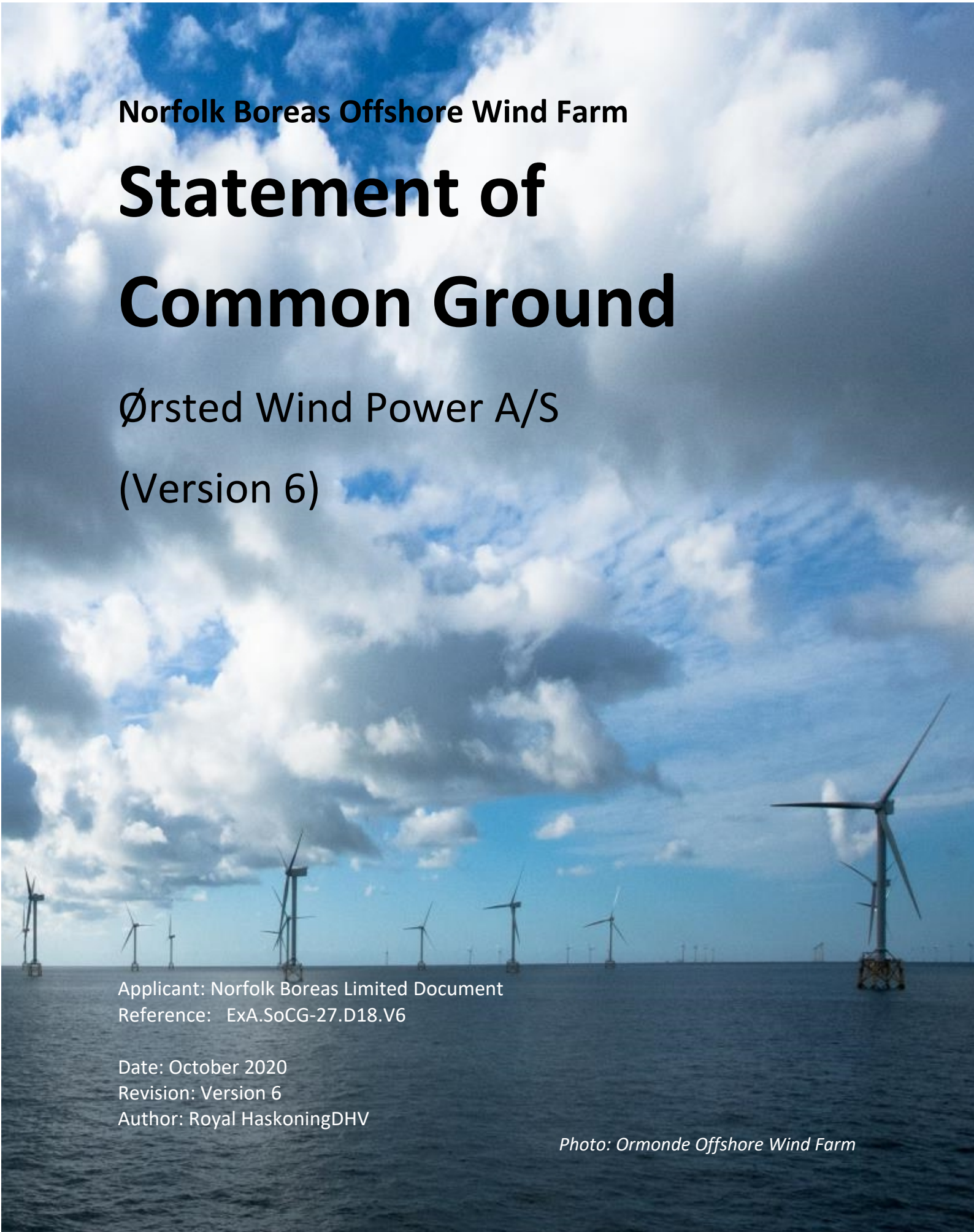
Norfolk Boreas Offshore Wind Farm

Statement of Common Ground

Ørsted Wind Power A/S

(Version 6)



Applicant: Norfolk Boreas Limited Document Reference: ExA.SoCG-27.D18.V6

Date: October 2020
Revision: Version 6
Author: Royal HaskoningDHV

Photo: Ormonde Offshore Wind Farm

Date	Issue No.	Remarks / Reason for Issue	Author	Checked	Approved
27/11/2019	01D	First draft for Hornsea Project Three (UK) Ltd Review	AH	VR/JL	JL
05/12/2019	01F	Final for submission at Deadline 2	AH	VR/JL	JL
28/02/2020	02F	Second Version for submission at Deadline 6	AH	VR	JL
08/04/2020	03F	Third Version for Submission at Deadline 8	AH	VR	JL
29/04/2020	04F	Final Version for Submission at Deadline 9	ES	JL	JL
25/09/2020	05F	Final Version for Submission at Deadline 16	CD	JL	JL
07/10/2020	06F	Final Version for Submission at Deadline 18. Updated Appendix 1 no change to agreements.	CD	JL	JL

Table of Contents

Table of Tables

Glossary of Acronyms

CIA	Cumulative Impact Assessment
CLO	Community Liaison Officer
DCO	Development Consent Order
ES	Environmental Statement
EMF	Electro-Magnetic Field
EPP	Evidence Plan Process
ETG	Expert Topic Group
HA	Highways Authority
HGV	Heavy Goods Vehicle
HDD	Horizontal Directional Drilling
HVAC	High Voltage Alternating Current
HVDC	High Voltage Direct Current
IEMA	Institute of Environmental Management and Assessment
NCC	Norfolk County Council
SoCG	Statement of Common Ground
OCoCP	Outline Code of Construction Practice
OTMP	Outline Traffic Management Plan
TMP	Traffic Management Plan
WSI	Written Scheme of Investigation

Glossary of Terminology

the Applicant	Norfolk Boreas Limited
the Application	Norfolk Boreas DCO application
the Parties	Norfolk Boreas Limited and Ørsted Wind Power A/S
the Project	Norfolk Boreas Offshore Wind Farm
Norfolk Vanguard	Norfolk Vanguard offshore wind farm, sister project of Norfolk Boreas.

1 INTRODUCTION

1. This Statement of Common Ground (SoCG) has been prepared by Norfolk Boreas Limited (hereafter the Applicant), and Ørsted Wind Power A/S (hereafter Ørsted), together 'the parties', as a means to set out the areas of agreement and disagreement in relation to the Development Consent Order (DCO) application for the Norfolk Boreas Offshore Wind Farm (hereafter 'the project').

2. This SoCG comprises an agreement log which has been structured to reflect the topics of interest to Ørsted with regard to the Norfolk Boreas DCO application (hereafter 'the Application') as indicated in Ørsted's Relevant Representation (RR-102) received by the Planning Inspectorate on the 30th August 2019.

3. As noted in RR-102 there is no physical overlap of the Norfolk Boreas offshore array, offshore export cable route or onshore at the grid connection points with any Ørsted project. The Norfolk Boreas proposed onshore export cable route does however cross the proposed onshore export cable route of Orsted proposed Hornsea Project Three offshore wind farm project. As there is no physical overlap of the projects offshore, this SoCG focuses on onshore interactions. However, Chapter 32 of the ES, (document reference 6.1.32 of the Application, APP-245), provides an assessment of the significance of cumulative impacts offshore.

4. Ørsted's Relevant Representation (RR-102) raises specific points in relation to onshore interaction with Hornsea Project Three UK Ltd's export cable corridor and the Norfolk Boreas cable corridor. Chapter 33 of the ES (document reference 6.1.33 of the Application, APP-246), provides an assessment of the significance of these impacts onshore. The agreement log (section 2) outlines the status of topic specific matters between Ørsted and the Applicant. The SoCG also provides information relating to electro-magnetic fields, design interaction, co-operation between Ørsted and the Applicant, as well as matters relating to exercise of compulsory acquisition powers.

