Hornsea Project Four

Clarification Note on Marine Mammals

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Revision Summary

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Revision Change Log

Rev	*Page*	*Section*	*Description*
01	N/A	N/A	Document prepared as a result of comments raised within Natural England's Deadline 2 Submission – Natural England Risk and Issues Log (REP2-083) and submitted at Deadline 4.

Table of Contents

List of Tables

List of Figures

Glossary

Term	Definition
Commitment	A term used interchangeably with mitigation and enhancement measures. The purpose of Commitments is to reduce and/or eliminate Likely Significant Effects (LSEs), in EIA terms. Primary (Design) or Tertiary (Inherent) are both embedded within the assessment at the relevant point in the EIA (e.g. at Scoping, Preliminary Environmental Information Report (PEIR) or ES). Secondary commitments are incorporated to reduce LSE to environmentally acceptable levels following initial assessment i.e. so that residual effects are acceptable.
Cumulative effects	The combined effect of Hornsea Four in combination with the effects from a number of different projects, on the same single receptor/resource. Cumulative impacts are those that result from changes caused by other past, present or reasonably foreseeable actions together with Hornsea Project Four.
Export cable corridor (ECC)	The specific corridor of seabed (seaward of Mean High Water Springs (MHWS)) and land (landward of MHWS) from the Hornsea Four array area to the Creyke Beck National Grid substation, within which the export cables will be located.
Habitats Regulations Assessment (HRA)	A process which helps determine likely significant effects and (where appropriate) assesses adverse impacts on the integrity of European conservation sites and Ramsar sites. The process consists of up to four stages of assessment: screening, appropriate assessment, assessment of alternative solutions and assessment of imperative reasons of over-riding public interest (IROPI) and compensatory measures.
Hornsea Project Four Offshore Wind Farm	The term covers all elements of the project (i.e. both the offshore and onshore). Hornsea Four infrastructure will include offshore generating stations (wind turbines), electrical export cables to landfall, and connection to the electricity transmission network. Hereafter referred to as Hornsea Four.
Maximum Design Scenario (MDS)	The maximum design parameters of each Hornsea Four asset (both on and offshore) considered to be a worst case for any given assessment.
Mitigation	A term used interchangeably with Commitment(s) by Hornsea Four. Mitigation measures (Commitments) are embedded within the assessment at the relevant point in the EIA (e.g. at Scoping, PEIR or ES).
Permanent Threshold Shift (PTS)	A total or partial permanent loss of hearing at a particular frequency caused by some kind of acoustic trauma. PTS results in irreversible damage to the sensory hair cells of the ear, and thus a permanent reduction of hearing acuity at that frequency.
Sound Exposure Level (SEL)	The constant sound level acting for one second, which has the same amount of acoustic energy, as indicated by the square of the sound pressure, as the original sound. It is the time-integrated, sound-

	pressure-squared level. SEL is typically used to compare transient sound events having different time durations, pressure levels, and temporal characteristics.
Sound Pressure Level (SPL)	The sound pressure level or SPL is an expression of the sound pressure using the decibel (dB) scale and the standard reference pressures of 1 µPa for water.
Temporary Threshold Shift (TTS)	Temporary loss of hearing at a particular frequency as a result of exposure to sound over time. The mechanisms underlying TTS are not well understood, but there may be some temporary damage to the sensory cells. The duration of TTS varies depending on the nature of the stimulus, but there is generally recovery of full hearing over time.
Threshold	The threshold generally represents the lowest signal level an animal will detect in some statistically predetermined percent of presentations of a signal.
Unweighted sound level	Sound levels which are 'raw' or have not been adjusted in any way, for example to account for the hearing ability of a species.
Weighted sound level	A sound level which has been adjusted with respect to a 'weighting envelope' in the frequency domain, typically to make an unweighted level relevant to a particular species. The overall sound level has been adjusted to account for the hearing ability of marine mammals.

Acronyms

Term	Definition
CTV	Crew Transfer Vessel
ECC	Export Cable Corridor
ES	Environmental Statement
HVAC	High Voltage Alternating Current
JNCC	Joint Nature Conservation Committee
JUV	Jack-Up Vessel
MMMP	Marine Mammal Mitigation Protocol
MU	Management Unit
OESEA	Offshore Energy Strategic Environmental Assessment
PTS	Permanent Threshold Shift
SAC	Special Area of Conservation
SCOS	Special Committee on Seals
SNCB	Statutory Nature Conservation Body
TTS	Temporary Threshold Shift
VMP	Vessel Management Plan
WTG	Wind Turbine Generator

1 Introduction

1.1.1.1 In response to Natural England's Deadline 2 Submission – Natural England Risk and Issues Log (**REP2-083**) the Applicant is providing this clarification note with respect to outstanding issues in relation to marine mammals.

