

Norfolk Boreas Offshore Wind Farm In Principle Habitats Regulations Derogation, Provision of Evidence

Appendix 3 Haisborough, Hammond and
Winterton SAC In Principle Compensation

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1 INTRODUCTION

1.1 Background

1. During the Norfolk Boreas Examination, Norfolk Boreas Limited ('the Applicant') committed to a number of mitigation measures that would address the potential effects of cable protection on the Haisborough, Hammond and Winterton (HHW) Special Area of Conservation (SAC). These measures are in addition to those which the Applicant has set out in the Information to Support Habitats Regulations Assessment (HRA) (document 5.3 [App-201] of the Norfolk Boreas examination library¹).
2. This specific mitigation and the justification for it is summarised in section 3.1.1 of this document and described in detail in the following documents:
 - The Haisborough Hammond and Winterton Special Area of Conservation Position Paper [REP5-057];
 - Additional information for the HHW SAC position paper [REP6-016]; and
 - Haisborough Hammond and Winterton SAC control documents (document 8.20) [REP6-011 or REP6-017].
3. As stated in the position paper [REP5-057], and in light of additional mitigation, the Applicant firmly maintains that an Adverse Effect on the Integrity (AEoI) of the HHW SAC can be ruled out. However, question Q3.8.6.1 posed by the Examining Authority (ExA) in the Norfolk Boreas Examination's third round of written questions requested that the *"Applicant presents a derogation case for the Alde-Ore Estuary Special Protection Area (SPA), Flamborough and Filey Coast SPA and the Haisborough, Hammond and Winterton (HHW) Special Area of Conservation (SAC) European sites."*
4. A request for Information was also issued by the Department for Business, Energy and Industrial Strategy (BEIS) on behalf of the Secretary of State (SoS) to Norfolk Boreas Limited on 28 April 2021 which requested Norfolk Boreas Limited to: *consider [a] letter published by Defra (February 2021), and provide details of alternative compensation strategies for the reef and sandbank features of the Haisborough, Hammond and Winterton Special Area of Conservation (SAC)*The letter to which BEIS refer can be found on the Planning Inspectorate website (Defra 2021).
5. In order to respond to the requests by the ExA, the Applicant prepared an in principle derogation case which is presented in the main document [REP11-011].

¹ 

This Appendix (3) was originally [REP11-014] prepared in response to the ExA's request and has now been updated (to form version 3) in response to the question from BEIS on the 28 April 2021 and to address comments on the document which have been provided by stakeholders during the SoS led consultation. This document outlines in-principle compensatory measures that could be developed should the Secretary of State (SoS) conclude that an AEoI on the HHW SAC cannot be ruled out and compensatory measures are required. In principle compensatory measures for the Flamborough and Filey Coast and the Alde-Ore Estuary SPAs are provided in Appendix 1 and Appendix 2 to the main document [documents which now form 8.24 and 8.26 of the Norfolk Boreas Application]. Notwithstanding the Applicant's approach to present in-principle compensatory measures, this should be considered subject to the Applicant's clear and firm position that necessary and appropriate mitigation measures are proposed to address AEoI on the HHW SAC features associated with habitat loss, and that these mitigation measures can be appropriately secured through the DCO and relevant outline plans to be certified.

6. A Request for further information was also issued by BEIS to Norfolk Vanguard Limited on the 6 December 2019 also inviting that project to provide information on any in-principle compensatory measures proposed to ensure that the overall coherence of the network of Natura 2000 sites is protected. The Applicant is therefore mindful that the SoS is considering the need for compensation for both projects and that this would be secured separately through each project's made DCO. However, given the shared cable corridor and the nature of the sister projects, the potential to deliver a single overarching compensation strategy for impacts from both projects, if that is required, has been taken into account by the Applicant in this (Version 3) document. Where relevant, consideration of how this could be achieved is provided within section 4.
7. Further to the above, on the 31 December 2020 Hornsea Project Three became the first offshore wind farm in UK waters to be granted a DCO which contained within it a condition to compensate for AEoI on marine SACs. The SoS's letter of the 5 July 2021 (to both Vanguard and Boreas) makes reference to this stating:

"The Secretary of State's determination of Hornsea Project Three Offshore Wind Farm concluded that habitats which are subjected to cable protection will experience the effects of habitat loss, habitat modification and changes in epifauna communities. This is likely to impede the restoration of Annex I habitats for the duration that they are in place. With this considered, compensatory measures for the North Norfolk Sandbanks and Saturn Reef SAC and the Wash and North Norfolk Coast SAC were secured to offset impacts on Annex I habitat and to ensure the overall coherence of the National Site Network. In light of the Hornsea Project Three Offshore Wind Farm determination, the associated Habitats Regulations Assessment, and the letter of February 2021 issued by Defra in respect of the Norfolk Boreas application the Secretary of State wishes to revisit

the Habitats Regulations Assessment for Norfolk Vanguard in relation to the Haisborough, Hammond and Winterton SAC.”

8. Prior to the Hornsea Project Three decision a version of this document was submitted to the Norfolk Boreas examination as REP11-014. This updated version of the document takes account of requests for information made by BEIS and the ExA, recent project examples and recent consultation with Defra, Natural England and other stakeholders.
9. Whilst considering the compensation proposals provided in this document it is important to bear in mind the considerable advantages and inherent compensation value which renewable energy would provide to the Natura 2000 network. This should be acknowledged; with climate change representing the biggest pressure for a wide range of Natura 2000 qualifying features. It is recognised that this is difficult to quantify and, therefore, these benefits are the focus of the Imperative Reasons of Overriding Public Interest (IROPI) case (discussed in Habitats Regulations Derogation Provision of Evidence, document reference [REP11-011]).

1.2 Purpose of this Document

10. In response to the requests put to the Applicant by BEIS and the Examining Authority this document provides a review of a range of potential measures that could be adopted to compensate for the potential effects of cable protection on the HHW SAC features if cable protection were to be installed by Norfolk Boreas. This range of compensation measures has been discussed with numerous stakeholders including: Natural England, the Marine Management Organisation (MMO), Defra, The Wildlife Trusts (TWT), Offshore Petroleum Regulator for Environment and Decommissioning (OPRED) and several seabed users, and their feedback is incorporated where appropriate (see section 1.3). However, it should be recognised that this feedback does not always reflect the opinion held by the Applicant.
11. This document now provides a range of possible compensation options that the Secretary of State could secure within the Norfolk Boreas DCO should he consider that any, or a combination of these, are necessary. The Applicant recommends its preferred options and provides reasoning for this preference, however at this stage is not precluding any of the options completely.
12. The Applicant considers it unlikely that cable protection will be required within the HHW SAC, and therefore is of the view that compensation should not be required until installation of the export cable is complete. This will allow the need for compensation to be clearly demonstrated or disproved. This does not preclude the Applicant from developing plans for compensation prior to installation so that the compensation can be implemented as soon as possible after cable installation,

rather, that the actual delivery of compensation should not be required until it is known for certain whether cable protection is required or not.

13. The Applicant understands that under EC guidance the compensation should normally be in place before the effect can take place, however it also allows certain circumstances where this cannot be fully fulfilled. Due to the fact that it is not yet known if cable protection is required, and the high likelihood that it will not be required, the Norfolk Boreas project is an exceptional example where it is appropriate to engage those circumstances.

1.3 Consultation

14. During the Norfolk Boreas Examination, the Applicant, jointly with Norfolk Vanguard, undertook extensive consultation with Natural England and the MMO in relation to possible compensation measures. A record of this consultation is provided in Appendix 4 consultation overview (document reference [REP11-015]).
15. In relation to compensatory measures, draft in principle compensatory measures were provided to Natural England and the MMO on 17 January 2020 in order to seek guidance on the effectiveness of the potential compensatory measures identified; in particular whether they would be sufficient to ensure that the overall coherence of the Natura 2000 network is protected.
16. Written feedback was provided from Natural England on 4 February 2020 and this was then taken into account in the previous version of this document.
17. Following the request for further information from the SoS on the 28 April 2021 (which, in respect of the HHW SAC, is identical to the request for further information from the SoS to the Norfolk Vanguard Limited published on the 5 July 2021), the Applicant has, jointly with Norfolk Vanguard Limited, undertaken further consultation with numerous stakeholders as described below and summarised in Table 1.1.
18. In the letter provided to BEIS by Defra (dated 21 February 2021), to which the SoS refers, Defra raised concerns about the legal mechanism and timescales for the Applicant's original proposal to extend the HHW SAC. These concerns are acknowledged, however the Applicant maintains that this is a feasible proposal, as detailed within section 4.3.2 and in Natural England's submission dated 23 August 2021 it states its continued support for this option. The Defra letter also indicates that it is not able to support direct fisheries management as a method of compensation in the form which was presented in the Applicant's original compensation submission [REP11-014]. The Applicant understands, from its consultation with Defra and Natural England that there are possibilities for direct

fisheries management to be an approach which could be implemented strategically for future projects, however this will not be an option for the Norfolk Boreas or Norfolk Vanguard projects. The Applicant also ruled out this option because the Applicant has a responsibility to work with other sea users and there is currently no legal mechanism by which the Applicant could restrict the activities of other offshore industries, including fishing, in order to deliver compensation for the project.

19. During consultation with Defra in April 2021, Defra advised the Applicant to explore whether there was a way to deliver compensation by working with aggregates, such as purchasing licences or scheduling activities. The Applicant has considered this but has ruled it out because the Applicant has not been able to identify a mechanism for purchasing or being awarded a marine aggregate dredging licence if there is no intention to undertake a dredging activity. Moreover, as with restricting fishing practices, the Applicant has a responsibility to co-exist with other marine users and industries as far as is reasonably possible. In light of these considerations, there is no legal mechanism available to a developer to deliver compensation in this form.
20. Following review of the information provided by Defra in its letter to BEIS, and taking account of the analysis undertaken as part of the original compensation proposals [REP11-014], the Applicant has further developed the removal of anthropogenic material as an option within versions 2 and 3 of this document.
21. During the development of the removal of anthropogenic material the Applicant has undertaken further consultation jointly with Norfolk Vanguard Limited, which is summarised in Table 1.1. A proposal for this alternative compensation package (removal of anthropogenic material) was provided to Natural England and Defra on 4 May 2021 and wording of a proposed condition which could be used to secure the compensation was provided to Natural England and the MMO for review on the 27 May 2021 (the Applicant's proposed wording for the condition has been provided in a separate document titled "*Extract of Schedule 19 to the draft DCO Compensation to protect the coherence of the Natura 2000 Network*"). Following the addition of the alternative compensation measures to this document a draft of the full document was provided to both Natural England (2 June 2021) and Defra (8 June 2021) for comment.

Table 1.1 Summary of consultation

Consultee	Consultation Type	Comment or summary of response	Applicant's response
Defra	Letter to the SoS Written in February 2021 and published as part of the SoS's request for further information 28 April 2021.	It is Defra's view that extending designated sites or creating new site designations on grounds other than the best available scientific evidence, for example as compensatory measures for a development, would not comply with the legislation. Therefore, we are unable to simply extend an SAC to provide appropriate compensation.	Subsequent consultation with Defra has indicated that significant further work would be required, but that this is not an option which should be ruled out completely. Therefore, given the support for this option from Natural England the Applicant has retained this option within the proposals detailed within this document.
Defra	Meeting and email correspondence April 2021.	Suggested possible options for further consideration of removal of existing infrastructure and consideration of reducing pressure on the HHW SAC by removing/reducing other human activity pressures, such as aggregate extraction.	The Applicant has considered the removal of existing out of service infrastructure further within this document (see sections 4.3.4 and 4.4.2) and this now forms part of one of the recommended options. As a responsible developer, the Applicant would not support the restriction of another marine user such as the aggregates industry. Furthermore, the Applicant has not identified a mechanism to allow a dredging licence to be awarded/purchased without the intention to undertake that activity.
Natural England	Meeting 13 May 2021	Advised that original compensation could still be considered a feasible option, but alternative compensation should focus on removal of surface laid existing infrastructure. In response to the Applicant raising concerns that there is not currently sufficient decommissioned surface laid infrastructure within the HHW SAC, Natural England explained that there is significant	Following these comments, the Applicant has repurposed the removal of anthropogenic material to give increased weight to the removal of surface laid decommissioned third party assets. The Applicant has also included this option as a three stranded approach and thus the

Consultee	Consultation Type	Comment or summary of response	Applicant's response
		<p>infrastructure within the HHW SAC much of which is not yet decommissioned but will be in the near future and thus could be removed possibly during the operation phase or even during the decommissioning phase of the project.</p>	<p>removal of marine debris is not presented to the SoS in isolation, rather the Applicant recommends an adaptive management approach (see section 4.4.2 for further details) which can be applied to give more certainty of success. The Applicant has also adapted its proposals so that although at least two options would be progressed prior to construction, the final compensation would not be fully delivered until after construction has been completed and therefore once it is known if cable protection has been installed and therefore if compensation is required.</p>
Defra	Meeting 20 May 2021	<p>Advised that they support the principle of removal of surface laid existing infrastructure.</p> <p>Defra welcomed the adaptive management approach using three strands but indicated that the focus should be on removal of infrastructure.</p> <p>Defra indicated that the approach for SAC compensation secured as part of the Hornsea Three project is not a precedent which should be relied upon as a complete compensation package.</p>	<p>The Applicant has also discussed with Natural England the concept of not fully delivering compensation prior to construction being applied to the extension of the HHW SAC, Natural England agreed that this was a concept which should be explored further and that it should not be ruled out, however it was recognised that overcompensation would to be required if this was the case.</p>
Natural England	Written feedback on draft alternative compensation proposal provided 28 May 2021	<p>We do not consider this [removal of marine litter] a valid compensatory measure due to the following reasons:</p> <ul style="list-style-type: none"> • we do not consider marine debris and/or litter to be a factor hindering the conservation objectives of the sites; • we do not consider that a single removal campaign would compensate for habitat loss over the lifetime of the project; • it is unclear how it could be demonstrated that the removal of litter is compensating for habitat loss; and, • it is unclear how an awareness campaign with key stakeholders will effectively compensate for habitat loss. <p>Therefore, we highlight that if this option is presented to the Secretary of State in isolation from other more substantial measures, it will be</p>	<p>The Applicant has also discussed with Natural England the concept of not fully delivering compensation prior to construction being applied to the extension of the HHW SAC, Natural England agreed that this was a concept which should be explored further and that it should not be ruled out, however it was recognised that overcompensation would to be required if this was the case.</p>

Consultee	Consultation Type	Comment or summary of response	Applicant's response
		<p>Natural England's unambiguous advice that appropriate compensatory measures have not been provided for HHW SAC.</p> <p>However, we would welcome the further exploration of options to remove surface laid 3rd party assets from HHW SAC to determine whether such activities could provide an opportunity for compensatory measures.</p> <p>Natural England have also urged caution in using Hornsea Project Three's DCO condition to use as a guide to what compensation will be acceptable.</p>	
Natural England	Written feedback on draft alternative compensation proposal provided 28 May 2021	We advise that where there remains uncertainty in deliverability of compensation and/or time lag between implementation/delivery of compensation and project installation that a greater than 1:1 ratio is required.	The Applicant maintains that the 1:1 ratio for compensation measures is appropriate where removal of out of service infrastructure or marine debris is concerned as this is a 'like for like' compensation. Where the delivery of compensation is delayed until it is known whether compensation is required, it is appropriate to require additional adaptive measures to deliver overcompensation and this is proposed by the Applicant in this document (see sections 4.3.4 and 4.3.2).
TWT	Meeting 11 May and follow up letter from TWT on 21 May 2021	Proposed that the compensation should be " <i>Removal of exposed oil and gas pipelines with rock armouring in Haisborough, Hammond and Winterton SAC.</i> "	The Applicant has considered the removal of existing out of service infrastructure further within this document (see sections 4.3.4 and 4.5.1).
BT Cables consortia	Email and Meeting 27 May 2021	BT confirmed that it is happy to assist the Applicant in identification of possible infrastructure for decommissioning and was also happy with the principle of the Applicant	The Applicant is undertaking a study to identify possible locations of surface laid infrastructure which BT and relevant consortia own.

Consultee	Consultation Type	Comment or summary of response	Applicant's response
		removing any out of service infrastructure. However, it would require further study, data collection and survey in order to identify possible opportunities. In principle agreement by way of a Letter of Comfort has been confirmed in Appendix 1 of the Applicant's Response to the Request for Further Information document (Appendix 1 of document ExA.PD.D19.V1).	
Helix Well Ops UK Ltd. (owner of decommissioned Camelot Field)	Telephone call	Helix are happy to assist the Applicant in the removal of a section of existing pipeline which is located within the HHW SAC or outside the SAC if appropriate. In principle agreement by way of a Letter of Comfort has been confirmed in Appendix 1 of the Applicant's Response to the Request for Further Information document (Appendix 1 of document ExA.PD.D19.V1).	Consultation is ongoing with Helix to identify exactly how much of their decommissioned infrastructure is located within the HHW SAC, its current condition, and whether it might be possible to remove it.
Offshore Petroleum Regulator for Environment and Decommissioning (OPRED)	Emails 28 May 2021 and 23 June 2021	Decommissioning of oil and gas infrastructure (including pipelines) is highly regulated in terms of liability and environmental impact. The practicalities of decommissioning pipelines is also complex and each pipeline goes through a comparative assessment to determine the best options available for each pipeline e.g. this may mean the best option is to leave in situ with or without the need for protective material; it could mean leaving in situ with the intention of re-use or it could mean full or partial removal etc. In terms of pipeline protection material, whether associated with a 'live' or decommissioned pipeline, protection is used for two main reasons (a) to protect pipeline integrity and (b) to protect other users of the sea, and therefore the removal of protection material is not an option. For decommissioned pipelines in situ, liability is for	The Applicant understands the risks associated with removal of oil and gas out of service infrastructure, however given the number of stakeholders that have endorsed this as their preferred option for compensation the Applicant has included this as an option.

