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[D3_HOW03_Appendix 15_The Wash.pdf](#)
[D3_HOW03_Appendix 16_NF_Ornithology_Roadmap.pdf](#)
[D3_HOW03_Appendix 17_Age class data.pdf](#)
[D3_HOW03_Appendix 18_Kuhn et al. CIGRE 2016.pdf](#)
[D3_HOW03_Appendix 19_Order Lim_amend.pdf](#)

Dear Kay, K-J

Please find attached the seventh instalment of documents.

Best regards,
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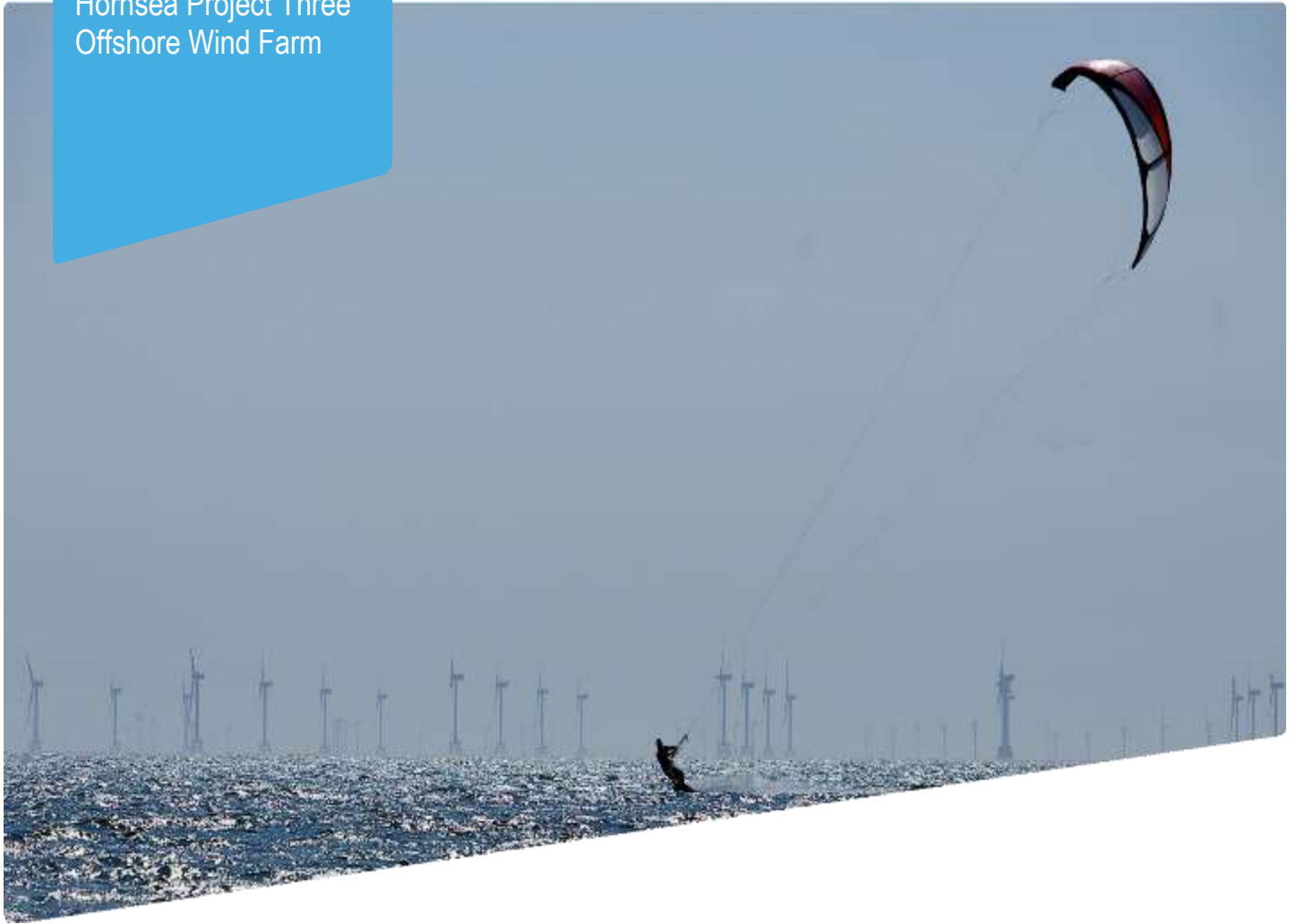
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Appendix 15 to Deadline 3 Submission - The Wash and North Norfolk Coast SAC In-combination Assessment