5. The Applicant has had regard to the Guidance for the examination of applications for development consent (Department for Communities and Local Government, 2015) when compiling this SoCG.

1.1 The Development

6. The Application is for the development of the Norfolk Boreas Offshore Wind Farm and associated infrastructure. A full description of the project can be found in Chapter 5 Project Description of the Environmental Statement (ES) (document reference 6.1.5 of the Application, APP-218).

7. The Application is seeking consent for the following two alternative development scenarios:

- Scenario 1 – Norfolk Vanguard proceeds to construction and installs ducts and other shared enabling works for Norfolk Boreas.
- Scenario 2 – Norfolk Vanguard does not proceed to construction and Norfolk Boreas proceeds alone. Norfolk Boreas undertakes all works required as an independent project.

8. Where a topic of agreement is specific to a scenario this is identified in the agreement log for each subject area, otherwise the agreement applies to both scenarios.

2 STATEMENT OF COMMON GROUND

2.1 Onshore Interactions

9. Table 1 provides areas of agreement and disagreement. In order to easily identify whether a matter is “agreed” or “not agreed”, a colour coding system of green and orange is used in the “final position” column to represent the final status of positions.[1]

[1] This SoCG between Norfolk Boreas Ltd and Ørsted Wind Power A/S should be read alongside the Hornsea Project Three note: Response to Norfolk Boreas Deadline 16 Submission – Technical Note. See Appendix 1.

Table 1 Statement of Common Ground – Onshore interactions

Topic	Norfolk Boreas Limited and Ørsted Joint final position
Ground conditions and Contamination	Cumulative effects have either been scoped out, or the Cumulative Impact Assessment (CIA) has not identified any significant adverse cumulative effects.
Water Resources and Flood Risk	
Land Use and Agriculture	
Ecology	
Ornithology	
Landscape and Visual	
Noise and Vibration	
Air Quality	
Socio-economics	
Archaeology and Cultural Heritage	To manage archaeological impacts, if required where the cable corridors cross, Hornsea Project Three (UK) Limited advocates a consistent approach to targeted geophysical survey and trial trenching through a consistent approach to (Archaeological) Written Schemes of Investigation (WSI) being agreed with the relevant authorities prior to commencement of the consented works where the cables cross. The Applicant has submitted an Outline Written Scheme of Investigation (Onshore) (document reference 8.5 of the Application, APP-696) which sets out details in relation to targeted geophysical survey and trial trenching. The final Written Scheme of Investigation submitted for approval under Requirement 23 of the DCO will be approved by the relevant planning authority in consultation with Norfolk County Council and Historic England. This will enable the relevant planning authority, and its consultees, to ensure that the approach to targeted geophysical survey and trial trenching is undertaken in a way which manages archaeological impacts from any interaction of the projects at the crossing point. The Applicant will also continue to work with Hornsea Project Three to co-operate on targeted geophysical surveys and trial trenching at the crossing point.
Public Rights of Way	To manage impacts on public rights of way, Ørsted advocates consistent approaches to the management of Reepham footpaths FP18 and FP34. The Applicant has submitted an Outline Code of Construction Practice (OCoCP) (document reference 8.01 of the Application, APP-692) which sets out details in relation to the management of footpaths. The final Code of Construction Practice submitted for approval under Requirement 20 of the DCO will be approved by the relevant planning authority, in consultation with Norfolk County Council (amongst others). This will enable the relevant planning authority, and relevant consultees, to ensure that the approach to managing footpaths FP18 and FP34 is appropriate given the interaction of the projects at the crossing point. The Applicant will also continue to work with Hornsea Project Three to co-operate in the management of public rights of way for footpaths FP18 and FP34.

Traffic and Transport	The Applicant and Hornsea Project Three (UK) Ltd have undertaken a cumulative impact assessment and concluded that, with the designed-in mitigation proposed (including those set out within the relevant traffic management plans), no significant cumulative effects relating to traffic and transport would occur. There has been extensive consultation with Norfolk County Council (NCC) and other relevant stakeholders (including Cawston Parish Council and Oulton Parish Council) in regard to a highways mitigation scheme to address cumulative impacts along The Street, Oulton and a Highways Intervention Scheme (HIS) for the B1145, Cawston. Norfolk County Council as the highway authority had advised Hornsea Project Three that from a highways perspective, subject to receipt of a satisfactory Road Safety Audit (RSA) the mitigation measures identified for Cawston are technically workable and would be acceptable to NCC as local highway authority. The RSA was issued to NCC on the 29th March 2019. Following NCC's review of the Cawston HIS RSA, a number of concerns were raised which required further amendments before NCC could agree to the scheme. It was agreed with Norfolk Vanguard and Hornsea Project Three (UK) that the Applicant would take forward the scheme design to address the concerns raised in the RSA and by NCC. A revised Cawston HIS was submitted at Deadline 4 of the Norfolk Boreas DCO Examination addressing the concerns raised by the RSA and NCC, and the HIS was subject to another RSA, undertaken on 16th February 2020. The resultant RSA report, RSA Decision Log response and updated HIS Plans were submitted at Deadline 5 of the Norfolk Boreas DCO Examination for further review by the relevant stakeholders. NCC have reviewed the second RSA recommendations and the Deadline 5 HIS plans and indicated that no further amendments were required to the HIS and there were no remaining technical objections. Accordingly, NCC also indicated they will be completing the RSA log to finalise the scheme. The Applicant, Norfolk Vanguard Limited and Hornsea Project Three are committed to implement the finalised (Deadline 5) HIS as a single project mitigation or cumulative project mitigation. NCC have raised a potential concern with regard to driver compliance, that drivers may fail to yield at pinch points causing traffic to back up, inducing unacceptable delays. In response to this concern, the Applicant and Hornsea Project Three (UK) Ltd have agreed to intensify the HIS monitoring regime to facilitate early warning of issues and to work with NCC to develop intervention measures to be introduced should driver compliance concerns manifest. A potential driver compliance intervention measure could be a commitment to ensure that Norfolk Boreas and Hornsea Project Three peak HGV demand does not overlap. The Applicant and Hornsea Project Three Ltd have profiled the respective Projects' HGV demand over the construction duration to facilitate consideration of this intervention. The commitment to implement the finalised Cawston HIS and to driver compliance monitoring and intervention, are captured in the Norfolk Boreas OTMP (document reference 8.8 of the Application) as revised at Deadline 8 and subsequently updated at Deadline

