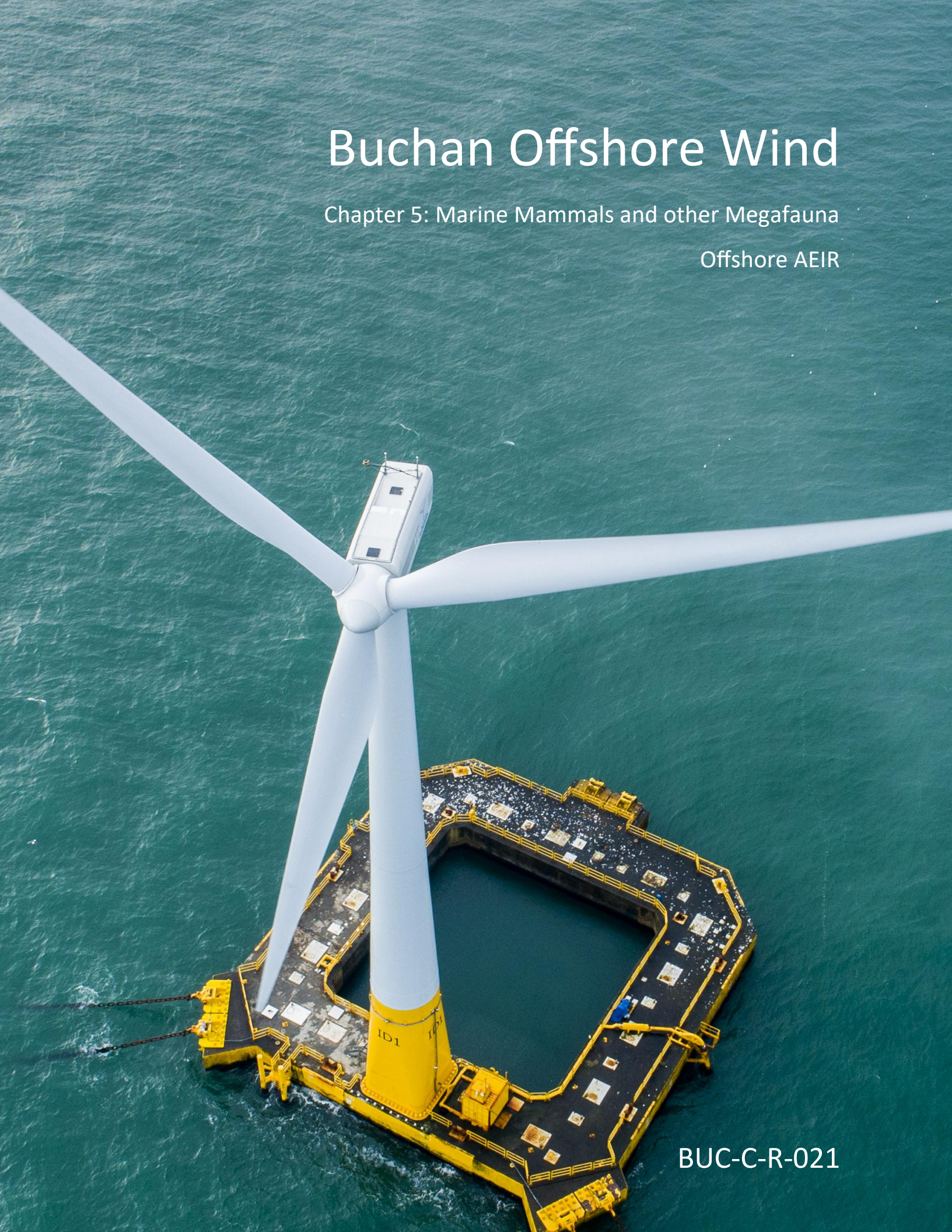
Buchan Offshore Wind

Chapter 5: Marine Mammals and other Megafauna

Offshore AEIR



BUC-C-R-021

Buchan Offshore Wind

Additional Environmental Information Report

Chapter 5: Marine Mammals and Other Megafauna

QMS Review

Name	Company	Date	Reviewed	Approved
KGR / WBN	Natural Power	22/06/2026	LJN	SMM
CMO	Buchan Offshore Wind	22/06/2026	CMO	DON

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5.1 INTRODUCTION

5.1.1 Overview

5-1 This Additional Environmental Information Report (AEIR) chapter has been prepared to respond to the Request for Additional Environmental Information (RAEI) issued by Marine Directorate – Licensing Operations Team (MD-LOT) on 18 December 2025, informed by consultation responses from NatureScot and subsequent consultation undertaken during the determination period in relation to Marine Mammals and Other Megafauna. An overview of the Proposed Offshore Development and Application, and approach to responding to the RAEI is presented in **AEIR, Chapter 1: Introduction**.

5.1.2 Relationship to the Environmental Impact Assessment Report

5-2 This chapter supplements Volume 2 Chapter 10: Marine Mammals and Other Megafauna of the EIAR and provides additional environmental information, updated assessment and clarification in response to the RAEI issued by MD-LOT on 18 December 2025 and subsequent consultation undertaken during the determination period.

5-3 Unless explicitly stated otherwise, the assessment methodology, baseline information and assessment conclusions presented within the EIAR remain valid and unchanged.

5-4 This chapter should be read in conjunction with the following documents submitted as part of the Application:

- Volume 1, Chapter 4: Project Description;
- Volume 1, Chapter 5: EIA Methodology;
- Volume 2, Chapter 8: Fish and Shellfish Ecology;
- Volume 2, Chapter 10: Marine Mammals and Other Megafauna;
- Volume 3, Appendix 7.3: Nature Conservation Marine Protected Area Assessment;
- Volume 3, Appendix 8.1: Underwater Noise Modelling Assessment;
- Volume 3, Appendix 10.1: Marine Mammals and other Megafauna Baseline Report;
- Volume 3, Appendix 10.2: Marine Mammals and Other Megafauna Technical Report;
- Report to Inform Appropriate Assessment (RIAA); and
- AEIR, Chapter 3: Fish and Shellfish Ecology.

5.1.3 Scope of This Report

5-5 The primary basis for the additional information presented within this chapter is the RAEI issued by MD-LOT on 18 December 2025, informed by representation from NatureScot on 01 October 2025. In addition, further clarification and supporting information has been provided in

response to consultation undertaken during the determination period, including the technical clarification letter to NatureScot from the Applicant (BOW-L-0409), the marine mammals workshop held on 31 March 2026, the NatureScot Post-Workshop Memo dated 28 April 2026 and subsequent correspondence with NatureScot and MD-LOT where relevant to matters raised through the RAEI .

5-6 In particular, this AEIR chapter provides clarification on the Maximum Design Scenario in terms of the piling parameters and durations used, confirmation on the instantaneous Permanent Threshold Shift (PTS) value for grey seals as an output from underwater noise modelling, verification of underwater noise outputs utilising more precautionary flee speeds, confirmation of iPCoD parameters and results including an update to the grey seal reference population used and an update to the Cumulative Effects Assessment and Nature Conservation Marine Protected Area assessment.

5-7 The conclusions presented within this chapter are consistent with, and do not materially alter, the conclusions presented within the EIAR (Volume 2 Chapter 10: Marine Mammals and Other Megafauna).

5.2 CONSULTATION AND REQUESTS FOR FURTHER INFORMATION

5.2.1 Approach to Consultation and RAEI

5-8 A summary of all consultation undertaken during the determination phase is provided in **AEIR Chapter 1: Introduction**. For detail on consultation undertaken to inform the EIAR please refer to EIAR Volume 2, Chapter 10: Marine Mammals and Other Megafauna.

5-9 In accordance with the RAEI issued by MD-LOT on 18 December 2025, this chapter of the AEIR focuses on responding to the RAEI items identified by the regulator in relation to marine mammals and other megafauna. These items form the primary basis of the additional information presented within this chapter.

5-10 Consultation matters relevant to the provision of additional environmental information arising from the MD-LOT RAEI (informed by NatureScot) are presented in a single consolidated table (**Table 5-1**). This approach ensures consistency in how consultation feedback has been captured and addressed within this AEIR.

5-11 All items relating to marine mammals and other megafauna raised NatureScot in their determination on the EIAR are presented and addressed in full in **Appendix 5.1** – CONSULTATION LOG. These matters are addressed, where relevant, through clarification, signposting to the EIAR, or provision of additional supporting information within this AEIR.

5.2.2 Summary of Consultation Relevant to Marine Mammals and Other Megafauna

5-12 **Table 5-1** presents the RAEI issued by MD-LOT on 18 December 2025, informed by consultation responses received from NatureScot (01.10.2025) during the determination period that are relevant to marine mammals and other megafauna. For each item, a summary of the issue raised is provided alongside a description of how and where the matter has been addressed within this AEIR.

Table 5-1: Summary of Requests for Additional Environmental Information relevant to Marine Mammals and other Megafauna and responses provided in this AEIR

Consultee	Date / consultation type	Summary	Where / how this has been considered
1. Maximum Design Scenario (MDS) including piling parameters and durations used			
a. Expected durations of each impact			
NatureScot and MD-LOT	01.10.2025 Representation on the EIAR / 18.12.2025 RAEI	NatureScot: Requested additional information on the maximum design scenario [Table 10-16 in EIAR, Volume 2, Chapter 10 (Marine Mammals and Other Megafauna)], particularly in relation to expected durations for each impact in order to better fully consider the magnitude of effect. Clarification required on worst case scenario (for frequency and duration) of pile driving activities that was assessed. It is noted that additional clarification can be provided post-consent through consideration of a Piling Strategy, but it is advisable that the limits of a worst-case scenario are acceptable prior to any consent. MD-LOT: Requested additional information on the maximum design scenario [Table 10-16 in EIAR, Volume 2, Chapter 10 (Marine Mammals and Other Megafauna)], particularly in relation to expected durations for each impact in order to better fully consider the magnitude of effect. MD-LOT require that these aspects are confirmed.	The indicative construction programme and pile driving scenarios have been clarified (in terms of frequency and duration). The AEIR confirms the indicative construction window, identifies when pile driving may occur, and provides additional detail on pile driving schedules, durations and concurrent piling scenarios to support assessment of magnitude of effect. Further detail is provided in **Section 5.3.4.** It can be confirmed that the indicative construction window for the Proposed Offshore Development is 2030 – 2035. All non-piling construction activities could occur at any time during this period. Piling activities are indicatively planned to occur between 2031 and 2034.
b. Increased underwater noise from pile driving activity			
NatureScot and MD-LOT	01.10.2025 Representation on the EIAR / 18.12.2025 RAEI	NatureScot: request that clarification is provided to confirm no concurrent piling between the OSP / IRC and WTGs is likely. If concurrent piling is required, then additional modelling will likely be required. MD-LOT: request that confirmation is provided on whether concurrent piling between the OSP / IRC and	Clarification was provided to NatureScot in the technical clarification letter (BOW-L-0409) confirming that concurrent piling between the Operation Substation Platform (OSP), Intermediate Reactive Compensation (IRC) and Wind Turbine Generators (WTGs) will not be undertaken and was therefore not included

Consultee	Date / consultation type	Summary	Where / how this has been considered
		WTGs is likely. If concurrent piling is required, this is to be confirmed at the earliest opportunity, as additional modelling will likely be required to be submitted.	within the maximum design scenario. This clarification is repeated within **Section 5.3.2.** The concern was addressed and no further clarification was requested.
NatureScot	28.04.2026 NatureScot Post-Workshop Memo	NatureScot confirmed that the clarification provided in technical clarification letter BOW-L-0409 confirmed no concurrent piling between the OSP / IRC and WTGs will occur, and so no further clarification was required.	
c. Instantaneous Permanent Threshold Shift (PTS)			
NatureScot and MD-LOT	01.10.2025 Representation on the EIAR / 18.12.2025 RAEI	NatureScot: request that clarification is provided to confirm whether the 1.4 km value for grey seals is an accurate output from the underwater noise modelling and if so, mitigation measures will need to be updated accordingly. MD-LOT: request confirmation as to whether the 1.4 km instantaneous PTS value for grey seals is an accurate output from the underwater noise modelling.	Clarification was provided to NatureScot in the technical clarification letter (BOW-L-0409) and is repeated in **Section 5.3.3** for clarity. The discrepancy was confirmed to be a typographical error and did not affect the assessment conclusions. The concern was therefore addressed.
NatureScot	28.04.2026 NatureScot Post-Workshop Memo	NatureScot confirmed that the clarification provided in technical clarification letter BOW-L-0409 satisfactorily explained the discrepancy and that the issue was resolved.	
d. Disturbance (behavioural responses)			
NatureScot and MD-LOT	01.10.2025 Representation on the EIAR / 18.12.2025 RAEI	NatureScot: Clarification is required on the maximum piling durations used in the modelling for individual piles (WTG anchor and OSP / IRC) as well as total duration and temporal spread across the construction period. This is important in understanding the significance of the impact as well as it being an influential factor in iPCoD outputs. MD-LOT: Require confirmation of the maximum piling durations used in the modelling for individual piles (WTG	Additional information has been provided on maximum piling durations, temporal distribution of piling activity and revised pile driving schedules. Following consultation with NatureScot, two additional piling schedules to those presented in EIAR were developed in conjunction with the Applicant's engineers to ensure the worst-case scenario was captured within the assessment. Further detail is provided in **Section 5.3.4**. and **Table 5-3**.

Consultee	Date / consultation type	Summary	Where / how this has been considered
		anchor and OSP / IRC) as well as total duration and temporal spread across the construction period.	
2. Flee speeds			
NatureScot and MD-LOT	01.10.2025 Representation on the EIAR / 18.12.2025 RAEI	NatureScot: The number of individuals impacted from cumulative PTS across each of the piling scenarios [e.g. Tables 10-31 to 10-34 in EIAR, Volume 2, Chapter 10 (Marine Mammals and Other Megafauna)] are updated using the agreed flee speeds for Low frequency and Very High Frequency cetaceans. MD-LOT: Due to disagreement with the flee speeds for low frequency and very high frequency cetaceans, MD-LOT require the number of individuals impacted from cumulative PTS across each of the piling scenarios [e.g. Tables 10-31 to 10-34 in EIAR, Volume 2, Chapter 10 (Marine Mammals and Other Megafauna)] to be updated using flee speeds agreed by NatureScot.	The Applicant acknowledges the request to undertake the assessment of the number of individuals impacted from cumulative PTS across each of the piling scenario should be clarified using the more conservative flee speeds (2.1 m/s for minke whales and 1.4 m/s for harbour porpoise). The Applicant has provided signposting to where these values were provided in the EIAR in **Section 5.4**. The number of individuals impacted (and percentage of the UK portion of the reference population this represents) provided by NatureScot in their Post-Workshop Memo (28/04/2026) were reviewed and confirmed in **Section 5.4**, with minor differences highlighted where relevant. The revised assessment confirms that the overall significance conclusions remain unchanged using the more conservative flee speeds. The impact the revised flee speeds would have on the proposed Acoustic Deterrent Device (ADD) durations has been clarified and will be agreed post consent with MD-LOT and NatureScot (as requested).
NatureScot	28.04.2026 NatureScot Post-Workshop Memo	NatureScot appreciate faster flee speeds being modelled and presented within the application for context, but request that the assessment is conducted on the recommended speeds provided by NatureScot . In the Post-Workshop Memo, NatureScot updated the percentage of the UK Management Unit (MU) with the potential to be impacted for cumulative PTS using the more precautionary flee speeds for minke whale and harbour porpoise. They requested for the Applicant to confirm these numbers in order to be satisfied that cumulative PTS impacts are not significant in EIA terms.	

Consultee	Date / consultation type	Summary	Where / how this has been considered
3. iPCoD modelling			
a. Inclusion of cumulative PTS within the iPCoD modelling including assumptions / modifications			
NatureScot and MD-LOT	01.10.2025 Representation on the EIAR / 18.12.2025 RAEI	NatureScot: Note that disturbance and cumulative PTS effects have been included within the iPCoD modelling. NatureScot considered that inclusion of cumulative PTS is relatively novel; has been useful to consider and would like to discuss further to better understand if / how this approach could improve the assessment of underwater noise impacts across the industry. Further information and discussion with the Applicant to better understand: • The compounding effects of the modifications / assumptions used to include cumulative PTS within the iPCoD modelling. • The impact each individual change has on the outputs for each species, particularly for minke whale and harbour porpoise. MD-LOT: Request further information to better understand the compounding effects of the modifications / assumptions used to include cumulative PTS within the iPCoD modelling and the impact each individual change has on the outputs for each species, particularly for minke whale and harbour porpoise.	Following consultation with NatureScot and MD-LOT, it was agreed that revised Project Alone iPCoD runs (see item **1d**) would utilise the same cumulative PTS inputs applied within the EIAR to facilitate comparison with other assessment scenarios. In line with NatureScot's request, cumulative PTS has not been included within the cumulative iPCoD modelling (see item **4b**). This agreed approach is reflected within the updated assessment in **Section 5.5.1**. As agreed with NatureScot, with MD-Lot in attendance, a workshop on the provision of further information and discussion regarding inclusion of cumulative PTS in iPCoD can occur post-submission of this AEIR if required.
	31.03.2026 Workshop	Discussion on the inclusion of cumulative PTS in iPCoD for any revised assessments required as part of the AEIR. The Applicant suggested for any revised Project Alone iPCoD runs the same cumulative PTS inputs are used as in the EIAR to allow comparison with the outputs of the other scenarios. For cumulative iPCoD cumulative PTS will not be included.	
NatureScot	28.04.2026	NatureScot: Appreciate the Applicant's inclusion of cumulative PTS numbers in the project alone iPCoD	

Consultee	Date / consultation type	Summary	Where / how this has been considered
	NatureScot Post-Workshop Memo	modelling – however at project-specific level, NatureScot are currently unable to decipher the specific impacts of each modelling step and how they affect the final results. NatureScot request that cumulative PTS is not included in IPCoD modelling in the cumulative effects assessment for the AEIR, and only the potential number of animals disturbed is included.	
	18.05.2026 Email from NatureScot	NatureScot: A workshop on the provision of further information and discussion regarding inclusion of cumulative PTS in iPCoD can occur post-submission of this AEIR.	
b. Grey seals (clarifications on the concurrent piling scenario)			
NatureScot and MD-LOT	01.10.2025 Representation on the EIAR / 18.12.2025 RAEI	MD-LOT: In relation to grey seals, further information is requested to outline each modelling step to clearly understand where and how each assumption / modification influences the change in population trajectory. Should concurrent piling happen more frequently than every 1 in 5 days then this scenario may require further consideration as it may not account for the worst-case scenario.	The concurrent WTG anchor pile driving scenario has been considered in further detail (see **Section 5.5.6)**. The Applicant will run iPCoD for the concurrent pile driving scenario (Project alone) using 2 additional piling schedules to that of the EIAR. To allow comparison with the outputs of the Project alone scenarios in the EIA, The Applicant will include the same cumulative PTS inputs that were used in the EIA. Including inputs for PTS *and* disturbance in iPCoD is more conservative than only including inputs for disturbance. In relation to grey seals, each modelling step is clarified in the responses to item **3c** in **Section 5.5.**
	31.03.2026 Workshop	Discussion regarding whether the piling schedule for the concurrent pile driving scenario represents the true worst case.	
	28.04.2026 NatureScot Post-Workshop Memo	NatureScot: confirm that the decision in relation to what will be included in the worst-case scenario is a Project decision. NatureScot do not consider it realistic or logistically feasible to be concurrently piling one day in six for September and October only (e.g. only 8 days of concurrent piling in one year).	

Consultee	Date / consultation type	Summary	Where / how this has been considered
c. Clarifications on disturbance effects (iPCoD modelling steps, assumptions and modifications)			
NatureScot	01.10.2025 Representation on the EIAR	NatureScot: Consider that a meeting would be helpful to run through each modelling step to clearly understand where and how each assumption / modification influences the change in population trajectory. In doing so this should cover items i to vi listed in the rows below:	The modelling approach and assumptions were discussed with NatureScot and MD-LOT during the workshop held on 31 March 2026. Additional clarification has been provided on the assumptions, inputs and interpretation of results used within the concurrent piling scenario assessment. Further detail is provided in **Sections 5.5.1** to **5.5.6**.
		i. Presentations of result both numerically as well as visually - currently this is just visually	Signposting to where results are presented both numerically as well as visually in the EIAR is provided **Section 5.5.2.** Mean and medium iPCoD results for each scenario are also provided in **Appendix 5.3** – iPCoD RESULTS FOR THE PROJECT ALONE SCENARIOS .
		ii. Clarification on the maximum number of piled days entered into iPCoD	Clarification on the maximum number of piled days used for each scenario is provided in **Section 5.5.3.**
		iii. Clarification on the modelling start year. The iPCoD modelled outputs show results starting from 2036, labelled as piling year 1, however the Project Description states the construction period will begin in 2030 and over a period of up to three years and Table 2-2 of Appendix 10.2 Marine Mammals and Other Megafauna Technical Report) states that the input range was between 2031-2034.	Clarification on the modelling start year for iPCoD modelling (which was 2031) is provided in **Section 5.5.4.**
		iv. Minke whale is the only receptor identified as being disturbed on the day of exposure plus one additional day of "residual disturbance". Please identify how the input was chosen for each of the four receptors for this parameter	Additional clarification has been provided and the assessment updated where necessary. Further detail is provided in **Section 5.5.5.**

Consultee	Date / consultation type	Summary	Where / how this has been considered
		v. For the concurrent piling scenario input values, this was entered into iPCoD as a "combination of one pile per day and concurrent piling at three locations, based on eight piles a day at each". It appears that concurrent piling has only been run for September and October and only every 1 in 5 days is expected to be concurrent piling. This scenario seems very specific and hasn't been described anywhere else (Table 2-2, Appendix 10.2 - Marine Mammals and Other Megafauna Technical Report). Also, should concurrent piling happen more frequently than every 1 in 5 days then this scenario may need to be revisited as it may not account for the worst-case scenario.	See consultation response **3b** for further detail on this topic. Addressed in **Section 5.5.6.**
		vi. How the reduction in reference population changes the outputs of iPCoD modelling for grey seals.	Additional clarification has been provided and the assessment updated where necessary. Further detail is provided in **Section 5.5.7.**
	28.04.2026 NatureScot Post-Workshop Memo	In relation to item **3c iii.** NatureScot acknowledge that the discrepancy in the modelling start year was a typographical error within the code and that all other input parameters remain valid. NatureScot request that the code should be thoroughly reviewed by the Applicant ahead of the cumulative assessment for the AEIR to ensure the error is not carried through. In relation to item **3c vi.** NatureScot provided the following summarised response: NatureScot question the rationale behind using all six Scottish management units as the reference population in the impact assessment for grey and harbour seals. NatureScot do not consider that this scale is appropriate and underestimates the impact on the grey (and harbour) seal population. NatureScot recalculated the percentage	For item **3c iii**, the Applicant confirmed that the discrepancy was a typographical error and that no further clarification was required on this point. Further detail is provided in **Section 5.5.4**. For item **3c vi**, The Applicant welcomes NatureScot's conclusions that the impact is not significant. The assessment approach and reference population used in the cumulative assessment are discussed further in **Section 5.5.7**. NatureScot's comments were reviewed and the assessment updated where necessary. The Applicant's rationale for the selected reference population and the implications for

Consultee	Date / consultation type	Summary	Where / how this has been considered
		of population impacted using the reference population they consider appropriate, which included North Coast and Orkney, Moray Firth and East Scotland MUs. Based on these recalculations, NatureScot are in agreement that the impact is not significant in EIA terms. Whilst NatureScot disagree with the approach taken, considering the percentage of the population impacted and the refinement of the design envelope post-consent NatureScot are content that this issue can be revisited in the Piling Strategy. NatureScot also advise that the reference population used in the cumulative assessment should align with the management units where the Project and the greatest spatial impacts are located when assessing the disturbance from pile driving activities.	the assessment conclusions are set out in **Section 5.5.7**.
4. Cumulative effects assessment			
a. Cumulative study area			
NatureScot and MD-LOT	01.10.2025 Representation on the EIAR / 18.12.2025 RAEI	NatureScot agree with most of the management unit ranges used in the assessment but raised concerns regarding several species-specific management units and project screening assumptions. Specific concerns related to the screening distance applied to coastal projects, consideration of the coastal bottlenose dolphin population, screening of smaller-scale projects and ports/harbours, and the temporal overlap criteria used to identify cumulative projects. NatureScot also advised that projects constructing up to one year either side of the Proposed Offshore Development should be considered within the screening process. MD-LOT: requested a re-evaluation of the cumulative effects assessment, including iPCoD modelling, taking	The cumulative project list was reviewed and updated following consultation with NatureScot and is presented in **Section 5.6.1,** this includes detail on why smaller scale projects have been screened out and updated criteria for the screening in of projects (e.g. Tier 3 projects, projects anticipated to be constructing between 2029 and 2036, and any ECC developments or subsea pipeline/cable developments which overlap with the coastal range of the east Scotland Bottlenose dolphin population in Scottish waters). The revised project list and associated construction dates were subsequently agreed with NatureScot during consultation. The construction

Consultee	Date / consultation type	Summary	Where / how this has been considered
		account of the issues raised by NatureScot in their representation.	programme and cumulative project screening have been amended where necessary to reflect the updated information. Re-evaluation of the potential cumulative effects on bottlenose dolphins from non-piling construction impacts using the revised cumulative project list is provided in **Section 5.6.2.**
	31.03.2026 Workshop	NatureScot and MD-LOT to discuss and revert re. the cumulative projects list. Cumulative Effects Assessment (CEA) for coastal/inshore bottlenose dolphin population – assessment acknowledges overlap with coastal strip but does not quantify magnitude clearly. BOW to provide clearer scale of activity, duration and combined pressure.	
	28.04.2026 NatureScot Post-Workshop Memo	Dates of construction for Buchan are anticipated to be between 2031- 2034, and as such NatureScot recommend screening in projects with a construction schedule of between 2030 – 2035 to allow for temporal overlap of years in which piling occurs. NatureScot did not agree with the Applicants approach of only using the harbour porpoise MU for screening in projects, however, didn't have an issue with the 500 km buffer for screening in projects for offshore wind. NatureScot advised it would have been preferable if the Applicant used species specific MUs to screen in projects however instance, NatureScot are content that the approach taken is sufficiently precautionary. NatureScot advised that should sufficient information not be available in the public domain for higher Tier projects then they recommend that EDRs and Small Cetaceans in European Atlantic Waters and the North Sea (SCANS) density estimates are used to estimate the potential number of individuals disturbed.	