Date: 14th December 2018

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1. Introduction

- 1.1 Natural England's response to Ex.A question Q1.2.32 at Deadline 1 (REP1-212) stated that in their opinion seabed disturbance associated with operation and maintenance activities should have been scoped into the cumulative impact assessment for benthic ecology in Volume 2, Chapter 2: Benthic Ecology of the Environmental Statement (APP-062). Natural England also commented on the benthic sections of the Report to Inform Appropriate Assessment (RIAA; APP-051) in Annex D5 of their Written Representation (REP1-214), noting that the in-combination impacts for the Wash And North Norfolk Coast Special Area of Conservation (SAC) should include recent Race Bank offshore wind farm marine licence applications/variation, which the Applicant has highlighted were not available at the time the Development Consent Order (DCO) application was submitted. The Wildlife Trust's Written Representation (REP1-023) also requested the in-combination assessment be updated to include the latest Race Bank marine licence applications, but also the Lincs marine licence applications for operation and maintenance works on export cables. Natural England requested in Annex D4 of their Written Representation (REP1-217) that such an in-combination assessment should consider the extents of the SAC sub-features, which Natural England made available to the Applicant in November 2018.
- 1.2 In the Applicant's response to Natural England's comments, as submitted at Deadline 2 (REP2-005), the Applicant committed to provide an update to the in-combination assessment for The Wash and North Norfolk Coast SAC for submission at Deadline 3, which would include the recent Race Bank marine licence applications and present the areas of seabed affected by temporary, long term and permanent habitat loss in the context of the SAC sub-features.
- 1.3 This note therefore presents an updated in-combination assessment of temporary disturbance and long-term/permanent habitat loss across the entire lifetime (i.e. construction, operation and maintenance and decommissioning phases) of Hornsea Three for The Wash and North Norfolk Coast SAC. It should be noted, that this note has also considered any additional marine licence applications for operation and maintenance activities within the SAC that have been submitted since the DCO application was made and were therefore not available to inform the assessment presented in Volume 2, Chapter 2: Benthic Ecology of the Environmental Statement and the RIAA. Any existing infrastructure and previously completed construction activity for offshore wind farm projects in the SAC are considered to be a part of the baseline for assessment purposes (see section 5.7.1 of the RIAA). This note should be read alongside the RIAA which includes further discussion of sensitivity and recoverability of the relevant Annex I features and sub-features and Appendix A of the RIAA which considers the implications for each of the attributes and targets for the relevant Annex I features, as set out in the Conservation Objectives for the SAC (APP-051 and AS-002).

2. In-combination Temporary Habitat Loss/Disturbance Over the Project Lifetime

Hornsea Three alone assessment

- 2.1 As outlined in paragraph 2.11.1.69 of Volume 2, Chapter 2: Benthic Ecology of the Environmental Statement and paragraph 5.5.1.2 of the RIAA, in the maximum design scenario a maximum area of up to 2,356,714 m² may be subject to temporary habitat loss/disturbance within The Wash and North Norfolk Coast SAC during the construction phase resulting from the burial of export cables, pre-construction activities (e.g. sandwave clearance) and anchor placements, representing 0.22% of the total area of the SAC. With regard to the corresponding proportions of the sub-features of Annex I 'sandbanks which are slightly covered by seawater all the time' which may be affected by Hornsea Three (i.e. Subtidal Coarse Sediment, Subtidal Mixed Sediments and Subtidal Sand), the maximum design scenario for each sub-feature is based on the length of the Hornsea Three offshore cable corridor that passes through each of the following biotopes as shown in Figure 4.28 of Volume 5, Annex 2.1: Benthic Ecology Technical Report of the Environmental Statement (APP-102): SS.SBR.PoR.SspiMx biotope (i.e. Subtidal Mixed Sediment sub-feature); SS.SCS.ICS.MoeVen biotope (i.e. Subtidal Coarse Sediment sub-feature); and SS.SSA.IFiSa.NcirBat (i.e. Subtidal Sand sub-feature). The maximum design scenario assumes that all sandwave clearance material deposition occurs wholly within one or other of the sub-features, and as such is highly conservative, as it is highly unlikely that all material would be deposited wholly within one or other of the sub-features. Based on this scenario, the maximum predicted percentage habitat losses of each sub-feature within the SAC (as provided in the data supplied by Natural England in November 2018) associated with temporary habitat loss during the construction of Hornsea Three are presented in Table 2-1. Temporary habitat loss during construction may affect up to 0.15% of Sublittoral Sand, 1.84% of Subtidal Coarse Sediment and 1.72% of Subtidal Mixed Sediment. For the reasons outlined above (e.g. placement of sandwave clearance material wholly within each of these sub-features), these proportions are not additive, but represent a maximum design scenario for each of the three sub-features of the Annex I sandbanks feature.

