



THE PLANNING ACT 2008  
THE INFRASTRUCTURE PLANNING (EXAMINATION PROCEDURE)  
RULES 2010

HORNSEA PROJECT THREE OFFSHORE WIND FARM

Planning Inspectorate Reference: EN10080

**Annex D4: JNCC and Natural England advice on offshore benthic  
ecology**

7 November 2018

## 1. Introduction

- 1.1. In creating this response the following documents have been considered:
  - Vol. 2 Chapter 2 – Benthic Ecology;
  - Vol. 5 Annex 2.1 – Benthic Ecology Technical Report;
  - Appendices to the Benthic Ecology Technical Report;
  - Vol 2 Chapter 1 – Marine processes;
  - Vol X Chapter X – Disposal site characterisation;
  - Sandwave Clarification note;
  - Cable protection clarification note.
- 1.2. The present document comprises:
  - Comments on protected sites and features assessment;
  - Detailed comments on benthic chapters on application.
- 1.3. NB: Some of these comments may be addressed further in the Statements of Common Ground with the Applicant as these are developed.
- 1.4. Detailed comments on the Markham's Triangle proposed Marine Conservation Zone are provided in Annex D6.

## 2. Overarching comment on the North Norfolk Sandbanks and Saturn Reef SAC

- 2.1. **We do not believe that The Applicant has either provided enough evidence for the characterisation of the cable corridor as it passes through the site; the assessment of impact to protected features, or site integrity for the North Norfolk Sandbanks and Saturn Reef (NNSR) SAC. As such, we cannot agree that the project is unlikely to have any 'significant effect' on features or Adverse Effect on Integrity of the designated site.**

## 3. Sandbanks

### Adverse effect on sandbanks feature

- 3.1. JNCC considers that the site boundary delineates the sandbank feature, supported by the original Site Assessment Document (JNCC, 2010) and further validated by recent biological community analysis (Parry et al., 2015).
- 3.2. Based on our current understanding, JNCC do not consider it likely that human activities taking place within the site have the potential to permanently impact on the large-scale topography of the North Norfolk sandbanks. They could, however, have an impact on the other variables that help define the extent and distribution of a sandbank, namely sediment composition and biological assemblages. Of note for the industrial activities taking place within the site are operations associated with the deposition of material (e.g. rock dump), or other alteration of surface sediment (e.g. drill cuttings and cabling operations), that are likely to lead to a persistent change to substrate which is not suitable habitat for sandbank communities.
- 3.3. As such, some of the sandbank's extent and distribution is lost, in that there are areas present within the site that no longer represent sandbank feature, as defined by sediment composition and/or biological communities, because the substrate has been changed. We believe that there has been physical change in sediment composition as a result of industrial activity in the site, but it is unclear what impact this may have on overall sediment composition and distribution. Furthermore, due to lack of evidence about deposits present within the site (i.e. not based on

anticipated worst case scenario estimates), it is currently not possible to quantify the loss of extent.

- 3.4. NB: The further clarification notes relating to cable protection and sandwave levelling provided by the Applicant to Natural England on 9th October 2018 referenced Dutch studies that demonstrated that there were on changes to biological communities from the deposition of material. Therefore until we have peer reviewed these papers our advice remains unchanged.
- 3.5. Our latest view on condition is that the sandbank feature is in unfavourable condition and needs to be restored to favourable condition. Restoration of the feature requires an overall reduction, or removal, of pressures associated with human activities that cause impacts to the sandbanks' extent and distribution, delineated by both substratum and biological communities. As such, any human activities which can cause pressures resulting in changes to substratum or biological communities to the sandbank feature may present a risk to the site's restoration.
- 3.6. We note that there is no expectation that The Applicant should demonstrate recovery of the site. Recovery is an objective for all sectors placing pressure on the site, including oil and gas, renewables, aggregates and fisheries. We do, however, expect The Applicant to demonstrate the risk levels that they believe their proposed operations will present to the restoration of the extent and distribution of the sandbank feature. We note that The Applicant may find our discussion of mitigation below helpful in this. As a minimum, this would be to demonstrate that proposed activities will be mitigated to not impede restoration, i.e. that activities will not increase the site's exposure to damaging pressures, particularly in regard to changes in extent and distribution of substratum and biological communities.
- 3.7. We note the Applicant's conclusion of "*high confidence that the seabed will recover to a new natural equilibrium state within a timescale of months to years.*" We would suggest that approaching a new equilibrium may not be in accord with restoration of the site, if that new equilibrium is outwith the sediment composition or biological communities expected from the designated feature.
- 3.8. We note that in the Cable protection clarification note (dated 9<sup>th</sup> October 2018) the Applicant discusses what 'natural conditions' exist in the North Sea in relation to the amounts of cobble-pebble-boulders that used to be in the North Sea vs. amounts of rock dump proposed to be added. We do not consider this to be a valid or appropriate argument for the addition of rock dump / stabilisation material into NNSSR.
- 3.9. Conservation objectives **must** be considered against the total impact, rather than individual impacts split by different sections of the project lifecycle, as is currently the case in the application. We currently cannot appropriately assess total impact including all remedial work during O&M with the information provided, which is highlighted in our response to the first set of examiners written questions.

