

Norfolk Boreas Offshore Wind Farm Additional information for the HHW SAC position paper

**Annex 2 Assessment of Additional
Mitigation in the Haisborough,
Hammond and Winterton Special Area
of Conservation (Version 2)**

Applicant: Norfolk Boreas Limited
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Photo: Ormonde Offshore Wind Farm

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1 Introduction

1. In response to discussions between the Applicant and Natural England and following a letter dated 6 December 2019 from BEIS to Norfolk Vanguard Limited, further mitigation measures to address the potential effects of cable protection on the features of the Haisborough, Hammond and Winterton (HHW) Special Area of Conservation (SAC) have been proposed by Norfolk Boreas Limited and Norfolk Vanguard Limited.
2. In order to understand the effectiveness of this additional mitigation, Natural England requested further assessment was undertaken. This document was first submitted as Appendix 1 to the Applicant's position paper on the Haisborough Hammond and Winterton Special Area of Conservation [REP5-057]. It contains the requested assessment which should be considered in addition to that provided in the original Norfolk Boreas Information to Support Habitats Regulations Assessment (HRA) report (document 5.3, [APP-201]).
3. This document has been updated as a result of the Applicant's further commitment at Deadline 6 of the Norfolk Boreas Examination to reflect a further mitigation measure to decommission cable protection within the HHW SAC placed as a result of inability to bury cables to the optimum depth due to ground conditions.
4. A description of the mitigation measures is provided in section 2, the proposed approach to the assessment is provided in section 3 and the assessment of effects is provided in section 5.

2 Proposed New Mitigation Measures

5. As set out in the updated HHW control document (document reference 8.20), submitted at Deadline 6, the Applicant is proposing further mitigation to that provided in the Norfolk Boreas application to reduce the potential effects of cable protection on the HHW SAC.

2.1 No cable protection in priority areas to be managed as reef

6. As set out in the updated outline Haisborough Hammond and Winterton (HHW) Special Area of Conservation (SAC) Site Integrity Plan (SIP) (updated version submitted at Deadline 6, document reference 8.20), the Cable Specification, Installation and Monitoring Plan (CSIMP) (alternative document 8.20 submitted as Appendix 1 of the) and the Applicant's Written Summary of the Applicant's Oral Case at Issue Specific Hearing 4 [REP4-014], a new commitment has been made by the Applicant to use no cable protection in the "*priority areas to be managed as S. spinulosa Annex I reef*" identified by Natural England within the HHW SAC (Figure 1), unless otherwise agreed with the Marine Management Organisation (MMO) in consultation with Natural England.

2.1.1 Areas to be managed as reef

7. The areas to be managed as *S. spinulosa* Annex I reef have formed the basis for fisheries management measures within the HHW SAC. As a result, two fisheries management areas have been proposed to manage the areas where *S. spinulosa* reef is most likely to recover. One of the management areas has been proposed by Defra and one by the Eastern Inshore Fisheries and Conservation Authority (EIFCA) both of which, if implemented, would partly overlap with the Project offshore cable corridor.
8. The management areas have been identified with the aim of enabling the priority areas¹ to be managed as *S. spinulosa* Annex I reef to recover to favourable condition in accordance with the Conservation Objectives for the site (section 4). These areas have been identified by Natural England as areas with high confidence that the existing reef will increase in extent if the recurring impact from bottom towed fishing gear ceases in these areas.

2.1.2 DEFRA management area

9. As stated in the MMO's submission at Deadline 6 of the Norfolk Vanguard Examination [REP6-030], fisheries management measures in offshore waters (e.g. those beyond 12 nautical miles) must be agreed by other Member States with an

¹ The term "priority" area has been used by the Applicant as this is the term used in Natural England's relevant representation [RR-069]. These are the areas in which Natural England have "high confidence" that reef will recover.

active interest in the site. With regards to the Defra fisheries management area, at the time of writing this designation does not appear to have progressed since a draft recommendation² was produced by Defra in 2016 (Appendix 2) and there is a high level of uncertainty that this designation will progress in advance of Norfolk Boreas construction commencing (currently proposed in 2025). Agreement has not been reached with the Member States for the proposed management area and therefore the likelihood of this management measure being successfully implemented appears to be low. The timescale for this management measure is therefore highly uncertain and likely to be many years away. It is therefore unlikely that any existing fishing (albeit low levels, see section 2.1.1 of the Applicant's Haisborough Hammond and Winterton Special Area of Conservation Position Paper [REP5-057]) pressure will be removed and therefore that any *S. spinulosa* Annex I reef will have restored in this management area, at the point at which cable protection for the Project is installed.

10. Based on the EIFCA's Deadline 2 submission (REP2-069), the Applicant understands the proposed small byelaw area in the inshore part of the Norfolk Boreas offshore cable corridor is currently in a period of review by the MMO and Defra and could be implemented in late 2020, if accepted. It is however noted that there is limited fishing activity at the proposed EIFCA byelaw area (see section 2.1 of the main Additional information to the HHW SAC position paper document [ExA.AS-2.D6.V1]) and therefore, should this byelaw be implemented, it is uncertain whether there will be a significant change in the habitat condition and extent of *S. spinulosa* Annex I Reef.

The Interim Cable Burial Study submitted by the Applicant (Appendix 3 of the HHW SAC SIP, [REP1-033]) (Likely Cable Protection Locations) provides evidence that cable protection will not be required in the priority areas to be managed as *S. spinulosa* Annex I reef, illustrating that the areas where it is more likely that cable protection may be required are outside of the areas to be managed as reef. The findings of this study are reflected in Figure 2 and Figure 3 of this document. However, the commitment to use no cable protection in the priority areas to be managed as reef within the HHW SAC is further mitigation proposed by the Applicant at Deadline 4.

2.2 Decommissioning cable protection

11. Following a review of the supply chain, the Applicant has made a commitment to decommission cable protection at the end of the Norfolk Boreas project life where it is associated with unburied cables due to ground conditions (where required for crossings this will be left *in situ*).

