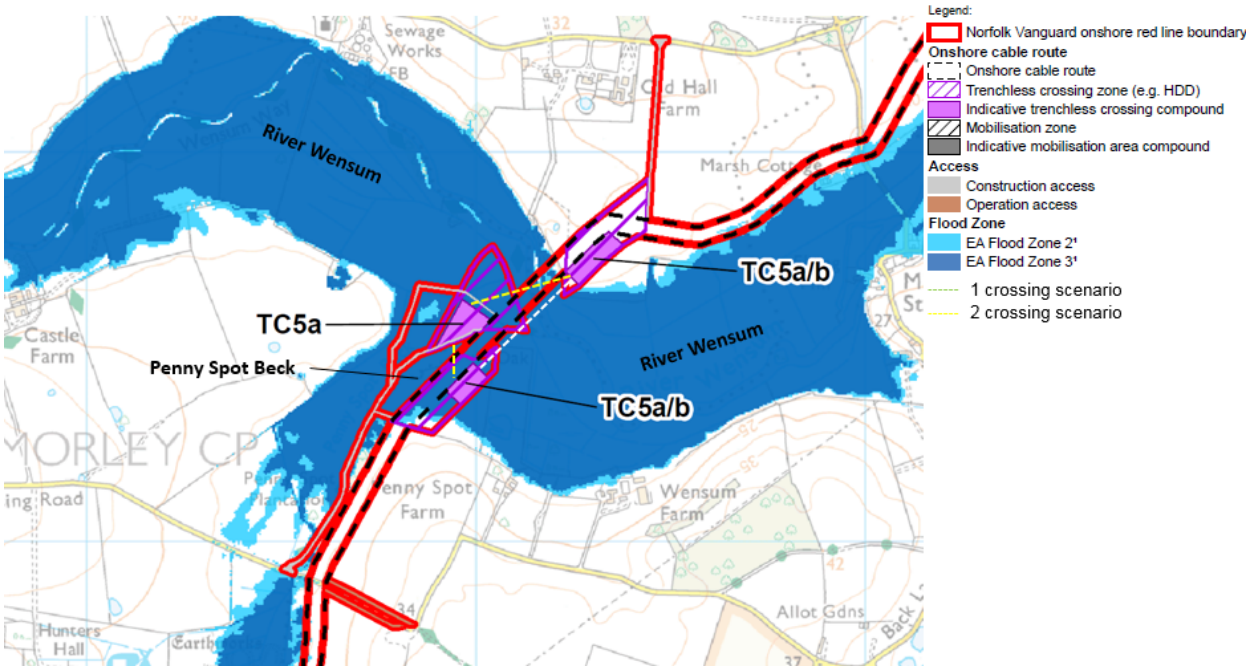

Figure 1 – location of trenchless crossings in proximity to the River Wensum and Penny Spot Beck

The proposed works associated with the River Wensum crossing are described within the Information to Support Habitats Regulations Assessment (document reference 5.3). The works will entail the introduction of temporary vehicle access and earthworks to establish the trenchless crossing compounds. Subject to ground conditions the preferred way of working in the functional floodplain would be to establish the compound area by placing protective matting (geotextile) down on top of the existing pasture grassland (i.e. avoiding the requirement for a topsoil strip). Some earthworks would still be required, for example where the drill rig itself would operate, but the remainder of the compound areas would not necessarily require a topsoil strip.

As a worst-case, a topsoil strip may still be required to establish the trenchless crossing compounds. This will be determined pre-construction following further site investigation and will be confirmed during detailed design. The three identified trenchless crossing compounds associated with the River Wensum crossing, shown on Figure 1, comprise:

- 0.75ha area on the northern side of the River Wensum, outside of the functional floodplain,
- 0.5ha area on the southern side of the River Wensum within the functional floodplain; and
- 0.7ha located north of the Penny Spot Beck within the functional floodplain (for the third compound if required).

In the worst case-scenario, up to approximately 1.2ha of topsoil within the functional floodplain will be stripped and stored during construction to accommodate the required trenchless crossing compounds (which represents 0.4% of the overall onshore cable route).

Access to the works compounds will be along the running track (outside of the functional floodplain). If the third compound is required then temporary new construction accesses will be formed of protective matting (geotextile), temporary metal road or permeable gravel aggregate, dependant on the ground conditions.

Plant, including a drilling rig, haulage vehicles and earth-moving equipment will be operating within the trenchless crossing compounds for approximately eight weeks. A small amount of additional material will be brought into site for drilling fluid. This will be a mixture of water and natural clays (e.g. bentonite), which will be removed from site as waste upon completion of the works.

Following completion of the trenchless crossing (taking approximately eight weeks) the working areas within the functional floodplain will demobilised and reinstated.

There are no new permanent accesses required for operation across the functional floodplain.

3.2 Mitigation measures

The following mitigation measures will be implemented to minimise the risk of sediment or pollutant release into the River Wensum and Penny Spot Beck.

Sediment management – works within the functional floodplain

- The preferred way of working within the functional floodplain will be to establish the trenchless crossing compounds by placing geotextile on top of the existing pasture grassland. Whilst it is accepted that grass covered by geotextile for 8 weeks will die back, it will not expose bare soils beneath and the grass will recover more quickly than reseeding or natural regeneration in the case of topsoil stripping.
- Where a topsoil strip is required, for existing grassland located within the functional floodplain, this will be undertaken using a turf cutter. Turf rolls will be retained and reinstated after the works are complete (approximately eight weeks) to maximise the potential for reinstatement / restoration to be effective.
- Removed topsoil and turf will be stored outside of the functional floodplain.
- Any damage to ground conditions caused by vehicle tracking will be rectified prior to the reinstatement of topsoil/turf.
- Construction drainage will be introduced along the onshore cable route in advance of the works. The drainage will be designed to minimise water entering works areas and to ensure ongoing drainage of surrounding land. A surface water drainage plan will be included within the final CoCP produced post-consent, which will be in accordance with the certified Outline CoCP. This will include the following measures:
    - The surface water drainage introduced in advance of construction will include interceptor drains for surface water flows. The interceptor drains will include areas for the settlement of sediment (sediment traps). Sediment traps are locally wider/deeper areas of the drains that will encourage passive sediment deposition.
    - Sediment traps will be monitored weekly (visual inspection) during the trenchless crossing works (with increased monitoring during inclement weather). If required these traps can be pumped via settling tanks to remove sediment, based on a pre-defined level / depth of sediment.
    - Where water enters the construction areas, this will be pumped via settling tanks or ponds to remove sediment before being discharged into local ditches or drains via the interceptor drains in order to prevent increases in fine sediment supply to the watercourses.
    - When the interceptor drains and associated sediment traps are decommissioned any standing water within the drains would be pumped out to settling tanks as described above. Sediment that has settled out within the interceptor drain would be left in place. Soils would be replaced in the reverse order that they were removed and turf reinstated.

- Existing tracks and roadways will be utilised for access where possible. Temporary construction accesses within the functional floodplain are required if the third trenchless crossing compound (north of Penny Spot Beck) is used. Any topsoil removal and subsequent post-construction reinstatement will follow the steps outlined above.