#### **Mitigation of adverse effect on sandbanks**

- 3.10. JNCC suggests that there are a number of ways that The Applicant could discuss how the proposed operations could aid in restoration of the sandbank feature and the site and deliver net gain. Ongoing and new activities must look to minimise, as far as is technically practicable, changes in substratum and the biological assemblages within the site. This is to further minimise the impact on feature extent and distribution, demonstrating the risk levels that proposed operations will present to the restoration of the extent and distribution of the sandbank feature.

- 3.11. Understanding the mitigation put in place by the Applicant that decreases seabed impact from a worst case scenario could potentially aid in demonstrating that the proposed operations could be considered as reducing impedance of recovery. While neither Natural England nor JNCC would want the Applicant to include a large amount of comparative assessment within their application, it may prove helpful to provide a tabular summary of major mitigation actions that ameliorate impact on seabed. Examples of mitigation measures undertaken by other activities in NNSR include reduction of footprint associated with vessel stabilisation through use of alternative work vessels, provision of evidence to quantify footprint of rock dump needed for works and reuse of existing stabilisation material footprints.
- 3.12. We also suggest that any operations or evidence the Applicant can undertake or provide that reduces uncertainty around impact to feature and site could support provision of a more robust assessment that better reflects the nature of any impacts associated with planned activities.
- 3.13. Please see further comments on sandwave levelling in Annex D3.

#### **Cable burial**

- 3.14. More information on cable burial operations is needed for us to reconsider the above position. We acknowledge that much of the technical detail will only be available post-consent, and as such, we strongly recommend that The Applicant's assessment be considered with sufficient precaution added to allow for significant, post-consent increases in worst-case scenarios, especially when operations occur within MPAs.
- 3.15. From the application, we believe the following to be correct. We would like the Applicant to confirm our understanding and provide answers to the questions:
- Sandwave clearance will occur on sandwaves up to 6 m in height;
  - Burial depth will then be 1-2m into the stable bed below the sandwaves;
  - Remedial works will include:
    - 2.5 remedial burial events per cable,
    - reburial of 2km of cable using jetting,
    - 15 repair events involving recovery of 200 m of cable per repair as well as creation of dredged pits or rock berm,
    - seabed disturbance from jack-up vessel for each repair event.
- 3.16. NB: Natural England and JNCC have considered the Sandwave Levelling Clarification Note provided on 9<sup>th</sup> October 2018 and believe that the impacts of maintenance and repair still aren't clear enough. Please see Annex D3 for full comments.

#### **Sandwave queries**

- 3.17. Please refer to the advice provided on the cable protection and sandwave levelling clarification notes in Annexes D2 and D3.
- 3.18. We do not believe that the following matters have been addressed:
- The extent to which the sandwave heights include the heights of megaripples on top of them is unclear. It would be helpful to understand how much height megaripples could add.
  - It would be helpful to understand if there are results from Race Bank to demonstrate recovery of sandwaves from trenches at 6m depth.
  - It is unclear how The Applicant has considered the change in mobility across the site and whether the majority of the sandwave clearance will focus around

Ower and Leman Banks. It is unclear if the methods need to be different across the site.

- The Applicant should provide further detail as to how they are anticipating that cables will stay buried in a mobile regime where changes in seabed can be in the order of several metres per year and whether these areas of increased fluctuations in seabed correspond to areas of deeper sandwaves.
- The Applicant should provide further justification around the applicability of sandwave clearance modelling for Hornsea Project Two given that the sand mobility within the Hornsea Project Three development site are considerably different.

#### **Cable activities queries**

3.19. Please refer to the advice provided on the cable protection and sandwave levelling clarification notes in Annexes D2 and D3.

3.20. We do not believe that the following matters have been addressed

- It is unclear how the Applicant calculated the 25% figure needed for operational and maintenance activities and whether this figure includes adequate precaution considering evidence from other industrial operations in the region.
- It is unclear if the Applicant expects any cables to be buried within mobile sediment layers and how this relates to the 10% expected to need cable protection, and the 25% remediation expected through operation and maintenance.

#### **4. Reefs**

##### **Adverse effect on reef features**

4.1. **Based on the information presented and flawed methods used for assessment, the Natural England and JNCC cannot currently provide an evidence-based opinion on the scale of the potential impacts to the Annex I *Sabellaria spinulosa* Reef feature of the NNSR SAC.**

4.2. Based on our current understanding, JNCC consider it likely that human activities taking place within the site have the potential to impact on variables that are used to delineate the extent and distribution of area to be managed as *Sabellaria spinulosa* reef (sediment composition and biological assemblages), structure and function (physical structure and biological structure), and supporting processes (supporting habitats). Of note for the industrial activities taking place within the site are operations associated with the deposition of material (e.g. rock dump), or other alteration of surface sediment (e.g. drill cuttings and cabling operations), that may lead to a persistent change in substrate which is not suitable habitat for reef communities.

##### **Favourable condition status of the reef features**

4.3. As such, some extent and distribution of area to be managed as reef could have been lost, in that there are areas present within the site that no longer represent reef feature either due to changes in substrate or movement of the reef feature. However, due to lack of evidence about deposits present within the site (i.e. not based on anticipated worst case scenario estimates), it is currently not possible to quantify the loss of extent. NB: We recognise that in the cable protection clarification note the Applicant has referenced some Dutch studies that provide some confidence that *Sabellaria spinulosa* will colonise artificial structures with similar biological communities to those of natural rocky reef, but until these papers are reviewed in detail by the SNCB's our advice remains unchanged.