2 Cumulative Permanent Threshold Shift

2.1.1.1 The Applicant maintains that at present, the estimation of weighted sound exposure criteria (SELcum) Permanent Threshold Shift (PTS) onset ranges is highly over-precautionary and as such there should not be a requirement to implement mitigation based on SELcum until these conservatisms have been quantified and addressed.

2.1.1.2 The current underwater noise modelling for SELcum PTS onset using the Southall et al. (2019) criteria assumes the following:

1) the amount of sound energy an animal is exposed to within 24 hours will have the same effect on its auditory system, regardless of whether it is received all at once (i.e. within a single bout of sound) or in several smaller doses spread over a longer period; and
2) the sound retains its impulsive character, regardless of the distance to the sound source.

2.1.1.3 However, in reality:

3) there is recovery of a threshold shift if the dose is applied in several smaller doses (e.g. between pulses during pile driving or in piling breaks) leading to an onset of PTS at a higher energy level than assumed with the given SELcum threshold; and
4) impulsive sound loses its impulsive characteristics while propagating away from the sound source, resulting in a slower shift of an animal's hearing threshold than would be predicted for an impulsive sound.

2.1.1.4 Both assumptions therefore lead to a conservative determination of the impact ranges. Document **A2.4 ES Volume A2 Chapter 4 Marine Mammals (APP-016)**, Appendix A provides further information on the range-dependent characteristics of impulsive sounds and Appendix B provides further information on the limitations of SELcum predictions. The following text expands what is presented in Appendix 2 with regards to the equal energy hypothesis assumption and accounting for duty cycles, drawing on more recently published evidence, where available.

2.1.1.5 Several studies (on bottlenose dolphins, harbour porpoise and California sea lions) have shown that for the same SELcum, if duty cycle decreases (i.e. the interval between successive impulses, such as gaps between hammer strikes of piles), then the magnitude of TTS decreases (Finneran et al. 2010, Kastelein et al. 2014, Kastelein et al. 2015, Kastelein et al. 2021, Kastelein et al. 2022). In such experiments, while the total amount of received energy is the same, the energy received per unit of time differs under different duty cycles, influencing the resulting TTS. Therefore, when exposed to sounds with a lower duty cycle, TTS develops more slowly.

2.1.1.6 Kastelein et al. (2014) showed that when a harbour porpoise was exposed to a SELcum of 204 dB re 1 μPa²s, a 100% duty cycle resulted in an initial TTS of 27.5 dB, a duty cycle of 75% resulted in an initial TTS of 21.3 dB, a duty cycle of 50% resulted in an initial TTS of 19.8

dB and a duty cycle of 25% resulted in an initial TTS of 17.4 dB. Kastelein et al. (2015) showed that the 40 dB hearing threshold shift proposed by Southall et al. (2007) for harbour porpoise, is expected to be reached at different SELcum levels depending on the duty cycle: for a 100% duty cycle, the 40 dB hearing threshold shift is predicted to be reached at a SELcum of 196 dB re 1 μPa2s, but for a 10% duty cycle, the 40 dB hearing threshold shift is predicted to be reached at a SELcum of 206 dB re 1 μPa2s (10 dB re 1 μPa2s difference in the threshold).

2.1.1.7 Pile strikes are relatively short signals; the signal duration of monopile pile strikes may range between 0.1 sec (De Jong & Ainslie, 2008) and approximately 0.3 sec (Dähne et al. 2017) measured at a distance of 3.3 to 3.6 km. The strike rate at Hornsea Four varies across the expected piling period, between 1 strike every 10 min (soft-start) to 30 strikes per minute (full hammer energy). Assuming the pile strike is 0.3 sec in duration, the soft-start will have a duty cycle of <0.1% (0.3 sec strike followed by 599.7 sec silence) and full hammer energy will have a duty cycle of 15% (0.3 sec strike followed by 1.7 sec silence). Therefore, it is expected that at Hornsea Four, the very low duty cycles (<0.1% - 15%) will result in a significantly smaller TTS than if 100% duty cycle was assumed. Therefore, the currently presented SELcum PTS onset impact ranges, which do not account for duty cycle and recovery between pulses, are highly conservative.