Sediment management – measures to be applied throughout the onshore work areas *(as detailed within section 11.1.1 of the outline CoCP – document ref: 8.1)*

- The area of open ground at any one time within one sub-catchment will be restricted, across a notional 5 km length, to 2 working areas (configured as 45m x 300m strips); with the assumptions that 50% of one mobilisation area, 50% of one set of trenchless crossing compounds and 25% of 5km running track will be open ground. This represents a maximum area of disturbed open ground of 0.068 km^2 per 5km of cable at any one time.
- Topsoil would be stripped from the entire width of the onshore cable route for the length of each approximately 150m workfront, and stored and capped to minimise wind and water erosion within the onshore cable route.
- Once all the trenching is completed and back-filled within each workfront, the stored topsoil will be re-distributed over the area of the workfront, with the exception of the running track and any associated drainage.
- Mobilisation areas within the onshore project area will comprise hardstanding of permeable gravel aggregate underlain by geotextile, or other suitable material.
- Subsoil exposure will be minimised and strips of undisturbed vegetation will be retained on the edge of the working area where possible.
- Where surface vegetation has been removed (with the exception of arable crops), this will be reseeded to prevent future runoff. (Where surface vegetation is located within the functional floodplain this will be removed using a turf cutter and stored as rolls to improve reinstatement success).
- On-site retention of sediment will be maximised by routing all drainage through the site drainage systems.
- The drainage system will include silt fences at the foot of soil storage areas to intercept sediment runoff at source. Where practicable, runoff will be routed into swales, which incorporate check dams to further intercept sediment and/or attenuation ponds which incorporate sediment forebays. Suitable filters will be used to remove sediment from any water discharged into the surface drainage network.
- Additional silt fences will be included in parts of the working area that are in proximity to surface drainage channels. It is not intended that silt fences will be used where works are located in the functional floodplain as spoil will not be stored in these locations. Sediment traps would be incorporated into the design of the surface water drainage.
- Soil and sediment will not be allowed to accumulate on roads. Traffic movement would be restricted to minimise the potential for surface disturbance.

Pollution prevention

- The working methodology will follow construction industry good practice guidance, as detailed in the Environment Agency's Pollution Prevention Guidance (PPG) notes (including PPG01, PPG05, PPG08 and PPG21)22, and CIRIA's 'Control of water pollution from construction sites – A guide to good practice' (2001), including:
    - Spill kits will be available on site at all times and staff will be trained in their use
    - Sand bags or stop logs will also be available for deployment on the outlets from the site drainage system in case of emergency spillages.
    - Equipment will be regularly checked to ensure leakages do not occur.

- Refuelling of construction plant will be restricted to designated impermeable areas.
- All fuels, oils, lubricants and other chemicals will be stored in an impermeable bund with at least 110% of the stored capacity.
- Suitable biosecurity protocols (such as those outlined by the Non-Native Species Secretariat (NNSS)) would be put in place during the works in order to minimise the risk of contamination and the spread of the invasive non-native species.

Bentonite breakout

Bentonite is an inert clay based material used as a lubricant at the drill head during trenchless crossing techniques – comprising 95% water and 5% clay. It does not represent a pollutant but can cause smothering of habitats if not contained.

For small breakouts it may cause more damage to the sensitive habitats to attempt to contain the breakout and remove the escaped material, i.e. trampling of grassland associated with responding to the breakout and the potential for exposing bare ground. A break-out contingency plan will be developed and will be included in the final CoCP, which will define the approach for responding to breakouts. The steps of the contingency plan will include:

- Measures to ensure drilling stops once a breakout is reported (there will be a drop in pressure at the drill head).
- Measures to contain the breakout, for example sand bags, to minimise the extent of any smothering.
- Measures to remove the released bentonite if a significant volume of material is contained – for example pumped back to the bentonite lagoon within the trenchless crossing compound, or pumped to the interceptor drains, or pumped to the mobile settling tanks that will be used for managing sediment traps.
- The exact specification for the contingency plan will be informed by further ground investigation and the specific design of the trenchless crossing.

3.3 Residual Effects and Securing Measures

The mitigation measures set out in section 3.2 for minimising the risk of sediment / pollutant release into areas functionally connected to the River Wensum will reduce impacts down to a negligible level. These measures will be fully captured within an updated outline CoCP and submitted to the Norfolk Vanguard examination.

In light of the negligible risk of sediment / pollutant release into the River Wensum and Penny Spot Beck following implementation of these mitigation measures, no potential adverse effect on the integrity of the River Wensum SAC has been identified in relation to the conservation objectives (as set out within the Information to Support Habitats Regulations Assessment - document reference 5.3).

No stage of the onshore transmission works may commence until for that stage a CoCP has been submitted to and approved by the relevant planning authority, in consultation with the Environment Agency. This is secured through Requirement 20 of the draft DCO.

No stage of the onshore works, involving the crossing of any watercourse, may commence until a scheme is submitted and approved setting out the design of that crossing, mitigation measures and details of reinstatement/restoration. The scheme will be submitted to the relevant planning authority in consultation with Natural England. This is secured through Requirement 25 of the draft DCO.

Clarification Note: Norfolk Vanguard
Other outstanding issues raised by Natural England

HaskoningDHV UK Ltd.

1 Unresolved issue: Sand martins at Happisburgh

1.1 Natural England's position

Sand martin are known to nest in Happisburgh Cliffs which may be affected by noise, vibration and 24hr working (i.e. works involving lighting). The stated distance between nest sites and landfall (130m), Chapter 25 Onshore Noise and Vibration Table 25.17 Predicted distances at which vibration levels may occur shows that some vibration may be felt at this distance. Therefore, an assessment of potential vibration effects and the significance of this for birds should be evaluated.

We agree that lighting should follow good practice guidance for wildlife.

1.2 Applicant's response

The potential impacts upon nesting sand martins arising from vibration effects generated during horizontal direction drilling (HDD) and other construction activities at the landfall have been considered as part of Environmental Statement (ES) Chapter 23 Onshore Ornithology. The first level of assessment was to consider whether there is any potential pathway for vibration to give rise to potential effects. Chapter 25 Noise and Vibration (section 25.4.1.2) considered the potential for different activities to give rise to vibration effects during the construction and operation phases of the project. Following BS 5228-1:2009+A1:2014 *Code of practice for noise and vibration control on construction and open sites*, Chapter 25 Noise and Vibration identified the following activities as potentially giving rise to vibration effects along the onshore cable route (which were confirmed through consultation feedback on the PEIR received in March 2018):

- Vibratory Compaction (Start-up) (associated with running track installation)
- Vibratory Compaction (Steady State) (associated with running track installation)
- Percussive Piling (associated with onshore substation)
- HGV Movement on uneven Haul Route (activities along the running track)

None of the activities potentially giving rise to a vibration effect are anticipated within the landfall works area – the running track will lead up to the landfall compound approximately 450m from the cliff edge. HDD was not considered to be an activity which in itself is likely to give rise to noticeable vibration effects. This was due to the following reasons:

1. Based on the calculations used in BS 5228-1:2009+A1:2014, HDD was not considered to be over the threshold for which vibration energy (measured as pea particle velocity) would give rise to noticeable effects. This includes boring below ground (the HDD activity will be located approximately 18m below the sand martin nests at its closet point).
2. The landfall area is underlain by sandy clay and sand to a depth of approximately 18m below ground level (as shown in Chapter 19 Ground Conditions and Contamination, section 19.6.1.1). HDD through this loose material would generate limited vibration effects; in addition, the loose material itself is a poor propagator of vibration effects. Vibration is best propagated through hard surfaces and the looser the material the more any potential vibration effect becomes dampened.

As such, vibration effects arising from HDD activities were screened out from further consideration. Chapter 23 Onshore Ornithology has based its conclusion that there is no pathway for vibration effects to impact upon sand martin nests at the landfall.

2 Unresolved issue: One year of survey data in relation to Broadland SPA / Ramsar site wintering birds

2.1 Natural England's position

Broadland SPA/Ramsar site: This site was scoped out of the HRA on the basis that there was evidence of low levels of wintering birds associated with the SPA/Ramsar using the study area. However, this may have been due to the cropping regime at the time of survey. We requested that this point was taken account of by including additional measures, e.g. survey and/or WeBS data and information about predicted crop patterns at the time of the proposed work. We suggest that the Outline Landscape and Ecological Management Strategy (OLEMS) is amended to include further survey and provide suitable mitigation measures if required.

2.2 Applicant's response

It was agreed with Natural England during the Evidence Plan Process (Norfolk Vanguard - Onshore Wintering Bird Surveys Survey Methodology Approach Update Response February 2017 (Document Reference: PB4476.003.038 – attached to this note) that one year of baseline surveys was appropriate, and as such the Applicant has not planned further surveys for wintering birds.

