

Norfolk Vanguard Offshore Wind Farm

Applicant's Comments on Written Representations

Appendix 1 - Comments on Annex C of Natural

England's Deadline 1 Submission

Applicant: Norfolk Vanguard Limited
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Photo: Kentish Flats Offshore Wind Farm



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APPLICANT'S COMMENTS ON RESPONSES TO THE FIRST WRITTEN QUESTIONS

1. Following the issue of First Written Questions by the Examining Authority outlined in the Rule 8 Letter of 19 December 2018, the Applicant has reviewed the responses submitted by Interested Parties at Deadline 1. This document provides the Applicant's response to Annex C of Natural England (NE)'s Deadline 1 Submission (Natural England detailed comments on Benthic Ecology and Habitats Regulation Assessment for the Haisborough Hammond and Winterton SAC).
2. The Applicant had a conference call with NE on 22 January 2019 to discuss these comments, in particular with regards to cable protection. Discussions are ongoing with NE and where possible, revised positions will be documented in the updated Statement of Common Ground (SoCG) (Rep1 - SOCG - 13.1) to be submitted at Deadline 4.

1 INTRODUCTION

NE para no.	NE comment	Applicant's Response:
1.1	In this appendix Natural England sets out what we consider to be the main issues in relation to the Habitats Regulation Assessment (HRA) for Haisborough Hammond and Winterton SAC, drawing upon information contained in the original application documents.	No response
1.2	Natural England identified a number of areas of uncertainty within the original information provided by the Applicant. These were set out in our Relevant Representations, submitted to PINS on 31 August 2018.	The Relevant Representation from Natural England informed the production of the Statement of Common Ground (SoCG) with Natural England that was submitted at Deadline 1 (document reference Rep1-SoCG-13.1)
1.3	Within our Relevant Representation Natural England was unable to advise beyond all scientific doubt that the project both alone and in-combination would not have an adverse effect on the integrity of the Haisborough Hammond and Winterton SAC Annex I sandbanks and reef features due to several reasons.	
1.4a	These main outstanding concerns relate to: <ul style="list-style-type: none"> the ability to effectively implement some of the proposed mitigation measures, for example micro-siting around <i>Sabellaria spinulosa</i> reef; 	The Applicant's response to these topics are provided against the detailed comments in Sections 2 to 4 below.
1.4b	<ul style="list-style-type: none"> the evidence presented to support the successful avoidance of reef and the ability of reef to recover if impacted through cable installation, particularly the mapping of extent of <i>Sabellaria spinulosa</i> reef and the analyses applied to the data; 	
1.4c	<ul style="list-style-type: none"> the ability to use 'sensitive' cable protection, i.e. that which has the least environmental impact at each particular location; 	

NE para no.	NE comment	Applicant's Response:
1.4d	<ul style="list-style-type: none"> the ability to remove cable protection at the time of decommissioning and therefore consideration as to whether this should be considered temporary or permanent habitat loss; 	
1.4e	<ul style="list-style-type: none"> the lack of empirical data that relate to interventions of similar spatial and temporal scale to the proposals and for this particular sandbank system to support the modelling for sandwave levelling; 	
1.4f	<ul style="list-style-type: none"> the lack of evidence that sandwave levelling ensures cables remain buried and therefore the assessment which indicates that there will be no future need for reburial or cable protection; 	
1.4g	<ul style="list-style-type: none"> the assessment that there will be a low impact magnitude in terms of Haisborough Hammond and Winterton SAC when Boreas is considered in-combination as the export cable footprint will be 11% of the cable corridor running through the SAC and doesn't take into account the interest features impacted; and 	
1.4h	<ul style="list-style-type: none"> the lack of detail as to how single build vs. phased build both alone and / or in-combination with Norfolk Boreas has been assessed against the conservation objectives for the site. 	
1.5	<p>This Written Representation is intended to provide more detail on certain issues raised in our Relevant Representations and any updates on those issues. Where relevant this Written Representation will refer to the specific sections of the Relevant Representation.</p>	Noted

2 ANNEX I SANDBANKS

2.1 Adverse effect on sandbank feature

NE para no.	NE comment	Applicant's Response:
2.1.1	<p>Based on our current understanding, Natural England does not consider it likely that human activities taking place within the site have the potential to permanently impact on the large-scale topography of the Haisborough Hammond and Winterton SAC Annex I sandbanks.</p> <p>However, they could, have an impact on the other variables that help define the extent and distribution of a sandbank, namely sediment composition and presence and distribution of biological communities.</p> <p>Of note for the activities taking place and proposed within the site are operations associated with the deposition of material (e.g. rock and concrete mattress placement/armouring), or other alteration of surface sediment (e.g. cabling operations), that are likely to lead to a persistent change to substrate which is not suitable habitat for sandbank communities.</p>	<p>The Applicant agrees that the project will not permanently impact on the large-scale topography of the Haisborough Hammond and Winterton Special Area Conservation (SAC) Annex I Sandbanks.</p> <p>The Information to Support HRA report (document reference 5.3) provides an assessment of the potential impacts on sediment composition and presence and distribution of biological communities.</p> <p>Whilst the Applicant agrees that placement of cable protection would be a persistent change to the substrate (as assessed in the Information to Support HRA report), the scale of the impact is extremely small in the context of the SAC and the Sandbank feature (discussed further below).</p> <p>Sediment composition would not change as a result of cabling operations due to the Applicant's commitment to ensure that any sediment arising within the SAC would be deposited back into the SAC.</p>
2.1.2	<p>As such, some of the sandbank's extent and distribution is likely to be lost, in that there are areas present within the site that no longer represent sandbank feature, as defined by sediment composition and/or biological communities, because the substrate has been changed.</p> <p>We believe that there has been physical change in sediment composition as a result of pipelines and their protection material in the HHW SAC, but it is unclear what impact this may have on overall sediment composition and distribution. Furthermore, due to lack of evidence about deposits within the site, partially due</p>	<p>As discussed in section 7.4.1.1.2 of the Information to Support HRA report (document reference 5.3), the maximum extent of cable protection within the Hammond and Winterton SAC is 0.05km² which represents 0.003% of the 1468km² SAC area. The Applicant expects to be able to bury cable within any Annex 1 Sandbank feature and therefore the worst case scenario for cable protection would be 0.012km² on Annex I Sandbank at cable and pipeline crossing locations. This represents 0.002% of the 669km² area of Annex 1 Sandbanks within the SAC.</p> <p>It is unclear why Natural England believe there has been a physical change in sediment composition as a result of pipelines given the acknowledgement that there is a lack of evidence and historical data.</p>

NE para no.	NE comment	Applicant's Response:
	to lack of historical data, it is currently not possible to quantify the loss of extent.	
2.1.3	<p>Natural England has recently produced revised conservation advice for Annex I Sandbanks feature of Haisborough Hammond and Winterton SAC which sets a restore objective for:</p> <ul style="list-style-type: none"> a) the presence and spatial distribution of subtidal sandbank communities. b) the total extent and spatial distribution of subtidal sandbanks to ensure no loss of integrity, while allowing for natural change and succession; and c) the species composition of component communities. 	<p>Noted, the Applicant has reviewed Natural England's conservation advice.</p> <ul style="list-style-type: none"> a) The Information to Support HRA report (document reference 5.3) provides an assessment of the potential impacts on sandbank communities. It should be noted that the sandbank community is characterised by species that are habituated to the naturally unstable nature of the sandbank system as well as the long-term exposure to commercial fishing activities. b) As noted in the response to paragraph 2.1.2, the potential loss of extent would be 0.002% of the area of sandbanks within the SAC; the Applicant considers that this highly localised change would not affect the overall integrity of the site. c) The species / communities listed by NE in the conservation objectives are: <ul style="list-style-type: none"> • The infaunal and epifaunal communities found on the crests of sandbanks are relatively species poor as a result of the highly dynamic sediment environment and the associated impacts of disturbance, smothering and scour. The low diversity communities are dominated by polychaetes (primarily <i>Nephtys cirrosa</i> and <i>Ophelia</i> sp.) and the amphipods (<i>Bathyporeia elegans</i>, <i>Gastrosaccus</i> sp. And <i>Urothoe</i> spp.). Some brittlestars (<i>Ophiocten</i> sp.) and sandeel (<i>Ammodytes</i> sp.). • Slightly higher diversity communities consist of hardy polychaetes and amphipods approximate to the biotope A5.233 (<i>Nephtys cirrosa</i> and <i>Bathyporeia</i> spp. in infralittoral sand). • The areas of the site where sediment movements are reduced (flanks and troughs) support an abundance of attached bryozoans, hydroids and sea anemones. <i>Sabellaria spinulosa</i> and other tube building worms (e.g. keel worms and sand mason worms) are found, along with bivalves and crustaceans.
2.1.4	<p>This revised conservation advice can be found by following this link (available online only): https://designatedsites.naturalengland.org.uk/Marine/MarineSiteDetail.aspx?SiteCode=UK0030369&SiteName=haisborough&countyCode=&responsiblePerson=&unitId=&SeaArea=&IFCAArea</p>	<ul style="list-style-type: none"> • The areas of the site where sediment movements are reduced (flanks and troughs) support an abundance of attached bryozoans, hydroids and sea anemones. <i>Sabellaria spinulosa</i> and other tube building worms (e.g. keel worms and sand mason worms) are found, along with bivalves and crustaceans. <p>None of the listed species are rare, scarce or notable. A number of infaunal species would be likely to remain in the sediment under or surrounding cable protection and the majority of those species that are associated with areas of the site where sediment movements are reduced (flanks and troughs) are common and/or regularly associated with sublittoral rocky or boulder communities, and can be expected to colonise cable protection (e.g. the ecological group 'Small epifaunal species with robust, hard or protected bodies', which includes the keel worm</p>