2.1.1.8 The Applicant acknowledges that the assessment of cumulative PTS is an area of active research. Ongoing studies are seeking to better understand the effects of duty cycle and how the impulsive characteristics of noise change with range; for example, further investigation of how duty cycle influences TTS in harbour porpoise and seals (R. Kastelein, pers. comm., April 2022), and the forthcoming (2022) ORJIP RaDIN (range-dependent nature of impulsive noise) project. It is anticipated that these and other studies will reduce existing uncertainties and sources of conservatism, and will result in developments to the process of estimating SELcum.

2.1.1.9 As such, the Applicant will maintain awareness of current research and maintain ongoing dialogue with Natural England as the project develops to ensure that the final MMMP presents an assessment and mitigation measures reflecting the state of knowledge at the time.

References

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Southall, B., J. J. Finneran, C. Reichmuth, P. E. Nachtigall, D. R. Ketten, A. E. Bowles, W. T. Ellison, D. Nowacek, and P. Tyack. 2019. Marine Mammal Noise Exposure Criteria: Updated Scientific Recommendations for Residual Hearing Effects. Aquatic Mammals 45:125-232.

3 Vessel Collision Risk

3.1.1 Introduction

3.1.1.1 Increased levels of vessel traffic may result in an increase in collision risk or injury to marine mammals. This is of increasing concern for harbour seals in the Southern North Sea since the haul-out count for The Wash, Donna Nook and Blakeney Point in 2019 was 27% lower than previous counts (SCOS 2021). Since these are the key areas for harbour seals in the South East England MU (including the Wash and North Norfolk Coast SAC) this drop in abundance has been described as an "immediate and serious concern" (SCOS 2021).

3.1.1.2 As such, Natural England are in the process of updating the conservation objectives for the Wash and North Norfolk Coast SAC from "maintain" to "restore". This means that additional precautions may need to be implemented to ensure the risk of vessel collisions is further reduced.

3.1.1.3 In response, additional information on collision risk from vessels associated with Hornsea Four is presented here.

3.1.2 Potential Ports

3.1.2.1 The Applicant is not able to commit to using any particular port for the construction base for the offshore elements of the Project at this time. Therefore, several ports in the southern North Sea are under consideration (

3.1.2.2 **Figure** 1). With regard to the potential impacts to harbour seals of collision risk from vessels, the ports located in England are considered to be the worst case, maximum design scenario (Port of Tyne, Immingham, Grimsby and Great Yarmouth) as they are situated in closest proximity to areas of higher harbour seal at-sea densities (**Figure 2**).