As part of this agreement Natural England recommended considering reviewing local cropping patterns to provide evidence as to how this may have influenced the survey findings and in turn whether this was representative for the available habitat during construction. The potential for local cropping patterns to influence the findings of the surveys was considered. Whilst some fields were recently ploughed, the majority of crops in place over winter within the wintering bird survey area (winter crop, fallow (grass)) would still provide suitable foraging habitat for pink-foot geese, and as such the survey results recorded over winter in 2016/2017 provided a robust estimate of the use of these habitats by qualifying features of the Broadland SPA and Ramsar site, i.e. that there are low levels of wintering birds associated with the SPA / Ramsar using the study area . These conclusions are based on the findings of the Wintering bird surveys conducted in Winter 2016/2017 (Document reference: 6.2.23.1).

Mitigation measures throughout the onshore project area have already been proposed to account for changes in cropping patterns for wintering birds to use different habitats for foraging and resting on an interannual basis and are set out in Paragraph 224 and 225 of the Outline Landscape and Ecological Management Strategy (Document Reference: 8.7). This includes a commitment to not undertake winter works in any one area in consecutive years. The area of arable land located within 5km of the Broadland SPA and Ramsar site and within the onshore project area is approximately 20ha, which represents a less than 0.5% of the available arable land within 5km of the SPA and

Ramsar (see paragraph 196 of Chapter 23 Onshore Ornithology for further information), and therefore the use of the mitigation measures set on in the Outline Landscape and Ecological Management Strategy (Document Reference: 8.7) are considered appropriate.

3 Unresolved issue: Use of the 300m disturbance buffer in relation to designated sites

3.1 Natural England's position

For the assessment of noise disturbance on birds which are features of designated sites, Natural England suggest designated sites within 500m are screened in for assessment. namely River Wensum SSSI; Dereham Rush Meadow SSSI; Dillington Carr, Gressenhall SSSI.

We advise that a detailed noise assessment is carried out for sites within 500m of the project area and mitigation provided for any impacts identified or evidence is provided to demonstrate that there will be no additional noise experienced from construction at the designated site boundary.

3.2 Applicant's response

A 300m buffer zone for potential noise impacts to birds which are features of designated sites was proposed and agreed with Natural England in February 2017. This was agreed in *Onshore Wintering Bird Surveys Survey Methodology Approach Update* (Document Reference: PB4476.003.038), is attached for reference.

Subsequent to this, the 300m disturbance buffer for potential effects upon designated sites was set out within Chapter 23 Onshore Ornithology of the Project's Preliminary Environmental Assessment Report (Document reference: PB4476-004-023). As these sites were beyond 300m they were screened out from the assessment. No further comments were received on the use of this buffer as part of stakeholder responses to the use of the 300m buffer.

The assessment provided within the application has been undertaken on the basis of this formal agreement of the methodology. The 300m buffer was is based on an average of the disturbance buffers detailed in Ruddock and Whitfield (2007) and is considered to be an appropriate distance for the basis of the assessment.

4 Unresolved issue: Grade 3 Agricultural Land Classification (ALC) soils need to be split to allow an assessment of impact to Best and Most Versatile (BMV) to be undertaken

4.1 Natural England's position

Grade 3 ALC soils need to be split into Grade 3a and Grade 3b, so that the assessment of loss of BMV land can be properly made (Table 21.10). The amount of BMV land that would be permanently lost to the development, i.e. by buildings etc., and the time it would take for the recovery of soils that are disturbed by the construction should be quantified in the ES.

We note that the total permanent land take for the footprint of the onshore project substation and National Grid substation extension zone is approximately 10.5ha according to the worst case scenario (Table 21.16). These will be on ALC grades 2 and 3 land; the amount of BMV land should be estimated.

4.2 Applicant's response

The Natural England dataset for this part of Norfolk is no longer broken down into ALC Grades 3a and 3b soils.

The Applicant has calculated the total extent of land that will be permanently lost within Chapter 21 Land use and Agriculture; that is 7.5ha for the onshore project substation (ALC Grade 3) and 3ha for the National Grid extension works (ALC 2 and 3) - 10.5ha in total. There is no permanent loss of land along the onshore cable route.

Within the assessment presented within ES Chapter 21 Land Use and Agriculture the Applicant identified the 3ha of land associated with the National Grid extension (ALC Grade 2 and 3) to be a receptor of high value (due to the presence of Grade 2 land); and the 7.5ha of land associated with the onshore project substation (ALC Grade 3) to be a receptor of medium value. However, in the absence of a dataset splitting up Grade 3a and 3b a precautionary approach should have been taken and all 10.5ha classed as Grade 2 and 3 should have be assessed as BMV land.

This was addressed in the errata document submitted to the examination in December 2018 (document reference - Pre-ExA; Errata; 9.4). The errata document updated the assessment presented within Chapter 21 and concluded that residual effects to BMV land remain non-significant but have been elevated from negligible to minor adverse.

The approach to mitigation remains unchanged to that reported at section 21.7.6.2.4, i.e. private agreements for compensation will be sought between Norfolk Vanguard Limited and relevant landowners/occupiers regarding any permanent loss of land incurred as a direct consequence of the operation phase of the project.

5 Unresolved Issue: Topsoil should be reinstated where it originated

5.1 Natural England's position

Topsoil should be reinstated where it originated. There are significant differences between topsoil in arable and grassland, valley bottom and valley sides and natural, semi natural and managed land. This will need clearly addressing in the Soil Management Plan (SMP).

5.2 Applicant's position

The onshore cable duct installation will be conducted in a sectionalised approach in order to minimise impacts. Construction teams would work on a short length (approximately 150m section) with topsoil stored adjacent to the excavated trench. Once the cable ducts have been installed, the 150m section would be back filled and the top soil replaced before moving onto the next section. This would minimise the amount of land being worked on at any one time and would also minimise the duration of works on any given section of the route. This is set out as embedded mitigation within the Outline Code of Construction Practise (OCoCP) (section 2.5.1).

Section 8 (soil management) of the OCoCP will be updated to confirm that topsoil will be stored adjacent to the excavated trench and will be reinstated where it originated. The SMP will be produced post-consent in accordance with the principles set out in section 8 of the OCoCP.

Onshore Wintering Bird Surveys Survey Methodology Approach Update Response February 2017

Note

HaskoningDHV UK Ltd.
Industry & Buildings

To: Louise Burton (Natural England), David White (Norfolk County Council)
From: Gordon Campbell (Royal HaskoningDHV)
Date: 21 February 2017
Copy:
Our reference: PB4476.003.038
Classification: Open

Subject: **Norfolk Vanguard - Onshore Wintering Bird Surveys Survey Methodology Approach Update**

Background

In September 2016 Royal HaskoningDHV undertook a desk-based assessment (Royal HaskoningDHV, 2016) in order to scope in the wintering bird surveys that may be required to inform the ecological baseline for the Norfolk Vanguard offshore wind farm Development Consent Order (DCO) application. The assessment identified a series of 'ornithological risk areas', based upon:

(i) Areas where the habitats are considered to be suitable to support the ornithological qualifying species of internationally designated sites for nature conservation located within 1km of the onshore scoping area.

(ii) Those nationally designated nature conservation sites which are notified for overwintering bird species, located within 1km of the onshore scoping area.

Following this assessment, a series of surveys were proposed in October 2016 to collect baseline data within these ornithological risk areas. The following surveys were proposed:

- Agricultural fields in North Walsham District (road transect)
- Dereham Rush Meadows SSSI (Vantage point (VP) survey)
- Mattishall Moor SSSI (transect survey)
- Mown Fen / Hundred Stream (transect survey)
- North Norfolk Coast between Eccles-on-Sea and Paston (VP survey)
- North Walsham and Dilham Canal (transect survey)
- Westwick Lakes SSSI (VP survey)

These surveys have been carried out monthly from October 2016 to January 2017, and are proposed to continue for two further survey visits through to March 2017.