	18 to include a commitment that parking restrictions will only be in place Monday to Friday. As such, in line with the parking restrictions both the Applicant and Hornsea Project Three (UK) have committed to restricting HGV deliveries through Cawston to Monday to Friday, 9.00am to 6.00pm and excluding 3.00pm to 4.00pm during school term time. The Applicant and Hornsea Project Three (UK) Ltd have committed to the implementation of the highway intervention schemes at The Street, Oulton, and the B1145, Cawston which would be sufficient to mitigate impacts for either the Applicant alone, Hornsea Project Three (UK) Ltd alone, or for these projects together. All of the identified and agreed measures to mitigate cumulative construction traffic impacts on these shared road links are captured in the Norfolk Boreas Outline Traffic Management Plans (OTMP) (see document reference 8.8, Version 7 , submitted at Deadline 18) and an updated Hornsea Project Three Outline Construction Traffic Management Plan, to be submitted to the Secretary of State by 30th September 2020. In addition to the outline mitigation schemes and Cawston HIS noted above, it has been agreed that for five specific links, the cumulative traffic effects from the Applicant and Hornsea Project Three (UK) Ltd should be monitored to ensure certain levels of construction traffic are not exceeded in the event of the projects running simultaneously. The links and maximum cumulative traffic levels not to be exceeded without a full Institute of Environmental Management and Assessment (IEMA) Transport Environmental Link Assessment and agreement with the Highways Authorities (HAs) and incorporated into the detailed OTMPs are defined below (HP3 link notation in Italics); - Link ID 13b (*34*): A148 from B1354 junction to Letheringsett - 729 two way movements per day, of which up to 535 (379 Norfolk Boreas & 156 Hornsea Project Three) can be HGVs; - Link ID 34 (*89*): B1145 through Cawston - 646 two way movements per day, of which up to 239 (112 Norfolk Boreas & 127 Hornsea Project Three) can be HGVs; - Link ID 32 (*59*): B1149 Edgefield to Heydon - 478 two-way total movements per day, of which up to 289 (136 Norfolk Boreas & 153 Hornsea Project Three) can be HGVs; - Link ID 41 (*190,191*): B1436 between A148 and A140 - 825 two way movements per day, of which up to 436 (287 Norfolk Boreas & 149 Hornsea Project Three) can be HGVs; - Link ID 68 (*208*): The Street, Oulton 408 two way movements per day, of which up to 198 (80 Norfolk Boreas & 118 Hornsea Project Three) can be HGVs. The Applicant and Hornsea Project Three continue to work together to seek to further refine cumulative traffic profiles, timescales and numbers prior to the close of examination. The relevant management plan for each project (e.g. Outline Code of Construction Practice (CoCP), Annex A: Framework Communication Plan, and Outline CTMP for Hornsea Project Three (UK) Ltd and OCoCP (document reference 8.01 of the Application, and OTMP (document reference 8.8 of the Application, APP-699) for the Applicant) will set out the process of continued engagement between both parties and the Local Highway Authority. This will ensure that as construction programmes are refined post-consent, this information is regularly shared between parties, particularly traffic demand on shared road links. This will ensure

	that commitments to manage cumulative construction traffic demand are fully delivered; for example, on a given road the projects may have to commit to programme works to ensure each scheme's peak traffic does not overlap. Regularly programme sharing of information will ensure that the final approved (C)TMPs for the projects accurately reflect the expected construction traffic demand (both volume and typical flows) of both projects, and provide certainty to the Local Highway Authority that commitments remain feasible and deliverable. The OTMP for the project is secured under Requirement 21 of the DCO, and the final Traffic Management Plan must be submitted to the relevant planning authority and approved in consultation with the highway authority. <u>B1149 Open Cut Trench</u> The Applicant has produced an updated traffic management design which has been developed to address the safety concerns raised by NCC. The drawings (which include Swept Path Analysis), demonstrate traffic management detail fully compliant with Chapter 8 of the Traffic Designs Manual, which can also accommodate Hornsea Project Three cumulative traffic (including Abnormal Loads) and is entirely within the current Norfolk Boreas DCO Order limits. The updated design has been included in the updated OTMP at Deadline 5.

2.2 Construction Management and Community Liaison

10. Both parties have both committed to community liaison through the construction phase.

11. The Applicant has submitted an OCoCP (document reference 8.01 of the Application, APP-692). Section 2.4 of the Applicant's OCoCP notes that the Applicant will ensure effective and open communication with local residents and businesses that may be affected by noise or other amenity aspects caused by the construction works. A designated local community liaison officer (CLO) will respond to any public concerns, queries or complaints in a professional and diligent manner as set out by a project community and public relations procedure which will be submitted for comment to the Local Authorities. Parish Councils in the relevant area will be contacted (in writing) in advance of the proposed works and ahead of key milestones, with these measures being captured in a communications plan as part of the final CoCP.

12. Similarly, Hornsea Project Three (UK) Ltd has produced an OCoCP[2]. Appendix A (Communication Plan Framework) of the OCoCP notes that a Communication Plan will be developed, managed and implemented by the Stakeholder Manager for Hornsea Project Three (UK) Ltd. During the construction phase, a CLO will be appointed prior to the commencement of onshore works. The CLO will attend public meetings including liaison with community groups and will manage all contacts with local resident groups, schools, emergency services and local businesses with regard to general construction works issues in accordance with the parameters established in the Communications Plan.

13. The respective OCoCPs as produced for both the Applicant and Hornsea Project Three (UK) Ltd include commitments to developing project specific Communication Plans post-consent, and include a framework to set out the key points of how communications will be delivered. The Communication Plans will ensure effective and open communication with local residents and businesses that may be affected by the construction works. In order to ensure communication between the respective parties, it is proposed that the Communication Plans will also set out the process of continued engagement between the Applicant, Hornsea Project Three (UK) Ltd and the Local Highway Authority. This will ensure that as construction programmes are refined post-consent that this information is regularly shared between parties, particularly traffic demand on shared road links and that commitments to manage cumulative construction traffic demand are fully

[2] Document reference REP9-063 of the Hornsea Project Three Examination, available here: https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/EN010080/EN010080-002003-%C3%98rsted%20Hornsea%20Project%20Three%20(UK)%20Ltd%20-Appendix%2036%20-%20Outline%20Code%20of%20Construction%20Practice%20-%20Clean.pdf

delivered; for example on a given road the projects may have committed to programme works that ensure each scheme's peak traffic does not overlap.

14. Furthermore, the final Traffic Management Plans (TMP) for each project will confirm cumulative traffic impacts and set out the measures to ensure that the cumulative environmental impacts are managed to levels such that they are acceptable by Norfolk County Council as the local highway authority. Regularly programmed sharing of information will ensure that the final approved TMPs accurately reflect the expected construction traffic demand of both projects, and provide certainty to the Local Highway Authority that commitments remain feasible and deliverable.

15. Outline mitigation schemes for each project alone and projects cumulatively have been agreed in principle with Norfolk County Council. These outline schemes will be included within updated versions of the outline (C)TMPs for each project.

16. All parties have committed to a process of continued engagement between them and the Local Highway Authority. This will ensure that as construction programmes are refined post-consent, this information is regularly shared between parties, particularly traffic demand on shared road links. This will ensure that commitments to manage cumulative construction traffic demand are fully delivered.

2.3 Cumulative Electro-Magnetic Fields (EMFs) at the crossing point of Hornsea Project Three (UK) Ltd and the Applicant

17. When considered cumulatively, as magnetic field strength decreases rapidly with distance from the source, combined with the vector nature of electric and magnetic fields, the cumulative field strength from multiple sources would not typically be as great as the scalar sum of their maximum strength. In practice, this means that magnetic field strength at a given location tends to be dominated by one source (the largest and/or nearest) where several sources in the area are present.

18. As such, and considering the large margin of compliance with the public exposure guidelines, no significant cumulative impacts from other existing or proposed sources are anticipated.

19. In response to local concerns, Ørsted and Vattenfall jointly commissioned an independent study and resulting report which explores the 'worst case' EMFs which may result where it is proposed the power cables from offshore wind farm projects will cross. The Vattenfall and Ørsted Circuit Crossings- EMF Information Sheet was submitted as Appendix 1 (AS-024) to the Applicant's Comments on Relevant Representations (AS-025) and is also available for download from both Ørsted and Vattenfall corporate websites[3].