Consultee	Consultation Type	Comment or summary of response	Applicant's response
		<p>perpetuity to make sure they are not a risk to other users of the sea. Pipeline monitoring is undertaken periodically to make sure they are safe. If it is possible to do so this liability would need to be transferred from the oil and gas operators under the Petroleum Act and the windfarm developer would need to acknowledge the risk that pipeline removal for existing decommissioned pipelines in-situ may not be achievable in practice – and therefore liability will remain with the windfarm developer and the compensatory measure has not been accomplished.</p> <p>The risks of pipeline removal are assessed at the comparative assessment stage and bearing in mind many pipelines have been in place for many years – the base case is always full removal, but generally full removal is not an option for many practical and environmental reasons.</p>	
TWT and Natural England	Written responses to meetings and review of documents	Have requested that further information is included on the governance of how compensation will be delivered.	The Applicant has proposed that, should compensation be required (due to the installation of cable protection), the Applicant would agree a compensation strategy with the SoS in consultation with Natural England and the MMO in which the mechanism for governance and delivery of compensation would be agreed.
Natural England	Meeting 8 June 2021	<p>The order of priority when seeking best location for delivering compensation should be as follows:</p> <ol style="list-style-type: none"> 1. Within or immediately adjacent to the site being affected. 	The Applicant has adopted this advice within its recommended options and proposed that: an extension be made to the HHW SAC which would comply

Consultee	Consultation Type	Comment or summary of response	Applicant's response
		<ol style="list-style-type: none"> 2. If not, possible compensation should occur within or immediately adjacent to an equivalent SAC within the southern North Sea 3. If not, possible compensation should occur within or immediately adjacent to an equivalent SAC within the wider North Sea 4. If not, possible compensation should occur within or immediately adjacent to another equivalent SAC within the Natura network. 5. If not, possible compensation would need to be delivered outside of the SAC network. This is highly undesirable and untested and therefore NE would advise against it. 	with the priority 1; and that for removal of anthropogenic material it would use this priority list starting at 1 and only if compensation was not fully delivered would move to 2 and so on.
Natural England	Meeting 8 th June 2021	Preliminary advice (although a legal view will be sought) was to not leave compensation until after construction and if this was to be the Applicant's approach overcompensation would be required.	The Applicant has proposed to progress two options as far as possible up to the point at which it is known <u>if</u> and how much cable protection is required. If overcompensation is required at that point it would be possible to develop part of, either or both options to provide the necessary overcompensation.
TWT	Meeting 11 June 2021	<p>The proposals should include:</p> <ol style="list-style-type: none"> 1. Clear rationale of the ratio used for compensation 2. Description of how monitoring would be undertaken including, the objectives for monitoring 3. The governance proposed for the monitoring 	<p>The Applicant has included discussion on what ratios should be applied for both of its recommended options in sections 4.3.3.3 for the extension to the HHW SAC and sections 4.3.4.3 and 4.4.2 for the removal of anthropogenic material.</p> <p>The Applicant, in response to TWT's comments has included an additional</p>

Consultee	Consultation Type	Comment or summary of response	Applicant's response
			section on monitoring at 4.4.2.4 which outlines the objectives for the monitoring.
Defra	Meeting 16 June 2021	Following initial review of the revised draft compensation document Defra agree with the principle of providing options for compensation. Defra provided more detail on the resource and length of time it would take to designate a site and highlighted the uncertainty with the outcome.	The Applicant recognise that significant time and resource would be required for an extension of the HHW SAC and has provided estimated costs in section 4.5.2. The Applicant also recognises and understands that the process of designating an SAC cannot be predetermined and there would be uncertainty over the final outcome. However, for the proposals in question the chance of success is very high. Further detail is provided in section 4.4
Natural England	Review of draft document 18 June 2021	This [delivery of compensation at or following construction rather than prior to construction] is not an approach that has been taken to compensatory measures to date, and we consider this presents significant concerns regarding the extent to which compensation could be considered secured at the point of decision. It also raises issues regarding the delay between the damage occurring and the compensatory measures achieving their benefits. Please see our DCO comments regarding these points.	The Applicant appreciates these concerns however given that cable protection and therefore compensation is very unlikely to be required and if it is required the size of the area to be compensated for is not yet known, that decisions on whether and how the compensation is delivered can only be made at the point of construction. Given the cost (see section 4.5.2) and possible risks (see OPRED consultation above) associated with delivery of the compensation the Applicant does not consider it appropriate for it to be required to deliver advance compensation for an effect that is unlikely to occur. The approach proposed by the Applicant is

Consultee	Consultation Type	Comment or summary of response	Applicant's response
			recognised as an acceptable approach in EC guidance.
MMO and Natural England	Meeting to discuss wording of a draft condition (schedule 19 part 3) to secure the compensation. 22 June 2021	<p>MMO's main concerns relate to ensuring that there is enough time for review and sign off of the strategy.</p> <p>Natural England disagree with the wording of the condition which allows compensation to not be delivered until after the effect has occurred.</p> <p>Although there was in principle agreement on many aspects of the draft condition wording complete agreement and sign off was not reached during this meeting.</p>	<p>The Applicant amended the condition as far as possible to address all concerns. The Applicant's preference is not to prescribe set timeframes for consultation within the condition to enable flexibility and promote ongoing engagement throughout the development of the compensation.</p> <p>The Applicant remains firm in its position that due to the likelihood that cable protection will not be required in the HHW SAC and the costs, risks and uncertainty around deliverability of any option, that compensation should only be required once it is known that cable protection has been placed.</p>
Natural England	24 June 2021	Provided a list of general topics that fully-formed compensation proposals should provide.	The Applicant has included the list within its proposals for the content of the HHW SAC compensation strategy (see sections 4.4.1 and 4.4.2). The Strategy would be agreed with the SoS in consultation with the SNCB.
Defra	Provided comments on the draft document 22 June 2021	<i>Applicant's summary of response:</i> Advised that protected features should not be impacted before compensation is secured and as the Applicant's proposals do not align with that overcompensation will be required. Also provided further advice on the complexities and risk of designating an offshore SAC and advised that this should be recognised in the document.	The Applicant has included detail of how overcompensation would be delivered for both of its recommended options (see sections 4.4.1 and 4.4.2)

22. As is apparent from the consultation undertaken above on behalf of both Norfolk Boreas and Norfolk Vanguard, three stakeholders are supportive of the projects removing out of service infrastructure, and it is perceived that the most likely candidate for this removal would be provided by the oil and gas industry. However, the Applicant has reservations in relation to the feasibility of this option given the concerns raised by OPRED. Notwithstanding this, due to the alignment of some stakeholders in support of this option, the Applicant has considered it as one of the potential options within this document.

1.4 This document

23. This document has evolved over nearly two years, however, to summarise the background:
- The Applicant is of the firm opinion that due to the mitigation measures which have been committed, AEoI of the HHW SAC can be ruled out and therefore no compensation is required.
 - In the event that AEoI is not ruled out by the SoS, the Applicant has provided a range of different compensatory measures within this document which could be implemented. The Applicant has identified the options which are most likely to deliver compensation, but the Applicant's clear position is that its delivery should not be required until it has been demonstrated that cable protection is needed in the HHW SAC due to adverse ground conditions.
 - The Applicant notes agreement by some stakeholders that removal of oil and gas infrastructure is a preferable compensation measure, but shares concerns raised by OPRED as to risks associated with the feasibility of this measure.
24. Notwithstanding the above and following this introduction:
- Section 2 of this document provides a description of the HHW SAC;
 - Section 3 quantifies the predicted worst case effect of the Project on the HHW SAC; and
 - Section 4 considers the guidance on compensation and sets out in principle compensation measures for Norfolk Boreas and the HHW SAC.
 - Within section 4.3 four different options are considered and reviewed, after which two of the four options, which the Applicant considers are most likely to deliver compensation, are developed further in section 4.4. A project plan is then provided in section 4.5 that demonstrates a road map for delivery of both options using adaptive management to maximise success.

- A draft DCO condition is proposed in section 4.5.2 to be included by the SoS should he decide to secure the compensation in the way suggested by the Applicant.
- Section 5 provides a summary of the document.

2 HAISBOROUGH, HAMMOND AND WINTERTON SAC

2.1 Overview

25. The HHW SAC is located to the west of Norfolk Boreas, and the proposed offshore cable corridor will pass through the SAC to make landfall. The SAC is designated for Annex I Sandbanks which are slightly covered by seawater all the time and Annex I Reefs (*Sabellaria spinulosa*).
26. The sandbank ridges consist of sinusoidal banks which have evolved over the last 5,000 years and comprise of Haisborough Sand, Haisborough Tail, Hammond Knoll, Winterton Ridge and Hearty Knoll. Older sandbanks, Hewett Ridge and Smiths Knoll, that have formed over the last 7,000 years are present along the outer site boundary. The more geologically recent sandbanks of Newarp Banks and North and Middle Cross Sands are located in the south west corner of the SAC².
27. The Joint Nature Conservation Committee (JNCC) HHW Site Details² state that, at the time of designation, *S. spinulosa* reef had been recorded on Haisborough Tail, Haisborough Gat and between Winterton Ridge and Hewett Ridge.

2.2 Conservation Objectives

28. Conservation objectives are set to ensure that, subject to natural change, the integrity of a 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; and,
 - the distribution of qualifying species within the site.

2.2.1 Favourable condition

29. '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 Directive³ when (JNCC and Natural England, 2013):

- its natural range and the 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.

30. Favourable condition of Annex I Sandbanks which are slightly covered by seawater all the time and Annex I 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).
- Natural England's most recent condition assessment of the HHW SAC concluded that the site is in unfavourable condition for both features.

2.2.2 Existing pressures in the HHW SAC

31. The Standard Data form for the HHW SAC⁴ reports the following pressures on the site:

- Mining and quarrying (low pressure).
- Exploration and extraction of oil or gas (high pressure).
- Utility and service lines (low pressure).
- Shipping lanes, ports, marine constructions (low pressure).
- Fishing (high pressure).
- Marine water pollution (low pressure).

³ Council Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora.

2.2.3 Targets for achieving Favourable condition

2.2.3.1 Annex I *S. spinulosa* reef

32. Natural England’s Supplementary Advice Targets⁵ of relevance to Norfolk Boreas for Annex I *S. spinulosa* Reef are outlined in Table 2.1.

Table 2.1 Supplementary Advice Targets for *S. spinulosa* 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 <i>Sabellaria</i> 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 <i>Sabellaria</i> species across the feature.
Structure: species composition of component communities	Restore the species composition of component communities.
	Restore the species composition of the <i>Sabellaria</i> 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 <i>Sabellaria</i> 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 <i>Sabellaria</i> reefs, to provide high levels of oxygen, sediment supply and food.

2.2.4 Annex I Subtidal Sandbanks

33. Natural England’s Supplementary Advice Targets of relevance to Norfolk Boreas for Annex I Subtidal Sandbanks are outlined in Table 2.2.

⁵



Table 2.2 Supplementary Advice Targets for Subtidal Sandbanks 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.

3 QUANTIFICATION OF EFFECT ON THE HHW SAC

34. In the Information to Support HRA Report [APP-201] the Applicant provides an assessment of both habitat loss and habitat disturbance for Annex I Sandbanks. Annex 4 of the Applicant's Additional information for the HHW SAC position paper [REP6-019]⁶ provides an updated assessment of the effect of habitat loss on *S.spinulosa* reef following further mitigation measures proposed during the examination. Habitat loss would be long term, for the duration of the project, which is expected to be approximately 30 years whereas habitat disturbance would be temporary, for a maximum of a few months in any one location. Following habitat disturbance, the assessment concludes that a full recovery of the sandbanks features would occur within a short time period (in the order of a few days to a year) and with the mitigation to microsite around *S.spinulosa* reef where possible there would be little or no effect on that feature.
35. Therefore, in principle compensatory measures would only be appropriate for long term habitat loss and not for temporary disturbance (as rapid recovery would occur). The only cause of long term habitat loss within the HHW SAC as a result of the project would be through the installation of cable protection and therefore the in principle measures provided within this document are designed to compensate for maximum amounts of cable protection which could be installed by Norfolk Boreas within the HHW SAC.

3.1 Cable Protection Worst Case Scenario

36. It is likely that ground conditions will allow burial of the export cables throughout the HHW SAC and therefore no cable protection will be placed as a result of partially buried cables. However, although recent discussions with possible export cable installers, currently bidding for the Norfolk Boreas contract have indicated that this is indeed likely (see Appendix 2 of the Applicants response to the request for further information document ExA.PD.D19.V1 for statements confirming this), this cannot be confirmed absolutely until cable installation has been completed and therefore a worst case scenario for cable protection has been established.
37. The predicted worst case scenario set out below relating to the potential effect of the deployment of cable protection on the HHW SAC incorporates the further

⁶ Effects of long term habitat loss on *S.spinulosa* reef were not assessed in the Information to Support HRA Report as the Applicant consider that as *S.spinulosa* reef is likely to colonise cable protection the feature would not suffer any overall loss of habitat. However, Natural England's position is that *S.spinulosa* reef established on artificial substrate cannot be defined as Annex I reef (see Natural England's Relevant Representation [RR-099]) and therefore further assessment of the potential effects of permanent or long term habitat loss is required. The Applicant completed the further assessment which is presented in Annex 4 of the Applicant's Additional information for the HHW SAC position paper [REP6-019]

mitigation proposed by the Applicant during the Norfolk Boreas Examination. It also takes account of the various mitigation commitments made prior to submission of the DCO application.

3.1.1 Mitigation

3.1.1.1 Commitments made in the Environmental Statement

38. The Applicant maintains that, due to the mitigation measures which have been committed to, there would be no AEoI within the HHW SAC and should the SoS disagree with this conclusion the area to be compensated for would be very small (see section 3.1.2 for further details). This section summarises those mitigation measures.
39. During the course of the assessment and examination process, the Applicant has committed to a comprehensive and significant suite of mitigation measures, well beyond those proposed by any other equivalent project (excepting the Norfolk Vanguard project). The extensive list of these measures can be found in the final version of the HHW SAC control documents [REP14-031 and REP14-033] and the summary table from that document has been included in Table 3.1 below. The mitigation measures have been designed to:
- Reduce the scale of any effects of the project on the HHW SAC;
 - Promote rapid and complete recovery of Annex I Sandbanks and *S.spinulosa* reef; and
 - Where possible avoid all interaction of the project with Annex I features.
40. In the Environmental Statement (ES) (document reference 6.1) submitted in support of the DCO application, the Applicant committed to use a High Voltage Direct Current (HVDC) export solution, rather than High Voltage Alternating Current (HVAC), in order to reduce the number of cables and cable protection required by the project. This results in the following mitigating features in relation to cable protection:
- There will be up to two cable installations instead of six for Norfolk Boreas (and the same for Norfolk Vanguard).
 - The potential quantity of cable protection required in the unlikely event that cables cannot be buried will be reduced due to the reduction in the number of cables.
 - The number of export cables required to cross existing cables and pipelines and its associated cable protection will be reduced.

- The space required for cable installation will be reduced, increasing the space available within the cable corridor for micro-siting to increase burial success and avoid constraints such as the presence of *S. spinulosa* reef.
41. Cables will be buried, where the substrate allows burial, to a depth of at least 1m and appropriate burial tools will be selected in order to maximise cable burial success, and minimise the requirement for cable protection and the likelihood of reburial being required.
 42. A commitment has been made to a maximum of 5% of the cable length within the HHW SAC being protected with cable protection due to inappropriate ground conditions (equating to an area of 20,000m² see section 3.2). During the Norfolk Boreas examination this was reduced from 10%, as set out in the DCO application, based on evidence from an interim cable burial study (provided in Appendix 2 of the control documents, document reference 8.20 [REP6-011] or [REP6-017]).
 43. In response to Natural England's Relevant Representation [RR-099] made to the Norfolk Boreas examination, the Applicant made a commitment to not use cable protection in the priority areas to be managed as reef within the HHW SAC, unless otherwise agreed with the MMO in consultation with Natural England. This is explained further within the HHW SAC Position paper [REP5-057].
 44. This commitment will ensure that no permanent habitat loss occurs in the priority areas that have been identified by Natural England in order to facilitate the recovery of *S. spinulosa* reef to favourable condition. Further mitigation measures are described in Table 3.1.
 45. Due to the implementation of these mitigation measures the maximum possible size of Annex I habitat loss that could be caused by the project would be extremely small (see section 3.1.2). The scale of this worst case area of loss was highlighted by the Applicant in the Written Summary of Oral Submissions: ISH 4 Offshore effects including the draft Development Consent Order [REP4-014]. The scale of loss for Norfolk Vanguard is identical to that of Norfolk Boreas, therefore the same principle applies across both projects.
 46. On consideration of these mitigation measures, Natural England acknowledged that the Applicant has taken all possible steps to mitigate any effects and that the considerable measures taken have significantly reduced the risk of AEoI.
 47. The significant mitigation is also acknowledged and welcomed by Defra in its letter to BEIS (dated 21 February 2021). In light of these considerations and as stated above, the Applicant's position remains that compensation is not required for the Norfolk Boreas (or Norfolk Vanguard) project.

48. The Applicant has also committed to decommission any cable protection placed within the HHW SAC apart from at cable crossing points [See REP11-001, REP14-033 and REP6-018] thus ensuring that the impacts of cable protection would be long term temporary. However, should the SoS rule that compensation for cable protection is required, this mitigation measure would no longer be necessary therefore would not be implemented by the Applicant. This concept was agreed with Natural England and they state in the Statement of Common Ground [REP16-010]

“Should the SoS conclude AEoI and that compensatory measures are required neither Condition 3(1)(g) nor Condition 20 should be included in the DCO.”

Table 3.1 Overview of Mitigation Commitments in the HHW SAC

Pre-consent Mitigation Commitments	Status	Final Mitigation solution following detailed design	Agreed with MMO in consultation with Natural England
Use of HVDC export cable solution to reduce the no. of cable trenches from six to two	Not subject to change	N/A	✓
Pre-construction survey to be undertaken within 12 months of commencing works	Survey methodology to be agreed with MMO in consultation with Natural England	To be confirmed	To be confirmed
Seabed preparation – potential use of pre-sweeping to minimise reburial	To be confirmed based on the pre-construction survey data, any relevant available evidence from other projects and agreed with the MMO in consultation with Natural England	To be confirmed	To be confirmed
Sediment disposal - up to 500,000m ³ of sediment arising from the SAC may be deposited within the SAC	The volume (up to this maximum) will be a factor of whether/or to what extent pre-sweeping is used (see above) and this will be agreed with the MMO in consultation with Natural England. The location and method for disposal will be agreed with the MMO in consultation with Natural England as shown below	To be confirmed	To be confirmed
Sediment disposal – location(s) to be agreed with MMO in consultation with Natural England	To be confirmed based on the pre-construction survey data and detailed design and agreed with the MMO in consultation with Natural England	To be confirmed	To be confirmed
Sediment disposal - method to be agreed with MMO in consultation with Natural England	To be confirmed based on the pre-construction survey data, any relevant available evidence from other projects and agreed with the MMO in consultation with Natural England	To be confirmed	To be confirmed
Cable installation – at least 95% of the cable length in the SAC will be buried to at least 1m. Any areas of unburied cable will be discussed with Natural England and the MMO (see also Cable Protection below)	To be confirmed based on the pre-construction survey data and detailed design and agreed with the MMO in consultation with Natural England	To be confirmed	To be confirmed
Cable installation – micro-siting and cable route to be agreed with the MMO in consultation with Natural England	To be confirmed based on the pre-construction survey data and detailed design and agreed with the MMO in consultation with Natural England	To be confirmed	To be confirmed
Cable installation method to be agreed with the MMO in consultation with Natural England	To be confirmed based on the pre-construction survey data and detailed design and agreed with the MMO in consultation with Natural England	To be confirmed	To be confirmed

Pre-consent Mitigation Commitments	Status	Final Mitigation solution following detailed design	Agreed with MMO in consultation with Natural England
Cable protection – up to 5% of the cable length within the SAC may require cable protection	To be confirmed based on the pre-construction survey data and detailed design and agreed with the MMO in consultation with Natural England	To be confirmed	To be confirmed
The total area and volume of cable protection in the SAC will not exceed 24,000m ² and 13,600m ³ , respectively	Only essential cable protection up to these maximum values will be used and prior to installation the location, extent, type and quantity must be agreed with the MMO in consultation with Natural England. This will be determined based on the results of the pre-construction survey and any crossings agreements	To be confirmed	To be confirmed
Cable repairs – approximately one cable repair every 10 years within the SAC has been assessed but any repairs would be agreed with the MMO in consultation with Natural England	The methodology for undertaking repairs would be agreed with the MMO in consultation with Natural England, prior to construction. Upon identifying a requirement to undertake repairs in the HHW SAC, the MMO and Natural England would be notified, and the methodology for undertaking repairs would be agreed. The approach for any subsequent repairs would then be discussed and agreed with the MMO and Natural England	To be confirmed	To be confirmed
Cable reburial - approximately 10km per cable within the SAC at approximately 5 year intervals has been assessed but any reburial would be agreed with the MMO in consultation with Natural England	The methodology for undertaking reburial would be agreed with the MMO in consultation with Natural England, prior to construction to allow a rapid response during the maintenance phase if reburial is required. Upon identifying a requirement to undertake reburial in the HHW SAC, the MMO and Natural England would be notified. The approach for any subsequent reburial would then be discussed and agreed with the MMO and Natural England	To be confirmed	To be confirmed