- 4.4. Our latest view on condition is that the reef feature is in unfavourable condition and needs to be restored to favourable condition. Installation and/or removal of infrastructure may have a continuing effect on extent and distribution of the reef within the site. Restoration of the feature requires an overall reduction, or removal, of pressures associated with human activities that cause impacts to the reefs' extent and distribution, delineated by both substratum and biological communities. As such, any human activities which can cause pressures resulting in changes to substratum or biological communities to the reef feature may present a risk to the site's restoration. Activities must look to minimise, as far as is practicable, damaging the established, i.e. high confidence, reef within the site.
- 4.5. As above, we note that it is for the competent authority to demonstrate recovery of the site. Recovery is an objective for all sectors placing pressure on the site, including oil and gas, renewables, aggregates and fisheries. We do, however, expect The Applicant to demonstrate the risk levels that they believe their proposed operations will present to the restoration of the extent and distribution of the reef feature. We note that The Applicant may find our discussion of mitigation below helpful in this. As a minimum, this would be to demonstrate that proposed activities will be mitigated to not impede restoration, i.e. that activities will not increase the site's exposure to damaging pressures, particularly in regard to changes in extent and distribution of substratum and biological communities.
- 4.6. The 2017 benthic surveys, as agreed at the EWG, provided DDV transects and ground truthing of some areas around Saturn Reef. This discovered that areas where *Sabellaria* reef had been found by JNCC/Cefas in 2013 no longer were represented by reef, and that the only survey points where reef did occur were outwith the SAC. We recognise that the latest surveys by The Applicant show the continued ephemerality of the *Sabellaria* reef (especially around stations ECR04 and ECR37), but we emphasise that ephemerality does not preclude Annex I status.

#### **Evidence base/mitigation**

- 4.7. JNCC's spatial products for Annex I reef is currently being updated. Version 7 (the current published version) of the Annex I reef layer was provided to the applicant during their PEIR consultation, and we provided updated layer images to the applicant in early 2018. JNCC were expecting to release version 8 before the Hornsea examination, but publication is now expected to be December 2018. We appreciate that this is likely to have caused some frustration for the applicant in being able to assess impact against the most up to date feature layer. We have provided below our current position on Annex I reef in the area around Saturn Reef for consideration, however, we emphasise that it is draft until publication later this year.
- 4.8. We also note that the reef terminology used by JNCC is currently being standardised across industry products. As such, depending on creation date, different products and pieces of advice may refer either to 'potential reef' or 'area to be managed as reef'. These terms delineate areas that represent our best judgement on those parts of the site that should be considered for management as Annex I reef feature. This is what will be represented in version 8 of the reef layer (and in figures below).

#### **Mapping ephemeral features**

- 4.9. The dynamic nature of the reef feature presents challenges to precisely mapping its location at any instance in time and therefore area to be managed as reef ('potential reef') was created by mapping a 500m margin around high quality point and polyline *Sabellaria* records to account for uncertainty in feature extent. We

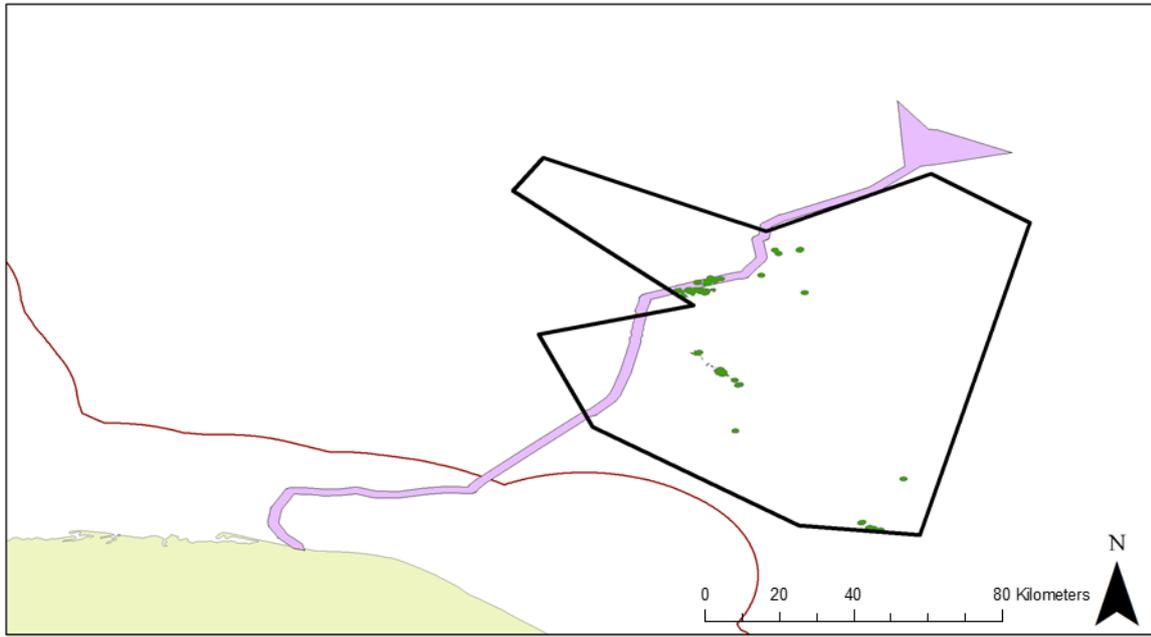
advise that regulators should then apply a further buffer on this area with regards to proposed operations.