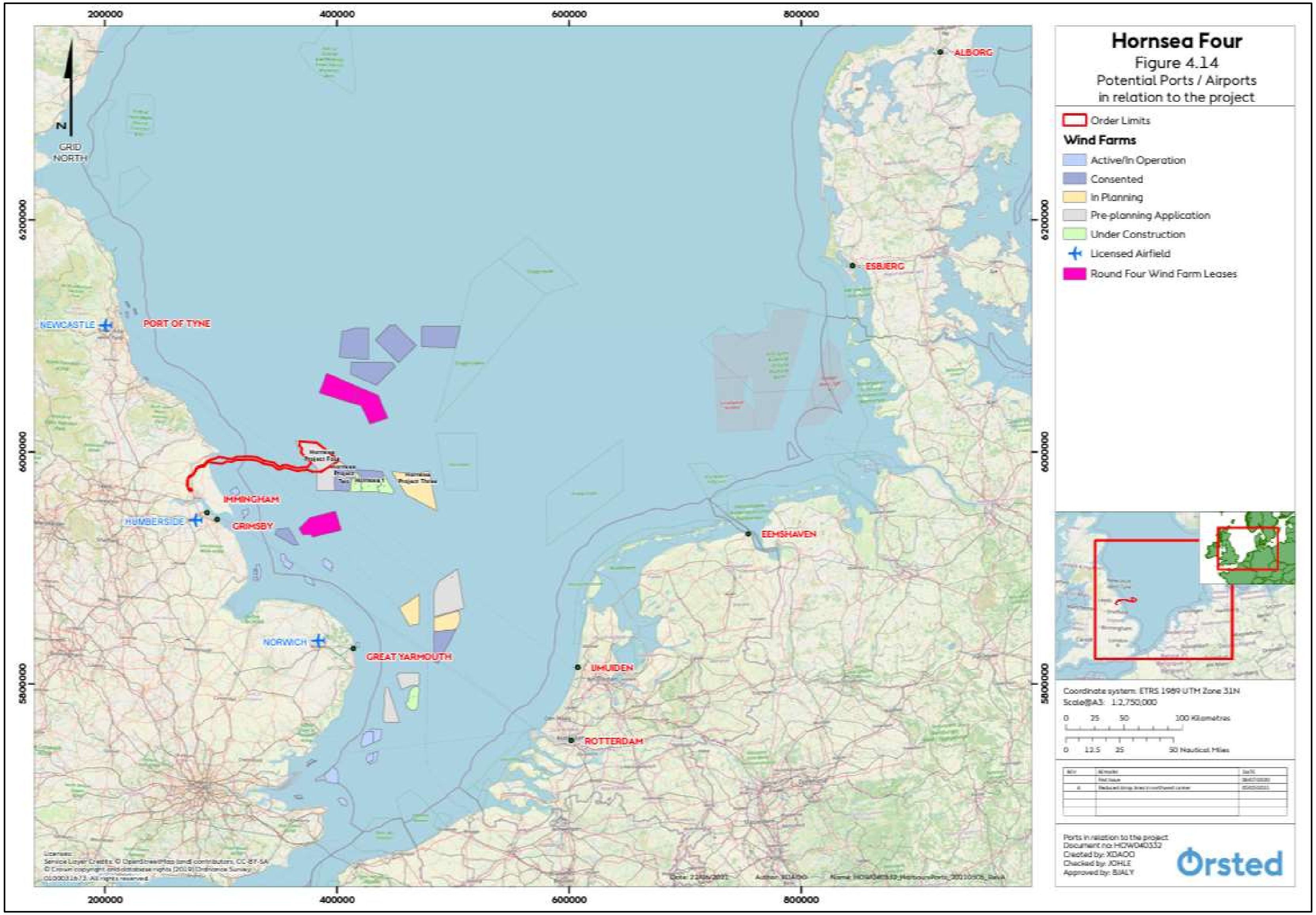


Figure 1: Potential ports and airports in relation to the project

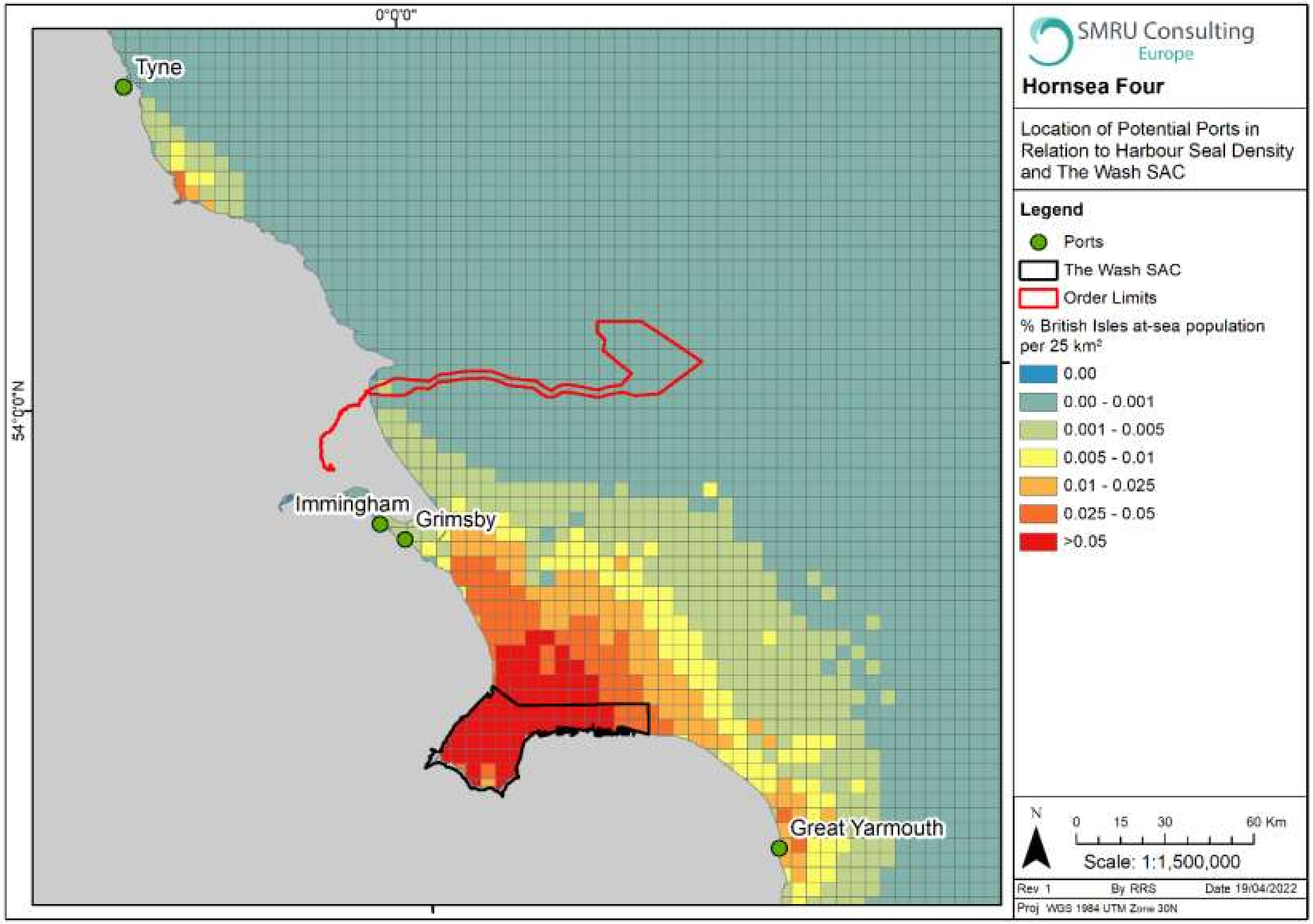


Figure 2: Harbour seal at-sea density in relation to potential construction ports. Seal density data obtained from Carter et al. (2020)

3.2 Baseline Vessel Information

3.2.1.1 The Hornsea Four array area, ECC and HVAC search areas already experience fairly high levels of baseline vessel traffic. Baseline vessel traffic is highest within the ECC area compared to the array area and HVAC search areas, and vessel numbers are similar between both summer and winter (**Table 1**). In most areas, and across both seasons, it is cargo ships that dominate the baseline vessel traffic. The primary vessel types already present in the area are large, slow-moving vessels such as cargo ships and tankers, which pose a low collision risk.

Table 1: Baseline vessel information. Data taken from A5.7.1 Environmental Statement Volume A5 Annex 7.1: Navigational Risk Assessment (APP-081 to APP-083).

		Array Area	ECC	HVAC
Summer	Average # of unique vessels	27	55	34
	Max # of unique vessels	37	71	42
	Vessel types	Cargo vessels (56%), tankers (21%) and oil and gas vessels (18%)	Cargo vessels (37%), tankers (22%) and fishing vessels (19%)	Cargo vessels (48%) and tankers (46%)