Pre-consent Mitigation Commitments	Status	Final Mitigation solution following detailed design	Agreed with MMO in consultation with Natural England
Additional Mitigation proposed during the Norfolk Boreas Examination			
A series of additional measures relating to the sediment disposal methodology	As a result of concerns raised by Natural England in their Relevant Representation (RR-099) Norfolk Boreas Limited has committed to: <ul style="list-style-type: none"> disposing of any dredged sediment close to the seabed using a fall pipe from the dredging vessel, disposing of sediment within a linear strip close to the cable route; and disposing of material updrift of the cable route to allow infill of any dredged areas as soon as possible following cable installation 	Confirmed	To be confirmed
Cable Reburial- If cable becomes exposed at any point during operation, reburial will be attempted before any cable protection is considered.	As a result of concerns raised by Natural England and the MMO in their Relevant Representations ([RR-099] and [RR-069]), Norfolk Boreas Limited have committed to attempting to rebury any exposed cable rather than adding cable protection. If after unsuccessful attempts to rebury the cable, cable protection is required this would only be installed following the attainment of a separate marine licence. As part of this licence the additional cable protection would be subject to agreement with the MMO in consultation with Natural England	Confirmed	To be confirmed
Installation vessels – no jack up vessels will be used during construction within the HHW SAC.	Norfolk Boreas Limited have made this commitment in response to advice provided by Natural England in their Relevant Representation [RR-099]. This commitment was made as a result of comments made in both Natural England’s [RR-099] and the MMO’s [RR-69] Relevant Representation	Confirmed	To be confirmed
Commitment not to install any cable protection in the priority areas to be managed as <i>S.spinulosa</i> reef (shown as dark Purple in Figure 4.1) identified by Natural England within the HHW SAC, unless otherwise agreed with the MMO in consultation with	This commitment was made at Deadline 5 during the Norfolk Boreas examination. The effectiveness of the proposed mitigation on the HHW SAC designated features has been assessed in the Assessment of Additional Mitigation in the Haisborough, Hammond and Winterton Special Area of Conservation (Version 3) submitted at Deadline 10 of the Norfolk Boreas Examination (document reference [REP10-028] and the outcome of the original HRA [APP-	Confirmed	To be confirmed

Pre-consent Mitigation Commitments	Status	Final Mitigation solution following detailed design	Agreed with MMO in consultation with Natural England
Natural England. ⁷	201] remains unchanged; no AEoI of the designated features of the HHW SAC		
Cable protection – commitment to decommission cable protection at the end of the project life where it is associated with unburied cables due to ground conditions (where required for crossings this will be left <i>in situ</i>) ⁸ . To ensure that cable protection is suitable for decommissioning the commitment has been made to not employ rock or gravel dumping within the HHW SAC apart from where required at cable crossings. This is secured in Condition 3(1)(g) of the Transmission DMLs (Schedules 11 and 12 of the DCO).	<p>This commitment was made at Deadline 6 during the Norfolk Boreas Examination. Further detail on the methods for decommissioning is provided in Appendix 2 of the Additional information for the HHW SAC position paper submitted at Deadline 6 of the Norfolk Boreas Examination ([REP6-018] in the Norfolk Boreas Examination Library). The commitment to not employ rock or gravel dumping within the HHW SAC where it is associated with unburied cables due to ground conditions, was made at Deadline 10 and is secured within Condition 3(1)(g) of the Transmission DMLs (Schedules 11 and 12 of the DCO).</p> <p>This commitment ensures that there will be no permanent habitat loss as a result of cable protection placed where cables cannot be buried due to ground conditions and further contributes to the ability to conclude no AEoI of the HHW SAC. This is discussed further in the Assessment of Additional Mitigation in the Haisborough, Hammond and Winterton Special Area of Conservation (Version 3) submitted at Deadline 10 of the Norfolk Boreas Examination [REP10-028]</p>	Confirmed	To be confirmed

⁷ Note this commitment should be removed if the Applicant is required to provide compensation for effects caused by cable protection.

⁸ Note that this mitigation should be removed (by removing condition 3(1)(g) and not including Condition 20 in the made DCO) if the Applicant is required to provide compensation for effects caused by cable protection

3.1.2 Footprint of Cable Protection in the HHW SAC

49. The maximum total footprint of cable protection installed by Norfolk Boreas within the HHW SAC could be up to 0.024km² based on the following:
- 0.004km² 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 in length and 10m in width of protection.
 - Every effort is being made by the Applicant to reduce the number of crossings by removing out of service cables where agreement can be reached with the cable owners. At Deadline 14 of the Norfolk Boreas examination the Applicant was able to report (in paragraph 115 of [REP14-033]) that negotiations with BT Subsea (and associated consortia) has been successful and that agreement had been reached to cut several out of service cables leaving only two crossing points (a telecom cable and an active pipeline) within the HHW SAC. Since the close of the Norfolk Boreas examination the final telecom cable has now become out of service and the Applicant has reached agreement for this to be cut, leaving only the active pipeline to cross.
 - 0.02km² 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.**
50. Where cable protection is required due to pipeline / cable crossings this is not considered to represent a loss of Annex I habitat in accordance with Natural England advice that *S. spinulosa* reef growing on artificial substrate is not Annex I reef. Therefore, compensation would only be required for cable protection placed at locations other than at cable crossings.

3.2 Quantification of Effects

51. Annex 4 of the Additional information for the HHW SAC position paper [REP6-019] provides an assessment of the effect of cable protection on the Annex I Sandbank and Annex I Reef features of the HHW SAC. This demonstrates the Applicant's position that there will be no AEoI. However, in order to facilitate consideration of an appropriate scale of compensation as a factor in determining the feasibility of deliverability, Table 3.2 provides a summary of the areas of potential habitat loss.

designed Swordfish¹², the Prysmian group Heavy duty plough¹³ and the t1000, there can be far more certainty of achieving cable burial than has previously been afforded. These new tools are both more versatile and capable of greater burial depths than their predecessors and therefore, combined with the presweeping of sand waves, offer a much more reliable solution than was available even a few years ago. The Applicant is committed to finding the best available solution that will minimise or negate the need for cable protection and therefore ensure that compensation is not required. Should further tools that offer further enhanced burial confidence come to market prior to installation these will be given full consideration.

54. Studies conducted as part of the application process indicate ground conditions will allow burial of the export cables throughout the HHW SAC and therefore cable protection will not be required. In addition, engagement to date with companies who are currently bidding to supply and install the Norfolk Boreas export cables confirm that it is highly likely that, other than at cable crossings, cable protection will not be required. A statement confirming this is included in Appendix 2 of the Applicant's response to request for further information (Appendix 2 of document ExA.PD.D19.V1).
55. Based on the information above the Applicant considers that compensation should only be required once it is known whether or not cable protection (apart from at cable crossings due to Natural England's acknowledgement that compensation should not be required for cable protection placed at crossing points) has been installed. The Applicant does recognise that the guidance described in section 4.1 recommends that, if possible, compensation should be in place prior to the effect occurring, however the guidance does make allowance for situations where this is not possible. The Applicant considers that the Norfolk Boreas case is one such example, due to the fact that the placement of cable protection is highly unlikely, and this can only be established following cable installation.
56. Table 3.2 provides the maximum area of potential habitat loss for Norfolk Boreas alone. If constructed, Norfolk Vanguard Limited could also cause up to 0.02km² of habitat loss, thus the total area of habitat loss within the HHW SAC across the two projects would be 0.04km². Whilst this document presents the compensation case for the Norfolk Boreas project only, if both projects are required to provide compensation then this would be delivered jointly by the two projects as the impacts would be very similar.

■ [REDACTED]

■ [REDACTED]

[REDACTED]

[REDACTED]

4 COMPENSATION

4.1 Guidance

57. Should the SoS conclude that, following the Appropriate Assessment, an AEoI on a Natura 2000 site(s) cannot be ruled out, that there are no alternative solutions and that there are IROPI, Article 6(4) of the Habitats Directive *“requires that all necessary compensatory measures are taken to ensure the overall coherence of the network of European sites as a whole is protected.”*
58. DEFRA (2012) and EC (2012 and 2018) explain that, for habitats, the overall coherence of the Natura 2000 Network can be maintained by:
- re-creation of a comparable habitat, which in time can be designated as a Natura 2000 site;
 - site creation or extension of an existing Natura 2000 site on comparable habitat; and/or
 - reduction of pressures on the feature within the affected site or as part of the wider Network.
 - The guidance provides an element of flexibility, recognising that compensation of a ‘like for like’ habitat and/or in the same designated site may not be practicable.
59. Compensation should not be used to address issues that are causing designated habitats or species to be in an unfavourable condition. This is the responsibility of the UK Government. For example, it would not be sufficient for the Applicant to support existing proposals by the EIFCA and DEFRA to designate fisheries closure areas in the HHW SAC in order to restore the condition of the site. However there may be options to expand on these measures (in circumstances where this would not otherwise occur) in order to provide additional project level compensation (discussed further section 4.3.3).
60. Ideally, compensation should be functioning before the effect takes place, although it is recognised that this may not always be possible, as stated in the EC Guidance (2012):
- “in principle, the result of implementing compensation has normally to be operational at the time when the damage is effective on the site concerned. Under certain circumstances where this cannot be fully fulfilled, overcompensation would be required for the interim losses.”*
61. In line with the guidance, indicative compensation options for the loss of subtidal Annex I habitat could include:

- Re-creation of a comparable habitat, such as:
 - Establish a new Annex I habitat.
 - Site creation or extension on comparable habitat, such as:
 - Extend the HHW SAC to encompass areas of Annex I Reef outside but proximate to the SAC and the introduction of appropriate management.
 - Extend the HHW SAC to encompass areas of Annex I Sandbanks outside but proximate to the SAC and the introduction of appropriate management.
 - Establish a new site (and appropriate management) for Annex I Reef at a location away from the HHW SAC.
 - Establish a new site (and appropriate management) for Annex I Sandbanks at a location away from the HHW SAC.
 - Reduction of pressures on the feature within the affected site or as part of the wider Network, such as:
 - Fisheries management through the reduction in fishing using intrusive methods.
 - Removal of disused anthropogenic infrastructure and marine debris.
62. The above indicative compensation options are reviewed in section 4.3 and the two options which are considered most feasible by the Applicant are further developed in sections 4.4 and 4.5.
63. This document relates to in principle compensation for Norfolk Boreas alone. However, should Norfolk Vanguard also be required to provide compensation then this could be delivered jointly by the two projects.

4.2 Recent examples

64. When the SoS granted consent for Hornsea Project Three offshore wind farm on the 31 December 2020, this was the first project in UK waters to be granted a DCO which contained within it a condition to secure compensation for AEoI on a marine SAC. The Appropriate Assessment completed by BEIS (2020) as part of the Habitats Regulations Assessment (HRA) did not rule out an AEoI to the North Norfolk Sandbanks and Saturn Reefs (NNSR) SAC and therefore compensation was required. The NNSR SAC is designated for the same two features that the HHW SAC is designated for, which are sandbanks which are slightly covered by sea water all of the time and *Sabellaria spinulosa* reefs. The Appropriate Assessment also concluded that an AEoI could also not be ruled out for the Wash and North Norfolk Coast (WNNC) SAC which is also designated for, amongst other features, Sandbanks which are slightly covered by sea water all of the time.

65. BEIS concluded that an AEol on the sandbank features of the NNSSR and the WNNC could not be ruled out due to the installation of cable protection (see section 5.6.4.2 of the HRA assessment (BEIS 2020)). Therefore, the SoS secured in schedule 14, Part 2 of the Hornsea Project Three DCO¹⁴ Benthic compensatory measures. The compensatory measures are to develop a ‘Sandbank Implementation Plan’ which would need to be consulted on with a steering group and approved by the SoS. The Sandbank Implementation Plan is required to include, amongst other things:

1. *“details of the areas which will be subject to marine debris removal, which should equate to no less than 41.80 ha at NNSSR and 2.77 ha at WNNC”*; and
2. *“details of the marine debris awareness events, and measures to facilitate the rapid recovery of lost fishing gear, as detailed in the sandbanks compensation strategy. Such measures should be applied to both NNSSR and WNNC”*.

4.3 Review of Potential Compensation Measures

4.3.1 Establish a new Annex I habitat

4.3.1.1 Overview

66. Creation of sandbank habitat is not considered possible given the potential for existing marine conditions to rapidly erode any artificially created banks. Furthermore, as advised by Natural England, any attempts to create Annex I sandbank is likely to impact upon other protected features.

67. There is little evidence that *S. spinulosa* reef can be established by human intervention successfully, however, compensation through the delivery of another biogenic reef could support increased biodiversity, comparable to the function of *S. spinulosa* reef. This recognises that, under the Habitats Directive, Article 17 report, relates to Annex I reef as a whole and does not distinguish between different types of reef.

68. Following consultation with Natural England, the Applicant is aware that establishing a reef feature within the HHW SAC, other than *S. spinulosa*, would not be acceptable. Therefore, the area of focus for this potential option would be outside the HHW SAC on appropriate substrate noting that this does not accord well with Natural England’s advice on priority areas for locating compensation (see Table 1.1 for further information).



69. JNCC¹⁵ states that, in addition to *S.spinulosa*, the main species which form biogenic reefs in the UK are blue mussels *Mytilus edulis*, horse mussels *Modiolus modiolus*, the serpulid worm *Serpula vermicularis*, and cold-water corals such as *Lophelia pertusa*.
70. There is little evidence that *S.vermicularis*, *M. modiolus*, or *L. pertusa* can be established by human intervention successfully to form reefs or beds, however *M. edulis* is widely farmed and readily colonises exposed surfaces. It is, therefore, possible to seed new *M.edulis* beds or enhance existing beds in areas of suitable habitat.
71. *M.edulis* inhabits hard substrate in the intertidal to shallow subtidal zone. It would not, therefore, be possible to deliver this within the Order limits of Norfolk Boreas, which is predominantly characterised by soft sediment and in deeper waters. While it is noted that *M.edulis* is likely to colonise sections of the turbine and platform foundations, this would not be on a natural substrate and therefore would not be considered an Annex I habitat by Natural England.
72. *Ostrea edulis* (native oyster) beds also support increased biodiversity and a recent study by the Dornoch Environmental Enhancement Project (DEEP) provides evidence of successful seeding of native oyster beds (Centre of Expertise for Waters (CREW), 2019). In accordance with Natural England's Norfolk Vanguard Deadline 1 submission ([REP1-088] of that examination), the southern North Sea was covered by extensive native oyster beds historically. Therefore, native oyster beds could provide a natural biogenic feature and it can be expected that there will be suitable habitat for planting *O. edulis*.
73. While the OSPAR commission (2009) states that "*Oyster beds need to be included in the European Natura 2000 network by Member States, given that they qualify as one of the habitats of the Habitats Directive (reefs)*", currently, oyster beds are not included in the Habitats Directive, are not therefore Annex I habitat, and are managed by National legislation.

4.3.1.2 Delivery mechanism

74. In order to deliver the planting of oyster beds, the Applicant could commission an appropriate academic body with experience and expertise in this field to undertake this initiative.
75. Should planting of oyster beds be deemed to be appropriate, commercial fishing in the vicinity of established native oyster beds would need to be limited and/or

restricted, and the mechanism for this would need to be agreed with the MMO, in order for additional planting to be successful.

76. Areas around the wind turbine and/or platform foundations could provide an opportunity for planting native oyster beds in locations that would experience limited fishing activity due to 50m advisory safety zones.

4.3.1.3 Spatial scale

77. Should this measure be deemed to be appropriate, the extent of the area to be planted in comparison to the area lost to cable protection would be agreed with Natural England.
78. A 2:1 ratio of *O. edulis* to *S. spinulosa* may be appropriate in recognition of the fact that replanting is unlikely to be 100% successful. Based on this, an area of 0.04km² (4ha) would compensate if 0.02km² of cable protection (as a worst case) in the SAC is determined to be required following detailed design, and if this overlaps with Annex I reef. The DEEP project aims to plant a significantly larger area of 40ha of oyster bed within 5 years.
79. Table 4.1 proposes indicative areas of deployment around wind turbine foundations based on a conservative assumption of planting a 20m wide ring around the foundations, on the basis that there is unlikely to be fishing at this proximity to turbines due to navigational safety. In determining the areas of deployment, however, the size of an oyster bed(s) required to deliver a viable, self-sustaining population needs to be taken into consideration and, therefore, the numbers below are indicative at this stage.

Table 4.1 Indicative areas of *O. edulis* deployment around foundations based on a total compensation area of 4ha

Indicative foundation type	Foundation diameter (m)	Area of <i>O.edulis</i> per foundation based on a 20m ring around foundations (m ²)	Number of turbines with <i>O.edulis</i> planting	% of total no. turbines
20MW turbine with gravity base	50	1885	21	23%
11.55MW turbine with gravity base	40	1571	25	16%
20MW turbine with monopiles	15	785	51	57%
11.55MW turbine with monopiles	10	628	64	41%

4.3.1.4 Timescale

80. The initial phase of the DEEP project between 2017 and 2018 demonstrated up to 86% survival.¹⁶ Based on this, should this measure be deemed to be appropriate, it is likely that planting at a sufficient scale could be undertaken in a relatively short timescale (e.g. approximately one year).
81. However, if the planting is to occur around infrastructure foundations within Norfolk Boreas, this would have to be delivered post construction. To account for the measure not being in place prior to the effect on the HHW SAC, a proportion of overplanting could be provided, in accordance with the EC (2012) Guidance discussed in section 4.1.
82. Alternatively, as the Applicant's parent company Vattenfall Wind Power Ltd owns a number of other OWFs, an area within an existing OWF could be planted with oyster bed to deliver compensation for Norfolk Boreas. In line with the EC guidance on locating any compensation as close to the point of impact as possible (by contrast to taking action elsewhere), Kentish Flats offshore windfarm or Thanet offshore windfarm may be appropriate locations for this compensatory measure.

4.3.1.5 Feasibility

83. As discussed in section 4.3.1.1, oyster beds are not an Annex I habitat and because of this, during consultation between the Applicant and Natural England, Natural England stated that oyster beds would not deliver coherence of the Natura 2000 network.
84. Therefore, due to the uncertainty associated with the acceptability and deliverability of this compensatory measure, the Applicant would not propose to progress this option.

