DBS Offshore Wind

RWE Renewables UK Dogger Bank South (West) Limited

RWE Renewables UK Dogger Bank South (East) Limited

Dogger Bank South Offshore Wind Farms

Appendix B Marine Mammal Environmental Statement Update

Document Date:	January 2025
Document Reference:	10.51
Revision Number:	01
Classification:	Unrestricted

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Company:	**RWE Renewables UK Dogger Bank South (West) Limited and RWE Renewables UK Dogger Bank South (East) Limited**	Asset:	**Development**
Project:	**Dogger Bank South Offshore Wind Farms**	Sub Project/Package	**Consents**
Document Title or Description:	Appendix B Marine Mammal Environmental Statement Update		
Document Number:	005442179-01	Contractor Reference Number:	PC2340-RHD-OF-ZZ-AX-Z-0121

Rev No.	Date	Status/Reason for Issue	Author	Checked by	Approved by
01	January 2025	Submission to accompany Project Change Request 1.	RHDHV	RWE	RWE

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Term	Definition
Array Areas	The DBS East and DBS West offshore Array Areas, where the wind turbines, offshore platforms and array cables will be located. The Array Areas do not include the Offshore Export Cable Corridor or that part of the Inter-Platform Cable Corridor within which no wind turbines are proposed. Each area is referred to separately as an Array Area.
Concurrent	Installation of monopiles or pin piles happening at the same time at the DBS Projects.
Concurrent Scenario	A potential construction scenario for the Projects where DBS East and DBS West are both constructed at the same time.
Cumulative effects	The combined effect of the Projects in combination with the effects of a number of different (defined cumulative) schemes, on the same single receptor/resource.
Cumulative impact	The combined impact of the Projects in combination with the effects of a number of different (defined cumulative) schemes, on the same single receptor/resource.
Development Consent Order (DCO)	An order made under the Planning Act 2008 granting development consent for one or more Nationally Significant Infrastructure Project (NSIP).
Development Scenario	Description of how the DBS East and/or DBS West Projects would be constructed either in -isolation, sequentially or concurrently.
Dogger Bank South (DBS) Offshore Wind Farms	The collective name for the two Projects, DBS East and DBS West.
Effect	Term used to express the consequence of an impact. The significance of an effect is determined by correlating the magnitude of the impact with the value, or sensitivity, of the receptor or resource in accordance with defined significance criteria.
Electrical Switching Platform (ESP)	The Electrical Switching Platform (ESP), if required would be located either within one of the Array Areas (alongside an Offshore Converter Platform (OCP)) or the Export Cable Platform Search Area.
Environmental Impact Assessment (EIA)	A statutory process by which certain planned projects must be assessed before a formal decision to proceed can be made. It involves the collection and consideration of environmental information, which fulfils the assessment requirements of the EIA Directive and EIA

Term	Definition
	Regulations, including the publication of an Environmental Statement (ES).
Environmental Statement (ES)	A document reporting the findings of the EIA and produced in accordance with the EIA Directive as transposed into UK law by the EIA Regulations.
Impact	Used to describe a change resulting from an activity via the Projects, i.e. increased suspended sediments / increased noise.
In Isolation Scenario	A potential construction scenario for one Project which includes either the DBS East or DBS West array, associated offshore and onshore cabling and only the eastern Onshore Converter Station within the Onshore Substation Zone and only the northern route of the onward cable route to the proposed Birkhill Wood National Grid Substation.
Offshore Converter Platforms (OCPs)	The OCPs are fixed structures located within the Array Areas that collect the AC power generated by the wind turbines and convert the power to DC, before transmission through the Offshore Export Cables to the Project's Onshore Grid Connection Points.
Offshore Development Area	The Offshore Development Area for ES encompasses both the DBS East and West Array Areas, the Inter-Platform Cable Corridor, the Offshore Export Cable Corridor, plus the associated Construction Buffer Zones.
Offshore Export Cable Corridor	This is the area which will contain the Offshore Export Cables between the Offshore Converter Platforms and Transition Joint Bays at the landfall.
Offshore platforms	Collective term which refers to all potential offshore platforms found within the Projects' Offshore Development Area (i.e. OCPs, CPs, ESP and Accommodation Platform).
Project Change Request 1	The proposed changes to the DCO application for the Projects set out in Project Change Request 1 - Offshore & Intertidal Works [document reference 10.49].
Projects Design (or Rochdale) Envelope	A concept that ensures the EIA is based on assessing the realistic worst case scenario where flexibility or a range of options is sought as part of the consent Application.
Sequential	Installation of monopiles or pin piles happening one after another at the DBS Projects.

Term	Definition
Sequential Scenario	A potential construction scenario for the Projects where DBS East and DBS West are constructed with a lag between the commencement of construction activities. Either Project could be built first.
The Applicants	The Applicants for the Projects are RWE Renewables UK Dogger Bank South (East) Limited and RWE Renewables UK Dogger Bank South (West) Limited. The Applicants are themselves jointly owned by the RWE Group of companies (51% stake) and Masdar (49% stake).
The Projects	DBS East and DBS West (collectively referred to as the Dogger Bank South Offshore Wind Farms).

Acronyms

Term	Definition
CEA	Cumulative Effects Assessment
CGNS	Celtic and Greater North Seas
DBS	Dogger Bank South
DCO	Development Consent Order
EDR	Effective Deterrence Range
EIA	Environmental Impact Assessment
ES	Environmental Statement
ESP	Electrical Switching Platform
ExA	Examining Authority
GBS	Gravity Based Structure
GNS	Greater North Sea
iPCoD	Interim Population Consequence of Disturbance
KM	Kilometres
MU	Management Unit
NE	North East
NRW	Natural Resources Wales
NS	North Sea
OWF	Offshore Wind Farm
PTS	Permanent Threshold Shift
RIAA	Report to Inform Appropriate Assessment
SE	South East
SEL_{cum}	Sound Exposure Level from cumulative exposure

Term	Definition
SPL_{peak}	peak Sound Pressure Level
TTS	Temporary Threshold Shift

1 Introduction

1. The Development Consent Order (DCO) application for the Dogger Bank South (DBS) East and DBS West Offshore Wind Farms (hereafter referred to as 'the Projects') was accepted by the Secretary of State for examination on 10th July 2024. RWE Renewables UK Dogger Bank South (East) Limited and RWE Renewables UK Dogger Bank South (West) Limited ('the Applicants') have been engaging with Interested Parties to seek to resolve concerns or comments ahead of the examination commencing. This engagement, in combination with continuing design work, has resulted in the Applicants deciding to seek a small number of changes to their DCO application. The acceptability of any change is to be determined by the Examining Authority (ExA). The proposed changes taken alone or together would not materially change the nature of the Projects.

2. The proposed changes to the Projects' Design Envelope are as follows:

- Removal of Gravity Based Structure (GBS) foundations;
- Removal of the Electrical Switching Platform (ESP) within the Offshore Export Cable Corridor from the Projects' Design Envelope;
- Reduction in the number of offshore platforms in the Projects' Design Envelope from eight to three within the Array Areas, including reductions in associated seabed preparation and scour protection;
- Reduction of cabling within the Array Areas, plus associated seabed preparation and cable protection; and
- Removal of the short trenchless crossing at landfall.

3. To aid the ExA in determining the acceptability of the proposed changes, a **Project Change Request 1 – Offshore and Intertidal Works** [document reference: 10.49] was submitted for consultation with key technical stakeholders to seek their views on the proposed changes. That report summarises all proposed changes to the assessments detailed in the Environmental Statement (ES) and Report to Inform Appropriate Assessment (RIAA).

4. The targeted non-statutory consultation period ran from the 15th November 2024 to the 16th December 2024, at which point all responses were reviewed by the Applicants with updates to the documents made as necessary (see section 5 of **Project Change Request 1 – Offshore and Intertidal Works** [document reference: 10.49], which details the stakeholder comments received and the Applicants' responses to each). No material changes to this appendix were required on receipt of stakeholder comments.

2 Purpose of this Document

5. This **Appendix B Marine Mammal Environmental Statement Update** [document reference: 10.51] has been produced to provide detail regarding the proposed changes to the marine mammal assessment summarised in the **Project Change Request 1 – Offshore and Intertidal Works** [document reference: 10.49]. The methodology used within this appendix is detailed within the original ES chapter (**Chapter 11 Marine Mammals** [APP-095]), which should be read alongside this document to contextualise assessments made.

6. Any construction or operational effects assessed in the original assessment (**Chapter 11 Marine Mammals** [APP-095]) which would not be affected by the proposed changes are not considered in this appendix, as conclusions reached for those effects would remain the same.

7. In addition, due to the proposed reduction in number of offshore platforms and the proposed removal of the ESP in the Offshore Export Cable Corridor, the underwater noise modelling for the Projects has been updated (see section 3 and **Appendix 11-3 Underwater Noise Modelling Report (Revision 2)** [document reference: 7.11.11.3]).

8. The assessment originally undertaken in the ES (**Chapter 11 Marine Mammals** [APP-095]) for impact pile driving to marine mammals was carried out for the DBS East Array Area, DBS West Array Area, the Offshore Export Cable Corridor and for the Projects together. However, following the proposed removal of the ESP from the Projects' Design Envelope all impact piling would be removed from the Offshore Export Cable Corridor. In addition, the number of monopiles at the Projects in isolation would be reduced from 104 to 102 monopiles, and if the Projects were constructed together the number of monopiles would be reduced from 208 to 203 (**Table 2-1**). The number of jacket pin piles would be reduced from 432 to 416 for the Projects in isolation and 864 to 824 for the Projects together (**Table 2-1**). All piling is proposed to be removed from the Offshore Export Cable Corridor (**Table 2-1**).

9. The realistic worst case design parameters (Table 11-1 of **Chapter 11 Marine Mammals** [APP-095]) for likely significant effects scoped into the ES for the marine mammal assessment have been updated for the proposed changes and are summarised in Table 3-5 of **Project Change Request 1 –Offshore and Intertidal Works** [document reference: 10.49].

Table 2-1 Changes in the number of monopile and jacket pin pile installations with the Projects' Design Envelope due to the proposed changes.

Location	Number assessed in the ES	Number assessed in this Appendix
Monopiles		
DBS East	104	102
DBS West	104	102
DBS East and DBS West	208	203
Offshore Export Cable Corridor	1	0
Jacket pin-piles		
DBS East	432	416
DBS West	432	416
DBS East and DBS West	864	824
Offshore Export Cable Corridor	8	0

10. Therefore, this Appendix provides an updated assessment based on the proposed removal of the ESP in the Offshore Export Cable Corridor and the reduction of piling days due to the proposed reduction in number of offshore platforms. The updates can be found in the following sections:

- Removal of ESP in the Offshore Export Cable Corridor (section 3);
- Reduction of piling days (section 4); and
- Corrections to the ES (section 5).

3 Removal of the ESP in the Offshore Export Cable Corridor

11. In **Chapter 11 Marine Mammals** [APP-095] impacts from piling were assessed for the Array Areas as well as the Offshore Export Cable Corridor. Due to the proposed changes as detailed in **Project Change Request 1 – Offshore and Intertidal Works** [document reference: 10.49]; there would be no piling in the Offshore Export Cable Corridor, therefore, the underwater noise modelling for the Projects has been updated. Based on the proposed removal of the ESP in the Offshore Export Cable Corridor, there will no longer be three concurrent (12 sequential) jacket pin piles. **Appendix 11-3 Underwater Noise Modelling Report (Revision 2)** [document reference: 7.11.11.3] presents impact ranges for two concurrent (four sequential) jacket pin piles per Array Area for both Permanent Threshold Shift (PTS) and Temporary Threshold Shift (TTS).

3.1 Permanent Threshold Shift

12. A PTS can occur instantaneously from acute exposure to high noise levels, such as single strike peak sound pressure level (SPL_{peak}) of the maximum hammer energy applied during piling. PTS can also occur as a result of prolonged exposure to increased noise levels, such as for the duration of pile installation cumulative sound exposure level (SEL_{cum}). More information is described in section 11.6.1.1 of **Chapter 11 Marine Mammals** [APP-095].

13. The only change to the PTS assessment that is presented in section 11.6.1.1.2 of **Chapter 11 Marine Mammals** [APP-095] is the assessment of the installation of concurrent jacket pin piles within the Array Areas and the Offshore Export Cable Corridor (presented in section 11.6.1.1.2.2.2 of **Chapter 11 Marine Mammals** [APP-095].

14. The underwater noise modelling for the concurrent piling of the jacket pin piles, (**Appendix 11-3 Underwater Noise Modelling Report (Revision 2)** [document reference: 7.11.11.3]) shows that there is a reduction of the potential impact area for all marine mammals (**Table 3-1**) due to the proposed removal of concurrent piling of jacket pin pile foundations at both Array Areas and the ESP in the Offshore Export Cable Corridor.

Table 3-1 Summary of the Impact Areas for the Concurrent Installation of jacket pin pile Foundations at multiple locations across DBS Array Areas, for Marine Mammals using the Impulsive Southall *et al.* (2019) criteria assuming a fleeing animal. Updates to Table 11-26 of Chapter 11 Marine Mammals [APP-095] *(Grey highlighted cells were assessed in the ES)*

PTS (Impulsive)	PTS from two concurrent jacket pin pile installations (four sequential at DBS East at the same time as four sequential at DBS West)	
	Area assessed in the ES	Area assessed in this Appendix
Harbour porpoise (155dB)	3,700km²	1,200km²
Dolphin species (185dB) *	0.3km²	<0.1km²
Minke whale (183dB)	6,500km²	1,800km²
Seal species (185dB)	240km²	230km²

** For the dolphin species group, PTS onset ranges do not overlap for concurrent piling, and therefore the assessment is based on the sum of PTS onset at each location separately*

15. **Table 3-2** shows that there is a reduction in the potential number of animals that could be at risk of PTS. However, with the proposed removal of the ESP in the Offshore Export Cable Corridor, the magnitude remains the same for all marine mammals as presented in Table 11-27 of **Chapter 11 Marine Mammals** [APP-095].