Winter	Average # of unique vessels	25	55	47
	Max # of unique vessels	31	69	51
	Vessel types	Cargo vessels (60%), tankers (18%) and oil and gas vessels (17%)	Cargo vessels (41%), tankers (22%) and fishing vessels (15%)	Tankers (48%), oil and gas vessels (29%) and cargo vessels (21%)

3.3 Construction Vessel Information

3.3.1.1 The expected levels of construction vessel activity and vessel types at Hornsea Four are outlined in **Table 2**. It is expected that up to 6,126 return trips per year by construction vessels may be made throughout the construction phase. Indicatively, the busiest period during construction would be when up to 8 vessels (installation and commissioning vessels) could be found in a given 5 km^2 area. This level of activity is unlikely to occur across the entire Hornsea Four array area at any one time (expected across ~3-4 5 km^2 blocks).

Table 2: Total values for vessel activities during construction. Data taken from A1.4 Environmental Statement Volume A4 Chapter 4: Project Description (REP1-004).

Task	Vessels	# Vessels	Max # return trips
WTG installation (non GBS)	Installation vessel (JUV or anchored)	2	90
	Support vessels: crew boats or SOVs (x4), service vessels for pre-rigging of towers (x2), diver vessels (x2), PLGR (x2) and post-lay inspection (x2)	12	270