4.3.2 Site creation or extension on comparable habitat

4.3.2.1 Overview

85. There are various areas of Annex I habitat (including areas of subtidal sandbanks and reef) outside existing SACs that have been identified by Statutory Nature Conservation Bodies (SNCBs) which could be designated and managed as new SACs in order to deliver compensation.
86. The protection of currently unprotected Annex I reef and/or Annex I sandbank habitat anywhere in the UK could deliver compensation. However, a key opportunity for the HHW SAC would be to extend its boundary to encompass Annex I *Sabellaria spinulosa* reef and Sandbanks outside but proximate to the current boundary (see

Figure 4.1 and Figure 4.2). This would align with the EC guidance and Natural England's advice (see Table 1.1) on locating any compensation as close to the point of effect as possible (by contrast to taking action elsewhere). The extension could then be covered by the existing Conservation Objectives and management measures for the HHW SAC.

4.3.2.2 Delivery mechanism

87. An extension to the HHW SAC and/or designation of reef or sandbank Annex I habitat outside the boundary of the SAC would have to be delivered by Defra in consultation with Natural England and the JNCC. The Applicant could provide support and assistance to this process in order to deliver compensation for the project. Further details on the deliverability of this measure are provided in section 4.4.
88. Based on consultation undertaken with Natural England in relation to these compensatory measures (outlined in Appendix 4 of the Applicant's derogation case: Consultation Overview, Appendix 4 [REP11-015] and Natural England's submission for the 23 August 2021 SoS consultation deadline, the Applicant understands that Natural England supports this measure, however Defra has concerns around the legal mechanism and time required to deliver this option (see Table 1.1).
89. The same compensation measures were proposed by Norfolk Vanguard Limited. If both projects are required to provide compensation, then this could be delivered jointly by the two projects since:
 - a. The magnitude of compensation which this would provide far outweighs both the individual and combined effects of the two projects; and
 - b. The two projects are 'sister-projects' being developed jointly within the Vattenfall Wind Power Ltd group.
90. Further detail on the proposed approach to delivery of this compensation is provided in section 4.4

4.3.2.3 Spatial scale

91. The extent of the area to be designated in comparison to the area lost to cable protection would be agreed with Natural England. For Norfolk Boreas a large 10:1 ratio of designation extension to habitat loss¹⁷ would recognise the fact that the addition of protection to existing habitat has a lesser value than direct habitat creation and would allow for overcompensation required should there be a delay between the effect and the full delivery of the compensation. However, Figure 4.1

¹⁷ That aligns with the compensation ratio provided for Maasflakte 2 (Voordelta SAC) (Schouten et al., 2008).

and Figure 4.2 demonstrate the very small area associated with a 10:1 ratio¹⁸ in the context of the wider HHW SAC. Therefore, consideration should be given to developing an area of an appropriate scale that could deliver further benefits to Annex I habitat. An indicative proposed area for extension in this case is discussed in section 4.4.

92. As stated throughout, the compensation measures described within this document are specific to Norfolk Boreas only. However, should a scenario arise where compensation for both Norfolk Boreas and Norfolk Vanguard was required, the area to be designated would be of a suitable size to compensate for the loss of habitat occurring as a result of both projects. In that scenario the area required to comfortably offset the area affected (using the 10:1 scale) would be 400,000m² (0.4km²) and thus double the area presented in Figure 4.1 and Figure 4.2).

4.3.2.4 Timescale

93. The aim of this potential compensation measure would be to designate the site extension as soon as possible following notification that cable protection has been installed within the HHW SAC due to ground conditions.
94. Recognising that DECC (2016) states that a notified possible SAC (pSAC) and Site of Community Importance (SCI) should be treated as if it has been formally designated or classified, it would be sufficient for the site to reach pSAC or SCI status to be considered as compensation. The Applicant would however continue to support the measures beyond this point to ensure the compensation continued to function. Further details on this and the expected timescales of this process are provided in section 4.4 and 4.5.
95. An advantage of promoting an extension to the HHW SAC over identifying a new site for designation elsewhere, would occur in relation to the timeframe that would be required for site selection of a new SAC. The HHW SAC has clear areas of potential for extension where the Annex I reef and Annex I sandbank extend beyond the existing site boundary (Figure 4.1 and Figure 4.2).
96. In the event that the extension to the HHW SAC is delayed in achieving pSAC status until after construction, the large potential spatial scale outlined above could provide a significant level of overcompensation for any interim loss and, as such, this would meet the requirements of the EC (2012) Guidance discussed in section 4.1.
97. Once the SoS has determined whether Norfolk Boreas must provide compensatory measures (in the event that cable protection due to adverse ground conditions is

¹⁸ A 200,000m² (0.2km²) extension to compensate for a loss of up to 20,000m² for the Norfolk Boreas project alone. An area twice this size could be designated to jointly compensate for Norfolk Boreas and Norfolk Vanguard.

installed), preparatory work could begin, as discussed further below in section 4.4.1 and 4.5.1. Initially this work would focus on collecting evidence and preparing for a consultation for an extension to the HHW SAC. If consent is awarded in December 2021 this would allow nearly four and half years to prepare for consultation prior to offshore export cable installation due to be completed in mid-2026. Then, once the HHW compensation strategy (see section 4.4.1 and 4.5.1 for further detail), has been agreed by the SoS (expected by the end of 2026) the application for the proposed extension area to the SAC could be made, at which point it would be awarded pSAC status. It is anticipated that the determination period could be up to two years and therefore the extension would be awarded full SAC status in late 2028.

98. A decision by the SoS on whether Norfolk Vanguard will be required to provide compensatory measures is also expected by December 2021. Should the outcome be that compensation is required for both projects, any compensatory measures required would be delivered jointly.

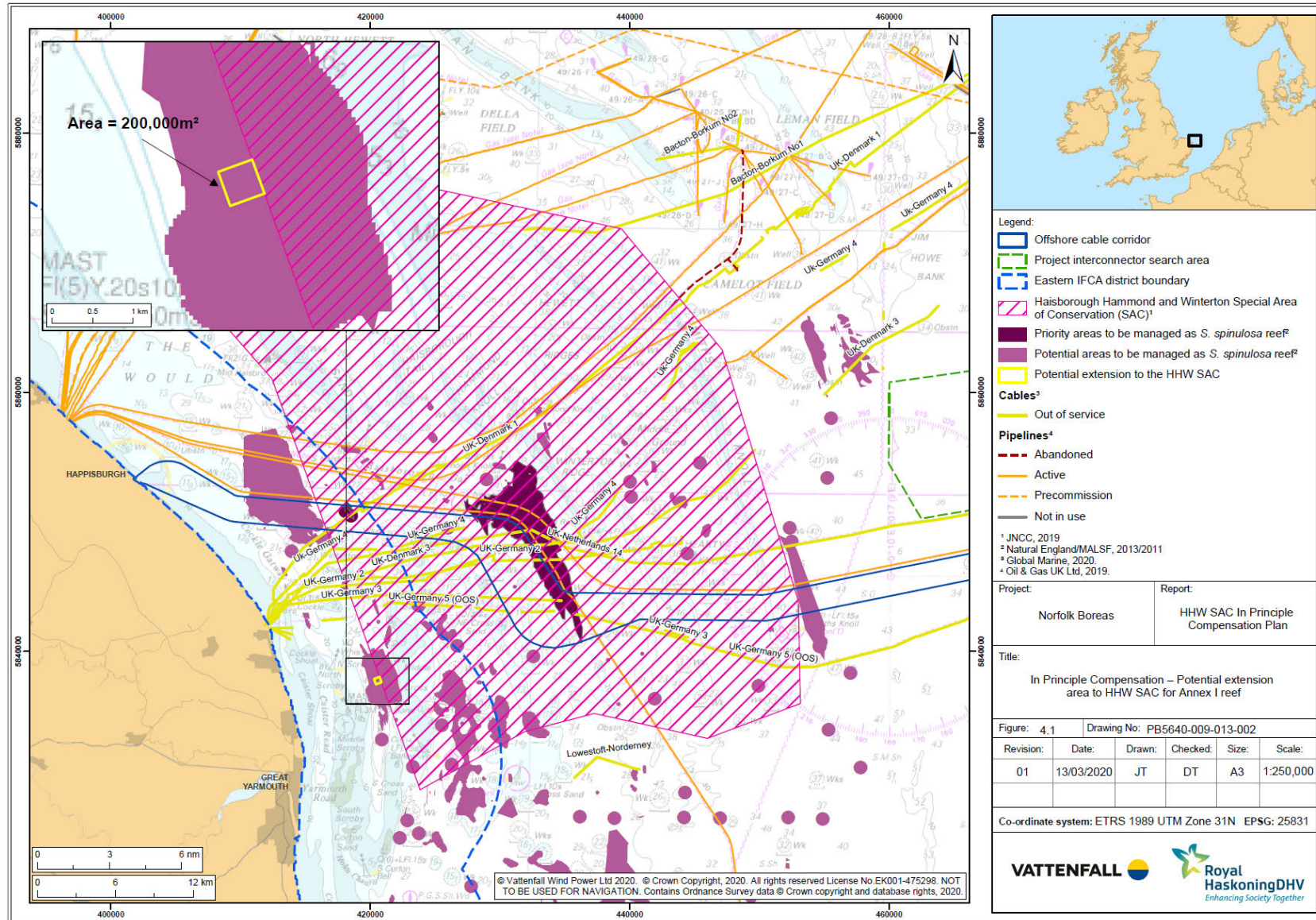


Figure 4.1 In Principle Compensation – Potential extension area to HHW SAC for Annex I reef

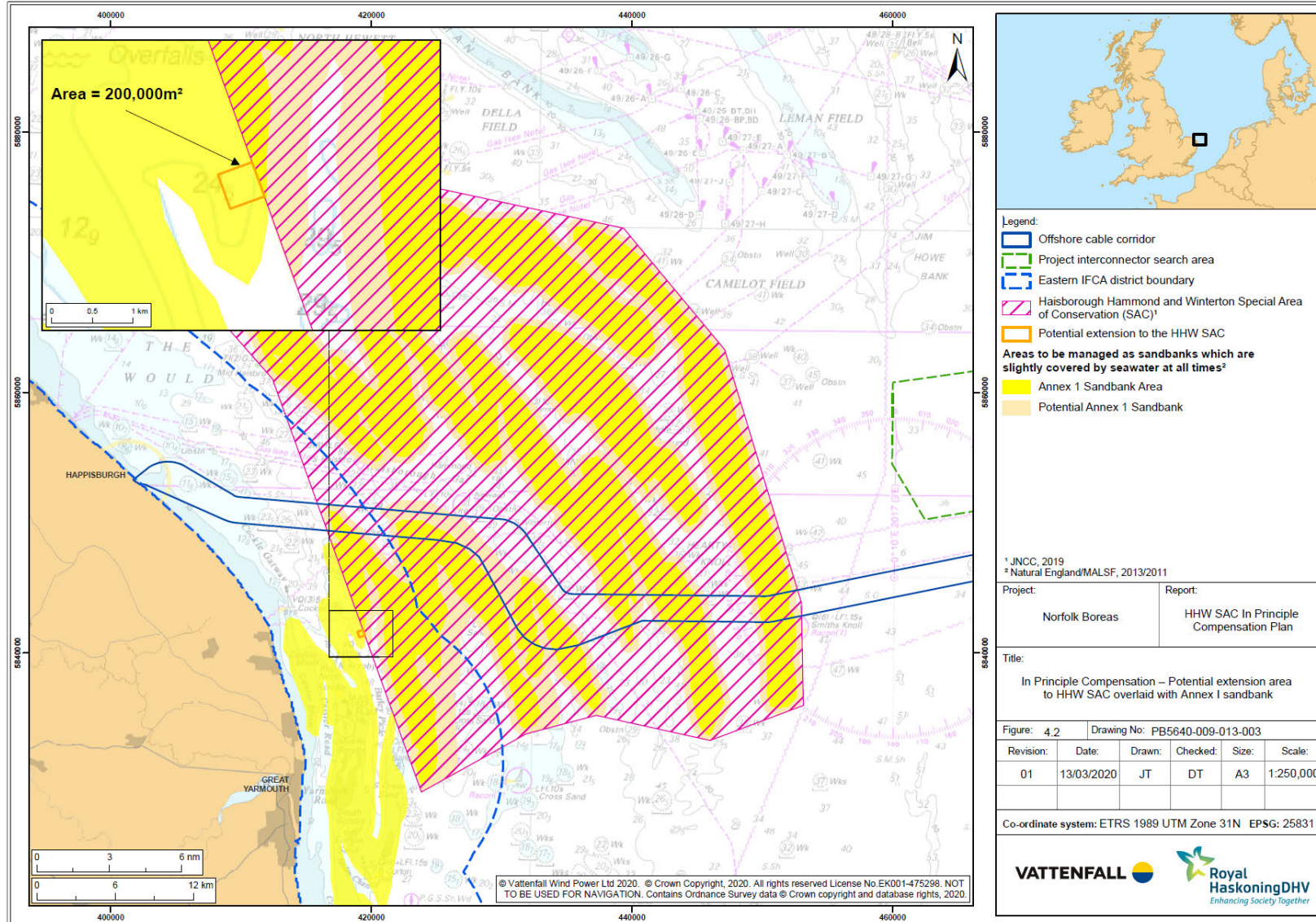


Figure 4.2 In Principle Compensation – Potential extension area to HHW SAC overlaid with Annex I sandbank

4.3.2.5 Feasibility

99. The Applicant considers that an extension to the HHW SAC is a feasible measure. Whilst Defra has concerns over timescales and legal mechanisms for designation, the Applicant does not consider that these are insurmountable. Further details on this recommended option are provided in sections 4.4 and 4.5.

4.3.3 Fisheries management – reduction of intrusive fishing methods

4.3.3.1 Overview

100. As discussed in section 2.2.2, fishing represents a key pressure on the HHW SAC. This particularly relates to intrusive fishing methods such as beam trawling which can cause damage to Annex I sandbanks and Annex I reef.
101. As discussed above, the removal of pressures which are already contributing to the unfavourable condition of a Natura 2000 site is the responsibility of the Regulator. Therefore, any proposals for compensation need to go beyond measures which are designed for the recovery of features in unfavourable condition. Recognising that the EIFCA and Defra have proposed closures to bottom towed fishing gear in areas within the HHW SAC, the Applicant would need to support the delivery of an additional closure to intrusive fishing methods outside the boundaries of the proposed management areas shown in Figure 4.3 (that would not be otherwise delivered) or facilitate a reduction in intrusive fishing effort through purchasing fishing quotas in relevant areas.

4.3.3.2 Delivery mechanism

102. At present, no authority has the jurisdiction to deliver fisheries management areas as compensation. An extension to a proposed fisheries management area or a new proposal would need to be facilitated by the UK Government in allocating appropriate powers to a relevant management body and, potentially, through the delivery of legislation to secure the necessary powers.
103. If this measure were to be considered further, baseline surveys would be required to confirm areas of suitable habitat and existing pressures to ensure areas identified for fisheries management have the potential to deliver benefits to Annex I habitat.

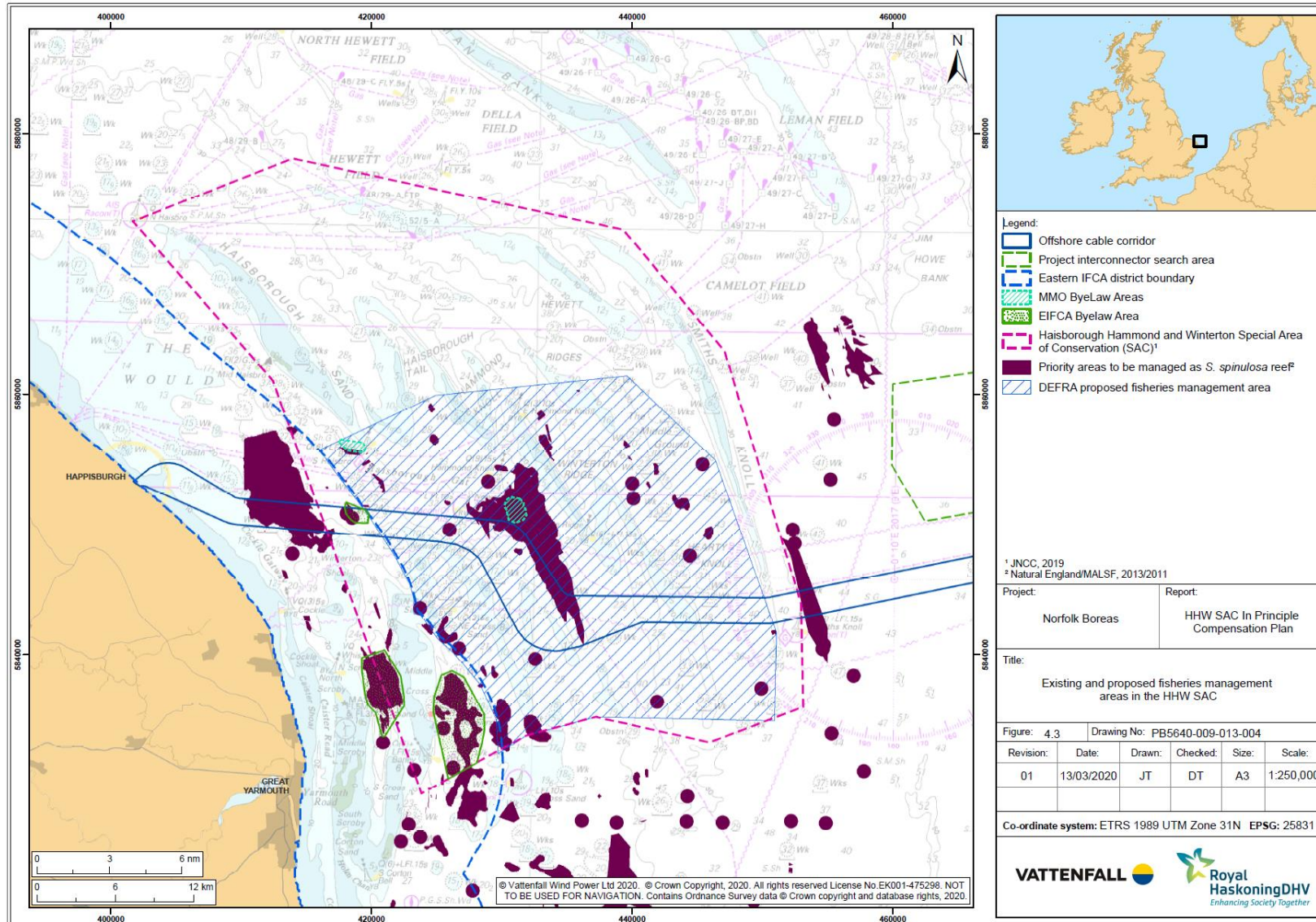


Figure 4.3 Existing and proposed fisheries management areas in the HHW SAC

104. Following the identification of suitable areas, the Applicant would financially support the process of developing a fisheries management measure in order to deliver compensation for the project, subject to the development of an authority having suitable powers to deliver this measure.

4.3.3.3 Spatial scale

105. The extent of the area required to be closed to bottom-towed fishing gear in comparison to the area lost to cable protection would be agreed with Natural England.

106. A 10:1 ratio may be appropriate, recognising that a closure would not guarantee that the whole area achieves favourable condition. It is notable, however, that Natural England has high confidence that the EIFCA and Defra proposed closure areas will result in recovery of Annex I reef.