Consultee	Date / consultation type	Summary	Where / how this has been considered
		Where available, information available on the Project specific parameters for projects screened in should be used.	
b. Cumulative disturbance from pile driving activities			
NatureScot and MD-LOT	01.10.2025 Representation on the EIAR / 18.12.2025 RAEI	NatureScot: The CEA for disturbance from pile driving activities relies heavily on stating that the project-alone assessment concluded no significant impacts therefore cumulative impacts from multiple projects do not pose any risk. NatureScot do not support this conclusion. Table 10-102 [in EIAR, Volume 2, Chapter 10 (Marine Mammals and Other Megafauna)] outlines the number of individuals for species populations that have the potential to be susceptible to the onset of 'cumulative PTS and disturbance' from increased underwater noise from pile driving, however for the 'Buchan OWF' column, the values used are for the single location WTG piling scenario and not the overall worst-case scenario of concurrent WTG piling in the Array Area. NatureScot note that no justification or reasoning for this has been provided. NatureScot also expect the CEA for disturbance from pile driving activities to provide the total number of individuals impacted alongside the percentage of the MU impacted. NatureScot advise that as no cumulative iPCoD has been carried out in the CEA for pile driving activities, they cannot agree that disturbance is unlikely to affect the viability of the populations of the species assessed. They also cannot agree with the evidence presented that likely behavioural impacts arising from a cumulative scenario of six projects constructing simultaneously will be short-term or sporadic.	Detail on the revised cumulative project list is provided in **Section 5.6.1** and **Table 5-7,** with updated CEA methodology fully presented in **Section 5.6.2.1** A quantitative assessment of disturbance from pile driving noise (for both the temporal and spatial worst case piling scenario) has been undertaken in **Section 5.6.2**. In addition, iPCoD modelling has been undertaken for minke whale, inshore and offshore bottlenose dolphin, harbour porpoise and grey seal (in line with the project alone assessment) in **Section 5.6.2.2** and full detail presented in **Appendix 5.2**. The Applicant confirms that the total number of individuals which may be disturbed from pile driving, and the percentage of the whole and UK portion of the relevant MU, has been calculated for each species for each project screened into the cumulative piling assessment (**Section 5.6.2.1**) For Tier 3 projects, where project specific information is not available, EDRs and relevant species-specific densities were used to

Consultee	Date / consultation type	Summary	Where / how this has been considered
		NatureScot request the CEA is updated and assessment through iPCoD modelling completed considering their comments, including assessment through iPCoD modelling. NatureScot acknowledge that further assessment will be required post consent to satisfy European Protected Species licensing requirements and that this will be considered alongside the development and adherence to a Piling Strategy (EM12). NatureScot advise a condition is attached to any consent requiring: Cumulative effects from disturbance are re-evaluated through the development of the Piling Strategy once there is greater certainty around project specific parameters as well as temporal overlap with other projects. Parameters for updated modelling should be agreed in advance.	estimate the potential number of individuals disturbed
	31.03.2026 Workshop	Outcome of discussion regarding timing of iPCoD modelling (cumulative effects of disturbance as a result of increased underwater noise from pile driving) is that it needs to be undertaken now (rather than wait until the Piling Strategy stage).	
	16.04.2026 Email correspondence	Applicant proposed: • use of deterrence function (relationship between distance from the development and proportion of animals displaced) to derive expected numbers of cetaceans displaced for all developments including Buchan to feed into iPCoD analysis... • continued use of the Whyte-derived numbers for seals... • only displacement (and not PTS) will be run in iPCoD.	

Consultee	Date / consultation type	Summary	Where / how this has been considered
	28.04.2026 NatureScot Post-Workshop Memo	The maximum number of animals potentially disturbed, and the associated percentage of the UK portion of the species' MU should be presented and considered when reaching a conclusion. In the absence of the CEF NatureScot recommend using iPCoD for assessing the long-term cumulative effects for marine mammals, as well as looking at the numbers and percentage of the population affected. NatureScot advise that the cumulative assessment accounts for the worst-case scenario. NatureScot recognise the logistical constraints regarding vessel availability, the inherent variability in construction timelines, and the precautionary assumptions applied to disturbance modelling. NatureScot appreciate the Applicant's inclusion of cumulative PTS numbers in the project alone iPCoD modelling – noting that current mitigation measures are insufficient to reduce impacts to negligible levels – however, given the number of assumptions applied at the project-specific level, they are currently unable to decipher the specific impacts of each modelling step and how they affect the final results. Therefore, NatureScot request that cumulative PTS is not included in IPCoD modelling in the cumulative effects assessment for the AEI submission, and only the potential number of animals disturbed is included. NatureScot do not yet accept use of the deterrence function as a standard approach. They may be open to the Applicant presenting the deterrence function for comparative purposes only and may require further discussion and agreement. NatureScot highlight that this	

Consultee	Date / consultation type	Summary	Where / how this has been considered
		should not replace the agreed-upon dose-response curve approach. NatureScot agree that PTS should not be included for the CEA in iPCoD and that only disturbance is to be included. Where available, project specific numbers of animals disturbed and piling parameters should be used. Where this level of information is not available SCANS density estimates and EDRs should be used to inform the potential number of animals disturbed which will be inputted into iPCoD.	
c. Cumulative disturbance from non-piling activities			
NatureScot and MD-LOT	01.10.2025 Representation on the EIAR / 18.12.2025 RAEI	NatureScot: Behavioural impacts from increased underwater noise from other construction activities, vessels and use of survey and positioning equipment has not been adequately assessed. The magnitude of the projects being considered cumulatively under this impact has not been set out and therefore we have difficulty supporting the conclusion of Not Significant in EIA terms. However, NatureScot are mindful that further assessment will be required post consent to satisfy European Protected Species licensing requirements, and this should be based on updated project parameters. MD-LOT: In relation to cumulative disturbance from other construction activities including survey equipment/vessels, NatureScot has outlined that it has difficulty in supporting the conclusion of 'Not Significant' for Construction Impacts 2, 4 and 5 in the CEA [in EIAR, Volume 2, Chapter 10 (Marine Mammals and Other Megafauna)]. NatureScot further clarified to MD-LOT in separate correspondence that this is due to the lack of narrative to support the Applicant's CEA conclusion and	An updated quantitative assessment of disturbance from non-pile driving activities has been undertaken in **Section 5.6.3.** This is demonstrated by the cumulative assessment being revisited and updated, with additional justification provided to reach our conclusions. This includes breaking down non-piling impacts by project, impact pathway, magnitude, duration and combined pressure. This update includes further consideration of the coastal range of the east Scotland bottlenose dolphin population and the potential for increased disturbance along the Coastal East Scotland MU in Scottish waters, in terms of export cable routes from ScotWind and Innovation and Targeted Oil & Gas (INTOG) projects.

Consultee	Date / consultation type	Summary	Where / how this has been considered
		the conclusion relying so heavily on the related project-alone conclusions. For example, the characterisation of the impacts (as outlined in Section 10.9.2; including magnitude and duration of impacts), needs to be assessed at the scale appropriate for a cumulative assessment. There has been no justification provided for how the project-level characterisation of an impact can be used to base the significance of effect for all projects outlined in Table 10-100 [in EIAR, Volume 2, Chapter 10 (Marine Mammals and Other Megafauna)]. As such, MD-LOT require the justification set out in the CEA to be revisited and further explanation provided.	
	31.03.2026 Workshop	Partial agreement from NatureScot on approach taken – approach accepted in principle but insufficient detail provided. There is a specific requirement to consider the east coast of Scotland bottlenose dolphin population. The Applicant committed to break down non-piling impacts by project, impact pathway, magnitude, duration and combined pressure; and to strengthen the cumulative narrative.	
	28.04.2026 NatureScot Post-Workshop Memo	NatureScot: At present, NatureScot do not have sufficient information to agree with the conclusions reached in the Application. In the AEI submission, we require it to be made clear which projects are screened in for the assessment of this impact. In the EIA Report, smaller scale projects have screened out on the basis of no potential for significant effects to arise, cumulatively. The EIA Report does not provide information on which small scale projects and impacts are being discussed, and as such NatureScot are unable to agree this at present.	

Consultee	Date / consultation type	Summary	Where / how this has been considered
		NatureScot require further consideration of the coastal range of the east Scotland bottlenose dolphin population and the potential for increased disturbance along the Coastal East Scotland MU in Scottish waters, in terms of export cable routes from ScotWind and INTOG projects. NatureScot are content that this is assessed at a Scottish scale although recent evidence has confirmed range expansion in northeast England. The relevant actions/next steps provided in the meeting minutes from the workshop held on 31 of March 2026 are appropriate. Due to the uncertainties of timescales and parameters for many projects at this stage NatureScot are content with a proportional assessment with sufficient narrative and justification provided for the conclusions reached.	
5. Southern Trench MPA Assessment			
a. Cumulative PTS			
NatureScot	01.10.2025 Representation on the EIAR	NatureScot conclude that underwater noise arising from IRC pile driving activities is capable of affecting, other than insignificantly, the minke whale feature of the Southern Trench Nature Conservation Marine Protected Area (ncMPA). However, NatureScot consider the risk could be avoided if installation of the IRC is conducted outside months with higher-than-average minke whale densities (May – October), unless further discussion and agreement on methods / timing is reached in consultation with NatureScot.	In **Section 5.7.1** the applicant presents justification and detail for the location of IRC noise modelling on the basis of it being considered representative and worst case location for the indicative IRC area. Also presented is an overlap-based assessment with reference to higher density areas of minke whale within the MPA.
	31.03.2026 Workshop	Expectation to assess worst case IRC location (c. 5 km from MPA).	
	28.04.2026 NatureScot Post-Workshop Memo	NatureScot maintain their original position, which supports a specified condition that the IRC is constructed outside months with higher-than-average minke whale	

Consultee	Date / consultation type	Summary	Where / how this has been considered
		densities (May-October) due to the potential for cumulative PTS from pile driving activities being capable of affecting, other than insignificantly, the minke whale feature of the Southern Trench ncMPA. This consent condition can be revisited post-consent once a detailed design phase has confirmed if an IRC is required, and its exact positioning is known. This condition enables us to conclude that cumulative PTS impacts will not affect, other than insignificantly, the minke whale feature of the Southern Trench ncMPA.	
b. Disturbance from pile driving IRC: Project alone assessment			
NatureScot	28.04.2026 NatureScot Post-Workshop Memo	NatureScot are content with the information, and do not require any further information to be satisfied that disturbance from the installation of the IRC will not affect, other than insignificantly, the minke whale feature of the Southern Trench ncMPA.	No further action required. Disturbance from piling the WTGs is assessed in **Section 5.7.2.**
c. Disturbance from pile driving WTG: Project alone assessment			
NatureScot and MD-LOT	01.10.2025 Representation on the EIAR / 18.12.2025 RAEI	NatureScot: There is currently insufficient information to determine whether the proposed Development is capable of affecting, other than insignificantly, the minke whale protected feature of the Southern Trench ncMPA, therefore NatureScot request the following information: • The percentage area of the Southern Trench ncMPA that will be disturbed during pile driving activities, when and for what duration. • Visual representation of disturbance ranges to be provided. MD-LOT: As there is insufficient information to determine whether the proposed Development is capable of affecting, other than insignificantly, the minke whale	A revised assessment of disturbance impacts from WTG pile driving on the Southern Trench ncMPA is provided in **Section 5.7.2.1.** This includes provision of the percentage area of the Southern Trench ncMPA that will be disturbed during pile driving activities, when and for what duration and a visual representation of disturbance ranges.

Consultee	Date / consultation type	Summary	Where / how this has been considered
		protected feature of the Southern Trench ncMPA, we request that the assessment is revisited to provide: The percentage area of the Southern Trench ncMPA that will be disturbed during pile driving activities, when and for what duration, including a visual representation of disturbance ranges to be provided.	
	31.03.2026 Workshop	Displacement visualiser (received noise levels plus ancillary information on probability of displacement and % MPA overlapped) presented at workshop.	
	28.04.2026 NatureScot Post-Workshop Memo	The Project should provide the MPA assessment for disturbance from piling activities using dose-response curves and not EDRs. NatureScot refer to our original request whereby we requested "The percentage area of the Southern Trench ncMPA that will be disturbed during pile driving activities" using the dose-response curve from piling activities taking place within the Array Area.	
d. Disturbance from pile driving: Cumulative assessment			
NatureScot and MD-LOT	01.10.2025 Representation on the EIAR / 18.12.2025 RAEI	NatureScot: NatureScot are mindful that the assessment was based on incomplete and indicative information and that the modelling approach used encompasses many sources of precaution, therefore they advise that: • The assessment is revisited to provide the percentage area of the Southern Trench ncMPA that will be disturbed cumulatively (through a spatial and / or temporal overlap) from pile driving activities from all relevant offshore wind developments. It would be helpful if visual representation of disturbance ranges are also provided. MD-LOT: As there is insufficient information to determine whether the proposed Development is capable of affecting, other than insignificantly, the minke whale	Additional information is provided on the cumulative disturbance impacts of pile driving on the Southern Trench MPA with detail on the percentage area of the Southern Trench MPA that will be disturbed cumulatively (through a spatial and / or temporal overlap) from pile driving activities from all relevant offshore wind developments. This is presented along with visual representation of disturbance ranges in **Section 5.7.2.2**.

Consultee	Date / consultation type	Summary	Where / how this has been considered
		protected feature of the Southern Trench ncMPA, we request that the assessment is revisited to provide: The percentage area of the Southern Trench ncMPA that will be disturbed cumulatively (through a spatial and / or temporal overlap) from pile driving activities from all relevant offshore wind developments	
	31.03.2026 Workshop	BOW: The Applicant agreed to provide further information on the cumulative piling assessment for disturbance impacts on the Southern Trench ncMPA. This will include WTG piling impacts only, the duration of piling from each screened in project, real project data where available instead of EDRs and the total percentage of the MPA affected.	
e. Key prey (Sandeel and Herring)			
NatureScot and MD-LOT	01.10.2025 Representation on the EIAR / 18.12.2025 RAEI	NatureScot: Modelling outputs presented in the Underwater Noise Assessment (Appendix 8.1 [EIAR, Volume 3]) for the IRC as well as the OSP and WTGs piling locations (Scenario 1) suggest that there is potential for some disturbance effects to key prey species for minke whale e.g. sandeel and herring. The narrative provided in Table 5-2 [in EIAR, Volume 3, Appendix 7.3 (Nature Conservation Marine Protected Area Assessment)] does not place the disturbance ranges within the context of impacts to spawning or nursery habitat within the ncMPA for these species, rather it relies on a Not Significant conclusion from the Chapter 8 (Fish and Shellfish) [in EIAR, Volume 2], which we do not support. As such, there is insufficient information to determine whether the proposed Development is capable of affecting, other than insignificantly, the minke whale protected feature of the Southern Trench ncMPA, therefore we request the following information:	A revised assessment on the potential impacts to sandeel and herring as a key prey species for minke whale as a result of piling activities is provided in **Section 5.7.3.**

Consultee	Date / consultation type	Summary	Where / how this has been considered
		• That potential impacts to sandeel and herring as key prey species for minke whale as result of piling activities are clarified. MD-LOT: As there is insufficient information to determine whether the proposed Development is capable of affecting, other than insignificantly, the minke whale protected feature of the Southern Trench ncMPA, we request that the assessment is revisited to provide: The potential impacts to sandeel and herring as key prey species for minke whale as result of piling activities	
	31.03.2026 Workshop	Information was presented on the potential impacts to sandeel and herring as a key prey species for minke whale from the worst case concurrent WTG anchor piling scenario.	

5.3 MDS: PILING PARAMETERS AND DURATIONS USED

5.3.1 Expected Durations of Each Impact

5-13 Expected durations of each impact are clarified in item **1a** in **Table 5-1.** Further information on piling schedules is provided in **Section 5.3.4**.

5.3.2 Increased Underwater Noise from Pile Driving Activity

5-14 This response relates to item **1b** in **Table 5-1**.

5-15 The Applicant would like to confirm that concurrent piling between the OSP, IRC and WTGs will not be undertaken. This option was therefore not included in the maximum design scenario of the EIAR.

5.3.3 Instantaneous PTS

5-16 This response relates to item **1c** in **Table 5-1**.

5-17 The 1.4 km instantaneous PTS (and Temporary Threshold Shift (TTS)) value for grey seals at the IRC location stated in Table 4-24 of the Underwater Noise Modelling Assessment (EIAR Volume 3, Appendix 8.1) is a typo. The correct value is 50 m as stated in Table 10-28 of Volume 2, Chapter 10 (Marine Mammals and Other Megafauna) of the EIAR. The correct value (50 m) was therefore used in the assessment presented in the EIAR and for all subsequent modelling.

5.3.4 Disturbance (Behavioural Responses)

5-18 This response relates to item **1a** and **1d** in **Table 5-1**.

5-19 Clarification on the following items from the EIAR is provided in **Table 5-2** which presents the original EIAR WTG piling scenarios:

- maximum piling durations used in the modelling for individual piles (WTG anchor);
- total duration; and
- temporal spread across the construction period.

5-20 This information was originally provided in the following locations in the EIAR:

- Table 3-2 to Table 3-5 in Section 3.2.2 (Impact piling parameters) of the Underwater Noise Modelling Assessment (EIAR Volume 3, Appendix 8.1); and
- Table 2-2 in Section 2.4.2.2 (Piling scenarios analysed) of the Marine Mammals Technical Appendix (EIAR Volume 3, Appendix 10.2).

5-21 The Applicant confirms that, assuming no weather delays, the three OSP platforms and one IRC platform will indicatively take three days of piling each to construct (12 days in total; each will have a four-legged jacket foundation with 12 piles per platform). As outlined in Section 10.12.2.1 of EIAR Volume 2, Chapter 10 (Marine Mammals and Other Megafauna) it is assumed that for the OSP and IRC platforms four piles can be piled a day.

5-22 As raised in consultation with NatureScot (NatureScot Post-Workshop Memo 28.04.2026), the concurrent WTG piling scenario in the EIAR has been revisited and two new piling schedules have been developed in conjunction with the Applicant's engineers to ensure that the worst-case scenario has been accounted for. The new concurrent scenarios are as follows:

- "Fast bounding scenario": In this scenario there will be constant concurrent piling i.e. no breaks between piling days. Three piling vessels will be available, each with the capacity to pile five piles per day. Two vessels will be pile driving on any given day while the third vessel restocks. This scenario represents the spatial worst case.
- "Realistic concurrent scenario": This is a two-year scenario in which 50% of piles will be piled in year 1 and 50% in year 2. At the start of each season a single vessel will pile one pile per day. This will continue until it becomes clear that installation of 50% of the piles will not be achievable in that year. At this point two additional vessels will be brought in to achieve this; all three vessels will have the capacity to pile five piles per day though in line with the fast bounding scenario two vessels will be pile driving on any given day while the third vessel restocks. Practically, this is a combination of the piling scenario for "WTG anchor piling Scenario 2" between March 1st and October 19th (taken from **Table 5-2)** and the piling scenario for "Fast bounding Scenario" between October 20th and October 31st for both years. This is termed the "realistic concurrent scenario".

5-23 A summary of the new concurrent WTG anchor pile driving scenarios and schedules is presented in **Table 5-3**, and all piling schedule inputs used with iPCoD for the assessment and additional information are provided in **Appendix 5.2** – iPCoD PILING SCENARIOS.

5-24 For both the original EIAR WTG piling scenarios (**Table 5-2**) and the new WTG piling scenarios (**Table 5-3**), all piling schedules assume that piling activity will take place between March and October inclusive.

5-25 Underwater noise modelling (Underwater Noise Modelling Assessment (EIAR Volume 3, Appendix 8.1)) was undertaken for the different piling scenarios based on either one or eight piles being piled per day by a single vessel. Piling a maximum of eight piles a day is a precautionary assumption and was chosen to represent the spatial worst-case scenario. However, there is a trade-off between the number of piles which can be piled in a day and the maximum duration of piling required (i.e. piling less piles in a day means more days of piling). Since the maximum vessel capacity is likely to be five piles per vessel, the number of days of piling required to complete construction used to devise the piling schedules have been based on a maximum of five piles per day. Consequently, for the piling scenarios which require multiple piles being piled within a day, a conservative approach is taken in which noise impacts on animals are based on the eight piles piled within a day underwater noise modelling results, whilst the duration of piling (days) is based on five piles being piled in a day.

5-26 Similarly, impacts of concurrent piling have been predicted based on three locations being piled simultaneously. Whilst the maximum number of vessels available to the Project is expected to be three, it is considered realistic that each vessel will not be able to work every day due to the need to restock, so the duration (days) of piling for concurrent scenarios is based on a maximum of two vessels piling simultaneously. I.e. for those scenarios including concurrent piling within a

day, a conservative approach is taken in which noise impacts on animals are based on three locations being piled simultaneously, whilst duration (days) of piling is based on a maximum of two locations being piled simultaneously at any given time.

5-27 What impact the updated concurrent piling scenarios have on the conclusions made in the EIAR are discussed in **Section 5.5.6** (for the project alone assessment) and **Section 5.6.3** (for the updated cumulative effects assessment).