Table 3-2 Magnitude of Impact for PTS due to the Cumulative Exposure of concurrent Jacket Pin Piles at DBS East and DBS West (Updates to Table 11-27 of Chapter 11 Marine Mammals [APP-095]) *(Grey highlighted cells were assessed in the ES)*.

Marine mammal species	Jacket pin pile (3,000kJ)			
	Three concurrent jacket pin piles at DBS East, DBS West, and Offshore Export Cable Corridor, with four sequential jacket pin piles at each location (total of 12 jacket pin piles installed in one day)	Magnitude* (permanent) Assessed in the ES	Two concurrent jacket pin piles at DBS East and DBS West with four sequential jacket pin piles at each location (total of 8 jacket pin piles installed in one day)	Magnitude* (permanent) Assessed in this Appendix
Harbour porpoise	2,442.0 (0.70% of the North Sea (NS) Management Unit (MU))	Medium	792.0 (0.228% of the NS MU)	Medium
Bottlenose dolphin	0.01 (0.0006% of the Greater North Sea (GNS) MU)	Negligible	0.0004 (0.00002% of the GNS MU)	Negligible
Common dolphin	0.005 (0.000005% of the Celtic Greater North Sea (CGNS) MU)	Negligible	0.0001 (0.0000002% of the CGNS MU)	Negligible
White-beaked dolphin	0.01 (0.00003% of the CGNS MU)	Negligible	0.0004 (0.0000009% of the CGNS MU)	Negligible
Minke whale	130 (0.65% of the CGNS MU)	Medium	36.0 (0.178% of the CGNS MU)	Medium
Grey Seal	127.4 (0.42% of the South East (SE) England MU & 0.23% of the wider MU)	Medium (Medium)	59.8 (0.20% of the SE England MU & 0.11 of the wider MU)	Medium (Medium)
Harbour seal	0.4 (0.008% of the SE England MU)	Low	0.4 (0.008% of the SE England MU)	Low

** Magnitudes given in brackets are for the secondary MU assessed for the wider population for grey seal species*

3.1.1 Significance of Effect

16. **Table 3-3** shows that there is no change to the significance of effect for the potential of PTS to marine mammals from concurrent piling of jacket pin piles at the Projects compared to Table 11-37 of **Chapter 11 Marine Mammals** [APP-095].

Table 3-3 Assessment of Significance of Effect for the Potential for PTS and TTS for DBS East and DBS West Together due to Piling of Jacket Pin Piles (Updates to Table 11-37 of Chapter 11 Marine Mammals [APP-095])

Marine mammal species	Sensitivity	Magnitude of impact	Significance of effect
PTS due to the cumulative exposure of concurrent jacket pin pile installations			
Harbour porpoise, minke whale and grey seal	High	Medium	Major adverse
Bottlenose dolphin, common dolphin and white-beaked dolphin		Negligible	Minor adverse
Harbour seal		Low	Moderate adverse

3.2 Temporary Threshold Shift

17. TTS can occur instantaneously from acute exposure to high noise levels, such as single strike (SPL_{peak}) of the maximum hammer energy applied during piling. TTS can also occur as a result of prolonged exposure to increased noise levels, such as during the duration of pile installation (SEL_{cum}). More information is described in section 11.6.1.1.3 of **Chapter 11 Marine Mammals** [APP-095].

18. As described in section 3.1, the proposed removal of the ESP in the Offshore Export Cable Corridor means there will no longer be three concurrent (12 sequential) jacket pin piles. **Appendix 11-3 Underwater Noise Modelling Report (Revision 2)** [document reference: 7.11.11.3] presents impact ranges for two concurrent (four sequential) jacket pin piles per Array Area and shows a reduction in the potential impact areas for all marine mammals (**Table 3-4**).

Table 3-4 Summary of the Impact Areas for the Concurrent Installation of Jacket Pin pile Foundations at Multiple Locations Across DBS Array Areas for Marine Mammals Using the Impulsive Southall *et al.* (2019) Criteria Assuming a Fleeing Animal (Updates to Table 11-33 of Chapter 11 Marine Mammals [APP-095]) *(Grey highlighted cells were assessed in the ES)*

Monopile foundation Southall *et al.* (2019) Weighted SEL_{cum}	Area of TTS onset for sequential and concurrent pile installations (km^2)	
	TTS from three concurrent jacket pin pile installations (four sequential at DBS East at the same time as four sequential at DBS West and at the Offshore Export Cable Corridor)	TTS from two concurrent jacket pin pile installations (four sequential at DBS East at the same time as four sequential at DBS West)
Harbour porpoise (155dB)	16,000km^2	7,800km^2
Dolphin species (185dB)	2.1km^2	<0.01km^2
Minke whale (183dB)	22,000km^2	12,000km^2
Seal species (185dB)	11,000km^2	4,100km^2

19. **Table 3-5** shows that with the proposed removal of the ESP in the Offshore Export Cable Corridor; the magnitude of the potential impact to grey seal (without any mitigation) has been reduced from high (as assessed in Table 11-34 in **Chapter 11 Marine Mammals** [APP-095]) to low (**Table 3-5**). For all other marine mammals, the magnitude would remain the same as the assessment presented in Table 11-34 in **Chapter 11 Marine Mammals** [APP-095].

Table 3-5 Magnitude of Impact of TTS due to the Cumulative Exposure of Concurrent Jacket Pin Piles at the Same Time at DBS East and DBS West (Updates to Table 11-34 of Chapter 11 Marine Mammals [APP-095]) (*Grey was assessed in the ES and any changes to magnitude are presented in red*)

Marine mammal species	Three concurrent jacket pin piles at the DSB East, DBS West, and Offshore Export Cable Corridor, with four sequential piles at each location (total of 12 jacket pin piles installed in one day)	Magnitude* (temporary)	Two concurrent jacket pin piles at the DSB East and DBS West, with four sequential piles at each location (total of 8 jacket pin piles installed in one day)	Magnitude* (temporary)
Harbour porpoise	10,560.0 (3.05% of the NS MU)	Low	5,148.0 (1.5% of the NS MU)	Low
Bottlenose dolphin	0.09 (0.004% of the GNS MU)	Negligible	0.0004 (0.00002% of the GNS MU)	Negligible
Common dolphin	0.04 (0.00003% of the CGNS MU)	Negligible	0.0001 (0.0000002% of the CGNS MU)	Negligible
White-beaked dolphin	0.07 (0.0002% of the CGNS MU)	Negligible	0.0004 (0.0000009% of the CGNS MU)	Negligible
Minke whale	440.0 (2.19% of the CGNS MU)	Low	240.0 (1.2% of the CGNS MU)	Low
Grey Seal	5,841.0 (19.09% of the SE England MU & 10.34% of the wider MU)	High (High)	1,066.0 (3.5% of the SE England MU & 1.9% of the wider MU)	Low (Low)
Harbour seal	18.7 (0.38% of the SE England MU)	Negligible	4.2 (0.086% of the SE England MU)	Negligible

** Magnitudes given in brackets are for the secondary MU assessed for the wider population for grey seal species*

3.2.1 Significance of Effect

20. For the significance of effect of TTS to marine mammals from concurrent piling of jacket pin piles at the Projects, the only change to the assessment is for grey seal. In Table 11-38 of **Chapter 11 Marine Mammals** [APP-095] the significance of effect was assessed as major adverse (significant in EIA terms) for grey seal, and is now assessed as minor adverse (not significant in EIA terms) due to the proposed removal of the ESP in the Offshore Export Cable Corridor (**Table 3-6**).

Table 3-6 Assessment of Significance of Effect for the Potential for TTS for DBS East and DBS West Together due to Piling of Jacket Pin Piles (Updates to 11-38 of Chapter 11 Marine Mammals [APP-095]) ***(Changes to magnitude and significance of effect from the ES are red)***

Marine mammal species species	Sensitivity	Magnitude of impact	Significance of effect
TTS due to the cumulative exposure of concurrent jacket pin pile installations			
Harbour porpoise, minke whale	Medium	Low	Minor adverse
Bottlenose dolphin, common dolphin, white-beaked dolphin and harbour seal		Negligible	Minor adverse
Grey seal		Low (Low)	Minor adverse (Minor adverse)

3.3 Disturbance or Behavioural Effects from Underwater Noise During Piling

21. The range of possible behavioural reactions that may occur as a result of exposure to noise include orientation or attraction to a noise source, increased alertness, modification of characteristics of their own sounds, cessation of feeding or social interaction, alteration of movement / diving behaviour, temporary or permanent habitat abandonment and, in severe cases, panic, or stranding, sometimes resulting in injury or death (Southall *et al.* 2007).

22. In section 11.6.1.2 of **Chapter 11 Marine Mammals** [APP-095], piling in the Offshore Export Cable Corridor resulted in high numbers of seals being potentially disturbed. The proposed removal of the ESP in the Offshore Export Cable Corridor would result in a significant reduction in number of seals to be potentially disturbed, in particular grey seal. The proposed removal of the ESP would make no difference to other species assessed in section 11.6.1.2 of **Chapter 11 Marine Mammals** [APP-095] in relation to disturbance or behavioural effects, therefore only updated assessments for grey seal and harbour seal are included in this section.

23. In section 11.6.1.2 of **Chapter 11 Marine Mammals** [APP-095], an assessment was carried out to assess for disturbance to both grey and harbour seal due to piling at the Projects using a 25km disturbance range during piling (or a disturbance area of 1,963.5km^2) (Russell *et al.* 2016) and the dose response curve assessment (Whyte *et al.* 2020) for piling in the Array Areas and the Offshore Export Cable Corridor.

3.3.1 DBS East and DBS West In Isolation

24. For the Projects in isolation, using the 25km disturbance range for grey seal, up to 1,043 individuals (3.41% of the SE England MU or 1.85% of the wider MU) could be potentially disturbed from piling in the Offshore Export Cable Corridor (Table 11-41 in **Chapter 11 Marine Mammals** [APP-095]. However, with the proposed removal of the ESP in the Offshore Export Cable Corridor there would only be the potential at:

- DBS East; up to 355.4 individuals to be disturbed (1.16% of the SE England MU or 0.63% of the wider MU); and
- DBS West; up to 510.5 individuals to be disturbed (1.67% of the SE England MU or 0.90% of the wider MU).

25. The numbers of grey seal to be potentially disturbed from piling in the Array Areas compared to piling in the Offshore Export Cable Corridor is significantly less. However, the worst case has been carried forward to the population modelling and the updates with the proposed removal of the ESP in the Offshore Export Cable Corridor are presented in section 4.1.1.4.

26. For harbour seal, up to four individuals (0.07% of the SE England MU reference population) could be potentially disturbed from piling in the Offshore Export Cable Corridor (Table 11-41 in **Chapter 11 Marine Mammals** [APP-095]. However, with the proposed removal of the ESP in the Offshore Export Cable Corridor there would be the potential at:

- DBS East; up to 3.3 individuals to be disturbed (0.07% of the SE England); and
- DBS West up to 2.0 individuals to be disturbed (0.04% of the SE England).

27. In section 11.6.1.2.2.1.4 of **Chapter 11 Marine Mammals** [APP-095], a dose response curve assessment (Whyte *et al.*, 2020) was carried out to assess for the potential of disturbance to seals from piling.

28. For grey seal, the Projects in isolation using the dose response curve assessment, up 9,103 individuals (24.00% of the SE England MU or 13.00% of the wider MU population) have the potential to be disturbed, which resulted in a high magnitude in Table 11-42 of **Chapter 11 Marine Mammals** [APP-095]. However, with the proposed removal of the ESP in the Offshore Export Cable Corridor there would be the potential at:

- DBS East; up to 3,124.2 individuals to be disturbed (10.21% of the SE England MU or 5.53% of the wider MU population); and
- DBS West; up to 2,378.7 individuals to be disturbed (7.78% of the SE England MU or 4.21% of the wider MU population).

29. With the proposed removal of the ESP in the Offshore Export Cable Corridor, the potential number of grey seal that could be disturbed is greatly reduced.

30. For harbour seal, up to 23.1 individuals (0.47% of the SE England MU reference population) could be potentially disturbed from piling in the Offshore Export Cable Corridor using the dose response curve assessment (Table 11-42 in **Chapter 11 Marine Mammals** [APP-095]. However, with the proposed removal of the ESP in the Offshore Export Cable Corridor there would only be the potential at:

- DBS East; up to 8.1 individuals to be disturbed (0.17% of the SE England); and
- DBS West up to 7.0 individuals to be disturbed (0.14% of the SE England).

3.3.2 DBS East and DBS West Together

31. For the Projects together, to assess for any disturbance to seals from piling only the 25km disturbance range was used in **Chapter 11 Marine Mammals** [APP-095]. For piling of jacket pin piles, disturbance was assessed with piling occurring concurrently in the Offshore Export Cable Corridor and both Array Areas as the worst case.