Following the site selection information provided within the Norfolk Vanguard Scoping Report (Royal HaskoningDHV, 2016), further site selection work has been undertaken to refine the locations of the onshore infrastructure. This additional site selection work has identified locations for all of the key onshore electrical infrastructure required for the construction of Norfolk Vanguard offshore wind farm. Three landfall options, associated cable relay station search zones, as well as an onshore substation search zone in proximity to the existing Necton 400kV National Grid substation (the grid connection point) have been identified. A 200m wide cable corridor has been identified, within which the cable route will be located. This refinement of infrastructure means that the areas being considered present a reduced footprint compared to the onshore scoping area, as set out in the Norfolk Vanguard Scoping Report. Therefore, the ornithological risk areas as defined in the ornithological baseline may no longer be relevant to the proposed footprint of the Norfolk Vanguard offshore wind farm. This note reviews the

Commented [RH(1]: Natural England was under the impression that our initial advice was that this distance should be 5km? Also the text below for the North Walsham and Dilham Canal transect surveys suggests that this area was initially scoped in as within 5km of Broadland SPA/Ramsar.

Commented [RH(2]: Our initial response stated that for nationally designated sites we were happy with 1km from SSSIs, so ok in this respect.

ornithological risk areas against the refined proposed red line boundary and proposes updates to the onshore wintering bird surveys accordingly.

Please note this technical note refers to the survey areas for wintering birds only. The scope of breeding bird surveys in relation to the onshore electrical infrastructure will be identified following the proposed Extended Phase 1 Habitat Survey of the onshore electrical infrastructure scheduled to take place in February 2016.

Commented [RH(3]: Should this be February 2017?

Interim Results

To date, surveys have been proposed and undertaken from the end of October 2016 through to January 2017 (4 monthly visits). The table below summarises the counts of focal species - i.e. notified overwintering species associated with SSSIs located within 1km of the onshore scoping area, or qualifying species of the Broadland SPA and Rasmar site. The table covers all results obtained from October to December 2016.

Survey	Visit 1 – Oct / Early Nov 2016	Visit 2 – Late Nov 2016	Visit 3 – Dec 2016
Agricultural fields in North Walsham District (road transect)			
**No focal species recorded			
Dereham Rush Meadows SSSI (Vantage point (VP) survey)			
Teal			3
Mallard	4		5
Mattishall Moor SSSI (transect survey)			
Snipe	1		
Mown Fen / Hundred Stream (transect survey)			
Gadwall			7
Shoveler			1
North Norfolk Coast between Eccles-on-Sea and Paston (VP survey)			
Cormorant	11		
Red-throated Diver	4	11	3
Common Scoter	14	25	
North Walsham and Dilham Canal (transect survey)			
Teal	1	3	
Cormorant	1		
Marsh harrier			1
Coot			1
Westwick Lakes SSSI (VP survey)			
Teal	14	8	12
Mallard	69	65	44
Shoveler	2	6	15

The numbers of focal species recorded during the three visits to each of the seven survey sites are relatively low and not of a scale to be of national or greater importance in any instance, or (in the case of the three SSSIs) to be a significant component of a SSSI.

No focal species selected from the qualifying species of the Broadland SPA and Rasmar site for the agricultural land transect (Bewick's Swan, Whooper Swan, Bean Goose, Greylag Goose, Pink-footed

Goose and White-fronted Goose) have yet been recorded. Only one flock of pink-footed geese has been recorded flying over the survey area (visit 3), with none recorded using the agricultural fields.

Commented [RH(4]: This could be linked to crop rotations – crops that the birds will feed on may not be grown in these fields in that particular year that the surveys were conducted. However, in another year if such crops are grown, then may get high numbers of birds in these fields. We recommend that consideration is given to this.

Low numbers of two species of wintering waterfowl (collectively a notifiable feature of the SSSI) only have been recorded at the Dereham Rush Meadows SSSI. Higher numbers of wintering waterfowl have been recorded at Westwick Lakes SSSI, but also not of a scale to be of national or greater importance or to constitute a significant component of the SSSI populations. A single Snipe only (a notifiable feature of the Mattishall Moor SSSI) has been recorded during the Mattishall Moor SSSI transect surveys.

Low numbers of qualifying species of the Broadland SPA and Rasmar site were observed during the surveys at Mown Fen / Hundred Stream and North Walsham and Dilham Canal.

Low numbers of qualifying species of the Broadland SPA and Rasmar site were also observed during the VP surveys at North Norfolk Coast between Eccles-on-Sea and Paston. Low numbers of Red-throated Diver and Common Scoter were also observed – these are qualifying species of the Greater Wash proposed SPA. The peak count of these two species was still below 1% of the mean peak non-breeding population for these species.

The Wintering Bird Survey Interim Report is provided alongside this technical note.

Limitations

The surveys undertaken to date are all considered to be robust, and to provide a good account of the ornithology at all of the survey sites. Landowner-related access restrictions have meant that the following small areas of the North Walsham and Dilham Canal and Mown Fen / Hundred Stream transects were not achievable:

- The Hundred stream from East Ruston Allotment (grid ref TG 3415 2842) to Dyball's Allotment (grid ref TG 3454 2942).
- An area of wet woodland and water meadows centred on grid reference TG 324 267 to the south of Honing.

It is considered that a large and significant flock of wildfowl in this floodplain area would not have been missed but that the more 'cryptic' species such as Bittern, Snipe and Water Rail, if present, will not have been recorded.

For all surveys with the exception of the North Norfolk Coast between Eccles-on-Sea and Paston VP surveys, the first visit was delivered in early November, as opposed to October, due to limitations in the process of survey procurement and project start up. The subsequent two visits were spaced evenly over the remaining weeks of 2016.

Proposed changes to survey methodology

The onshore scoping area, upon which the identification of ornithological risk areas was based, covered a large area of North Norfolk, and was situated in proximity to the Broadland SPA and Rasmar site. The updated and refined location for onshore electrical infrastructure covers a much smaller footprint, located within the onshore scoping area. **Figures 1 – 3** show the refined location for onshore electrical infrastructure in relation to the onshore scoping area.

Following the refinement of onshore electrical infrastructure location, each of the seven survey sites have been reviewed to ensure that they are still relevant. The following sections review each survey site to determine whether coverage of each site continues to be required.

At this stage no sites are recommended to be removed for the survey scope based on the findings for survey visits 1-3 alone. Rather, selected surveys are recommended to be removed from the survey based on the distance from the refined onshore electrical infrastructure location. No new surveys have been added or no survey areas extended for the remainder of the onshore wintering bird survey programme.

Westwick Lakes SSSI VP surveys

This site was previously scoped into onshore wintering bird surveys due to it being located within the onshore scoping area, over concern around both the proposed works having a direct impact on the habitats of the SSSI and upon the potential for disturbance effects on those notified features of the SSSI. Following the refinement of the project red line boundary, this site is now located approximately 3.8km from the refined project red line boundary. This distance is considerably greater than the maximum distance that bird species are likely to be subject to disturbance effects from construction activities (approximately 300m (Ader & Bryant 2003)). In light of this, no further wintering bird surveys will take place at this location.

Commented [RH(5]: We agree that no further surveys are needed here

Mattishall Moor SSSI transect surveys

This site was previously scoped into onshore wintering bird surveys due to it being located adjacent to the onshore scoping area, over concern that construction of the Norfolk Vanguard offshore wind farm may potentially give rise to disturbance effects upon those notified features of the SSSI. Following the refinement of the project red line boundary, this site is now located approximately 3.8km from the refined project red line boundary. This distance is considerably greater than the maximum distance that bird species may be subject to disturbance effects from construction activities (approximately 300m). In light of this, no further wintering bird surveys will take place at this location.