20. These assessments represent the worst-case scenario for two crossing points, one where both transmission systems use High Voltage Alternating Current (HVAC) technology and the other where both use High Voltage Direct Current (HVDC) technology. It should be noted that this worst case scenario was correct at the time the study was commissioned, however the Applicant and Norfolk Vanguard Ltd have subsequently made the commitment to deploy HVDC technology. The parameters modelled are included in the tables below and are conservative as maximum rating, minimum burial depth and most acute crossing angle (45°) were taken and the most highly loaded circuits were located on top which produced the highest magnetic fields.

21. A summary of the cumulative impact of the parties projects is:

    - The study found that the maximum calculated HVAC magnetic fields were 50.7 µT, which is 14% of the UK exposure limit values; the maximum calculated HVDC magnetic fields were 60.8 µT which is less than 1% of the UK exposure limit.
    - All of the cable crossing scenarios irrespective of whether HVDC or HVAC cable connections are used will be compliant with the UK exposure limits set to protect the health of members of the public against EMF exposure.

[3] https://corporate.vattenfall.co.uk/contentassets/bf0e5e31bbab467eaf02040c7b17513a/vattenfall-orsted-emf-information-sheet.pdf

- As the magnetic field is mainly dependant on cable rating, burial depth and phase separation, all cable crossings with similar or less onerous design parameters will also be compliant.

22. The study advises that if both cable routes that cross use the same power transmission technology, i.e. HVAC and HVAC or HVDC and HVDC, the fields can combine to add or subtract from one another. However, if different technologies are used, i.e. HVAC and HVDC, the magnetic fields do not interact with one another. In that scenario, the installations of the HVAC and HVDC cables can be considered separately.

2.4 Design Interaction and Co-Operation Agreement

23. The parties are in advanced stages of entering into a Co-operation Agreement. Whilst the terms of that agreement are confidential – those matters pertinent to construction management and implementation extend to:-

- The parties agree that there should be no detrimental impact for either party to execute their statutory consents.
- The parties agree to consult one another and keep each other reasonably appraised of key decisions and changes to programme, milestones and upcoming communication with any relevant regulatory body. Further, the parties shall provide a rolling stakeholder engagement plan to ensure that each party is aware of ongoing engagement with the wider community. This will help ensure that all parties are aware of works ongoing in the area so as to assist with each project's own community liaison initiatives.
- The parties will share all survey works at the point of crossing and/or shared access areas – this will help reduce the number of surveys undertaken and ensure consistency in base survey data utilised by all parties.
- All parties will design the cable installation works so as to ensure that the other parties can still install their cables – for example, if the first project installs the cables by way of open cut trench, that section of trenching will include enhanced thermal conductivity backfill to reduce any potential future thermal interactions with the second project.
- Parties will share design specifications when known to help facilitate the design of the other party's cables at the point of crossing.
- The Parties will work together to share information and agree mitigation, such as traffic management measures and plans, with the collective aim of minimising the cumulative environmental impact of construction on the local road network, noise management and management of neighbouring Public Rights of Way.
- Each Party will grant the other Parties rights of access in an emergency.

2.5 Compulsory Acquisition Powers

24. It is agreed that all parties will seek to enter into either a tri-partite Option Agreement or a direct voluntary agreement with the relevant landowner to acquire the rights necessary to construct, use and maintain assets for the parties at the cable crossing point. The terms of the Option Agreement will provide for, amongst other items, crop loss and severance compensation where the accumulative impact of projects in construction at the same time have increased impact to the landowner when compared to separate construction periods.

25. In the event that a voluntary agreement cannot be entered into with the relevant landowner, it is agreed that the compulsory acquisition of new rights and imposition of restrictive covenants can co-exist for the parties. The Co-operation Agreement will regulate the exercise of compulsory acquisition and temporary use powers.

26. Reciprocal protective provisions have also been included in the dDCOs for the projects which govern the interaction of the projects and rights in relation to the areas in which the cables cross. In the dDCO for the Norfolk Boreas project, protective provisions are included for the undertaker with the benefit of the Hornsea Project Three DCO at Part 8 of Schedule 17.

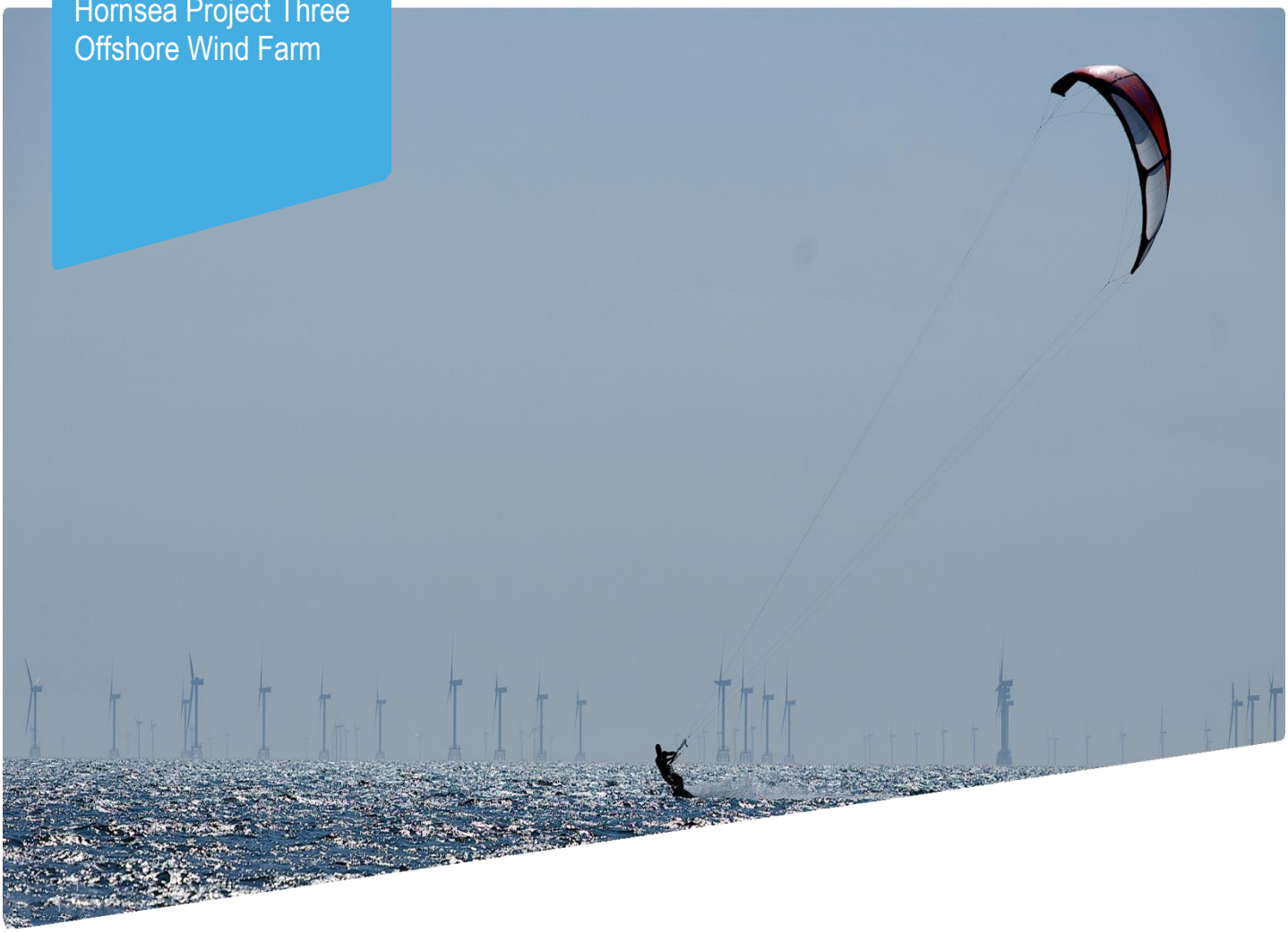
The undersigned agree to the provisions within this SoCG