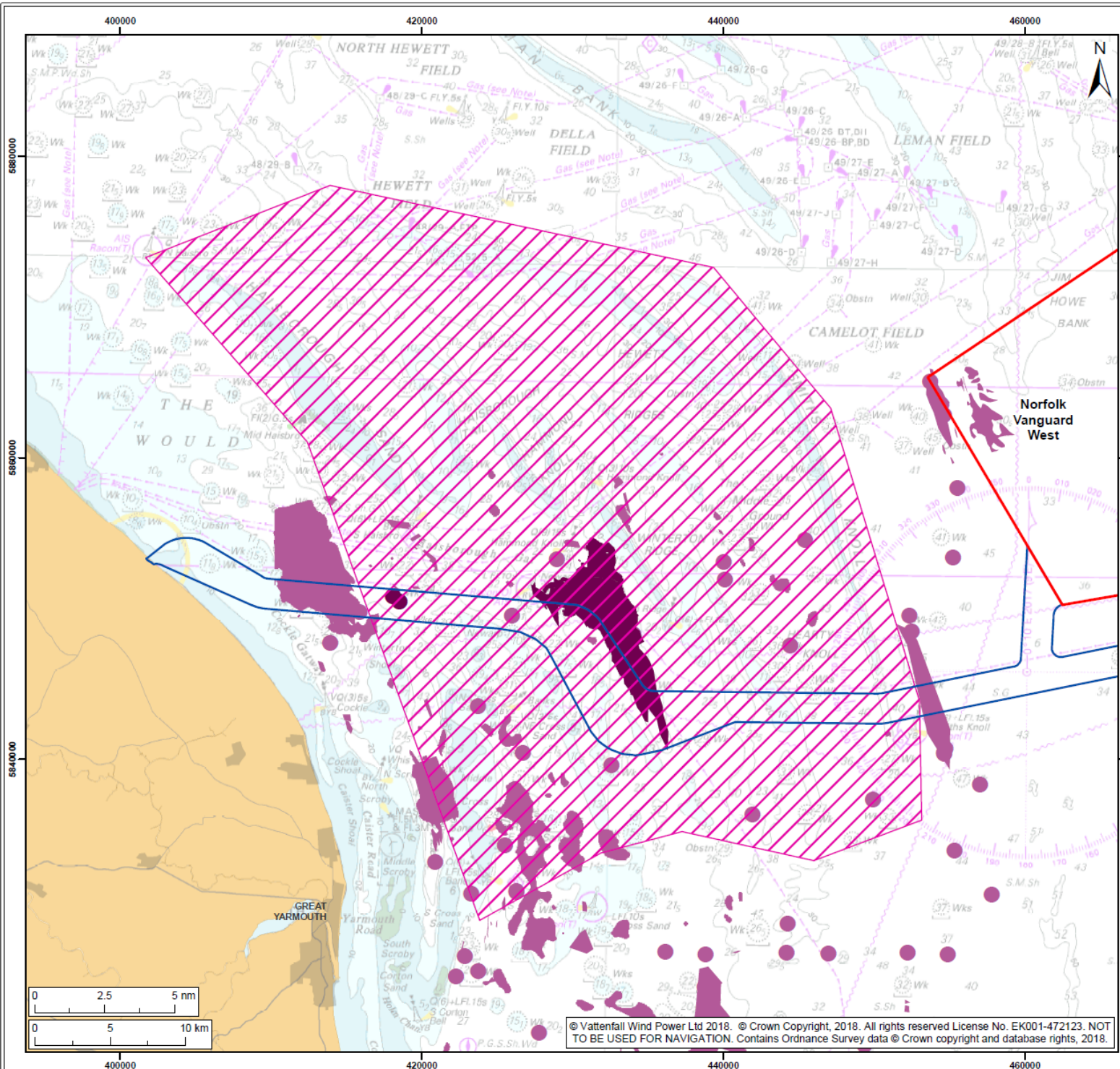
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12. Further detail on the methods for decommissioning is provided in Appendix 2 of the Applicant's Additional information to the HHW SAC position paper (document reference ExA.AS-2.D6.V1.App2).
13. This commitment ensures that there will be no permanent habitat loss as a result of cable protection.

2.3 Removal of disused cables

14. Every effort is being made by the Applicant to reduce the number of crossings by removing disused cables where agreement can be reached with the cable owners. An Out of Service Cable Recovery Agreement is close to finalisation with BT Subsea who own a number of out of service assets within the HHW SAC. Appendix 3 of the Applicant's Additional information to the HHW SAC position paper (document reference ExA.AS-2.D6.V1.App2) demonstrates the advanced stages of these discussions by way of a Letter of Comfort from BT Subsea
15. While it is recognised that it is not possible to include the reduction in volume of cable protection that this will represent in the current assessment, it does enable the Applicant to demonstrate the commitment that it will be possible to reduce the number of crossings from six to two per cable in due course.



- Legend:
- Norfolk Vanguard
 - Offshore cable corridor
 - Haisborough Hammond and Winterton Special Area of Conservation (SAC)¹
 - Priority areas to be managed as *S. spinulosa* reef²
 - Areas to be managed as *S. spinulosa* reef²

¹ JNCC, 2019
² Natural England/MALSF, 2013/2011

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Title:
 Areas Identified by Natural England to be managed as *S. spinulosa* reef

Figure: 1 Drawing No: PB4476-009-008-001

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Co-ordinate system: ETRS 1989 UTM Zone 31N EPSG: 25831