Commented [RH(6]: We agree that no further surveys are needed here

Dereham Rush Meadow SSSI VP surveys

This site was previously scoped into onshore wintering bird surveys due to being located within the onshore scoping area, over concern around both the proposed works having a direct impact on the habitats of the SSSI and upon the potential to give rise to disturbance effects on those notified features of the SSSI. Following the refinement of the project red line boundary, this site is now located approximately 300m from the refined project red line boundary. This distance is on the edge of the likely maximum distance that bird species may be subject to disturbance effects from construction activities (approximately 300m), and actual disturbance effects at this location are likely to be lower due to the extensive cover provided at the northern end of the SSSI by the woodland and alder carr. However, to ensure a precautionary approach is taken, surveys at this location have been retained for the remaining two surveys visits.

North Walsham and Dilham Canal transect surveys

The habitats associated with North Walsham and Dilham Canal were previously scoped into onshore wintering bird surveys due to being located within 5km of the Broadland SPA and Ramsar site, over concern around both the proposed works having a direct impact on functionally-linked land (i.e. ex situ supporting habitats) of the Broadland SPA and Ramsar site and upon the potential to give rise to disturbance effects on those qualifying species features of the Broadland SPA and Ramsar site using the functionally-linked land. Following the refinement of the project red line boundary, these habitats are now located approximately 2km from the refined project red line boundary. This distance is considerably greater than the likely maximum distance that bird species may be subject to disturbance effects from construction activities (approximately 300m). In light of this, no further wintering bird surveys will take place at this location.

Mown Fen / Hundred Stream transect surveys

The habitats associated with Mown Fen and Hundred Stream were previously scoped into onshore wintering bird surveys due to being located within 5km of the Broadland SPA and Ramsar site, over concern around both the proposed works having a direct impact on functionally-linked land (i.e. ex situ supporting habitats) of the Broadland SPA and Ramsar site and potentially giving rise to disturbance effects upon those qualifying features of the Broadland SPA and Ramsar site using the functionally-linked land. Following the refinement of the project red line boundary, the northern extent of these habitats is located within the refined project red line boundary, whilst the southern extent is located outside of the refined project red line boundary. Therefore, for the final two survey visits a reduced survey extent for the transect survey has been proposed. This reduced survey extent will cover all the habitats of functionally-linked land within 5km of the Broadland SPA and Rasmar site and within 300m of the project red line boundary (the likely maximum distance that bird species may be subject to disturbance effects from construction activities). This revised survey area is shown on the attached **Figure 1**.

Agricultural fields in North Walsham District road transect surveys

Agricultural land within the scoping area and within 5km of the Broadland SPA and Ramsar site was previously scoped into onshore wintering bird surveys over concern around both the proposed works having a direct impact on functionally-linked land (i.e. ex situ supporting habitats) of the Broadland SPA and Ramsar site and potentially giving rise to disturbance effects upon those qualifying features of the Broadland SPA and Ramsar site using the functionally-linked land. Following the refinement of the project red line boundary, the area of agricultural land which is within both (i) 5km of the Broadland SPA and Rasmar site and (ii) 1km of the project red line boundary is greatly reduced. Therefore, for the final two survey visits a reduced survey extent for the agricultural road transect surveys has been proposed. This reduced survey extent will cover all agricultural land within 5km of the Broadland SPA and Rasmar site and within 300m of the project red line boundary (the likely maximum distance that bird species may be subject to disturbance effects from construction activities). This revised survey area is shown on the attached **Figure 3**.

North Norfolk Coast between Eccles-on-Sea and Paston VP surveys

The coastal habitats of the north Norfolk coast were previously scoped into onshore wintering bird surveys due to concern around both the proposed works having a direct impact on functionally-linked land (i.e. ex situ supporting habitats) of the Broadland SPA and Ramsar site and potentially giving rise to disturbance effects upon those qualifying features of the Broadland SPA and Ramsar site using the functionally-linked land. Refinement of the project red line boundary retains three potential landfall locations located along the coastal survey area between Bacton Green and Happisburgh. The refined landfall locations cover the majority of the previous survey extent along the north Norfolk coast in this area. In light of this, the full coastal survey extent has been retained for the final two survey visits.

In summary, the following wintering bird surveys will be retained for the final two survey visits (February and March):

Survey	Visit 5 – February 2016	Visit 6 – March 2016	Notes
Agricultural fields in North Walsham District (road transect)	✔	✔	Visits 5 and 6 will cover a reduced survey extent, covering all agricultural land within 5km of the Broadland SPA and Rasmar site and within 300m of the project red line boundary.

Commented [AT7]: As above, should this be 2017?

Survey	Visit 5 – February 2016	Visit 6 – March 2016	Notes
Mown Fen / Hundred Stream (transect survey)	✔	✔	Visits 5 and 6 will cover a reduced survey extent, covering all agricultural land within 5km of the Broadland SPA and Rasmar site and within 300m of the project red line boundary.
North Norfolk Coast between Eccles-on-Sea and Paston (VP survey)	✔	✔	
Dereham Rush Meadows SSSI (Vantage point (VP) survey)	✔	✔	

Commented [AT7]: As above, should this be 2017?

References

Ader, K.G. & Bryant, D.M., 2003. Stage 3 Ecological Impact Assessment of the proposed Second Forth Crossing at Kincardine-on-Forth. Final Report for Babtie Group by Northern Ecological Services. 3 Vols.

APPENDIX 2 - NATURAL ENGLAND'S RESPONSES

Date: 18 March 2019
Our ref: 275160
Your ref: Appendix 2

Royal Haskoning DHV on behalf of Norfolk Vanguard Ltd.

BY EMAIL ONLY

Customer Services
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Dear Gemma,

Planning consultation: Norfolk Vanguard Offshore Windfarm Appendix 2 Clarification Note - Water Dependant Designated Sites
Location: Norfolk

Thank you for your consultation on the above dated 25 February 2019 which was received by Natural England on 27 February 2019. The following advice is provided under Natural England's Discretionary Advice Service (DAS).

Appendix 2 Clarification Note - Water Dependant Designated Sites

Concerns withdrawn
Following receipt of further information on 27 February 2019 Natural England is satisfied that the specific issues we have raised in previous correspondence relating to the assessment of impacts to water dependant designated sites have been resolved.

Within the Relevant Representations of Natural England dated 31 August 2018 we advised that *'further information is obtained from Environment Agency and used in a detailed appraisal of groundwater effects, e.g. WETMEC data showing the water supply mechanism for all the component sites and/or EA's groundwater modelling. If the installation of the cable route would affect the groundwater supply to these sites, then a detailed assessment should be undertaken and mitigation measures implemented to minimise any identified effects*.'

The updated Clarification Note dated 25 February 2019 provides sufficient detail regarding potential hydrological impacts on the sites where Natural England are particularly concerned. The updated Clarification Note now considers the EA's WETMEC data showing the water supply mechanism for all the component sites and provides a conceptual model to consider the risks of ground water supply to the sites from the development of the cable route. Natural England is happy that this is in line with the EA conceptual model.

Natural England agrees with the conclusion of no Likely Significant Effect to Booton Common SSSI and the Norfolk Valley Fens SAC from open cut trenching and dewatering or directional drilling based on the conceptual model and the mitigation measures, which have enabled a conclusion of low or negligible risk. Therefore we agree with the conclusions of no adverse effect on integrity.

We welcome the commitment to develop a scheme and programme for each watercourse crossing, diversion and reinstatement, which will include site specific details regarding sediment management and pollution prevention measures, as secured through Requirement 25 (Watercourse Crossings) of the draft DCO. Natural England looks forward to commenting on the scheme for each water course in due course.

For any queries relating to the content of this letter please contact me using the details provided

below.

☒ The advice provided in this letter has been through Natural England's Quality Assurance process.