- 4.10. We consider the balance of evidence at this time indicates that these areas form part of the full extent of the feature at this site and excluding them risks significantly underestimating the extent and distribution of reef in the site, and puts the feature at risk of not achieving its conservation objectives.

#### **Micro-routing as mitigation**

- 4.11. We believe that with the current cable corridor routing, primary mitigation (i.e. avoiding Annex I reefs within SACs and/or biogenic or geogenic reefs outside SACs within the Hornsea Three offshore cable corridor) will not always be possible, particularly around Saturn Reef where evidence for Annex I reef shows presence across the cable corridor. We do not consider the Applicant's consideration of routing through 'lower quality' reef to be acceptable in terms of restoration of conservation objectives as the 'lower quality' reef mentioned by the applicant is still contained within area to be managed as reef, with the protection provided by Annex I status.
- 4.12. We welcome the applicant's desire to avoid areas of higher quality reef and/or restrict cable installation to the periphery of reef features, and we consider that both of these mitigations may decrease impact on individual reefs. However, we do not consider that they will lower risk related to leaving the overall reef feature in unfavourable condition.
- 4.13. We acknowledge that the applicant considers that *Sabellaria* biotopes have a wide distribution throughout the southern North Sea benthic ecology study area. We agree with this, but we would not agree that Annex I *Sabellaria* reef has a wide distribution in the area (Figure 1).

Fig 1: Annex 1 reef layer v8 (area to be managed as reef).



**Legend**

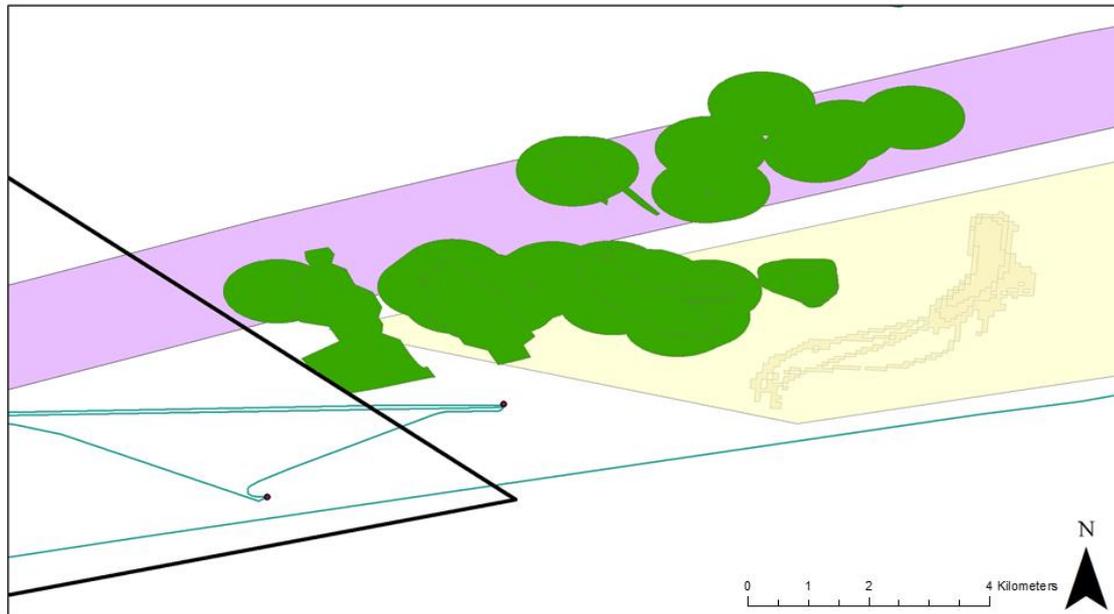
- Area to be managed as Annex I Reef DRAFT output as of 1/11/2018. Finalised layer to be available before January 2019
- North Norfolk Sandbanks and Saturn Reef cSAC/SCI
- Cable\_Corridor\_ETRS89\_v6\_20180207
- UKIreland\_Coastline\_OSGB36
- C20150121\_UKTSandFrBoundary\_WGS84

JNCC @ 2018 except  
 Cable\_Corridor\_ETRS89\_v6\_20180207 @ Orsted 2018  
 UK Territorial Sea Limit. Contains UKHO data © Crown copyright. All rights reserved.  
 World Vector Shoreline © US Defence Mapping Agency. Not to be used for navigation.

### Micrositing as mitigation: Saturn Reef

- 4.14. JNCC have particular concerns over the section of offshore cable routing next to Saturn Reef as we are unsure as to whether the applicant can microsite around the reef feature in this area (Fig 2).

Fig 2: Annex 1 reef layer v8 (area to be managed as reef), Saturn Reef detail showing reef and Hornsea 3 cable corridor.



#### Legend

- Area to be managed as Annex I Reef DRAFT output as of 1/11/2018. Finalised layer to be available before January 2019
- North Norfolk Sandbanks and Saturn Reef cSAC/SCI
- Aggregate production areas
- UK\_Dredging\_2017
- Cable\_Corridor\_ETRS89\_v6\_20180207
- pipeline\_eab\_201807

JNCC @ 2018 except  
Cable\_Corridor\_ETRS89\_v6\_20180207 @ Orsted, aggregate  
production areas and UK\_Dredging\_2017 @ The Crown Estate  
2018, pipeline\_eab\_201807 @ UKOilandGasData 2018

- 4.15. The primary mitigation for impact to *Sabellaria* reef in the application is “where possible” avoidance of reef area. We note that if the suggested mitigation is successful, we would agree with the assessment of magnitude. However, we advise that it is necessary to look at this primary mitigation with a degree of caution, and question whether there are any studies from HHW or IDNRRB that could inform likelihood of success.