Task	Vessels	# Vessels	Max # return trips
	Transport vessel	24	540
WTG installation (GBS)	Installation vessel (6 (2xJUV, 2 x anchored or 4 DP2 or 6x Tugs))	6	90
	Support vessels: Tug boats (x10), crew boats (x2), drilling vessel (x2), TSHD for ballasting (x1) and guard boats (x4)	19	900
	Transport / Feeder vessel (incl. Tugs)	40	720
	Dredging vessels: dedicated dredging vessels (x2, typically TSHD), primary gravel bed vessels (x2), and additional miscellaneous dredging support vessels (x8)	12	720
Substation installation	Installation vessel	2	36
	Support vessel	12	162
	Transport vessel	4	72
Substation foundation installation	Installation vessel	2	24
	Support vessel	12	108
	Transport vessel	4	48
Inter-array and offshore interconnector cables installation	Main laying vessel	3	204
	Main burial vessel	3	204
	Support vessel	12	1080
Offshore export cables installation	Main Cable Laying vessel	3	96
	Main Cable Jointing Vessel	3	72
	Main Cable Burial vessel	3	96
	Support vessel	15	144

3.4 Operations and Maintenance Vessel Information

3.4.1.1 During the Hornsea Four operations and maintenance (O&M) phase, there can be a total of up to 16 vessels in the array area on any given day. The O&M vessels are likely to be Crew Transport Vessels (CTVs), Service Operation Vessels (SOVs), offshore accommodation, supply vessels, cable and remedial protection vessels. An indicative 1,433 return trips per year by operation and maintenance vessels is assumed to be a maximum design scenario.

3.5 Vessel Collision Risk

3.5.1.1 The following text is duplicated from **A2.4 Environmental Statement Volume A2 Chapter 4 Marine Mammals (APP-016)**.

3.5.1.2 There are very few studies that indicate a critical level of activity in relation to risk of collisions but an analysis presented in Heinänen and Skov (2015) suggested that harbour porpoise density was significantly lower in areas with vessel transit rates of greater than 80 per day within a 5 km grid. As outlined in **A1.4 Environmental Statement Volume A4 Chapter 4: Project Description (REP1-004)**, the busiest period during construction in terms of vessel traffic would be when up to eight vessels are present in a given 5 km^2 block. This level of activity is unlikely to occur across the entire Hornsea Four array area at any one time, rather this intensity is expected across approximately three or four 5 km^2 blocks. Vessel traffic in the Hornsea Four area, even considering the addition of construction traffic, will still be below 80 per day within a 5 km grid.

3.5.1.3 Harbour porpoises, dolphins and seals are relatively small and highly mobile, and given observed responses to noise, are expected to detect vessels in close proximity and largely avoid collision. Predictability of vessel movement by marine mammals is known to be a key aspect in minimising the potential risks imposed by vessel traffic (e.g. Nowacek et al. 2001, Lusseau 2003, 2006).

3.5.1.4 It is highly likely that a proportion of vessels will be stationary or slow moving throughout construction activities for significant periods of time. Therefore, the actual increase in vessel traffic moving around the site and to/from port to the site will occur over short periods of the offshore construction activity.

3.5.2 Magnitude of Impact

3.5.2.1 It is not expected that the level of vessel activity during construction would cause an increase in the risk of mortality from collisions. The adoption of a vessel management plan during construction (Commitment Co108) will minimise the potential for any impact. The impact is therefore predicted to be of local spatial extent, short term duration and intermittent. The magnitude is therefore considered to be minor.

3.5.3 Sensitivity of the Receptor

3.5.3.1 All marine mammal receptors are deemed to be of low vulnerability given that vessel collision is not considered to be a key source of mortality highlighted from post-mortem examinations of stranded animals. However, should a collision event occur, this is likely to kill or injure the animal. As a result of the low vulnerability to a strike but the serious consequences of a strike, the sensitivity of the marine mammal receptors to collisions is considered to be high.

3.6 Vessel Collision Risk: Additional Information

3.6.1.1 The following text is additional information presented to further justify the conclusions reached in **A2.4 Environmental Statement Volume A2 Chapter 4 Marine Mammals (APP-016)**.

3.6.2 Corkscrew Seals

3.6.2.1 There had previously been concern that ducted propellers may be causing the death of seals with characteristic spiral lesions "corkscrew seals". Brownlow et al. (2016) investigated the corkscrew seal deaths and concluded that *"most of the seal carcasses displaying spiral lacerations in the UK are caused by grey seal predation".* However, they did also note that *"scale model trials demonstrated that ducted propellers can produce these types of wounds"* and that *"It would therefore be premature to assume that the interactions with propellers are not responsible for any of the observed injuries to seals".*

3.6.2.2 The most recent SNCB advice (Scottish Natural Heritage et al. 2015) states that "*Based on the latest information it is considered very likely that the use of vessels with ducted propellers may not pose any increased risk to seals over and above normal shipping activities and therefore mitigation measures and monitoring may not be necessary in this regard, although* *all possible care should be taken in the vicinity of major seal breeding and haul-out sites to avoid collisions"*. Therefore, there is considered to be a negligible risk of "corkscrew seal" deaths occurring as a result of vessel activity in association with Hornsea Four.