NE para no.	NE comment	Applicant's Response:
		<i>Pomatoceros triqueter</i> is able to colonise artificial substratum (Tillin & Tyler-Walters ¹ , 2014))
2.1.5	<p>Natural England has recently undertaken a condition assessment of the features within Haisborough Hammond and Winterton SAC (unpublished) and our latest view on condition is that the sandbank feature is in unfavourable condition and needs to be restored to favourable condition. Restoration of the feature requires an overall reduction, or removal, of pressures associated with human activities that cause impacts to the sandbanks' extent and distribution, delineated by both substratum and biological communities. As such, any human activities which can cause pressures resulting in changes to substratum or biological communities to the sandbank feature may present a risk to the site's restoration.</p>	<p>The Applicant notes that the condition assessment is unpublished and NE do not state what is required to restore the site. Although the revised conservation objectives are stated to have targets, these are entirely qualitative and give no indication of what 'overall reduction' would be.</p> <p>The Applicant also notes NE's position in paragraph 3.7.2. "<i>We agree that potential beneficial effects may occur from introduction of hard substrate into a soft substrate system. However, within MPAs, this must be considered secondary to the requirement to recover or maintain the features for which the site is designated.</i>"</p> <p>As discussed in the response to paragraphs 2.1.2 and 2.1.3, impacts would be highly localised. In addition, the effects of cable installation would be temporary and short term, as discussed in the Information to Support HRA report (document reference 5.3) and therefore would not affect the overall restoration of the sandbank extent and communities.</p>
2.1.6	<p>We note that there is no expectation that The Applicant should demonstrate recovery of the site. Recovery is an objective for all sectors placing pressure on the site, including oil and gas, renewables, aggregates and fisheries.</p> <p>We do, however, expect The Applicant to demonstrate the risk levels that they believe their proposed operations will present to the restoration of the extent and distribution of the sandbank feature.</p> <p>As a minimum, this would be to demonstrate that proposed activities will be mitigated to not impede restoration, i.e. that activities will not increase the site's</p>	

¹ Tillin, H, Tyler-Walters, H. 2014. Assessing the sensitivity of subtidal sedimentary habitats to pressures associated with marine activities Phase 2 Report – Literature review and sensitivity assessments for ecological groups for circalittoral and offshore Level 5 biotopes. Available at: http://jncc.defra.gov.uk/PDF/Report%20512-B_phase2_web.pdf

NE para no.	NE comment	Applicant's Response:
	<p>exposure to damaging pressures, particularly in regard to changes in extent and distribution of substratum and biological communities. We note that The Applicant may find our discussion of mitigation below helpful in this.</p>	
2.1.7	<p>We note the Applicant's conclusion of "high confidence that the seabed will recover to a new natural equilibrium state within a timescale of months to years." We would suggest that approaching a new equilibrium may not be in accord with restoration of the site, if that new equilibrium is without the sediment composition or biological communities expected from the designated feature.</p>	<p>As noted in the opening comments from NE (para 2.1.1) "<i>Natural England does not consider it likely that human activities taking place within the site have the potential to permanently impact on the large-scale topography.</i>" As outlined in the response to paragraph 2.1.1, sediment will be retained within the system and therefore the system will not be without the sediment composition.</p> <p>As discussed in the response to paragraphs 2.1.3 and 2.1.4, the biological communities of the site are relatively species poor, consisting primarily of hardy polychaetes and amphipods or other common and regularly occurring species associated with sublittoral rocky or boulder communities, therefore cable installation works and the small scale of cable protection will not significantly alter the community and the site will not be without the biological communities expected from the designated feature.</p>
2.1.8	<p>Conservation objectives must be considered against the total impact, rather than individual impacts split by different sections of the project lifecycle, as is currently the case in the application. We currently cannot provide advice on the total impact including all remedial work during O&M with the information provided, which is highlighted in our response to the first set of examiners written questions.</p>	<p>The Information to Support HRA report (document reference 5.3) takes a conservative approach to the assessment of the project by considering the worst case for each of the construction, operation and decommissioning phases of the project. This is standard practice.</p> <p>The Applicant considers that the assessment is sufficiently representative of the project lifecycle through the assessment of the following impacts:</p> <ul style="list-style-type: none"> • Physical disturbance – the effects would be temporary and localised. It is likely that the site would have recovered from installation impacts before any potential maintenance would be required. The potential for disturbing communities, in particular <i>Sabellaria</i> reef that has recolonised the site during this recovery is considered in Section 7.4.2.1.2 of the Information to Support HRA report. The area affected by any repairs or reburial would also be highly localised and recovery from each event can be expected. • Increased suspended sediment and smothering – as above, the effects would be temporary and localised. It is likely that the site would have recovered from installation impacts before any potential maintenance would be required. <p>Given the likely short term, localised nature of these impacts, there is unlikely to be a significant</p>

NE para no.	NE comment	Applicant's Response:
		additive effect across the project life cycle. <ul style="list-style-type: none"> Habitat loss – this is assessed as a permanent impact i.e. throughout the project life cycle and beyond. Introduction of new substrate - this is assessed as a permanent impact

2.2 Mitigation of adverse effect on sandbanks

NE para no.	NE comment	Applicant's Response:
2.2.1	<p>Natural England suggests that there are a number of ways that The Applicant could discuss how the proposed operations could aid in restoration of the sandbank feature and the site as well as deliver net gain. Ongoing and new activities must look to minimise, as far as is technically practicable, changes in substratum and the biological communities within the site to minimise further impact on feature extent and distribution, demonstrating the risk levels that proposed operations will present to the restoration of the extent and distribution of the sandbank feature.</p>	<p>As noted by NE in paragraph 2.1.6, <i>“there is no expectation that The Applicant should demonstrate recovery of the site. Recovery is an objective for all sectors placing pressure on the site, including oil and gas, renewables, aggregates and fisheries.”</i></p> <p>Cable protection will be minimised as far as is technically practicable, and the extent, type, location etc. of cable protection must be agreed with the MMO in consultation with Natural England prior to construction through the scour protection and cable protection plan, as required under Schedules 9 and 10 Part 4 Condition 14(1)(e), and Schedules 11 and 12 Part 4 Condition 9(1)(e) of the dDCO.</p> <p>The Applicant has demonstrated through the Information to Support HRA report (document reference 5.3), the risk levels of the proposed works to the site conservation objectives, through the assessment undertaken for each relevant activity in each stage of the project lifecycle.</p>
2.2.2	<p>Understanding the mitigation put in place by The Applicant that decreases seabed impact from a worst case scenario could potentially aid in demonstrating that the proposed operations could be considered as reducing impedance of recovery.</p> <p>While Natural England would not expect The Applicant to include a large amount of comparative assessment within their application, it may prove helpful to provide a tabular summary of major mitigation actions that ameliorate impact on seabed.</p>	<p>Section 10.7.1 of Environmental Statement (ES) Chapter 10 Benthic Ecology, outlines the embedded mitigation the Applicant has committed to. Of note, with regards to Sandbanks is the commitment to use HVDC technology which results in the following reductions:</p> <ul style="list-style-type: none"> There would be two cable trenches instead of six for Norfolk Vanguard (and two cable trenches for Norfolk Boreas, considered in the CIA); The volume of sediment arising from pre-sweeping and cable installation works is reduced; The area of disturbance for pre-sweeping and cable installation is reduced; The space required for cable installation is reduced, increasing the space available within the cable corridor for micro-siting; The potential requirement for cable protection in the unlikely event that cables cannot be