### Core reef

- 4.16. The Applicant provided an assessment of the likelihood of reef being present in the area of SAC intersected by the cable corridor prior to construction. This uses Natural England’s concept of core reef and the reef index (Roberts et al, 2014). A core reef approach requires a historical evidence dataset of suitable confidence, which limits its application not least in offshore sites due to the resources required to develop a sufficient evidence base. It has been JNCC’s consistent opinion on offshore casework that a core reef approach is unlikely to be applicable to the assessment of *Sabellaria* in offshore sites because results of the reef index are highly dependent on the number of surveys undertaken in the area of interest.
- 4.17. While we understand that the Applicant has tried to fulfil requirements of the EWG, we consider that further work is needed to be able to characterise the likelihood of *Sabellaria* occurring within NNSRR, at present and before construction. We

strongly suggest re-analysis using the approach that all other industries take when operating in areas of offshore *Sabellaria* reef, which is use of the JNCC reef layer with 500m buffers added to allow for change in reef extent and distribution.

- 4.18. We note that buffering in this way lead in a cumulative exclusion zone across the whole of the cable corridor. We suggest that The Applicant considers possibly reroutes around the area of Saturn Reef, or provides evidence as to why rerouting is not possible (for example presence of aggregates extraction areas or a series of cable crossings that would cause prohibitive cost).

## 5. Phased build

- 5.1. There are elements of the phased build approach that have not been fully explored in the worst case scenario for cable installation as that includes all of the cables being installed at once and the extent of that impact. However, the ability for features to recover may be hindered by repetitive adjacent impacts from the installation and associated infrastructure.

## 6. Survey evidence

- 6.1. JNCC has a considerable amount of questions for the Applicant on their analysis and interpretation of benthic survey results. We had the opportunity through the Benthic EWG to provide initial comments to The Applicant on the quality of their benthic analysis. Where The Applicant provided comment, we remain uncertain that the analyses have been undertaken to the standards that we would expect in a development of this nature. Please see detailed comments in the table below.
- 6.2. We have questions for the Applicant relating to the biotopes noted within NNSR. These are highlighted in the 'comments' column below.

Table 6.1 – Detailed comments on biotope classification.

Station	Epifaunal biotope	Infaunal biotope	Comments
ECR27	IMoSa	NcirBat	Is IMoSa an epifaunal biotope? The epifaunal components seem slightly unusual for IMoSa – <i>Cliona</i> , <i>Conopeum</i> , hydroid / bryozoan mixed turf etc – these would all need attachment points, which seem unlikely to be common in mobile sand. Are these just rare observations? The significance of these results are hard to interpret without some understanding of what the abundances mean in the epifaunal abundances matrix.
ECR28	IMoSa	AfilMysAnit	
ECR34	SspiMx	-	Is it correct that only <i>Sabellaria</i> was seen from DDV results? No other epifauna is mentioned.
ECR37	FluHyd	-	No <i>Flustra</i> / Flustridae nor <i>Hydrallmania</i> present in survey results – this seems counterintuitive to biotope results

## 7. Detailed comments

Table 7.1 – Comments on Vol. 2 Chapter 1 – Benthic Ecology

Point	Chapter section	Comment
7.1.1.	T2.9	Definition of SS.SSa.IFiSa.IMoSa needs editing, some words appear to be missing. We are also unclear why this biotope is included as an epifaunal biotope, with much of the characteristic abundance being infaunal.
7.1.2.	T2.9	SS.SCS.ICS.SSh – we are unclear as to whether this biotope is correctly assigned.
7.1.3.	T2.13	Habitat E: when outwith European sites, <i>Sabellaria</i> reef remains an Annex I feature
7.1.4.	T2.14	Temporary habitat loss: offshore cable corridor – total subtidal temporary habitat loss adds up to 30,237,542 m <sup>2</sup> , not the 29,789,810 m <sup>2</sup> in the document (unless some sets of impact are on the same area of site).
7.1.5.	T2.14	Temporary habitat loss: offshore cable corridor – where does the figure of 1,202,946 m <sup>3</sup> originate from? Can this be signposted to another document?
7.1.6.	T2.14	Long term loss of seabed habitat: offshore cable corridor – we are pleased that The Applicant are considering a range of cable protection options. We suggest that it is noted in the table which options are being considered for inshore only (e.g. fronding, artificial seaweed).
7.1.7.	T2.14	<p><i>‘Long term loss of seabed habitat through presence of foundations, scour protection and cable protection, resulting in potential effects on benthic receptors’:</i></p> <ul style="list-style-type: none"> <li>• Using The Applicant’s impact assessment tables, we believe magnitude in NNSSR should be moderate, as minor implies the lack of long-term loss to the system. Moderate, on the other hand, implies that there is some degree of long term loss.</li> <li>• It is currently unclear how this phase of long-term habitat loss coincides with footprints of temporary habitat loss from construction work. This needs to be detailed to allow best understanding of total impact.</li> <li>• It is currently unclear to us how these figures relate to replenishment of 25% of cable length and crossings and the permanent habitat loss at decommissioning. Is extra cable protection expected in this, and where is the expected extra cable protection included – is it included under long term loss? What percentage of this 25% is expected to need cable protection?</li> <li>• Spud cans – is it expected that hard substrate will be needed for stabilisation of spud cans. If not, please provide evidence for this.</li> </ul>