Table 5-2: Detail of the EIAR pile driving scenarios and schedules (summarised from Volume 3, Appendix 8.1 and Volume 3, Appendix 10.2 of the EIAR)

EIA Scenario	Description	Total no. of piles	Maximum piling duration used in the modelling for individual piles	Total piling duration (hours)	Temporal spread across the construction period (indicative piling dates)	Total duration of the construction period (years)	Days of active piling
WTG anchor piling Scenario 1	Single vessel, 5 piles per day (using animal impacts based on 8 piles per day)	630	1 hour, 20 minutes per pile (5 piles per day)	840	01/03/2031 – 31/10/2031 01/03/2032 – 27/10/2032	2	406[1]
WTG anchor piling Scenario 2 (temporal worst case)	Single vessel (1 pile per day)	630	4 hours, 10 minutes per pile (1 pile per day)	2,635	01/03/2031 – 31/10/2031 01/03/2032 – 31/10/2032 01/03/2033 – 31/10/2033 01/03/2034 – 17/03/2034	4	630
Concurrent WTG anchor piling	Combination of single vessel, 1 pile per day, and 3 vessels, 5 piles per day per vessel (using animal impacts based on 1 vessel, 1 pile per day and 3 vessels, 8 piles per day respectively)	630	As Scenario 1 (5 piles per day) and Scenario 2 (1 pile a day)	1,732	01/03/2031 – 31/10/2031 01/03/2032 – 27/10/2032	2	406

[1] This was intended to be 126 days of piling, but an incorrect piling schedule was used in error. This resulted in a more precautionary scenario in which the animal impacts were based on eight piles being piled per day, but the duration reflected an average of 1.5 piles per day, rather than 5 as had been intended (see **Paragraph 5-25**). Since this scenario still resulted in lower predicted population level impacts than the single pile per day scenario (WTG anchor piling Scenario 2), the correct scenario was not re-run, as the population level impacts from the corrected scenario would be lower than that of the existing scenario and is therefore not required to understand the worst case.

Table 5-3: Detail of the new concurrent WTG anchor pile driving scenarios and schedules

New concurrent WTG anchor piling scenarios	Description	Total no. of piles	Maximum piling duration used in the modelling for individual piles	Total piling duration (hours)	Temporal spread across the construction period (indicative piling dates)	Total duration of the construction period (years)	Days of active piling	Inbuilt conservatism
New fast bounding concurrent scenario (spatial worst case)	Constant concurrent piling (3 piling vessels available each with the capacity to pile 5 piles per day, assumed 2 vessels active each day while the other restocks)	630	As EIAR Scenario 1 (5 piles a day)	420	01/03/2031 – 02/05/2031	1	63	The concurrent underwater noise modelling outputs are for 3 vessels piling 8 piles a day each, whilst the duration of the piling is calculated based on 2 vessels piling 5 piles a day. It is assumed that there are no weather delays as a worst case scenario.
Updated realistic concurrent scenario	Combination of single vessel (1 pile per day) and 3 vessels (each with the capacity to pile 5 piles per day, assumed 2 vessels active each day while the other restocks)	630	As Scenario 1 (5 piles per day) and Scenario 2 (1 pile a day)	1,785	01/03/2031 – 31/10/2031 01/03/2032 - 31/10/2032	2	414	The underwater noise modelling inputs are for 8 piles per day rather than 5, and for 3 vessels rather than 2.

5.4 FLEE SPEEDS

5-28 This response relates to item **2** in **Table 5-1**.

5-29 In the RAEI, MD-LOT and NatureScot requested that the number of individuals impacted from cumulative PTS across each of the piling scenarios are updated using the agreed flee speeds for Low frequency and Very High Frequency cetaceans. During further consultation (NatureScot Post-Workshop Memo, 28.04.2026), clarification on which flee speeds to use was provided by NatureScot.

5-30 In the EIAR the assessment was undertaken using 'faster flee speeds' for low frequency cetaceans (4.19 m/s) and very high frequency cetaceans (1.9 m/s) in Volume 2, Chapter 10: Marine Mammals and Other Megafauna). Underwater noise modelling outputs using the standard flee speeds were also provided (Section 4 of the Underwater Noise Modelling Assessment (EIAR Volume 3, Appendix 8.1)), and the number of individuals impacted from cumulative PTS across each of the piling scenarios using the average swim speeds suggested for collision risk models for tidal turbines (SNH, 2016) were presented in the Marine Mammals Technical Appendix (Volume 3, Appendix 10.2) at the following locations:

- 2.1 m/s for minke whale: Table 3.2 (Predicted numbers of minke whale at risk of cumulative PTS from piling activities) in Section 3.1.1; and
- 1.4 m/s for harbour porpoise: Table 3-25 (Predicted numbers of harbour porpoise at risk of cumulative PTS from piling activities) in Section 3.1.7.

5-31 These data have been reproduced below (**Table 5-4** for minke whale, **Table 5-5** for harbour porpoise) including the addition of ancillary information (% UK portion of Management Unit (MU), % whole MU with the potential to be impacted by cumulative PTS). It should be noted that for all scenarios the percentage of the whole MU impacted for minke whales for the 4.19 m/s flee speed have been updated (there was a typo in the formula used to generate these data in the EIAR). Considering the assessment focused on the UK portion of the MU impacted (whose results were correct) and that all updates were very small (no greater than a 0.3% difference), this does not represent a material change or affect any assessment conclusions.

5-32 After further consultation (NatureScot Post-Workshop Memo, 28.04.2026), NatureScot calculated the percentage of the UK MU with the potential to be impacted for cumulative PTS using the more precautionary flee speeds for minke whale and harbour porpoise. They requested for the Applicant to confirm these numbers and once confirmed they can be satisfied that for cumulative PTS this is not significant in EIA Terms.

5-33 When comparing the data in **Table 5-4** and **Table** 5-5 to the values provided by NatureScot (NatureScot Post-Workshop Memo, 28.04.2026) some minor differences have been identified which are marked as bold. It is considered that these differences are due to the number of decimal places used when making the calculations and do not impact any conclusions made. Two discrepancies were identified in the calculations made by NatureScot in **Table 5-5** for the predicted number of harbour porpoise at risk of cumulative PTS from piling activities for the WTG anchor piling Scenario 2 at the W and SE piling locations for the 1.4 m/s flee speed. Although the correct figures are larger than those presented by NatureScot, the percentage of

the UK MU which may be impacted is very similar to or smaller than that presented by NatureScot. The Applicant can therefore conclude that cumulative PTS is not significant in EIA terms for these species.

5-34 As advised by NatureScot on their representation on the EIAR (01.10.2025), the influence of flee speed on proposed ADD (as committed to as mitigation in Volume 2, Chapter 10 of the EIAR) durations will be discussed post consent with MD-LOT and NatureScot as required, and will be considered during the European Protected Species (EPS) licencing process including when undertaking any EPS Risk Assessments. Agreement on specific ADD timings will be reached post consent with MD-LOT and NatureScot as required, taking account of up-to-date evidence on the use of ADDs during piling campaigns in order to cover the impact range for instantaneous PTS and mitigate the cumulative PTS range.

Table 5-4: Predicted numbers of minke whale at risk of cumulative PTS from piling activities. Values in bold differ from those calculated by NatureScot (NatureScot Post-Workshop Memo, 28.04.2026)

Scenario	Location	Flee speed (m/s)	Cumulative PTS		
			183 dB PTS threshold		
			n	% UK portion	% whole MU
WTG anchor piling Scenario 1 (single location, 8 piles per day)	NE	2.1	31	**0.305**	0.155
		4.19	11	0.103	0.053
WTG anchor piling Scenario 2 (single location, 1 pile per day)		2.1	**36**	**0.351**	0.178
		4.19	15	0.142	0.072
WTG anchor piling Scenario 1	SE	2.1	26	**0.254**	0.129
		4.19	9	0.083	0.042
WTG anchor piling Scenario 2		2.1	**30**	**0.298**	0.152
		4.19	12	0.114	0.058
WTG anchor piling Scenario 1	W	2.1	27	**0.268**	0.136
		4.19	9	0.088	0.045
WTG anchor piling Scenario 2		2.1	32	**0.314**	0.160
		4.19	12	0.122	0.062
Concurrent WTG anchor piling (3 locations, 8 piles per day)		2.1	**89**	0.875	0.445
		4.19	49	0.477	0.242
OSP piling		2.1	52	**0.507**	0.258
		4.19	21	0.209	0.106
IRC piling		2.1	62	**0.608**	0.309
		4.19	20	0.197	0.100

Table 5-5: Predicted numbers of harbour porpoise at risk of cumulative PTS from piling activities. Values in bold differ from those calculated by NatureScot (NatureScot Post-Workshop Memo, 28.04.2026)

Scenario	Location	Flee speed (m/s)	Cumulative PTS		
			155 dB PTS threshold		
			n	% UK portion	% whole MU
WTG anchor piling Scenario 1 (single location, 8 piles per day)	NE	1.4	68	0.043	0.020
		1.97	23	0.014	0.007
WTG anchor piling Scenario 2 (single location, 1 pile per day)		1.4	84	0.053	0.024
		1.97	34	0.021	0.010
WTG anchor piling Scenario 1	SE	1.4	**59**	**0.037**	0.017
		1.97	19	0.012	0.006
WTG anchor piling Scenario 2		1.4	**75**	**0.047**	0.022
		1.97	29	0.018	0.008
WTG anchor piling Scenario 1	W	1.4	63	0.040	0.018
		1.97	21	0.013	0.006
WTG anchor piling Scenario 2		1.4	**79**	**0.050**	0.023
		1.97	32	0.020	0.009
Concurrent WTG anchor piling (3 locations, 8 piles per day)		1.4	755	**0.473**	0.218
		1.97	549	0.344	0.158
OSP piling		1.4	189	0.118	0.054
		1.97	84	0.053	0.024
IRC piling		1.4	164	0.103	0.047
		1.97	73	0.046	0.021

5.5 IPCOD MODELLING

5-35 The following request, as outlined in item **3b** in **Table 5-1**, from the RAEI issued by MD-LOT (18.12.2025) is addressed in **Sections 5.5.1** to **Section 5.5.7** below split into the subsections defined by NatureScot in their representation on the EIAR (01.10.2025): *In relation to grey seals, we request further information to outline each modelling step to clearly understand where and how each assumption / modification influences the change in population trajectory. Should concurrent piling happen more frequently than every 1 in 5 days then this scenario may require further consideration as it may not account for the worst-case scenario.*

5.5.1 Inclusion of Cumulative PTS Within the iPCoD Modelling

5-36 Inclusion of cumulative PTS within iPCoD modelling is clarified in item **3a** in **Table 5-1**.

5.5.2 Presentation of Results Both Numerically as Well as Visually

5-37 This response relates to item **3c i**. in **Table 5-1**.

5-38 Results have been presented both numerically as well as visually for each species within EIAR Volume 2, Chapter 10 (Marine Mammals and Other Megafauna) as follows:

- minke whale – Table 10-43; Table 10-45; Table 10-47; Figure 10-13; Figure 10-14; Figure 10-15;
- inshore bottlenose dolphin – Table 10-49; Table 10-51; Table 10-53; Figure 10-16; Figure 10-17; Figure 10-18;
- offshore bottlenose dolphin – Table 10-55; Table 10-57; Table 10-59; Figure 10-19; Figure 10-20; Figure 10-21;
- harbour porpoise – Table 10-61; Table 10-63; Table 10-65; Figure 10-22; Figure 10-23; Figure 10-24; and
- grey seal – Table 10-67; Table 10-69; Table 10-71; Figure 10-25; Figure 10-26; Figure 10-27.

5-39 Following further consultation with NatureScot (NatureScot Post-Workshop Memo 28.04.2026) regarding presentation of the iPCoD results, the mean predicted population sizes, growth rates, and corresponding counterfactuals have been presented alongside the medians for each species for each of the original (EIA) project alone scenarios (see **Appendix 5.3** – iPCoD RESULTS FOR THE PROJECT ALONE SCENARIOS

5-40 The typographical error in the code used to generate the EIAR modelling output summaries (see **Section 5.5.4**) has been corrected here meaning that the outputs (including the corresponding population trajectories) originally presented within the EIAR Volume 2, Chapter 10 (Marine Mammals and Other Megafauna) are now labelled correctly in **Appendix 5.3** – iPCoD RESULTS FOR THE PROJECT ALONE SCENARIOS (i.e., starting in 2031).

5-41 There is no material difference between the mean and median predicted population sizes, population growth rates and corresponding counterfactuals for each species for each scenario. This supports the original EIAR conclusion of Not Significant likely effects (cumulative PTS and disturbance) of increased underwater noise from pile driving for each species (i.e. minke whale,

inshore and offshore bottlenose dolphin, harbour porpoise and grey seal). This is because they do not affect the viability of the population within the UK portion of the MU for each of these species in the long term (the growth rate of the impacted population is very similar to that of the unimpacted population).

5.5.3 Maximum Number of Piled Days Entered into iPCoD

5-42 This response relates to item **3c ii**. in **Table 5-1**.

5-43 The schedule for each piling scenario modelled in the EIAR is shown in Table 2-2 of the Marine Mammals Technical Appendix (EIAR Volume 3, Appendix 10.2) and also presented in **Appendix 5.2** – iPCoD PILING SCENARIOS.

5-44 As presented in **Table 5-2** the number of piled days used in iPCoD in the EIAR was;

- 406[2] days for Scenario 1 (single vessel);
- 630 days for Scenario 2 (single vessel; the temporal worst case);
- 406 for the concurrent WTG anchor piling scenario (combination of single vessel and three vessels).

5-45 As presented in **Table 5-3** the equivalent information for the updated concurrent WTG anchor pile driving scenarios is:

- 63 days for the new fast bounding concurrent scenario (three vessels; the spatial worst case);
- 414 days for the updated realistic concurrent scenario (combination of single vessel and three vessels).

5-46 The maximum number of piled days entered into iPCoD is therefore 630 days in the original EIAR (piling Scenario 2). This is the temporal worst case scenario has been taken forward to the updated cumulative effects assessment (**Section 5.6.2**).

5.5.4 Modelling Start Year

5-47 This response relates to item **3c iii**. in **Table 5-1**.

5-48 As stated in the Project Description (Volume 1, Chapter 4 of the EIAR), the indicative start date for the construction period is 2030. Activities such as the pre-construction surveys are expected to take place in 2030 while pile driving is not expected to commence until 2031. As such, 2031 was used as the modelling start year.

5-49 The discrepancy in the modelling start year relates to a typographical error in the code used to generate the modelling outputs. As a result, the outputs are labelled as starting in 2036,

[2] This was intended to be 126 days of piling, but an incorrect piling schedule was used in error. This resulted in a more precautionary scenario in which the animal impacts were based on eight piles being piled per day, but the duration reflected an average of 1.5 piles per day, rather than 5 as had been intended (see **Table 5-2**).

however, the modelling itself was undertaken using the correct timeframe (pile driving commencing in 2031 as shown in Table 2-2 of the Marine Mammals Technical Appendix (EIAR Volume 3, Appendix 10.2)). This error does not change any of the conclusions made in the EIAR (see section 10.12.2.1 of the EIAR, Volume 2, Chapter 10 (Marine Mammals and Other Megafauna)). The outputs reproduced in **Appendix 5.3** – iPCoD RESULTS FOR THE PROJECT ALONE SCENARIOS are labelled correctly.

5-50 The modelling start year (2031) remains the same for the new concurrent WTG anchor pile driving scenarios (see **Table 5-3**).

5.5.5 Biological Input Parameters

5-51 This response relates to item **3c iv**. in **Table 5-1**.

5-52 As stated in Table 2-3 of Section 2.4.2.3 of the Marine Mammals Technical Appendix (EIAR Volume 3, Appendix 10.2), a precautionary assumption was made for the parameter in iPCoD representing the number of days disturbed for minke whale (i.e., that individuals exposed to noise were assumed to be impacted on that day as well as one additional residual day). This precautionary assumption was made in the absence of evidence to support any other assumption.

5-53 However, for the other species modelled (bottlenose dolphin, harbour porpoise, grey seal), there is evidence that individuals return within a few hours of pile driving. References describing this evidence were cited in the input values table for each species and are as follows:

- bottlenose dolphin – Graham *et al.* (2017); Table 2-5 and Table 2-7 of the Marine Mammals Technical Appendix (Volume 3, Appendix 10.2).
- harbour porpoise – Graham *et al.* (2017); Table 2-9 of the Marine Mammals Technical Appendix (Volume 3, Appendix 10.2).
- grey seal – Russell *et al*. (2016); Aarts *et al.* (2018); Table 2-11 of the Marine Mammals Technical Appendix (Volume 3, Appendix 10.2).

5-54 As such, individuals of these species exposed to pile driving noise were assumed to be impacted on that day only.

5.5.6 Concurrent Piling Scenario Input Parameters

5-55 This response relates to item **3b** and **3c v.** in **Table 5-1**.

5-56 As outlined in **Section 5.3.4**, the concurrent piling scenario has been revisited following consultation with NatureScot (NatureScot Post-Workshop Memo 28.04.2026) and two new piling schedules developed in conjunction with the Applicant's engineers to ensure that the worst-case scenario has been accounted for.

5-57 To enable direct comparison of outputs, all iPCoD models were run using the same version used in the EIA (version 5.2). Aside from the specified changes to the piling scenarios, iPCoD was run consistent with the approach used for the project only assessment in the EIAR, using the same

input parameters (see EIAR Volume 3, Appendix 10.2: Marine Mammals and Other Megafauna Technical Report).

5-58 iPCoD outputs for the "new fast bounding concurrent scenario" are presented in **Appendix 5.3** – iPCoD RESULTS FOR THE PROJECT ALONE SCENARIOS as follows:

- minke whale – **Section A.1.4**;
- inshore bottlenose dolphin – **Section A.2.4**;
- offshore bottlenose dolphin – **Section A.3.4**;
- harbour porpoise – **Section A.4.4**; and
- grey seal – **Section A.5.4**.

5-59 iPCoD outputs for the "updated realistic concurrent scenario" are presented in **Appendix 5.3** – iPCoD RESULTS FOR THE PROJECT ALONE SCENARIOS as follows:

- minke whale – **Section A.1.5**;
- inshore bottlenose dolphin – **Section A.2.5**;
- offshore bottlenose dolphin – **Section A.3.5**;
- harbour porpoise – **Section A.4.5**; and
- grey seal – **Section A.5.5**.

5-60 The iPCoD outputs for the two new concurrent WTG anchor pile driving scenarios are in line with those for the original (EIA) concurrent scenario for each species i.e., the likely effects (cumulative PTS and disturbance) of increased underwater noise from pile driving are considered to be **Not Significant** for all species (see section 10.12.2.1 of the EIAR, Volume 2, Chapter 10 (Marine Mammals and Other Megafauna)). This is because they do not affect population viability of any of the species in the long term (the growth rates of the impacted populations are very similar to that of the unimpacted populations).

5-61 Scenario 2 (the temporal worst case) accounts for the greatest difference between predicted mean population sizes (of impacted vs. unimpacted populations) for each species and thereby representing the worst case. These numbers (of animals disturbed) have been taken forward to the cumulative effects assessment (**Section 5.6.2**).

5.5.7 Grey Seal Reference Population

5-62 This response relates to item **3c vi.** in **Table 5-1**.

5-63 As advised in their representation on the EIAR (01.10.2025), NatureScot do not consider the reference population input parameter for iPCoD modelling (100,250 individuals) to be an accurate reflection of the MUs likely to be impacted, and as such considered that the outputs are likely to be an underestimate of the impacts to the grey seal population (NatureScot Post-Workshop Memo, 28/04/2026).

5-64 In the EIAR, the MUs used for the grey seal reference population were proposed during consultation with NatureScot. Details of the approach were proposed in letter BOW-L-287 dated 23/08/2024 and revised in letter BOW-L-0304 dated 18/12/2024. NatureScot's response (letter CNS / REN / OSWF / NE8 – BUCHAN – PRE-APPLICATION dated 10/02/2025) advised that the reference populations according to SCOS (the PBR N_{min} estimates for grey seal and the SCOS (2022) abundance estimates for harbour seal) should be used, rather than deriving reference populations using Carter *et al.* (2022) as proposed. The Applicant applied this approach in the EIAR. This is presented in Section 10.7.8 of EIAR Volume 2, Chapter 10 (Marine Mammals and Other Megafauna); the reasoning is provided in paragraph 65 (MUs were considered to be relevant if they were overlapped by any of the underwater noise modelling contours or contained Special Areas of Conservation (SACs) considered to have potential for connectivity with the Proposed Offshore Development (e.g. for grey seals this would include the Berwickshire and North Northumberland Coast SAC which is in the both the East Scotland and Northeast England seal MUs)).

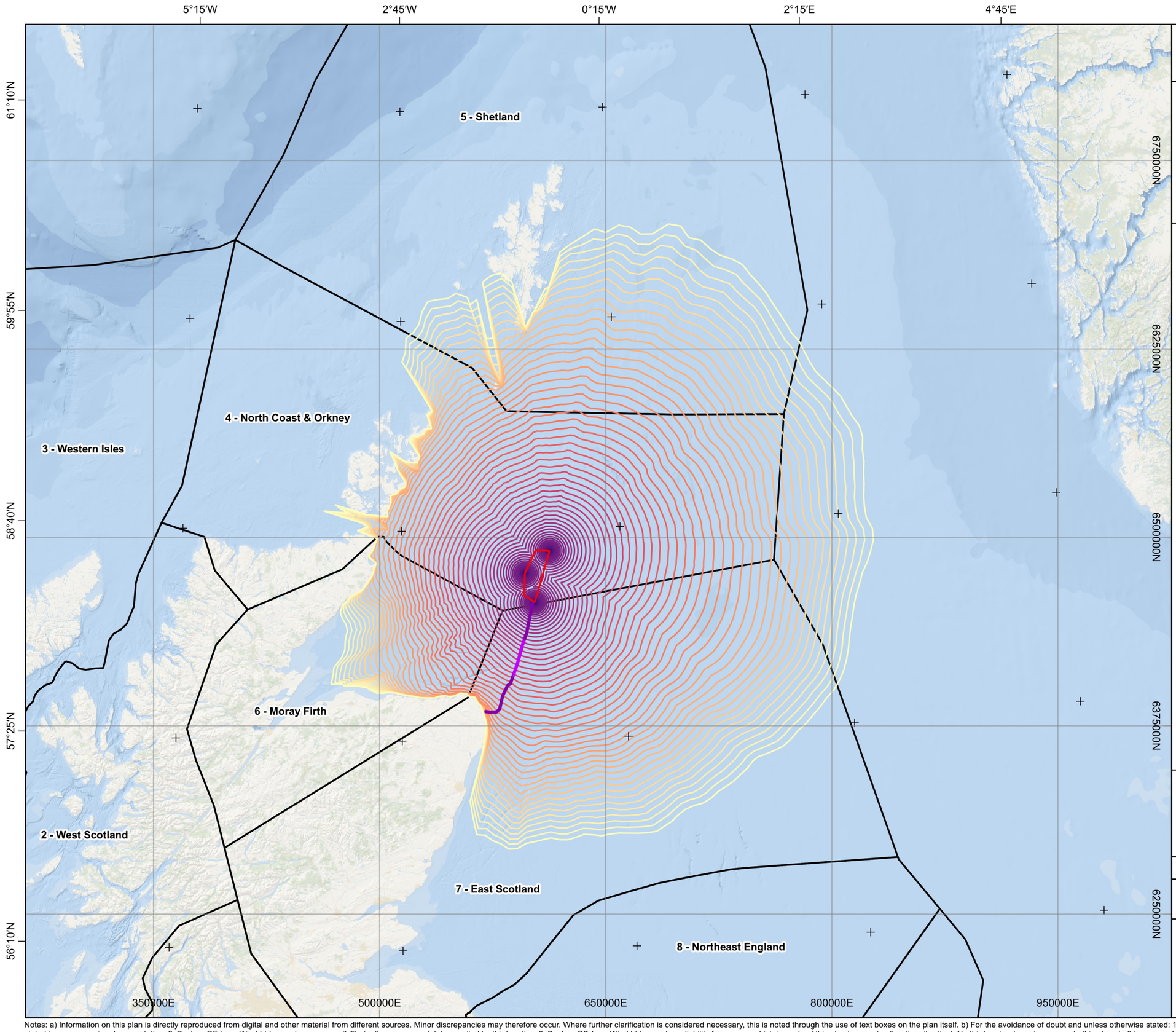
5-65 Following the workshop with the Applicant, NatureScot acknowledged that there was a misunderstanding of the pre-application agreement in relation to the reference population used for harbour and grey seals (NatureScot Post-Workshop Memo, 28/04/2026). Following their own analysis, using a smaller reference population (49,065 individuals), they agreed that for project alone, disturbance impacts on grey seals from pile driving would not be significant in EIA terms. NatureScot further confirmed that whilst noting their disagreement with the approach taken in the EIAR, considering the percentage of the population impacted and the refinement of the design envelope post-consent they are content that in this instance this issue can be revisited in the Piling Strategy. The Applicant confirms that this is their intention.