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3 Approach to Assessment

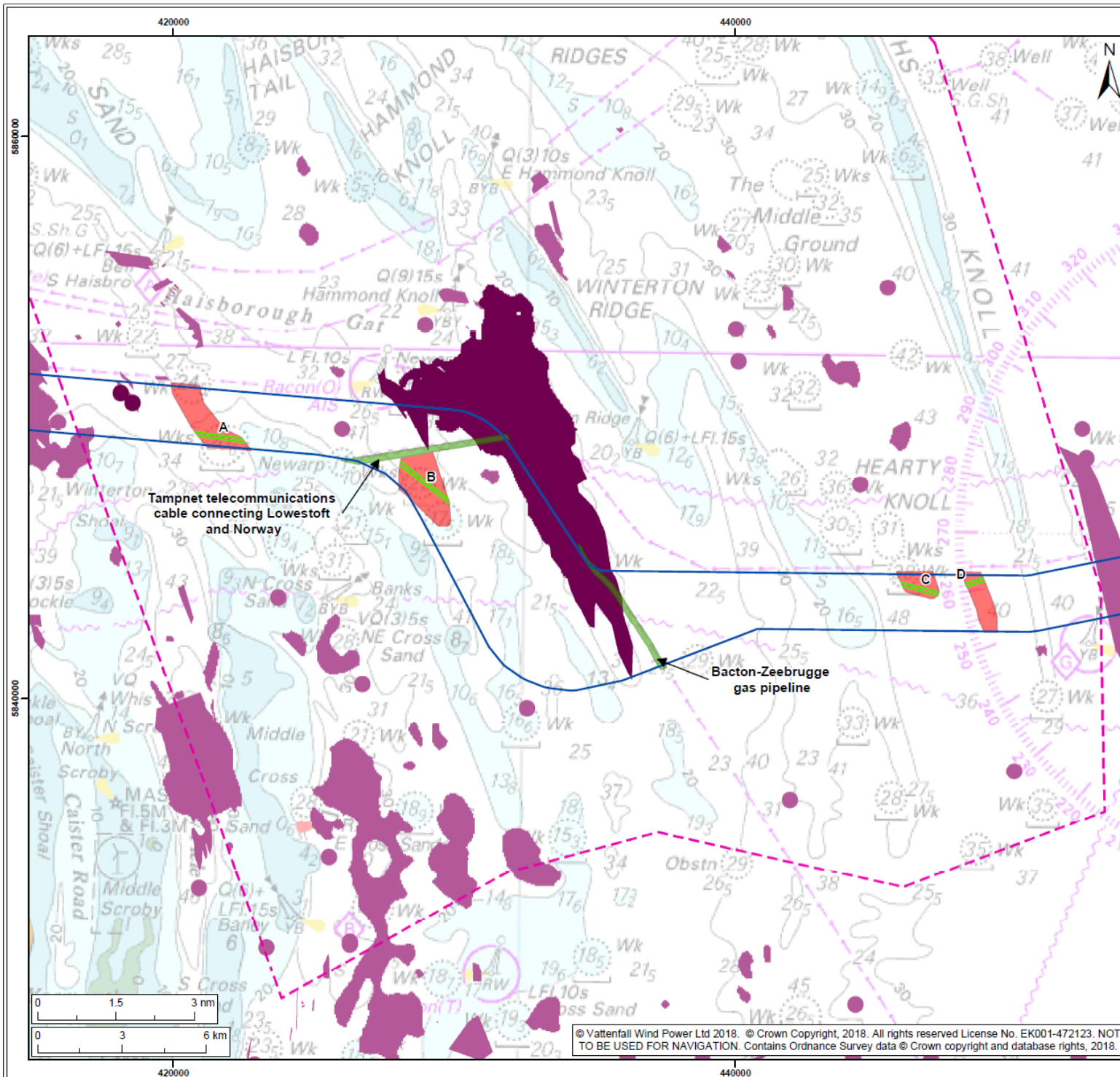
3.1 Overview

16. The further assessment in this document of the HHW SAC in relation to cable protection has been undertaken based on the additional mitigation measures being proposed by the Applicant (described in section 2).
17. It is noted that an assessment of long term habitat loss on *S. spinulosa* Annex I reef was not provided in the original Norfolk Boreas Information to Support HRA report (document 5.3) due to the Applicant's position that cable protection can be colonised by *S. spinulosa* reef and that this would provide the same function in terms of biodiversity and is therefore not a loss of habitat. However, it is acknowledged that Natural England's position is that whilst *S. spinulosa* can be expected to colonise cable protection, this is not on a natural substrate and therefore Natural England does not consider this an Annex I Habitat (Natural England's generic position on cable protection, submitted at as Appendix 2.5 of Natural England's Relevant Representation [RR-099] of the Norfolk Boreas Examination). As a result, the assessment provided in section 5.1 considers long term habitat loss of Annex I Reef as a worst case scenario.
18. Where cable protection is required due to pipeline / cable crossings this will not be treated as Annex I habitat in the assessment in accordance with Natural England's advice that *S. spinulosa* reef growing on artificial substrate is not Annex I reef as well as Natural England's Pre 22nd January 2020 Issue Specific Hearing Updated Benthic Ecology Advice, which states "*Natural England is less concerned about cable crossing points compared to un-impacted areas, as it is unlikely for reef to be present.*" [REP4-038].

3.2 Approach

19. In accordance with the 'Natural England advice note regarding consideration of small scale habitat loss within SACs in relation to cable protection' submitted at Deadline 1 (REP1-057), the assessment will consider the following:
 - Location of the predicted habitat loss in terms of whether it overlaps a designated or supporting feature of the site;
 - Duration of the loss;
 - Scale of the loss in relation to the feature / sub feature of the site including consideration of the quality and rarity of the affected area;
 - Impact on structure, functioning or supporting processes of the habitat;
 - Feature condition; and
 - Existing habitat loss within the same site/ feature/ sub feature.

20. The advice from Natural England also states that whilst there are no ‘hard and fast’ rules or thresholds, in order for Natural England to advise that there is no likelihood of an adverse effect the project would need to demonstrate the following:
- That the loss is not on the priority habitat/feature/ sub feature/ supporting habitat; and/or
 - That the loss is temporary and reversible (within guidelines above); and/or
 - That the scale of loss is so small as to be *de minimis* alone; and/ or
 - That the scale of loss is inconsequential including other impacts on the site/ feature/ sub feature.
21. The assessment has also considered the Conservation Objectives (section 4) and targets within the Supplementary Advice for the HHW SAC and uses areas identified by Natural England to be managed as Reef (Figure 2) and areas to be managed as Sandbank (Figure 3) as the baseline for the assessment.