32. In Table 11-55 of **Chapter 11 Marine Mammals** [APP-095] an assessment was carried out using the 25km disturbance range for the installation of three concurrent jacket pin piles. With the proposed removal of the ESP in the Offshore Export Cable Corridor, the maximum number of jacket pin piles to be installed at the same time would be two (concurrent installation of one jacket pin pile in DBS East Array Area and one in DBS West Array Area).

33. **Table 3-7** presents the updated assessment and shows that there would be a significant decrease in the potential number of grey seal to be disturbed. The magnitude is low for grey seal and negligible adverse for harbour seal which remain unchanged to those assessed for grey seal and harbour seal in **Chapter 11 Marine Mammals** [APP-095] despite the reduction in the potential number of seals disturbed.

Table 3-7 Assessment of the Potential for Disturbance to Grey Seal and Harbour Seal Based on a Disturbance Range of 25km for the installation of concurrent Jacket Pin Piles at the Projects (Updates to Table 11-55 in Chapter 11 Marine Mammals [APP-095]) *(Grey was assessed in the ES)*

Species	Jacket pin piles at three concurrent locations (EDR – 25km, with a disturbance area of 5,890.5km²)	Magnitude of impact (temporary)	Jacket pin piles at two concurrent locations (EDR – 25km, with a disturbance area of 3,927km²)	Magnitude of impact (temporary)
Grey seal	1,376.4 (4.5% of the SE England MU or 2.4% of the wider MU)	Low (Low)	865.9 (2.8% of the SE England MU or 1.5% of the wider MU)	Low (Low)
Harbour seal	7.3 (0.15% of the SE England MU)	Negligible	5.3 (0.11% of the SE England MU)	Negligible

** Magnitudes given in brackets are for the secondary MU assessed for the wider population for grey seal species*

4 Reduction of Piling Days

34. The population modelling was redone to include the proposed reduction in number of offshore platforms, and therefore a reduction in piling days, and the proposed removal of the ESP in the Offshore Export Cable Corridor for both Projects in Isolation and for the cumulative effects assessment.

35. Population modelling using the Interim Population Consequence of Disturbance (iPCoD) has been undertaken again to determine the population consequences of disturbance due to piling at DBS East and DBS West sequentially, with the proposed reduction of piling of the offshore platforms and proposed removal of the ESP in the Offshore Export Cable Corridor potentially altering the significance of effect.

36. With the proposed reduction in the number of offshore platforms and the proposed removal of piling for the ESP in the Offshore Export Cable Corridor, there is a reduction in the number of animals that could potentially be disturbed or suffer from auditory injury as well as a reduction of two piling / disturbance days.

37. The results of this modelling for harbour porpoise, bottlenose dolphin, minke whale, grey seal and harbour seal will be used to determine the requirement for any noise reduction measures to be put in place, and it is this assessment of which the overall impact significances for disturbance from piling is assessed. For more information on the population modelling, an introduction and methodology, and the parameters used, see **Appendix 11-4 iPCoD Modelling (Revision 2)** [document reference: 7.11.11.4].

38. If, as a result of noise impacts, a population shows a continued decline of more than 1% per year (versus a modelled unimpacted reference population) over a 6-year period following first disturbance, there is a high likelihood that a significant effect cannot be ruled out (Natural Resources Wales (NRW), 2023). This approach has been used to determine whether there are significant effects.

4.1.1 Projects Alone

4.1.1.1 Harbour Porpoise

39. The iPCoD modelling was based on the number of harbour porpoise to be disturbed and at risk of PTS for every piling day with a piling schedule of four years. The worst case total number of potentially 17,334 harbour porpoise disturbed within the ES would be reduced to 9,393.2, and a total of 276 individuals at risk of PTS; reduced from 601.5 in the ES.

- The worst case results for the potential number of harbour porpoise that could be disturbed from one monopile installation came from the assessment using dose response curves (Table 11-42 in **Chapter 11 Marine Mammals** [APP-095]). The potential numbers are:

  - DBS East - 4,295.5; and
  - DBS West - 5,097.7.
- Based on the assessment of PTS (number of potential individuals at risk of PTS) (Table 11-24 in **Chapter 11 Marine Mammals** [APP-095]) the worst case numbers are:
  - DBS East – 144; and
  - DBS West - 132.

40. The population modelling predicts that by the end of 2032 (two years after piling ends, and six years after the onset of the disturbance), the median ratio population size for the impacted population is predicted to be 99.62% of the unimpacted population. Beyond 2032, the impacted population is expected to maintain the same stable trajectory as the un-impacted population as far as 2052 which is the end point of the modelling (**Table 4-1**). There is less than 1% annual decline over the first six years (NRW 2023) and over the 25-year period. Therefore, piling has very little impact to the population of harbour porpoise in the North Sea (**Table 4-1**).

41. **Plate 4-1** shows the mean unimpacted and the mean impacted population of harbour porpoise and overlaid both together. As stated in **Appendix 11-4 iPCoD Modelling (Revision 2)** [document reference: 7.11.11.4], the simulation is run a thousand times and includes other elements that may impact the population as well as pile driving. This plate shows that with piling at the Array Areas, there is no significant effect on the population of harbour porpoise. The impact on the population is assessed as a negligible magnitude, therefore the magnitudes are unchanged from those presented in Table 11-43 of **Chapter 11 Marine Mammals** [APP-095].

Table 4-1 Results of the iPCoD modelling for DBS East and DBS West sequentially scenario, giving the mean population size of harbour porpoise population (NS MU) for years up to 2052 for both impacted and un-impacted populations as well as median ratio between their populations (Updates to Table 11-43 of Chapter 11 Marine Mammals [APP-095])

Year	Un-impacted population mean	Impacted population mean	Median impacted
Start	346,601	346,601	100.00%
End 2028	346,706	346,692	99.99%
End 2029	347,089	346,723	99.89%
End 2032	348,079	347,313	99.62%
End 2037	346,164	345,475	99.87%
End 2047	346,663	345,970	99.99%
End 2052	346,857	346,165	99.76%

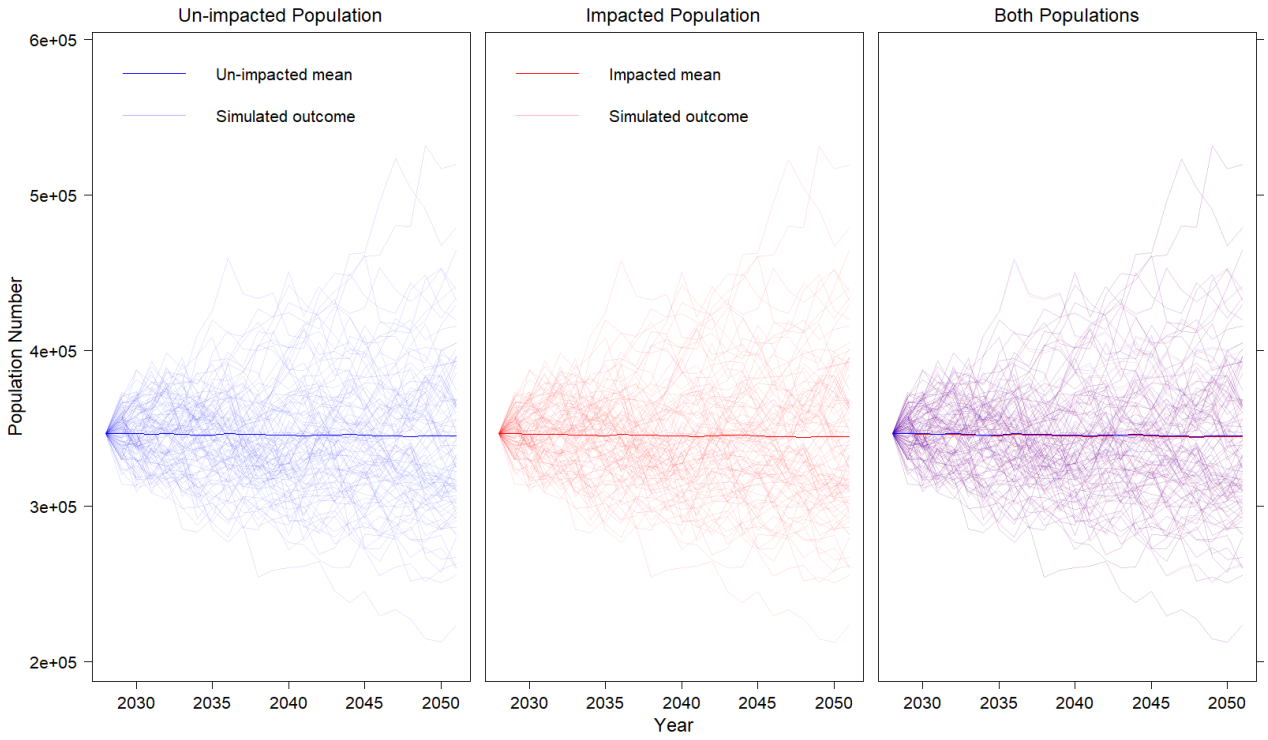

Plate 4-1 Simulated worst case harbour porpoise population sizes for both the unimpacted and the impacted populations [Updates to Plate 11-4 of Chapter 11 Marine Mammals [APP-095]].

4.1.1.2 Bottlenose Dolphin

42. The iPCoD modelling was based on the number of bottlenose dolphin to be disturbed and at risk of PTS for every piling day with a piling schedule of four years. The worst case total number of potentially up to one bottlenose dolphin disturbed for both Projects, along with up to one (0.008) bottlenose dolphin at risk of PTS, remains the same as in the ES.

- The worst case results for the potential number of bottlenose dolphin that could be disturbed from one monopile installation came from the assessment using TTS impact ranges from disturbance (Table 11-31 in **Chapter 11 Marine Mammals** [APP-095]). The potential numbers are:
  - DBS East - 0.1; and
  - DBS West - 0.1.
- Based on the assessment of PTS (number of potential individuals at risk of PTS) (Table 11-24 in **Chapter 11 Marine Mammals** [APP-095]), the worst case numbers are:
  - DBS East - 0.004; and
  - DBS West - 0.004.

43. The number of bottlenose dolphins remained the same in the population modelling, even after the proposed reduction in number of offshore platforms and piling of the ESP in the Offshore Export Cable Corridor being removed.

44. The population modelling predicts that by the end of 2032 (two years after piling ends and six years after the onset of the disturbance), the median population size for the impacted population is predicted to be 100% of the unimpacted population and remains stable at 100% until 2052, which is the end point of the modelling (**Table 4-2**).

45. There is less than 1% annual decline over the first six years (NRW, 2023) and over the 25 year period. Therefore, the iPCoD model estimates there to be no change between the impacted and unimpacted bottlenose dolphin population (**Table 4-2**) in the worst case project scenario where both DBS East and DBS West are constructed sequentially.

46. **Plate 4-2** shows the mean unimpacted and the mean impacted population of bottlenose dolphin and overlaid both together. This plate shows that with piling at DBS East and DBS West, there is no impact on the population of bottlenose dolphin. The impact on the population is assessed as having a negligible magnitude, therefore the magnitudes are unchanged from those presented in Table 11-44 of **Chapter 11 Marine Mammals** [APP-095].

Table 4-2 Results of the iPCoD modelling for DBS East and DBS West sequentially scenario, giving the mean population size of bottlenose dolphin population (NS MU) for years up to 2052 for both impacted and un-impacted populations as well as median ratio between their populations (Updates to Table 11-44 of Chapter 11 Marine Mammals [APP-095])

Year	Un-impacted population mean	Impacted population mean	Median impacted
Start	2,022	2,022	100.00%
End 2028	2,010	2,010	100.00%
End 2029	2,003	2,003	100.00%
End 2032	1,970	1,970	100.00%
End 2037	1,914	1,914	100.00%
End 2047	1,803	1,803	100.00%
End 2052	1,751	1,751	100.00%

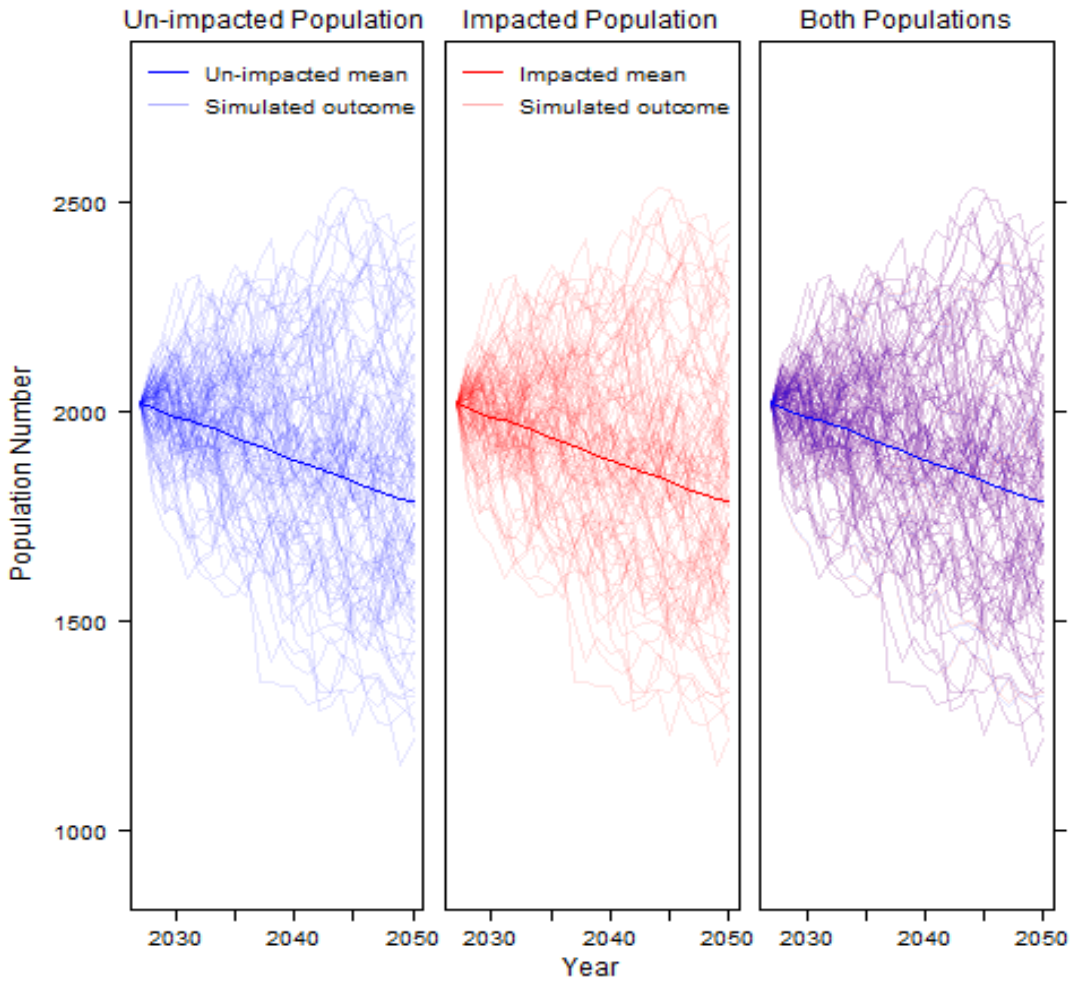

Plate 4-2 Simulated worst case bottlenose dolphin population sizes for both the unimpacted and the impacted populations (Updates to Plate 11-5 of Chapter 11 Marine Mammals [APP-095]).