Printed name	Karma Leyland
Position	Hornsea Project Three Consents Manager
On behalf of	Hornsea Project Three
Date	07/10/2020

Printed name	Jake Laws
Position	Norfolk Boreas Consents Manager
On behalf of	Norfolk Boreas Limited (the Applicant)
Date	07/10/2020

APPENDIX 1 HORNSEA PROJECT THREE OFFSHORE WIND FARM, UPDATED RESPONSE TO NORFOLK BOREAS DEADLINE 16 SUBMISSION – TECHNICAL NOTE

Hornsea Project Three
Offshore Wind Farm



Hornsea Project Three

Offshore Wind Farm

Updated Response to Norfolk Boreas Deadline 16 Submission - Technical Note

Date: September 2020

Hornsea 3
Offshore Wind Farm

Ørsted

Updated Response to Norfolk Boreas Deadline 16 Submission - Technical Note

Revision History

Version	Date	Author	Context
Rev A	6th May 2020	Paul Zanna	Comments addressed
Rev B	22th July 2020	Aidan Fisher	Comments addressed
Rev C	18th August 2020	Aidan Fisher	Comments addressed
Rev D	23rd September 2020	Aidan Fisher	Working week revised to 5 days with text / Appendix A amended accordingly
Rev E	30th September 2020	Aidan Fisher	NV traffic figures updated in line with DL16 SoCG

Ørsted

5 Howick Place,

London, SW1P 1WG

Front cover picture: Kite surfer near a UK offshore wind farm © Orsted Hornsea Project Three (UK) Ltd., 2018.

Updated Response to Norfolk Boreas Deadline 16 Submission - Technical Note

Revision History

Version	Date	Author	Context
Rev A	6th May 2020	Paul Zanna	Comments addressed
Rev B	22th July 2020	Aidan Fisher	Comments addressed
Rev C	18th August 2020	Aidan Fisher	Comments addressed
Rev D	23rd September 2020	Aidan Fisher	Working week revised to 5 days with text / Appendix A amended accordingly
Rev E	30th September 2020	Aidan Fisher	NV traffic figures updated in line with DL16 SoCG

Ørsted

5 Howick Place,

London, SW1P 1WG

Front cover picture: Kite surfer near a UK offshore wind farm © Orsted Hornsea Project Three (UK) Ltd., 2018.

Table of Contents

Abbreviation

Abbreviation	Definition
AADT	Annual Average Daily Traffic
ATC	Automatic Traffic Counter
CRF	Congestion Reference Flow
DfT	Department for Transport
HGVs	Heavy Goods Vehicles
LPA	Local Planning Authority

1. Introduction

1.1 This document with accompanying appendices and plans is prepared as part of the Hornsea Project Three Offshore Wind Farm (hereafter referred to as Hornsea Three) and focusses on the potential impact of the scheme on the village of Cawston, Norfolk, particularly in connection with the construction vehicles and the delivery of cable sections 9 & 10 (to the West of the village).

1.2 Whether this is approached simultaneously or in a staggered manner, the construction of cable sections 9 & 10 to the West of the village of Cawston will result in some traffic impact, but as noted previously, this impact will be temporary.

1.3 In March 2019 Create Consulting Engineers prepared a 'High Street, Cawston – Highway Intervention Scheme' (HIS) document. This document set out a series of measures proposed to be introduced through the village of Cawston, to mitigate the localised impact of the HGV traffic associated with the construction of Hornsea Three alone and cumulatively with the Norfolk Vanguard and Boreas schemes which utilise the same route for access.

1.4 A wide range of activities are associated with the construction of Hornsea Three, of which HGV movements associated with the transportation of cable drums form only a minor component of overall levels of traffic generation (see 2.6).

1.5 In January 2020, Royal Haskoning, as part of the Boreas DCO inquiry, produced 'Technical; Note Revised Cawston Highway Intervention Scheme' on behalf of Vattenfall which was produced in response to the Action Point 1 from Issue Specific Hearing 3 of the Norfolk Boreas Limited DCO Examination. The Vattenfall document sets out an alternative mitigation scheme to what was identified in Create's 2019 document, following on from the same principles established.

1.6 In addition, during the Norfolk Boreas Limited DCO Examination, Hornsea Three have been requested to consider, if possible, a refinement of the numbers of planned construction vehicles which would travel along the High Street in Cawston to allow a more accurate picture of the peak construction impact to be considered.

1.7 The purpose of this Technical Note is to refine the construction traffic flow forecasts presented in the original HIS submissions for the Hornsea Three scheme (for a proposed maximum 3.3m diameter cable drum size on links 88 and 89) and provide further, more detailed analysis of daily HGV traffic generation in terms of worse-case forecasts, more typical levels of traffic generation and also an "intermediate" period of HGV traffic generation.

1.8 This note has been updated since the original Boreas DL14 submission. The change reflects the agreement to reduced HGV operating hours through Cawston to 5 days (Monday to Friday, no HGV movements on a Saturday), from the 5.5 day HGV working week specified in the previous version of this technical note. This reduced working week does not apply to non-HGV movements through Cawston and does not change the daily peaks presented throughout this note.

2. HGV Traffic Movements

Traffic Analysis

2.1 Associated with the construction of cable sections 9 & 10, Create previously set out the two-way daily construction traffic numbers for "Link ID 89: B1145 in Cawston" which considered Hornsea Three (HOW03) construction traffic, and also the traffic figures associated with Norfolk Vanguard to derive and account of cumulative impact.

2.2 Further details are presented in Table 2.1.

Table 2.1 Summary of Daily Two-Way Traffic Movements at Cawston – Maximum Cumulative

Hornsea Three Link	2022 Base		HOW03 Construction		Norfolk Vanguard		Maximum Cumulative Traffic	
	Total	HGVs	Total	HGVs	Total	HGVs	Total	HGVs
Link ID 89: B1145 in Cawston	3,477	127	370	127	276	112	646	239

Note: Figures in Table 2.1 are derived from Table 3.1 of Appendix 7 to Deadline 4 - HGV Haul Road Reduction Report, with the Norfolk Vanguard figures DERIVED from DL16 SoCG.

2.3 The figure of 127 two-way HGVs is a *combined* Hornsea Three total figure, and a maximum that should not be exceeded for a primary peak/secondary peak or during the 'average' periods. This figure represents a worse-case scenario that cables sections 9 & 10 would be constructed simultaneously, whereas in reality these works would be staggered.

2.4 Staggering these construction works has now been considered and agreed by Hornsea Three. This extends the duration, albeit at a lower traffic level, that HGVs will travel through Cawston.

2.5 Associated with the construction of cable section 9, in isolation, are a maximum of 62 daily two-way HGVs, and for cable section 10, in isolation, 65 two-way HGVs (rounded). These figures represent more realistic levels of HGV traffic generation associated with the staggered construction of each cable section along "Link ID 89: B1145 in Cawston". This level of HGV traffic generation should only take place during the peak period of construction activities.

2.6 To provide further insight, as part of this Technical Note the HGV traffic generation figures for the construction of cable sections 9 & 10 associated with Hornsea Three have been broken down further into constituent components for the following construction activities:

- Temporary Site Compounds;
- Site facilities and equipment;
- Fencing and temporary Roadway construction along cable route;
- Trench Construction;
- Tile loads;
- Cable and ducting deliveries;
- TT (HDD / Thrust Bore) Sites;

- Drainage Pipe;
- Link Boxes.