The advice provided within the Discretionary Advice Service is the professional advice of the Natural England adviser named below. It is the best advice that can be given based on the information provided so far. Its quality and detail is dependent upon the quality and depth of the information which has been provided. It does not constitute a statutory response or decision, which will be made by Natural England acting corporately in its role as statutory consultee to the competent authority after an application has been submitted. The advice given is therefore not binding in any way and is provided without prejudice to the consideration of any statutory consultation response or decision which may be made by Natural England in due course. The final judgement on any proposals by Natural England is reserved until an application is made and will be made on the information then available, including any modifications to the proposal made after receipt of discretionary advice. All pre-application advice is subject to review and revision in the light of changes in relevant considerations, including changes in relation to the facts, scientific knowledge/evidence, policy, guidance or law. Natural England will not accept any liability for the accuracy, adequacy or completeness of, nor will any express or implied warranty be given for, the advice. This exclusion does not extend to any fraudulent misrepresentation made by or on behalf of Natural England.

Yours sincerely,

Jessica Taylor
Marine Lead Adviser
E-mail: Jessica.Taylor@naturalengland.org.uk
Telephone: 0208 225 8234

Date: 20 March 2019
Our ref: 275160
Your ref: Appendix 3

Royal Haskoning DHV on behalf of Norfolk Vanguard Ltd.

BY EMAIL ONLY

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Dear Gemma,

Planning consultation: Norfolk Vanguard Offshore Windfarm Appendix 3 Clarification Note – Bat Impact Assessment – Paston Great Barn SAC
Location: Norfolk

Thank you for your consultation on the above dated 27 February 2019 and received by Natural England on the same date. The following advice is provided under Natural England's Discretionary Advice Service (DAS).

Appendix 3 Clarification Note – Bat Impact Assessment

Concerns withdrawn
Following receipt of further information on 27 February 2019 Natural England is satisfied that the specific issues we have raised in previous correspondence relating to the assessment of bats at Paston Great Barn SAC have been resolved.

Within the Relevant Representations of Natural England dated 31 August 2018 we advised that from the information provided, we considered that there was likely to be an impact on the Paston Great Barn Special Area of Conservation (SAC) due to loss and severance of foraging and commuting habitat over at least 7 years.

In order to assess the impact we requested more information about each hedgerow to be removed plus an accurate estimation of the timescale for recovery to previous condition (or better) following installation of the cable trench. We did not feel that the assessment had sufficiently assessed the importance to bats from Paston Great Barn of the 11ha of woodland that will be fragmented by the hedgerow removal.

The information provided within Appendix 3 contains sufficient information regarding the hedgerow quality for bats, and illustrates the availability of habitat in the area. Therefore we agree with the conclusions with regards to Bats at Great Paston Barn SAC.

We advise that, as a requirement of the development, that prior to removal of hedgerows, a OLEM/EMP is developed in consultation with Natural England. The plan should include for the improvement of the hedgerows either side of the section to be removed including any gapping up, tree management and the development of scrub/rough grassland margins. The mitigation plan should be in place for 7 years or until the original hedgerow has recovered fully. Consideration could be given within the OLEM/EMP to the planting of more mature hedge plants, that could reduce the time required for these hedgerows to return to their original state/or better.

Natural England recommends that the developer incorporate Net Gain for bats within the final design and suggests consultation with the Norfolk Barbastelle Study Group/ Norwich Bat Group, as they will be the best placed to recommend local enhancement for the species.

For any queries relating to the content of this letter please contact me using the details provided below.

☒ The advice provided in this letter has been through Natural England's Quality Assurance process.

The advice provided within the Discretionary Advice Service is the professional advice of the Natural England adviser named below. It is the best advice that can be given based on the information provided so far. Its quality and detail is dependent upon the quality and depth of the information which has been provided. It does not constitute a statutory response or decision, which will be made by Natural England acting corporately in its role as statutory consultee to the competent authority after an application has been submitted. The advice given is therefore not binding in any way and is provided without prejudice to the consideration of any statutory consultation response or decision which may be made by Natural England in due course. The final judgement on any proposals by Natural England is reserved until an application is made and will be made on the information then available, including any modifications to the proposal made after receipt of discretionary advice. All pre-application advice is subject to review and revision in the light of changes in relevant considerations, including changes in relation to the facts, scientific knowledge/evidence, policy, guidance or law. Natural England will not accept any liability for the accuracy, adequacy or completeness of, nor will any express or implied warranty be given for, the advice. This exclusion does not extend to any fraudulent misrepresentation made by or on behalf of Natural England.

Yours sincerely,

Jessica Taylor
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Date: 18 March 2019
Our ref: 275160
Your ref: Sediment Management at the River Wensum crossing

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Royal Haskoning DHV on behalf of Norfolk Vanguard Ltd.

BY EMAIL ONLY

Dear Gemma,

Planning consultation: Norfolk Vanguard Offshore Windfarm Clarification Note - Sediment Management at the River Wensum crossing
Location: Norfolk

Thank you for your consultation on the above dated 20 February 2019 which was received by Natural England on 27 February 2019. The following advice is provided under Natural England's Discretionary Advice Service (DAS).

Clarification Note: Sediment Management at the River Wensum Crossing

Most concerns withdrawn. However further information is required regarding some elements.
Following receipt of further information on 27 February 2019 Natural England is broadly satisfied that the specific issues we have raised in previous correspondence relating to the assessment of sediment management at the River Wensum crossing have been resolved.
However, further clarification is still required with regards to:

1. Restoration plan outside of functional floodplain;
2. Reinstatement of work areas; and
2. Number of HDD's

Within the Relevant Representations of Natural England dated 31 August 2018 we raised several concerns with regards to the assessment on River Wensum SAC / SSSI. The Sediment Management at the River Wensum Crossing clarification note attempts to address each of these concerns; so, for ease of tracking, this advice letter has been broken down by each comment and whether or not through provision of the clarification note Natural England's concerns can be withdrawn.

1. Restoration of the site should be undertaken sensitively: deep turf stripping and reinstatement is more appropriate than natural regeneration or reseeding.

Most concerns withdrawn. However further information is required regarding some elements.
Following receipt of further information on 27 February 2019 Natural England is broadly satisfied that the specific issues we have raised in previous correspondence relating to restoration of the site have been resolved. However, some further clarification is required.

Within the Relevant Representations of Natural England dated 31 August 2018 we advised that: *'Works to facilitate the trenchless crossing of the River Wensum may take place within the River Wensum floodplain north of Penny Spot Beck which we advised should be avoided as it is part of a Countryside Stewardship agreement to improve the site integrity of the River Wensum SAC. We are content with the mitigation proposed if this location has to be used, i.e. works will take place outside of the winter period (October – February inclusive) (para 1166). However, restoration of this site*

should be undertaken sensitively: deep turf stripping and reinstatement is more appropriate than natural regeneration or reseeding. We would be happy to agree a restoration plan when more information is known.'

Natural England welcomes the commitment that, within the functional floodplain, where a topsoil strip is required for existing grassland located within the functional floodplain, this will be undertaken using a turf cutter and these turf rolls will be retained and reinstated after the works are complete (approximately eight weeks). Natural England also welcomes the commitment to store removed topsoil and turf outside of the functional floodplain.

However, Natural England note that a similar practice will not be employed in areas outside of the functional floodplain. In these areas where surface vegetation has been removed (with the exception of arable crops), this will simply be reseeded to prevent future runoff. Reseeding will only be effective when carried out in suitable growing conditions, otherwise it risks extended periods of bare ground, liable to erosion. The applicant has committed to providing a detailed scheme and programme which will include site specific water course crossing, with consultation with Natural England. We would expect the detailed design to demonstrate that reseeding of bare ground within the River Wensum catchment would not have a detrimental effect on water quality within the River Wensum SAC. If a negative impact on water quality cannot be ruled out at the detailed design stage then turf stripping may be necessary within a wider area of the catchment, not just the floodplain. Natural England look forward to commenting on the detailed design.