4.1.1.3 Minke Whale

47. The iPCoD modelling was based on the number of minke whale to be disturbed and at risk of PTS for every piling day with a piling schedule of four years. The worst case total number of potentially 142 minke whale disturbed within the ES would be reduced to 85, and a total of 15 individuals at risk of PTS; reduced from 45 in the ES.

- The worst case results of the number of minke whale that could be disturbed from one monopile installation came from the assessment using the 30km disturbance range assessment (Table 11-40 in **Chapter 11 Marine Mammals** [APP-095]). The potential numbers are:
  - DBS East - 28.3; and
  - DBS West - 56.5.

- Based on the assessment of PTS (number of potential individuals at risk of PTS) (Table 11-24 in **Chapter 11 Marine Mammals** [APP-095]). The potential numbers are:
  - DBS East - 5.6; and
  - DBS West - 9.4.

48. The population modelling predicts that by the end of 2032 (two years after piling ends and six years after the onset of the disturbance), the median population size for the impacted population is predicted to be 99.86% of the unimpacted population. Within the first six years of the modelling, there has been a total change of 0.14%, which is less than 1% annually for the first six years, therefore not significant under the NRW (2023) guidance. By 2052 , which is the end point of the modelling, the median population size for the impacted population is predicted to be 99.71% of the unimpacted population (**Table 4-3**). Therefore, the iPCoD model estimates there to be a small change between the impacted and unimpacted CGNS minke whale population in the worst case project scenario where both DBS East and DBS West are constructed sequentially.

49. **Plate 4-3** shows the mean unimpacted and the mean impacted population of minke whale overlaid together. This plate shows that with piling at DBS East and DBS West, there is a small impact on the population of minke whale. The impact on the population remains assessed as a low magnitude and therefore, the magnitudes are unchanged from those presented in Table 11-45 of **Chapter 11 Marine Mammals** [APP-095].

Table 4-3 Results of the iPCoD modelling for DBS East and DBS West sequentially scenario, giving the mean population size of minke population (CGNS MU) for years up to 2052 for both impacted and un-impacted populations as well as median ratio between their populations (Amendments to Table 11-45 of Chapter 11 Marine Mammals [APP-095])

Year	Un-impacted population mean	Impacted population mean	Median impacted
Start	20,118	20,118	100.00%
End 2028	20,119	20,1195	100.00%
End 2029	20,055	20,048	99.95%
End 2032	20,068	20,045	99.86%
End 2037	20,097	20,061	99.81%
End 2047	19,971	19,926	99.83%
End 2052	19,904	19,859	99.71%

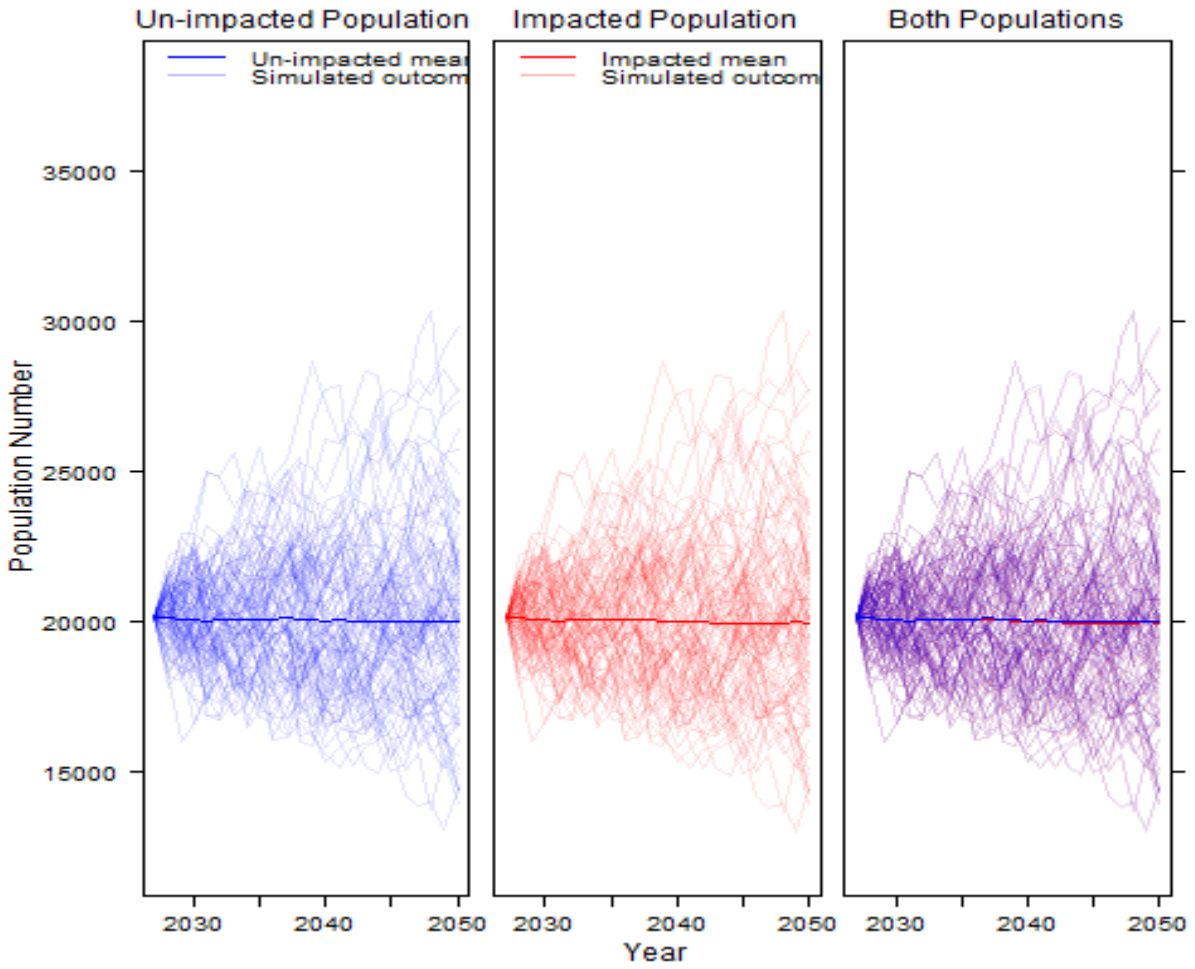

Plate 4-3 Simulated worst case minke whale population sizes for both the unimpacted and the impacted populations (Updates to Plate 11-6 of Chapter 11 Marine Mammals [APP-095]).

4.1.1.4 Grey Seal

50. The iPCoD modelling was based on the number of grey seal to be disturbed and at risk of PTS for every piling day with a piling schedule of four years. The worst case total number of potentially 14,601 grey seal disturbed within the ES would be reduced to 5,502.9, and a total of up to three individuals at risk of PTS; reduced from 15 in the ES.

- The worst case results for the potential number of grey seal that could be disturbed from monopile installation came from the assessment using the dose response curve assessments (Table 11-42 of **Chapter 11 Marine Mammals** [APP-095]): The potential numbers are:
  - DBS East - 3,124.2; and
  - DBS West - 2,378.7.

- Based on the assessment of PTS (number of potential individuals at risk of PTS) (Table 11-24 in **Chapter 11 Marine Mammals** [APP-095]. The worst case numbers are:
  - DBS East - 1.1; and
  - DBS West - 1.2.

51. The population modelling predicts that for the SE England MU, by the end of 2032 (two years after piling ends and six years after the onset of the disturbance), the median population size for the impacted population is predicted to be 99.29% of the unimpacted population and remains relatively stable up until 2052 which is the end point of the modelling (**Table 4-4**). There is less than 1% annual decline over the first six years (NRW, 2023) and over the 25 year period, therefore not significant under the NRW (2023) guidance.

52. Looking at the wider MU, the median population size for the impacted population is predicted to be 100.00% of the unimpacted population (**Table 4-5**). Therefore, the iPCoD model estimates that there is no change between the impacted and unimpacted seal population (and the wider MU), therefore not significant under the NRW (2023) guidance.

Table 4-4 Results of the iPCoD modelling for DBS East and DBS West sequentially scenario, giving the mean population size of grey seal population (SE England MU) for years up to 2052 for both impacted and un-impacted populations as well as median ratio between their populations (Updates to Table 11-46 of Chapter 11 Marine Mammals [APP-095])

Year	Un-impacted population mean	Impacted population mean	Median impacted
Start	30,594	30,594	100.00%
End 2028	30,719	30,718	100.00%
End 2029	30,933	30,880	99.83%
End 2032	31,469	31,247	99.29%
End 2037	32,506	32,173	98.98%
End 2047	34,689	34,338	98.99%
End 2052	35,806	35,440	98.98%

Table 4-5 Results of the iPCoD modelling for DBS East and DBS West sequentially scenario, giving the mean population size of grey seal population (Wider MU) for years up to 2052 for both impacted and un-impacted populations as well as median ratio between their populations (Updates to Table 11-47 of Chapter 11 Marine Mammals [APP-095])

Year	Un-impacted population mean	Impacted population mean	Median impacted
Start	56,502	56,502	100.00%
End 2028	57,010	57,010	100.00%
End 2029	57,618	57,620	100.00%
End 2032	59,390	59,393	100.00%
End 2037	62,362	62,365	100.00%
End 2047	69,021	69,026	100.00%
End 2052	72,535	72,539	100.00%

53. **Plate 4-4** shows the mean unimpacted and the mean impacted population of grey seal overlaid together for the SE England MU and the wider population (**Plate 4-5**). Both plates show that with piling at DBS East and DBS West, there is no material impact on the population of grey seal. The impact on the population is assessed as having a negligible magnitude, therefore the magnitudes are unchanged from those presented in Table 11-46 and Table 11-47 of **Chapter 11 Marine Mammals** [APP-095].