- 2.2 As outlined in paragraph 2.11.2.162 of Volume 2, Chapter 2: Benthic Ecology of the Environmental Statement and paragraph 5.5.2.34 of the RIAA, in the maximum design scenario a maximum area of up to 198,838 m² may be subject to temporary habitat loss/disturbance within The Wash and North Norfolk Coast SAC during the operation and maintenance phase as a result of localised cable remedial burial and repair works. At this stage it is not possible to specify where the remedial works will take place, therefore the maximum design scenario assumes that all habitat loss occurs wholly within one or other of the sub-features. As such, these proportions are not additive, but represent a maximum design scenario for each of the three sub-features of the Annex I sandbanks feature. Based on this scenario, the maximum predicted percentage habitat losses of each sub-features within the SAC (as provided in the data supplied by Natural England in November 2018) associated with temporary habitat loss during the operation and maintenance phase of Hornsea Three are presented in Table 2-1. Temporary habitat loss during operation and maintenance is, even in the maximum design scenario outlined above, predicted to affect very small proportions of the SAC sub-features; up to 0.03% of Sublittoral Sand, 0.55% of Subtidal Coarse Sediment and 0.26% of Subtidal Mixed Sediment. As noted above, this is a highly conservative, as it is highly unlikely that all remedial burial and repair works would occur wholly within one or other of the sub-features, should these activities be required at all.
- 2.3 Over the entire project lifetime (i.e. construction, operation and maintenance and decommissioning) Hornsea Three, in the maximum design scenario, total temporary habitat loss would not exceed 2,555,552 m² within The Wash and North Norfolk Coast SAC and would be likely to be lower than this extent. The maximum predicted percentage habitat losses of each sub-features within the SAC (as provided in the data supplied by Natural England in November 2018) associated with temporary habitat loss across the entire project lifetime of Hornsea Three are presented in Table 2-1. As outlined above, these proportions are not additive, but represent a maximum design scenario for each of the three sub-features of the Annex I sandbanks feature. It is important to highlight that the impacts to associated benthic communities will be temporary and reversible as recovery is predicted within the timescales outlined in paragraph 2.11.1.74 *et seq.* of Volume 2, Chapter 2: Benthic Ecology of the Environmental Statement.

Table 2-1: Maximum temporary habitat loss/disturbance during the construction phase, operation and maintenance phase and project lifetime for sub-features of the Annex I sandbank feature of The Wash and North Norfolk Coast SAC.

| Sub-feature of Annex I sandbanks | Temporary habitat loss/disturbance (m ²) during construction (maximum proportion of sub-feature affected within SAC) | Temporary habitat loss/disturbance (m ²) during operation and maintenance (maximum proportion of sub-feature affected within SAC) | Temporary habitat loss/disturbance (m ²) across entire project lifecycle (maximum proportion of sub-feature affected within SAC) |
|----------------------------------|--|---|--|
| A5.2 Sublittoral sand | 868,354 (0.15%) | 198,838 (0.03%) | 1,067,192 (0.18%) |

| Sub-feature of Annex I sandbanks | Temporary habitat loss/disturbance (m ²) during construction (maximum proportion of sub-feature affected within SAC) | Temporary habitat loss/disturbance (m ²) during operation and maintenance (maximum proportion of sub-feature affected within SAC) | Temporary habitat loss/disturbance (m ²) across entire project lifecycle (maximum proportion of sub-feature affected within SAC) |
|----------------------------------|--|---|--|
| A5.1 Sublittoral coarse sediment | 661,114 (1.84%) | 198,838 (0.55%) | 859,952 (2.39%) |
| A5.4 Sublittoral mixed sediments | 1,339,354 (1.72%) | 198,838 (0.26%) | 1,538,192 (1.98%) |

In-combination maximum design scenario

- 2.4 The following sections consider the potential for in-combination temporary habitat loss/disturbance effects within The Wash and North Norfolk Coast SAC over the entire lifetime of Hornsea Three together with the following projects:
- Operation and maintenance activities along the Race Bank offshore wind farm export cable route (MLA/2017/00333);
 - Remedial cable burial works for the Race Bank offshore wind farm cable route (L/2017/00459/1);
 - Remedial cable burial works (dredging and back-filling) for the Race Bank offshore wind farm cable route (Ørsted, 2018); and
 - Operation and maintenance activities for the Lincs offshore wind farm cable route (MLA/2015/00290/1).
- 2.5 As outlined in Section 2.12 of Volume 2, Chapter 2: Benthic Ecology of the Environmental Statement, the existing infrastructure and previously completed construction activity for the Lincs and Race Banks offshore wind farm projects is considered to be a part of the baseline for assessment purposes and so is not considered further here.
- 2.6 Table 2-2 below provides the details of the temporary habitat loss associated with these other projects that have been considered in the in-combination assessment for The Wash and North Norfolk Coast SAC. The maximum predicted area of in-combination temporary habitat loss across the lifetime of Hornsea Three is 3,238,289 m², which equates to 0.3% of the total area of The Wash and North Norfolk Coast SAC.