NE para no.	NE comment	Applicant's Response:
	<p>Examples of mitigation measures undertaken by other activities in SACs designated for similar features include reduction of footprint associated with vessel stabilisation through use of alternative work vessels, provision of evidence to quantify footprint of rock armouring potentially needed for works and reuse of existing stabilisation material footprints.</p>	<p>buried is reduced; and</p> <ul style="list-style-type: none"> The number of export cables required to cross existing cables and pipelines and the associated cable protection is reduced. <p>The Applicant agrees that the examples provided by NE would lead to localised reductions of impact (e.g. the use, if practicable, of alternative work vessels such as dynamic positioning (DP), however these differences would be minimal as this represents a temporary and localised effect (the worst case area for the footprint of vessels during construction is 0.3km² and 0.58km² per year during operation). The Applicant will assess the suitability of these options during the development of Construction Method Statements pre-consent.</p>
2.2.3	<p>We also suggest that any operations or evidence The Applicant can undertake or provide that reduces uncertainty around impact to feature and site could support provision of a more robust assessment that better reflects the nature of any impacts associated with planned activities.</p>	<p>The Applicant has sought to use available evidence; if Natural England is aware of further evidence, referenced examples would be welcome.</p> <p>The In Principle Monitoring Plan (document reference 8.12) proposes to undertake pre- and post-construction geophysical surveys of the seabed.</p>
2.2.4	<p>Natural England welcome the commitment by the Applicant to ensure that the dredged material from sandwave clearance operations will be deposited within Haisborough Hammond and Winterton SAC (HHW) such that the sediment will remain within the sandbank system. It is acknowledged that there will need to be further agreement on the disposal location/s post-consent based on the pre-construction surveys, as we would wish areas of Annex I Sabellaria reef to be avoided when depositing the sediment, but we believe that this is achievable. This should be secured in the DML.</p>	<p>As per the Applicant's response to First Written Questions (Q5.3), the Applicant suggests this is already secured in the DMLs as the final approach to cable installation, including the methodology for pre-sweeping must be agreed with the MMO (in consultation with the relevant statutory bodies) through the Cable Specification and Monitoring Plan, as required under dDCO Schedules 11 and 12, Part 4 Condition 9(1)(g). The methodology for the cable installation strategy and sediment disposal (if required) will be determined following pre-construction surveys (required under dDCO Schedules 11 and 12 Condition 13(2)(b)). The method and location for sediment disposal will be dependent on the installation strategy and cable route, taking into account the location of Annex 1 <i>Sabellaria</i> reef at that time (as established by pre construction surveys), in order to provide the required buffer between disposal and reef.</p>

2.3 Sandwave levelling

NE para no.	NE comment	Applicant's Response:
2.3.1	<p>The main factors that are considered to influence the recovery potential (i.e. the mechanism and speed of recovery) of the levelled sandwaves are:</p> <ul style="list-style-type: none"> • The dimensions of the dredged area, particularly the width and depth of the dredged channel relative to the overall sandwave height, and the alignment of the dredged channel relative to the crest axis; and • The degree of sediment mobility at the dredge location, which is in turn controlled by the environmental forcing conditions and water depth 	Noted
2.3.2	<p>Natural England is aware that Hornsea Project Three OWF (also in the planning system) proposes sandwave levelling within an Offshore SAC namely North Norfolk Sandbanks. Therefore we thought it appropriate to undertake a review to compare the evidence presented to support this application with that for HOW03 and North Norfolk Sandbanks. In summary both HOW03 and Norfolk Vanguard come to the same conclusions – i.e. no significant impacts from sandwave clearance on relevant MPAs, with the evidence in the Norfolk Vanguard's assessment providing more confidence in the conclusions. Therefore, we are more confident in the conclusions, but there still remains some uncertainty around site specific impacts from the actual cable installation that are set out in the detailed comments below.</p>	<p>The Applicant welcomes the confirmation that the Norfolk Vanguard and Hornsea Project Three assessments of impacts to Sandbanks concur that there would be no significant impacts from sandwave clearance and that the Norfolk Vanguard assessment provides NE with more confidence in the conclusions.</p> <p>The uncertainty is noted and the Applicant has drawn upon existing survey data as evidence where possible. The In Principle Monitoring Plan (document reference 8.12) proposes to undertake pre- and post-construction geophysical surveys of the seabed.</p>
2.3.3	There is no discussion in the application about the fact	The worst case scenario for the O&M phase is based upon the potential for suboptimal burial <i>in</i>

NE para no.	NE comment	Applicant's Response:
	that even with sandwave levelling cables may be sub optimally buried and require protection or become exposed over the life time of the protect resulting in further impacts to the site.	<i>the absence of</i> sandwave levelling. The assessment is therefore conservative, and should the sandwave levelling installation strategy be adopted, it is expected that suboptimal burial would be reduced and therefore O&M impacts would be less than presented in the ES (document reference 6.1) and Information to Support HRA report (document reference 5.3).
2.3.4	Natural England advises that a pre-construction sandwave levelling report and assessment is required to ensure that the results of any further monitoring and specific site characteristics are taken into consideration and the impacts remain within the parameters assessed especially in relation to orientation of levelling to wave and interaction with troughs. This should be secured as part of the DML.	The Applicant is willing to commit to a pre-construction sandwave levelling report and will discuss with NE the proposed wording to be included in the DMLs to secure this.
2.3.5	The assumption to date was that the levelling within HHW SAC would be over discrete waves / banks, not levelling across a larger number of smaller features. This situation may impact differently on the conservation objectives for the site and a more detailed HRA assessment is required before we can agree with the conclusions of the HRA that there is no adverse effect on Integrity from sandwave levelling.	<p>The worst case scenario assumptions are as presented to NE previously, including in the Preliminary Environmental Information Report (PEIR), although noting that the total extent of potential levelling has been significantly reduced through the Applicant's commitment to use HVDC export cables, and therefore reducing the number of cable trenches from six to two for Norfolk Vanguard.</p> <p>The extent of Sandwave levelling in the SAC has been informed by analysis which is reported in ES Appendix 5.1 Norfolk Vanguard Offshore Windfarm Export Cable Installation Study.</p> <p>It is not clear what Natural England are referring to with the statement that <i>"This situation may impact differently on the conservation objectives for the site and a more detailed HRA assessment is required"</i>. A detailed assessment of the worst case scenario is provided in the Information to Support HRA report (document reference 5.3).</p>

2.4 Cable Protection

NE para no.	NE comment	Applicant's Response:
2.4.1	Currently 10% cable protection is proposed as a contingency should cables be sub optimally buried	<i>"10% cable protection"</i> refers to the proportion of the potential length of the export cable pairs that could require cable protection. As discussed in section 7.4.1.1.2 of the Information to Support

NE para no.	NE comment	Applicant's Response:
	<p>within the SAC which if permitted as set out would result in persistent habitat loss of Annex I sandbank feature.</p> <p>Habitat change is a pressure different to habitat loss, but it is still a change to the feature that the site was designated for. Sandbanks features have high sensitivity to both habitat loss and habitat change.</p>	<p>HRA report (document reference 5.3) and in response to paragraph 2.1.2 above, the maximum extent of cable protection within the SAC is 0.05km² which represents 0.003% of the 1468km² SAC area; of which 0.012km² of cable protection could be located on Annex I Sandbank (0.002% of the 669km² area of Annex 1 Sandbanks within the SAC).</p> <p>The Applicant has assessed this as permanent habitat loss (section 7.4.1.1.2 of the Information to Support HRA report) and concludes that this extremely small-scale habitat loss would not affect the form and function of the Sandbank. Introduction of new substrate is also assessed in section 7.4.2.1.2 of the Information to Support HRA report. This would only affect the localised footprint where cable protection is placed. It would not lead to wider changes in the surrounding soft sediment communities, noting that this includes low diversity and hardy species as well as those that can be expected to colonise cable protection (e.g. <i>Sabellaria spinulosa</i> and keel worms, as discussed in response to paragraphs 2.13 and 2.1.4 above).</p>

2.5 Cable Installation

NE para no.	NE comment	Applicant's Response:
2.5.1	<p>As with the other documents provided, Natural England is of the view that the reasoning is not unsound, but it could have been evidenced further to support and give us the necessary confidence.</p> <p>Overall we believe that it is likely that the sediments will recover from cable installation, assuming that the sediments are what is stated here and if no protection/ sand wave clearance occurs. Although it should be recognised that in coarser sediment areas scarring will remain. But if the benthos recovers, which is likely if the sediment composition remains unchanged we believe that it is unlikely to impact the conservation objective for the site.</p>	<p>The Applicant has sought to use available evidence; if Natural England is aware of further evidence, referenced examples would be welcome.</p> <p>The Applicant believes it is likely that the sediments will recover from cable installation, including sand wave clearance, since sediment will be retained within the system, as outlined in the responses to paragraphs 2.1.1 and 2.2.4 and presented within the Information to Support HRA report (document reference 5.3).</p> <p>The Applicant also believes that there will be no significant change to the benthos due to cable installation (as outlined in the responses to paragraphs 2.1.3, 2.1.4 and 2.4.1 and presented within the Information to Support HRA report), since there will be no change to sediment composition as a result of cable installation works. In addition, the extent of cable protection represents only 0.003% of the SAC area and the biological communities of the SAC are relatively species poor, consisting primarily of hardy polychaetes and amphipods or other common and regularly occurring species associated with sublittoral rocky or boulder communities.</p>