- Legend:
- Offshore cable corridor
 - Zones where cable protection could be required
 - Zones where cable protection could be required due to infrastructure
 - Haisborough Hammonds and Winterton SAC¹
 - Priority areas to be managed as *S. spinulosa* reef²
 - Potential areas to be managed as *S. spinulosa* reef²
 - Indicative cable route

¹ JNCC, 2019
² Natural England/MALSF, 2013/2011

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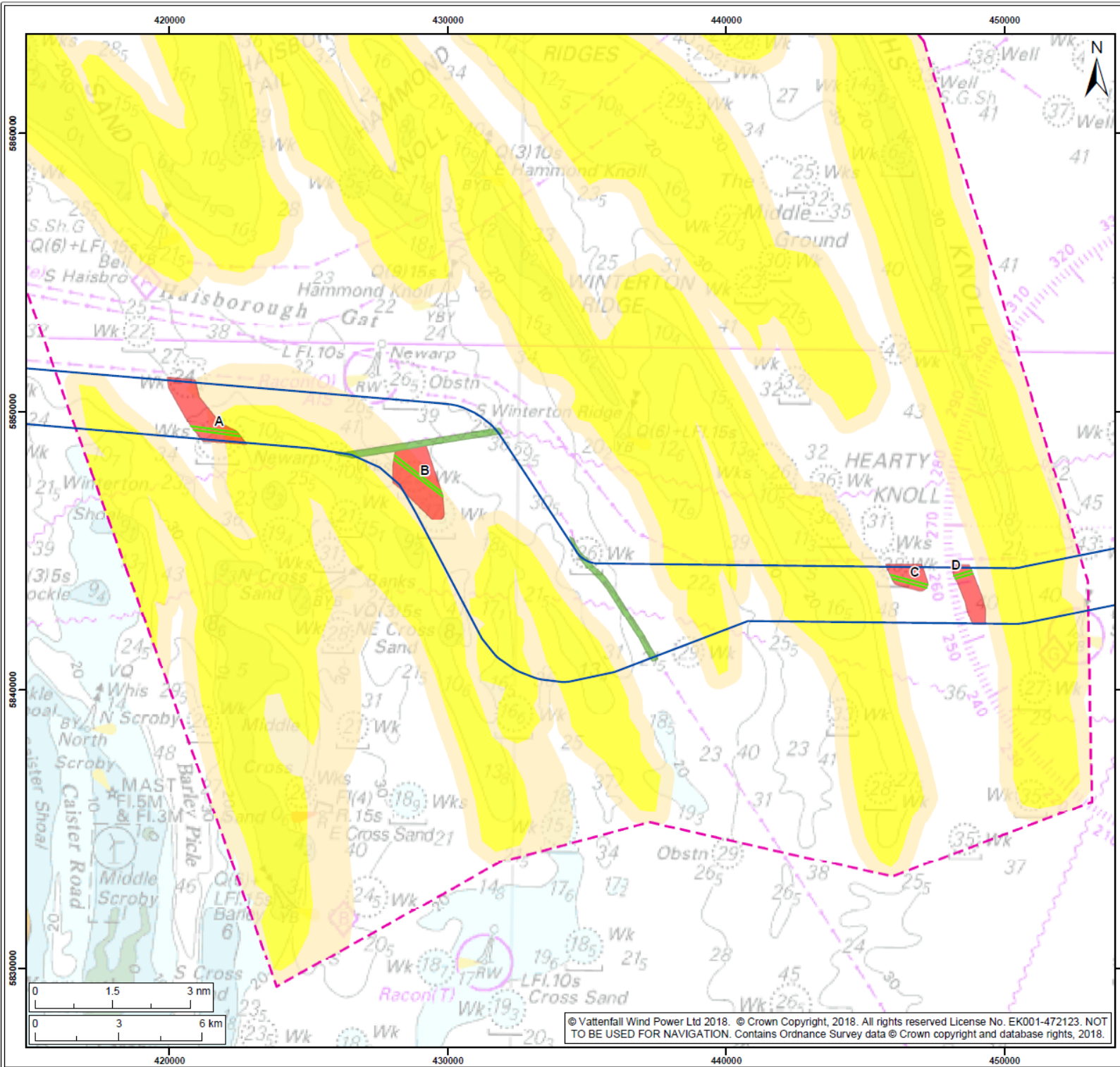
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Indicative cable protection locations and Area to be managed as Sabellaria reef

Figure: 2	Drawing No: PB4476-009-008-002				
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- Legend:
- Offshore cable corridor
 - Zones where cable protection could be required
 - Zones where cable protection could be required due to infrastructure
 - Haisborough Hammond and Winterton Special Area of Conservation (SAC)¹
 - Indicative cable route
- Areas to be managed as sandbanks which are slightly covered by seawater at all times²**
- Annex I Sandbank Area
 - Potential Annex I Sandbank

¹ JNCC, 2019. ² JNCC, 2016.

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Title:
Indicative Cable Protection locations and Areas to be managed as Annex I Sandbank

Figure: 3	Drawing No: PB4476-009-008-003				
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Co-ordinate system: ETRS 1989 UTM Zone 31N EPSG: 25831



3.3 Cable Protection Worst Case Scenario

22. The worst case scenario for deployment of cable protection incorporates the new mitigation outlined in section 2 in addition to the various mitigation commitments made prior to submission of the DCO application, as well as commitments made during the ongoing Norfolk Boreas Examination (see below).
23. The Applicant committed to use an HVDC export solution in order to reduce the number of cables and cable protection. This results in the following mitigating features in relation to cable protection:
 - There will be two cable installations instead of six for Norfolk Boreas (and the same for Norfolk Vanguard);
 - The potential quantities of cable protection in the unlikely event that cables cannot be buried is reduced due to the reduction in the number of cables; and
 - The number of export cables required to cross existing cables and pipelines and the associated cable protection is reduced; and
 - The space required for cable installation is reduced, increasing the space available within the cable corridor for micrositing to increase burial success and avoid constraints such as *S. spinulosa* reef.
24. An interim survey in 2020 and pre-construction survey within 12 months of any cable installation works will be undertaken. Data from Norfolk Vanguard pre-construction surveys are also likely to be available to inform the Norfolk Boreas project. The detailed cable route, including micrositing will be determined based on the results of the interim and pre-construction surveys and must be agreed with the MMO in consultation with Natural England before any installation works can commence.
25. Cables will be buried where the substrate allows burial to a depth of at least 1m and appropriate burial tools will be selected following the preconstruction surveys in order to maximise cable burial success and minimise the requirement for cable protection.
26. A maximum of 5% of the cable length within the HHW SAC may require cable protection due to insufficient ground conditions for burial. This is reduced from 10% in the original DCO application (and used in the Information to support HRA report [APP-201]) based on evidence from an interim cable burial study (provided in Appendix 2 of the HHW SAC Site Integrity Plan (document 8.20 [REP1-033])).
27. The Applicant has been in discussion with one of the cable owners and is progressing an agreement that four of the disused cables within the HHW SAC can be cut and removed, rather than using cable protection to create a crossing. A letter of comfort has been provided demonstrating that both parties are confident that agreement

can be reached before the end of the Examination (Appendix 3 of the Applicant's Additional information to the HHW SAC position paper (document reference ExA.AS-2.D6.V1.App2)). However, as the agreements are not yet finalised it is not possible to secure the mitigation in the DCO via the HHW control document.