Table 2-2: Projects considered in the in-combination assessment for temporary habitat loss/disturbance over the entire project lifetime of Hornsea Three for the Wash and North Norfolk Coast SAC.

| Project | Total temporary habitat loss (m2) | Notes |
|---|-----------------------------------|--|
| Hornsea Three – construction phase | 2,356,714 | |
| Hornsea Three – operation and maintenance phase | 198,838 | Calculated on the assumption that, as approximately 7% of the total export cable length coincides with The Wash and North Norfolk Coast SAC, 7% of the total operational temporary habitat loss along the Hornsea Three offshore cable corridor could occur within the site (see paragraph 2.11.2.162 of Volume 2, Chapter 2: Benthic Ecology of the Environmental Statement). |
| Race Bank - operation and maintenance activities | 11,328 | The footprint of these works overlaps spatially with other activities along the export cable including local levelling, cable installation and boulder clearance. |
| Race Bank - remedial cable burial works (already undertaken) | 263,610 | |
| Race Bank - remedial cable burial works (dredging and back-filling) | 344,799 | |
| Lincs - operation and maintenance activities | 63,000 | Worst case scenario of all ten instances of cable reburial and all five cable repair works occurring within the SAC. If this is the case, there will be temporary habitat disturbance of 63,000 m ² . This is a highly conservative scenario as much this work could occur outside the SAC, i.e. the Lincs export cables are not entirely within the SAC, if cable reburial and repair operations are required on export cables at all. |
| Total | 3,238,289 | |

- 2.7 It should be noted, however, that the majority (73%) of this in-combination temporary habitat loss is associated with the construction phase for Hornsea Three and will therefore occur over up to three years of the Hornsea Three construction phase, with recovery following cable burial. In addition, remedial cable burial works associated with the Race Bank offshore cables has already been completed (see Table 3-1) accounting for a further 8% of the in-combination temporary habitat loss. The remaining 19% of the in-combination temporary habitat loss for Hornsea Three, Race Bank and Lincs is more likely to occur intermittently over the lifetime of Hornsea Three (should maintenance operations be required at all) and will be highly localised to specific sections of the SAC (Note: for Lincs operation and maintenance activities, some or all of these activities may occur outside the SAC). Therefore, as per the Hornsea Three alone assessment for temporary habitat loss presented in paragraph 2.11.1.73 of Volume 2, Chapter 2: Benthic Ecology of the Environmental Statement, the magnitude of the in-combination impact is considered to be minor.
- 2.8 The assessment of the sensitivity of the sub-features of the Annex I sandbank feature is presented in full in paragraph 2.11.1.74 *et seq.* of Volume 2, Chapter 2: Benthic Ecology of the Environmental Statement and paragraph 5.5.1.2 *et seq.* of the RIAA. The biotopes representative of the sub-features of Annex I 'Sandbanks which are slightly covered by seawater all the time' are deemed to be of low to medium vulnerability and medium to high recoverability. The sensitivity of the receptor is therefore, considered to be low to medium. The benthic communities are predicted to recover between these disturbance events (recovery taking up to a maximum of five years, depending on the sub-feature affected) so that no long-term effects are predicted.

Conclusion – Temporary habitat loss/disturbance

- 2.9 Overall, and as predicted for the Hornsea Three assessment alone in paragraph 2.11.1.80 of Volume 2, Chapter 2: Benthic Ecology of the Environmental Statement, the cumulative effect of temporary habitat loss/disturbance on benthic habitats within The Wash and North Norfolk Coast SAC over entire lifetime of Hornsea Three is, therefore, predicted to be of minor adverse significance, which is not significant in EIA terms.
- 2.10 Considering the effects of temporary habitat loss/disturbance associated with Hornsea Three in-combination with the other projects considered above, the following Conservation Objectives are relevant to the Annex I Sandbanks which are slightly covered by sea water all the time feature, and associated sub-features, of the Wash and North Norfolk Coast SAC.
- To ensure that, subject to natural change, the extent and distribution of qualifying natural habitats are maintained;
 - To ensure that, subject to natural change, the structure and function (including typical species) of qualifying natural habitats are maintained; and
 - To ensure that, subject to natural change, the supporting processes on which qualifying natural habitats are maintained.
- 2.11 Each of these Conservation Objectives and their associated attributes are considered in turn below, in line with the approach taken for Hornsea Three alone in Table 9.1 of Appendix A of the RIAA.
- 2.12 To ensure that, subject to natural change, the extent and distribution of qualifying natural habitats are maintained:

- Presence and spatial distribution of biological communities: While a small proportion of the extent of the sandbank habitats of the SAC may be affected by temporary habitat loss/disturbance (i.e. up to 0.3% of the total area of the SAC), the vast majority of this would be affected during Hornsea Three construction, or has already occurred in the case of Race Bank remedial burial. Full recovery of communities into the discrete areas affected by habitat loss/disturbance will occur over a period of years (i.e. up to a maximum of five years) following construction. Following the Hornsea Three construction phase, any further habitat loss/disturbance would be highly localised and spatially discrete areas (if maintenance activities are required at all) with no overlap between the projects and recovery of communities occurring following disturbance. As such, the presence and spatial distribution of biological communities of the subtidal sandbank communities will be maintained.
- Extent and Distribution: As outlined above, the proportion of the subtidal sandbanks affected by Hornsea Three in-combination with other projects is predicted to be small, even in the maximum design scenario, with the vast majority of effects occurring during Hornsea Three construction. Effects will be limited to sub-features of the Annex I sandbanks habitat, all of which have the potential to fully recover, with no direct impacts predicted on Annex I sandbanks features. As such, the total extent and spatial distribution of subtidal sandbanks will be maintained.

2.13 To ensure that, subject to natural change, the structure and function (including typical species) of qualifying natural habitats are maintained:

- Presence and abundance of key structural and influential species: While a small proportion of sub-features of the Annex I sandbanks habitat will be affected by temporary habitat loss/disturbance, key species will recover into the areas affected by cable installation and maintenance operations following cessation of such operations. The abundance of key species associated with each of the sub-features of the Annex I sandbanks habitat will therefore be maintained, allowing them to continue to be a viable component of the habitat;
- Sediment composition and distribution: Following cable installation works for Hornsea Three and cable maintenance operations for Hornsea Three and the other projects considered, sediment composition will be altered in highly localised areas where cable works have occurred, although full recovery of sediments will occur soon after cessation of such operations. Distribution of sediments across the SAC will be affected in discrete areas where cable installation operations occur, although will not be affected at the scale of wider Annex I sandbank feature. The distribution of sediment composition across the feature will therefore be maintained for the Annex I sandbank feature and its sub-features.
- Species composition of component communities: As outlined above, while a small proportion of the Annex I sandbank habitat feature would be affected by Hornsea Three in-combination with other projects, component communities will recolonise the areas affected over a period of years (i.e. up to five years) following cessation of such operations. The species composition of the component communities associated with the sub-features of the Annex I sandbanks habitat feature will therefore be maintained.

- Topography: While cable installation and cable maintenance operations associated with Hornsea Three and the other projects considered in this assessment will result in small scale bathymetric changes (e.g. cable trenches), these will naturally infill. Where remnant trenches persist for longer periods of time, these are not expected to have implications for sediment transport, but will be local seabed depressions which will infill over time. The presence of topographical characteristics of the Annex I sandbank feature (and sub-features) will therefore be maintained.
- Volume: Where cable installation occurs, this will result in localised disturbance of sediments, with these sediments resettling onto the seabed in close proximity to the cable trench. Sandwave clearance operations will result in localised displacement of sediment, although the volumes affected are inconsequential in the context of the volume of the Annex I sandbank feature and relevant sub-features. All sediment cleared during sandwave clearance operations would be deposited within the SAC, to ensure no sediment is lost to the SAC. As such, the existing volume of sediment associated with the sandbank feature will be maintained.
- Non-native species and pathogens is not relevant to temporary habitat loss/disturbance effects from Hornsea Three in-combination with other projects.

2.14 To ensure that, subject to natural change, the supporting processes on which qualifying natural habitats are maintained:

- Sediment movement and hydrodynamic regime: The patterns of processes governing the overall evolution of Annex I sandbanks within the SAC (e.g. flow regime, water depths and sediment availability) are at a much larger scale and so would not be affected by the localised works associated with cable installation at Hornsea Three and the other projects considered in this assessment. Sandwave clearance operations are not likely to influence the overall form and function of the Annex I sandbank feature and associated sub-features, and full recovery of the discrete affected by these activities is predicted over a period of years following clearance. Hydrodynamic and physical conditions will therefore be maintained such that natural water flow and sediment movement will not be significantly altered or prevented from responding to changes in environmental conditions.