NE para no.	NE comment	Applicant's Response:
2.5.2	<p>More information on cable burial operations is needed for us to reconsider our current position that adverse effect on integrity of the site cannot be ruled out.</p> <p>We acknowledge that much of the technical detail will only be available post-consent, and as such, we strongly recommend that The Applicant's assessment must be considered with sufficient precaution added to allow for significant, post-consent increases in worst case scenarios, especially when operations occur within Marine Protected Areas.</p>	<p>As acknowledged by Natural England, additional information would be provided post consent. The Applicant is committed to providing further detail prior to construction through the Construction Method Statement (required under dDCO, Schedules 11 and 12, Part 4 Condition 9(1)(c)) and Cable Specification Installation and Monitoring Plan (required under dDCO Schedules 11 and 12, Part 4 Condition 9(1)(g)).</p> <p>The assessment is based upon a worst case scenario which the Applicant feels provides sufficient and appropriate precaution. The worst case scenario also includes contingency estimates as requested by Natural England during the Evidence Plan Process and therefore post-consent increases in worst case scenarios are highly unlikely and would be subject to additional licencing or variation to the DCO.</p> <p>Where Natural England refers to "Marine Protected Areas" (MPAs), the Applicant reiterates that the only MPA of relevance to this assessment is Haisborough, Hammond and Winterton SAC.</p>
2.5.3	<p>Based on lessons learnt our standard advice is for the early provision of a pre consent Cable Burial Risk Assessment for activities within Marine protected areas which pose a significant risk to interest features and there is limited confidence in the proposed installation activities. Ideally, the cable burial risk assessment should be based on the data from a recent comprehensive geotechnical and geophysical survey campaign. But consideration of the likely success of the installation techniques in particular sandwave levelling and alternative options to that of cable burial in relation to contingency measures should the cable be sub optimally buried. Natural England would welcome further discussions with the applicant on this.</p>	<p>The Applicant has discussed this with Natural England, and is exploring the feasibility of producing a pre-consent Cable Burial Risk Assessment based on the existing 2016 site specific survey data.</p>

3 REEFS

3.1 Adverse effect on reef features

NE para no.	NE comment	Applicant's Response:
3.1.1	Based on the information presented and flawed methods used for assessment, Natural England cannot currently provide an evidence-based opinion on the actual scale of the potential impacts to the Annex I <i>Sabellaria spinulosa</i> reef feature of the HHW SAC.	<p>The Applicant believes Natural England is referring to the methodology used to map the extent of <i>Sabellaria</i> reef as part of the characterisation of the baseline for the assessment. The Applicant acknowledges that Natural England disputes this methodology, however, as presented in the SoCG (Rep1-SOCG-13.1), irrespective of the methodology the Applicant and Natural England agree on the general extent and location of the potential feature. The Applicant therefore feels that the baseline reef extent used by the Applicant (comparable as it is to Natural England's map of reef extent), provides a sufficient baseline and therefore poses no reason that Natural England cannot currently provide an opinion on the potential impacts to the Annex I <i>Sabellaria</i> reef feature of the SAC.</p> <p>The Applicant notes that the future location and extent of <i>Sabellaria</i> reef at the time of construction is unknown as the species is ephemeral in nature and the location/extent is therefore likely to change prior to construction. The Applicant suggests that this is the key limitation with regards to Natural England providing an evidence-based opinion on the actual scale of the potential impacts to the Annex I <i>Sabellaria</i> reef feature of the Haisborough Hammond and Winterton SAC and as such, the Applicant has committed to undertaking pre-construction surveys (as required by dDCO Schedules 11 and 12 Part 4 Condition 13(2)(a)) and to agree cable installation methods and routing with the MMO through the Construction Method Statement (required under dDCO, Schedules 11 and 12, Part 4 Condition 9(1)(c)) and Cable Specification Installation and Monitoring Plan (required under dDCO Schedules 11 and 12, Part 4 Condition 9(1)(g)).</p>
3.1.2	Based on our current understanding, Natural England considers it likely that operations and activities already taking place within the site have the potential to impact on variables that are used to delineate the extent and distribution of area to be managed as <i>Sabellaria</i> reef (sediment composition and biological assemblages), structure and function (physical	<p>The Applicant agrees that operations and activities already taking place within the site (as well as natural variation) have the potential to impact on <i>Sabellaria</i> reef.</p> <p>The Applicant does not agree that cable protection is not a suitable habitat for Annex I reef communities. The Applicant notes that <i>Sabellaria</i> reef can develop on artificial hard substrate as noted in the JNCC (2016)² definition:</p> <p><i>"S. spinulosa requires only a few key environmental factors for survival in UK waters. Most</i></p>

² http://jncc.defra.gov.uk/pdf/UKBAP_BAPHabitats-47-SabellariaSpinulosaReefs.pdf

NE para no.	NE comment	Applicant's Response:
	<p>structure and biological structure), and supporting processes (supporting habitats).</p> <p>Of note for the activities taking place and proposed within the site are operations associated with the deposition of material (e.g. rock and concrete mattress placement/ armouring), or other alteration of surface sediment (e.g. cabling operations), that are likely to lead to a persistent change to substrate which is not suitable habitat for mixed sediment Annex I reef communities.</p>	<p><i>important seems to be a good supply of sand grains for tube building, put into suspension by strong water movement....The worms need some form of hard substratum to which their tubes will initially be attached, whether bedrock, boulders, artificial substrata, pebbles or shell fragments."</i></p> <p>The Applicant notes that Ørsted (Hornsea Project Three) referenced some Dutch studies that provide some evidence that <i>Sabellaria spinulosa</i> will colonise artificial structures with similar biological communities to those of natural rocky reef, but until these papers are reviewed in detail by the SNCB's NE's advice remains unchanged in relation to requirement to protect the existing habitat and features which support the Annex I reef (see paragraph 3.2.1 below). The Applicant agrees with Ørsted that <i>Sabellaria spinulosa</i> will colonise artificial structures.</p> <p>The Applicant understands that Natural England is currently discussing with other Statutory Nature Conservation Bodies (SNCB)s whether it is agreed that such aggregations would count as Annex 1 reef (as mentioned in para 3.5.9).</p>
3.1.3a	<p>Fishing byelaw:</p> <p>Defra's revised approach to fisheries requires that fishing activity in European Marine Sites are managed in line with the requirements of Article 6 of the Habitats Directive. Towed demersal gear is considered a red risk interaction with <i>Sabellaria</i> spp. reef, meaning the use of towed demersal gear over <i>Sabellaria</i> spp. reef is not considered compatible with achieving the conservation objectives for the feature.</p>	Noted
3.1.3b	<p><i>Sabellaria</i> spp. reef is sensitive to the following pressures exerted by towed demersal gear:</p> <ul style="list-style-type: none"> i. Abrasion/disturbance of the substrate on the surface of the seabed; ii. Penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion; iii. Removal of non-target species; and iv. Physical change (to another sediment 	Noted

NE para no.	NE comment	Applicant's Response:
	type).	
3.1.3c	Reef in Haisborough Hammond and Winterton SAC is currently considered to be in unfavourable condition, in part due to insufficient fisheries management. Natural England has advised that all areas of <i>S. spinulosa</i> reef within Haisborough Hammond and Winterton SAC are closed to towed demersal gears in order to remove these pressures and so enable the reefs to recover and the site to achieve its conservation objectives. Natural England have advised that fisheries closures protect areas which are suitable for reef formation, as described in the Conservation Advice package, rather than solely where reef is present at any given time, due to <i>S. spinulosa</i> reef extent being variable in space and time and reliant on the physical and biological processes that allow reefs to form	<p>Noted, however Natural England state that it is not possible to quantify the loss of extent (paragraph 3.2.1 below) and the Natural England conservation advice, referenced in paragraph 3.2.4 below, states³:</p> <p><i>“Annex 1 biogenic ross worm Sabellaria spinulosa reef has been detected at several locations within the site. However due to the ephemeral nature of the reef its presence can be highly variable in both space and time and therefore estimating its total extent is not possible.”</i></p> <p>It is therefore unclear how a restoration objective can be measured.</p>
3.1.3d	Eastern Inshore Fisheries and Conservation Authority are currently developing fisheries closures for within 6nm. Closures for beyond 6nm are being progressed through the Joint Recommendation process under the Common Fisheries Policy and one such area coincides with the Applicant's cable corridor.	Noted

3.2 Favourable condition status of the reef features

NE para no.	NE comment	Applicant's Response:
3.2.1	Some extent and distribution of area to be managed	Noted, the Applicant agrees with Ørsted (Hornsea Project Three) that <i>Sabellaria spinulosa</i> will

³ Statement can be found within the Supplementary Advice under Reef; Extent and distribution

NE para no.	NE comment	Applicant's Response:
	<p>as reef could have been lost, in that there are areas present within the site that no longer represent reef feature either due to changes in substrate or movement of the reef feature. However, due to lack of evidence about deposits present within the site, partially due to lack of historical data, it is currently not possible to quantify the loss of extent.</p> <p>NB: We recognise that in the cable protection clarification note provided by Hornsea Project Three (REF1 – 183 and REF1-138) the Applicant has referenced some Dutch studies that provide some confidence that <i>Sabellaria spinulosa</i> will colonise artificial structures with similar biological communities to those of natural rocky reef, but until these papers are reviewed in detail by the SNCB's our advice remains unchanged in relation to requirement to protect the existing habitat and features which support the Annex I reef</p>	<p>colonise artificial structures with similar biological communities to those of natural rocky reef.</p>
3.2.2	<p>Natural England has recently produced revised conservation advice for Annex I Reefs feature of Haisborough Hammond and Winterton SAC which sets a restore objective for:</p> <ul style="list-style-type: none"> a) the presence and spatial distribution of reef communities; b) the total extent and spatial distribution and types of reef (and each of its subfeatures); and c) the species composition of component communities 	<p>Noted, however as discussed in the Applicant's response to paragraph 3.1.3c, it unclear how Natural England proposes to measure, and therefore manage a restoration objective when Natural England also states that it is not possible to quantify the total extent, or loss of extent of <i>Sabellaria</i> reef.</p>
3.2.3	<p>In addition Annex I reef extent attribute states: When <i>Sabellaria</i> reef develops within the site, its extent and persistence should not be compromised by human</p>	<p>The feature is naturally dynamic, and the fluctuating extent that Natural England refers to supports the potential for recovery within the ranges of natural variation as the species is ephemeral in</p>