107. Based on this ratio, the designation of an area of 200,000m² (0.2km²)¹⁹ would compensate if 20,000m² of cable protection (as a worst case) in the SAC is determined to be required following detailed design, and if this cable protection overlaps with Annex I habitat. Should both Norfolk Vanguard and Norfolk Boreas be required to provided compensation this would likely amount to 400,000m² (0.4km²) to provide for both projects. This is significantly less than the following proposed EIFCA byelaw areas associated with the HHW SAC and consideration would need to be given to developing an area of an appropriate scale that could deliver benefits to Annex I habitat:

- Area 36 – 189.8ha (1.9km²);
- Area 37 – 1401ha (14.0km²); and
- Area 38 – 2237ha (22.4km²).

4.3.3.4 Timescale

108. As discussed above, no authority currently has the jurisdiction to deliver fisheries management areas for the purposes of compensation and, therefore, this measure would require government intervention.

109. Given this, compensation through fisheries management is unlikely to be deliverable either prior to construction of Norfolk Boreas or immediately following construction.

¹⁹ As a decision had not been made at the time the first version of this document was submitted to the Norfolk Boreas Examination (May 2020 [REP11-014]) the original version included the following “*Should both Norfolk Vanguard and Norfolk Boreas be required to provided compensation this would likely amount to 400,000m² (0.4km²) to provide for both projects.*” However, the SoS ruled that for Norfolk Vanguard compensation was not required in its decision letter (July 2020).

4.3.3.5 Feasibility

110. The feasibility of fisheries management measures to deliver compensation would be subject to the presence of Annex I habitat or habitat that has potential to become an Annex I feature following the removal of fishing pressures. This could include areas within or outside the HHW SAC where intrusive fishing methods are used. As shown in Figure 4.3, areas that have the potential to become Annex I reef ('areas to be managed as reef') have been identified by Natural England. However, as noted above, at present no authority has the jurisdiction to deliver fisheries management areas as compensation. An extension to a proposed fisheries management area or a new proposal would need to be facilitated by the UK Government in allocating appropriate rights to a relevant management body and, potentially, through the delivery of legislation to secure the necessary rights. The feasibility of this measure is, therefore, currently uncertain and so the Applicant would not propose to progress this option.
111. The ability of the Applicant to purchase fishing quotas would be dependent on fishermen with appropriate quotas being willing to sell. The feasibility of this measure is, therefore, also uncertain and so the Applicant would not propose to progress this option either. Furthermore the Applicant as a responsible developer, would not support the exertion of control over another marine industry such as the fishing industry.

4.3.4 Removal of disused anthropogenic material

4.3.4.1 Overview

112. As discussed in section 2.2.2, oil and gas infrastructure and utility and service lines represent key pressures in the HHW SAC. Based on advice from Natural England that artificial features hinder the development of Annex I habitats, the potential benefits of removing existing out of service infrastructure could remove a pressure on the HHW SAC (that otherwise would not occur) in order to provide a compensatory measure. This option for compensation was initially supported by stakeholders, such as the EIFCA when discussed as part of the Norfolk Boreas Examination [REP13-034] and the National Federation of Fishing Organisations (NFFO)²⁰ in their representations made to the SoS for the Norfolk Vanguard project, and has since been endorsed by Natural England, Defra and TWT.
113. In addition, most other SACs in the UK include disused anthropogenic features such as cables, pipelines, lost objects and fishing gear. In line with advice provided by

■ [REDACTED]

[REDACTED]

[REDACTED]

Natural England in Table 1.1 the Applicant would prioritise the HHW SAC as an initial area of search and if suitable anthropogenic material could not be identified through desk based studies, the area of search could then be widened to include equivalent SACs within the southern North Sea, and then the wider North Sea before being widened further if required.

114. Furthermore, there is potential with the correct intervention to reduce or prevent further introduction of anthropogenic material into the marine environment, through the use of education, technology and waste disposal facilities.
115. The Applicant's proposal for delivery of this compensation option would have three main strands:
- Strand 1: Identification and removal of existing disused infrastructure.
 - Strand 2: Identification and retrieval of marine debris; and
 - Strand 3: Education, awareness and facilities to limit further marine debris.
116. The Applicant has proposed a three-strand approach as this will allow an adaptive management principle to be applied whereby if one strand is not demonstrating delivery the other two strands would provide sufficient contingency to ensure that the compensation is delivered. The SoS may conclude that a single strand (or two of the strands) is appropriate to deliver all necessary compensation and the Applicant would support this decision.

4.3.4.2 Delivery mechanism

117. Agreement from the owner of any disused infrastructure (where applicable) would need to be secured. Feasibility studies would need to be completed to determine the practical nature of how the material would be removed.
118. The method for removal would need to be agreed with Natural England to ensure that it did not have a greater impact on an Annex I feature. However, relevant removal measures are believed to be available. Once the method for removal had been agreed a marine licence may need to be granted by the MMO depending on the nature of the activity.

4.3.4.3 Spatial scale

119. Of the three strands of compensation proposed it is only strands 1 and 2 that could and should be subject to a spatial requirement. A 1:1 ratio would be appropriate in this case, on the basis that this would be a direct like-for-like removal of debris or infrastructure to compensate for the addition of new infrastructure.
120. It is noted by the Applicant that should the SoS determine that compensation is required and that this should, in part, or wholly be in the form of survey to identify

marine debris or removal of infrastructure, that the SoS may also set the scale of such compensation. This has been the case in the Hornsea Project Three example with the SoS inserting a condition within the DCO which dictated that a spatial scale of 40.8ha was required for the survey effort within the NNSR SAC (noting the SoS has set an area of survey to be equivalent to the area of compensation and the Applicant is proposing an area of actual removal).

121. Norfolk Boreas will have far less of an impact on the HHW SAC than Hornsea Project Three could have on the NNSR SAC²¹ (approximately 1 /20th), and therefore should be considered as materially different, however the Applicant does consider that Hornsea Project Three provides a recent and relevant example of how a ratio can be applied for compensation and therefore this should be taken into account when determining the ratio.
122. As discussed above, Hornsea Project Three recently received consent with a condition stating that the project must subject an area of 41.80ha to removal of marine debris. This is to compensate for that project's worst case scenario of up to 418,404m² of habitat loss due to cable protection (BEIS 2020). 41.80ha and 418,404m² are approximately the same in area and therefore a 1:1 ratio has been applied.
123. The Applicant understands that some stakeholders including Defra, Natural England and TWT do not support the application of a 1:1 ratio for that project. However, the Applicant has committed to substantial measures (beyond those which Hornsea Protect Three committed to) mitigating (see section 3.1.1) the possible effects of cable protection including:
 - committing to not placing cable protection in the areas which Natural England have identified as having the greatest potential for recovery of *S.spinulosa* reef;
 - committing to only placing cable protection that can be fully decommissioned at the end of the project life and;
 - committing to not rock dump within the SAC.
124. As a result of these commitments it was recognised by Natural England, within the final Statement of Common Ground (REP16-010), that any cable protection would be of low profile and therefore have less effect on sandbank form and function, thereby significantly reducing the chance of AEol. As Norfolk Vanguard has committed to the same level of mitigation this is applicable for both projects.

²¹ And noting that Hornsea Project Three would also effect the Wash & North Norfolk Coast SAC making the overall impact of Norfolk Boreas on SACs approximately 1/25th of the impact that Hornsea Project Three could have on SACs

125. When identifying what the final ratio would be, it would be important to take into account the possible area affected by the anthropogenic material both to be placed and to be removed. For example if a large pipeline sitting proud of the seabed was removed this may be affecting, through scour and disruption to physical processes at least 10m either side (essentially a 20m wide corridor) of that structure, whereas the cable protection installed by the Applicant would be low profile and therefore only affect a small area either side.
126. Given the additional mitigation proposed by the Norfolk Boreas project the Applicant maintain that a 1:1 ratio should be applied to the Norfolk Boreas project.
127. As stated throughout, the compensation measures described within this document are specific to Norfolk Boreas only. However, should a scenario arise where compensation for both Norfolk Boreas and Norfolk Vanguard was required, this mitigation would be delivered jointly for both projects and the area from which anthropogenic material would be removed would be of a suitable scale to compensate for the loss of habitat occurring as a result of both projects (further information is provided in section 4.4.2).
128. The Applicant proposes that any compensation is delivered only once it is known whether cable protection due to adverse ground conditions is required, following cable installation. Therefore, in line with guidance, overcompensation should be applied. However due to uncertainty over whether there is enough surface laid infrastructure available within the HHW SAC the Applicant proposes that rather than increase the ratio to overcompensate, the use of adaptive management to include the three different strands would provide the overcompensation if required.

4.3.4.4 Timescale

129. As discussed in more detail in section 4.5 the compensation should be progressed as far as possible prior to cable installation, and then if cable protection (apart from at crossing points) is required, should be progressed as quickly as possible following installation. Construction of the export cable (the only part of the project which would interact with the HHW SAC) for Norfolk Boreas is currently anticipated to be completed in mid-2026, at which point it will be known whether cable protection due to adverse ground conditions is required.
130. The timeline presented in Plate 4.4 demonstrates how all strands of compensation could be delivered. Noting that adaptive management could be applied, for example Strand 2 would only be pursued past stage 3 if it was agreed that Strands 1 and 3 were not delivering and, therefore, that Strand 2 was also required.

4.3.4.5 Feasibility

131. Where existing infrastructure within the HHW SAC may be reaching the end of its life (e.g. the gas pipeline), it may be the responsibility of the owner to decommission this infrastructure if possible and therefore consideration would need to be given to whether this measure would provide a compensatory measure for Norfolk Boreas which is in addition to the existing requirements for the site. Often however it is agreed with BEIS that oil and gas infrastructure can be left in situ and therefore opportunities could be found to progress this.
132. In addition, depending on the type of infrastructure proposed for removal, the feasibility of lifting aging infrastructure, the degree of colonisation, and potential safety implications would need to be considered.
133. As mentioned above the three strands allow for an adaptive management approach whereby if one strand is not delivering there would still be potential for the other strands to provide necessary compensation. Therefore, this option has been taken forward by the Applicant and discussed further in section 4.4.2 below.

4.4 Proposed Approach to Delivery of Compensation (if required)

134. If compensation is deemed to be required following the Appropriate Assessment, the Applicant recommends that either an extension to the HHW SAC or removal of anthropogenic material (in part or fully) would be the most appropriate measures to deliver compensation for both Annex I reef and Annex I sandbank prior to the construction of Norfolk Boreas. A roadmap for delivery of each of these two options is provided below and in section 4.5.1.
135. The Applicant proposes to progress both options to a position where they could be rapidly implemented if required. The Applicant would then install the export cables at which point it would be known whether or not cable protection within the HHW SAC was required and if so, what area of Annex I habitat would be affected. Once this is known the compensation strategy (following the details outlined within this document) would be agreed with the SoS, this would include agreement on how much overcompensation would be required to allow for the fact that the compensation may not be fully delivered until up to a few years after construction.

4.4.1 Extension to the HHW SAC

136. During consultation Defra provided a summary of the offshore SAC designation process to the Applicant. The Applicant has recreated this summary in Plate 4.1 below.

137. The area proposed by the Applicant in Figure 4.4 has been subject to significant survey including:
- Southern North Sea Sandbanks Monitoring Survey (2017): Collaborative survey between Cefas and JNCC.
 - Inner Dowsing, Race Bank and North Ridge SAC and Haisborough, Hammond and Winterton SAC Survey (2016): Commissioned as part of an inshore benthic marine survey
 - Inner Dowsing, Race Bank and North Ridge, Haisborough, Hammond and Winterton Special Areas of Conservation (SACs) Joint Wash Baseline Survey (2011): JNCC, Natural England and Cefas worked together to identify the location, extent and condition of Annex I habitat features at these two sites.
 - Surveys conducted by the Marine Aggregate Sustainability Fund (MALSF) in 2011 and 2013 as part of the regional characterisation surveys (REC).
138. The Applicant therefore maintains that this data represents a robust evidence base over a good time series and would therefore be sufficient to support the designation of the HHW SAC extension and that further survey data would not be required.
139. Furthermore in 2019 Natural England and the JNCC used existing data to produce detailed mapping of Annex I Sand bank and *S.spinulosa* reef shown in Figure 4.1 and Figure 4.2.
140. The Applicant recognises that this is a complex and rigorous process and that there is no certainty of outcome prior to the process starting. However, the Applicant maintains that due: to the level of existing data (see above for information on survey); the fact that Natural England and the JNCC have already identified Annex I habitat for both Sand banks and *S.spinulosa* reef in the proposed area to be extended; and the fact that the proposed area is not currently widely used by other marine industries, this particular extension would have a very good chance of being designated.

Offshore SAC Designation Process

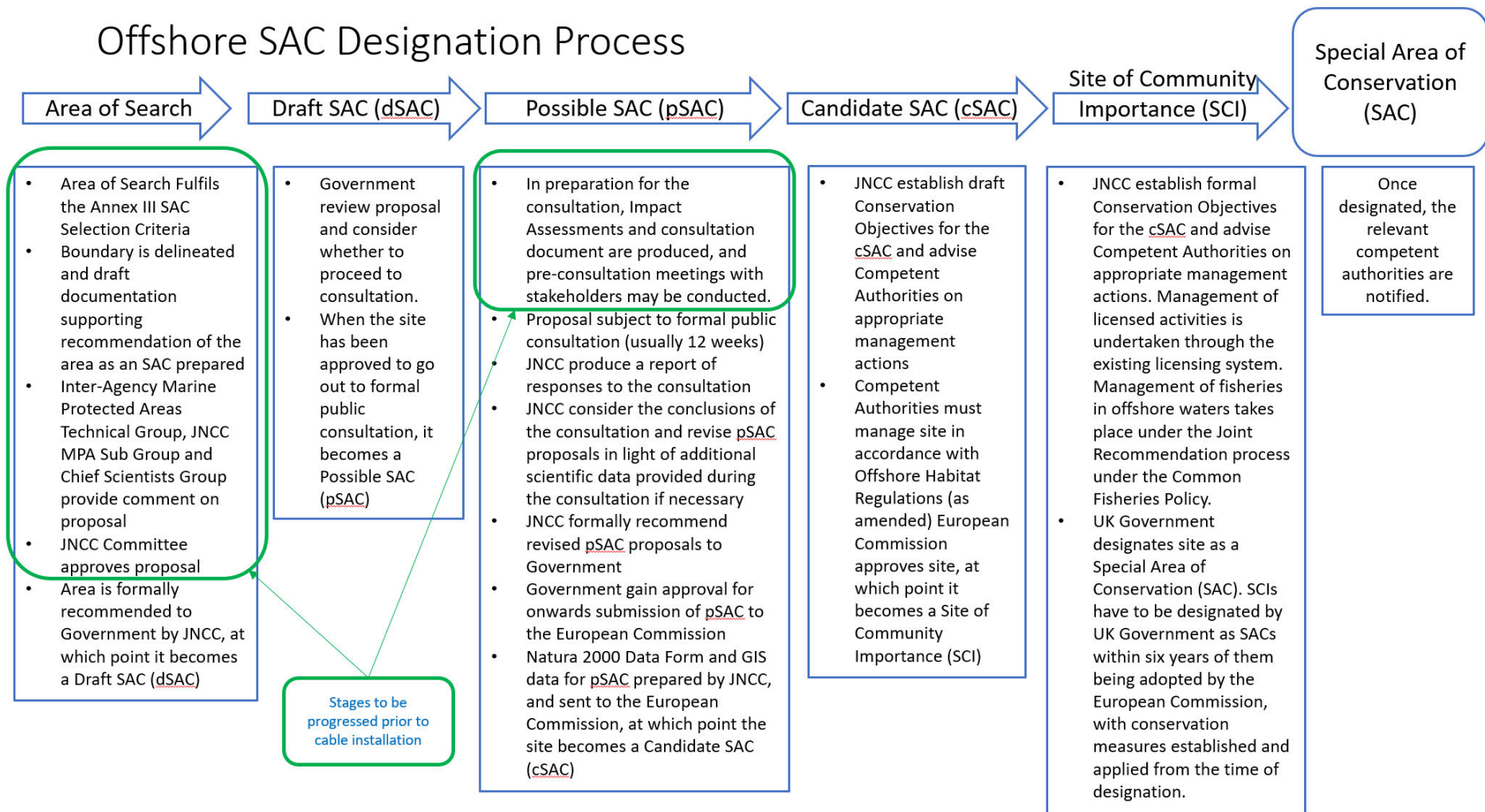


Plate 4.1 Offshore SAC designation Process

141. In order to assist the process outlined in Plate 4.1 the steps to be undertaken by the Applicant to promote an extension to the HHW SAC are as follows (and a project plan is provided in section 4.5):

1. Agreement of the proposal to deliver an extension to the HHW SAC with Natural England, the JNCC and DEFRA.
2. Provision of assistance in the development of an Area of Search in accordance with the JNCC Marine SAC Selection Process and Guidance²². This may be undertaken either by the Applicant or by a third party (e.g. Natural England, Defra or JNCC) with financial support from the Applicant.
3. Data gathering: SNCBs have already identified areas, and data used in this identification (see further information on surveys below) is understood to be sufficient to support the designation of the HHW SAC extension. This would be supplemented with any further information available to prepare for a consultation.
4. Support to Defra in preparing for the formal consultation based on an area of search to be refined once the extent of cable protection is known.
5. Norfolk Boreas export cable installation completed (anticipated to be mid 2026), at which point it would be known if cable protection had been placed and therefore whether compensation would be required.
6. Following export cable installation, the Applicant would submit a strategy to provide compensation for the Haisborough, Hammond and Winterton Special Area of Conservation to the SoS for approval, in consultation with the MMO and the relevant statutory nature conservation body.
7. It is anticipated that the approved strategy would include provision of ongoing support to Natural England, Defra (and JNCC as required) to progress agreement of an extension boundary (including confirmation of the size of the extension) which would be formally submitted to the UK Government as a draft SAC (dSAC).
8. Once the proposal is accepted and progressed to a pSAC by the UK Government, the compensation would be deemed to be effective for the Project. However, the Applicant would provide ongoing support to progress the formal public consultation required for the site to reach full SAC status. This is likely to take the form of funding for an appropriate person(s) in Natural England or JNCC for approximately two to three years.
9. Once fully designated, it is understood that the Applicant would be required to contribute to the management of the site through funding support for site condition monitoring.