2.7 Only cable sections 9 & 10 were considered in this exercise, given that these are the only two sections for which construction requires HGV traffic to pass along the B1145 directly through the village centre of Cawston.

2.8 Taking account of the Hornsea Three HIS it was confirmed a 3.3m diameter cable drum size would be the largest diameter drum to travel through Cawston, the resultant HGV traffic has been broken down into total deliveries in monthly and weekly figures, assuming a working week for the scheme is 5 days, and a working month is 20 days.

2.9 The duration of the construction of each cable section (in days) has also been taken from the original transport submission for the Hornsea Three scheme which equates to 133 days and 114 days respectively for cable sections 9 & 10.

2.10 While the overall construction of cable sections 9 & 10 would occur over a longer period, it is expected that the "cable and ducting deliveries" activities particular to cable sections 9 & 10 would take place during a condensed period of approximately six months if constructed simultaneously, or over approximately 11 months when staggered.

2.11 However, there could be a period of "overlap" between the construction of these two cable sections. While the overall construction of cable sections 9 & 10 when staggered would take approximately 11 months in total, an intermediate period of HGV two-way traffic generation would occur roughly centrally within this period during months 5-6 whereby there would be a "spike" in traffic generation.

2.12 Nevertheless, the level of daily traffic generation would still not exceed the figure of 127 two-way HGVs (i.e. that figure presented in aforementioned HGV Haul Road Reduction Report that in turn replaced the figure presented in the original Transport Assessment prepared to accompany the original Hornsea Three Development Consent Order submissions).

2.13 The comprehensive suite of spreadsheet outputs based on those figures included in the aforementioned HGV Haul Road Reduction Report (see Appendix A) provide a detailed account of the resultant implications for traffic movements through the village of Cawston on a monthly basis.

2.14 The HGV numbers presented have been broken down and calculated using the prescribed cable drum diameter size of 3.3m confirmed as the largest drum which would travel along the B1145 to the cable section access points.

2.15 All calculations have been derived from the original data (Table 2.1 above) and are considered to be the best estimate of maximum HGV traffic generation at the time of production of the report that accompanied the original submissions.

2.16 From the overall two-way HGV movement figures, only those associated with 'cable and ducting deliveries' are affected by the metres of cable that can be carried by each load.

2.17 The capacity of the drum size is estimated to be as follows and the specification of the vehicle is provided in Appendix B.

- 3.3m 1,167m of cable per drum (estimated maximum value)

2.18 Taking into account the traffic movements using a 3.3m diameter cable drum size the overall two way HGV movements for the simultaneous and staggered construction method scenarios are shown in Table 2.2 below.

Table 2.2 Summary of Daily Two-way HGV Traffic through Cawston for 3.3m dia. cable drum

Cable sections 9 & 10	Total month daily two-way HGV movements on B1145										
	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*
Simult'us	**127**	**121**	**121**	**117**	**122**	**123**					
Staggered	**67**	**65**	**65**	**65**	**68**	**127**	**56**	**56**	**56**	**59**	**60**

2.19 Taking this assessment and profiling into account the Hornsea Three scheme is able to confirm the following for cable sections 9 & 10.

- Primary peak does not exceed 127 daily HGV movements: Duration: 1 month
- Secondary peak: 68 daily HGV movements: Duration: 1 month
- Average over remaining period: 62 daily HGV movements Duration: 9 months
- Cable drum maximum diameter size 3.3m

3. Summary and Conclusions

3.1 Previous submissions for the Hornsea Three scheme have forecast that the construction of the two cable sections 9 & 10 to the West of Cawston could generate up to 127 two-way HGVs along Link ID 89: B1145 in Cawston.

3.2 The figure of 127 two-way HGVs was stated as a maximum (rounded) figure, and a maximum that should not be exceeded for a primary peak/secondary peak and average periods. This figure represents a worse-case scenario on the basis that cables sections 9 & 10 would be constructed simultaneously.

3.3 Associated with the construction of cable section 9 in isolation are a maximum of 62 daily two-way HGVs, and 65 two-way HGVs for cable section 10. These figures represent more realistic levels of HGV traffic generation associated with the staggered construction of each cable section along "Link ID 89: B1145 in Cawston". This level of HGV traffic generation should only take place during the peak period of construction activities.

3.4 Even during the "overlap" between the construction of these two cable sections, the level of daily traffic generation would still not exceed the figure of 127 two-way HGVs.

3.5 The cable for sections 9 & 10 would be delivered on cable drums with a maximum diameter of 3.3m due to the presence of two bridges with a 44 tonne limit as well as limited highway width as previously confirmed in the HIS presented by Hornsea Three.

3.6 Hornsea Three confirms the following maximum HGV traffic flows and durations:

- Primary peak does not exceed 127 daily HGV movements: Duration: 1 month
- Secondary peak: 68 daily HGV movements: Duration: 1 month
- Average over remaining period: 62 daily HGV movements Duration: 9 months
- Cable drum maximum diameter size 3.3m

3.7 This summary Technical Note pertains only to the construction of cable sections 9 & 10 and the on-road route referred to as "Link ID 89: B1145 in Cawston" and does not relate to any other cable sections or links associated with the Hornsea Three scheme.

3. Summary and Conclusions

3.1 Previous submissions for the Hornsea Three scheme have forecast that the construction of the two cable sections 9 & 10 to the West of Cawston could generate up to 127 two-way HGVs along Link ID 89: B1145 in Cawston.

3.2 The figure of 127 two-way HGVs was stated as a maximum (rounded) figure, and a maximum that should not be exceeded for a primary peak/secondary peak and average periods. This figure represents a worse-case scenario on the basis that cables sections 9 & 10 would be constructed simultaneously.

3.3 Associated with the construction of cable section 9 in isolation are a maximum of 62 daily two-way HGVs, and 65 two-way HGVs for cable section 10. These figures represent more realistic levels of HGV traffic generation associated with the staggered construction of each cable section along "Link ID 89: B1145 in Cawston". This level of HGV traffic generation should only take place during the peak period of construction activities.

3.4 Even during the "overlap" between the construction of these two cable sections, the level of daily traffic generation would still not exceed the figure of 127 two-way HGVs.

3.5 The cable for sections 9 & 10 would be delivered on cable drums with a maximum diameter of 3.3m due to the presence of two bridges with a 44 tonne limit as well as limited highway width as previously confirmed in the HIS presented by Hornsea Three.

3.6 Hornsea Three confirms the following maximum HGV traffic flows and durations:

- Primary peak does not exceed 127 daily HGV movements: Duration: 1 month
- Secondary peak: 68 daily HGV movements: Duration: 1 month
- Average over remaining period: 62 daily HGV movements Duration: 9 months
- Cable drum maximum diameter size 3.3m

3.7 This summary Technical Note pertains only to the construction of cable sections 9 & 10 and the on-road route referred to as "Link ID 89: B1145 in Cawston" and does not relate to any other cable sections or links associated with the Hornsea Three scheme.