NE para no.	NE comment	Applicant's Response:
	<p>activities, accepting that, due to the naturally dynamic nature of the feature, its extent will fluctuate over time.</p>	<p>nature.</p> <p>In the unlikely event that <i>Sabellaria</i> reef has developed to such an extent that it is not possible to route the cable trenches through the 2 to 4km wide corridor (which provides approximately 1.05km to 3.75km space for micrositing), then the proportion of temporary disturbance to such a large area of reef would be very small, combined with the likely recoverability of reef, resulting in no adverse effect on integrity (AEoI) (as discussed in Section 7.4.2.1.1 of the Information to Support HRA report). Given the conditions listed in the definition of <i>Sabellaria</i> reef by JNCC (2016), as discussed in the response to paragraph 3.1.2, it is considered that, once the disturbance has ceased (i.e. cable laying or placement of cable protection) <i>S. spinulosa</i> could once again settle and form reef aggregations. Given the small scale of cable protection, 0.003% of the SAC (as discussed in paragraph 2.1.2), and the potential for cable protection to become colonised by <i>Sabellaria</i> reef, the extent and persistence of reef in the SAC would not be compromised by Norfolk Vanguard. The Applicant maintains the position presented in the Information to Support HRA report, that there would be no AEoI.</p>
3.2.4	<p>This revised conservation advice can be found by following this link (available online only): https://designatedsites.naturalengland.org.uk/Marine/MarineSiteDetail.aspx?SiteCode=UK0030369&SiteName=haisborough&countyCode=&responsiblePerson=&unitId=&SeaArea=&IFCAArea=</p>	Noted
3.2.5	<p>Natural England have recently undertaken a condition assessment of the features within Haisborough Hammond and Winterton SAC (unpublished) and our latest view on condition is that the reef feature is in unfavourable condition and needs to be restored to favourable condition. Installation of infrastructure may have a continuing effect on extent and distribution of the reef within the site. Restoration of the feature requires an overall reduction, or removal, of pressures associated with human activities that cause impacts to the reefs' extent and distribution, delineated by both substratum and biological communities. As such, any human activities which can cause pressures resulting</p>	<p>The Applicant notes that the condition assessment is unpublished and Natural England do not state what is required to restore the site. Although the revised conservation objectives are stated to have targets, these are entirely qualitative and give no indication of what 'overall reduction' is required.</p> <p>The Applicant also notes NE's position in paragraph 3.7.2. <i>"We agree that potential beneficial effects may occur from introduction of hard substrate into a soft substrate system. However, within MPAs, this must be considered secondary to the requirement to recover or maintain the features for which the site is designated."</i></p> <p>As discussed in the response to paragraphs 2.1.2 and 2.1.3, impacts would be highly localised. In addition, cable protection could become colonised by <i>Sabellaria</i> reef and would therefore not limit the recovery potential.</p>

NE para no.	NE comment	Applicant's Response:
	<p>in changes to substratum or biological communities to the reef feature may present a risk to the site's restoration. Activities must look to minimise, as far as is practicable, damaging the established, i.e. high confidence, reef within the site.</p>	<p>The Applicant has demonstrated through the Information to Support HRA report (document reference 5.3), the risk levels of the proposed works to the site conservation objectives, through the assessment undertaken for each relevant activity in each stage of the project lifecycle.</p>
3.2.6	<p>We note that there is no expectation that The Applicant should demonstrate recovery of the site. Recovery is an objective for all sectors placing pressure on the site, including oil and gas, renewables, aggregates and fisheries. We do, however, expect The Applicant to demonstrate the risk levels that they believe their proposed operations will present to the restoration of the extent and distribution of the reef feature. We note that The Applicant may find our discussion of mitigation below helpful in this. As a minimum, this would be to demonstrate that proposed activities will be mitigated to not impede restoration, i.e. that activities will not increase the site's exposure to damaging pressures, particularly in regard to changes in extent and distribution of substratum and biological communities.</p>	

3.3 Micro-routing as mitigation

NE para no.	NE comment	Applicant's Response:
3.3.1	<p>We believe that with the current cable corridor routing, primary mitigation (i.e. avoiding Annex I reefs within SACs and/or biogenic or geogenic reefs outside SACs within the Norfolk Vanguard offshore cable corridor) will not always be possible. We do not consider the Applicant's consideration of routing</p>	<p>Natural England's Relevant Representation states that on the basis of survey data at this point there should be room to microsite around reef in the cable corridor, although noting that this may not be the case pre-construction. The Applicant agrees that micrositing to avoid reef should be possible and has committed to undertake pre-construction surveys (as required by dDCO Schedules 11 and 12 Part 4 Condition 13(2)(a)) and to agree cable installation methods and routing with the MMO through the Construction Method Statement (required under dDCO,</p>

NE para no.	NE comment	Applicant's Response:
	<p>through 'lower quality' reef to be acceptable in terms of restoration of conservation objectives as the 'lower quality' reef mentioned by the Applicant is still contained within area to be managed as reef, with the protection provided by Annex I status.</p>	<p>Schedules 11 and 12, Part 4 Condition 9(1)(c) and Cable Specification Installation and Monitoring Plan (required under dDCO Schedules 11 and 12, Part 4 Condition 9(1)(g)).</p> <p>It should be noted that the Applicant does not refer to routing through lower quality reef, having committed to micrositing around all reef, where possible. The Applicant believes this is a pre-emptive position from Natural England based on the Hornsea Project Three Application. It should be noted however that by definition, "low reef" is inherently patchy (with only 10-20% coverage, Gubbay (2007)⁴) and therefore increases the potential for micrositing. Medium reef also has high potential for micrositing, being classified by 20-30% coverage.</p>
3.3.2	<p>We welcome the Applicant's desire to avoid areas of higher quality reef and/or restrict cable installation to the periphery of reef features, and we consider that both of these mitigations may decrease impact on individual reefs. However, we do not consider that they will lower the risk related to leaving the overall reef feature in unfavourable condition.</p>	<p>In the unlikely event that <i>Sabellaria</i> reef has developed to such an extent that it is not possible to route the cable trenches through the 2 to 4km wide corridor (which provides approximately 1.05km to 3.75km space for micrositing), then the proportion of temporary disturbance to such a large area of reef would be very small, combined with the likely recoverability of reef, resulting in no AEoI (as discussed in Section 7.4.2.1.1 of the Information to Support HRA report). Given the conditions listed in the definition of <i>Sabellaria</i> reef by JNCC (2016), as discussed in the response to paragraph 3.1.2, it is considered that, once the disturbance has ceased (i.e. cable laying or placement of cable protection) <i>S. spinulosa</i> could once again settle and form reef aggregations.</p>
3.3.3	<p>We acknowledge that the Applicant considers that <i>Sabellaria</i> biotopes have a wide distribution throughout the southern North Sea benthic ecology study area. Natural England agrees with this statement, however, this does not preclude mitigation measures being sought to avoid areas of Annex I reef.</p>	<p>The Applicant notes the agreement and highlights that the mitigation proposed includes micrositing around Annex I reef where possible.</p>
3.3.4	<p>The primary mitigation for impact to <i>Sabellaria spinulosa</i> reef in the application is "where possible" avoidance of reef area. We note that if the suggested mitigation is successful in its entirety (i.e. all reef feature is avoided) we would agree with the assessment of magnitude.</p> <p>However, we advise that it is necessary to look at this</p>	<p>The Applicant notes that "where possible" is a necessary caveat to the mitigation in accordance with Natural England's Relevant Representation:</p> <p><i>"Relevant Representation states that on the basis of survey data at this point there should be room to microsite around reef in the cable corridor, although noting that this may not be the case pre-construction."</i></p> <p>However, as discussed in the Applicant's response to paragraphs 3.3.1 and 3.3.2, in the unlikely event that <i>Sabellaria</i> reef has developed to such an extent that it is not possible to route the cable</p>

⁴ Gubbay (2007) Defining and managing *Sabellaria spinulosa* reefs: Report of an inter-agency workshop 1-2 May, 2007

NE para no.	NE comment	Applicant's Response:
	primary mitigation with a degree of precaution, and question whether there are any studies from HHW or IDNRRB that could inform likelihood of success.	<p>trenches through the 2 to 4km wide corridor (which provides approximately 1.05km to 3.75km space for micrositing), then the proportion of temporary disturbance to such a large area of reef would be very small, combined with the likely recoverability of reef, resulting in no AEoI (as discussed in Section 7.4.2.1.1 of the Information to Support HRA report).</p> <p>The Applicant has sought to use available evidence, if Natural England is aware of monitoring studies from the Haisborough, Hammond and Winterton SAC and Inner Dowsing, Race Bank and North Ridge SAC, referenced examples would be welcome.</p>