28. Total habitat loss within the HHW SAC could be up to 32,000m² (0.03km²) based on the following:
- 12,000m² as a result of up to two crossings for each of the export cable pairs (four crossings in total) within the HHW SAC.
 - Each crossing could require up to 100m length and 10m width of protection.
 - Cable protection at crossings would be left *in situ* at the end of the project life, however as noted above this cannot be Annex I reef, in accordance with Natural England advice that *S. spinulosa* reef growing on artificial substrate is not Annex I reef.
 - 20,000m² as a result of up to 5% of the cable length in the SAC (2km of cable protection per cable pair, 4km in total) potentially requiring cable protection in the unlikely event that unsuitable ground conditions are encountered. A 5m width of cable protection could be required. **If required, this would only be deployed outside the priority areas to be managed as reef in the HHW SAC.**

4 Conservation Objectives

4.1 Overview

29. Conservation objectives are set to ensure that, subject to natural change, the integrity of the site is maintained or restored as appropriate, and that the site contributes to achieving the Favourable Conservation Status of its qualifying features, by maintaining or restoring:
- The extent and distribution of qualifying natural habitats and habitats of the qualifying species;
 - The structure and function (including typical species) of qualifying natural habitats;
 - The structure and function of the habitats of the qualifying species;
 - The supporting processes on which qualifying natural habitats and habitats of qualifying species rely;
 - The population of qualifying species;
 - The distribution of qualifying species within the site

4.2 Favourable condition

30. 'Favourable Condition' is the term used in the UK to represent 'Favourable Conservation Status' for the interest features of SACs. For an Annex I habitat, Favourable Conservation Status occurs under the Habitats Directive when (JNCC and Natural England, 2013):
- Its natural range and area it covers within that range are stable or increasing;
 - The specific structure and functions, which are necessary for its long-term maintenance, exist and are likely to continue to exist for the foreseeable future; and
 - The conservation status of its typical species is favourable.
31. Favourable condition of the sandbanks and reefs is assessed based on the long-term maintenance of the following (JNCC and Natural England, 2013):
- Extent of the habitat (and elevation and patchiness for reef);
 - Diversity of the habitat;
 - Community structure of the habitat (population structure of individual species and their contribution to the functioning of the habitat); and
 - Natural environmental quality (e.g. water quality, suspended sediment levels).

4.2.1 Targets for achieving Favourable Condition

4.2.1.1 Annex I *S. spinulosa* reef

32. Natural England's Supplementary Advice Targets³ for Annex I Reef are outlined in Table 4.1.

Table 4.1 Annex I reef Supplementary Advice Targets of Relevance to Norfolk Boreas

Attribute	Target
Distribution: presence and spatial distribution of biological communities	Restore the presence and spatial distribution of reef communities.
Extent of subtidal biogenic reef	When Sabellaria reef develops within the site, its extent and persistence should not be compromised by human activities, accepting that, due to the naturally dynamic nature of the feature, its extent will fluctuate over time.
	Restore the total extent and spatial distribution and types of reef (and each of its subfeatures).
Structure and function: presence and abundance of key structural and influential species	Maintain OR Recover OR Restore the abundance of listed species, to enable each of them to be a viable component of the habitat.
Structure: non-native species and pathogens	Restrict the introduction and spread of non-native species and pathogens, and their impacts.
Structure: population density	Restore the density of Sabellaria species across the feature.
Structure: species composition of component communities	Restore the species composition of component communities.
	Restore the species composition of the Sabellaria reef community.
Supporting processes: areas with conditions suitable for reef formation	Restore the environmental conditions in those locations that are known, or which become known, to be important for Sabellaria reef formation.
	Maintain the natural rate of sediment deposition.
	Maintain natural levels of turbidity (e.g. concentrations of suspended sediment, plankton and other material) across the habitat.
	Maintain the natural water flow velocity to the subtidal Sabellaria reefs, to provide high levels of oxygen, sediment supply and food.

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4.2.1.2 Annex I Sandbank

33. Natural England's Supplementary Advice Targets for Annex I Sandbank are outlined in Table 4.1.

Table 4.2 Annex I Sandbank Supplementary Advice Targets of Relevance to Norfolk Boreas

Attribute	Target
Distribution: presence and spatial distribution of biological communities	Restore the presence and spatial distribution of subtidal sandbank communities.
Extent and distribution	Restore the total extent and spatial distribution of subtidal sandbanks to ensure no loss of integrity, while allowing for natural change and succession.
Structure and function: presence and abundance of key structural and influential species	Maintain OR Recover OR Restore the abundance of listed species, to enable each of them to be a viable component of the habitat.
Structure: non-native species and pathogens	Restrict the introduction and spread of non-native species and pathogens, and their impacts.
Structure: sediment composition and distribution	Restore the distribution of sediment composition across the feature (and each of its sub-features).
Structure: species composition of component communities	Restore the species composition of component communities.
Structure: topography	Maintain the presence of topographic features, while allowing for natural responses to hydrodynamic regime, by preventing erosion or deposition through human-induced activity.
Structure: volume	Maintain the existing (where no previous evidence exists) or best-known (where some evidence exists) volume of sediment in the sandbank, allowing for natural change.
Supporting processes: sediment movement and hydrodynamic regime	Maintain all hydrodynamic and physical conditions such that natural water flow and sediment movement are not significantly altered or prevented from responding to changes in environmental conditions.