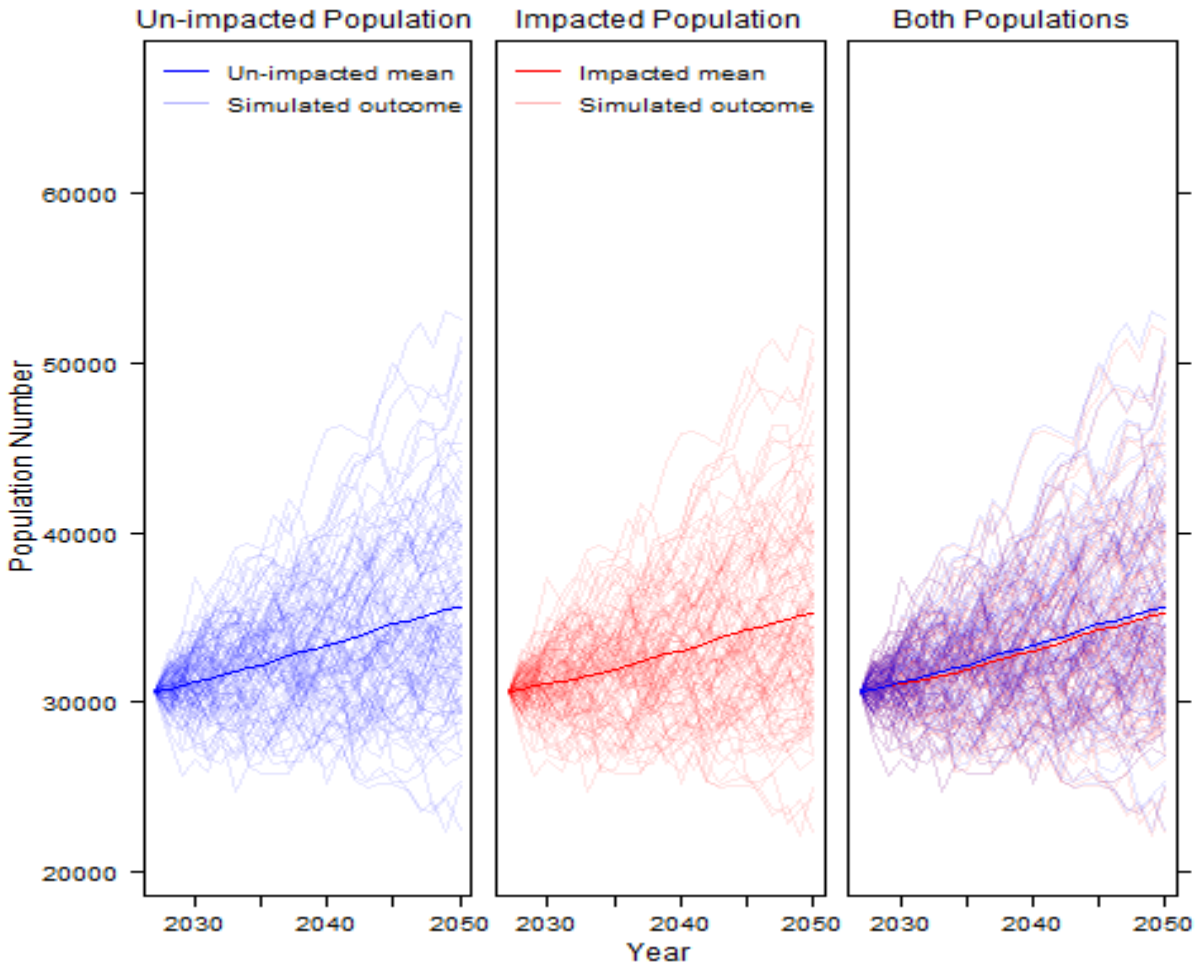

Plate 4-4 Simulated worst case grey seal population sizes (SE England MU) for both the unimpacted and the impacted populations (Updates to Plate 11-7 of Chapter 11 Marine Mammals [APP-095]).

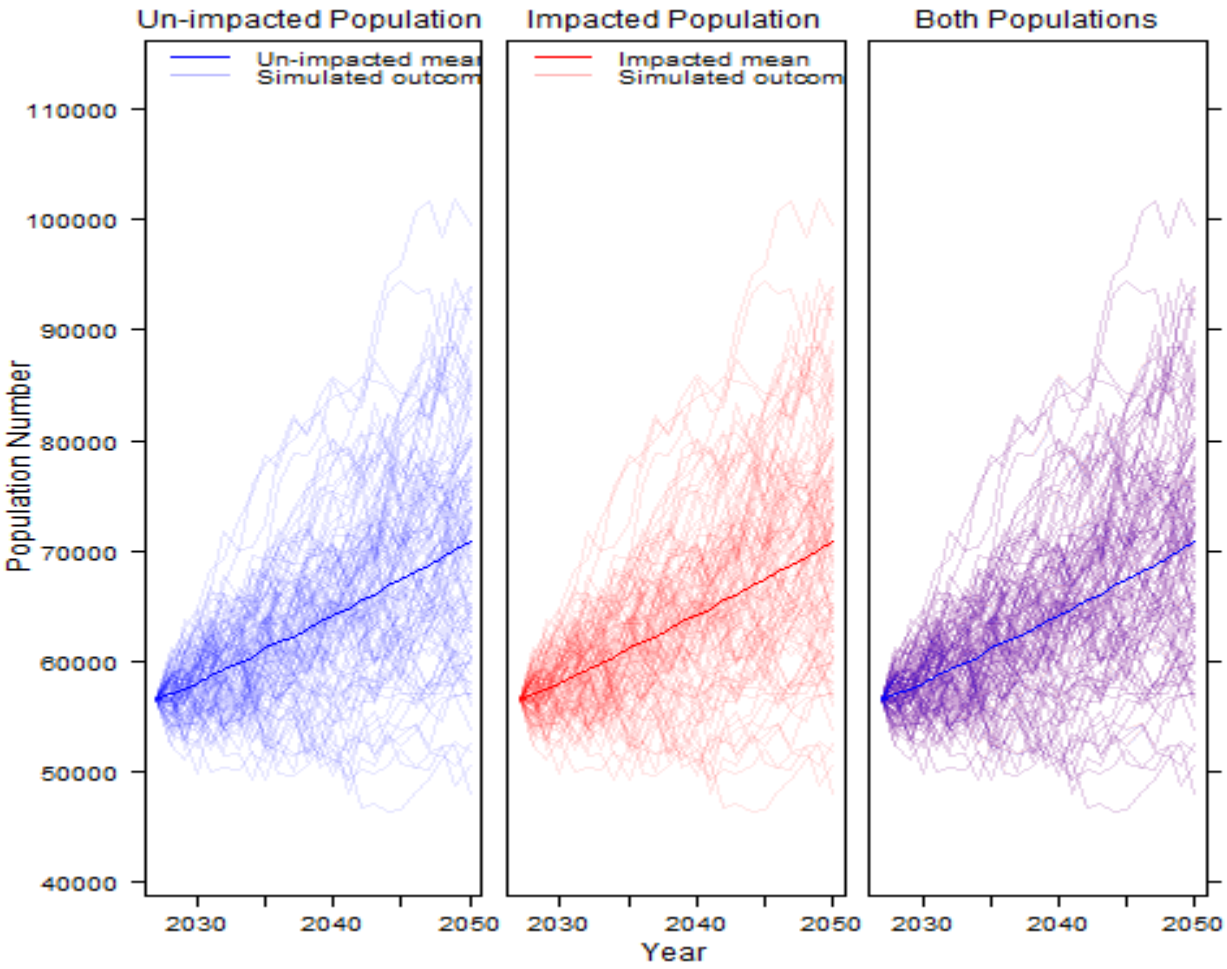

Plate 4-5 Simulated worst case grey seal population sizes (SE & NE England (Wider) MU) for both the unimpacted and the impacted populations (Updates to Plate 11-8 of Chapter 11 Marine Mammals [APP-095]).

4.1.1.5 Harbour Seal

54. The iPCoD modelling was based on the number of harbour seal to be disturbed and at risk of PTS for every piling day with a piling schedule of four years. The worst case total number of potentially 39 harbour seal disturbed within the ES would be reduced to 16, and a total of up to one individual at risk of PTS; the same at the ES.

- The worst case results for the potential number of harbour seal that could be disturbed from one monopile installation came from the assessment using the dose response curves (Table 11-42 in **Chapter 11 Marine Mammals** [APP-095]). The potential numbers are:
  - DBS East - 8.1; and
  - DBS West - 7.0.

- Based on the assessment of PTS (number of potential individuals at risk of PTS) (Table 11-24 in **Chapter 11 Marine Mammals** [APP-095]). The worst case numbers are:
  - DBS East - 0.01; and
  - DBS West - 0.005.

55. The population modelling predicts that by the end of 2032 (two years after piling ends and six years after the onset of the disturbance), the median population size for the impacted population is predicted to be 100% of the unimpacted population and remains stable at 100% until 2052, which is the end point of the modelling (**Table 4-6**). Therefore, the iPCoD model estimates there to be no change between the impacted and unimpacted SE England harbour seal population, for the worst case scenario where both DBS East and DBS West are constructed sequentially, therefore not significant under the NRW (2023) guidance.

56. **Plate 4-6** shows the mean unimpacted and the mean impacted population of harbour seal both overlaid together. The figure shows that with piling at DBS East and DBS West, there is no change to the population of harbour seal in the SE England MU. The impact on the population is assessed as have a negligible magnitude, therefore the magnitudes are unchanged from those presented in Table 11-48 in **Chapter 11 Marine Mammals** [APP-095] considering a stable population of the SE England MU.

Table 4-6 Results of the iPCoD modelling for DBS East and DBS West sequentially scenario, giving the mean population size of harbour seal (stable) population (SE England MU) for years up to 2052 for both impacted and un-impacted populations as well as median ration between their populations (Updates to Table 11-48 Chapter 11 Marine Mammals [APP-095]).

Year	Un-impacted population mean	Impacted population mean	Median impacted
Start	4,870	4,870	100.00%
End 2028	5,076	5,076	100.00%
End 2029	5,272	5,272	100.00%
End 2032	5,915	5,915	100.00%
End 2037	7,204	7,204	100.00%
End 2047	10,676	10,676	100.00%
End 2052	12,994	12,994	100.00%

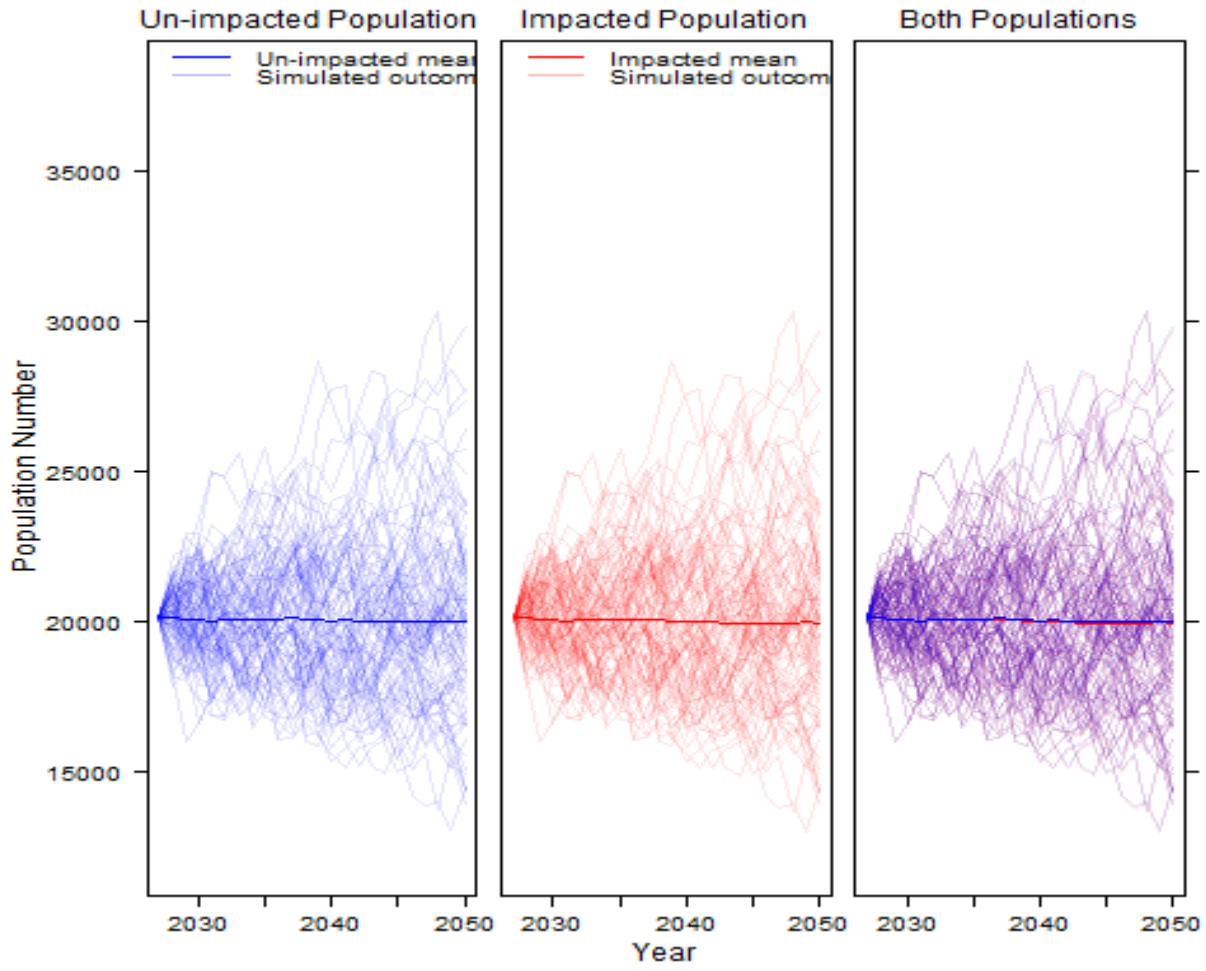

Plate 4-6 Simulated worst case harbour seal (stable) population sizes for both the unimpacted and the impacted populations (Updates to Plate 11-9 of Chapter 11 Marine Mammals [APP-095]).

4.1.1.6 Harbour Seal (Declining Population)

57. Taking into consideration of the reports that the harbour seal within the SE England MU is in decline (SCOS, 2022), additional population modelling was undertaken with the parameters for a declining harbour seal population as described in **Appendix 11-4 iPCoD Modelling (Revision 2)** [document reference: 7.11.11.4] (based on Sinclair *et al.* 2020).

58. Using the same data for project related impacts as set out above, by the end of 2032 (two years after piling ends and six years after the onset of the disturbance), the median population size for the impacted population is predicted to be 100% of the unimpacted population and remains stable at 100% until 2052, which is the end point of the modelling. Therefore, the iPCoD model estimates there to be no change in the SE England harbour seal population (**Table 4-7**) due to piling in the worst case scenario where both DBS East and DBS West are constructed sequentially, therefore not significant under the NRW (2023) guidance.

59. While there is a significant decline in the population, it is the same level of decline for either an impacted or un-impacted population, and therefore the Projects are not considered to be affecting that decline.