5-66 Following this confirmation from NatureScot the Applicant has used the original larger reference population for grey seals (100,250 individuals) for all revised project-alone piling assessments presented in the AEIR to allow comparison with the results in the EIAR.

5-67 Following NatureScot's request (NatureScot Post-Workshop Memo, 28/04/2026), the Applicant has updated the grey seal reference population to align with the MUs where the Proposed Offshore Development and the greatest spatial impacts (the modelled received level contours (1 dB increments) for concurrent piling scenarios) are located (**Figure 5-1**), for use in the revised cumulative assessment (**Section 5.6.2**). The minimum population estimate for each of these MUs along with an updated total grey seal reference population for the Proposed Offshore Development is provided in **Table 5-6**. As noted by NatureScot in their representation on the EIAR (01.10.2025), the N_{min} population estimate for each seal MU has also been updated using the most recent data provided in SCOS (2024). This is why the total population estimate provided for all four MUs (46,823 individuals) does not match the reference population provided (49,065 individuals) in their representation on the EIAR (01.10.2025).

Table 5-6: Grey seal reference population abundance estimates for the relevant MUs (SCOS, 2024)

Management Unit	Minimum population estimate (N_{min})
4 - North Coast and Orkney	32,114
5 - Shetland	3,760
6 - Moray Firth	5,046
7 - East Scotland	5,903
Total	46,823



Project:

Buchan Offshore Wind EIA

Title:

Figure 5.1: Received levels (1 dB increments) for piling at the NE, W and SE piling location and their overlap with grey seal management units

Key

- Array Area
- Export Cable Corridor (ECC)
- Indicative IRC Area
- Management Unit (MU)

Received levels (1 dB increments)

190 dB

120 dB

Scale @ A3: 1:2,500,000

Coordinate System: WGS 84 UTM Zone 30N
Graticules: WGS84

0 25 50 75 100 km

N

Date: 16-06-26	Prepared by: AC	Checked by: WB

EIA Ref No: BUC-C-MP-NP-0372

Map Ref: GB204095_M_390_A

BUCHAN OFFSHORE WIND

5.6 CUMULATIVE EFFECTS ASSESSMENT

5.6.1 Cumulative Project List

5-68 As requested in the RAEI issued by MD-LOT (18.12.2025), informed by representations from NatureScot (01.10.2025; see item **4a** in **Table 5-1**), the cumulative project list for Marine Mammals and Other Megafauna has been updated (see **Table 5-7**). This updates the cumulative project list in the EIAR (see Table 10-100 in EIAR Volume 2, Chapter 10: Marine Mammals and Other Megafauna) for disturbance from piling and non-piling construction activities only.

5-69 The list has been created using the criteria presented in Section 10.13 of EIAR Volume 2, Chapter 10: Marine Mammals and Other Megafauna. Some of the key components of these criteria are:

- A tiered approach has been used to consider the cumulative impacts and likely significant effects of other plans and projects. The following tiers were employed:
    - Tier 1 – The Proposed Offshore Development, combined with onshore elements of the project;
    - Tier 2 – All projects or plans assessed under Tier 1, plus those plans/projects which have become operational since the baseline characterisation of the Proposed Offshore Development, plus those under construction, those with consent, and those pending determination following a submitted application;
    - Tier 3 – All projects or plans assessed under Tier 2, plus those projects that have submitted a Scoping Report; and
    - Tier 4 - All projects or plans assessed under Tier 3, projects that are considered reasonably foreseeable, plus those with a granted Agreement for Lease (AfL) or equivalent where information is available to inform the cumulative assessment and there is sufficient data confidence.
- The projects are within the Marine Mammal and Other Megafauna Cumulative Study Area (**Figure 5-2**) and as outlined in Table 10-99 and Figure 10-28 of EIAR Volume 2, Chapter 10: Marine Mammals and Other Megafauna.

5-70 As per the advice from NatureScot in their representation on the EIAR (01.10.2025) and NatureScot Post-Workshop Memo (28.04.2026) the following have also been applied:

- Projects which are anticipated to be constructing between 2029 and 2036 have been screened in. These dates are one year before and one year after the anticipated indicative construction dates for the Proposed Offshore Development (2030 – 2035) as requested by NatureScot. For each project it is assumed that the end of construction and the start of operation will occur in the same year;
- Any export cable corridors developments or subsea pipeline and cable developments which overlap with the coastal range of the east Scotland bottlenose dolphin population in Scottish waters have been screened in. The long list of indicative Ports and Harbours identified for assembly and installation of WTGs is presented in Volume 2, Chapter 17: Socio-Economics, Tourism and Recreation of the EIAR and was considered in the

development of this CEA. Smaller scale projects like harbour works and dredging projects have not been included as they are very unlikely to have long term (>5 years from present) temporal overlap information with the Proposed Offshore Development in order to allow for a meaningful assessment of associated cumulative effects; and

- Tier 2 and 3 projects have been taken forward into the revised cumulative assessment.

5-71 The cumulative long list has been further refined in the revised cumulative assessments of the disturbance impacts of underwater noise from pile driving (see **Section 5.6.2**) and non-piling construction activities (see **Section 5.6.3**) on marine mammals and other megafauna.

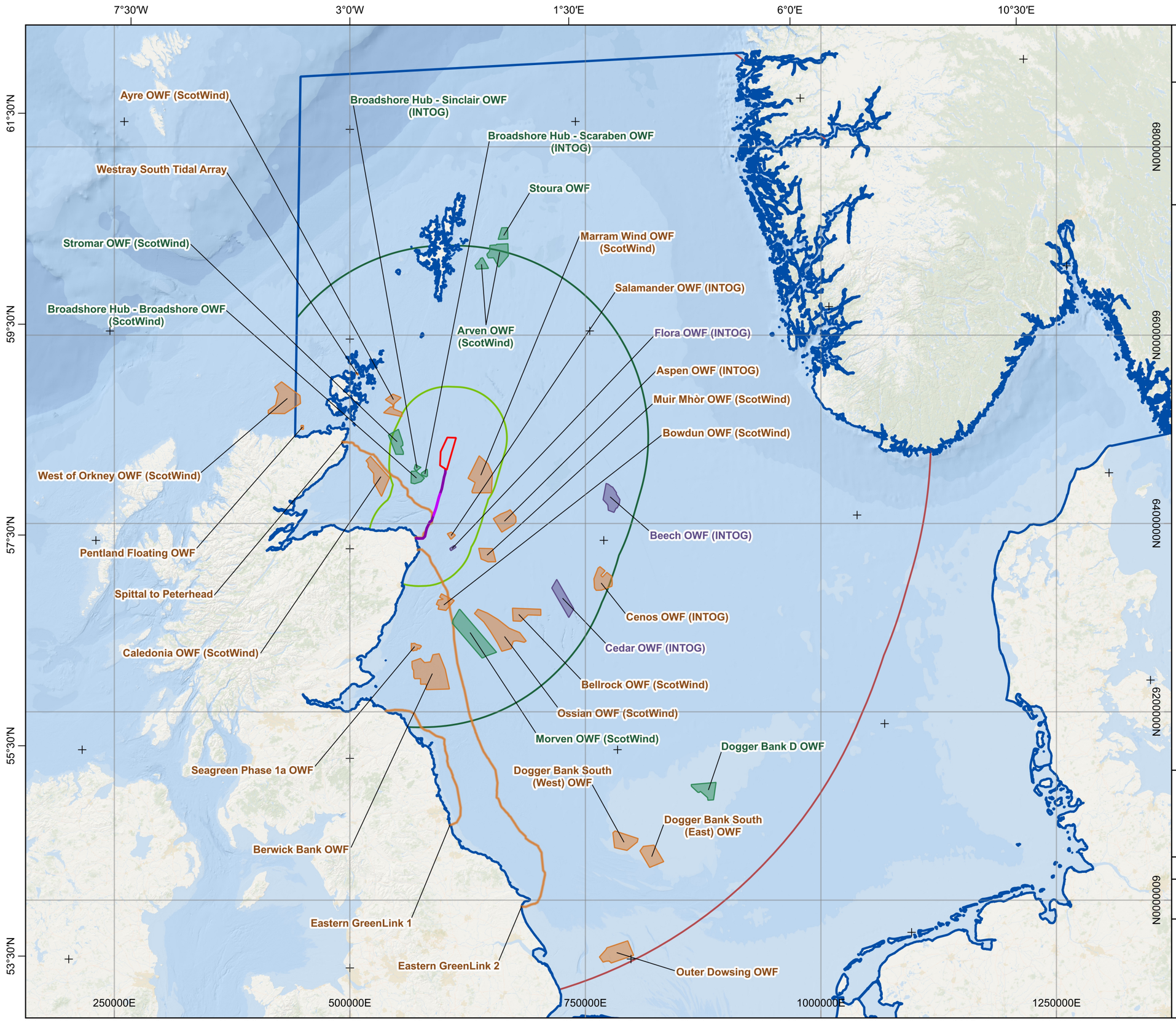
5-72 For assessment of non-piling impacts (see **Section 5.6.3**), all Tier 2 and Tier 3 projects identified in **Table 5-7** have been screened in. In response to the Memo from NatureScot (NatureScot Post-Workshop Memo, 28.04.2026) it can be confirmed that all export cable routes from ScotWind and INTOG projects in the shortlist have been considered in regard to the coastal range of the east Scotland bottlenose dolphin population in Scottish waters.

Table 5-7: Updated list of developments considered within the CEA for Marine Mammals and Other Megafauna

Plan/Project	Summary	Tier	Distance from Array Area (km)	Distance from Export Cable Corridor (km)	Construction Start Year	Piling Years (if relevant)	Operational by
MarramWind OWF (ScotWind)	Planned floating OWF 3,000 MW 225 turbines	2	24.2	25	2030	2033 – 2039 (Worst-case temporal scenario)	2041
Spittal – Peterhead Subsea Cable Link	HVDC cable route	2	40	0	2026	Not relevant – no piling will be undertaken	2030
Ayre OWF (ScotWind)	Planned floating OWF 1,008 MW 40 turbines	2	53.1	72.3	2029	2031 - 2033	2033
Caledonia OWF (ScotWind)	Planned fixed/floating OWF 2,000 MW 40 turbines One quarter of the turbines in deeper water may require floating foundations	2	55.1	40.8	2028	2028 – 2032 (for worst-case piling scenario for Caledonia North and South i.e., sequential installation with no gap)	2032
Salamander OWF (INTOG)	Consented floating OWF 100 MW 5-7 turbines	2	66.3	4.7	2026	2028	2029
Aspen OWF (INTOG)	Planned floating OWF 1,008 MW 72 turbines	2	71.5	61.1	2028	2028 - 2030	2031
Muir Mhòr OWF (ScotWind)	Planned floating OWF 798 MW 67 turbines	2	84.8	5	2028	2029-2031	2033
Eastern Green Link 2	Consented Subsea cable connecting two convertor stations	2	88.9	11	2024	Not relevant – no piling will be undertaken	2029
Bowdun OWF (ScotWind)	Planned fixed/floating OWF 1,008 MW 67 turbines	2	131.7	61.4	2029	2031 – 2033	2033
Pentland Floating OWF	Consented Demo floating OWF Up to 100 MW 6 turbines	2	147.6	156.2	2027	2027 – 2029	2030
Ossian OWF (ScotWind)	Planned floating OWF 2,600-3,600 MW 265 turbines	2	151.6	94.6	2031	Assumed could be piling anytime within construction window	2038
West of Orkney Wind Farm (ScotWind)	Planned OWF 2,000 MW 125 turbines	2	157.3	168.5	2028	2028-2030	2031
Bellrock OWF (ScotWind)	Planned floating/fixed OWF 1,200 MW 132 turbines	2	162.6	119.6	2030	2031-2037	2037
Cenos OWF (INTOG)	Planned floating OWF 1,350 MW 95 turbines	2	185.7	182.5	2030	2031-2033	2035
Seagreen Phase 1a Windfarm	Consented OWF 500 MW 36 turbines	2	187.9	110.9	2029	2029-2032	2032

Plan/Project	Summary	Tier	Distance from Array Area (km)	Distance from Export Cable Corridor (km)	Construction Start Year	Piling Years (if relevant)	Operational by
Berwick Bank OWF	Consented OWF 1,400 – 4,100 MW 179 turbines	2	193.3	118.7	2026	Assumed could be piling anytime within construction window	2032
Eastern Green Link 1*	Consented Subsea cable connecting two convertor stations	2	264.8	186.5	2025	Not relevant – no piling will be undertaken	2029
Dogger Bank South (East and West)	Planned OWF 3 GW 200 turbines across both projects	2	420.0	367.6	2026	Assumed could be piling anytime within construction window	2032
Outer Dowsing	Planned OWF 1,500 MW 75-100 turbines	2	535.2	476.0	2027	2027-2029	2030
Broadshore Hub - Scaraben OWF (INTOG)	Planned floating OWF 99.45 MW Between 3 – 6 turbines	3	14.2	17.1	2028	Assumed could be piling anytime within construction window	2031
Broadshore Hub - Sinclair OWF (INTOG)	Planned floating OWF 99.45 MW Between 3 – 6 turbines	3	16.9	20.9	2028	Assumed could be piling anytime within construction window	2031
Broadshore Hub - Broadshore OWF (ScotWind)	Planned floating OWF 900 MW Between 32 – 60 turbines	3	21.2	22.4	2029	Assumed could be piling anytime within construction window	2032
Stromar OWF (ScotWind)	Planned floating OWF 1,000 MW 71 turbines	3	39.6	47.1	2027	Assumed could be piling anytime within construction window	2033
Westray Tidal Array	Planned tidal array 200 MW tidal array	3	119.3	135.8	2029	Not relevant – no piling will be undertaken	2035
Morven OWF (ScotWind)	Planned OWF 2,907 MW 191 turbines	3	148.9	84.2	2030	Assumed could be piling anytime within construction window	2037
Arven OWF (including Arven South) (ScotWind)	Planned floating OWF 2,300 MW 161 turbines	3	183.5	217.7	2030	Assumed could be piling anytime within construction window	2033
Stoura OWF (ScotWind)	Planned floating OWF 500 MW 40 turbines	3	218.2	252.9	2030	Assumed could be piling anytime within construction window	2035
Dogger Bank D	Planned OWF (Preliminary EIR available) 1.5 GW 113 turbines	3	428.2	392.3	2029	Assumed could be piling anytime within construction window	2033
Flora OWF (INTOG)	Planned floating OWF 50 MW 50 turbines	4	80.8	28.9	Unknown**	Assumed could be piling anytime within construction window	Unknown**
Cedar OWF (INTOG)	Planned floating OWF 1,008 MW 100 turbines	4	164.7	144.8	2027	Assumed could be piling anytime within construction window	2031
Beech OWF (INTOG)	Planned floating OWF 1,008 MW 100 turbines	4	168.1	169.3	2027	Assumed could be piling anytime within construction window	2031

*Projects which were not in the CEA project list in the EIAR **Projects with unknown construction dates have been assumed to have temporal overlap with the Proposed Offshore Development



Project:

Buchan Offshore Wind EIA

Title:

Figure 5.2: Buchan marine mammal and other megafauna cumulative study areas and screened in cumulative projects

Key

- Array Area (Tier 1)
- Export Cable Corridor (ECC)
- Indicative IRC Area
- Regional Study Area – Harbour porpoise North Sea Management Unit (MU)

Screening ranges

- Other offshore developments – 50 km
- Offshore oil and gas developments – 200 km
- Offshore renewable energy developments – 500 km

Offshore renewable energy

- Tier 2
- Tier 3
- Tier 4

Subsea cables and utilities

- Tier 2

Scale @ A3: 1:4,000,000

Coordinate System: WGS 84 UTM Zone 30N
Graticules: WGS84

0 50 100 150 200 km

N

Date: 16-06-26	Prepared by: AC	Checked by: WB

EIA Ref No: BUC-C-MP-NP-0380

Map Ref: GB204095_M_398_A

BUCHAN OFFSHORE WIND

5.6.2 Quantitative Assessment of Disturbance from Pile Driving Noise Using iPCoD

5-73 As requested in the RAEI issued by MD-LOT (18.12.2025), informed by representations from NatureScot (01.10.2025), and further advice from NatureScot (NatureScot Post-Workshop Memo, 28.04.2026) (see item **4b** in **Table 5-1**), an updated quantitative assessment of cumulative disturbance from pile driving noise has been undertaken. In addition, iPCoD modelling has been undertaken for minke whale, inshore and offshore bottlenose dolphin, harbour porpoise and grey seal (in line with the project alone assessment and for those species in which the model is available). As stated in the EIAR, Volume 2, Chapter 10 (Marine Mammals and Other Megafauna), few harbour seals have potential to be affected by noise from pile driving at the Proposed Offshore Development (<1 individual for PTS, 1-3 individuals for disturbance (equivalent to ≤0.039 of the reference population). This contribution to any cumulative impact from the Proposed Offshore Development is determined to be **Not Significant** in EIA terms and therefore iPCoD was not run for this species.

5-74 The iPCoD outputs (including the total number of individuals impacted alongside the percentage of the MU this represents) are provided in **Section 5.6.2.2** (and its sub-sections) below. These outputs show that disturbance is unlikely to affect the viability of the populations of the species assessed. This is because, although there is a difference in population size between impacted and unimpacted populations for some species, the growth rate of the impacted populations is very similar to that of the unimpacted populations (following the approach used to assess the significance of iPCoD results in the EIAR, Volume 2, Chapter 10 (Marine Mammals and Other Megafauna)).

5-75 As outlined in Section 2.4.3 in EIAR Volume 3, Appendix 10.2: Marine Mammals and Other Megafauna Technical Report the counterfactual metrics calculated from the iPCoD modelling, and especially the counterfactual growth rate, are useful for comparing baseline and impact scenarios in population modelling, since they are relatively insensitive to any misspecification of input parameters (Jitlal *et al.,* 2017). Population growth rate is a suitable means to measure significance for iPCoD models because they use an age-based Leslie matrix to model change in population size over time. For a given set of demographic parameters (survival and productivity rates), in the absence of stochasticity (random perturbations in demographic rates), a simulated population will settle to a specific population growth rate and population structure. When an impact is applied (as a change in demographic parameters), the structure and trajectory of that population will change. However, when the impact is removed, the structure and trajectory will return to what it was previously. In the absence of any additional factors (for example inclusion of density dependence which allows demographic parameters to vary relative to population size), there is no mechanism by which an impacted population can return to the same size as the baseline at the same time point. Where convergence does appear to occur over a short period following the impact this reflects the period during which the population structure readjusts to the original structure based on the change in demographic rates (Morris and Doak, 2002).

5-76 Due to the total length of time all of the screened in projects (see **Section 5.6.2.1**) may be piling (14 years) it was only possible to run iPCoD for a maximum of 11 years following piling (25 years is the longest time recommended to be used within the iPCoD model (Sinclair *et al.,* 2019)).

Therefore, there is only a short period of time for the impacted population growth rate to match the unimpacted population

5-77 It can therefore be concluded, in line with the EIA conclusion, that due to the growth rate of the impacted populations being very similar to that of the unimpacted populations, the Proposed Offshore Development's contribution cumulatively with the contribution of other projects is Not Significant for increased underwater noise from pile driving for all receptors. Furthermore, any noise generated will be temporary and intermittent; any animals displaced will likely return to the area once activities cease (see Section 10.12.2.1 of EIAR Volume 2, Chapter 10 (Marine Mammals and Other Megafauna) for information on likely return rates following disturbance).

5.6.2.1 Updated CEA Methodology

5-78 For assessment of cumulative disturbance from pile driving noise, the project short list (**Table 5-7**) has been further refined. Projects have been screened in if their piling dates fall one year before or after the indicative piling dates for Buchan (i.e. 2030 – 2035 (piling activities at Buchan are indicatively 2031-2034)). For projects which don't have published piling dates it is assumed that piling may occur in any year during their construction window. The screened in projects along with their construction and piling dates are presented in **Table 5-8.**

5-79 As agreed with NatureScot (NatureScot Post-Workshop Memo, 28.04.2026) the total number of individuals which may be disturbed from pile driving, and the percentage of the whole and UK portion of the relevant MU, has been calculated for each species for each project screened into the cumulative piling assessment (for all cetacean species and harbour seal reference populations are the same as presented in Section 10.7.8 of Volume 2, Chapter 10: Marine Mammals and Other Megafauna, for grey seal it has been updated as per **Section 5.5.7**). For Tier 2 projects, project specific information (i.e. using dose-response curves) on the potential number of animals disturbed was used. For Tier 3 projects, where project specific information is not available, Effective Deterrence Ranges (EDRs[3]) and relevant species-specific densities (i.e. SCANS (for all cetacean species other than inshore bottlenose dolphin[4]), and Carter *et al.,* 2022 (for seals)[5]) were used to estimate the potential number of individuals disturbed (see **Figure** 5-3 and **Figure 5-4** for which seal MU and SCANS block each project falls in). For the Proposed Offshore Development, the potential number of animals disturbed and the percentage of the whole and UK portion of the relevant MU this represents has been presented for both WTG anchor piling Scenario 2 (temporal worst case) and the new fast bounding concurrent scenario (spatial worst case; see **Table 5-2**). The percentage of the whole and UK portion of the relevant MU for all screened in projects without the Proposed Offshore Development has also been

[3] For all Tier 3 projects the updated 20 km EDR for monopiles and pin piles without noise abatement was used (JNCC, 2025).
[4] No Tier 3 projects are within 20 km of the east coast of Scotland bottlenose dolphin population so a density of 0 animals/km^2 was applied for this species.
[5] Relative density surfaces (for seals hauling out in Scotland only) have since been updated (Carter *et al*., 2025) but were not available at the time of writing the EIAR. To allow comparison with the results presented in the EIAR these updated densities have therefore not been used.