		<ul style="list-style-type: none"> <li>• Prediction of no long term habitat loss should be evidenced fully. We advise that the impact does not need to weaken regional ecosystem functions to be significant.</li> </ul> <p><i>Colonisation of foundations / cable protection / scour protection may affect benthic ecology and biodiversity</i></p> <p>We agree that potential beneficial effects may occur from introduction of hard substrate into a soft substrate system. However, within MPAs, this must be considered secondary to the requirement to recover or maintain the features for which the site is designated. As such, any potential benefits from hard substrate in NNSSR are contradicted by the impact that the hard substrate will have on the features of the site and the achievement of recovery.</p> <p>We suggest that The Applicant continues to consider potential interaction with <i>Didemnum vexillum</i> before construction, given that it has been found subtidally in the North Sea, and that it is known to be both invasive and can invade sediment seabeds.</p>
7.1.8.	2.9.2.5	We suggest that the “expert’s professional judgement” is elaborated upon – what qualifies that person as an expert? In accordance with the latest EIA Directive, throughout the application it would be useful to understand evidence bases and the quality assurances for ‘appropriateness’
7.1.9.	T2.18	We note that areas of low reef and medium reef should be determined as Annex I reef, as does areas of potential reef.
7.1.10.	<i>General point</i>	We would like further discussion with The Applicant about the details of routing around reef – would this be to the expected 500 m as per JNCC guidance, or would it be considerably nearer to areas of reef? We would like to consider further the relative value of restricting routes to the periphery of reef features versus bisection.
7.1.11.	<i>General point</i>	Cable / scour protection optimisation is noted as “may include”. What likelihood is there that optimisation will occur?
7.1.12.	2.11.1.13 2.11.1.40 / RIAA 5.6.1.5	“ <i>it is reasonable to assume similarity of sediment particle size with depth based on sediment transport processes</i> ”. Could this be elaborated on? It is discussed in the Marine Processes chapter? If so, could it be signposted. If not, references should be provided that explain the comment. For example Standard aggregate best practice is to acquire sediment profile data to ascertain the correct depth they can dredge to whilst still leaving behind some of surface sediment type. Therefore we advise that it would be worth looking into if there is a standard depth for this? But if the Applicant is alluding to bathymetric depth here then we would agree.
7.1.13.	2.11.1.5	We are unsure what a “displacement scour” is as a method of boulder clearance. Could this be explained further in relation of levels of impact. What levels of impact are included in the previous assessment of cable impacts?
7.1.14.	2.11.1.17	This needs to be explained further.
7.1.15.	2.11.1.19	Impact is not just area, but also timing and relative severity.
7.1.16.	2.11.1.29	Habitats D and E should be separated for assessment, and this paragraph needs splitting to apply either to D or E (or both). Evidence regarding <i>Sabellaria</i> also needs to be corrected to provide consistent understanding of the organism to impact and the reef to impact.

7.1.17.	2.11.1.45	JNCC/Cefas survey should be referenced.
7.1.18.	2.11.1.46	"... conditions for <i>S. spinulosa formation</i> " should read "... conditions for <i>S. spinulosa reef formation</i> " This is also still confused on sandwave levelling and cable protection clarification notes Oct 2018.
7.1.19.	2.11.1.50	Reference needs adding to the reference list.
7.1.20.	2.11.1.52	We understand that there is more flexibility in the temporary working corridor, but temporary or long term impact may still occur there that coincides with areas of reef or potential reef. We suggest that this area is treated in the same way as the cable corridor itself.
7.1.21.	2.11.1.61	The updated Conservation Objectives for the site should be used, not JNCC 2012.
7.1.22.	T2.32	We advised The Applicant that aggregates Area 483 is now licensed. Dredging area and exclusion zones can be obtained from the MMO.
7.1.23.	2.12.2.3	We recommend that temporary impacts associated with maintenance operations be included in CEA.