5 Assessment of Effects

5.1 Long term Loss of Annex I Reef

34. As stated in section 3, the assessment focuses on the effect of habitat loss only, as this is the only effect that is of relevance to the new mitigation; avoidance of cable protection in the areas to be managed as *S. spinulosa* Annex I reef as identified by Natural England and decommissioning of cable protection. All other effects are assessed in the Information to Support HRA report (document 5.3 [APP-201]).
35. As discussed in section 3.3, micrositing will be undertaken to avoid *S. spinulosa* reef where possible and therefore it is highly unlikely that there would be any cable protection in areas of *S. spinulosa* reef and thus no associated loss of existing reef. Based on current data there is likely to be sufficient space to microsite cables through existing reef, as recognised in Natural England's Relevant Representation for Norfolk Vanguard [RR-106, of the Norfolk Vanguard Examination] which states: *"Whilst Natural England understands that on the basis of survey data at this point there should be room to microsite around reef in cable corridor, we note that this may not be the case pre construction."*
36. The Applicant acknowledges the potential for *S. spinulosa* to extend prior to construction but notes that the basis for this would largely be as a result of fisheries management measures in the priority areas to be managed as reef which are highly uncertain and which the Applicant has now committed to avoiding with cable protection.

5.1.1 Location of habitat loss

37. There will be no loss of an Annex I priority natural habitat⁴ as a result of cable protection as there are no priority natural habitats within the HHW SAC.
38. The potential location of habitat loss due to the cable protection required within the HHW SAC is indicated in Figure 2, showing that the areas where cable protection may be required are outside areas to be managed as *S. spinulosa* Annex I Reef. Natural England and JNCC have identified these areas of potential *S. spinulosa* reef habitat as a management measure in order to meet the conservation objectives for Annex I reefs, as they consider those are areas where there is high confidence that *S. spinulosa* has potential to increase in extent if damaging pressures (i.e. from bottom towed fishing gear) are removed. Therefore, if these areas are avoided, the cable

⁴ As stated in the Habitats Directive, priority natural habitat types means natural habitat types in danger of disappearance, which are present on the territory referred to in Article 2 and for the conservation of which the Community has particular responsibility in view of the proportion of their natural range which falls within the territory referred to in Article 2; these priority natural habitat types are indicated by an asterisk (*) in Annex I of the Habitats Directive;

protection cannot hinder the achievement of the conservation objective of maintain or restore the *S. spinulosa* Annex I reef to a favourable condition. Therefore, this ensures that any small scale permanent loss of habitat within the SAC would be inconsequential to the conservation objectives of Annex I reef.

5.1.2 Duration of habitat loss

39. The duration of habitat loss is expected to be approximately 30 years in line with the expected design life of the project.

5.1.3 Scale of habitat loss

40. The Applicant acknowledges the potential for *S. spinulosa* to recover prior to construction but notes that the basis for this would largely be as a result of fisheries management measures and it remains highly uncertain whether this will lead to increased levels of *S. spinulosa* prior to cable installation, as discussed previously (see section 2.1.1 of the Applicant's Haisborough Hammond and Winterton Special Area of Conservation Position Paper [REP5-057]).
41. As demonstrated in section 5.1.1 there will be no permanent loss of areas to be managed as *S. spinulosa* Annex I reef. Therefore, the project would not prevent achievement of the conservation objectives for *S. spinulosa* Annex I reef within HWW SAC in these areas.
42. With regards to *S. spinulosa* Annex I reef outside the areas to be managed as reef, the Applicant has committed to micrositing around any *S. spinulosa* Annex I reef identified during the pre-construction surveys where there is sufficient space to do so, unless otherwise agreed with the MMO in consultation with Natural England (see the Outline HHW SAC SIP, document reference 8.20 [REP1-033]). Therefore, there is not expected to be any cable protection in areas of existing *S. spinulosa* Annex I reef.
43. As discussed in the Information to Support HRA report (document 5.3), Norfolk Boreas Limited commissioned a Cable Constructability Assessment by Global Marine Systems Ltd (provided in Appendix 4.2 of the ES) to determine an appropriate cable corridor width of approximately 2km to 4.7km (a combined corridor for Norfolk Vanguard and Norfolk Boreas).
44. The space available for micrositing within the offshore cable corridor where it overlaps with the HHW SAC is approximately 1.05km along most of the route (where the corridor width is 2km), with up to 3.75km of micrositing available in the 'dog-leg' area (where the corridor width is 4.7km). This takes into account the space required

for Norfolk Boreas export cables⁵. The calculated space available for micrositing is based on the following worst case scenario:

- Up to four export cable trenches (four cables in 2 trenches for Norfolk Boreas and four cables in two trenches for Norfolk Vanguard) with spacing as shown in Plate 5-1;
- The cable corridor is typically 2km in width, with a wider section of up to 4.7km where there is a dog-leg in the corridor within the SAC;
- A total width of approximately 1.35km is required for Norfolk Boreas and Norfolk Vanguard; which includes up to four cables (laid in pairs, i.e. two trenches) for each project, a contingency of 440m (0.4km), an anchor placement zone, and a buffer for potential anchor placement and cable replacement works (GMSL, 2016 unpublished; Plate 5-1); and
- The remaining width of the offshore cable corridor within the SAC is therefore approximately 0.65km to 3.35km plus the built-in contingency of 0.4km, resulting in approximately 1.05km to 3.75km available for micrositing.