- The remaining attributes associated with this Conservation Objective (i.e. energy/exposure, sediment contamination, water quality and physico-chemical properties) will not be affected by temporary habitat loss/disturbance effects from Hornsea Three alone or in-combination with other projects.

2.15 As concluded in paragraph 5.5.1.13 and 5.5.2.36 of the RIAA for Hornsea Three alone, there is no indication that intermittent temporary seabed disturbance associated with Hornsea Three in-combination with the projects considered would adversely affect the ability for the Conservation Objectives of this SAC to be achieved with regard to the environmental quality, natural environmental processes and extent of the Annex I sandbanks feature or associated sub-features. Additionally, there is no indication that temporary seabed disturbance would lead to an adverse change to the physical structure, biological diversity or community structure of typical species that are representative of Annex I sandbanks feature or associated sub-features. Therefore, no adverse effect on the integrity of The Wash and North Norfolk Coast SAC from in-combination temporary habitat loss over the lifetime of the project is concluded.

3. In-combination Long-term/Permanent Habitat Loss

3.1 The following sections consider the potential for in-combination long-term/permanent habitat loss effects within The Wash and North Norfolk Coast SAC as a result of the installation of cable protection for Hornsea Three together with the following projects:

- Remedial cable burial works (dredging and back-filling) for the Race Bank offshore wind farm (Ørsted, 2018).

In-combination maximum design scenario

3.2 As outlined in paragraph 2.11.2.22 of Volume 2, Chapter 2: Benthic Ecology of the Environmental Statement and paragraph 5.5.2.2 of the RIAA, there may be up to 46,200 m² of long-term/permanent habitat loss within The Wash and North Norfolk Coast SAC resulting from the installation of cable protection (i.e. up to 10% of the 66 km of offshore export cables within the SAC; up to six cables of up to 11 km in length, up to 7 m width of cable protection per cable). As the maximum design scenario is for cable protection to remain in situ post-decommissioning, then there is the potential for this to become permanent habitat loss, as assessed in paragraph 2.11.3.49 *et seq.* of Volume 2, Chapter 2: Benthic Ecology of the Environmental Statement. A total of 46,200 m² of habitat loss represents 0.004% of the total area of the SAC in this maximum design scenario.

3.3 As part of Ørsted's application to carry out remedial cable burial works to complete the installation of the Race Bank offshore wind farm offshore export cables, installation of cable protection within The Wash and North Norfolk Coast SAC has been proposed. The proposed footprint of this remedial cable protection material within the SAC is up to 24,132 m² (Ørsted, 2018).

- 3.4 In-combination with the proposed footprint of up to 46,200 m² of cable protection for Hornsea Three, in the maximum design scenario this would result in a total long-term/permanent habitat loss within the SAC of up to 70,332 m², which represents a very small (0.0065%) proportion of the total area of the site.

Proportion of SAC sub-features

- 3.5 The Hornsea Three maximum design scenario for each of the sub-features of the Annex I sandbanks feature present within the Hornsea Three offshore cable corridor (i.e. Subtidal Coarse Sediment, Subtidal Mixed Sediments and Subtidal Sand) assumes that all 46,200 m² of habitat loss associated with Hornsea Three cable protection occurs entirely within each of these sub-features. As such, these proportions are not additive, but represent a maximum design scenario for each of the three sub-features of the Annex I sandbanks feature. This is a highly conservative assumption, particularly so for Subtidal Coarse Sediments which only extends over 2.1 km of the part of the Hornsea Three offshore cable corridor coinciding with the Wash and North Norfolk Coast SAC. The Race Bank remedial cable burial works assessment (Ørsted, 2018) provides more detailed information on the maximum extent of each sub-feature affected, as that application has specific information regarding where the cable protection measures are required. Based on these assumptions, the maximum predicted percentage habitat losses of each sub-feature of the Annex I sandbank feature of the SAC (as provided in the data supplied by Natural England in November 2018) is presented in Table 3-1.
- 3.6 The Race Bank assessment (Ørsted, 2018) also predicts long-term habitat loss of 2,408 m² of *Sabellaria spinulosa* core reef. As there is not predicted to be any direct impact to Annex I reefs within the SAC as a result of Hornsea Three (either during construction or the operation and maintenance phase), there is no predicted in-combination loss of this habitat as a result of Hornsea Three together with Race Bank.
- 3.7 It should also be noted that the Race Bank application, assumes that habitat loss will be long term temporary, with cable protection assumed to be removed during decommissioning. The maximum design scenario for Hornsea Three assumes cable protection will remain in situ following decommissioning.
- 3.8 It should be also noted that these percentages are highly precautionary as it is highly unlikely that all habitat loss would occur wholly within one or other of the sub-features.