3.4 Core reef

NE para no.	NE comment	Applicant's Response:
3.4.1	The Applicant provided an assessment of likelihood of reef being present in the area of SAC intersected by the cable corridor prior to construction. This uses Natural England's concept of core reef and the reef index (Roberts et al, 2016). A core reef approach requires a historical evidence dataset of suitable confidence, which limits its application not least in offshore sites due to the resources required to develop a sufficient evidence base. It has been the SNCB's consistent opinion on offshore casework that a core reef approach is unlikely to be applicable to the assessment of <i>Sabellaria spinulosa</i> reef in MPAs because results of the reef index are highly dependent on the number of surveys undertaken in the area of interest.	The Applicant believes Natural England is referring to the methodology used to map the extent of <i>Sabellaria</i> reef as part of the characterisation of the baseline for the assessment. The Applicant acknowledges that Natural England disputes this methodology, however, as stated in response to paragraph 3.1.1, and as presented in the SoCG (Rep1-SOCG-13.1), irrespective of the methodology the Applicant and Natural England agree on the general extent and location of the potential feature. The Applicant therefore feels that the baseline reef extent used by the Applicant (comparable as it is to Natural England's map of reef extent), provides a sufficient baseline and therefore poses no reason that Natural England cannot currently provide an opinion on the potential impacts to the Annex I <i>Sabellaria</i> reef feature of the SAC.
3.4.2	It should be noted that a trial is being agreed of use of the core reef approach at Thanet Extension OWF on the basis that this is outside a designated site. This may change opinion on use of core reef approach in	Noted

NE para no.	NE comment	Applicant's Response:
	the future, but this data will not be in time for this application. Alternative reef indices are being agreed to account for the lower availability of survey data.	

3.5 Cable protection

NE para no.	NE comment	Applicant's Response:
3.5.1	Contrary to point 66 and 349 of Vanguard Information to support HRA (APP – 045), Natural England didn't agree in the January 2018 evidence plan working group meeting that cable protection was a temporary impact for <i>Sabellaria spinulosa</i> reef. Please see further points below in relation to why this is the case. Therefore Natural England doesn't agree with Table 7.4 and other locations within the Vanguard Information to support the HRA that there will be no habitat loss.	<p>Section 5 of Appendix 25.6 of the Consultation Report outlines the discussion and agreement with Natural England regarding permanent loss of <i>Sabellaria</i> reef during the Expert Topic Group on 31 January.</p> <p>The Applicant maintains its position that, in the unlikely event that <i>Sabellaria</i> reef cannot be avoided by micrositing, the reef can be expected to colonise cable protection (as discussed in the Applicant's responses to paragraphs 3.1.2, 3.3.1 and 3.3.2), therefore there would be no permanent loss of <i>Sabellaria</i> reef.</p> <p>The Applicant therefore also maintains the position stated in the Information to Support HRA report (document reference 5.3) that the temporary and localised impacts associated with Norfolk Vanguard would result in no AEoI of the Haisborough, Hammond and Winterton SAC in relation to the conservation objectives for Annex I Reef and therefore the Applicant considers that the proposed cable protection should be permitted.</p>
3.5.2	Natural England advises against the use of cable protection within designated sites as the addition of hard substrata is often incompatible with the conservation objectives for Annex I sandbanks and reef features.	<p>Natural England state below (paragraph 3.5.9) that they do not yet have a position on the status of <i>Sabellaria</i> reef which is growing on artificial substrate. The Applicant suggests that this is a key example of why it is most appropriate to agree cable protection with the MMO in consultation with Natural England prior to construction through the Scour Protection and Cable Protection Plan (as required under dDCO Schedules 11 and 12 Part 4 Condition 9(e), in accordance with the Outline Scour Protection and Cable Protection Plan (document reference 8.16)) based on the preconstruction survey data, latest scientific understanding and relevant guidance at that time.</p> <p>See the Applicant's response to paragraph 2.4.1 above with regards to the conservation objectives for Annex I Sandbanks.</p>

NE para no.	NE comment	Applicant's Response:
3.5.3	<p>Natural England agrees that 10% is conservative, but equally that doesn't make it acceptable in terms of impact to nature conservation and MPAs.</p> <p>In order for it to be considered as part of the application we provide advice on the worst case scenario being applied for, i.e. 10% in this case. However, we would welcome further discussion with the Applicant to see if some agreement can be found between us in relation to the contingency measure.</p>	<p>The Applicant welcomes Natural England's position that a contingency of 10% of the cable length is conservative. The Applicant notes that (as stated in the Applicant's response to paragraph 2.5.2), the inclusion of a contingency estimate for cable protection was in response to advice from Natural England during the Evidence Plan Process, based on their lessons learnt from other projects, acknowledging that there are a number of uncertainties regarding the ground conditions and ability to bury cables along the offshore cable corridor. The Applicant has committed to undertaking detailed pre-construction surveys (as required by dDCO Schedules 11 and 12 Part 4 Condition 13(2)(a)) and to agree cable installation methods with the MMO through the Construction Method Statement (required under dDCO, Schedules 11 and 12, Part 4 Condition 9(1)(c)) and Cable Specification Installation and Monitoring Plan (required under dDCO Schedules 11 and 12, Part 4 Condition 9(1)(g)). Cable protection will be minimised as far as is technically practicable, and the extent, type, location etc of cable protection must be agreed with the MMO in consultation with Natural England prior to construction through the scour protection and cable protection plan, as required under Schedules 9 and 10 Part 4 Condition 14(1)(e), and Schedules 11 and 12 Part 4 Condition 9(1)(e) of the dDCO.</p> <p>The Applicant believes that the 10% contingency allows for a conservative worst case scenario and given the small impact upon the site (0.003% of the SAC, as discussed in paragraph 2.1.2), and the potential for cable protection to become colonised by species associated with the SAC including <i>Sabellaria</i> reef, the Applicant feels that even this worst case scenario will not cause an AEoI.</p>
3.5.4	<p>Overall, it is the view of Natural England that cable protection should not be used within MPAs as it has the potential to cause long-term impacts. Theoretically impacts may not be permanent if a condition is put in place to remove cable protection at decommissioning stage, however, at present there is uncertainty both around the ability to remove cable protection and around what the impacts of removal would be on the designated features of the site.</p>	<p>The Applicant has assessed cable protection as a permanent impact on the basis of that it is unlikely to be practicable to lift cable protection, in particular there are potential Health and Safety implications with such operations which may not be acceptable.</p>
3.5.5	<p>Natural England note that Coolen (2017) and similar studies discuss the positive effects of rock protection in terms of wider North Sea biodiversity. They do not consider it in terms of MPAs and their conservation</p>	<p>It should be noted that the Applicant does not refer to cable protection being a beneficial impact. The Applicant believes this is a pre-emptive position from Natural England based on the Hornsea Project Three Application. The Applicant does, however agree that there are various references that support the conclusion that cable protection can become colonised by species associated</p>

NE para no.	NE comment	Applicant's Response:
	objectives. We advise that considering rock protection installation as a positive effect is not in line with the Habitat Regulations which are protecting the features the site is designated for.	with the SAC such as <i>Sabellaria</i> reef and keel worms. This allows the conclusion that there would be no AEoI on the communities of the Haisborough, Hammond and Winterton SAC.
3.5.6	Sensitive cable protection measures – In our opinion this is unlikely to be possible in mobile sediment environments as it requires mimicking the natural sediment size and composition with the cable protection.	It should be noted that the Applicant does not refer to sensitive cable protection measures. The Applicant believes this is a pre-emptive position from Natural England based on the Hornsea Project Three Application. The Applicant proposes that it would be most appropriate to agree the type and source of cable protection (as well as the quantity, extent and location) with the MMO in consultation with Natural England through the Scour Protection and Cable Protection Plan (as required under dDCO Schedules 11 and 12 Part 4 Condition 9(e), in accordance with the Outline Scour Protection and Cable Protection Plan (document reference 8.16)). This would be based on the preconstruction survey data, latest scientific understanding, and relevant guidance at that time.
3.5.7	Natural England questions whether sensitive cable protection measures can be undertaken due to engineering requirements. The evidence presented for Race Bank OWF marine licence variation and marine licence re the type of protection that can be technically used, such as similar grain size has been discounted because it could be moved during a storm and doesn't provide sufficient protection against anchors and fisheries (Ref. WSP Remedial Burial Assessment – SJ20180628115546973)	
3.5.8	There is also the added concern that any protection of this nature will be displaced over time and there will need to be operation and maintenance work over the life time of the project to recharge any cable protection; thus ultimately requiring the use of rock protection anyway and subsequently increasing the amount of rock in the marine environment. And as noted for Hornsea Project 3 there would be no ability to review/control this going forwards as often the O&M assessment simply says 'where rock has been previously placed' with no information on amount and locations.	