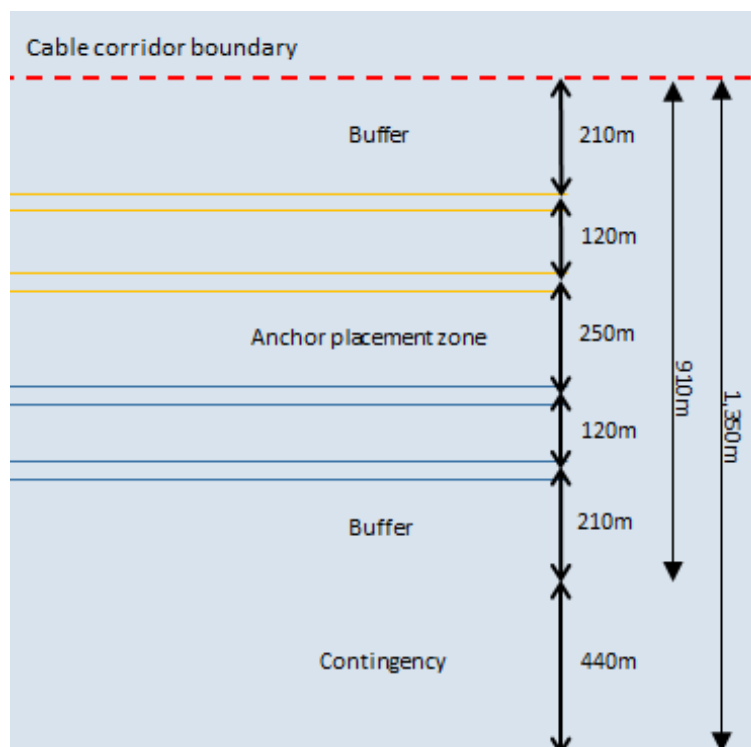


Plate 5-1 Export cables layout (two pairs of cables for Norfolk Vanguard (yellow) and two pairs of cables for Norfolk Boreas (blue)) based on 48m water depth⁶

⁵ This SIP is for Norfolk Boreas alone, however the space available for micrositing within the cable corridor must take account of Norfolk Boreas.

⁶ The separation between cables is determined by the potential space required to undertake a cable repair which is a factor of the water depth. Depth in the SAC is less than 48m and therefore this represents a conservative worst case scenario

45. However, should *S. spinulosa* reef colonise the 2km to 4.7km wide offshore cable corridor to such an extent that micrositing is not possible, and in the unlikely event that cable protection would be required in these areas, the habitat loss would be of *de minimis* proportions in relation to a new large expanse of reef bisecting the cable corridor. Such a reef extent would have grown significantly compared with the current extent and would be significantly larger than the Annex I Reef that the HHW SAC was designated for. Therefore any small scale loss (as quantified in paragraph 46, below) would likely be within the range of natural variation observed for this ephemeral species. This would therefore not impact Natural England management measures and would not hinder the conservation objectives for the HHW SAC in relation to Annex I reef.
46. As a worst case, total habitat loss within the HHW SAC could be 32,000m² (0.03km²), as discussed in section 3.3. This represents 0.002% of the 1,468km² SAC area, however as explained above there will be 0% loss of habitat in the priority areas to be managed as reef.

5.1.4 Effect on structure, function and supporting processes

47. As there will be no habitat loss of *S. spinulosa* Annex I reef from the areas to be managed as reef, there will be no adverse effect on the structure, functioning, supporting processes or feature condition of the *S. spinulosa* Annex I reef as a result of the deployment of cable protection. Furthermore, as demonstrated in Section 5.1.1 the management measures being proposed by Natural England will not be impacted and the following targets for achieving the conservation objectives of *S. spinulosa* Annex I reef will not be hindered:
- No significant decline in community with different growth phases present
 - No decline in the abundance of specified species from an established baseline
 - Maintain age/size class structure of individual species.

5.1.5 Existing habitat loss

48. Annex I Reef in the HHW SAC is in unfavourable condition due to various existing pressures on the site, for example fishing and aggregate dredging which have all been permitted or unmanaged in the site to date. This unfavourable condition and the target to restore the site has been taken into account in the assessment.
49. The in-combination effect of Norfolk Boreas and Norfolk Vanguard cable protection is considered below.

5.1.6 In-combination habitat loss with Norfolk Vanguard

50. Total habitat loss associated with cable protection for Norfolk Boreas and Norfolk Vanguard within the HHW SAC could be up to 64,000m² (0.064km²) based on the following:
- 24,000m² as a result of up to six crossings for each of the export cable pairs (24 crossings in total) within the HHW SAC. Each crossing could require up to 100m length and 10m width of protection.
 - It is noted that every effort will be made by the Applicant to further reduce the area occupied by cable protection at crossings where agreement can be reached with the cable owners. This is evidenced by the possible reduction in number of cable crossings from six to two (section 3.3) for each cable.
 - Where cable protection is required due to pipeline / cable crossings this is not considered Annex I reef, in accordance with Natural England advice.
 - 40,000m² as a result of up to 5% of the cable length in the SAC (2km of cable protection per cable pair, 4km in total) potentially requiring cable protection in the unlikely event that unsuitable ground conditions are encountered. A 5m width of cable protection could be required. If required for Norfolk Boreas and/or Norfolk Vanguard, this would only be deployed outside the priority areas to be managed as reef in the HHW SAC.
51. Norfolk Vanguard will also incorporate the new additional mitigation with regards to committing to no cable protection in the priority areas to be managed as reef. Therefore any loss would not prevent restoration in accordance with the conservation objectives for *S.spinulosa* Annex I reef within the HHW SAC.
52. As with Norfolk Boreas alone, micrositing will be undertaken for Norfolk Vanguard to avoid Annex I *S. spinulosa* reef where at all possible and therefore, it is highly unlikely that there would be any cable protection on areas of Annex I reef and no associated loss of existing reef.
53. The worst case scenario for cable protection for Norfolk Boreas and Norfolk Vanguard represents 0.003% of the 1,468km² SAC area. However as explained above, there will be 0% loss of habitat in the priority areas to be managed as reef.

5.2 Long term loss of Annex I Sandbank

5.2.1 Location of loss of Annex I Sandbank

54. As discussed in section 5.1, there will be no loss of an Annex I priority natural habitat as a result of cable protection as there are no priority natural habitats in the HHW SAC.

55. The potential location of habitat loss due to the cable protection required within HHW SAC is indicated in Figure 3, showing that the majority of cable protection is likely to be outside Natural England's identified areas to be managed as Annex I Sandbanks.

5.2.2 Duration of habitat loss

56. The duration of habitat loss is expected to be approximately 30 years in line with the expected design life of the project.

5.2.3 Scale of habitat loss

57. Total habitat loss within the HHW SAC could be up to 32,000m² (0.03km²) as discussed in section 3.3. This represents 0.002% of the 1,468km² SAC area and 0.003% of the 678km² area of sandbanks within the SAC. This extent of loss is *de minimis*, taking into account the absence of effect on the function of the Annex I Sandbank (discussed in section 5.2.4). This is in keeping with various case studies where Annex I habitat has been lost as a result of a project, for example (Natural England, 2016):

- Walney Extension - habitat loss of intertidal mudflats and sand flats due to cable installation and rock armour. 0.41% of overall 600ha of feature was affected and the appropriate assessment concluded no AEol.
- Hinkley Point C - habitat loss of a small area of potential Sabellaria reef within the rock armour barge berthing and unloading area. This area equated to less than 0.05% of the SAC reef feature and was not considered significant.
- Kentish Flats Extension - habitat loss of 0.003% of Special Protection Area (SPA). The Secretary of State (SoS) and Natural England agreed this loss to be negligible.