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142. The aim of this potential compensation measure would be to designate the site extension as soon as possible following the installation of cable protection required due to adverse ground conditions. As discussed above, pSAC status would deliver compensation.
143. The Applicant will progress further consultation with Natural England and Defra (and the JNCC if advised) to progress point 1 above prior to the consent decision in December, however the conclusion of this step would not be possible until after the consent decision has been made.
144. Following consent, preparatory works would immediately start on steps 2 to 4 (with continuation of step 1) above with the intention of having all stages highlighted in green in Plate 4.1 complete by the point that export cables were installed in the HHW SAC.
145. It would not be possible to finalise support for the designation of pSAC and full designation until after export cable installation which is due to be completed in mid-2026. Therefore, in line with EC guidance (section 4.1) and Defra advice, as this compensation is not anticipated to be in place until the end of 2027 (and the impacts would occur in mid-2026) some overcompensation may be required. However as discussed below and in line with the guidance, this could be easily achieved by extending the SAC by more than the 10:1 ratio proposed.
146. This compensation would be secured through the approval of a strategy by the SoS, in consultation with the MMO and Natural England (see section 4.3.2.2). The strategy would need to be approved by the SoS prior to the transmission of electricity via the export cable for which cable protection has been installed. Should this option be taken forward the strategy would include:
 - Details of the method and level of support provided to Defra, and Statutory Nature Conservation Bodies;
 - Timescales for completing the designation;
 - Details of contributions to ongoing site condition management and monitoring to support the continued success of the compensation.
147. In line with Natural England's list of general topics that fully-formed compensation proposals should provide. The Applicant would also include the following within the strategy:
 - a) What, where, when: clear and detailed statements regarding the location and design of the proposal.
 - b) Why and how: ecological evidence to demonstrate compensation for the impacted site feature is deliverable in the proposed locations

- c) Evidence to demonstrate the deliverability of the compensation is secured
 - d) Evidence to demonstrate that there is/are policy/legislative mechanism for delivering the compensation (where relevant)
 - e) Governance for the proposals for the post-consent phase (where relevant)
148. Results from the monitoring scheme would need to be submitted to the SoS and Natural England, along with any proposals to address the effectiveness of the measures, which must thereafter be implemented as approved by the SoS.
149. The precise size and location of the extension would be approved by the SoS, in consultation with the MMO, Natural England, JNCC and Defra and would depend on the conclusions of the Appropriate Assessment regarding the area of any adverse effect, the final amount of cable protection required due to adverse ground conditions, as well as confirmation of an appropriate scale of extension.
150. As identified in section 4.3.2.3, the appropriate area required to compensate for habitat loss caused by the Norfolk Boreas project is likely to be in the region of 200,000m² (0.2km²) (or 400,000m² for Norfolk Vanguard and Norfolk Boreas). Through discussions with Natural England, it has been determined that should an extension to the HHW SAC be required it may be preferable that, given the amount of work required, a larger (than the 0.2km²) extension is designated.
151. As mentioned previously Natural England and JNCC have identified areas of Annex I sandbank and Annex I reef that extend beyond the boundary of the HHW SAC, and thus the size of a suitable extension could be in the order of 120km² if required. This possible area of extension is shown in Figure 4.4.
152. In the event that there is a delay to the HHW extension achieving designation of pSAC status within a few years of construction, this large potential spatial scale would provide a significant level of overcompensation (for both Norfolk Vanguard and Norfolk Boreas if required) and, as such, this would meet the requirements of the EC Guidance (2012) discussed in section 4.1.

Given the requirement for formal consultation following designation to pSAC status, the Applicant acknowledges that there could be uncertainty as to whether the site would progress to full SAC status. As discussed above, classification as a pSAC would deliver compensation in the short term, however, if the consultation feedback is such that it is deemed unlikely that this measure would be secured in the long term, the Applicant would be responsible for identifying an alternative measure or measures which could include one or more of the measures discussed in sections 4.3.1 and 4.3.3 or, as recommended by the Applicant, the measures discussed in

greater detail in section 4.4.2. Alternative measures would be included within the strategy to be agreed with the SoS if appropriate.

153. If both Norfolk Boreas and Norfolk Vanguard were required to provide compensation, then this would be delivered jointly by the two projects since the proposed indicative area of 120km² provided would far outweigh both the individual and combined effects of the two projects (which is 0.04km²) as this would be 300 times the size of the area required for compensation (even with the 10:1 ratio).
154. Under the scenario where both projects require compensatory measures Norfolk Boreas would work jointly with Norfolk Vanguard to deliver the measures to promote an extension to the HHW SAC, as presented in paragraph 141, across the two projects. This would be logical and possible as the two projects are 'sister-projects' being developed jointly by Vattenfall Wind Power Ltd.

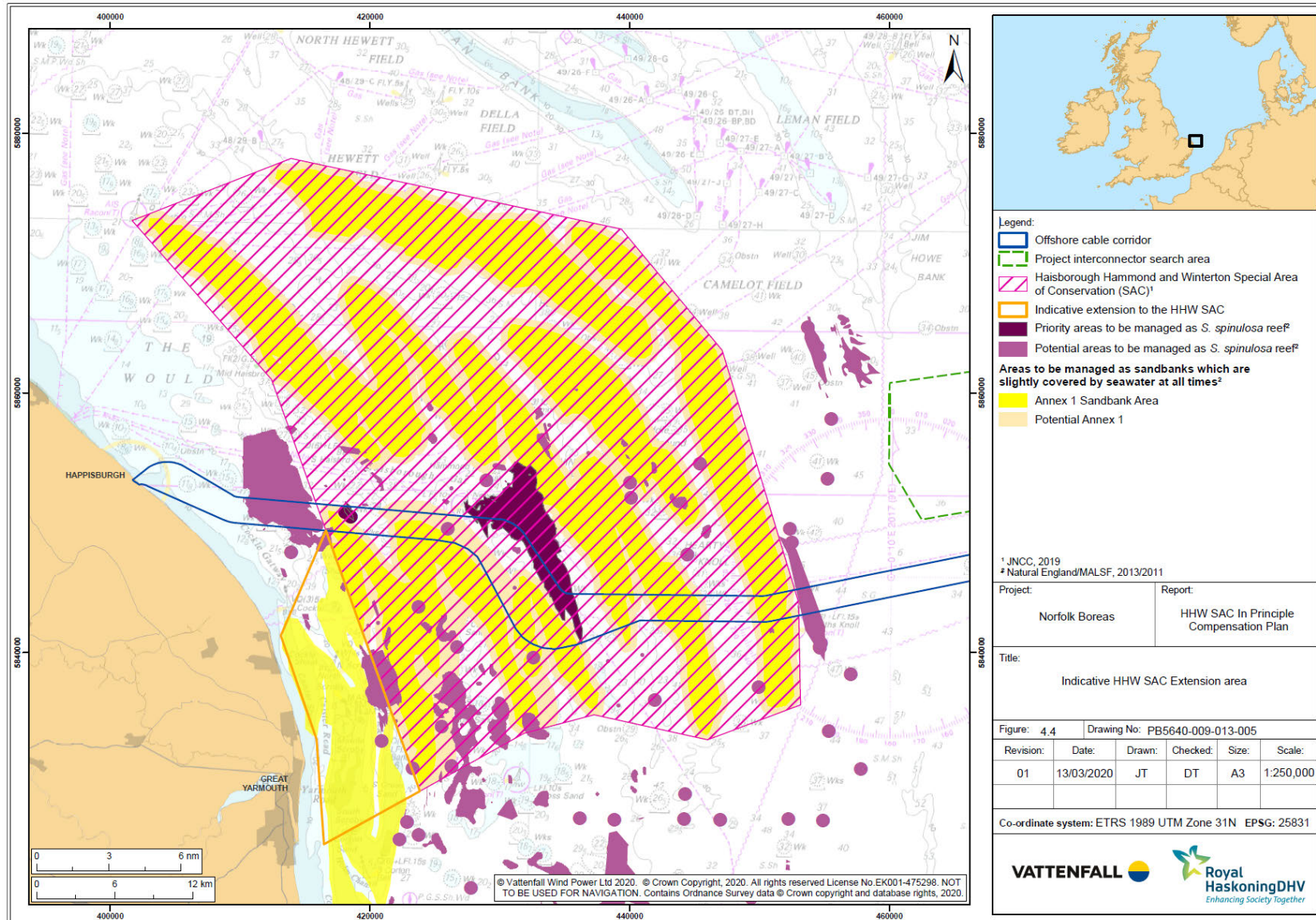


Figure 4.4 Indicative HHW SAC Extension area

4.4.1.1 Monitoring

155. An advantage of this compensation measure is that, once designated, management of the extension could be aligned with the existing management of the SAC; providing long term efficiency. The Applicant could therefore provide funding for a proportion of the Common Standards Monitoring and/or initiatives to achieve favourable condition, proportionate to the size of area of habitat loss in comparison to the existing HHW SAC area.
156. Alternatively, the Applicant could extend the proposed post construction monitoring (outlined in the HHW SAC control document, document 8.20) to encompass the extension area (see Table 4.2).

Table 4.2 Potential monitoring of extension in line with in principle post construction monitoring within the HHW SAC

Receptor/s	Potential Monitoring
Sandbanks	A single survey within the Extension area using full sea floor coverage swath-bathymetric surveys undertaken to IHO S44ed5 Order 1a standard and side scan sonar surveys.
<i>S. spinulosa</i> reef	Where potential areas of <i>S. spinulosa</i> reef are identified during geophysical surveys, a single survey, specifically targeting those reefs identified would be undertaken using drop down video to confirm presence, extent and elevation. The duration over which monitoring of the Extension would occur would be aligned with the duration for post construction monitoring; the latter must be agreed with the MMO following review of the post-construction survey data.

157. As with the provision of the measures to promote the extension, should both Norfolk Boreas and Norfolk Vanguard be required to provide compensation, the monitoring requirements would also be undertaken jointly by the two projects.

4.4.2 Removal of Anthropogenic material

158. As described in section 4.3.4 the Applicant has proposed a three-stranded approach for this compensation option. Delivery mechanisms for each of the three strands are provided below. Should the SoS conclude that compensation for the SAC is required the Applicant will progress preparatory work up until the point at which it is known whether cable protection due to adverse ground conditions will be required. Following installation of cable protection, the Applicant would submit a compensation strategy to the SoS for approval, in consultation with the MMO and the relevant Statutory Nature Conservation Body. In that strategy it would be made clear which of the three strands proposed were being progressed based on the amount of compensation required. Should the compensation be minimal a single strand may be required with the possible addition of Strand 3 to account for any overcompensation required; however should the compensation required be closer to the maximum worst case scenario all three strands might be required to deliver the necessary compensation and overcompensation.
159. The strategy which would need to be approved by the SoS prior to the transmission of electricity via the export cable for which cable protection has been installed (see document entitled “*Extract of Schedule 19 to the draft DCO Compensation to protect the coherence of the Natura 2000 Network*” for proposed wording of the DCO condition), would include:
- Details of any further survey work required to confirm presence and condition of anthropogenic material;
 - Details for the location, nature and size of material to be removed;
 - A method statement for infrastructure removal, to include the vessel type, tools used and mitigation for how impacts on the surrounding habitat will be minimised;
 - A programme of works for removal including when the compensation is expected to be delivered;
 - A programme of delivery for education, awareness and provision of facilities to reduce further marine debris from affecting the HHW SAC;
160. In line with Natural England’s list of general topics that fully-formed compensation proposals should provide. The Applicant would also include the following within the strategy:
- a) Ecological evidence to demonstrate compensation for the impacted site feature is deliverable in the proposed locations;
 - b) Evidence to demonstrate the deliverability of the compensation is secured;

- c) Evidence to demonstrate that there is/are policy/legislative mechanism for delivering the compensation (where relevant);
 - d) Governance for the proposals for the post-consent phase (where relevant);
 - e) Proposals for management of the compensation area to support the continued success of the compensation measures (where relevant) which in this option is likely to be support for the ongoing site management and monitoring of the HHW SAC; and
 - f) Timescales for implementation including how these timescales relate to the ecological impacts from the development
161. Once the SoS had approved the above, and should it be agreed that this option should be taken forward work would be continued (in accordance with the project management plan described in section 4.5) on delivering the three strands that form the compensation proposals.
162. As discussed above a 1:1 ratio is proposed for this option as for strands 1 and 2 it would be like-for-like compensation. A 1:1 ratio was deemed appropriate by the SoS for Hornsea Project Three for subjecting an area to survey. The Applicant understands that some stakeholders do not agree with the ratio used in the Hornsea Project Three condition (see Table 1.1) which relates to a survey area as opposed to the area of compensation to be provided. The Applicant however is proposing a 1:1 ratio to be applied to the area affected by the anthropogenic material which is to be removed, therefore creating a like for like replacement. The eventual amount of material removed would be designed to remove the pressure from an area directly proportionate to the area affected by the cable protection placed. Using the proposed ratio the worst case scenario for Norfolk Boreas would mean that a maximum area of 20,000m² that is currently affected by existing infrastructure or marine debris would need to be cleared. The Applicant does recognise that due to the fact that this option will not have delivered the compensation by the start of construction that some overcompensation will be required. The Applicant considers that the use of all three strands would create the necessary overcompensation if required.
163. As stated throughout, the compensation measures described within this document are specific to Norfolk Boreas only. However, should a scenario arise where compensation for both Norfolk Boreas and Norfolk Vanguard was required, the maximum area from which pressure associated with anthropogenic material is required to be removed would be 40,000m². This would be of a suitable size area to compensate for the loss of habitat occurring as a result of both projects.

4.4.2.1 Strand 1: Identification and removal of existing disused infrastructure

164. As noted above Natural England has identified the presence of existing infrastructure as being one of the key pressures on the HHW SAC. Within the HHW SAC there are a number of disused cables and a small section of disused pipeline (Figure 4.5). There is also Oil and Gas infrastructure which is due to be decommissioned in the near future.
165. The Applicant has included this strand of this compensation option as a number of stakeholders support this option, see section 1.3 for further detail. It should however be noted that this is not the Applicant's preferred strand within this option given the concerns on feasibility which have been raised by OPRED (see OPRED's comments provided in Table 1.1).
166. Notwithstanding this the Applicant has already progressed this option and has used its existing agreements to cut out of service cables (see section 3.1 for further information) to agree the principles of how this strand might be delivered. The exact length of the out of service cables to be removed as part of the existing agreements will be determined at the detailed design stage. The removal of sections of out of service cable would contribute compensation within Strand 1. The Applicant is also in discussion with the owners of the decommissioned Camelot field over the removal of out of service pipeline. Letters from both BT and Helix Well Ops Ltd confirming in principle support to the Applicant for removing their out of service infrastructure are provided in Appendix 1 of the Applicant's Response to the Request for Further Information document (Appendix 1 of document ExA.PD.D19.V1).
167. The Applicant will continue to engage with OPRED, Natural England, Defra and infrastructure owners to identify further opportunities for removal and investigate further possible mechanisms for transfer of ownership and liability. This will be progressed prior to the consent decision (anticipated to be on or before the 10 December 2021) but will also continue post consent should a consent be granted.
168. If this compensation is required as part of the consent, the Applicant will commit to attempting to identify any parts of infrastructure which could be safely and feasibly removed and, if agreed with the SoS in consultation with Natural England, remove them. This would require a five-stage approach which is illustrated in Plate 4.2 and described below:
- **Stage 1:** Contact owners and operators of all currently or soon to be out of service cables and pipelines within the HHW SAC to identify infrastructure that has the potential to be removed. The Applicant has existing relationships with owners of out of service cables and will develop these further to identify further opportunities (to the existing cutting agreements). Furthermore, the Applicant is progressing (and will continue to do so) discussions with OPRED, oil

and gas infrastructure owners and Natural England to identify possible out of service oil and gas infrastructure which could be removed. In order of priority this will include identification of:

- Any cable or pipeline or scour protection (noting the underlying infrastructure would also need to be removed or made safe);
 - Any free spanning infrastructure;
 - Any surface lying infrastructure;
 - Any buried infrastructure.
- **Stage 2:** Undertake a feasibility assessment on what could feasibly be removed based on likely condition and existing technology. Also at this stage further detail will be included on the methods which would be employed and the costs required to undertake removal.
 - **Stage 3:** Report back to the regulator on findings and seek guidance from SNCBs on what could be removed without causing greater environmental harm. This stage would also include a study of tools which could remove the material without causing further harm to the environment.

At this point this strand would be put on hold until the Norfolk Boreas export cables had been installed and it was known whether cable protection (apart from at crossing points) had been installed. In accordance with the proposed condition provided in a document entitled “*Extract of Schedule 19 to the draft DCO Compensation to protect the coherence of the Natura 2000 Network*”, the Applicant would then notify the SoS whether any relevant cable protection has been installed and, if so, the quantity. The Applicant would then submit a strategy (in accordance with the details outlined in this document) for approval by the SoS (in consultation with the MMO and Natural England), for compensating for the cable protection placed. Should that strategy include this strand of this compensation option, the Applicant would proceed to stage 4.

- **Stage 4:** A survey of the infrastructure would then be undertaken to assess its condition and to confirm the degree to which it was providing further desirable habitat. The survey scope would be agreed with the SoS and the regulator by means of the strategy document, but is likely to include sidescan sonar and dropdown video elements. This could be undertaken during the same survey campaign as the marine debris survey (see section 4.4.2.2) should both strands be included within the strategy.

The results of this survey would determine, in agreement with the regulator whether to proceed with stage 5.

- **Stage 5:** A single removal of infrastructure campaign, if survey indicates this should occur. This could be undertaken during the same survey campaign as the marine debris removal campaign (see section 4.4.2.2), should both strands

be required. This would be combined with acquiring as much information as possible from the owners of the infrastructure. For example, if the infrastructure is an oil or gas pipeline detail on, how the decommissioning process has removed environmental risk, including how the pipe was flushed to clean it and the condition any pipeline protection has been left in²³, as well as the driver of the decision (as will/would be reported in the associated comparative assessment) to leave the infrastructure on the seabed (safety, socioeconomic, environmental, etc).

169. Further information on a project plan for how this would be implemented is provided in section 4.5.

²³ The Applicant has already received such information from Camelot on an out of service pipeline part of which is within the HHW SAC site.