NE para no.	NE comment	Applicant's Response:
3.5.9	Between the SNCB's there is ongoing discussions in relation to the Annex I status of any <i>Sabellaria spinulosa</i> reef growing over artificial substrate such as cable protection.	Noted, the Applicant suggests that this is a key example of why it is most appropriate to agree cable protection with the MMO in consultation with Natura England prior to construction through the Scour Protection and Cable Protection Plan (as required under dDCO Schedules 11 and 12 Part 4 Condition 9(e), in accordance with the Outline Scour Protection and Cable Protection Plan (document reference 8.16)) taking account of the latest scientific understanding and relevant guidance at that time.
3.5.10	Natural England agrees that in some locations and in a wider seas context that cable protection may become infilled or even buried, but currently this is not a valid argument for lack of longer term impact within an MPA. Habitat change is a pressure different to habitat loss, but it is still a change to the feature that the site was designated for, although Natural England recognise that <i>Sabellaria spinulosa</i> has medium sensitivity to habitat change.	<p><i>Sabellaria</i> reef can be expected to colonise cable protection (as discussed in the Applicant's responses to paragraphs 3.1.2, 3.3.1 and 3.3.2), therefore there would be no Annex I reef habitat loss. As discussed in the response to paragraphs 2.1.2 and 2.1.3, impacts associated with cable protection would be highly localised, therefore there would be no AEoI of the Haisborough, Hammond and Winterton SAC.</p> <p>It should be noted that Gibb⁵ <i>et al.</i> (2014) reports that <i>Sabellaria spinulosa</i> reef has medium sensitivity to habitat change where the change represents an increase in fine sediments which is not applicable to Norfolk Vanguard. Gibb <i>et al.</i> (2014) also states that <i>Sabellaria spinulosa</i> reef is considered to be 'Not Sensitive' to a change which results in increased coarseness as the resulting habitat is suitable for this species. This scenario is analogous to the introduction of cable protection creating increased hard substrate.</p>
3.5.11	Therefore, Natural England advises the Applicant seeks to find alternatives to rock armouring for cable protection. If the Applicant determines that there is no alternative to rock armouring then details should be provided as to how this will be removed at decommissioning stage and this should be secured as part of DCO.	The Applicant has stated that cable protection would be left <i>in situ</i> . As discussed above in response to paragraph 3.5.1 and 3.5.2, the Information to Support HRA report assesses the impact of cable protection and concludes no AEoI, taking into account that it would not be removed at the decommissioning stage. It should also be noted that, as stated by Natural England in paragraph 3.5.4, " <i>at present there is uncertainty both around the ability to remove cable protection and around what the impacts of removal would be on the designated features of the site.</i> "

⁵ Gibb, N., Tillin, H., Pearce, B. & Tyler-Walters, H. (2014). Assessing the sensitivity of *Sabellaria spinulosa* reef biotopes to pressures associated with marine activities. Available at: http://jncc.defra.gov.uk/PDF/JNCC_Report_504_web.pdf

3.6 Survey evidence

NE para no.	NE comment	Applicant's Response:
3.6.1	Natural England has concerns about the analysis and interpretation of benthic survey results. We had the opportunity through the Benthic EWG to provide initial comments to The Applicant on the quality of their benthic analysis. Where The Applicant provided comment, we remain uncertain that the analyses have been undertaken to the standards that we would expect in a development of this nature.	<p>As stated in response to para 3.1.1, the Applicant acknowledges that Natural England disputes the methodology used to map the extent of <i>Sabellaria</i> reef as part of the characterisation of the baseline for the assessment, however, as presented in the SoCG (Rep1-SOCG-13.1), irrespective of the methodology the Applicant and Natural England agree on the general extent and location of the potential feature. The Applicant therefore feels that the baseline reef extent used by the Applicant (comparable as it is to Natural England's map of reef extent), provides a sufficient baseline and therefore poses no reason that Natural England cannot currently provide an opinion on the potential impacts to the Annex I <i>Sabellaria</i> reef feature of the SAC.</p> <p>The Applicant notes that the future location and extent of <i>Sabellaria</i> reef at the time of construction is unknown as the species is ephemeral in nature and the location/extent is therefore likely to change prior to construction. The Applicant suggests that this is the key limitation with regards to Natural England providing an evidence-based opinion on the actual scale of the potential impacts to the Annex I <i>Sabellaria</i> reef feature of the Haisborough Hammond and Winterton SAC and as such, the Applicant has committed to undertaking pre-construction surveys (as required by dDCO Schedules 11 and 12 Part 4 Condition 13(2)(a)) and to agree cable installation methods and routing with the MMO through the Construction Method Statement (required under dDCO, Schedules 11 and 12, Part 4 Condition 9(1)(c)) and Cable Specification Installation and Monitoring Plan (required under dDCO Schedules 11 and 12, Part 4 Condition 9(1)(g)).</p>

3.7 Colonisation of foundation/ cable protection/ scour protection may affect benthic ecology

NE para no.	NE comment	Applicant's Response:
3.7.1	Whilst it is true that hard substrate used to be naturally more prevalent in the North Sea this is not the recent and current situation and is not a justification that anthropogenic introduction of hard substrate, and any associated changes to the fauna are acceptable. Additionally as noted here, these	It should be noted that the Applicant does not refer to hard substrate formerly being more prevalent in the North Sea to provide justification that anthropogenic introduction of hard substrate is acceptable. The Applicant believes this is a pre-emptive position from Natural England based on the Hornsea Project Three Application.

NE para no.	NE comment	Applicant's Response:
	earlier natural hard substrates were oyster reefs, gravel field and peat deposits, not terrestrial-sourced granite from Norwegian quarries.	
3.7.2	We agree that potential beneficial effects may occur from introduction of hard substrate into a soft substrate system. However, within MPAs, this must be considered secondary to the requirement to recover or maintain the features for which the site is designated. As such, any potential benefits from hard substrate in HHW SAC are contradicted by the impact that the hard substrate will have on the features of the site and the achievement of recovery.	The Applicant agrees that there are various references that support the conclusion that cable protection can become colonised by species associated with the SAC such as <i>Sabellaria</i> reef and keel worms. This allows the conclusion that there would be no AEoI on the communities of the Haisborough, Hammond and Winterton SAC.
3.7.3	A change of habitat is just as significant as loss of habitat, when that habitat is the designated feature.	As discussed in response to paragraphs 3.1.2, 3.3.1 and 3.3.2, <i>Sabellaria</i> reef can be expected to colonise cable protection, therefore there would be no loss of Annex I reef habitat. Gibb ⁶ <i>et al.</i> (2014) states that <i>Sabellaria</i> reef is considered to be 'Not Sensitive' to a change which results in increased coarseness as the resulting habitat is suitable for this species. In addition, as discussed in the response to paragraphs 2.1.2 and 2.1.3, impacts associated with cable protection would be highly localised, therefore there would be no AEoI of the Haisborough, Hammond and Winterton SAC.

3.8 Invasive non-native species

NE para no.	NE comment	Applicant's Response:
3.8.1	We suggest that The Applicant continues to consider potential interaction with <i>Didemnum vexillum</i> before construction, given that it has been found subtidally in the North Sea, and that it is known to be both invasive	The risk of spreading non-native invasive species would be mitigated through use of best-practice techniques, including appropriate vessel maintenance following guidance from the International Convention for the Prevention of Pollution from Ships (MARPOL). These commitments are secured in the Project Environmental Management Plan (PEMP) required under DCO Schedules 9 and 10

⁶ Gibb, N., Tillin, H., Pearce, B. & Tyler-Walters, H. (2014). Assessing the sensitivity of *Sabellaria spinulosa* reef biotopes to pressures associated with marine activities. Available at: http://jncc.defra.gov.uk/PDF/JNCC_Report_504_web.pdf

NE para no.	NE comment	Applicant's Response:
	and can invade sediment seabeds.	Part 4 Condition 14(1)(d) and Schedules 11 and 12 Part 4 Condition 9(1)(d), in accordance with the Outline PEMP (document reference 8.14) provided with the DCO application.