Appendix A - Traffic Spreadsheets

Construction Vehicle Movements by Cable Route Section	Section 8	Section 9	Section 10	Total
Temporary Site Compounds				
% compound surfaced				
area (m^2)	0	0	1,800	**1,800**
m3 stone required - depth	0	0	540	**540**
Tonnes stone - t/m3	0	0	972	**972**
HGV loads - t/load	0	0	49	**49**
Removal of compounds	0	0	49	**49**
2-way HGV moves	**0**	**0**	**194**	**194**
Site facilities and equipment				
assume no HGVs for compound set up proportional to compound areas	0	0	2	**2**
Welfare (water, food, etc) assume proportional to compound areas	0	0	18	**18**
Removal of equipment etc.	0	0	2	**2**
2-way HGV moves	**0**	**0**	**43**	**43**
Fencing and temporary Roadway construction along cable route				
Length (metres)	4,370	1,935	1,660	**3,595**
Fencing - m/HGV	44	19	17	**36**
width - m	12	12	12	**24**
depth - m	0.5	0.5	0.5	**1**
Cubic metres stone for roadway	26,220	11,610	9,960	**21,570**
Tonnes stone - t/m3	47,196	20,898	17,928	**38,826**
HGV loads - t/load	2,360	1,045	896	**1,941**
Geogrid for underlaying stone - m2/HGV	1	1	0	**1**
Misc HGVs eg, culvert pipe, temp metal roadway sections - /km	22	10	9	**19**
Removal of Roadway	2,360	1,045	896	**1,941**
2-way HGV moves	**9,486**	**4,201**	**3,605**	**7,805**
Trench Construction				
trench width (average) - m				
depth - m				
No. cables per trench				
No. trenches				
Cable dia				
tiles per HGV / tiles to cover trench width				
Volume of stabilised backfill in cubic metres per trench	7,743	3,428	2,941	**6,370**
m3 backfill	46,457	20,571	17,647	**38,218**
Tonnes backfill	76,654	33,942	29,118	**63,060**
HGV loads	3,833	1,697	1,456	**3,153**
Tile loads	107	48	41	**89**
Wall support proportional to length of trenches - loads	9	4	3	**7**
Removal of excavated material				**0**
2-way HGV moves	**7,897**	**3,498**	**3,000**	**6,498**
Drainage Pipe				
Volume of stabilised backfill in cubic metres per trench (m3)	2,193	971	833	**1,804**
trench width at bottom (m)				
Trench depth (m)				
Pipes per trench				
Tonnes backfill - t/m3	3,618	1,602	1,374	**2,977**
HGV loads	181	80	69	**149**
Removal of excavated material	181	80	69	**149**
2-way HGV moves	362	160	137	**298**
Link Boxes				
Volume per trench m3	18	18	18	**36**
Total No. of Link Boxes on corridor	1,131	16	14	**30**
HGV loads - m3/HGV	189	3	2	**5**
2-way HGV moves	377	5	5	**10**
Transition Pits		only for landfall (not applicable for Cawston)		
Cable and ducting deliveries				
m of Cable	78,660	34,830	29,880	**64,710**
Number of cable drums - m/cable roll	127	56	49	**105**
HGV loads	127	56	49	**105**
m of ducting	78,660	34,830	29,880	**64,710**
Number of duct loads	105	47	40	**87**
2-way HGV moves	464	206	178	**384**
TT (HDD / Thrust Bore) Sites				
HDD Site Preparation	125	89	89	**178**
HGV movements per HDD				
HDD Site Reinstatement				
HGV movements per HDD	107	76	76	**152**
Factor 101 to 120 HDDs				

Construction Vehicle Movements by Cable Route Section	Section 8	Section 9	Section 10	Total
Major HDD works	0	0	26	**26**
Total Major HDD 2-way HGV Movements	231	165	191	**357**
Minor HDD works	166	119	95	**214**
HGV movements per HDD				
Total Minor HDD 2-way HGV Movements	139	139	163	**302**
2-way HGV moves	**370**	**304**	**354**	**659**
Construction period Duration - Days	**300**	**133**	**114**	**247**
Construction period Duration - Weeks	**60**	**27**	**23**	**49**
Construction period Duration - Months	**14**	**6**	**5**	**12**
TOTAL HGV DELIVERIES	**18956**	**8374**	**7517**	**15,891**
Monthly HGV Deliveries	1,327	1,322	1,385	**2,707**
Weekly STAFF Deliveries	316	315	330	**645**
Daily HGV Deliveries	63	63	66	**129**
TOTAL STAFF MOVEMENTS	**9,180**	**4,118**	**3,539**	**7,657**
Monthly STAFF Deliveries	3,841	2,944	2,668	**5,612**
Weekly STAFF Deliveries	919	704	638	**1,342**
Daily STAFF Deliveries	167	128	116	**244**
TOTAL MOVEMENTS	**28,136**	**12,492**	**11,056**	**23,548**
MONTHLY MOVEMENTS	5,168	4,266	4,053	**8,319**
WEEKLY MOVEMENTS	1,234	1,019	968	**1,987**
DAILY MOVEMENTS	230	191	182	**373**

Daily Material Movements per Month

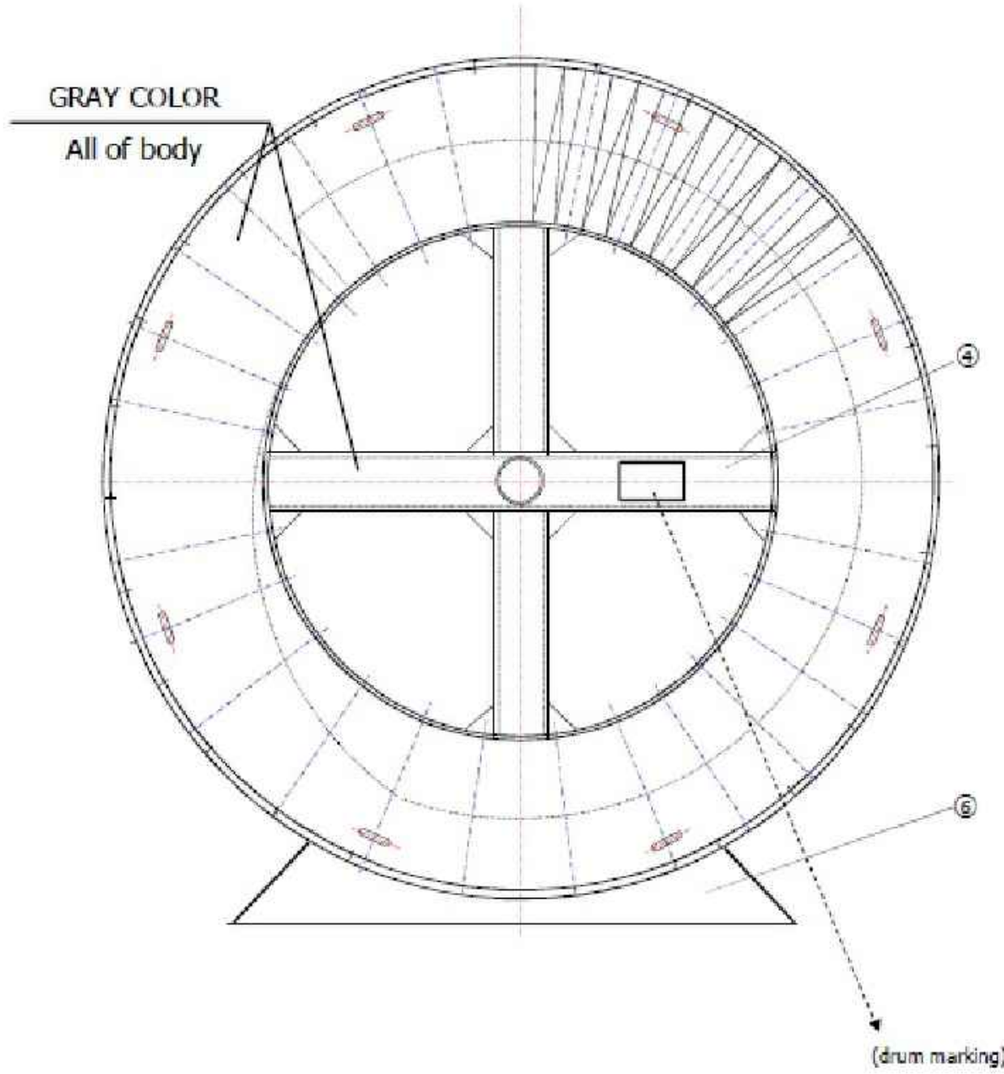
Simoultaneous Construction					Months																																					
Activity	Total HGVs	Duration (months)	Duration (days)	Notes	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
Temporary Site Compounds	97	2	46	Includes installation and removal															2					2																			
Site facilities and equipment	29	2	46																1					1																			
Fencing and temporary Roadway construction along cable route	3,902	6	138	Includes installation and removal															28	28	28	28	28	28																			
Trench Construction	3153	6	138	activity suspended during winter															23	23	23	23	23	23																			
Tile loads	89	5	115	activity suspended during winter															1	1	1		1																			
Cable and ducting deliveries	143	5	115	n/a															1	1	1		1																			
TT (HDD / Thrust Bore) Sites	240	6	138	n/a															2	2	2																					
Drainage Pipe	149	3	69	Includes installation and removal																		2	2	2																		
Link Boxes	5	3	69	activity suspended during winter								0									0	0	0																			
Total monthly daily HGV movements					**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**58**	**55**	**55**	**53**	**55**	**56**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Total monthly daily HGV movements + 10% contingency					**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**63**	**60**	**60**	**59**	**61**	**62**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Total monthly daily two-way HGV movements					**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**127**	**121**	**121**	**117**	**122**	**123**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