Table 7.2. – Detailed comments on the Benthic Ecology Technical Report

Point	Chapter section	Comment																
7.2.2.	iv	Circalittoral definition needs changing to "subzone of the sublittoral".																
7.2.3.	2.2.1.5	<p>"Over a series of EWG meetings conducted between June 2016 and publication of this Environmental Statement, it was agreed that in general this approach was appropriate and sufficient for the purposes of characterising the benthic ecology of the Hornsea Three benthic ecology study area,"</p> <p>We note that this agreement was before the re-routing discussions.</p>																
7.2.4.	T3.1	<p>As per response to examiners written questions This table needs correcting so that the EUNIS Habitat Types correctly correspond to the UK biotope codes. Please find corrected version below:</p> <table border="1"> <tr> <td rowspan="3">A5.24</td> <td rowspan="3">Infralittoral muddy sand</td> <td>SS.SSa.IMuSa.EcorEns <i>Echinocardium cordatum</i> and <i>Ensis</i> spp. in lower shore and shallow sublittoral slightly muddy fine sand</td> </tr> <tr> <td>SS.SSa.IMuSa.FfabMag <i>Fabulina fabula</i> and <i>Magelona mirabilis</i> with venerid bivalves and amphipods in infralittoral compacted fine muddy sand</td> </tr> <tr> <td>SS.SSa.CFiSa.EpusOborApri <i>Echinocyamus pusillus</i>, <i>Ophelia borealis</i> and <i>Abra prismatica</i> in circalittoral fine sand</td> </tr> <tr> <td>A5.26</td> <td>Circalittoral muddy sand</td> <td>SS.SSa.CMuSa Circalittoral muddy sand</td> </tr> <tr> <td rowspan="3">A5.13</td> <td rowspan="3">Infralittoral coarse sediment</td> <td>SS.SCS.ICS Infralittoral coarse sediment</td> </tr> <tr> <td>SS.SCS.ICS.MoeVen <i>Moerella</i> spp. with venerid bivalves in infralittoral gravelly sand</td> </tr> <tr> <td>SS.SCS.ICS.CumCset Cumaceans and <i>Chaetozone setosa</i> in infralittoral gravelly sand</td> </tr> <tr> <td>A5.45</td> <td>Offshore mixed sediments</td> <td>SS.SMx.Omx.PoVen Polychaete-rich deep <i>Venus</i> community in offshore gravelly muddy sand</td> </tr> </table>	A5.24	Infralittoral muddy sand	SS.SSa.IMuSa.EcorEns <i>Echinocardium cordatum</i> and <i>Ensis</i> spp. in lower shore and shallow sublittoral slightly muddy fine sand	SS.SSa.IMuSa.FfabMag <i>Fabulina fabula</i> and <i>Magelona mirabilis</i> with venerid bivalves and amphipods in infralittoral compacted fine muddy sand	SS.SSa.CFiSa.EpusOborApri <i>Echinocyamus pusillus</i> , <i>Ophelia borealis</i> and <i>Abra prismatica</i> in circalittoral fine sand	A5.26	Circalittoral muddy sand	SS.SSa.CMuSa Circalittoral muddy sand	A5.13	Infralittoral coarse sediment	SS.SCS.ICS Infralittoral coarse sediment	SS.SCS.ICS.MoeVen <i>Moerella</i> spp. with venerid bivalves in infralittoral gravelly sand	SS.SCS.ICS.CumCset Cumaceans and <i>Chaetozone setosa</i> in infralittoral gravelly sand	A5.45	Offshore mixed sediments	SS.SMx.Omx.PoVen Polychaete-rich deep <i>Venus</i> community in offshore gravelly muddy sand
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7.2.5.	3.1.2.12	"generally these were not identified as having potential for <i>S. spinulosa</i> reefs" – this statement needs referencing.																																																																																
7.2.6.	4.1.4.37	<p>For all issues with biotopes, please also see our pre-application discussions with The Applicant [can the email from the Applicant be included as an appendix? We've got further comments on it].</p> <p>We would like to see photographic evidence of the biotope SS.SCS.ICS.SSh.</p> <p>We are unsure about the validity of this paragraph. There is a high degree of overlap between hydrodynamic conditions in IMoSa and SSh because of the mobility of the sediment, though the level of mobility will clearly be different (higher levels of energy needed for movement of larger clasts). Whether that reflects into ecological equivalence, we are unsure, especially with a different assemblage of species expected to occur in each biotope:</p> <p>IMoSa:</p> <table border="1" data-bbox="438 761 1380 1657"> <thead> <tr> <th>Taxa</th> <th>Frequency</th> <th>Typical Abundance</th> <th>% Contribution to similarity</th> <th>Abundance (no.<sup>2</sup>)</th> </tr> </thead> <tbody> <tr> <td><i>Nephtys</i></td> <td>●</td> <td>P</td> <td>4</td> <td>3</td> </tr> <tr> <td><i>Nephtys cirrosa</i></td> <td>●</td> <td>P</td> <td>11</td> <td>2</td> </tr> <tr> <td><i>Gastrosaccus spinifer</i></td> <td>●</td> <td>P</td> <td>13</td> <td>2</td> </tr> <tr> <td><i>Pontocrates arenarius</i></td> <td>●</td> <td>P</td> <td>17</td> <td>4</td> </tr> <tr> <td><i>Urothoe brevicornis</i></td> <td>●</td> <td>P</td> <td>15</td> <td>2</td> </tr> <tr> <td><i>Bathyporeia elegans</i></td> <td>●</td> <td>P</td> <td>1</td> <td>1</td> </tr> <tr> <td><i>Eurydice pulchra</i></td> <td>●</td> <td>P</td> <td>6</td> <td>2</td> </tr> <tr> <td><i>Pagurus bernhardus</i></td> <td>●●●●●</td> <td>P</td> <td>41</td> <td></td> </tr> <tr> <td><i>Liocarcinus depurator</i></td> <td>●●</td> <td>R</td> <td>4</td> <td></td> </tr> <tr> <td><i>Ammodytes</i></td> <td>●●</td> <td>F</td> <td>3</td> <td></td> </tr> <tr> <td><i>Ammodytes tobianus</i></td> <td>●●●●</td> <td>P</td> <td>46</td> <td></td> </tr> <tr> <td><i>Pleuronectes platessa</i></td> <td>●●</td> <td>P</td> <td>6</td> <td></td> </tr> </tbody> </table> <p>SSh:</p> <table border="1" data-bbox="454 1758 1316 2016"> <thead> <tr> <th>Taxa</th> <th>Frequency</th> <th>Typical Abundance</th> <th>% Contribution to similarity</th> <th>Abundance (no.