60. **Plate 4-7** shows the mean unimpacted and the mean impacted population of harbour seal both overlaid together for a declining harbour seal population. This plate shows that with piling at the Array Areas, there is no impact on the declining population of harbour seal in the SE England MU. The impact on the population is assessed as having a negligible magnitude, therefore the magnitude is unchanged from that presented in Table 11-49 of **Chapter 11 Marine Mammals** [APP-095].

Table 4-7 Results of the iPCoD modelling for DBS East and DBS West sequentially scenario, giving the mean population size of harbour seal (declining) population (SE England MU) for years up to 2052 for both impacted and un-impacted populations as well as median ratio between their populations (Updates to Table 11-49 of Chapter 11 Marine Mammals [APP-095]).

Year	Un-impacted population mean	Impacted population mean	Median impacted
Start	4,868	4,868	100.00%
End 2028	4,366	4,366	100.00%
End 2029	3,904	3,904	100.00%
End 2032	2,814	2,814	100.00%
End 2037	1,625	1,625	100.00%
End 2047	544	544	100.00%
End 2052	314	314	100.00%

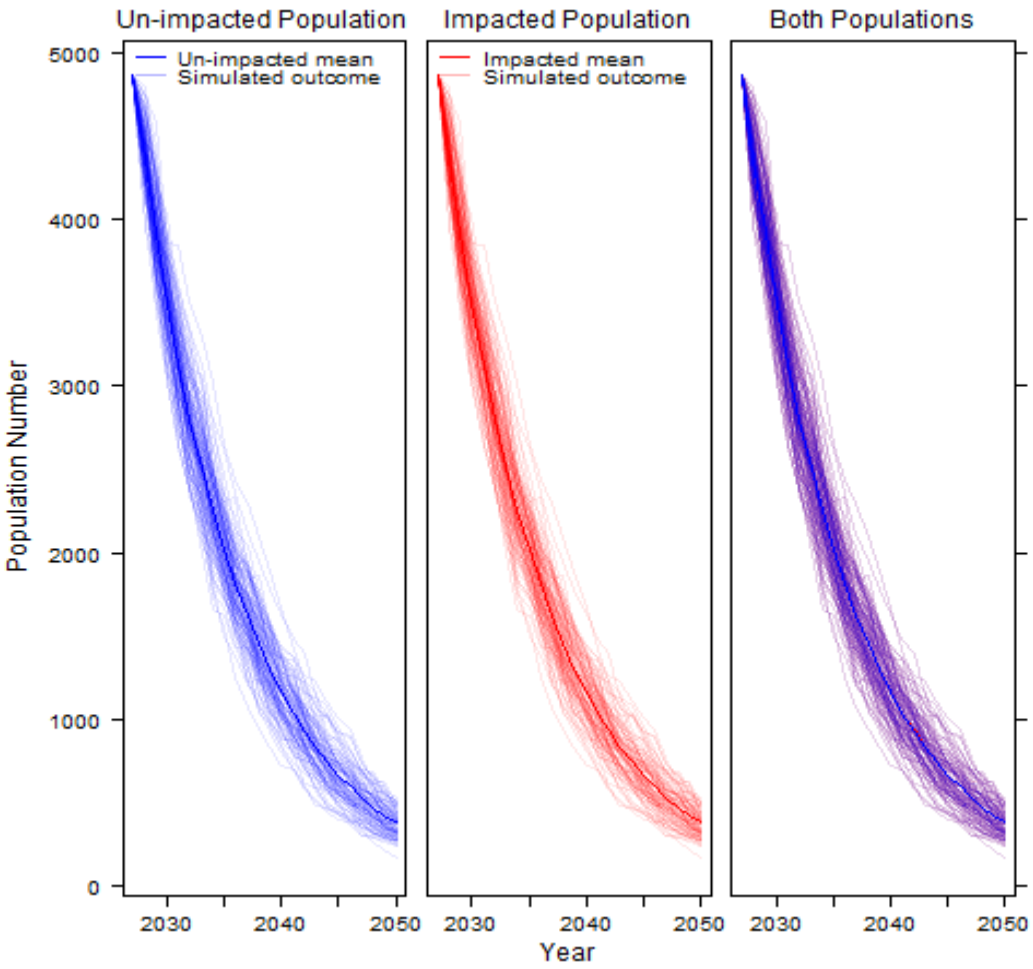

Plate 4-7 Simulated worst case harbour seal (declining) population sizes for both the unimpacted and the impacted populations (Updates to Plate 11-10 of Chapter 11 Marine Mammals [APP-095]).

4.1.1.7 Summary of Population Level Consequences due to Disturbance for Projects Alone

61. The results of population modelling for DBS East and DBS West piling as shown above show no significant difference in the population estimates at the end of the 25-year modelling period for the disturbed or un-disturbed populations.

62. There is the potential for a maximum of 0.24% reduction in the harbour porpoise population over the modelled period of 25 years (**Table 4-1**). For bottlenose dolphin the disturbance from piling at the Array Areas would not cause a population level effect (**Table 4-2**).

63. There is a potential population decline of 0.29% in the minke whale population over the 25 years (**Table 4-3**), and within the first six years of disturbance, there is a decline of 0.14%.

64. For the SE England population of grey seal, there is a potential decline of 1.02% (**Table 4-4**) and no population level effect for the wider MU (**Table 4-5**).

65. For harbour seal, carrying out the population modelling on either a stable or declining population results in the same conclusion; that there is no population level effect on the SE England population (**Table 4-6**; **Table 4-7**).

4.1.2 Cumulative

66. The modelling has been undertaken based on the same information as provided in section 11.7.3.1.1.2 of **Chapter 11 Marine Mammals** [APP-095] using iPCoD, with some minor changes:

- The number of piling days has been reduced from 104 days for DBS East and 104 days for DBS West, to 102 days for DBS East and 102 days for DBS West; and
- Two days for piling for the ESP in the Offshore Export Cable Corridor has been removed.

67. The total numbers of marine mammals that may suffer from PTS or maybe be disturbed due to piling at the Projects and other Offshore Wind Farm (OWF) projects is presented in **Table 4-8**. Project specific numbers are presented in Table 11-4-5; Table 11-4-6 and Table 11-4-7 of **Appendix 11-4 iPCoD Modelling (Revision 2)** [document reference: 7.11.11.4] and are broken down for each OWF project that was used for the cumulative population modelling.

Table 4-8 Estimated Number of Animals for Potential PTS and Disturbance from Piling due to the Projects and Other OWF Projects

Marine mammal species	Estimate number of animals to have PTS from cumulative piling	Estimate number of animals to be disturbed from cumulative piling
Harbour porpoise	1,431.2	39,828.4
Bottlenose dolphin	0.03	89.5
Minke whale	129.5	661.5
Grey seal	3.7	9,442.0
Harbour seal	1.5	194.3

4.1.2.1 Harbour Porpoise

68. For the updated cumulative scenario assessed with the NS MU, the iPCoD model predicts a slight decrease in harbour porpoise population size over time (**Table 4-9** and **Plate 4-8**).

69. The median population size was predicted to be 99.67% of the un-impacted population size at the end of 2028 (one year after the piling has commenced). By the end of 2032, the median ratio for the impacted population is predicted to be 98.72% of the un-impacted population size. Beyond 2032, the impacted population is expected to maintain the same stable trajectory as the un-impacted population (as far as 2052 which is the end point of the modelling, at which point the median impacted to un-impacted ratio remains 98.76%).

70. For harbour porpoise, the magnitude of the cumulative disturbance from underwater noise from piling is assessed as negligible as there is less than a 1% population level impact annually over the first six years (NRW, 2023) and over the 25-year modelled periods. The magnitude is unchanged from that presented in Table 11-118 of **Chapter 11 Marine Mammals** [APP-095].

Table 4-9 Results of the iPCoD modelling for the cumulative assessment, giving the mean population size of the harbour porpoise population (NS MU) for years up to 2052 for both impacted and un-impacted populations in addition to the median ratio between their population sizes [Updates to Table 11-118 of Chapter 11 Marine Mammals [APP-095]]

Year	Un-impacted population mean	Impacted population mean	Median impacted as % of un-impacted
Start	346,602	346,602	100.00%
End 2028	346,821	345,767	99.67%
End 2029	347,362	343,910	99.18%
End 2032	347,080	343,206	98.72%
End 2037	346,795	342,852	98.80%
End 2047	347,321	343,363	98.79%
End 2052	346,086	342,128	98.76%

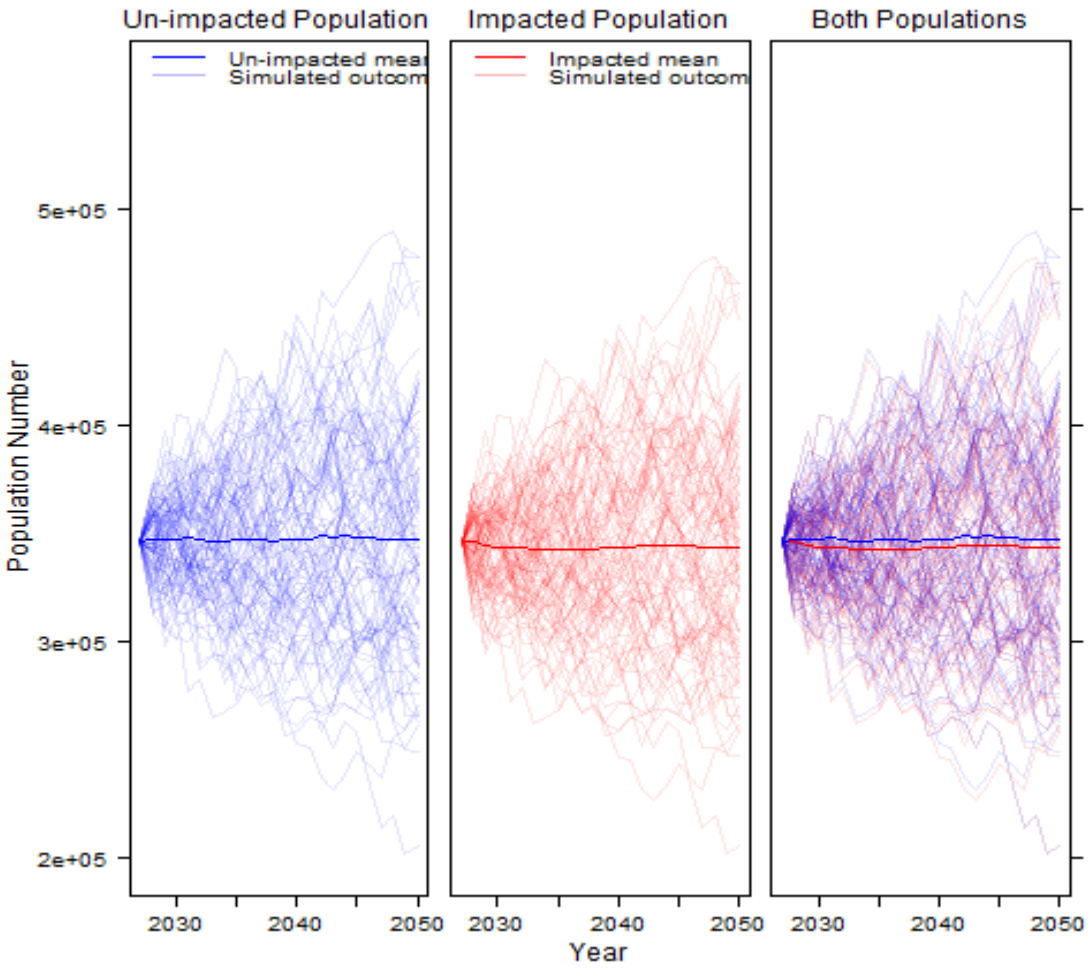

Plate 4-8 Simulated worst case harbour porpoise population sizes for both the un-impacted and the impacted populations (Updates to Plate 11-17 of Chapter 11 Marine Mammals [APP-095]).

4.1.2.2 Bottlenose Dolphin

71. For the updated cumulative scenario assessed within the GNS MU, the iPCoD model predicts a slight decrease in bottlenose dolphin population size over time (**Table 4-10** and **Plate 4-9**).

72. The median population size was predicted to be 100% of the impacted to un-impacted population size at the end of 2028 (one year after piling has commenced). After six years of piling the median ratio of the impacted to the unimpacted population is 97.98%. This trend is maintained until 2052, with the median ratio of the impacted to the unimpacted population being 98.33%, which is the end point of the modelling.

73. For bottlenose dolphin, the potential cumulative magnitude of disturbance from underwater noise from piling is assessed as negligible due to there being less than 1% annual decline over the first six years (NRW, 2023) and over the 25-year period, therefore not significant under the NRW (2023) guidance. The magnitude is unchanged from that presented in Table 11-119 of **Chapter 11 Marine Mammals** [APP-095].

Table 4-10 Results of the iPCoD modelling for the cumulative assessment, giving the mean population size of the bottlenose dolphin population (GNS MU) for years up to 2052 for both impacted and un-impacted populations in addition to the median ratio between their population sizes (Updates to Table 11-119 of Chapter 11 Marine Mammals [APP-095]).