Table 3-1: Maximum in-combination long-term/permanent habitat loss over the lifetime of Hornsea Three for relevant sub-features of the Annex I sandbank feature of The Wash and North Norfolk Coast SAC.

| Sub-feature of Annex I sandbanks | Long-term/permanent habitat loss/disturbance (m ²) | Proportion of sub-feature affected within SAC | Notes |
|----------------------------------|--|---|--|
| A5.1 Sublittoral coarse sediment | 50,088 | 0.14% | Includes for Race Bank: 3,888 m ² in sublittoral coarse sediments. |
| A5.2 Sublittoral sand | 46,780 | 0.008% | Includes for Race Bank: 580 m ² in sublittoral sandy sediments. |
| A5.4 Sublittoral mixed sediments | 53,124 | 0.07% | Includes for Race Bank: 580 m ² in sublittoral mixed sediments and 6,344 m ² in mosaic habitats (which includes mixed and stony sediment). |

Conclusion - Long-term/Permanent Habitat Loss

- 3.9 As concluded for the Hornsea Three alone assessment in paragraph 2.11.2.28 of Volume 2, Chapter 2: Benthic Ecology of the Environmental Statement, based on the very small extents of habitat loss and the continued ecological functioning within the areas affected (i.e. through the use of appropriately sized rock protection allowing for some recolonization by native communities), the cumulative effect will be of minor adverse significance, which is not significant in EIA terms.
- 3.10 When considering the effects of long term/permanent habitat loss associated with Hornsea Three in-combination with Race Bank, the following Conservation Objectives are relevant to the Annex I Sandbanks which are slightly covered by sea water all the time, and associated sub-features, of the Wash and North Norfolk Coast SAC.
- To ensure that, subject to natural change, the extent and distribution of qualifying natural habitats are maintained;
 - To ensure that, subject to natural change, the structure and function (including typical species) of qualifying natural habitats are maintained; and
 - To ensure that, subject to natural change, the supporting processes on which qualifying natural habitats are maintained.
- 3.11 Each of these Conservation Objectives and their associated attributes are considered in turn below, in line with the approach taken for Hornsea Three alone in Table 9.2 of Appendix A of the RIAA.
- 3.12 To ensure that, subject to natural change, the extent and distribution of qualifying natural habitats are maintained:

- Presence and spatial distribution of biological communities: Long term/permanent habitat loss from Hornsea Three and Race Bank is predicted to affect a very small proportion of the Annex I sandbank feature (i.e. up to a maximum of 0.0065% of the area of the SAC) within the SAC, in a maximum design scenario. While this is assessed as habitat loss, some ecological functioning will continue within the areas affected, allowing some recolonisation of infaunal and epifaunal communities into the areas affected. As such, the presence and spatial distribution of biological communities of the Annex I sandbank feature will be maintained within the SAC.
- Extent and Distribution: As outlined above, the proportion of the subtidal sandbanks affected by Hornsea Three in-combination with Race Bank is predicted to be very small in the context of the broadscale nature of the Annex I sandbanks sub-features, even in a maximum design scenario. Any effects of cable protection (should these be required for Hornsea Three) will also be highly localised to discrete sections of the export cables. Effects will be limited to sub-features of the Annex I sandbanks habitat and the use of rock protection of small grain sizes will limit the change in the substrate type. As such, the extent and spatial distribution of subtidal sandbanks will be maintained across the SAC, allowing for natural change and succession.

3.13 To ensure that, subject to natural change, the structure and function (including typical species) of qualifying natural habitats are maintained:

- Presence and abundance of key structural and influential species: While a very small proportion of sub-features of the Annex I sandbanks habitat may be affected by cable protection, the presence and abundance of key structural and influential species will be maintained across the SAC in general. The use of rock protection of small grain sizes will allow for some ecological functioning in the discrete areas affected by cable protection. The abundance of key species associated with each of the sub-features of the Annex I sandbanks habitat will therefore be maintained, allowing them to continue to be a viable component of the habitat.
- Sediment composition and distribution: As outlined in Table 9.2 of Appendix A of the RIAA, the placement of cable protection may result in some temporary effects on sediment transport, although any such effects will be temporary and short lived, with no long term effects on sediment transport processes. The sediment composition and distribution of sediments across the wider Annex I sandbank feature will therefore be maintained.
- Species composition of component communities: As outlined above, although a very small proportion of the Annex I sandbank habitat may be affected (i.e. in a maximum design scenario for Hornsea Three), the species composition of component communities would be maintained across the vast majority of the SAC. In the areas affected, some ecological function would continue, with some colonisation of component infaunal and epifaunal communities within the areas affected by rock protection. The species composition of the component communities associated with the sub-features of the Annex I sandbanks habitat feature will therefore be maintained.