3.6.3 Vessel speeds

3.6.3.1 There is evidence that a reduction in speed will result in a lower probability of lethal injury across various marine species (from large whales to turtles) (Schoeman et al. 2020). In general, the construction phase will mainly require the use of large vessels (jack-up vessels, dynamically positioned (DP) vessels, and feeder barges) which are expected to travel at slow speeds in the region of 12-15 kts (though the vessel speeds would likely be affected by the weight of equipment being transported) (Table 3). Vessel speeds for installation vessels (DP vessels), once operational are minimal at <1 knot. It is expected that only small workboats and crew transfer vessels will transit at greater speeds between 15-44 knots.

Table 3: Information on typical vessel speeds.

Vessel type	Vessel info	Speed	Source
Jack up vessel	Length = 140.4 m Width = 41 m width Hull = 9.5 m	maximum = 12kt service = 10.2kt	ship-technology[1]
Jack up vessel	hull = 147 m breadth = 42 m Depth of the hull = 11 m	12 kt	cubic[2]
Jack up vessel	hull = 132 m by 39 m	Transit = 12kt	abpmer[3]
DP vessel	Typical DP vessels	Typical optimum 12-14 kts	rules.dnv[4]
DP vessel	NA	Operational speed < 1.0 knots	nautinst[5]
DP Vessel	NMA Maritime & Offshore Contractors	Travel 15 kts	offshore-mag[6]
Feeder barge	CFL and Barge Master 82.5-m cargo hold capable of transporting two 80-metre long, 900-tonne monopiles, or four transition pieces at one time	Transit = up to 14 knots	offshorewind.biz[7]
Crew vessel	Typical CTV	Transit = 15-25 kts Top speed = 30 kts	4coffshore[8]
Crew vessel	Mauric Crew Boat 360	Cruising = 40 kts	mauric.ecagroup[9]

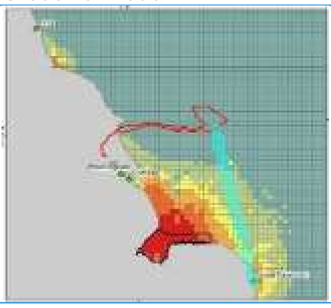
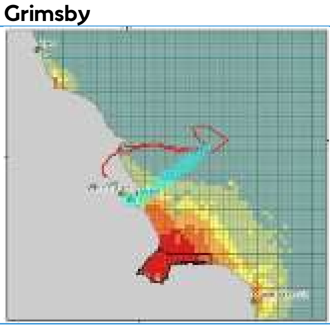
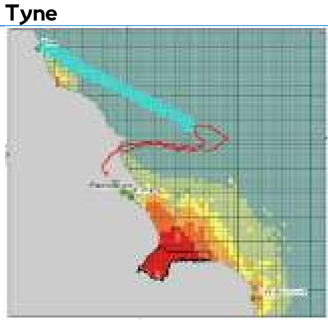
[1] [redacted]

Vessel type	Vessel info	Speed	Source
		Max = 44 kts	
Crew vessel	Chartwell 24 Crew Transfer Vessel	Max = 29 kts	ship-technology[10]
Crew vessel	BMT 27m Crew Transfer Vessel	Service speed = 25 kts Max = 27 kts	bmt[11]
Supply vessel	MAURIC fast supply vessel	Typical = 25 kts and 30 kts, Full load = 17 kts to 20 kts	mauric[12]
Supply vessel	Most modern supply vessels	economical speed = 11–13 kts Max speed = 17–18 kts	eprints.lancs[13]
Support vessel	Multi-Purpose Support Vessel 750	Max speed = 9.5 kts	mauric[14]
Pilot vessel	Mauric Pilot Vessel 400	Max speed = 14 kts	mauric[15]
Support vessel	Mauric Wind Farm Support Vessel (WFSV) 280	Max = 25 kts Cruising = 23 kts	mauric[16]

3.6.4 Seal Density

3.6.4.1 The ports of Great Yarmouth, and those in the Humber Estuary area (Grimsby and Immingham) are closest to areas of higher harbour seal at-sea densities that extend out of the Wash SAC. Since the Humber Estuary ports are closer to the Hornsea Four array area, the assumed straight line vessel transit route from the port to the edge of the array area is relatively short compared to the assumed straight line vessel transit route from the port of Great Yarmouth. Therefore the highest number of seals that are predicted to be exposed to vessels associated with Hornsea Four is for the Great Yarmouth vessel transit route, where up to 100 harbour seals are expected to be in the vicinity of the vessel along the assumed straight line vessel route between port and the edge of the array area (Table 4).