4 SPECIFIC COMMENTS REGARDING HABITATS REGULATIONS ASSESSMENT

4.1 Avoidance of Annex I *Sabellaria spinulosa* reef

NE para no.	NE comment	Applicant's Response:
4.1.1	<p>The primary mitigation for impact to <i>Sabellaria spinulosa</i> reef in the application is "where possible" avoidance of reef area. We note that if the suggested mitigation is successful in its entirety (i.e. all reef feature is avoided) we would agree with the assessment of magnitude.</p> <p>However, we advise that it is necessary to look at this primary mitigation with a degree of precaution, and question whether there are any studies from HHW or Inner Dowsing North Ridge and Race Bank SAC that could inform likelihood of success.</p>	See above, response to paragraph 3.3.4
4.1.2	<p>In addition Natural England has concerns with the caveat 'where possible', due to the increased level of risk to the integrity of the site such a caveat would endorse as there are no parameters to assess and agree what is "possible".</p>	<p>The Applicant notes that "where possible" is a necessary caveat to the mitigation in accordance with Natural England's Relevant Representation:</p> <p><i>"Relevant Representation states that on the basis of survey data at this point there should be room to microsite around reef in the cable corridor, although noting that this may not be the case pre-construction."</i></p> <p>As discussed in the Applicant's response to paragraphs 3.3.1, 3.3.2 and 3.3.4, in the unlikely event that <i>Sabellaria</i> reef has developed to such an extent that it is not possible to route the cable trenches through the 2 to 4km wide corridor (which provides approximately 1.05km to 3.75km space for micrositeing), then the proportion of temporary disturbance to such a large area of reef would be very small, combined with the likely recoverability of reef, resulting in no AEoI (as discussed in Section 7.4.2.1.1 of the Information to Support HRA report).</p> <p>The Applicant has committed to agreeing cable installation methods and routing with the MMO through the Construction Method Statement (required under dDCO, Schedules 11 and 12, Part 4 Condition 9(1)(c)) and Cable Specification Installation and Monitoring Plan (required under dDCO Schedules 11 and 12, Part 4 Condition 9(1)(g)).</p>
4.1.3	Using the Applicant's survey data and the recent site	The Applicant notes that Natural England's Relevant Representation states:

NE para no.	NE comment	Applicant's Response:
	<p>survey data it is highly probable that the area to be managed as a fisheries byelaw area for the recovery of reef could straddle the cable route. We therefore advise that this leaves insufficient space in the proposed cable corridor to micro-route around the byelaw area and any additional reef feature. Whilst we continue to advocate that the standard mitigation measure/marine licence conditioned to avoid reef features should be included in the Projects DML, it may not be feasible to do so.</p>	<p><i>“Relevant Representation states that on the basis of survey data at this point there should be room to microsite around reef in the cable corridor, although noting that this may not be the case pre-construction.”</i></p> <p>The Applicant also notes that that the Eastern Inshore Fisheries and Conservation Agency’s proposal to establish a fisheries byelaw area, in accordance with Natural England’s advice, is in relatively early stages having not yet been issued for consultation at the time of writing.</p> <p>As discussed in the Applicant’s response to paragraphs 3.3.1 and 3.3.2, in the unlikely event that <i>Sabellaria</i> reef has developed to such an extent that it is not possible to route the cable trenches through the 2 to 4km wide corridor (which provides approximately 1.05km to 3.75km space for micrositing), then the proportion of temporary disturbance to such a large area of reef would be very small, combined with the likely recoverability of reef, resulting in no AEoI (as discussed in Section 7.4.2.1.1 of the Information to Support HRA report).</p> <p>The Applicant has committed to agreeing cable installation methods and routing with the MMO through the Construction Method Statement (required under dDCO, Schedules 11 and 12, Part 4 Condition 9(1)(c)) and Cable Specification Installation and Monitoring Plan (required under dDCO Schedules 11 and 12, Part 4 Condition 9(1)(g)).</p>
4.1.4	<p>We do not consider the Applicant’s consideration of routing through ‘lower quality’ reef to be acceptable in terms of restoration of conservation objectives as the ‘lower quality’ reef mentioned by the Applicant is still contained within area to be managed as reef, with the protection provided by Annex I status. As part of the SOCG between NE and the Applicant it has now been agreed that all quality of Annex I reef will be avoided</p>	<p>As discussed in the Applicant’s response to paragraphs 3.3.1, 3.3.2 and 4.1.4, it should be noted that the Applicant does not refer to routing through lower quality reef, having committed to micrositing around all reef, where possible. The Applicant believes this is a pre-emptive position from Natural England based on the Hornsea Project Three Application. It should be noted however, that by definition, “low reef” is inherently patchy (with only 10-20% coverage, Gubbay (2007)⁷) and therefore increases the potential for micrositing. Medium reef also has high potential for micrositing, being classified by 20-30% coverage.</p>
4.1.5	<p>In addition the evidence presented in the HRA to support conclusions on recoverability predominantly relates to individuals/abundance, and doesn’t take into account repeated O&M impacts or cable</p>	<p>The following references, considered in the Information to Support HRA report, refer to <i>Sabellaria</i> reef rather than (or as well as) individuals:</p> <ul style="list-style-type: none"> • Tillin, H.M. & Marshall, C.M. (2015) <i>Sabellaria spinulosa</i> on stable circalittoral mixed sediment. In Tyler-Walters H. and Hiscock K. (eds) Marine Life Information Network: Biology

⁷ Gubbay (2007) Defining and managing *Sabellaria spinulosa* reefs: Report of an inter-agency workshop 1-2 May, 2007

NE para no.	NE comment	Applicant's Response:
	<p>protection. Therefore we have limited confidence in the ability of reef to recover from cable installation and ongoing maintenance activities. Therefore, we further advocate that the standard mitigation measure of avoidance is adhered to.</p>	<p>and Sensitivity Key Information Reviews, [online]. Plymouth: Marine Biological Association of the United Kingdom. Available from: http://www.marlin.ac.uk/habitats/detail/377</p> <ul style="list-style-type: none"> Holt, T.J., Rees, E.I., Hawkins, S.J., & Reed, R. (1998) Biogenic reefs: An overview of dynamic and sensitivity characteristics for conservation management of marine SACs. Scottish Association of Marine Sciences (UK Marine SACs Project), Oban. <p><i>Sabellaria</i> reef can be expected to colonise cable protection (as discussed in the Applicant's responses to paragraphs 3.1.2, 3.3.1 and 3.3.2). In addition, Gibb⁸ <i>et al.</i> (2014) states that <i>Sabellaria</i> reef is considered to be 'Not Sensitive' to a habitat change which results in increased coarseness as the resulting habitat is suitable for this species.</p> <p>The Applicant notes that Natural England expects <i>Sabellaria</i> reef to recover following circa. 100 years of extensive and repeated commercial fisheries dredging, should the area become closed to fishing via a fisheries byelaw closure area. It is therefore highly likely that the same logic would apply to short term and localised cable installation and potential maintenance activities for Norfolk Vanguard.</p>
4.1.6	<p>Furthermore whether reef is avoided or not during installation there does remain a risk during O&M cable remediation activities that reef could establish across the cable corridor or nearby areas where remediation activities needed to occur. Accordingly, every effort should be made, with input from the MMO and NE, to minimise the impacts at the time of undertaking the works.</p>	<p>The Information to Support HRA report (document reference 5.3) considers potential temporary disturbance impacts on <i>Sabellaria</i> reef during maintenance on the assumption that reef could have colonised/recolonised following cable installation. This assessment concludes there would be no AEoI.</p> <p>The Applicant is willing to consult with the MMO and Natural England prior to undertaking intrusive maintenance works within the Haisborough, Hammond and Winterton SAC.</p>

4.2 Long term loss of seabed habitat including from cable protection

NE para no.	NE comment	Applicant's Response:
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⁸ Gibb, N., Tillin, H., Pearce, B. & Tyler-Walters, H. (2014). Assessing the sensitivity of *Sabellaria spinulosa* reef biotopes to pressures associated with marine activities. Available at: http://jncc.defra.gov.uk/PDF/JNCC_Report_504_web.pdf

NE para no.	NE comment	Applicant's Response:
4.2.1	<p>Without removal at decommissioning the impacts are likely to persist and depending on the location may hinder the conservation objectives of the designated sites. Currently there is no guarantee of removal. The documents provided for the current Race Bank marine licence application includes two options for rock armouring removal that involve dredging up the material. The document provided was purely a method statement and didn't take into consideration the feasibility and confidence in being able to decommission in similar environments; including the associated impacts. For example the two options presented involve dredging to no lower than 30cm below seabed, and in undertaking this activity there would almost certainly be disturbance to, or removal of, the interest features of the site.</p>	<p>It should be noted that the Applicant does not refer to removal of cable protection. The Applicant believes this is a pre-emptive position from Natural England based on the Hornsea Project Three Application. The Applicant has assessed cable protection as a permanent impact on the basis that it is unlikely to be practicable to lift cable protection, in particular there are potential Health and Safety implications with such operations which may not be acceptable.</p>
4.2.2	<p>We suggest that there needs to be some evidence presented where rock armouring has been decommissioned, in similar sediment types, and monitoring provided of the associated impacts. To date all the evidence presented to NE from OWF developers is that rock armouring cannot currently be feasibly removed. A good example of this issue is within Thanet OWF, where a section of cable under rock armouring needed to be replaced. It was determined that removing that hard substrate to access the cable wasn't feasible, so a new cable section was spliced in around the existing cable leaving the original section with protection in situ. See Natural England's recent cable's paper (Natural England, 2018).</p>	
4.2.3	<p>Whilst the information presented provides a robust argument for WCS presented as being 10% of cable to</p>	<p>The Applicant queries whether the reference to "information presented" refers to the Hornsea</p>

NE para no.	NE comment	Applicant's Response:
	be rock armoured within a designated site, it doesn't take into account the impacts from any secondary scouring that may happen.	Project Three Application as stated in the response to paragraph 4.2.2. The Applicant has referred to secondary scour in its response to First Written Questions (Q5.9).
4.2.4	Overall, it is the view of Natural England that cable protection should not be used within MPAs as it has the potential to cause long-term impacts. Theoretically impacts may not be permanent if a condition is put in place to remove cable protection at decommissioning stage. However, at present there is uncertainty both around the ability to remove cable protection and around what the impacts of removal would be on the designated features of the site	See response to paragraph 3.5.4.