- **Topography:** The presence of cable protection is not anticipated to alter the topographic characteristics of the Annex I sandbank feature, particularly in the east of the SAC, where the local conditions are less dynamic and seabed more homogenous than other parts of the SAC. The presence of cable protection will not interrupt sediment transport, nor would it preclude the formation of Annex I sandbank features at any point in the future. The presence of topographical characteristics of the Annex I sandbank feature (and sub-features) will therefore be maintained.
- **Non-native species and pathogens:** Due to the large distance between Hornsea Three and Race Bank, there is not predicted to be an in-combination effect associated with introduction or spread of non-native species and pathogens. The risk of this impact will also be minimised by the designed-in measures adopted for Hornsea Three, including a biosecurity plan and vessels complying with International Maritime Organisation ballast water guidelines.
- **Volume:** The volume of sediment in the sandbank system would be unaffected by the presence of cable protection.

3.14 To ensure that, subject to natural change, the supporting processes on which qualifying natural habitats are maintained:

- **Sediment movement and hydrodynamic regime:** As outlined in Table 9.2 of Appendix A of the RIAA, the placement of cable protection may result in some temporary effects on sediment transport, although any such effects will be temporary and short lived, with no long term effects on sediment transport processes. Hydrodynamic and physical conditions will therefore be maintained such that natural water flow and sediment movement will not be significantly altered or prevented from responding to changes in environmental conditions.
- **Energy/exposure:** Impacts associated with cable protection will only exert a highly localised influence on the tidal and wave regime within the Wash and North Norfolk Coast SAC. The natural physical energy from waves, tides and other water flows will therefore be maintained, so that the exposure does not cause alteration to the biotopes, and stability, across the habitat.
- **Sediment contamination, water quality and physico-chemical properties of features** will not be affected by long term habitat loss/disturbance effects from Hornsea Three in-combination with other projects.

3.15 As concluded in paragraph 5.5.2.7 of the RIAA for the Hornsea Three alone assessment, there is no indication that localised permanent/long term habitat loss would adversely affect the ability for the Conservation Objectives of the Wash and North Norfolk Coast SAC to be achieved with regards to the environmental quality, natural environmental processes and extent of the Annex I Sandbanks which are slightly covered by seawater all the time feature, especially when considering the dynamic and transient nature of these habitats. Additionally, there is no indication that localised permanent/long term habitat loss would lead to any adverse change to the physical structure, biological diversity or community structure of typical species that are representative of Annex I Sandbanks which are slightly covered by seawater all the time. As such there is predicted to be no adverse effect on integrity of the sub-features of the Annex I sandbanks feature from Hornsea Three alone or in-combination with Race Bank.

4. Summary

- 4.1 This note has presented the proportions of Annex I sandbank sub-features of The Wash and North Norfolk Coast SAC that may be affected by temporary habitat loss across the lifetime of Hornsea Three in the maximum design scenario and demonstrated them to be small: 0.18% of Subtidal Sand; 2.39% of Subtidal Coarse Sediment; and 1.98% of Subtidal Mixed Sediment.
- 4.2 For in-combination temporary habitat loss, this note has demonstrated that the majority of the impact will occur during the construction phase for Hornsea Three, from which the benthic communities are predicted to recover within the timescales outlined in Volume 2, Chapter 2: Benthic Ecology of the Environmental Statement and the RIAA. Repeat temporary disturbance as a result of operation and maintenance activities for all projects in the SAC will, if required at all, be intermittent, affect a very small proportion of Annex I sandbanks habitat, be highly localised and will not spatially overlap between the different projects. Therefore, communities are anticipated to fully recover between disturbance events such that, as for the Hornsea Three alone assessment, no adverse effect on site integrity are predicted.
- 4.3 With respect to the in-combination assessment for Hornsea Three with Race Bank, the information presented within this note has demonstrated that the proportion of in-combination long-term/permanent habitat loss is predicted to be very small for the maximum design scenario (0.0065% of the total area of the SAC). The corresponding proportions of the sub-features which may be affected is correspondingly small and the conclusions of the in-combination assessment are the same as those for Hornsea Three alone assessment (i.e. no adverse effect on site integrity).

5. References

Ørsted (2018) Race Bank Offshore Wind Farm. Remedial Cable Burial in the Wash: Supporting Environmental Information. Ref: 2985I&BRP1808171547.