Year	Un-impacted population mean	Impacted population mean	Median impacted as % of un-impacted
Start	2,020	2,020	100.00%
End 2028	2,010	1,988	99.20%
End 2029	2,000	1,958	98.55%
End 2032	1,966	1,932	97.98%
End 2037	1,914	1,884	98.01%
End 2047	1,814	1,785	98.66%
End 2052	1,771	1,743	98.33%

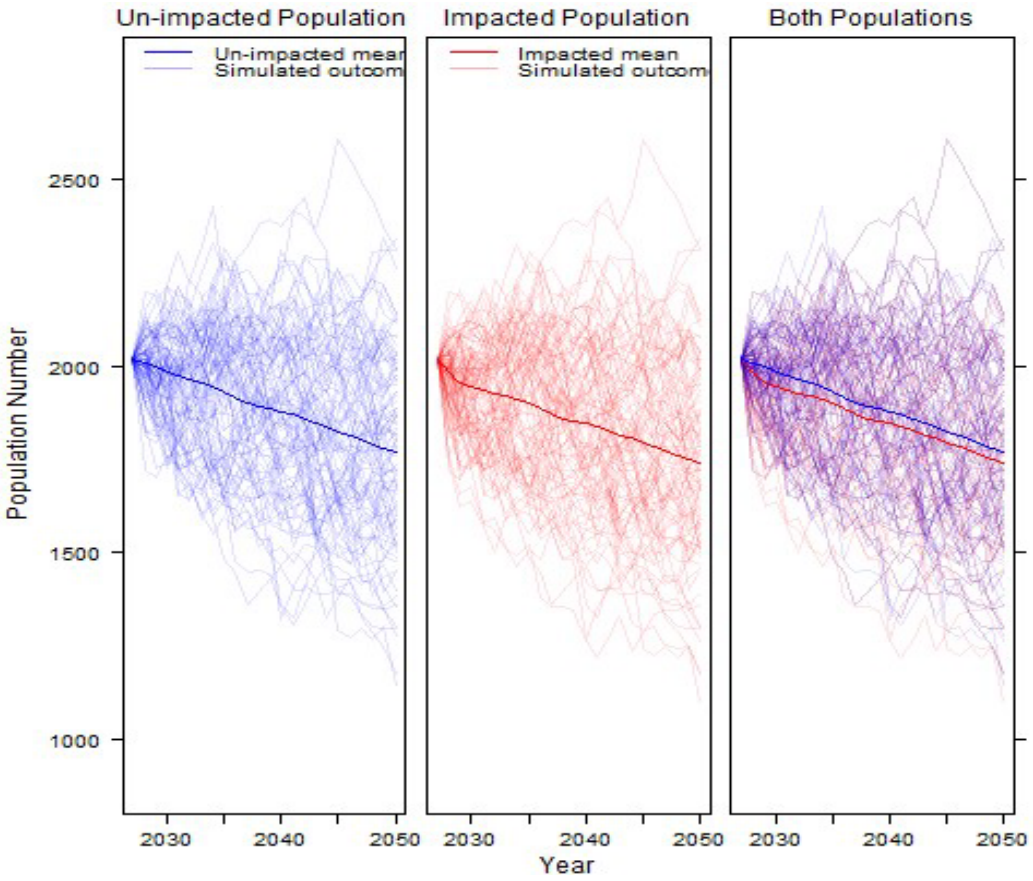

Plate 4-9 Simulated worst case bottlenose dolphin population sizes for both the un-impacted and the impacted populations (Updates to Plate 11-18 of Chapter 11 Marine Mammals [APP-095]).

4.1.2.3 Minke Whale

74. For the updated cumulative scenario assessed within the CGNS MU, the iPCoD model predicts a slight decrease in minke whale population size over time (**Table 4-11** and **Plate 4-10**).

75. The median population size was predicted to be 99.57% of the un-impacted population size at the end of 2028 (one year after the piling has commenced). By the end of 2029 the median population size for the impacted population is predicted to be 99.81% of the un-impacted population size. The impacted population at the end of 2047 (20 years after piling commences) is expected to be 96.39% of un-impacted population, and in 2052, which is the end point of the modelling, the impacted population is predicted to be 96.86% of the unimpacted population.

76. For minke whale, the magnitude of cumulative disturbance from underwater noise from piling is assessed as low, due to there being less than 1% annual decline over the first six years (NRW, 2023) and over the 25 year period, therefore not significant under the NRW (2023) guidance, (**Table 4-11**), therefore the magnitude is unchanged from that presented in Table 11-120 of **Chapter 11 Marine Mammals** [APP-095].

Table 4-11 Results of the iPCoD modelling for the cumulative assessment, giving the mean population size of the minke whale population (CGNS MU) for years up to 2052 for both impacted and un-impacted populations in addition to the median ratio between their population sizes (Updates to Table 11-120 of Chapter 11 Marine Mammals [APP-095]).

Year	Un-impacted population mean	Impacted population mean	Median impacted as % of un-impacted
Start	20,120	20,120	100.00%
End 2028	20,108	20,105	99.57%
End 2029	20,062	20,040	99.81%
End 2032	20,092	19,734	98.34%
End 2037	20,059	19,139	96.61%
End 2047	19,867	18,485	96.39%
End 2052	19,815	18,3825	96.86%

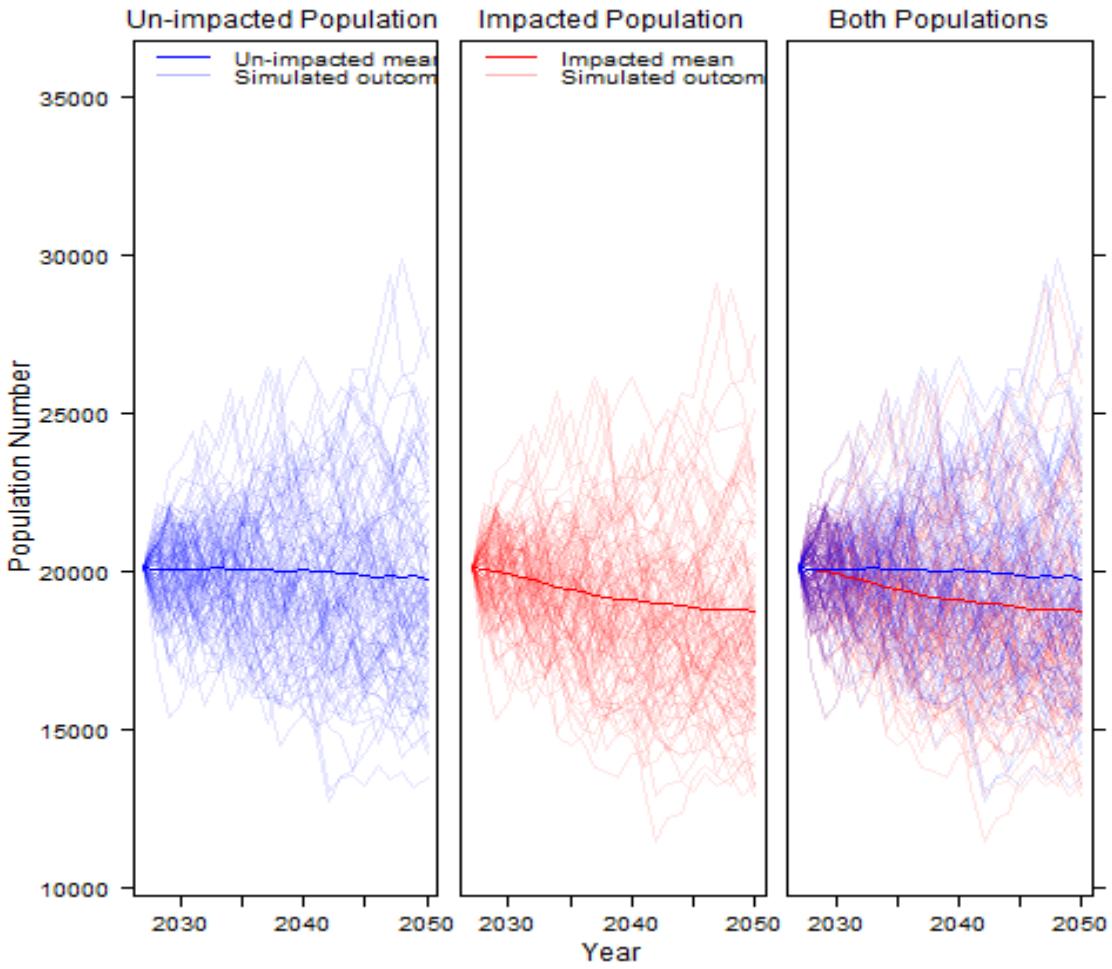

Plate 4-10 Simulated worst case minke whale population sizes for both the un-impacted and the impacted populations (Updates to Plate 11-19 of Chapter 11 Marine Mammals [APP-095]).

4.1.2.4 Grey Seal

77. For the updated cumulative scenario assessed; the iPCoD model predicts very little change in the median ratio population size of the impacted to the unimpacted in grey seal population size over time for the SE England or the wider MU (**Table 4-12** and **Plate 4-11** (SE England MU); **Table 4-13** and **Plate 4-12** (Wider MU)).

78. The median population size was predicted to be 100% of the un-impacted population size at the end of 2028 (one year after piling has commenced) for both populations. This lack of discernible effect on the impacted population is maintained until 2052 for both the SE England or wider MU, which is the end point of the modelling (**Table 4-12** and **Table 4-13**).

79. For grey seal, the potential magnitude of the cumulative disturbance from underwater noise from piling is assessed as negligible due to there being less than a 1% annual population level impact over the first six years (NRW, 2023) and 25-year modelled periods. Therefore the magnitudes are unchanged from those presented in Table 11-121 and Table 11-122 of **Chapter 11 Marine Mammals** [APP-095].

Table 4-12 Results of the iPCoD modelling for the cumulative assessment, giving the mean population size of the grey seal population (SE England MU) for years up to 2052 for both impacted and un-impacted populations in addition to the median ratio between their population sizes (Updates to Table 11-121 of Chapter 11 Marine Mammals [APP-095]).

Year	Un-impacted population mean	Impacted population mean	Median impacted as % of un-impacted
Start	30,596	30,596	100.00%
End 2028	30,798	30,798	100.00%
End 2029	31,015	31,015	100.00%
End 2032	31,588	31,589	100.01%
End 2037	32,614	32,616	99.99%
End 2047	34,677	34,679	100.01%
End 2052	35,728	35,731	99.99%

**Note that the marginal increase in the impacted population in comparison to the un-impacted population is a result of the environmental stochasticity built into the model*

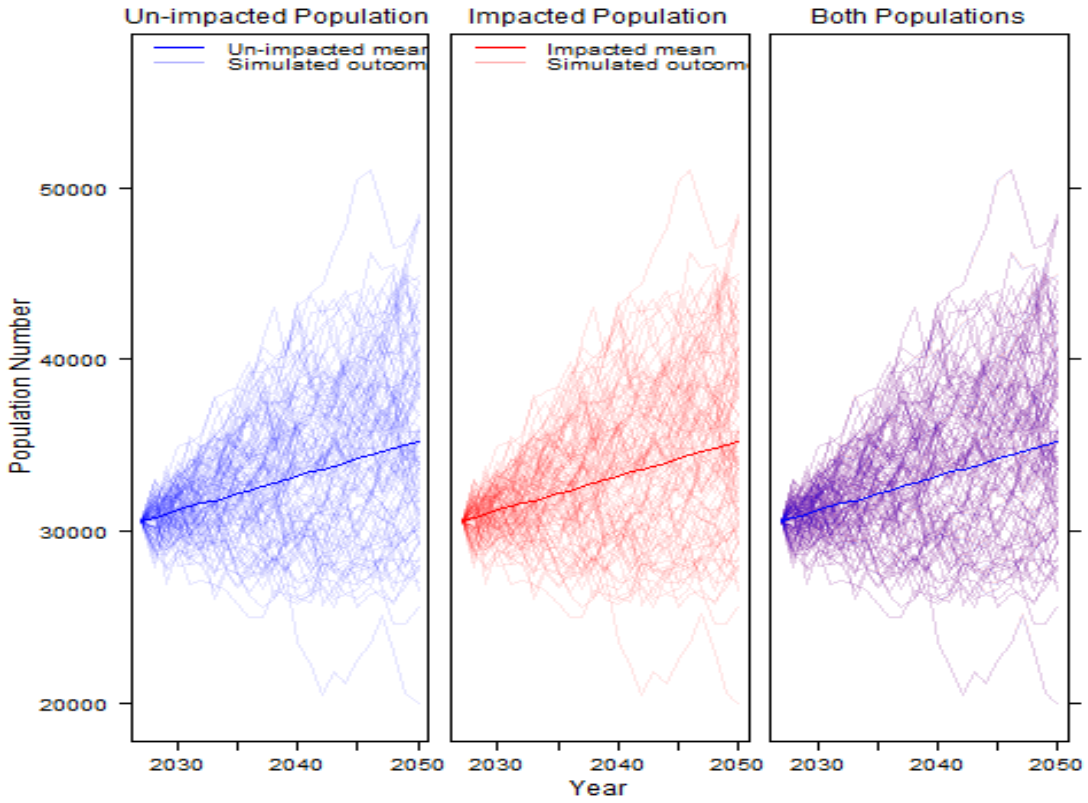

Plate 4-11 Simulated worst case grey seal population sizes (SE England MU) for both the unimpacted and the impacted populations (Updates to Plate 11-20 of Chapter 11 Marine Mammals [APP-095]).

Table 4-13 Results of the iPCoD modelling for the cumulative assessment, giving the mean population size of the grey seal population (Wider MU) for years up to 2052 for both impacted and un-impacted populations in addition to the median ratio between their population sizes (Updates to Table 11-122 of Chapter 11 Marine Mammals [APP-095]).