2. Sediment Control and reinstatement of work areas

Most concerns withdrawn. However, further information is required regarding some elements. Following receipt of further information on 27 February 2019 Natural England is satisfied that the specific issues we have raised in previous correspondence relating to sediment control have been resolved. However, some further clarification is required with regards to reinstatement of work areas.

Within the Relevant Representations of Natural England dated 31 August 2018 we advised that: *'There is insufficient detail in the Code of Construction Practice (CoCP) for measures to safeguard the designated site in relation to sediment control and reinstatement of all work areas.'* and

'Details of actual methods employed are needed in relation to sediment control, and reinstatement of all work areas.'

The clarification note provides sufficient details with regards to sediment control and therefore Natural England withdraw their concerns in this regard.

However, whilst the clarification note states that 'any damage to ground conditions caused by vehicle tracking will be rectified prior to the reinstatement of topsoil/turf', there are no details on how this will be done. Natural England would request further information in this regard.

3. Permanent Access Tracks

Concerns withdrawn
Following receipt of further information on 27 February 2019 Natural England is satisfied that the specific issues we have raised in previous correspondence relating to permanent access tracks have been resolved.

Within the Relevant Representations of Natural England dated 31 August 2018 we advised that: *'Location of permanent access tracks is not provided and is needed. These would require the retention and maintenance of sediment and surface water control measures.'*

Natural England welcomes the confirmation in the clarification note that there are no new permanent

access tracks required for operation across the functional floodplain with existing tracks and roadways being utilised for access where possible. Temporary construction accesses within the functional floodplain will only be required if the third trenchless crossing compound (north of Penny Spot Beck) is used.

However, Natural England notes that if the third compound is chosen it is still not known what the temporary new construction accesses will be formed of (e.g. protective matting (geotextile), temporary metal road or permeable gravel aggregate). Norfolk Vanguard Ltd. has committed to providing a detailed scheme and programme which will include site specific water course crossing, with consultation with Natural England. Natural England would expect further detail to be provided as to the location of temporary access (this is not illustrated In Figure 1 in the Clarification Note), design, materials, and post construction reinstatement. Natural England looks forward to receiving and commenting on the site specific crossing plan.

In addition, it should be noted that Natural England advises that if possible the area north of Penny Spot Beck should be avoided as it is part of a Countryside Stewardship agreement to improve the site integrity of the River Wensum SAC.

4. Further detail on the ongoing management of silt traps and screens and decommissioning / disposal of retained sediment

Concerns withdrawn
Following receipt of further information on 27 February 2019 Natural England is satisfied that the specific issues we have raised in previous correspondence relating to management of silt traps and decommissioning/disposal of retained sediment have been resolved.

Within the Relevant Representations of Natural England dated 31 August 2018 we advised that: *'Further detail on the ongoing management of silt traps and screens and decommissioning/disposal of retained sediment is required.'*

The clarification note confirms that the sediment traps will be monitored weekly (visual inspection) during the trenchless crossing works (with increased monitoring during inclement weather) and when required the traps can be pumped via settling tanks to remove sediment, based on a pre-defined level / depth of sediment. When the interceptor drains and associated sediment traps are decommissioned any standing water within the drains would be pumped out to settling tanks as described in the clarification note. Sediment that has settled out within the interceptor drain would be left in place. Soils would be replaced in the reverse order that they were removed and turf reinstated.

Natural England welcomes this confirmation and are satisfied that the clarification note provides sufficient information to withdraw our concerns in this regard. Natural England looks forward to receiving the updated CoCP, with mitigation measures as outlined in the clarification note included.

5. Interceptor Drains

Concerns withdrawn
Following receipt of further information on 27 February 2019 Natural England is satisfied that the specific issues we have raised in previous correspondence relating to interceptor drains have been resolved.

Within the Relevant Representations of Natural England dated 31 August 2018 we advised that: *'Interceptor drains are an important part of sediment control and therefore need to be combined with sediment management measures in 11.1.1 Para 103'.*

Natural England welcomes the confirmation in the clarification note that the surface water drainage introduced in advance of construction will include interceptor drains for surface water flows and that

these interceptor drains will include areas for the settlement of sediment (sediment traps). Natural England therefore withdraw our concerns in this regard.

6. Detailed management and monitoring procedures should be provided in the CoCP in case of 'breakout'

Concerns withdrawn
Following receipt of further information on 27 February 2019 Natural England is satisfied that the specific issues we have raised in previous correspondence relating to the need for detailed management and monitoring procedures in case of 'breakout' have been resolved.

Within the Relevant Representations of Natural England dated 31 August 2018 we advised that:
'In addition, detailed management and monitoring procedures should be provided in the CoCP in case of 'breakout' (where the drilling fluid leaves the bore and escapes into the surrounding substrate).'

The clarification note provides a brief overview of the steps that will be in any break-out contingency plan, including measures to ensure drilling stops once a breakout is reported (there will be a drop in pressure at the drill head).

As bentonite is an inert substance Natural England's preference is to consider allowing natural processes to winnow the substance away over more intrusive/damaging options. However, should a more proactive approach be required then the following can also be considered:

- Where appropriate, deploy measures to contain the breakout, for example sand bags, to minimise the extent of any smothering. However, sandbags shouldn't be placed where they will cause significant damage to vegetation or sediment.
- Measures to remove the released bentonite if a significant volume of material is contained – for example pumped back to the bentonite lagoon within the trenchless crossing compound, or pumped to the interceptor drains, or pumped to the mobile settling tanks that will be used for managing sediment traps.

The exact specification for the contingency plan will be informed by further ground investigation and the specific design of the trenchless crossing.

Natural England welcome the commitment to ensure a break-out contingency plan is included in the final CoCP and will provide further advice, if necessary, when this and the crossing site specific plans are produced.

7. Number of HDD's if location north of Penny Spot Beck is used

Further information required to determine impacts on designated sites/landscapes.
Following receipt of further information on 27 February 2019, there remains insufficient information to enable Natural England to provide a substantive response to this consultation. We expect this to be provided in the site specific crossing plan.

Within the Relevant Representations of Natural England dated 31 August 2018 we advised that: '*It is unclear whether there would be 2 HDD's or 1 if the location north of Penny Spot Beck is used.'*

The clarification Note states that 'two trenchless crossings may be required due to local ground conditions, i.e. one to cross the Wensum north of the Penny Spot Beck, and a second one to cross the Penny Spot Beck.

Natural England expects confirmation on the exact number of HDD crossings to be provided in the detailed scheme and programme which will include site specific water course crossing.

Please note that whilst this clarification note broadly allays Natural England's concerns with regards

to impacts on River Wensum SAC / SSSI we would defer to the Environment Agency with regards to its suitability to allay any concerns regarding flood risk. Therefore, Natural England recommends that this clarification note is also provided to the Environment Agency for comment if this hasn't already been done.

For any queries relating to the content of this letter please contact me using the details provided below.

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Yours sincerely,

Jessica Taylor
Marine Lead Adviser
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Telephone: 0208 225 8234

Date: 18 March 2019
Our ref: 275160
Your ref: Outstanding Issues Clarification Note

Royal Haskoning DHV on behalf of Norfolk Vanguard Ltd.

BY EMAIL ONLY

Customer Services
Hornbeam House
Crewe Business Park
Electra Way
Crewe
Cheshire
CW1 6GJ

T 0300 060 3900

Dear Gemma,

Planning consultation: Norfolk Vanguard Offshore Windfarm Other Outstanding Issues Clarification Note
Location: Norfolk

Thank you for your consultation on the above dated 27 February 2019 which was received by Natural England on 27 February 2019. The following advice is provided under Natural England's Discretionary Advice Service (DAS).

Other Outstanding Issues Clarification Note:

1. Sand martins at Happisburgh

Concerns withdrawn
Following receipt of further information on 27 February 2019 Natural England is satisfied that the specific issues we have raised in previous correspondence relating to the assessment of impacts to sand martins at Happisburgh Cliffs have been resolved.