<sup>2</sup>)</th> </tr> </thead> <tbody> <tr> <td><i>Chaetopterus variopedatus</i></td> <td>●●●●●</td> <td>R</td> <td>100</td> <td></td> </tr> <tr> <td><i>Spisula elliptica</i></td> <td>●●●●●</td> <td>P</td> <td>100</td> <td>4</td> </tr> </tbody> </table>	Taxa	Frequency	Typical Abundance	% Contribution to similarity	Abundance (no. <sup>2</sup> )	<i>Nephtys</i>	●	P	4	3	<i>Nephtys cirrosa</i>	●	P	11	2	<i>Gastrosaccus spinifer</i>	●	P	13	2	<i>Pontocrates arenarius</i>	●	P	17	4	<i>Urothoe brevicornis</i>	●	P	15	2	<i>Bathyporeia elegans</i>	●	P	1	1	<i>Eurydice pulchra</i>	●	P	6	2	<i>Pagurus bernhardus</i>	●●●●●	P	41		<i>Liocarcinus depurator</i>	●●	R	4		<i>Ammodytes</i>	●●	F	3		<i>Ammodytes tobianus</i>	●●●●	P	46		<i>Pleuronectes platessa</i>	●●	P	6		Taxa	Frequency	Typical Abundance	% Contribution to similarity	Abundance (no. <sup>2</sup> )	<i>Chaetopterus variopedatus</i>	●●●●●	R	100		<i>Spisula elliptica</i>	●●●●●	P	100	4
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		<p><b>EPIBENTHIC SURVEYS</b></p> <p>We note that <i>P. bernhardus</i> is rare in survey results for epibenthic biotopes, and is associated with coarse sediment cluster m.</p> <p>Epifaunal abundance – “tubes” should not be included if they cannot be assigned to at least phylum.</p> <p>Please provide the meaning of 0.1, 1, 2, 3 etc. for epifaunal abundance matrix.</p> <p>We are unclear as to the evidence underlying determination of biotopes and are unsure whether the biotope descriptions are meant to be JNCC defined biotopes or biotopes altered to fit particular Hornsea Three survey results. This should be made clear as a number of biotopes seems considerably different from the biotope descriptions on the JNCC website. For example, the biotope SS.SBR.PoR.SspiMx (A5.611) reads in Table 4.2: Hornsea Three Biotope Description Characterising species accounting for up to 75% of cumulative similarity (SIMPER) This biotope occurred on mixed sediments and was characterised by high abundances of the tube-building polychaete <i>Sabellaria spinulosa</i> and a diverse community of infaunal polychaetes including <i>Polycirrus</i> spp., <i>Scalibregma inflatum</i>, <i>Mediomastus fragilis</i> and <i>Pholoe baltica</i> together with the bivalve mollusc <i>Abra alba</i>. <i>Amphiura filiformis</i>, <i>Kurtiella bidentata</i>, <i>Pholoe baltica</i>, <i>Glycera alba</i>, <i>Goniada maculata</i>, <i>Notomastus</i> spp., <i>Nemertea</i> spp., <i>Mediomastus fragilis</i>, <i>Lumbrineris gracilis</i>, <i>Upogebia deltaura</i>, <i>Corbula gibba</i>, <i>Phoronis</i>, <i>Magelona alleni</i>, <i>Cylichna cylindracea</i>, <i>Gattyana cirrhosa</i>, <i>Owenia</i>, <i>Atherospio guillei</i>, <i>Callianassa subterranean</i>. Of these, only <i>Mediomastus fragilis</i> is included in the characterising species list within the JNCC biotope description. We would expect to see characterisation to involve species we consider to be important in the biotope, in this case, <i>Sabellaria spinulosa</i>, <i>Flustra foliacea</i>.</p> <p>Benthic Ecology Technical Report (Appendices O-P) 2.2.30 DDV / trawl / grab abundances We would like clarification on the following:</p> <ul style="list-style-type: none"> <li>- How taxa marked with a ? (e.g. ?<i>Corystes cassivelaunus</i>, ?<i>Tubularia</i>) were considered in analysis We would like to see evidence for the identification of the following from DDV, and comment on whether DONG Energy considers potential misidentification of any/all of them could cause significant changes in analytical results: - <i>Arachnidium fibrosum</i> - <i>Clytia hemisphaerica</i> - <i>Edwardsiidae</i> - <i>Escharella immersa</i> - <i>Campanulinoidea</i> - <i>Pedicellina</i> spp. - <i>Alcyonidium parasiticum</i> - <i>Triticella</i> spp</li> </ul> <p><b>EPIBENTHIC TRAWL SURVEYS</b></p> <p>Trawl data – why is <i>Simnia patula</i> in a cluster without <i>A. digitatum</i>? Surely this would suggest that at least this cluster is not ecologically meaningful?</p>
7.2.7.	F4.20	We question why crustaceans are not represented in IMoSa given the previous importance placed in <i>Asterias</i> and <i>Astropecten</i> as characterising species.

7.2.8.	F4.21	We question why crustaceans are not represented in IMoSa given the previous importance placed in <i>Asterias</i> and <i>Astropecten</i> as characterising species.
7.2.9.	T5.2	Site information should be updated to NNSSR SAC

### 7.3. Disposal site characterisation

7.3.1. Section 4.1.2.7 notes that material different to surface sediment may be disposed (further detail in comments in relation to marine processes).