58. It is noted that Natural England has previously made reference to the Sweetman case study. The Applicant notes that this refers to permanent loss of priority natural habitat, which is not applicable in the HHW SAC.

5.2.4 Effect on structure, function and supporting processes

59. It is expected that the cable protection may undergo some periodic burial and uncovering during the life of the project. As the natural processes of the mobile Sandbanks would continue, there would be no effect on the low diversity communities associated with this feature.
60. Due to the small scale of cable protection, with a maximum height of approximately 50cm in the context of sand wave heights of approximately 5m, the natural patterns of erosion, accretion and movement of sand waves will not be restricted by the

deployment of cable protection in areas of unsuitable burial conditions (if applicable).

61. As the natural processes of the mobile sandbanks would continue, there would be no effect on the low diversity communities associated with this feature.

5.2.5 Existing habitat loss

62. Annex I Sandbank in the HHW SAC has been assessed as being in unfavourable condition due to various existing pressures on the site, for example fishing and aggregate dredging which are persistent activities and existing cables and pipelines the installation of which is a one-off event. However, all have been permitted or unmanaged in the site to date. This unfavourable condition and the target to restore the site has been taken into account in the assessment.
63. The in-combination effect of Norfolk Boreas and Norfolk Vanguard cable protection is considered below.

5.2.6 In-combination habitat with Norfolk Boreas

64. There is potential for long term habitat loss to Annex I Sandbanks in the shared Norfolk Boreas and Norfolk Vanguard offshore cable corridor due to the presence of cable protection. The worst case total area of cable protection installed within the HHW SAC could be up to 64,000m² (0.064km²) for both Norfolk Boreas and Norfolk Vanguard based on the following:

- 24,000m² as a result of up to two crossings for each of the export cable pairs (eight crossings in total) within the HHW SAC. Each crossing could require up to 100m length and 10m width of protection.
 - Every possible effort has been made by the Applicant and Norfolk Vanguard Limited to further reduce the area occupied by cable protection at crossings where agreement can be reached with cable owners. This is evidenced by the anticipated reduction in number of cable crossings from six to two (section 3.3) for each cable.
- 40,000m² as a result of up to 5% of the cable length in the SAC (2km of cable protection per cable pair, 4km in total) potentially requiring cable protection in the unlikely event that unsuitable ground conditions are encountered. A 5m width of cable protection could be required.
 - This would only be deployed outside the priority areas to be managed as reef in the HHW SAC, unless otherwise agreed with the MMO in consultation with Natural England.
 - This would be decommissioned and therefore a long term (but not permanent) impact.

65. This represents 0.004% of the 1,468km² SAC area and 0.09% of the 678km² area of sandbanks within the SAC.

66. This extent of loss is *de minimis*, taking into account the absence of effect on the function of the Annex I Sandbank (discussed in section 5.2.4). This is in keeping with the case studies discussed in section 5.2.3.

6 Conclusion

67. The Applicant is proposing a commitment to use no cable protection in the priority areas to be managed as *S. spinulosa* Annex I reef within the HHW SAC, unless otherwise agreed with the MMO in consultation with Natural England. This commitment ensures that the proposed management measures for the site will not be impacted and the targets for achieving the conservation objectives of *S. spinulosa* Annex I reef will not be hindered.
68. The Applicant is proposing a further additional commitment to decommission cable protection at the end of the Norfolk Boreas project life at locations where ground conditions preclude adequate burial (where required for crossings this will be left *in situ*). This commitment ensures that there will be no permanent habitat loss as a result of cable protection.
69. The assessment of habitat loss on the HHW SAC, taking into account this new additional mitigation, demonstrates that any small scale permanent loss of habitat within the SAC would not affect the form and function of the Annex I Reef and Annex I Sandbanks.
70. In addition, the small proportion of cable protection proposed would be of *de minimis* scale, in accordance with existing precedent (Walney Extension; Hinkley Point C; and Kentish Flats Extension).
71. Waddenzee case law (C-127/02) states that a project which is not likely to undermine the site's nature conservation objectives cannot be considered to have an adverse effect on site integrity.
72. In addition, in the advice note regarding consideration of small scale habitat loss within SACs in relation to cable protection (submitted at Deadline 1, REP1-057) it is stated Natural England would consider there to be no likelihood of an AEoI where any one (or more) of the following can be demonstrated:
 - That the loss is not on the priority habitat/feature/sub feature/supporting habitat, and/or
 - That the loss is temporary and reversible, and/or
 - That the scale of loss is so small as to be *de minimis* and/or
 - That the scale of loss is inconsequential including other impacts on the site/feature/sub feature.
73. The Applicant considers that all of the above are demonstrably and conclusively met in the case of Norfolk Boreas.
74. Based on the outcome of the assessment it is determined there will be **no AEoI of the HHW SAC in relation to the conservation objectives for *S. spinulosa* Annex I**

reef and Annex I Sandbank due to long term habitat loss as a result of cable protection.

75. The Applicant is also close to signing an agreement that will allow disused cables within the HHW SAC to be cut, allowing the Applicant to reduce the amount of cable protection deployed even further. Should this be agreed, this would serve to increase the certainty in the outcome of this assessment further.

7 References

JNCC and Natural England (2013). Haisborough, Hammond and Winterton candidate Special Area of Conservation: Formal advice under Regulation 35(3) of The Conservation of Habitats and Species Regulations 2010 (as amended), and Regulation 18 of The Offshore Marine Conservation Regulations (Natural Habitats, &c.) Regulations 2007 (as amended). [Version 6.0 March 2013]. JNCC, Peterborough.

Natural England (2016). Small-scale effects: How the scale of effects has been considered in respect of plans and projects affecting European sites - a review of authoritative decisions. Natural England Commissioned Report NECR205