Within the Relevant Representations of Natural England dated 31 August 2018 we advised that *'Sand martin are known to nest in Happisburgh Cliffs which may be affected by noise, vibration and 24hr working (i.e. works involving lighting). It would be preferable to avoid the breeding season during construction. However, the stated distance between nest sites and landfall (130m), Chapter 25 Onshore Noise and Vibration Table 25.17 Predicted distances at which vibration levels may occur, shows that some vibration may be felt at this distance and the significance of this for birds should be evaluated. We agree that lighting should follow good practice guidance for wildlife.*'

The clarification note dated 27 February 2019 confirms that none of the activities potentially giving rise to a vibration effect are anticipated within the landfall works area, with the running track leading up to the landfall compound approximately 450m from the cliff edge. Natural England is therefore satisfied that under the current project design there is no pathway for vibration effects to impact upon sand martin nests at the landfall.

However, please note if the project design changes Natural England would expect this issue to be revisited.

2. One year of survey data in relation to Broadland SPA / Ramsar site wintering birds

Further information required to determine impacts on designated sites/landscapes
Following receipt of further information on 27 February 2019 there remains insufficient information to enable Natural England to provide a substantive response to this consultation. Therefore, Natural England is not satisfied that the specific issues we have raised in previous correspondence relating to the need for one year of survey data in relation to Broadland SPA / Ramsar site wintering birds have been fully resolved.

Within the Relevant Representations of Natural England dated 31 August 2018 we advised that *'Broadland SPA/Ramsar site: This site was scoped out of the HRA on the basis that there was evidence of low levels of wintering birds associated with the SPA/Ramsar using the study area. However, this may have been due to the cropping regime at the time of survey. We requested that this point was taken account of by including additional measures, e.g. survey and/or WeBS data and information about predicted crop patterns at the time of the proposed work. We suggest that the Outline Landscape and Ecological Management Strategy (OLEMS) is amended to include further survey and provide suitable mitigation measures if required.*'

Natural England agrees with the assertion in the clarification note that it was agreed during the Evidence Plan Process (Norfolk Vanguard - Onshore Wintering Bird Surveys Survey Methodology Approach Update Response February 2017 (Document Reference: PB4476.003.038) that one year of baseline surveys was appropriate.

However, during the same plan meeting Natural England suggested that the reason that no focal species selected from the qualifying species of the Broadland SPA and Ramsar site for the agricultural land transect (Bewick's Swan, Whooper Swan, Bean Goose, Greylag Goose, Pink-footed Goose and White-fronted Goose) were recorded may be linked to crop rotations. Crop rotations may mean that crops that the birds will feed on may not have been grown in these fields in that particular survey year. However, in another year if such crops were grown, then higher numbers of birds may be recorded in these fields. Natural England therefore questioned whether this was representative for the available habitat during construction and recommended that consideration was given to this.

The clarification note states that the potential for local cropping patterns to influence the findings of the surveys was considered and that whilst some fields were recently ploughed the majority of crops in place over winter within the wintering bird survey area (winter crop, fallow (grass)) would still provide suitable foraging habitat for pink-foot geese. Therefore it was concluded that the survey results recorded over winter in 2016/2017 provided a robust estimate of the use of these habitats by qualifying features of the Broadland SPA and Ramsar site, i.e. that there are low levels of wintering birds associated with the SPA / Ramsar using the study area.

Natural England welcomes the commitment to not undertake winter works in any one area in consecutive years to attempt to account for changes in cropping patterns for wintering birds to use different habitats for foraging and resting on an inter-annual basis.

However, as per our original query, Natural England would expect to see an assessment of cropping rotation and how this may impact bird species present across several years so as to assess whether or not the low numbers of birds was due to the cropping regime of that particular year or genuinely represents low usage of those areas. Until this has been done Natural England cannot agree with the conclusions regarding wintering birds at Broadland SPA / Ramsar.

3. Use of the 300m disturbance buffer in relation to designated sites

Concerns withdrawn
Following receipt of further information on 27 February 2019 Natural England is satisfied that the specific issues we have raised in previous correspondence relating to the use of the 300m disturbance buffer in relation to designated sites have been resolved.

Within the Relevant Representations of Natural England dated 31 August 2018 we advised that: *'For the assessment of noise disturbance on birds which are features of designated sites, we suggest designated sites within 500m are screened in for assessment, namely River Wensum SSSI; Dereham Rush Meadow SSSI; Dillington Carr, Gressenhall SSSI. However, it is stated in Chapter 25 Onshore Noise and Vibration (Table 25.3 Consultation responses) that 'no sites are located within the noise and vibration study area'. However, Figure 25.1 Noise and Vibration Study Area rather confusingly does not appear to show a noise and vibration study area. However in the report, Dillington Carr, Gressenhall SSSI and Dereham Rush Meadows SSSI are scoped out from further assessment as they are located more than 300m from the onshore project area (paragraph 169) but we are unclear as to how this distance criteria was derived. Therefore, no detailed assessment of noise on bird features appears to have been carried out, i.e. noise modelling. We advise that a detailed noise assessment is carried out for sites within 500m of the project area and mitigation provided for any impacts identified or evidence is provided to demonstrate that there will be no additional noise experienced from construction at the designated site boundary.*'

Natural England has reviewed all documents submitted as part of this application and which are relevant to this point and can confirm that we agree with the use of 300m as a disturbance buffer in relation to noise disturbance on birds which are features of onshore designated sites. Natural England, therefore withdraw our concern in this regard.

4. Grade 3 Agricultural Land Classification (ALC) soils need to be split to allow an assessment of impact to Best and Most Versatile (BMV) to be undertaken

Concerns withdrawn
Following receipt of further information on 27 February 2019 Natural England is satisfied that the specific issues we have raised in previous correspondence relating to the Agricultural Land Classification have been resolved.

Within the Relevant Representations of Natural England dated 31 August 2018 we advised that: *'Grade 3 ALC soils need to be split into Grade 3a and Grade 3b, so that the assessment of loss of BMV land can be properly made (Table 21.10). The amount of BMV land that would be permanently lost to the development, i.e. by buildings etc., and the time it would take for the recovery of soils that are disturbed by the construction should be quantified in the ES.*
We note that the total permanent land take for the footprint of the onshore project substation and National Grid substation extension zone is approximately 10.5ha according to the worst case scenario (Table 21.16). These will be on ALC grades 2 and 3 land; the amount of BMV land should be estimated.'

Natural England welcome the information supplied within the clarification note 'Other unresolved issues' provided 27 February 2019. We note that all Grade 3 land has now been assessed as best and most versatile agricultural land. We note the reassessment within the Errata document 9.4 and that the effects to BMV have been reassessed as minor adverse. Natural England confirm that our concerns with regard to Agricultural Land Classification and the assessment of impact to Best and Most Versatile (BMV) are withdrawn.

5. Topsoil should be reinstated where it originated

Concerns withdrawn
Following receipt of further information on 27 February 2019 Natural England is satisfied that the specific issues we have raised in previous correspondence relating to the need to ensure topsoil is reinstated where it originated have been resolved.

Within the Relevant Representations of Natural England dated 31 August 2018 we advised that: *'Topsoil should be reinstated where it originated. There are significant differences between topsoil in arable and grassland, valley bottom and valley sides and natural, semi natural and managed land.*

This will need clearly addressing in the SMP mentioned in Para 154.'

Natural England welcomes the commitment made in the clarification note to update Section 8 (soil management) of the Outline Code of Construction Practice (OCoCP) to confirm that topsoil will be stored adjacent to the excavated trench and will be reinstated where it originated in sequential order. Natural England, therefore, withdraw our concerns in this regard.

Natural England also welcome the commitment that the SMP will be produced post-consent in accordance with the principles set out in section 8 of the OCoCP.

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Yours sincerely,

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