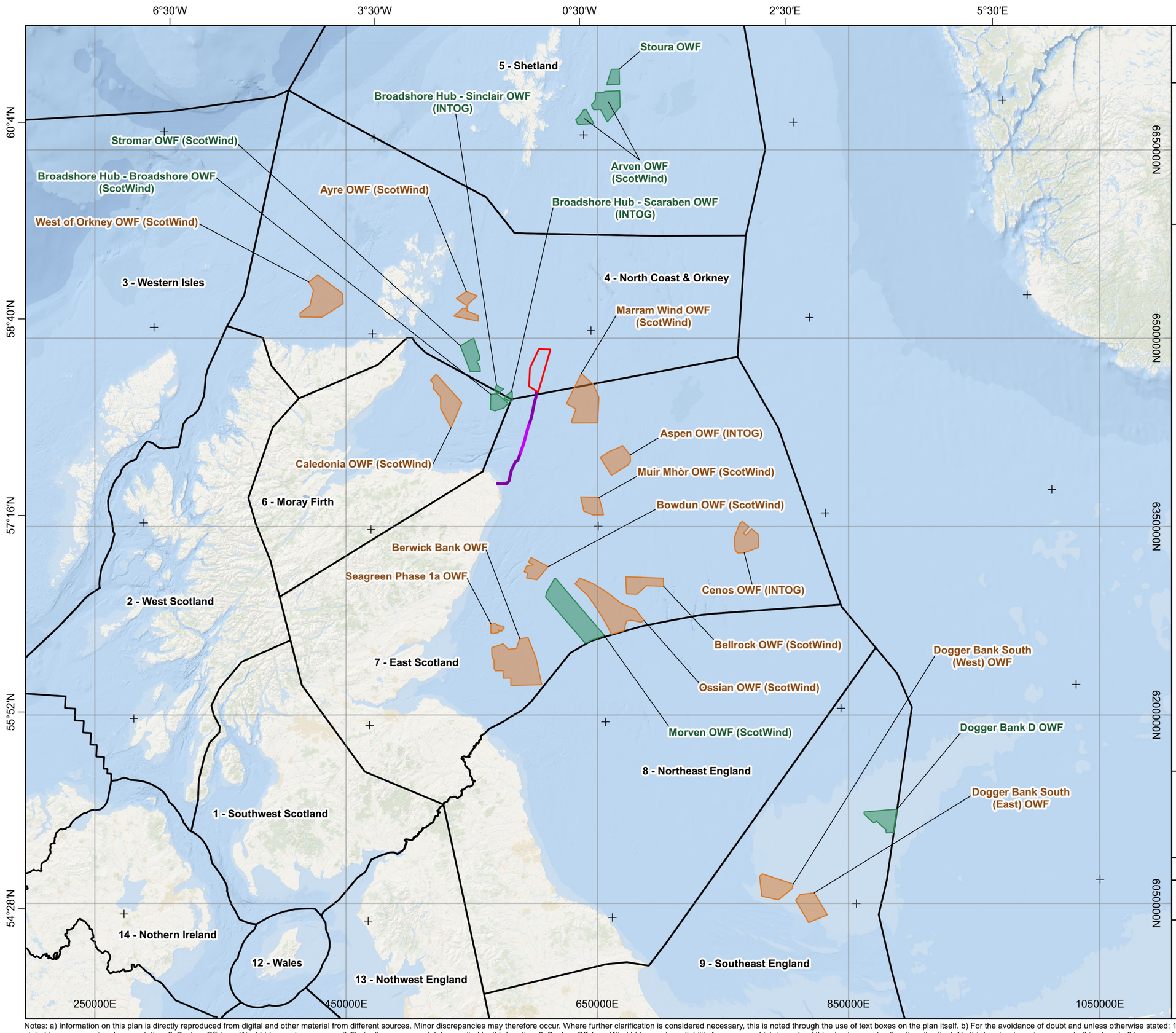
presented for comparative purposes. These numbers are additional to what was provided in the EIAR, and are presented for minke whale (**Table 5-10**), inshore bottlenose dolphin (**Table 5-13**), offshore bottlenose dolphin (**Table 5-16**), Risso's dolphin (**Table 5-19**), white-beaked dolphin (**Table 5-20**), white-sided dolphin (**Table 5-21**), harbour porpoise (**Table 5-22**), grey seal (**Table 5-25**) and harbour seal (**Table 5-28**).

5-80 As requested by NatureScot in their representation to the RAEI (01.10.2025), cumulative iPCoD has been run for minke whale, inshore bottlenose dolphin, offshore bottlenose dolphin, harbour porpoise and grey seal (see **Section 5.6.2.2**). WTG anchor piling Scenario 2 (temporal worst case) for the Proposed Offshore Development was selected as the worst case scenario to be included in cumulative iPCoD. This scenario has the greatest temporal spread across the construction period (four years) and therefore has the potential to disturb animals for the longest time period. This is supported by the iPCoD results for all five project alone scenarios which showed that Scenario 2 has the greatest impact on the mean counterfactual population size and growth rate for all species (see **Appendix 5.3** – iPCoD RESULTS FOR THE PROJECT ALONE SCENARIOS).

Table 5-8: Cumulative project list for behavioural responses from piling for all marine mammal species[6]. 'C' identifies years in which projects are under construction (shaded light blue). 'P' identifies years in which known piling activity will occur (shaded dark blue). The proposed piling window for the Proposed Offshore Development is marked with a thick black line.

Project	Tier	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
Proposed Offshore Development	1					C	P	P	P	P	C						
Arven OWF	3					C	C	C	C								
Aspen OWF	2			P	P	P	C										
Ayre OWF	2				C	C	P	P	P								
Bellrock OWF	2					C	P	P	P	P	P	P	C				
Berwick Bank OWF	2	C	C	C	C	C	C	C									
Bowdun OWF	2				C	C	P	P	P								
Broadshore Hub - Broadshore OWF	3				C	C	C	C									
Broadshore Hub - Scaraben OWF	3			C	C	C	C										
Broadshore Hub – Sinclair OWF	3			C	C	C	C										
Caledonia OWF	2			P	P	P	P	P									
Cenos OWF	2					C	P	P	P	C	C						
Dogger Bank D	3				C	C	C	C	C								
Dogger Bank South (East and West)	2	C	P	P	P	P	P	P									
Marram Wind OWF	2					C	C	C	P	P	P	P	P	P	P	C	C
Morven OWF	3					C	C	C	C	C	C	C	C				
Muir Mhòr OWF	2			C	P	P	P	C	C								
Ossian OWF	2						C	C	C	C	C	C	C	C			
Seagreen Phase 1a Windfarm	2				C	C	C	C									
Stoura OWF	3					C	C	C	C	C	C						
Stromar OWF	3		C	C	C	C	C	C	C								
West of Orkney Wind Farm	2			P	P	P	C										

[6] For grey seal and harbour seal two projects which do not overlap with the same seal MUs as the Proposed Offshore Development have been screened out (Dogger Bank South (East and West) and Dogger Bank D).



Project:

Buchan Offshore Wind EIA

Title:

Figure 5.3: Screened in cumulative projects for pile driving behavioural responses and their overlap with seal management units

Key

- Array Area (Tier 1)
- Export Cable Corridor (ECC)
- Indicative IRC Area
- Management Unit (MU)

Offshore renewable energy

- Tier 2
- Tier 3

Scale @ A3: 1:3,000,000

Coordinate System: WGS 84 UTM Zone 30N
Graticules: WGS84

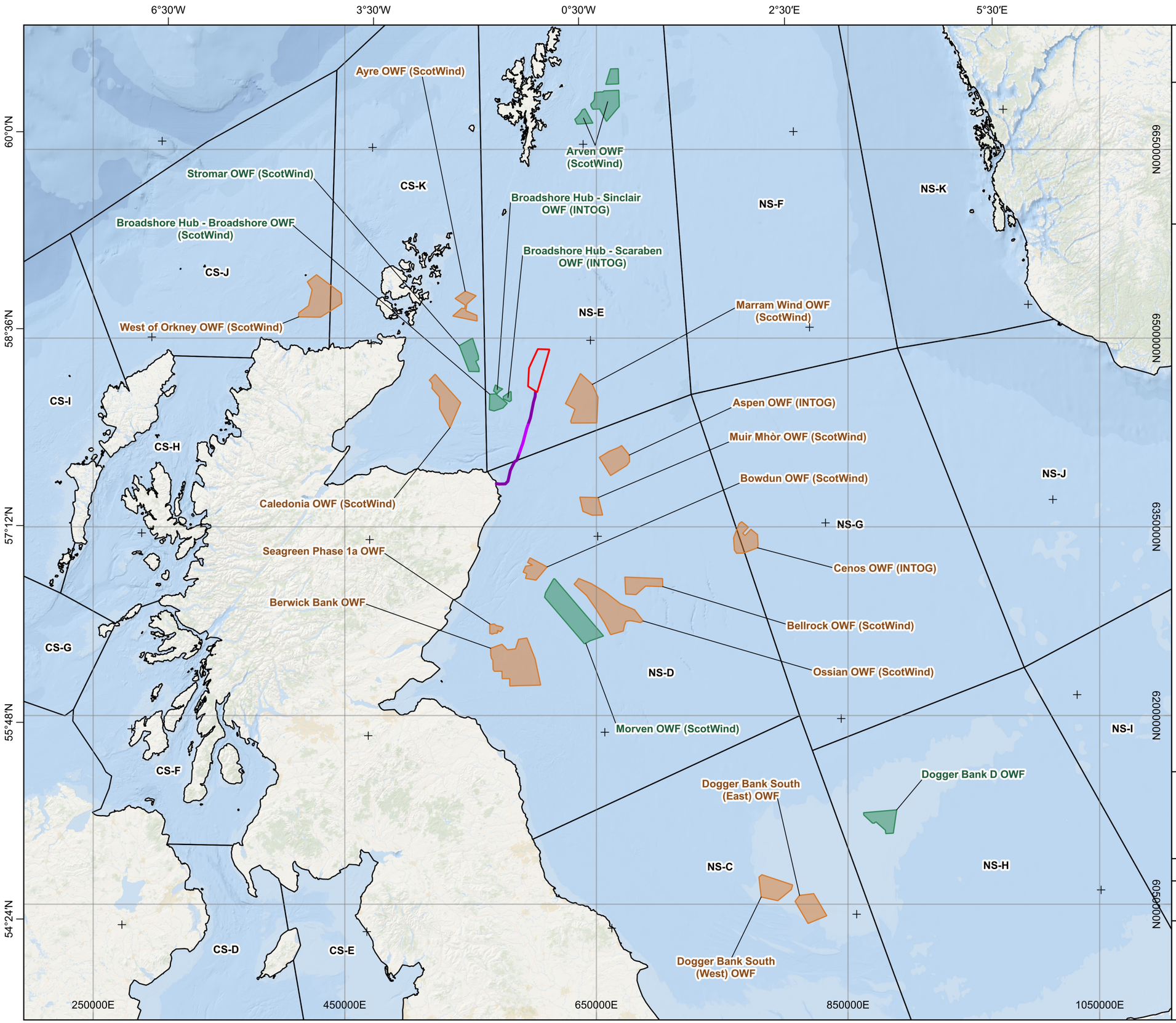
N

0 40 80 120 160 km

Date: 16-06-26	Prepared by: AC	Checked by: WB

EIA Ref No: BUC-C-MP-NP-0381
Map Ref: GB204095_M_399_A

BUCHAN OFFSHORE WIND



Project:

Buchan Offshore Wind EIA

Title:

Figure 5.4: Screened in cumulative projects for pile driving behavioural responses and their overlap with SCANS IV survey blocks

Key

- Array Area (Tier 1)
- Export Cable Corridor (ECC)
- Indicative IRC Area
- SCANS-IV survey block

Offshore renewable energy

- Tier 2
- Tier 3

Scale @ A3: 1:3,000,000

Coordinate System: WGS 84 UTM Zone 30N
Graticules: WGS84

N

0 40 80 120 160 km

Date: 16-06-26	Prepared by: AC	Checked by: WB

EIA Ref No: BUC-C-MP-NP-0382

Map Ref: GB204095_M_400_A

BUCHAN OFFSHORE WIND

Cumulative iPCoD

5-81 For the cumulative modelling, iPCoD was run in the same way as for the project only modelling (see EIAR Volume 3, Appendix 10.2: Marine Mammals and Other Megafauna Technical Report for details), except that the model was run for disturbance impacts only, i.e. PTS was not considered, as agreed with NatureScot (NatureScot Post-Workshop Memo, 28.05.2026). Since iPCoD is recommended to be used to predict a maximum of 25 years (Sinclair *et al*., 2019), models were run for the 14 impact years representing the span of construction years for all projects whose construction periods are planned to overlap with the Proposed Offshore Development's construction period, and 11 post-impact years. Projects included in the cumulative iPCoD runs, and a summary of the information used to derive their indicative piling schedules are presented in **Table 5-9**.

5-82 The following decisions were made when collating the input criteria for the cumulative iPCoD runs:

- For each project the number of piling days were distributed evenly throughout the piling period(s) to create a specific piling schedule for each project. These piling schedules are provided in **Appendix 5.2** – iPCoD PILING SCENARIOS;
- For each screened in project in the cumulative piling assessment the temporal worst case piling scenario, as identified by each project, was selected unless otherwise specified in **Table 5-9**;
- For each project the potential number of animals disturbed in each piling year was inputted into the iPCoD model. These numbers are additional to what was provided in the EIAR and are provided for minke whale (**Table 5-10**), inshore bottlenose dolphin (**Table 5-13**), offshore bottlenose dolphin (**Table 5-16**), harbour porpoise (**Table 5-22**) and grey seal (**Table 5-25**);
- For each project the total number of piling days for WTGs and OSPs (when specified) were combined to calculate the total number of piling days within the projects piling window;
- For Tier 3 projects that don't have a specified seasonal piling window it has been assumed that they will pile March – October as a realistic and precautionary approach. For Tier 2 projects with a published EIA which don't specify a seasonal piling window it is assumed that they will be piling all year round based on the assumption that if they were planning on piling seasonally it would have been specified in their EIA;
- For Tier 3 projects (without a published EIA) that do not have information on their temporal worst case piling scenario it was assumed that they will be piling a maximum of two piles a day unless otherwise specified in **Table 5-9.** This assumption is the most precautionary approach that can be taken whilst also allowing the piling schedule for these projects to be followed (i.e. for some projects assuming one pile a day results in a longer piling period than specified by the project);
- For grey seals the updated reference population (46,823) was used in the cumulative iPCoD runs (see **Section 5.5.7**). Two projects (Dogger Bank South (West and East) and Dogger Bank D) which do not overlap with the relevant seal MUs which make up the updated reference

population were not included in the cumulative piling assessment for grey seals (see **Figure 5-3**);

- An error was identified in the input parameters used for the project alone iPCoD modelling (for the scenarios run in the EIAR and the new concurrent piling scenarios; see **Section 5.5.6**) for the minke whale initial population size (10,228 was used when the UK portion of the Celtic and Greater North Seas MU is 10,288). Due to the minor nature of this error, and because the value used in the original assessment is smaller and therefore more conservative (i.e. precautionary), the project alone iPCoD runs for minke whale have not been rerun. However, for the cumulative iPCoD modelling the correct population size has been used (10,288).

Table 5-9: Cumulative projects piling schedules

Project	Scenario and Approach Used	Piling Years	Piling Season	Number of Piled Foundations	Maximum Number of Piles	Total Number of Piling Days
Proposed Offshore Development	Scenario 2 (Temporal Worst Case) - Dose-response	2031 - 2034	March - October	70 WTG	WTG: 630	630
Arven OWF	Temporal Worst Case Scenario - EDR	2030 - 2033	Not specified. Assumed to be March – October.	161 WTG 10 OSP (3 large, 7 small) Total: 171	WTG: 1449 Small OSP: 56 (8 piles each) Large OSP: 48 (16 piles each) Total: 1553	777
Aspen OWF	Temporal Worst Case Scenario - Dose-response	2028 - 2030	April - September	72 WTG 3 OSP Total: 75	WTG: 324 OSP: 24 Total: 348	174
Ayre OWF	Temporal Worst Case Scenario - Dose-response (capped >140 dB)	2031 - 2033	April – September	40 WTG 2 OSP Total: 42	WTG: 360 OSP: 36 Total: 396	396
Bellrock OWF	Temporal Worst Case Scenario - Dose-response	2031 - 2036	March - October	132 WTG	WTG: 1188	396
Berwick Bank OWF	Concurrent Scenario - Dose-response using a 10% reducing to 1% conversion factor	2026 - 2032	No defined season. Year-round piling assumed.	179 WTG 10 OSP/Offshore Convertor Total: 189	WTG: 1432 OSP/Offshore Convertor: 256 Total: 1688	372
Bowdun OWF	Temporal Worst Case Scenario - Dose-response (capped >140 dB)	2031 - 2033	Year-round.	67 WTG 2 OSP Total: 69	WTG: 268 OSP: 36 Total: 304	304
Broadshore Hub - Broadshore OWF	Temporal Worst Case Scenario - EDR	2029 - 2032	Not specified. Assumed to be March – October.	60 WTG	WTG: 720	360
Broadshore Hub - Scaraben OWF	Temporal Worst Case Scenario - EDR	2028 - 2031	Not specified. Assumed to be March – October.	6 WTG	WTG: 72	36
Broadshore Hub – Sinclair OWF	Temporal Worst Case Scenario - EDR	2028 - 2031	Not specified. Assumed to be March – October.	6 WTG	WTG: 72	36
Caledonia OWF	Temporal Worst Case Scenario - Dose-response (Sequential piling - Caledonia North for 2 years, Caledonia South for 3 years)	North: 2028-2030 South: 2030 - 2032	North: October 2028 - February 2030 South: March 2030 - January 2032	North: 62 WTG, 2 OSP South: 78 WTG, 2 OSP Total: 144	North: WTG: 248, OSP: 8 South: WTG: 390, OSP: 8 Total: 654	North: 64 days South: 275 days Total: 339 days
Cenos OWF	Temporal Worst Case Scenario - Dose-response	2031 - 2033	April - September	95 WTG 2 OSP Total: 97	WTG: 855 OSP: 24 Total: 879	299
Dogger Bank D	Temporal Worst Case Scenario - EDR (assuming jacket foundations)	2029 - 2033	Not specified. Assumed to be March – October.	113 WTG 2 OSP Total: 115	WTG: 904 OSP: 60 Total: 964	241 (4 piles a day)
Dogger Bank South (East and West)	Temporal Worst Case Scenario - Dose-response (Sequential piling - Dogger Bank East and West)	East: 2027 - 2029 West:2030 - 2032	April - September	East: 100 WTG, 1 OSP West: 100 WTG, 1 OSP + 1 Accommodation Platform	East: 102 West: 102	East: 102 West: 102
Marram Wind OWF	Temporal Worst Case Scenario - Dose-response	2033 - 2039	No defined season. Year-round piling assumed.	225 WTG 4 OSP 2 Reactive Compensation Platforms (RCP) Total: 231	WTG: 1,800 OSP: 48 RCP: 8 Total: 1,856	1,856

Project	Scenario and Approach Used	Piling Years	Piling Season	Number of Piled Foundations	Maximum Number of Piles	Total Number of Piling Days
Morven OWF	Temporal Worst Case Scenario - EDR	2030 - 2037	Not specified. Assumed to be March – October.	191 WTG 11 OSPs Total: 202	WTG: 2,292 OSP: 264 Total: 2,556	1,278
Muir Mhòr OWF	Temporal Worst Case Scenario - Dose-response	2029 - 2031	March - October	67 WTG 2 OSP Total: 69	WTG: 603 OSP: 24 Total: 627	175
Ossian OWF	Temporal Worst Case Scenario - Dose-response with WTG and OSP concurrent piling	2031 - 2038	April - December	265 WTG 15 OSP Total: 280	WTG: 1590 OSP: 216 Total: 1,806	602
Seagreen Phase 1a Windfarm	Temporal Worst Case Scenario - Dose-response	2029 - 2032	No defined season. Year-round piling assumed.	36 WTG	WTG: 144	36
Stoura OWF	Temporal Worst Case Scenario - EDR	2030 - 2035	Not specified. Assumed to be March – October.	40 WTG 1 OSP Total: 41	WTG: 360 OSP: 9 Total: 369	185
Stromar OWF	Temporal Worst Case Scenario - EDR	2027 - 2033	Not specified. Assumed to be March – October.	WTG: 71 OSS: 3 Total: 74	WTG: 639 OSS: 27 Total: 666	333
West of Orkney Wind Farm	Temporal Worst Case Scenario - Dose-response (assuming jacket foundations)	2028 - 2030	May - October	125 WTG 5 OSP Total: 130	WTG: 500 OSP: 80 Total: 580	290

5.6.2.2 Pile Driving Cumulative Behavioural Responses

Minke Whale

5-83 The largest number of minke whales predicted to show a behavioural response from pile driving across all screened in projects is 3,526 in 2031 (17.5% of the MU, 34.3% of the UK portion of the MU), which coincides with the spatial worst case piling scenario for the Proposed Offshore Development (**Table 5-10**). The Proposed Offshore Development contributes 471 animals to this impact (13.4% of the total number of animals impacted in the MU in this year).

Table 5-10: Number of minke whale predicted to have a behavioural response per day from cumulative pile driving at 22 OWFs. Dark blue cells indicate confirmed piling years, light blue cells indicate indicative piling years. Totals marked as bold indicate the worst case (largest) number of animals predicted to be impacted in any year.

Project		2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
Proposed Offshore Development[7]	Temporal Worst Case						378	378	378	378					
	Spatial Worst Case						471								
Arven OWF						15	15	15	15						
Aspen OWF				1,368	1,368	1,368									
Ayre OWF							51	51	51						
Bellrock OWF							504	504	504	504	504	504			
Berwick Bank OWF		167	167	167	167	167	167	167							
Bowdun OWF							134	134	134						
Broadshore Hub - Broadshore OWF					15	15	15	15							
Broadshore Hub - Scaraben OWF				15	15	15	15								
Broadshore Hub – Sinclair OWF				15	15	15	15								
Caledonia OWF				259	259	298	298	298							
Cenos OWF							357	357	357						
Dogger Bank D					19	19	19	19	19						
Dogger Bank South (East and West)			65	65	65	162	162	162							
Marram Wind OWF									984	984	984	984	984	984	984
Morven OWF						53	53	53	53	53	53	53	53		
Muir Mhòr OWF					735	735	735								
Ossian OWF							362	362	362	362	362	362	362	362	
Seagreen Phase 1a Windfarm					123	123	123	123							
Stoura OWF						15	15	15	15	15	15				
Stromar OWF			15	15	15	15	15	15	15						
West of Orkney Wind Farm				77	77	77									
Total - Proposed Offshore Development Temporal Worst Case		167	247	1,981	2,873	3,092	**3,433**	2,668	2,887	2,296	1,918	1,903	1,399	1,346	984
% Celtic and Greater North Seas MU		0.83	1.23	9.85	14.28	15.37	**17.06**	13.26	14.35	11.41	9.53	9.46	6.95	6.69	4.89
% UK portion of MU		1.62	2.40	19.26	27.93	30.05	**33.37**	25.93	28.06	22.32	18.64	18.50	13.60	13.08	9.56
Total - Proposed Offshore Development Spatial Worst Case		167	247	1,981	2,873	3,092	**3,526**	2,290	2,509	1,918	1,918	1,903	1,399	1,346	984
% Celtic and Greater North Seas MU		0.83	1.23	9.85	14.28	15.37	**17.53**	11.38	12.47	9.53	9.53	9.46	6.95	6.69	4.89
% UK portion of MU		1.62	2.40	19.26	27.93	30.05	**34.27**	22.26	24.39	18.64	18.64	18.50	13.60	13.08	9.56
Total without Proposed Offshore Development		167	247	1,981	2,873	**3,092**	3,055	2,290	2,509	1,918	1,918	1,903	1,399	1,346	984
% Celtic and Greater North Seas MU		0.83	1.23	9.85	14.28	**15.37**	15.19	11.38	12.47	9.53	9.53	9.46	6.95	6.69	4.89
% UK portion of MU		1.62	2.40	19.26	27.93	**30.05**	29.69	22.26	24.39	18.64	18.64	18.50	13.60	13.08	9.56

[7] For information, the number of minke whale estimated to be disturbed from concurrent piling (spatial worst case scenario) using the 20 km EDR (JNCC, 2025) is 35.

iPCoD Results

5-84 The iPCoD modelling shows that the consequences of disturbance from pile driving are unlikely to result in long term changes at the population level for minke whales for the cumulative scenario.

5-85 Although the size of the impacted population is less than that of the unimpacted population, the impacted population is predicted to follow the same trajectory as the unimpacted population in the years following piling (**Figure 5-5**). This difference in population size is due to the inability of the impacted population to converge with the unimpacted population size because iPCoD assumes no density dependence. As such, population growth rate is a more useful metric than population size (**Table 5-11**).