Table 4: Harbour seal occurrence along assumed vessel transit routes.

Port	Great Yarmouth	Grimsby	Tyne
Route			
Number of harbour seals	100	39	3
Max density	0.462	0.232	0.009

[redacted]

3.6.5 **Seal Vessel Co-Occurrence**

3.6.5.1 Onoufriou et al. (2016) produced maps of harbour seal usage maps in the Moray Firth alongside maps of shipping activity based on AIS data. The maps were combined to obtain a total number of minutes of seal/vessel co-occurrence per year in the inner Moray Firth. There was no evidence of a relationship between incidences of corkscrew seals and where seal-shipping co-occurrence was high and as such the study concluded that "the number and location of corkscrew seal strandings within the Moray Firth are not proportional to the estimates of seal-shipping overlap". This was also the conclusion reached by Jones et al. (2015) from a UK wide analysis, where corkscrew seal sightings did not coincide with areas of higher seal-ship co-occurrence.

3.6.5.2 Additionally, further research has found no evidence of a decline in population size where there are high levels of co-occurrence between seals and vessels (Jones et al. 2017). The paper concluded that around the UK, co-occurrence between seals and ships was highest within 50 km of the coast and close to haul-outs. As shown in their analysis (**Figure 3**), there are already high levels of co-occurrence between harbour seals and ships in the coastal waters that extend out of the Wash SAC and as such, vessel presence is not a novel phenomenon for this species in this area.

3.7 Vessel Management Plan

3.7.1.1 Commitment Co108: A Vessel Management Plan (VMP) will be developed pre-construction which will determine vessel routing to and from construction areas and ports to minimise, as far as reasonably practicable, encounters with marine mammals and thus minimise the risk of collisions with harbour seals.

3.7.1.2 It is expected that the VMP will include provisions such as:

- Maintain regular vessel transit routes;
- Maintain predictable movement - avoid sudden changes in direction and speed ;
- Keep a look forward (especially for smaller and faster vessels); and
- Do not intentionally peruse or instigate contact with marine mammals.

3.8 Conclusions

3.8.1.1 There is evidence that a reduction in speed will result in a lower probability of lethal injury across various marine species (from large whales to turtles), however, the species-specific relationship between vessel type and speed and the likelihood of lethal injury is not well understood (Schoeman et al. 2020). The majority of the vessels associated with Hornsea Four will be large size, slow moving vessels that will be associated with a low collision risk. In addition, the adoption of a vessel management plan will serve to minimise the potential for collisions from smaller, faster vessels.

3.8.1.2 While certain species are often attracted to vessels (such as bottlenose dolphins), seal species have been shown to be displaced by vessel traffic associated with marine construction works, likely due to noise disturbance (Anderwald et al. 2013). Thus, the likelihood of seals remaining in the immediate vicinity of vessels to be at risk of collision is considered to be low.

3.8.1.3 The conservation objectives of the Wash and North Norfolk Coast SAC are to: Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:

- The extent and distribution of qualifying natural habitats and habitats of qualifying species;
- The structure and function (including typical species) of qualifying natural habitats;
- The structure and function of the habitats of qualifying species;
- The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely;
- The populations of qualifying species; and
- The distribution of qualifying species within the site.

3.8.1.4 Given the already high levels of vessel activity in the area, in conjunction with the fact that most vessels associated with Hornsea Four will be large and slow moving, the implementation of a vessel management plan is expected to mitigate the risk of vessel collisions with harbour seals. Therefore, there is expected to be no change to the extent, distribution or population of harbour seals within the Wash and North Norfolk Coast SAC as a result of vessel activity associated with Hornsea Four.

3.8.1.5 There is, therefore, no potential for an AEoI to the conservation objectives of the harbour seal feature of the Wash and North Norfolk Coast SAC in relation to collision effects from vessel activity associated with Hornsea Four.

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