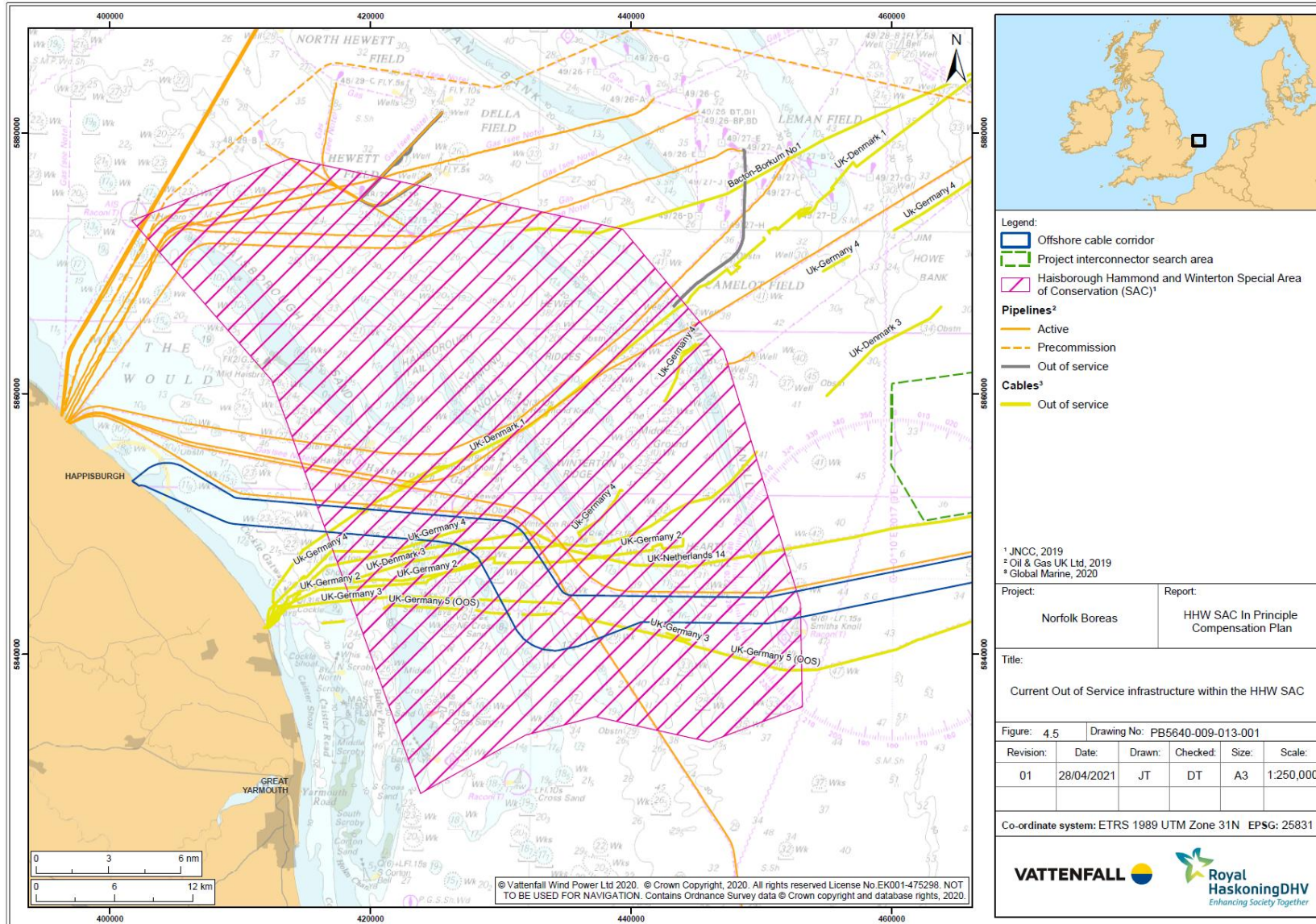


Figure 4.5 Current Out of Service infrastructure within the HHW SAC

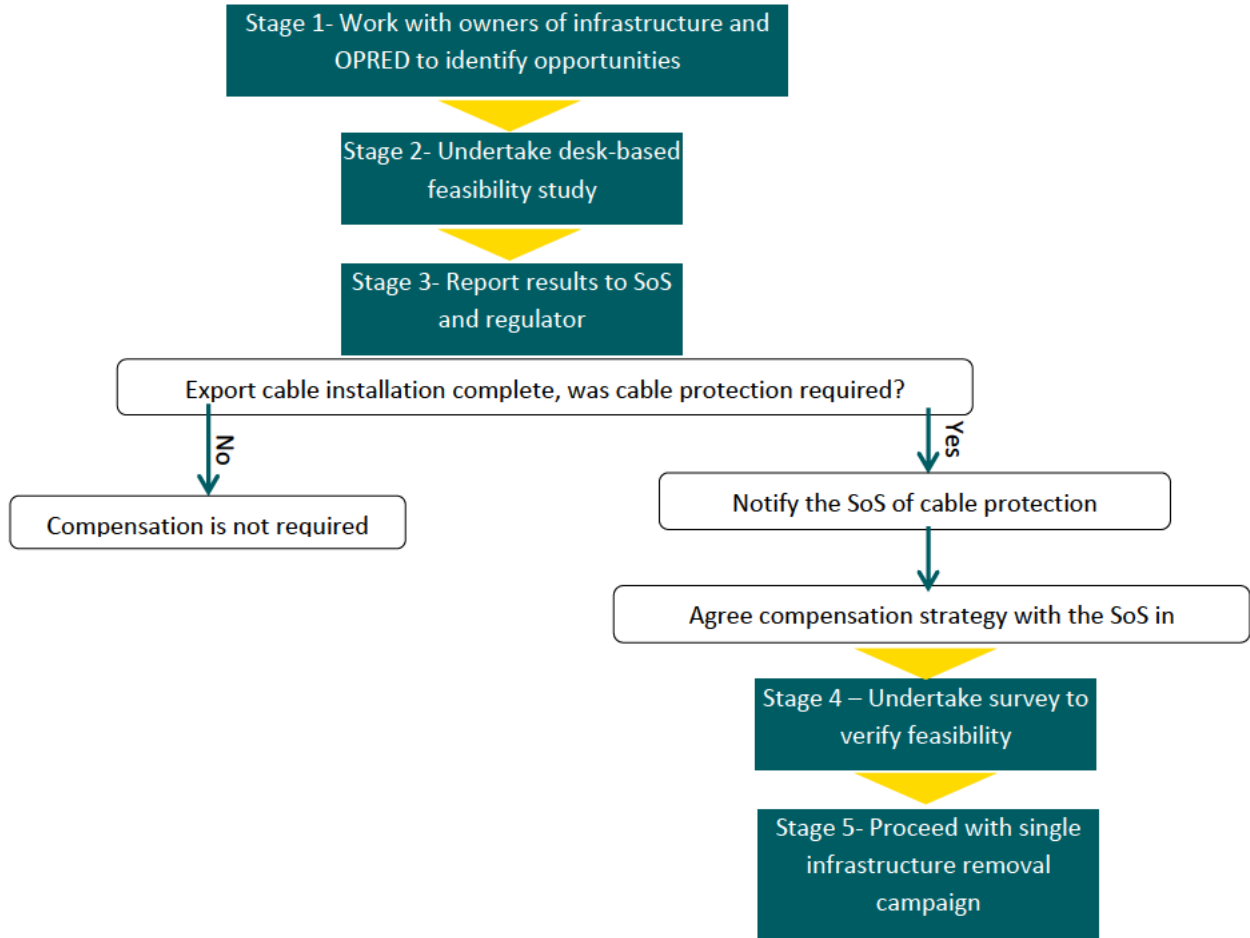


Plate 4.2 Staged approach for Strand 1: identifying and removing disused marine infrastructure

4.4.2.2 Strand 2: Identification and retrieval of marine debris

170. The problems caused by marine debris are now well documented (Veiga et al 2016; Richardson 2018). Discarded fishing gear (either intentionally or accidentally) is a particularly destructive type of marine debris. If not retrieved, discarded fishing gear can move with marine currents scouring large areas of seabed and therefore affect an area far greater than its actual size. Similarly, other sources of marine debris, such as a discarded anchor and chain, could also sweep the seabed, continually affecting a large area.
171. Towed fishing gear can be lost due to the gear becoming snagged on the seabed or may need to be cut loose to avoid a threat to human life during bad weather. Static gear such as pots can be lost if fishermen fail to relocate the gear or it becomes snagged.
172. Other marine debris derives from: dropped objects either from vessels or offshore structures, maritime disasters or illegally jettisoned waste.
173. In order to locate and retrieve such marine debris the Applicant would undertake a five stage approach similar to that proposed for Strand 1. This would include
- **Stage 1: a “marine debris data search”**. This would collate data from the following sources to identify an area within the HHW SAC which may contain high levels of marine debris:
 - UK Fisheries Monitoring Centre (UKFMC): If any fishing gear is lost it is a legal requirement to report it to the UKFMC within 24 hours²⁴;
 - United Kingdom Marine Monitoring Assessment Strategy: Trends and Status in Seafloor litter²⁵ ; and
 - The International Council for the Exploration of the Sea (ICES) DATRAS database²⁶.
174. If no suitable areas were identified within the HHW SAC, the search would be widened to other suitable SACs within the network.
- **Stage 2:** Undertake a feasibility assessment on what could realistically be removed based on likely condition and existing technology.
 - **Stage 3:** Report back to the SoS and regulator on findings and seek guidance on what could be removed without causing greater environmental harm. The

■ [REDACTED]
■ [REDACTED]
■ [REDACTED]

stage would also include a study of tools which could remove the material without causing further harm to the environment.

175. At this point this strand would be put on hold until the Norfolk Boreas export cables had been installed and it was known whether cable protection (apart from at crossing points) had been installed. In accordance with the proposed condition provided in a document titled “*Extract of Schedule 19 to the draft DCO Compensation to protect the coherence of the Natura 2000 Network*”, the Applicant would then notify the SoS whether any relevant cable protection has been installed and, if so, the quantity. The Applicant would then submit a strategy (in accordance with the details outlined in this document) for approval by the SoS (in consultation with the MMO and Natural England), for compensating for the cable protection placed. Should that strategy include this strand of this compensation option, the Applicant would proceed to stage 4. Also at this stage a decision would be made on whether, this strand was still required (if Stands 1 and 3 were proven successful in delivering all of the compensation required it may be the case that it would not be) or if there was any merit, based on ensuring net environmental benefit, in proceeding with stage 4.

- **Stage 4:** Once a suitable area had been identified a targeted “**marine debris survey**” would be undertaken to provide up to date information on the presence and exact location of marine debris. The vessel undertaking the survey could be equipped with retrieval capabilities or locations would be marked using suitable Global Positioning System (GPS) and a suitably equipped vessel sent to site to retrieve any debris identified. The steps taken to deliver marine debris retrieval are shown in Plate 4.3. The spatial scale of the area or areas to be surveyed would be agreed through consultation with the regulator. However as discussed above in section 4.3.4.3 the Applicant proposes a 1:1 ratio as it would be like for like removal.

176. The results of this survey would determine, in agreement with the regulator whether to proceed with stage 5.

- **Stage 5:** A single marine debris retrieval campaign if survey indicates this should occur. This could be undertaken during the same campaign as the infrastructure removal campaign (see section 4.4.2.1) if both strands were proceeding.

177. Further information on a project plan for how this would be implemented is provided in section 4.5.

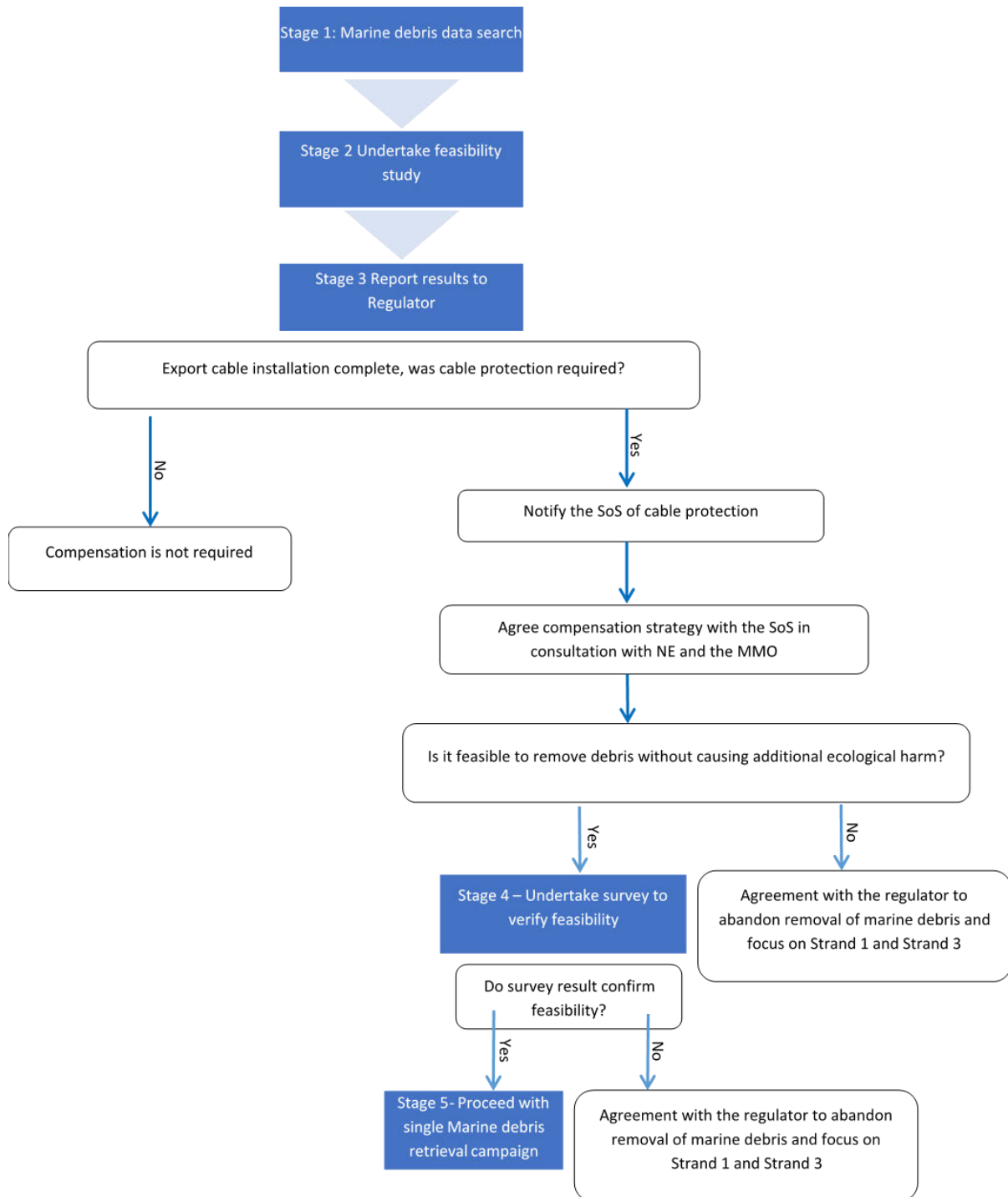


Plate 4.3 Approach to Strand 2: identification of marine debris and removal

4.4.2.3 Strand 3: Education, awareness and facilities to limit further marine debris

178. An education programme would be set up in agreement with the regulator, with the aim of reducing the quantity of debris being added to the marine environment, this could include:

- a. Consultation with the fishing industry (especially targeting those who fish in the HHW SAC) to:
 - i. Ensure awareness of the legal requirements to: not discard fishing gear and/or waste at sea, to attempt to retrieve it if lost, to carry equipment to allow retrieval, and to report lost gear within 24 hours if all of the gear has not been retrieved.
 - ii. Highlight the advantages of less destructive fishing methods;
 - iii. To identify possible ways that the Applicant could contribute to less destructive fishing methods being used. This could include data sharing with the fishing industry of the locations of Annex I habitats within the HHW SAC, for example through the provision of memory sticks with relevant shapefiles installed.
- b. The provision, by the Applicant, of better methods for static gear retrieval such as beacons and tracking systems to ensure that static gear can be swiftly retrieved or relocated if it has moved.
- c. The provision by the Applicant of safe fishing gear disposal bins at local fishing ports and on vessels: although not common, fishing gear can be illegally disposed of at sea if it has become damaged. Once placed in the disposal bins the Applicant would then arrange for safe disposal or recycling of the gear²⁷. Bins could also be provided for fishermen to dispose of general waste which otherwise may enter the marine environment.

179. The details of the above would be agreed with the SoS and regulator and finalised through sign off of the Haisborough Hammond and Winterton Compensation strategy. Lessons could be learnt from similar projects which have been implemented in other countries such as the Fishing for Energy project in the United States of America²⁸.

²⁷ It should be noted that in a representation to the SoS for the Norfolk Vanguard project the NFFO raised “*establishment and improvement of port reception facilities to enable the collection and disposal of marine litter which the fishing industry potentially along with others could contribute to*” as a compensation option which merited further discussion.

180. As discussed above the compensation strategy would need to be submitted to the SoS following export cable installation when it would be known whether cable protection is required. The strategy for compensation would then be required to have been approved by the SoS (in consultation with the MMO and Natural England) prior to the transmission of electricity via the export cable for which cable protection has been installed. This is in accordance with the proposed condition provided in a document titled “*Extract of Schedule 19 to the draft DCO Compensation to protect the coherence of the Natura 2000 Network*”. Export cable installation (the only part of the project which would interact with the HHW SAC) is currently anticipated to be complete in mid-2026 with first power generation due to start in late 2027.
181. The timeline presented in Plate 4.4 demonstrates how all strands of compensation could be delivered if required. Noting that Strand 2 would only be pursued past stage 3 if it was agreed that Strands 1 and 3 were not fully delivering the full amount of compensation required and therefore Strand 2 was required.

4.4.2.4 Monitoring

182. It is the Applicant’s position that once anthropogenic material has been removed from the seabed the compensation has been delivered however should the SoS deem that monitoring would be required for this compensation option the Applicant would agree and include details of the monitoring within the HHW SAC compensation strategy. With this compensation option, as under strands 1 and 2 the material would be removed either from the HHW SAC or another relevant SAC, monitoring of the newly created habitat could be aligned with the existing management of the SAC; providing long term efficiency. The Applicant could therefore provide funding for a proportion of the Common Standards Monitoring and/or initiatives to achieve favourable condition, proportionate to the area of new habitat created. Detail on monitoring could only be determined once the scale and nature of the material being removed from the seabed is known.
183. Should, as part of the site condition monitoring for the HHW SAC, Natural England and the JNCC in their role of managing the site decide there was a specific need to monitor specific sites where removal of anthropogenic material had occurred, a monitoring programme with clear objectives would be implemented. The objective for this specific monitoring programme would be to determine how the habitat responded to the removal of anthropogenic material. Research questions would include:
- Does the habitat recover?
 - What are the timescales for recovery?

- How do the biological communities respond to the removal of the pressure from anthropogenetic material?
184. In order to answer such questions in a scientifically rigorous way a robust experimental design would be required which would include surveys of the sites where material had been removed (sample sites) and sites which would not be influenced by the removal (reference sites) within the HHW SAC.
185. If it was agreed that this is required, surveys of both the sample sites and reference sites would need to be completed at appropriate intervals following removal. Appropriate intervals would be agreed with Natural England and the JNCC, but are anticipated to be up to three surveys for example three years non-consecutive e.g. 1, 3 and 6 years or 1, 5 and 10 years.
186. The surveys, if required are likely to consist of a combination of side scan sonar, Multibeam Echosounder, drop down video surveys and benthic grabs.
187. Monitoring of Strand 3 would include the quantification of any fishing equipment and discarded material disposed of within bins (possibly using VMS technology to identify where the material was retrieved from or would have been discarded) and monitoring of how often fishing gear retrieval was successful following any provision of new technology by the Applicant.