5-86 The growth rate of the impacted population is very similar to that of the unimpacted population (**Table 5-12**); the mean counterfactual population growth rate is 0.998 in the years following piling.

5-87 These outputs show that disturbance is unlikely to affect the viability of the population of minke whales (the growth rate of the impacted population is very similar to that of the unimpacted population) and that, in line with the EIAR conclusion, the Proposed Offshore Development's contribution cumulatively with the contribution of other projects is **Not Significant** for increased underwater noise from pile driving. Furthermore, any noise generated will be temporary and intermittent; any animals displaced will likely return to the area once activities cease (see Section 10.12.2.1 of EIAR Volume 2, Chapter 10 (Marine Mammals and Other Megafauna) for information on likely return rates following disturbance).

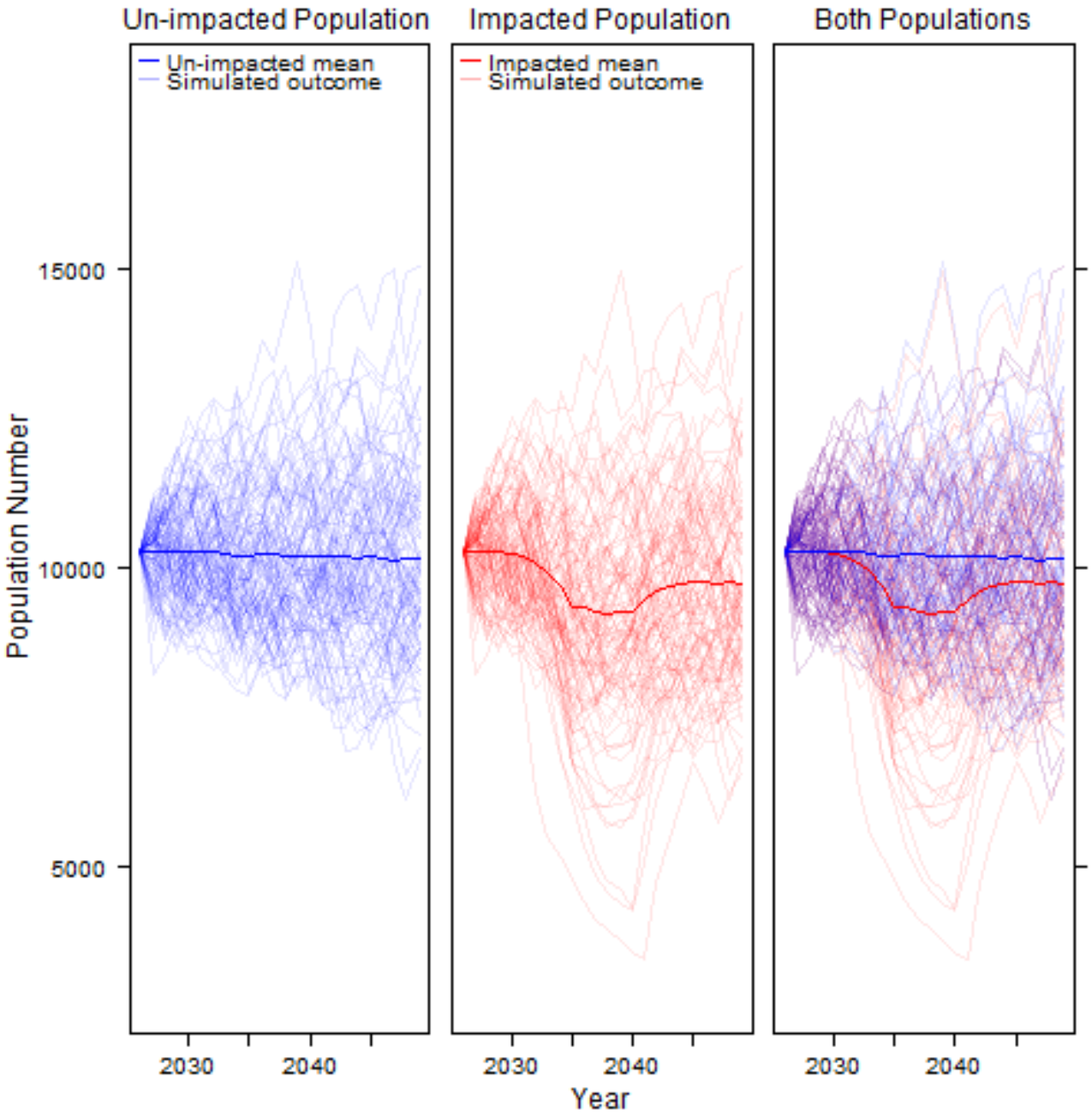


Figure 5-5: Simulated unimpacted and impacted population trajectories for minke whale in the UK portion of the Celtic and Greater North Seas MU: Cumulative scenario

Table 5-11: Mean and median (± 95% confidence intervals) predicted population sizes for minke whale in the UK portion of the Celtic and Greater North Seas MU: Cumulative scenario, and the counterfactual population size

Year	Description	Unimpacted population		Impacted population		Counterfactual population size	
		Mean	Median	Mean	Median	Mean	Median
2025	Pre-piling	10,288	10,288 (10,288 – 10,288)	10,288	10,288 (10,288 – 10,288)	1	1
2026	First year piling	10,282	10,336 (9,165 – 11,168)	10,282	10,336 (9,165 – 11,168)	1	1
2031	First year Buchan piling	10,255	10,218 (8,570 – 12,098)	10,063	10,069 (8,052 – 11,914)	0.981	0.985
2034	Final year Buchan piling	10,208	10,167 (8,262 – 12,401)	9,360	9,522 (6,090 – 11,989)	0.917	0.937
2039	Final year piling	10,191	10,144 (7,896 – 12,864)	9,277	9,418 (4,672 – 12,398)	0.91	0.928
2044	Five years following piling	10,182	10,087 (7,678 – 13,363)	9,782	9,645 (7,184 – 12,972)	0.961	0.956
2050	Eleven years following piling	10,122	9,994 (7,223 – 14,008)	9,690	9,487 (6,806 – 13,525)	0.957	0.949

Table 5-12: Mean and median (± 95% confidence intervals) predicted population growth rates for minke whale in the UK portion of the Celtic and Greater North Seas MU: Cumulative scenario, and the counterfactual population growth rate

Year	Description	Unimpacted population		Impacted population		Counterfactual population growth rate	
		Mean	Median	Mean	Median	Mean	Median
2025	Pre-piling	1	1.000 (1.000 - 1.000)	1	1.000 (1.000 - 1.000)	1	1
2026	First year piling	0.999	1.005 (0.891 - 1.086)	0.999	1.005 (0.891 - 1.086)	1	1
2031	First year Buchan piling	0.999	0.999 (0.970 - 1.027)	0.996	0.996 (0.960 - 1.025)	0.997	0.998
2034	Final year Buchan piling	0.999	0.999 (0.976 - 1.021)	0.988	0.991 (0.943 - 1.017)	0.99	0.993
2039	Final year piling	0.999	0.999 (0.981 - 1.016)	0.991	0.994 (0.945 - 1.013)	0.992	0.995
2044	Five years following piling	0.999	0.999 (0.985 - 1.014)	0.997	0.997 (0.981 - 1.012)	0.998	0.998
2050	Eleven years following piling	0.999	0.999 (0.986 - 1.012)	0.997	0.997 (0.984 - 1.011)	0.998	0.998

Inshore Bottlenose Dolphin

5-88 The largest number of inshore bottlenose dolphins predicted to show a behavioural response from pile driving across all screened in projects is 74 in 2031 (32.7% of the MU), which coincides with the first year of piling for both the temporal and spatial worst case piling scenario for the Proposed Offshore Development (**Table 5-13**). The Proposed Offshore Development contributes 2 animals to this impact (2.7% of the total number of animals impacted in the MU in this year).

Table 5-13: Number of inshore bottlenose dolphin predicted to have a behavioural response per day from cumulative pile driving at 22 OWFs. Dark blue cells indicate confirmed piling years, light blue cells indicate indicative piling years. Totals marked as bold indicate the worst case (largest) number of animals predicted to be impacted in any year. A '-' marks projects which did not screen in this species.

Project		2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
Proposed Offshore Development[8]	Temporal Worst Case						2	2	2	2					
	Spatial Worst Case						2								
Arven OWF						-	-	-	-						
Aspen OWF				5	5	5									
Ayre OWF							-	-	-						
Bellrock OWF							-	-	-	-	-	-			
Berwick Bank OWF		7	7	7	7	7	7	7							
Bowdun OWF							-	-	-						
Broadshore Hub - Broadshore OWF					-	-	-	-							
Broadshore Hub - Scaraben OWF				-	-	-	-								
Broadshore Hub – Sinclair OWF				-	-	-	-								
Caledonia OWF				44	44	48	48	48							
Cenos OWF							-	-	-						
Dogger Bank D					-	-	-	-	-						
Dogger Bank South (East and West)			-	-	-	-	-	-							
Marram Wind OWF									31	31	31	31	31	31	31
Morven OWF						-	-	-	-	-	-	-	-		
Muir Mhòr OWF					8	8	8								
Ossian OWF							5	5	5	5	5	5	5	5	
Seagreen Phase 1a Windfarm					4	4	4	4							
Stoura OWF						-	-	-	-	-	-				
Stromar OWF			-	-	-	-	-	-	-						
West of Orkney Wind Farm				-	-	-									
Total - Proposed Offshore Development Temporal Worst Case		7	7	56	68	72	**74**	66	38	38	36	36	36	36	31
% Coastal East Scotland MU		3.10	3.10	24.78	30.09	31.86	**32.74**	29.20	16.81	16.81	15.93	15.93	15.93	15.93	13.72
Total - Proposed Offshore Development Spatial Worst Case		7	7	56	68	72	**74**	64	36	36	36	36	36	36	31
% Coastal East Scotland MU		3.10	3.10	24.78	30.09	31.86	**32.74**	28.32	15.93	15.93	15.93	15.93	15.93	15.93	13.72
Total without Proposed Offshore Development		7	7	56	68	**72**	**72**	64	36	36	36	36	36	36	31
% Coastal East Scotland MU		3.10	3.10	24.78	30.09	**31.86**	**31.86**	28.32	15.93	15.93	15.93	15.93	15.93	15.93	13.72

[8] For information, the number of inshore bottlenose dolphin estimated to be disturbed from concurrent piling (spatial worst case scenario) using the 20 km EDR (JNCC, 2025) is 0.

iPCoD Results

5-89 The iPCoD modelling shows that the consequences of disturbance from pile driving are unlikely to result in long term changes at the population level for inshore bottlenose dolphins for the cumulative scenario.

5-90 Although the size of the impacted population is less than that of the unimpacted population, the impacted population is predicted to follow the same trajectory as the unimpacted population in the years following piling (**Figure 5-6**). This difference in population size is because there is no ability for the impacted population to converge with the unimpacted population size because iPCoD assumes no density dependence. As such, population growth rate is a more useful metric than population size (**Table 5-14**).

5-91 The growth rate of the impacted population is very similar to that of the unimpacted population (**Table 5-15**); the mean counterfactual population growth rate varies between 0.989 and 0.991 in the years following piling.

5-92 These outputs show that disturbance is unlikely to affect the viability of the population of inshore bottlenose dolphins (the growth rate of the impacted population is very similar to that of the unimpacted population) and that, in line with the EIAR conclusion, the Proposed Offshore Development's contribution cumulatively with the contribution of other projects is **Not Significant** for increased underwater noise from pile driving. Furthermore, any noise generated will be temporary and intermittent; any animals displaced will likely return to the area once activities cease (see Section 10.12.2.1 of EIAR Volume 2, Chapter 10 (Marine Mammals and Other Megafauna) for information on likely return rates following disturbance).

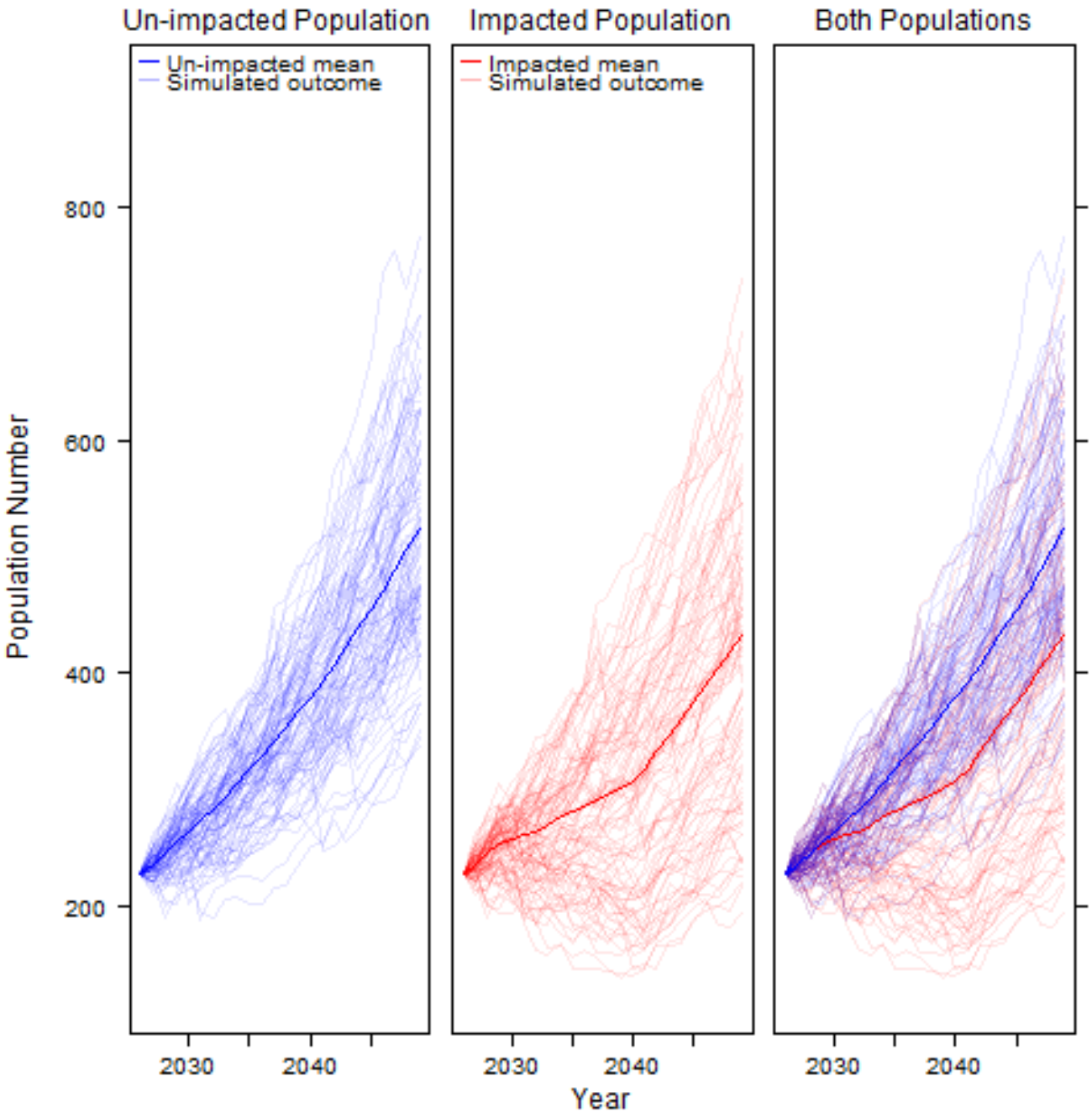


Figure 5-6: Simulated unimpacted and impacted population trajectories for inshore bottlenose dolphin in the Coastal East Scotland MU: Cumulative scenario

Table 5-14: Mean and median (± 95% confidence intervals) predicted population sizes for inshore bottlenose dolphin in the UK portion of the Coastal East Scotland MU: Cumulative scenario, and the counterfactual population size

Year	Description	Unimpacted population		Impacted population		Counterfactual population size	
		Mean	Median	Mean	Median	Mean	Median
2025	Pre-piling	228	228 (228 - 228)	228	228 (228 - 228)	1	1
2026	First year piling	237	236 (214 - 256)	236	236 (214 - 256)	1	1
2031	First year Buchan piling	284	284 (228 - 338)	264	270 (186 - 330)	0.932	0.951
2034	Final year Buchan piling	317	319 (244 - 386)	282	291 (174 - 372)	0.888	0.912
2039	Final year piling	380	380 (280 - 482)	308	322 (156 - 460)	0.811	0.847
2044	Five years following piling	454	452 (324 - 598)	375	384 (198 - 568)	0.827	0.85
2050	Eleven years following piling	563	558 (380 - 760)	464	472 (236 - 712)	0.825	0.846

Table 5-15: Mean and median (± 95% confidence intervals) predicted population growth rates for inshore bottlenose dolphin in the UK portion of the Coastal East Scotland MU: Cumulative scenario, and the counterfactual population growth rate

Year	Description	Unimpacted population		Impacted population		Counterfactual population growth rate	
		Mean	Median	Mean	Median	Mean	Median
2025	Pre-piling	1	1.000 (1.000 - 1.000)	1	1.000 (1.000 - 1.000)	1	1
2026	First year piling	1.037	1.035 (0.939 - 1.123)	1.037	1.035 (0.939 - 1.123)	1	1
2031	First year Buchan piling	1.036	1.037 (1.000 - 1.068)	1.024	1.029 (0.967 - 1.064)	0.988	0.992
2034	Final year Buchan piling	1.037	1.038 (1.008 - 1.060)	1.022	1.027 (0.970 - 1.056)	0.986	0.99
2039	Final year piling	1.036	1.037 (1.015 - 1.055)	1.019	1.025 (0.973 - 1.051)	0.983	0.988
2044	Five years following piling	1.036	1.037 (1.019 - 1.052)	1.024	1.028 (0.993 - 1.049)	0.989	0.991
2050	Eleven years following piling	1.036	1.036 (1.021 - 1.049)	1.027	1.030 (1.001 - 1.047)	0.991	0.993

Offshore Bottlenose Dolphin

5-93 The largest number of offshore bottlenose dolphins predicted to show a behavioural response from pile driving across all screened in projects is 1,016 in 2031 (50.25% of the MU, 53.9% of the UK portion of the MU), which coincides with the spatial worst case piling scenario for the Proposed Offshore Development (**Table 5-16**). The Proposed Offshore Development contributes 101 animals to this impact (9.94% of the total number of animals impacted in the MU in this year).

Table 5-16: Number of offshore bottlenose dolphin predicted to have a behavioural response per day from cumulative pile driving at 22 OWFs. Dark blue cells indicate confirmed piling years, light blue cells indicate indicative piling years. Totals marked as bold indicate the worst case (largest) number of animals predicted to be impacted in any year. A '-' marks projects which did not screen in this species.

Project		2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
Proposed Offshore Development[9]	Temporal Worst Case						87	87	87	87					
	Spatial Worst Case						101								
Arven OWF						-	-	-	-						
Aspen OWF				40	40	40									
Ayre OWF							13	13	13						
Bellrock OWF							32	32	32	32	32	32			
Berwick Bank OWF		102	102	102	102	102	102	102							
Bowdun OWF							32	32	32						
Broadshore Hub - Broadshore OWF					4	4	4	4							
Broadshore Hub - Scaraben OWF				4	4	4	4								
Broadshore Hub – Sinclair OWF				4	4	4	4								
Caledonia OWF				-	-	-	-	-							
Cenos OWF							254	254	254						
Dogger Bank D					2	2	2	2	2						
Dogger Bank South (East and West)			0.13	0.13	0.13	0.1	0.1	0.1							
Marram Wind OWF									20	20	20	20	20	20	20
Morven OWF						37	37	37	37	37	37	37	37		
Muir Mhòr OWF					426	426	426								
Ossian OWF							-	-	-	-	-	-	-	-	
Seagreen Phase 1a Windfarm					-	-	-	-							
Stoura OWF						-	-	-	-	-	-				
Stromar OWF			5	5	5	5	5	5	5						
West of Orkney Wind Farm				-	-	-									
Total - Proposed Offshore Development Temporal Worst Case		102	107	155	587	624	**1,002**	568	482	176	89	89	57	20	20
% Greater North Seas MU		5.04	5.30	7.67	29.04	30.87	**49.56**	28.10	23.84	8.70	4.40	4.40	2.82	0.99	0.99
% UK portion of MU		5.41	5.68	8.23	31.15	33.11	**53.16**	30.14	25.57	9.34	4.72	4.72	3.02	1.06	1.06
Total - Proposed Offshore Development Spatial Worst Case		102	107	155	587	624	**1,016**	481	395	89	89	89	57	20	20
% Greater North Seas MU		5.04	5.30	7.67	29.04	30.87	**50.25**	23.79	19.54	4.40	4.40	4.40	2.82	0.99	0.99
% UK portion of MU		5.41	5.68	8.23	31.15	33.11	**53.90**	25.52	20.95	4.72	4.72	4.72	3.02	1.06	1.06
Total without Proposed Offshore Development		102	107	155	587	624	**915**	481	395	89	89	89	57	20	20
% Greater North Seas MU		5.04	5.30	7.67	29.04	30.87	**45.26**	23.79	19.54	4.40	4.40	4.40	2.82	0.99	0.99
% UK portion of MU		5.41	5.68	8.23	31.15	33.11	**48.55**	25.52	20.95	4.72	4.72	4.72	3.02	1.06	1.06

[9] For information, the number of offshore bottlenose dolphin estimated to be disturbed from concurrent piling (spatial worst case scenario) using the 20 km EDR (JNCC, 2025) is 11.

iPCoD Results

5-94 The iPCoD modelling shows that the consequences of disturbance from pile driving are unlikely to result in long term changes at the population level for offshore bottlenose dolphins for the cumulative scenario.

5-95 Although the size of the impacted population is less than that of the unimpacted population, the impacted population is predicted to follow the same trajectory as the unimpacted population in the years following piling (**Figure 5-7**). This difference in population size is because there is no ability for the impacted population to converge with the unimpacted population size because iPCoD assumes no density dependence. As such, population growth rate is a more useful metric than population size (**Table 5-17**).

5-96 The growth rate of the impacted population is very similar to that of the unimpacted population (**Table 5-18**); the mean counterfactual population growth rate varies between 0.994 and 0.996 in the years following piling.

5-97 These outputs show that disturbance is unlikely to affect the viability of the population of offshore bottlenose dolphins (the growth rate of the impacted population is very similar to that of the unimpacted population) and that, in line with the EIAR conclusion, the Proposed Offshore Development's contribution cumulatively with the contribution of other projects is **Not Significant** for increased underwater noise from pile driving. Furthermore, any noise generated will be temporary and intermittent; any animals displaced will likely return to the area once activities cease (see Section 10.12.2.1 of EIAR Volume 2, Chapter 10 (Marine Mammals and Other Megafauna) for information on likely return rates following disturbance).