Year	Un-impacted population mean	Impacted population mean	Median impacted as % of un-impacted
Start	56,502	56,502	100.00%
End 2028	56,751	56,751	100.00%
End 2029	57,069	57,069	100.00%
End 2032	58,025	58,026	100.00%
End 2037	59,541	59,543	100.01%
End 2047	63,274	63,276	100.00%
End 2052	65,547	65,549	100.00%

**Note that the marginal increase in the impacted population in comparison to the un-impacted population is a result of the environmental stochasticity built into the model*

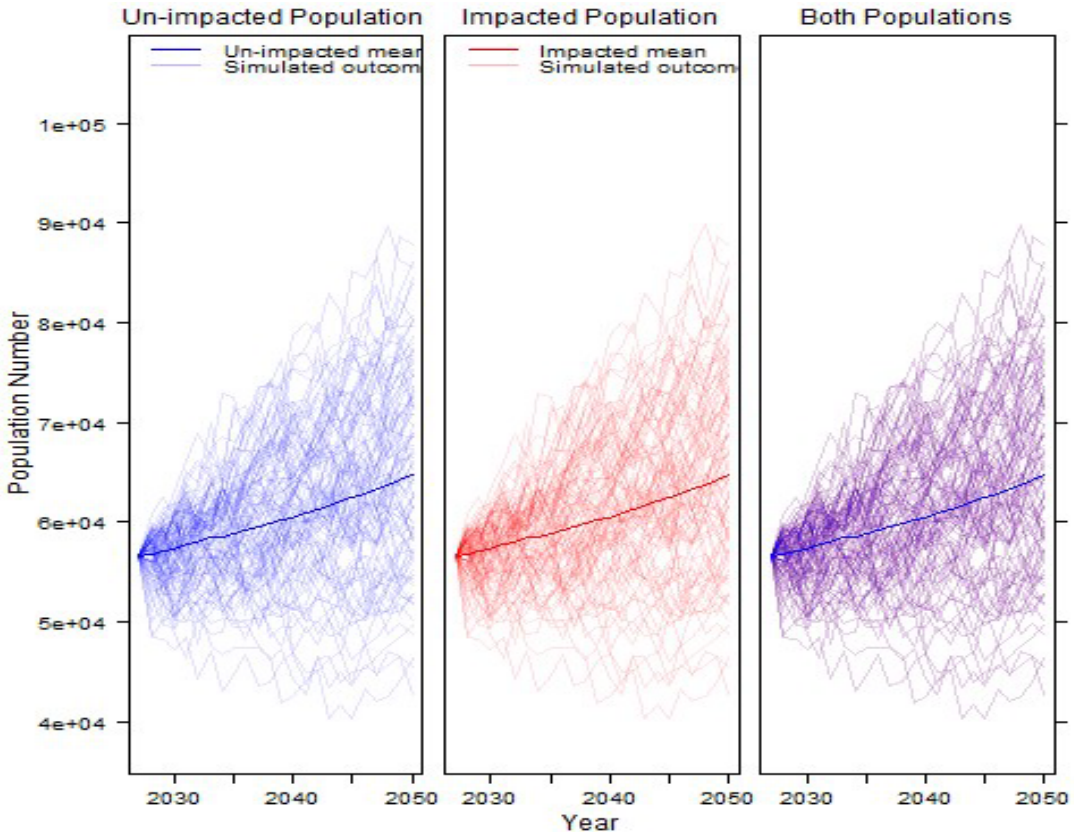

Plate 4-12 Simulated worst case grey seal population sizes (Wider MU) for both the un-impacted and the impacted populations (Updates to Plate 11-21 of Chapter 11 Marine Mammals [APP-095]).

4.1.2.5 Harbour Seal

80. As a worst case, the population modelling used the parameters for a declining harbour seal population for the cumulative scenario. For the updated cumulative scenario assessed within the SE England MU, the iPCoD model predicts no discernible decrease in harbour seal population size over the 25 year modelled periods (**Table 4-14** and **Plate 4-13**).

81. The median population size was predicted to be 100% of the un-impacted population size at the end of 2028 (one year after the piling has commenced) and remained relatively stable until 2052, which is the end point of the modelling, therefore not significant under the NRW (2023) guidance.

82. For harbour seal, the cumulative magnitude of disturbance from underwater noise from piling is assessed as negligible magnitude due to there being less than a 1% annual population level impact over the first six years and the 25 year modelled periods (**Table 4-14**). Therefore, the magnitudes are unchanged from those presented in Table 11-123 of **Chapter 11 Marine Mammals** [APP-095].

Table 4-14 Results of the iPCoD modelling for the cumulative assessment, giving the mean population size of the harbour seal (declining) population (SE England MU) for years up to 2052 for both impacted and un-impacted populations in addition to the median ratio between their population sizes (Updates to Table 11-123 of Chapter 11 Marine Mammals [APP-095])

Year	Un-impacted population mean	Impacted population mean	Median impacted as % of un-impacted
Start	3,956	3,956	100.00%
End 2028	3,548	3,548	100.00%
End 2029	3,170	3,172	100.00%
End 2032	2,271	2,275	100.00%
End 2037	1,313	1,316	100.00%
End 2047	432	433	100.00%
End 2052	249	249	100.00%

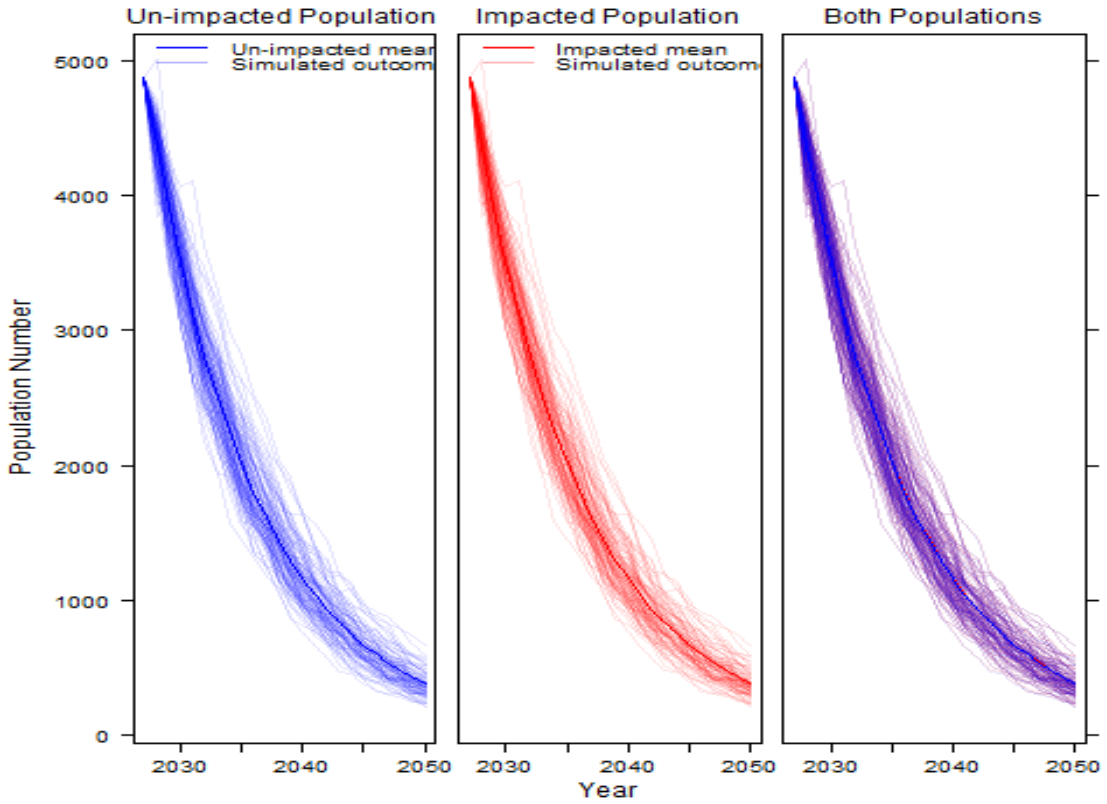

Plate 4-13 Simulated worst case harbour seal (declining) population sizes for both the un-impacted and the impacted populations (Updates to Plate 11-22 of Chapter 11 Marine Mammals [APP-095]).

4.1.2.6 Summary of Magnitude of Cumulative Population Level Consequences due to Disturbance

83. For all species assessed, the modelled impact of piling from the Projects falls below the threshold of a 1% annual decline in population which is considered to be not significant in EIA terms. The greatest impact of cumulative disturbance occurs for minke whale, with a predicted 3.14% decline in population size over a 25-year period but falls below the 1% annual decline mark. The population consequence of disturbance is therefore assessed as negligible magnitude for all species, with exception of minke whale with a magnitude of low, therefore the magnitudes are unchanged from those presented in section 11.7.3.1.1.2.3 of **Chapter 11 Marine Mammals** [APP-095].

5 ES Corrections

84. There was one error in **Chapter 11 Marine Mammals** [APP-095], which was for harbour seal in the quantitative assessment for cumulative disturbance from underwater noise from piling at the Projects and other OWF Projects. In section 11.7.3.1.1.2.1.7 of **Chapter 11 Marine Mammals** [APP-095], the maximum number of individuals potentially disturbed during single piling were taken from the assessment using the 25km Effective Deterrence Range (EDR), whereas numbers were higher from the dose response curve and therefore the worst case. Therefore, in **Chapter 11 Marine Mammals** [APP-095], there was an error as the worst case numbers should have been used for the cumulative assessment, which has been amended and presented in **Table 5-2**.

85. The project scenario colour code for **Table 5-2** is defined in **Table 5-1**.

Table 5-1 Protect scenario colour code (Updates to Table 11-110 of the Chapter 11 Marine Mammals [APP-095]).

With DBS East	Green
With DBS West	Blue
DBS Projects together	Dark blue
Without DBS Projects	Orange

86. For harbour seal, the maximum number of individuals that could potentially be disturbed from the Projects was taken from the EDR assessment, where in fact the worst case numbers were actually from the dose response curve. In Table 11-117 in **Chapter 11 Marine Mammals** [APP-095], the number was 3.3 at DBS East, 2.0 at DBS West and 6.6 at the Projects together, from the EDR assessment.

87. **Table 5-2** presents the correction with the Projects worst case numbers using the dose response curve of, 8.1 at DBS East, 7.0 at DBS West and 15.1 at the Projects together.

88. The potential magnitude for the cumulative effect assessment (CEA) of impacts from piling remains low for either DBS East or DBS West in isolation or the Projects together. Although the numbers of individuals have changed slightly, the magnitude is unchanged from that presented in Table 11-117 of **Chapter 11 Marine Mammals** [APP-095].

Table 5-2 Quantitative CEA for the potential Disturbance of harbour seal during single piling at OWF projects which could be concurrently piling at the same as DBS East and DBS West (Updates to Table 11-117 of Chapter 11 Marine Mammals [APP-095]) *(Grey was presented in the ES)*.

OWF Project	Harbour seal density (/km²)	Maximum number of individuals potentially disturbed during single piling
DBS East	*0.0017*	*8.1*
DBS West	*0.001*	*7.0*
DBS East & DBS West concurrently	-	*15.1*
Berwick Bank	-	-
Dudgeon Extension	0.076	43.0
East Anglia One North	0.008	1.0
Five Estuaries	0.018	2.0
Green Volt	-	-
Hornsea Project Three	0.00126	4.5
Hornsea Project Four	0.0715	5.0
North Falls	0.0034	8.0
Outer Dowsing	0.13	35.0
Rampion 2	-	-
Seagreen 1A	-	-
Sheringham Shoal Extension	0.23	84
West of Orkney	-	-
Total number of harbour seal with DBS East *Magnitude of cumulative impact*		**190.6 (3.92% of the SE England MU)** *Low*
Total number of harbour seal with DBS West *Magnitude of cumulative impact*		**189.5 (3.99% of the SE England MU)** *Low*
Total number of harbour seal with all DBS Projects *Magnitude of cumulative impact*		**197.6 (4.0% of the SE England MU)** *Low*
Total number of harbour seal without DBS Projects *Magnitude of cumulative impact*		**182.5 (3.75% of the SE England MU)** *Low*

6 Conclusion

89. The proposed removal of the ESP in the Offshore Export Cable Corridor would not cause any change to the magnitudes or significance of effect of concurrent piling of jacket pin piles for PTS (**Table 3-3**). However, the proposed removal of the ESP in the Offshore Export Cable Corridor would reduce the significance of effect for TTS due to the cumulative exposure of concurrent jacket pin pile installations at multiple piling locations for grey seal, from major adverse (significant in EIA terms) to **minor adverse** (not significant in EIA terms) (**Table 3-6**).

90. The proposed reduction of piling days (section 4) would not have any significant changes to the results from the population modelling in sections 11.6.1.2.2.3 and 11.7.3.1.1.2.2 of **Chapter 11 Marine Mammals** [APP-095].

91. The updates to the harbour seal assessment (**Table 5-2**) from section 11.7.3.1.1.2 of **Chapter 11 Marine Mammals** [APP-095], resulted in no change in the magnitude (**Table 5-2)** or the significance of effect for harbour seal (section 5) due to using the Projects' worst case numbers as described in paragraph 84.

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RWE Renewables UK Dogger Bank
South (West) Limited

RWE Renewables UK Dogger Bank
South (East) Limited

Windmill Business Park
Whitehill Way
Swindon
Wiltshire, SN5 6PB