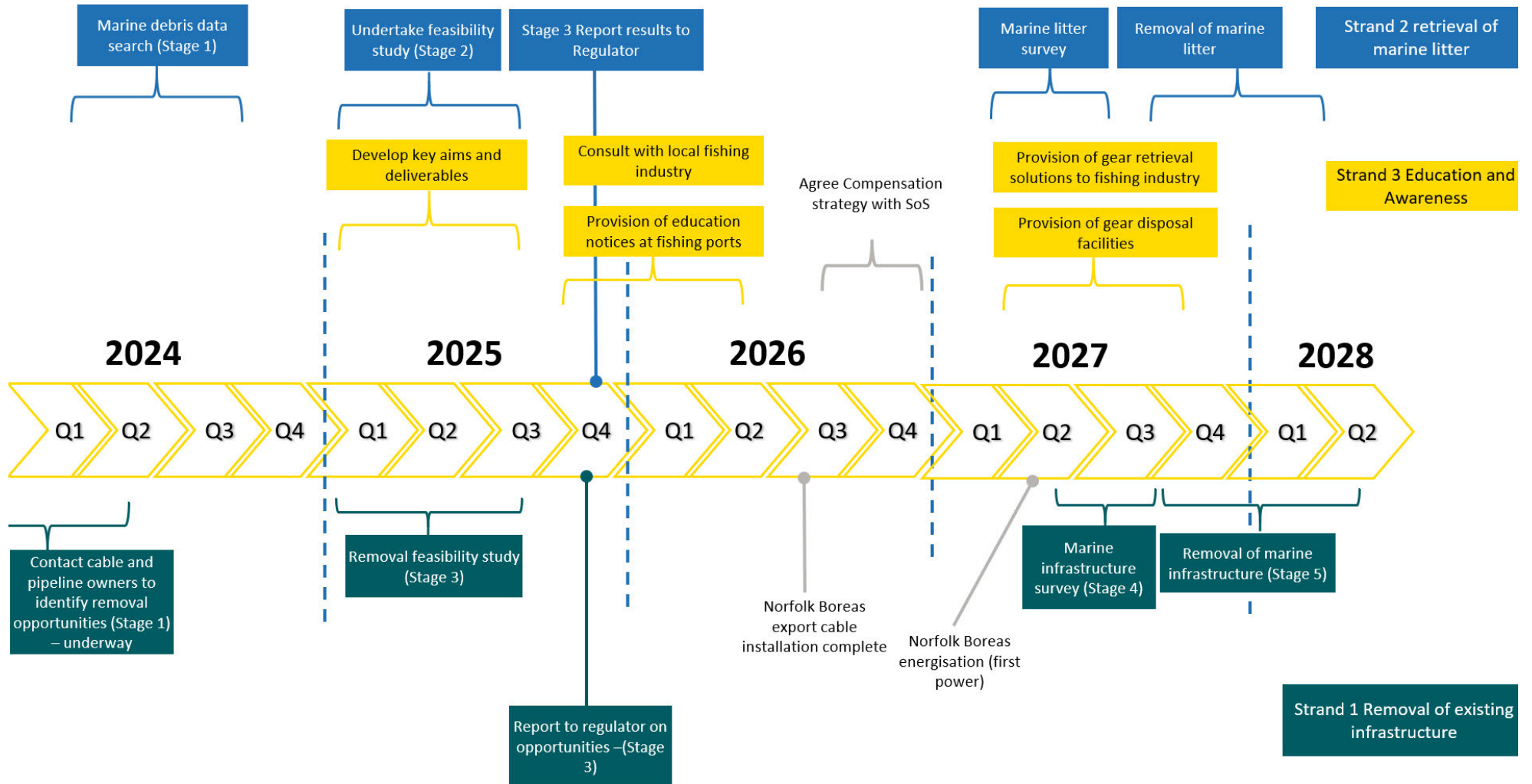


Plate 4.4 Indicative timeline for compensation (removal of anthropogenic material) delivery

4.5 Project Management Plan

188. Should the SoS determine that compensation is required the two options recommended by the Applicant could be progressed together if required up to the point at which it is confirmed cable protection has been installed. At this point the compensation strategy will be submitted for the SoS's approval in consultation with the MMO and Natural England. The strategy would include a full detailed project management plan for the ongoing delivery.

4.5.1 Road map for adaptive management

189. A road map for delivery of both recommended options is provided in Plate 4.5 below. The Applicant proposes that both options would be progressed up until the point of cable installation. At this point it would be agreed through the HHW SAC compensation strategy which options and/or which strands of options would not need to be progressed in favour of other options/strands which would continue. This decision would be taken based on the amount of cable protection which had been installed, which options and strands were, at that point in time demonstrating greatest chance of successful delivery, and any recent guidance which had been produced.
190. Should compensation be required for both Norfolk Boreas and Norfolk Vanguard, the programme for delivery of the compensation for Norfolk Boreas would be bought forward to allow joint delivery across both projects in line with the timeframes outlined within this document.

Plate 4.5 Road map for delivery of both recommended options, illustrating how adaptive management would work. Option: Extension of the HHW SAC shown in purple and option: removal of Anthropogenic material shown in Green. Dates are indicative at this stage.

Stage	2021				2022				2023				2024				2025				2026				2027				2028			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Consent Award																																
Consultation with NE, Defra and JNCC on proposal to extend the SAC.																																
Provision of assistance in the development of an Area of Search																																
Data gathering and (noting that sufficient survey data is already available)																																
Support to Defra in preparing for the formal consultation																																
Ongoing work with OPRED, Natural England, Defra and owners of Infrastructure to identify options for removal																																
Marine Debris data search																																
Feasibility studies for removal of infrastructure and Marine Debris																																
Agreements reached with owners to decommission																																
Reporting results to the regulator																																
Develop key aims and deliverables for education and awareness																																
Consult with local fishing industry																																
Export cable installation complete and notification of cable protection given to the SoS																																
Applicant to propose <u>which options and which strands to be taken forward and which are discontinued</u>																																
If required submit compensation strategy to SoS for approval																																
Norfolk Boreas energisation (and therefore transmission of electricity via the export cable)																																

4.5.2 Funding

191. As described above the HHW SAC extension would require the Applicant to provide either support or funding for staff time to Natural England, Defra and possibly the JNCC. This support would not be required on a full-time basis as there would be peaks and troughs in activity. Therefore, an assumption has been made that an equivalent of two full time members of staff would be required up until the point of full designation. Once the extension had been designated further support for ongoing site management and site condition monitoring would be provided.
192. In terms of removal of anthropogenic material, at this stage it is only possible to accurately calculate costs up to the point of identifying what debris or infrastructure might be removed. However, the Applicant has also included estimated costs for a single removal operation. This estimate has been based on the outturn costs of pipeline removal from Rose field (Spirit Energy, 2018), which equates to approximately £850,000 per kilometre of pipeline removed. Estimates in Table 4.3 are based on the assumption that the equivalent of 4km of pipeline would need to be removed to compensate for the worst case scenario of 4km of cable protection being placed (see section 3.1.2). This estimate is based on agreement of the principles behind the 1:1 ratio. If these principles are not agreed or a ratio of greater than 1:1 is determined to be part of the compensation a worst case estimate is that up to 20km of pipeline removal may be required in which case the worst case estimate for costs for removal of anthropogenic infrastructure would increase by up to £13.6 million.
193. Estimated costs for both options are provided in Table 4.3.

Table 4.3 indicative costs for both recommended in principle compensation options

Category of compensation	Compensation Option	Cost Estimate subcategories	Norfolk Boreas costs outlined
Annex I Features for the HHW SAC	Extension of the HHW SAC	Development Expenditure	£288,000
		Capital Expenditure	
		Operational Expenditure	£296,000
		Decommissioning Expenditure	n/a
Total estimated cost			£584,000
	Removal of Anthropogenic material	Development Expenditure	£42,000
		Capital Expenditure	£4,595,000
		Operational Expenditure	£2,500,000
		Decommissioning Expenditure	n/a
Total estimated cost			£7,037,000.00

194. Having regard to the estimated costs for delivery of the compensation measures set out above (as well as those measures which may be required for compensation in relation to the Flamborough and Filey Coast Special Protection Area and the Alde Ore Estuary Special Protection Area), the Applicant considers that delivery of the measures, in line with the timescales proposed in the implementation programme, is financially feasible. Therefore, in the event that it is necessary to deliver these (and/or other) compensation measures, the Applicant is confident that the commercial viability of the Norfolk Boreas project would not be prejudiced.
195. The Applicant provided a Funding Statement [APP-025] with the Application, which explains, that the Applicant will have the ability to procure the financial resources necessary to fund the works to be authorised by the Order, subject to final Board authority. The Applicant's parent company (Vattenfall Wind Power Ltd), which is part of the wider Vattenfall Group (Europe's fifth largest generator of electricity and the largest generator of heat), have the experience and reputation to enable funds to be procured and this applies equally in respect of the funds to deliver the compensation measures. The Applicant will secure funding for the Project after certainty is obtained on development consent, the tender process is complete for the major construction contracts, and the investment case has been satisfied. Once these criteria are met the Applicant will take a final investment decision (FID) which will irrevocably commit funding for the project. Should funding for any compensation measures be required as part of the project then these costs will be factored into any FID.
196. In summary, the Applicant, its parent company (VWPL), and the wider Vattenfall Group have substantial net assets (as outlined in the accounts shown at Annex 1 and Annex 2 of the Funding Statement, [APP-025]) as well as a positive track record in the field of renewable energy development. The Applicant and the Parent Company are therefore able to provide the required funding for the Project, which would include funding to guarantee the success of any compensation measures required.
197. Should both Norfolk Boreas and Norfolk Vanguard be required to provide compensation the extension to the HHW SAC would incur no additional costs for the parent company and the projects would provide an equal contribution.
198. However, should the removal of anthropogenic material be required as compensation, this would result in a greater combined cost to deliver for both projects. There would be cost efficiencies by combining surveys, data searches and feasibility work however as the amount of material to be removed would be greater the overall maximum cost to deliver this compensation across both projects is estimated as approximately £10,437,000. This is considered by the Applicant to be financially feasible and would not prejudice the viability of the projects.

4.6 DCO Condition

199. The Applicant has provided (in a document titled *Extract of Schedule 19 to the draft DCO Compensation to protect the coherence of the Natura 2000 Network*) proposed wording of a condition which could be inserted into the Norfolk Boreas DCO should the SoS decide that compensation is required. The wording has taken into account the condition contained in the Hornsea Project Three DCO, however given some significant differences between the two projects, which have been highlighted in this document and the fact that there may not be a need for any cable protection within the HHW SAC (apart from at a crossing point with a single pipeline), the wording has been adapted so that it is relevant to the Norfolk Boreas project. The proposed condition has been worded in such a way as to provide for either recommended option to be taken forward.
200. Natural England and the MMO have been consulted on the proposed wording and are in agreement with much of the principle of the wording, however agreement has not been reached on the principle to delay compensation until cable protection has or has not been placed and on the inclusion of strict timeframes for consultation of the compensation strategy, which the Applicant does not consider it is necessary to include on the face of the DCO given the ongoing and iterative engagement.

5 SUMMARY

201. The Applicant maintains the position that Article 6(4) need not be engaged in relation to the Haisborough Hammond and Winterton Special Area of Conservation as a result of the Norfolk Boreas project, as an AEoI can be ruled out. This is discussed further in the HHW SAC Position Statement (REP5-057).
202. Should the Secretary of State be minded to disagree with this position and conclude an AEoI following the Appropriate Assessment, the evidence presented in this document shows that there are multiple deliverable compensation measures which could be used to provide the required compensation. Due to the fact that stakeholder support for the options varies the Applicant has proposed several options, two of which it recommends and others which it does not. The final decision on which options and strands of options are chosen to deliver the compensation will be made through agreement with the SoS on the HHW SAC compensation strategy.
203. It is highly likely that the ground conditions within the HHW SAC will facilitate cable burial at all locations apart from at crossing points and therefore the installation of cable protection to protect unburied or sub optimally buried cables will not be required. The Applicant is of the firm opinion that, as it is highly unlikely that cable protection will be installed and this cannot be known until after export cable installation, the Applicant should only be required to provide compensation following the availability of this information. At which point, should cable protection be installed and compensation be required, the Applicant will agree a suitable strategy, in accordance with the details set out in this document for its delivery. The strategy will be agreed in consultation with Natural England and the MMO and will need to have been agreed before the project will be allowed to generate electricity.
204. Table 5.1 provides a summary of the compensatory measures that have been reviewed by the Applicant in consultation with numerous stakeholders including Natural England, the MMO, TWT, the EIFCA, Defra, OPRED and asset owners and seabed users.
205. While the Applicant has included a range of potential measures to compensate habitat loss, the Applicant proposes an extension to the HHW SAC or the removal of anthropogenic material to be the most feasible for delivery. The Applicant has proposed to progress two options as far as possible up to the point at which it is known if cable protection has been installed. If overcompensation is required at that point, it would be possible to develop either or both options to provide the necessary overcompensation. If Norfolk Vanguard is also required to provide compensatory measures, these would be developed jointly with Norfolk Boreas and could, if required, provide compensation for both projects.

206. The Applicant has set out how this compensatory measure could be secured within an extract of Schedule 19 for the draft DCO (document reference ExA.AS-1.D22.V2).

Table 5.1 Summary of In Principle Compensation Measures

Indicative Measure	Benefits	Delivery mechanism	Spatial scale	Timescale	Potential feasibility	Annex I habitat Compensated by Measure		Measure taken forward for further development by the Applicant.
						Sandbank	Reef	
Establish an Annex I reef and/or Annex I sandbanks at a location outside the HHW SAC	<i>O. edulis</i> or <i>M. edulis</i> beds would support increased biodiversity, comparable to the function of <i>S. spinulosa</i> reef. <i>O. edulis</i> and <i>M. edulis</i> beds are natural and native to the North Sea.	✓ In order to deliver the planting of biogenic reef/beds, the developer could commission an appropriate academic body with experience and expertise in this field. Need to ensure beds are not damaged by commercial fisheries. ✗ it would not be possible to create Annex I sandbank.	✓ The scale would be agreed with Natural England. Need to plant areas which are of suitable size to become self-sustaining. A 2:1 ratio may be appropriate to recognise that replanting would not be 100% successful. Based on this, a maximum area of 0.04km ² could be required. The DEEP project aims to plant a significantly larger area of 0.4km ² of <i>O. edulis</i> bed within 5 years.	✓ If <i>O. edulis</i> beds were to be located within Norfolk Boreas this would be delivered post consent with a proportion of overplanting to compensate for not being in place at the time of the effect in accordance with EC (2012) and DEFRA (2013) Guidance. Alternatively, as the Applicant owns a number of other OWFs, an area within an existing OWF could be planted with oyster bed to deliver compensation for Norfolk Boreas. <i>M. edulis</i> translocation would not be feasible within the order limits of Norfolk Boreas, therefore the timescale for site selection is likely to be challenging.	? Technically feasible that <i>O. edulis</i> and <i>M. edulis</i> can be translocated based on existing evidence. <i>However, O. edulis</i> is not deemed to be an acceptable measure by Natural England and <i>M. edulis</i> translocation would not be feasible within the Order limits of Norfolk Boreas, therefore the deliverability of this as compensation for Norfolk Boreas would be uncertain.	x	✓	x
Extend the HHW SAC to encompass areas of Annex I habitat outside the SAC	Only a very small extension required relative to the scale of the HHW SAC. Once designated, management of the extension could be aligned with the existing management of the SAC providing long term efficiency.	✓ Technical input and/or financial support to SNCB to progress agreement of a designation boundary extension by the UK Government. The Applicant would provide ongoing support to progress the formal consultation towards the site reaching SAC status and provide a contribution to management measures and site condition monitoring,	✓ The precise size of the extension would be approved by the Secretary of State, in consultation with the MMO and Natural England, and would depend on the conclusions of the Appropriate Assessment and amount of cable protection installed, (i.e. the area of any adverse effect). However, it is anticipated that the size of the extension could be up to 120km ² based on the known area of Annex I sandbank and Annex I reef that extends beyond the boundary of the HHW SAC.	? It is policy to consider early designations (including pSAC and SCI) as SACs in decision making. Therefore, it would be sufficient for the site to reach pSAC or SCI status in order for compensation to be in place. The Applicant could begin support for this process following consent and it is expected that pSAC status could be achieved within 2 to 3 years of construction being completed. Defra have concerns over the timeframe and legal mechanism for how this could be achieved.	✓ Existing mapping by Natural England shows areas of Annex I habitat beyond the HHW SAC that could be protected, therefore this measure is expected to be feasible.	✓ Annex I sandbank extends beyond the boundary of the SAC	✓ Annex I reef extends beyond the boundary of the SAC	✓
Fisheries management – Reduction in intrusive fishing methods such as bottom-towed trawling	Would represent a relatively small additional area further to existing proposals for fisheries management areas in the SAC. Approach for project compensation could be	✓ Financial contribution from the Applicant if this measure were adopted, calculated by reference to spatial scale of impact. If appropriate the contribution could be made	✓ The scale would be agreed with Natural England. For example, a 10:1 ratio may be appropriate – e.g. 0.02km ² of habitat loss compensated by 0.2km ² of extension to, or	? Long term/uncertain due to the absence of existing powers for an authority to deliver fisheries management areas for the purposes of compensation	? Currently no authority has the jurisdiction to deliver fisheries management areas for the purposes of compensation. The feasibility of this measure therefore requires government intervention	✓ Fisheries represent a key pressure on Annex I sandbank in the SAC.	✓ Fisheries represent a key pressure on Annex I reef in the SAC.	x

Indicative Measure	Benefits	Delivery mechanism	Spatial scale	Timescale	Potential feasibility	Annex I habitat Compensated by Measure		Measure taken forward for further development by the Applicant.
						Sandbank	Reef	
	aligned with existing proposals for efficiency.	jointly with Norfolk Vanguard Requires strategic input from the UK Government to develop legislation and a strategic fund to facilitate delivery of fisheries management.	new fisheries management areas.					
Removal of disused anthropogenic features								
Strand 1 removal of infrastructure	Direct like for like removal of pressure comparable to the pressure being added to the SAC. In principle support by stakeholders (TWT, NE, and Defra)	? Agreement of method for removal with Natural England. Commissioning of removal. Granting of Marine Licence from the MMO	✓ The scale would be agreed with Natural England. For example, a 1:1 ratio may be appropriate in this case, on the basis that this is a direct like-for-like removal of infrastructure to compensate the addition of new infrastructure.	✓ Provided an agreement can be reached with the owners of disused infrastructure and the location of suitable infrastructure identified, this measure could be implemented immediately after export cable installation.	✓ In principle agreement on removal with owners of the disused infrastructure, is in progress, however there is still a need to confirm feasibility, environmental consequences and safety of lifting aging infrastructure.	✓ Subject to the habitat type the infrastructure is located on	✓ Subject to the habitat type the infrastructure is located on	✓
Strand 2 removal of marine debris	Direct removal of pressure comparable to the pressure being added to the SAC. Deliverable by the developer with minimal input from Regulator/SNCBs (compared with designating a SAC or fisheries management area)	? Agreement of method for removal with Natural England. Technology available for removal. Granting of Marine Licence from the MMO	✓ The scale would be agreed with Natural England. For example, a 1:1 ratio may be appropriate in this case, on the basis that this is a direct like-for-like removal of infrastructure to compensate the addition of new infrastructure.	✓ Provided suitable debris could be identified, this measure could be implemented immediately following approval of strategy by the SoS	✓ Provided suitable debris could be identified, and suitable removal techniques could be identified.	✓ Subject to the habitat type the Marine debris is located on. ? Natural England do not support this measure (although the NFFO do)	✓ Subject to the habitat type the Marine debris is located on ? Natural England do not support this measure (although the NFFO do)	
Strand 3 Awareness and education	Clear and ecological benefit with minimal input from Regulator/SNCBs (compared with designating a SAC or fisheries management area)	✓ Education to other sea users, provided by the Applicant; The provision, by the Applicant, of better methods for static gear retrieval such as beacons and tracking systems; The provision by the Applicant of safe fishing gear disposal bins at local fishing ports	✓ It is difficult to define a spatial scale for this form of compensation and therefore it is being proposed in tandem with strands 1 and 2.	✓ This strand could be progressed by the Applicant as far as possible prior to cable installation at which point its final deliverables and targets would be agreed with the SoS through approval of the compensation strategy	✓ With clear objectives and a clear road map for delivery this strand is considered feasible.	? Natural England do not support this measure due to concerns that it cannot be demonstrated that it would apply to the HHW SAC	? Natural England do not support this measure due to concerns that it cannot be demonstrated that it would apply to the HHW SAC	

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