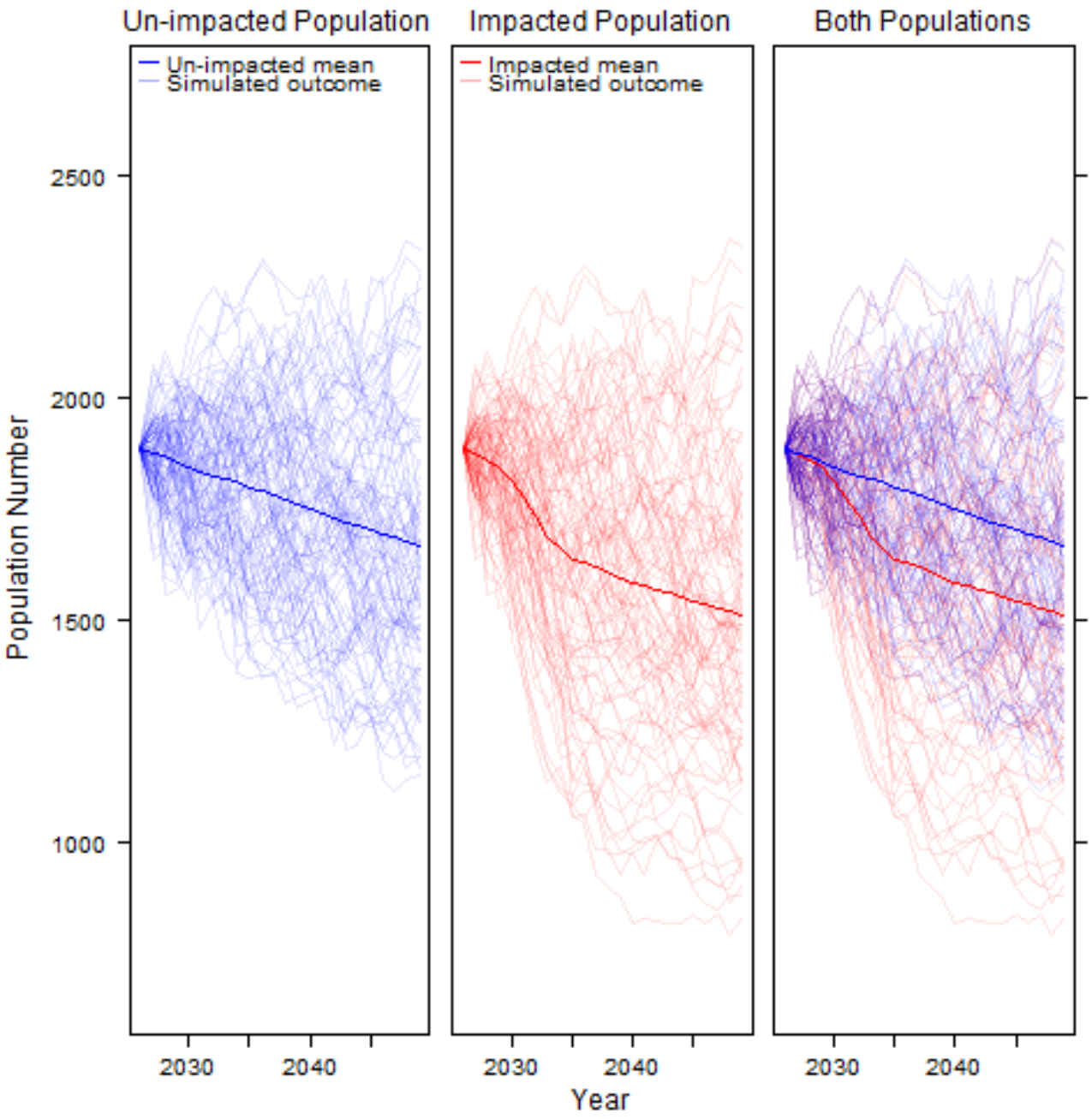


Figure 5-7: Simulated unimpacted and impacted population trajectories for offshore bottlenose dolphin in the UK portion of the Greater North Sea MU: Cumulative scenario

Table 5-17: Mean and median (± 95% confidence intervals) predicted population sizes for offshore bottlenose dolphin in the UK portion of the Greater North Sea MU: Cumulative scenario, and the counterfactual population size

Year	Description	Unimpacted population		Impacted population		Counterfactual population size	
		Mean	Median	Mean	Median	Mean	Median
2025	Pre-piling	1,886	1,886 (1,886 – 1,886)	1,886	1,886 (1,886 – 1,886)	1	1
2026	First year piling	1,876	1,882 (1,686 – 2,010)	1,875	1,882 (1,684 – 2,010)	1	1
2031	First year Buchan piling	1,824	1,828 (1,506 – 2,108)	1,736	1,750 (1,270 – 2,074)	0.952	0.957
2034	Final year Buchan piling	1,800	1,802 (1,404 – 2,158)	1,636	1,676 (1,066 – 2,110)	0.909	0.93
2039	Final year piling	1,749	1,743 (1,328 – 2,200)	1,586	1,632 (924 – 2,114)	0.907	0.936
2044	Five years following piling	1,703	1,690 (1,250 – 2,200)	1,544	1,578 (896 – 2,150)	0.907	0.934
2050	Eleven years following piling	1,649	1,628 (1,150 – 2,266)	1,493	1,500 (848 – 2,186)	0.905	0.921

Table 5-18: Mean and median (± 95% confidence intervals) predicted population growth rates for offshore bottlenose dolphin in the UK portion of the Greater North Sea MU: Cumulative scenario, and the counterfactual population growth rate

Year	Description	Unimpacted population		Impacted population		Counterfactual population growth rate	
		Mean	Median	Mean	Median	Mean	Median
2025	Pre-piling	1	1.000 (1.000 - 1.000)	1	1.000 (1.000 - 1.000)	1	1
2026	First year piling	0.995	0.998 (0.894 - 1.066)	0.994	0.998 (0.893 - 1.066)	1	1
2031	First year Buchan piling	0.994	0.995 (0.963 - 1.019)	0.985	0.988 (0.936 - 1.016)	0.991	0.993
2034	Final year Buchan piling	0.994	0.995 (0.968 - 1.015)	0.983	0.987 (0.939 - 1.013)	0.989	0.992
2039	Final year piling	0.994	0.994 (0.975 - 1.011)	0.986	0.990 (0.950 - 1.008)	0.992	0.995
2044	Five years following piling	0.994	0.994 (0.979 - 1.008)	0.988	0.991 (0.962 - 1.007)	0.994	0.996
2050	Eleven years following piling	0.994	0.994 (0.980 - 1.007)	0.99	0.991 (0.969 - 1.006)	0.996	0.997

Risso's Dolphin

5-98 The largest number of Risso's dolphins predicted to show a behavioural response from pile driving across all screened in projects is 3,020 in 2033 (24.63% of the MU, 34.76% of the UK portion of the MU), which coincides with the temporal worst case piling scenario for the Proposed Offshore Development (**Table 5-19**). The Proposed Offshore Development contributes 1,194 animals to this impact (39.54% of the total number of animals impacted in the MU in this year).

5-99 There are several conservatisms which should be considered when interpreting these results Some of these are:

- It is assumed that the maximum number of animals impacted by each project remains the same throughout the year resulting in the greatest potential overlap between projects. This is a very large conservatism which dramatically increases the number of animals affected, and in reality projects will only be piling for a short period of time each year (see **Table 5-9** for project specific piling schedules). For example, for the Proposed Offshore Development's worst case temporal scenario (Scenario 2) it is assumed that piling may occur during 630 days within the piling window (March – October; 01/03/2031 – 17/03/2034). However, on each piling day piling will only occur for 4hrs, 10 minutes. Therefore, throughout the whole piling period (1,112 days; 01/03/2031 – 17/03/2034) piling will only occur 9.84% of the time[10]. Assuming this applies to all projects then it is likely that animals will be able to quickly recover from any behavioural disturbance from piling on a short term basis.
- The dose-response relationships (e.g. Graham *et al*. (2019)) used by the Proposed Offshore Development and each Tier 2 project, and the EDRs (JNCC, 2025) used for Tier 3 projects, to calculate the number of Risso's dolphins impacted behaviourally by piling were developed for harbour porpoise which are particularly sensitive to underwater noise (Southall *et al.,* 2007; JNCC, 2020; Southall *et al.,* 2021). As such, the estimated number of Risso's dolphins impacted are likely to be conservative.
- It is assumed each project will disturb different individuals from the population. This is unlikely due to the disturbance noise contours from each project (dose-response or EDRs) overlapping.

5-100 Considering these conservatisms, it can be concluded that the Proposed Offshore Development's contribution cumulatively with the contribution of other projects is **Not Significant** for increased underwater noise from pile driving for Risso's dolphins. Furthermore, any noise generated will be temporary and intermittent; any animals displaced will likely return

[10]The percentage of overall time the Proposed Offshore Development is piling (x) can be calculated using the following formula, where A is the total days the Proposed Offshore Development is piling (630), B is the total time that piling will be undertaken in a day (250 minutes), C is the total number of days in the whole piling window for the Proposed Offshore Development (1,112) and D is the number of minutes in a day (1440 minutes): $x = \frac{AB}{CD} \times 100$

to the area once activities cease (see Section 10.12.2.1 of EIAR Volume 2, Chapter 10 (Marine Mammals and Other Megafauna) for information on likely return rates following disturbance).

Table 5-19: Number of Risso's dolphins predicted to have a behavioural response per day from cumulative pile driving at 22 OWFs. Dark blue cells indicate confirmed piling years, light blue cells indicate indicative piling years. Totals marked as bold indicate the worst case (largest) number of animals predicted to be impacted in any year. A '-' marks projects which did not screen in this species.

Project		2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
Proposed Offshore Development[11]	Temporal Worst Case						1,194	1,194	1,194	1,194					
	Spatial Worst Case						1,321								
Arven OWF						88	88	88	88						
Aspen OWF				1,250	1,250	1,250									
Ayre OWF							222	222	222						
Bellrock OWF							-	-	-	-	-	-			
Berwick Bank OWF		-	-	-	-	-	-	-							
Bowdun OWF							-	-	-						
Broadshore Hub - Broadshore OWF					-	-	-	-							
Broadshore Hub - Scaraben OWF				-	-	-	-								
Broadshore Hub – Sinclair OWF				-	-	-	-								
Caledonia OWF				1	1	1	1	1							
Cenos OWF							-	-	-						
Dogger Bank D					-	-	-	-	-						
Dogger Bank South (East and West)			-	-	-	-	-	-							
Marram Wind OWF									1,381	1,381	1,381	1,381	1,381	1,381	1,381
Morven OWF						-	-	-	-	-	-	-	-		
Muir Mhòr OWF					450	450	450								
Ossian OWF							-	-	-	-	-	-	-	-	
Seagreen Phase 1a Windfarm					-	-	-	-							
Stoura OWF						88	88	88	88	88	88				
Stromar OWF			47	47	47	47	47	47	47						
West of Orkney Wind Farm				103	103	103									
Total - Proposed Offshore Development Temporal Worst Case		0	47	1,401	1,851	2,027	2,090	1,640	**3,020**	2,663	1,469	1,381	1,381	1,381	1,381
% Celtic and Greater North Seas MU		0	0.38	11.43	15.10	16.53	17.04	13.37	**24.63**	21.72	11.98	11.26	11.26	11.26	11.26
% UK portion of MU		0	0.54	16.13	21.31	23.33	24.06	18.88	**34.76**	30.66	16.91	15.90	15.90	15.90	15.90
Total - Proposed Offshore Development Spatial Worst Case		0	47	1,401	1,851	2,027	**2,217**	446	1,826	1,469	1,469	1,381	1,381	1,381	1,381
% Celtic and Greater North Seas MU		0	0.38	11.43	15.10	16.53	**18.08**	3.64	14.89	11.98	11.98	11.26	11.26	11.26	11.26
% UK portion of MU		0	0.54	16.13	21.31	23.33	**25.52**	5.13	21.02	16.91	16.91	15.90	15.90	15.90	15.90
Total without Proposed Offshore Development		0	47	1,401	1,851	**2,027**	896	446	1,826	1,469	1,469	1,381	1,381	1,381	1,381
% Celtic and Greater North Seas MU		0.00	0.38	11.43	15.10	**16.53**	7.31	3.64	14.89	11.98	11.98	11.26	11.26	11.26	11.26
% UK portion of MU		0.00	0.54	16.13	21.31	**23.33**	10.31	5.13	21.02	16.91	16.91	15.90	15.90	15.90	15.90

[11] For information, the number of Risso's dolphins estimated to be disturbed from concurrent piling (spatial worst case scenario) using the 20 km EDR (JNCC, 2025) is 201.

White-beaked Dolphin

5-101 The largest number of white-beaked dolphin predicted to show a behavioural response from pile driving across all screened in projects is 22,605 in 2031 (51.43% of the MU, 66.44% of the UK portion of the MU), which coincides with the spatial worst case piling scenario for the Proposed Offshore Development (**Table 5-20**). The Proposed Offshore Development contributes 4,378 animals to this impact (19.37% of the total number of animals impacted in the MU in this year).

5-102 There are several conservatisms which should be considered when interpreting these results Some of these are:

- It is assumed that the maximum number of animals impacted by each project remains the same throughout the year resulting in the greatest potential overlap between projects. This is a very large conservatism which dramatically increases the number of animals affected , and in reality projects will only be piling for a short period of time each year (see **Table 5-9** for project specific piling schedules). For example, for the Proposed Offshore Development's worst case temporal scenario (Scenario 2) it is assumed that piling may occur during 630 days within the piling window (March – October; 01/03/2031 – 17/03/2034). However, on each piling day piling will only occur for 4hrs, 10 minutes. Therefore, throughout the whole piling period (1112 days; 01/03/2031 – 17/03/2034) piling will only occur 9.84% of the time[12]. Assuming this applies to all projects then it is likely that animals will be able to quickly recover from any behavioural disturbance from piling on a short term basis.
- The dose-response relationships (e.g. Graham *et al*. (2019)) used by the Proposed Offshore Development and each Tier 2 project, and the EDRs (JNCC, 2025) used for Tier 3 projects, to calculate the number of white-beaked dolphins impacted behaviourally by piling were developed for harbour porpoise which are particularly sensitive to underwater noise (Southall *et al.,* 2007; JNCC, 2020; Southall *et al.,* 2021). As such, the estimated number of white-beaked dolphins impacted are likely to be conservative.
- It is assumed each project will disturb different individuals from the population. This is unlikely due to the disturbance noise contours from each project (dose-response or EDRs) overlapping.

5-103 Considering these conservatisms, it can be concluded that the Proposed Offshore Development's contribution cumulatively with the contribution of other projects is **Not Significant** for increased underwater noise from pile driving for white-beaked dolphins. Furthermore, any noise generated will be temporary and intermittent; any animals displaced will likely return to the area once activities cease (see Section 10.12.2.1 of EIAR Volume 2,

[12]The percentage of overall time the Proposed Offshore Development is piling (x) can be calculated using the following formula, where A is the total days the Proposed Offshore Development is piling (630), B is the total time that piling will be undertaken in a day (250 minutes), C is the total number of days in the whole piling window for the Proposed Offshore Development (1112) and D is the number of minutes in a day (1440 minutes): $x = \frac{AB}{CD} \times 100$

Chapter 10 (Marine Mammals and Other Megafauna) for information on likely return rates following disturbance).

Table 5-20: Number of white-beaked dolphin predicted to have a behavioural response per day from cumulative pile driving at 22 OWFs. Dark blue cells indicate confirmed piling years, light blue cells indicate indicative piling years. Totals marked as bold indicate the worst case (largest) number of animals predicted to be impacted in any year.

Project		2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
Proposed Offshore Development[13]	Temporal Worst Case						3,886	3,886	3,886	3,886					
	Spatial Worst Case						4378								
Arven OWF						223	223	223	223						
Aspen OWF				3,644	3,644	3,644									
Ayre OWF							1,402	1,402	1,402						
Bellrock OWF							1,091	1,091	1,091	1,091	1,091	1,091			
Berwick Bank OWF		830	830	830	830	830	830	830							
Bowdun OWF							691	691	691						
Broadshore Hub - Broadshore OWF					223	223	223	223							
Broadshore Hub - Scaraben OWF				223	223	223	223								
Broadshore Hub – Sinclair OWF				223	223	223	223								
Caledonia OWF				2,624	2,624	2,873	2,873	2,873							
Cenos OWF							896	896	896						
Dogger Bank D					13	13	13	13	13						
Dogger Bank South (East and West)			1	1	1	1	1	1							
Marram Wind OWF									8,181	8,181	8,181	8,181	8,181	8,181	8,181
Morven OWF						100	100	100	100	100	100	100	100		
Muir Mhòr OWF					6,750	6,750	6,750								
Ossian OWF							1,531	1,531	1,531	1,531	1,531	1,531	1,531	1,531	
Seagreen Phase 1a Windfarm					764	764	764	764							
Stoura OWF						223	223	223	223	223	223				
Stromar OWF			170	170	170	170	170	170	170						
West of Orkney Wind Farm				1,456	1,456	1,456									
Total - Proposed Offshore Development Temporal Worst Case		830	1,001	9,171	16,921	17,716	**22,113**	14,917	18,407	15,012	11,126	10,903	9,812	9,712	8,181
% Celtic and Greater North Seas MU		1.89	2.28	20.87	38.50	40.31	**50.31**	33.94	41.88	34.16	25.31	24.81	22.32	22.10	18.61
% UK portion of MU		2.44	2.94	26.95	49.73	52.07	**64.99**	43.84	54.10	44.12	32.70	32.04	28.84	28.54	24.04
Total - Proposed Offshore Development Spatial Worst Case		830	1,001	9,171	16,921	17,716	**22,605**	11,031	14,521	11,126	11,126	10,903	9,812	9,712	8,181
% Celtic and Greater North Seas MU		1.89	2.28	20.87	38.50	40.31	**51.43**	25.10	33.04	25.31	25.31	24.81	22.32	22.10	18.61
% UK portion of MU		2.44	2.94	26.95	49.73	52.07	**66.44**	32.42	42.68	32.70	32.70	32.04	28.84	28.54	24.04
Total without Proposed Offshore Development		830	1,001	9,171	16,921	17,716	**18,227**	11,031	14,521	11,126	11,126	10,903	9,812	9,712	8,181
% Celtic and Greater North Seas MU		1.89	2.28	20.87	38.50	40.31	**41.47**	25.10	33.04	25.31	25.31	24.81	22.32	22.10	18.61
% UK portion of MU		2.44	2.94	26.95	49.73	52.07	**53.57**	32.42	42.68	32.70	32.70	32.04	28.84	28.54	24.04

[13] For information, the number of white-beaked dolphins estimated to be disturbed from concurrent piling (spatial worst case scenario) using the 20 km EDR (JNCC, 2025) is 509.

White-sided Dolphin

5-104 The largest number of white-sided dolphins predicted to show a behavioural response from pile driving across all screened in projects is 553 in 2033 (3.05% of the MU, 4.5% of the UK portion of the MU), which coincides with the temporal worst case piling scenario for the Proposed Offshore Development (**Table 5-21**). The Proposed Offshore Development contributes 229 animals to this impact (41.41% of the total number of animals impacted in the MU in this year).

5-105 There are several conservatisms which should be considered when interpreting these results Some of these are:

- It is assumed that the maximum number of animals impacted by each project remains the same throughout the year resulting in the greatest potential overlap between projects. This is a very large conservatism which dramatically increases the number of animals affected , and in reality projects will only be piling for a short period of time each year (see **Table 5-9** for project specific piling schedules). For example, for the Proposed Offshore Development's worst case temporal scenario (Scenario 2) it is assumed that piling may occur during 630 days within the piling window (March – October; 01/03/2031 – 17/03/2034). However, on each piling day piling will only occur for 4hrs, 10 minutes. Therefore, throughout the whole piling period (1112 days; 01/03/2031 – 17/03/2034) piling will only occur 9.84% of the time[14]. Assuming this applies to all projects then it is likely that animals will be able to quickly recover from any behavioural disturbance from piling on a short term basis.
- The dose-response relationships (e.g. Graham *et al*. (2019)) used by the Proposed Offshore Development and each Tier 2 project, and the EDRs (JNCC, 2025) used for Tier 3 projects, to calculate the number of white-sided dolphins impacted behaviourally by piling were developed for harbour porpoise which are particularly sensitive to underwater noise (Southall *et al.,* 2007; JNCC, 2020; Southall *et al.,* 2021). As such, the estimated number of white-sided dolphins impacted are likely to be conservative.
- It is assumed each project will disturb different individuals from the population. This is unlikely due to the disturbance noise contours from each project (dose-response or EDRs) overlapping.

5-106 Considering these conservatisms, it can be concluded that the Proposed Offshore Development's contribution cumulatively with the contribution of other projects is **Not Significant** for increased underwater noise from pile driving for white-sided dolphins. Furthermore, any noise generated will be temporary and intermittent; any animals displaced will likely return to the area once activities cease (see Section 10.12.2.1 of EIAR Volume 2,

[14]The percentage of overall time the Proposed Offshore Development is piling (x) can be calculated using the following formula, where A is the total days the Proposed Offshore Development is piling (630), B is the total time that piling will be undertaken in a day (250 minutes), C is the total number of days in the whole piling window for the Proposed Offshore Development (1112) and D is the number of minutes in a day (1440 minutes): $x = \frac{AB}{CD} \times 100$

Chapter 10 (Marine Mammals and Other Megafauna) for information on likely return rates following disturbance).

Table 5-21: Number of white-sided dolphin predicted to have a behavioural response per day from cumulative pile driving at 22 OWFs. Dark blue cells indicate confirmed piling years, light blue cells indicate indicative piling years. Totals marked as bold indicate the worst case (largest) number of animals predicted to be impacted in any year. A '-' marks projects which did not screen in this species.

Project		2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
Proposed Offshore Development[15]	Temporal Worst Case						229	229	229	229					
	Spatial Worst Case						247								
Arven OWF						18	18	18	18						
Aspen OWF				178	178	178									
Ayre OWF							-	-	-						
Bellrock OWF							-	-	-	-	-	-			
Berwick Bank OWF		-	-	-	-	-	-	-							
Bowdun OWF							-	-	-						
Broadshore Hub - Broadshore OWF					-	-	-	-							
Broadshore Hub - Scaraben OWF				-	-	-	-								
Broadshore Hub – Sinclair OWF				-	-	-	-								
Caledonia OWF				-	-	-	-	-							
Cenos OWF							-	-	-						
Dogger Bank D					-	-	-	-	-						
Dogger Bank South (East and West)			-	-	-	-	-	-							
Marram Wind OWF									288	288	288	288	288	288	288
Morven OWF						-	-	-	-	-	-	-	-		
Muir Mhòr OWF					-	-	-								
Ossian OWF							-	-	-	-	-	-	-	-	
Seagreen Phase 1a Windfarm					-	-	-	-							
Stoura OWF						18	18	18	18	18	18				
Stromar OWF			-	-	-	-	-	-	-						
West of Orkney Wind Farm				-	-	-									
Total - Proposed Offshore Development Temporal Worst Case		0	0	178	178	214	265	265	**553**	535	306	288	288	288	288
% Celtic and Greater North Seas MU		0.00	0.00	0.98	0.98	1.18	1.46	1.46	**3.05**	2.95	1.69	1.59	1.59	1.59	1.59
% UK portion of MU		0.00	0.00	1.45	1.45	1.74	2.16	2.16	**4.50**	4.35	2.49	2.34	2.34	2.34	2.34
Total - Proposed Offshore Development Spatial Worst Case		0	0	178	178	214	283	36	**324**	306	306	288	288	288	288
% Celtic and Greater North Seas MU		0.00	0.00	0.98	0.98	1.18	1.56	0.20	**1.79**	1.69	1.69	1.59	1.59	1.59	1.59
% UK portion of MU		0.00	0.00	1.45	1.45	1.74	2.30	0.29	**2.64**	2.49	2.49	2.34	2.34	2.34	2.34
Total without Proposed Offshore Development		0	0	178	178	214	36	36	**324**	306	306	288	288	288	288
% Celtic and Greater North Seas MU		0.00	0.00	0.98	0.98	1.18	0.20	0.20	**1.79**	1.69	1.69	1.59	1.59	1.59	1.59
% UK portion of MU		0.00	0.00	1.45	1.45	1.74	0.29	0.29	**2.64**	2.49	2.49	2.34	2.34	2.34	2.34

[15] For information, the number of white-sided dolphins estimated to be disturbed from concurrent piling (spatial worst case scenario) using the 20 km EDR (JNCC, 2025) is 42.