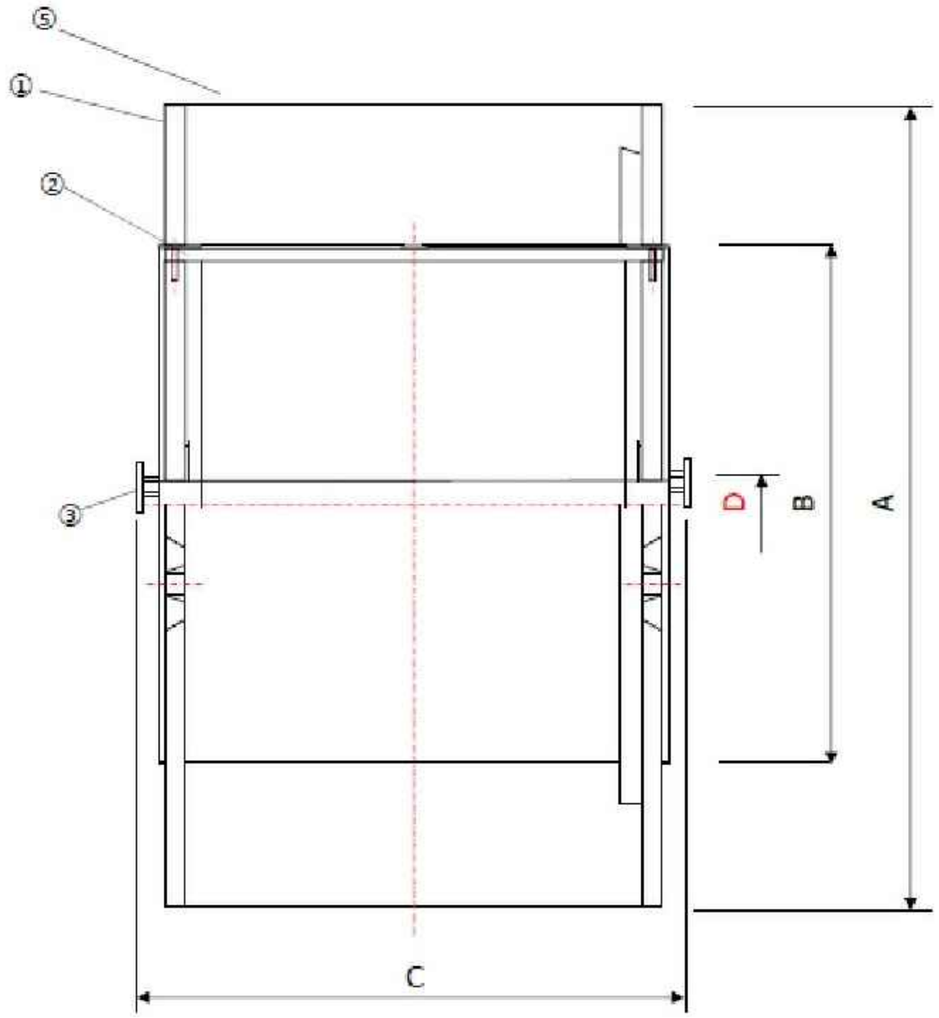
Daily Material Movements per Month

Staggered Construction

Activity	Section 9 HGVs	Section 10 HGVs	Duration per section (months)	Duration (days)	Notes	Months																																				
						0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
Temporary Site Compounds	0	97	2	46	Includes installation and removal														0	2				0	2																		
Site facilities and equipment	4	25	2	46															0	1				0	1																	
Fencing and temporary Roadway construction along cable route	2,100	1,802	6	138	Includes installation and removal										15	15	15	15	15	28	13	13	13	13	13																		
Trench Construction	1697	1456	6	138	activity suspended during winter										12	12	12	12	12	23	11	11	11	11	11																		
Tile loads	48	41	5	115	activity suspended during winter										0	0	0	0	0	0	0	0	0	0																			
Cable and ducting deliveries	77	66	5	115	n/a										1	1	1	1	1	1	1	1	1	1																			
TT (HDD / Thrust Bore) Sites	119	121	5	115	n/a										1	1	1	1	1	1	1	1	1	1																			
Drainage Pipe	80	69	3	69	Includes installation and removal										1				1	2				1	1																		
Link Boxes	3	2	3	69	activity suspended during winter													0	0	0			0	0	0																		
Total monthly daily HGV movements						**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**31**	**30**	**30**	**30**	**31**	**58**	**26**	**26**	**26**	**27**	**27**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Total monthly daily HGV movements + 10% contingency						**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**34**	**33**	**33**	**33**	**34**	**64**	**28**	**28**	**28**	**29**	**30**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Total monthly daily two-way HGV movements						**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**67**	**65**	**65**	**65**	**68**	**127**	**56**	**56**	**56**	**59**	**60**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Appendix B– 3.3m Cable Drum Specification Plan





No.	Description	Material
1	Flange	Steel
2	Barrel	Steel
3	Lift Ring	Steel
4	Spider	Steel
5	Lagging	Steel
6	Stopper	Steel Sheet

Part	Dimension (Approx.)
A (Length)	3300mm
B (Barrel dia.)	1990mm
C (Width)	3020mm
D (Spindle dia.)	205 (+5)
Gross Weight	23,290 kg

REV	DATE	AMENDMENT DETAILS	DRAWN	APPROVED

Ørsted

PROJECT: HORNSEA 3 OFF-SHORE WIND FARM	DATE: 20.08.20	DRAWING STATUS: INFORMATION	
	SCALE(S): N.T.S.	DESIGNED: AF	DRAWN: AF
DRAWING TITLE: 3.3M CABLE DRUM SPECIFICATION		CHECKED: PZ	APPROVED: PZ
	JOB No: 1554		
CLIENT: ORSTED	DRAWING No: 03/510	REVISION: -	

create CONSULTING ENGINEERS LTD

www.createconsultingengineers.co.uk

DO NOT SCALE ORIGINAL SHEET SIZE - A3 Landscape