Harbour Porpoise

5-107 The largest number of harbour porpoise predicted to show a behavioural response from pile driving across all screened in projects is 82,378 in 2031 (23.77% of the MU, 51.6% of the UK portion of the MU), which coincides with the spatial worst case piling scenario for the Proposed Offshore Development (**Table 5-22**). The Proposed Offshore Development contributes 13,449 animals to this impact (16.33% of the total number of animals impacted in the MU in this year).

Table 5-22: Number of harbour porpoise predicted to have a behavioural response per day from cumulative pile driving at 22 OWFs. Dark blue cells indicate confirmed piling years, light blue cells indicate indicative piling years. Totals marked as bold indicate the worst case (largest) number of animals predicted to be impacted in any year.

Project		2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
Proposed Offshore Development[16]	Temporal Worst Case						11,527	11,527	11,527	11,527					
	Spatial Worst Case						13449								
Arven OWF						648	648	648	648						
Aspen OWF				9,690	9,690	9,690									
Ayre OWF							1,633	1,633	1,633						
Bellrock OWF							8,554	8,554	8,554	8,554	8,554	8,554			
Berwick Bank OWF		3,575	3,575	3,575	3,575	3,575	3,575	3,575							
Bowdun OWF							2,829	2,829	2,829						
Broadshore Hub - Broadshore OWF					648	648	648	648							
Broadshore Hub - Scaraben OWF				648	648	648	648								
Broadshore Hub – Sinclair OWF				648	648	648	648								
Caledonia OWF				7,274	7,274	8,201	8,201	8,201							
Cenos OWF							8,863	8,863	8,863						
Dogger Bank D					1,010	1,010	1,010	1,010	1,010						
Dogger Bank South (East and West)			4,296	4,296	4,296	5,098	5,098	5,098							
Marram Wind OWF									14,787	14,787	14,787	14,787	14,787	14,787	14,787
Morven OWF						752	752	752	752	752	752	752	752		
Muir Mhòr OWF					14,630	14,630	14,630								
Ossian OWF							8,309	8,309	8,309	8,309	8,309	8,309	8,309	8,309	
Seagreen Phase 1a Windfarm					1,882	1,882	1,882	1,882							
Stoura OWF						648	648	648	648	648	648				
Stromar OWF			353	353	353	353	353	353	353						
West of Orkney Wind Farm				1,149	1,149	1,149									
Total - Proposed Offshore Development Temporal Worst Case		3,575	8,224	27,633	45,803	49,580	**80,456**	64,530	59,913	44,577	33,050	32,402	23,848	23,096	14,787
% North Sea MU		1.03	2.37	7.97	13.21	14.30	**23.21**	18.62	17.29	12.86	9.54	9.35	6.88	6.66	4.27
% UK portion of MU		2.24	5.15	17.31	28.69	31.06	**50.40**	40.42	37.53	27.92	20.70	20.30	14.94	14.47	9.26
Total - Proposed Offshore Development Spatial Worst Case		3,575	8,224	27,633	45,803	49,580	**82,378**	53,003	48,386	33,050	33,050	32,402	23,848	23,096	14,787
% North Sea MU		1.03	2.37	7.97	13.21	14.30	**23.77**	15.29	13.96	9.54	9.54	9.35	6.88	6.66	4.27
% UK portion of MU		2.24	5.15	17.31	28.69	31.06	**51.60**	33.20	30.31	20.70	20.70	20.30	14.94	14.47	9.26
Total without Proposed Offshore Development		3,575	8,224	2,7633	45,803	49,580	**68,929**	53,003	48,386	33,050	33,050	32,402	23,848	23,096	14,787
% North Sea MU		1.03	2.37	7.97	13.21	14.30	**19.89**	15.29	13.96	9.54	9.54	9.35	6.88	6.66	4.27
% UK portion of MU		2.24	5.15	17.31	28.69	31.06	**43.18**	33.20	30.31	20.70	20.70	20.30	14.94	14.47	9.26

[16] For information, the number of harbour porpoise estimated to be disturbed from concurrent piling (spatial worst case scenario) using the 20 km EDR (JNCC, 2025) is 1478.

iPCoD Results

5-108 The iPCoD modelling shows that the consequences of disturbance from pile driving are unlikely to result in long term changes at the population level for harbour porpoise for the cumulative scenario.

5-109 Although the size of the impacted population is less than that of the unimpacted population, the impacted population is predicted to follow a similar trajectory as the unimpacted population in the years following piling (**Figure 5-8**). This difference in population size is because there is no ability for the impacted population to converge with the unimpacted population size because iPCoD assumes no density dependence. As such, population growth rate is a more useful metric than population size (**Table 5-23**).

5-110 The growth rate of the impacted population is very similar to that of the unimpacted population (**Table 5-24**); the mean counterfactual population growth rate varies between 0.992 and 0.994 in the years following piling.

5-111 These outputs show that disturbance is unlikely to affect the viability of the population of harbour porpoise (the growth rate of the impacted population is very similar to that of the unimpacted population) and that, in line with the EIAR conclusion, the Proposed Offshore Development's contribution cumulatively with the contribution of other projects is **Not Significant** for increased underwater noise from pile driving. Furthermore, any noise generated will be temporary and intermittent; any animals displaced will likely return to the area once activities cease (see Section 10.12.2.1 of EIAR Volume 2, Chapter 10 (Marine Mammals and Other Megafauna) for information on likely return rates following disturbance).

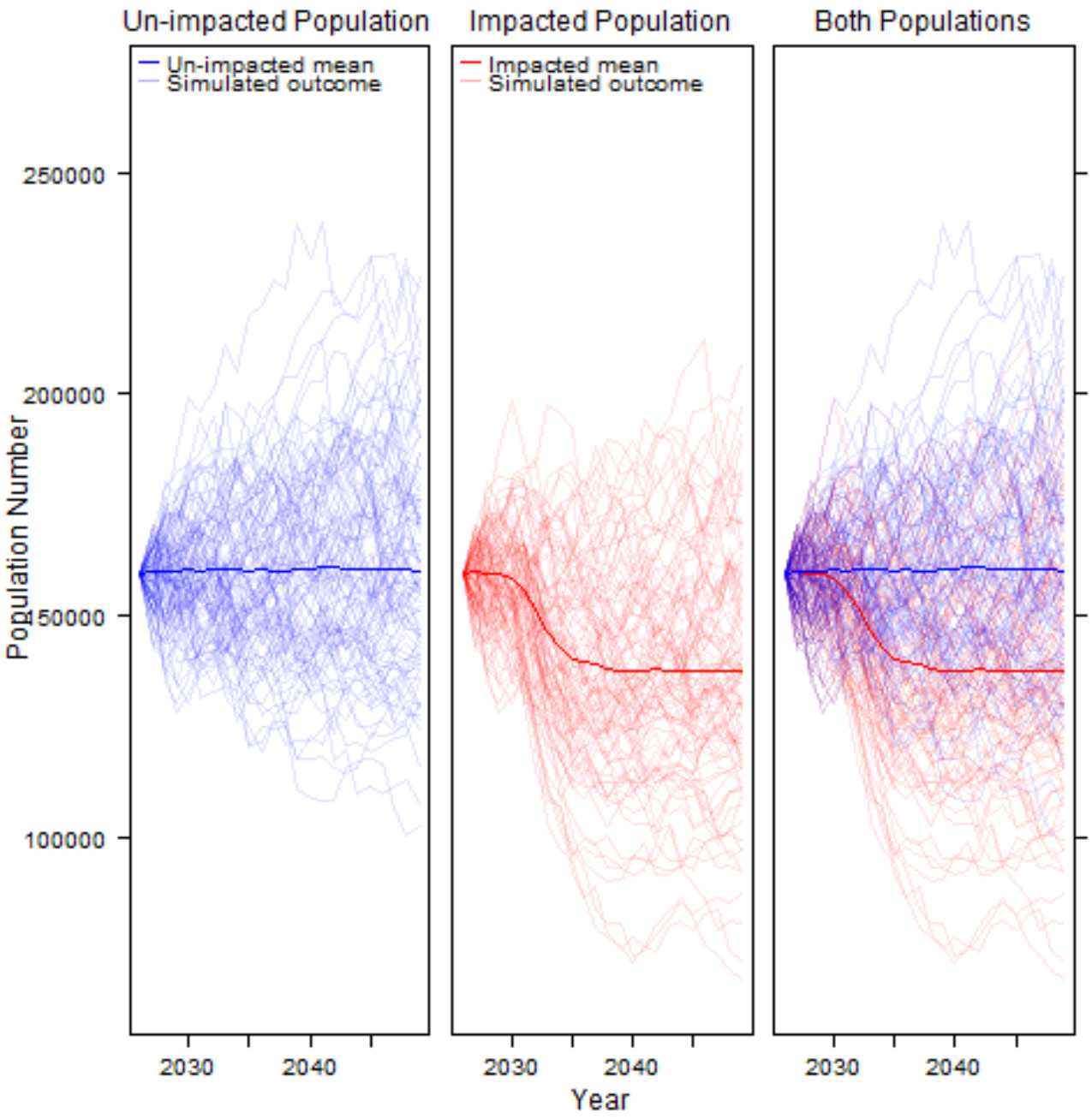


Figure 5-8: Simulated unimpacted and impacted population trajectories for harbour porpoise in the UK portion of the North Sea MU: Cumulative scenario

Table 5-23: Mean and median (± 95% confidence intervals) predicted population sizes for harbour porpoise in the UK portion of the North Sea MU: Cumulative scenario, and the counterfactual population size

Year	Description	Unimpacted population		Impacted population		Counterfactual population size	
		Mean	Median	Mean	Median	Mean	Median
2025	Pre-piling	159,634	159,634 (159,634 – 159,634)	159,634	159,634 (159,634 – 159,634)	1	1
2026	First year piling	159,764	160,168 (146,110 – 171,639)	159,747	160,142 (146,110 – 171,634)	1	1
2031	First year Buchan piling	160,277	160,228 (135,259 – 186,190)	151,362	151,520 (125,678 – 178,626)	0.944	0.946
2034	Final year Buchan piling	160,194	159,471 (129,880 – 195,881)	139,910	140,110 (102,136 – 178,042)	0.873	0.879
2039	Final year piling	160,624	159,633 (123,707 – 202,715)	137,400	136,820 (91,827 – 185,746)	0.855	0.857
2044	Five years following piling	160,351	159,216 (120,763 – 210,859)	137,409	136,239 (90,431 – 190,024)	0.857	0.856
2050	Eleven years following piling	160,342	158,308 (113,506 – 217,894)	137,396	135,629 (88,081 – 197,759)	0.857	0.857

Table 5-24: Mean and median (± 95% confidence intervals) predicted population growth rates for harbour porpoise in the UK portion of the North Sea MU: Cumulative scenario, and the counterfactual population growth rate

Year	Description	Unimpacted population		Impacted population		Counterfactual population growth rate	
		Mean	Median	Mean	Median	Mean	Median
2025	Pre-piling	1	1.000 (1.000 - 1.000)	1	1.000 (1.000 - 1.000)	1	1
2026	First year piling	1.001	1.003 (0.915 - 1.075)	1.001	1.003 (0.915 - 1.075)	1	1
2031	First year Buchan piling	1	1.001 (0.973 - 1.026)	0.991	0.991 (0.961 - 1.019)	0.99	0.991
2034	Final year Buchan piling	1	1.000 (0.977 - 1.023)	0.984	0.986 (0.952 - 1.012)	0.985	0.986
2039	Final year piling	1	1.000 (0.982 - 1.017)	0.988	0.989 (0.961 - 1.011)	0.988	0.989
2044	Five years following piling	1	1.000 (0.985 - 1.015)	0.991	0.992 (0.971 - 1.009)	0.992	0.992
2050	Eleven years following piling	1	1.000 (0.986 - 1.013)	0.993	0.994 (0.976 - 1.009)	0.994	0.994

Grey Seal

5-112 The largest number of grey seals predicted to show a behavioural response from pile driving across all screened in projects is 16,977 in 2031 (36.26% of the relevant seal MUs), which coincides with the spatial worst case piling scenario for the Proposed Offshore Development (**Table 5-25**). The Proposed Offshore Development contributes 2,186 animals to this impact (12.88% of the total number of animals impacted in the MU in this year).

Table 5-25: Number of grey seals predicted to have a behavioural response per day from cumulative pile driving at 22 OWFs. Dark blue cells indicate confirmed piling years, light blue cells indicate indicative piling years. Totals marked as bold indicate the worst case (largest) number of animals predicted to be impacted in any year.

Project		2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
Proposed Offshore Development[17]	Temporal Worst Case						1,711	1,711	1,711	1,711					
	Spatial Worst Case						2,186								
Arven OWF						727	727	727	727						
Aspen OWF				348	348	348									
Ayre OWF							1,864	1,864	1,864						
Bellrock OWF							200	200	200	200	200	200			
Berwick Bank OWF		1,867	1,867	1,867	1,867	1,867	1,867	1,867							
Bowdun OWF							904	904	904						
Broadshore Hub - Broadshore OWF					270	270	270	270							
Broadshore Hub - Scaraben OWF				270	270	270	270								
Broadshore Hub – Sinclair OWF				270	270	270	270								
Caledonia OWF				5,277	5,277	5,277	4,740	4,740							
Cenos OWF							126	126	126						
Marram Wind OWF									183	183	183	183	183	183	183
Morven OWF						401	401	401	401	401	401	401	401		
Muir Mhòr OWF					1,156	1,156	1,156								
Ossian OWF							436	436	436	436	436	436	436	436	
Seagreen Phase 1a Windfarm					49	49	49	49							
Stoura OWF						252	252	252	252	252	252				
Stromar OWF			1,259	1,259	1,259	1,259	1,259	1,259	1,259						
West of Orkney Wind Farm				2,596	2,596	2,596									
Total - Proposed Offshore Development Temporal Worst Case		1,867	3,126	11,887	13,362	14,742	**16,502**	14,806	8,063	3,183	1,472	1,220	1,020	619	183
% Relevant Seal MUs		3.99	6.68	25.39	28.54	31.48	**35.24**	31.62	17.22	6.80	3.14	2.61	2.18	1.32	0.39
Total - Proposed Offshore Development Spatial Worst Case		1,867	3,126	11,887	13,362	14,742	**16,977**	13,095	6,352	1,472	1,472	1,220	1,020	619	183
% Relevant Seal MUs		3.99	6.68	25.39	28.54	31.48	**36.26**	27.97	13.57	3.14	3.14	2.61	2.18	1.32	0.39
Total without Proposed Offshore Development		1,867	3,126	11,887	13,362	14,742	**14,791**	13,095	6352	1,472	1,472	1,220	1,020	619	183
% Relevant Seal MUs		3.99	6.68	25.39	28.54	31.48	**31.59**	27.97	13.57	3.14	3.14	2.61	2.18	1.32	0.39

[17] For information, the number of grey seals estimated to be disturbed from concurrent piling (spatial worst case scenario) using the 20 km EDR (JNCC, 2025) is 711.

iPCoD Results

5-113 The iPCoD modelling shows that the consequences of disturbance from pile driving are unlikely to result in long term changes at the population level for grey seals for the cumulative scenario.

5-114 The impacted population is predicted to follow the same trajectory as the unimpacted population in the years following piling (**Figure 5-9**).

5-115 The counterfactual population size (**Table 5-26**) and growth rate (**Table 5-27**) is 0.994 and 1 in the years following piling respectively; i.e., the impacted population size and growth rate is the same as (or very similar to) the unimpacted population size and growth rate.

5-116 These outputs show that disturbance is unlikely to affect the viability of the population of grey seals in either the short or long term and that, in line with the EIAR conclusion, the Proposed Offshore Development's contribution cumulatively with the contribution of other projects is **Not Significant** for increased underwater noise from pile driving for all receptors. Furthermore, any noise generated will be temporary and intermittent; any animals displaced will likely return to the area once activities cease (see Section 10.12.2.1 of EIAR Volume 2, Chapter 10 (Marine Mammals and Other Megafauna) for information on likely return rates following disturbance).

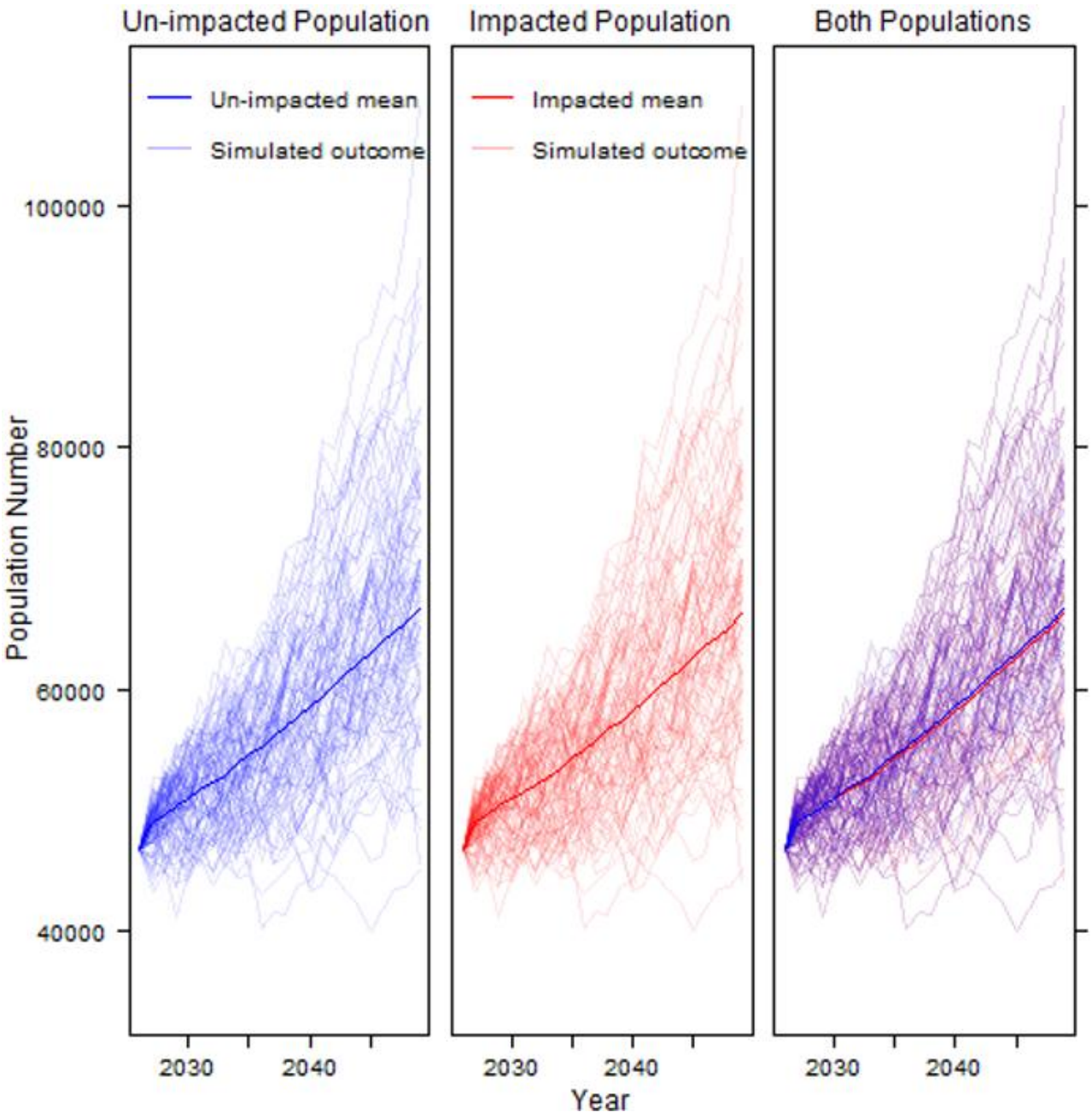


Figure 5-9: Simulated unimpacted and impacted population trajectories for grey seal in the relevant seal MUs: Cumulative scenario

Table 5-26: Mean and median (± 95% confidence intervals) predicted population sizes for grey seal in the relevant seal MUs: Cumulative scenario, and the counterfactual population size

Year	Description	Unimpacted population		Impacted population		Counterfactual population size	
		Mean	Median	Mean	Median	Mean	Median
2025	Pre-piling	46,821	46,821 (46,821 – 46,821)	46,821	46,821 (46,821 – 46,821)	1	1
2026	First year piling	48,950	49,182 (44,368 – 52,205)	48,950	49,182 (44,368 – 52,205)	1	1
2031	First year Buchan piling	52,280	52,247 (44,011 – 60,122)	52,139	52,038.5 (43,895 – 60,073)	0.997	0.996
2034	Final year Buchan piling	54,595	54,205.5 (44,434 – 65,899)	54,316	53,959 (44,370 – 65,489)	0.995	0.995
2039	Final year piling	58,595	58,352 (44,220 – 73,834)	58,234	57,894.5 (43,923 – 73,590)	0.994	0.992
2044	Five years following piling	63,045	62,988 (45,028 – 81,435)	62,671	62,625.5 (44,884 – 81,356)	0.994	0.994
2050	Eleven years following piling	68,757	68,406.5 (46,750 – 93,140)	68,345	67,887 (46,285 – 92,631)	0.994	0.992

Table 5-27: Mean and median (± 95% confidence intervals) predicted population growth rates for grey seal in the relevant seal MUs: Cumulative scenario, and the counterfactual population growth rate

Year	Description	Unimpacted population		Impacted population		Counterfactual population growth rate	
		Mean	Median	Mean	Median	Mean	Median
2025	Pre-piling	1	1.000 (1.000 - 1.000)	1	1.000 (1.000 - 1.000)	1	1
2026	First year piling	1.045	1.050 (0.948 - 1.115)	1.045	1.050 (0.948 - 1.115)	1	1
2031	First year Buchan piling	1.018	1.018 (0.990 - 1.043)	1.018	1.018 (0.989 - 1.042)	1	0.999
2034	Final year Buchan piling	1.017	1.016 (0.994 - 1.039)	1.016	1.016 (0.994 - 1.038)	0.999	0.999
2039	Final year piling	1.016	1.016 (0.996 - 1.033)	1.015	1.015 (0.995 - 1.033)	1	0.999
2044	Five years following piling	1.015	1.016 (0.998 - 1.030)	1.015	1.015 (0.998 - 1.030)	1	1
2050	Eleven years following piling	1.015	1.015 (1.000 - 1.028)	1.015	1.015 (1.000 - 1.028)	1	1

Harbour Seal

5-117 The largest number of harbour seals predicted to show a behavioural response from pile driving across all screened in projects is 423 in 2030 (5.5% of the relevant seal MUs), which does not coincide with any piling at the Proposed Offshore Development (**Table 5-28**). In 2031, when the largest number of harbour seals are impacted by the Proposed Offshore Development (2), the Proposed Offshore Development contributes 0.6% of the total number of animals impacted in the MU in this year.

5-118 Considering these results, showing that only a small proportion the reference population will be impacted, it can be concluded that the Proposed Offshore Development's contribution cumulatively with the contribution of other projects is **Not Significant** for increased underwater noise from pile driving for harbour seals.

Table 5-28: Number of harbour seals predicted to have a behavioural response per day from cumulative pile driving at 22 OWFs. Dark blue cells indicate confirmed piling years, light blue cells indicate indicative piling years. Totals marked as bold indicate the worst case (largest) number of animals predicted to be impacted in any year. A '-' marks projects which did not screen in this species.

Project		2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
Proposed Offshore Development[18]	Temporal Worst Case						1	1	1	1					
	Spatial Worst Case						2								
Arven OWF						155	155	155	155						
Aspen OWF				1	1	1									
Ayre OWF							57	57	57						
Bellrock OWF							1	1	1	1	1	1			
Berwick Bank OWF		3	3	3	3	3	3	3							
Bowdun OWF							7	7	7						
Broadshore Hub - Broadshore OWF					0	0	0	0							
Broadshore Hub - Scaraben OWF				0	0	0	0								
Broadshore Hub – Sinclair OWF				0	0	0	0								
Caledonia OWF				84	84	89	89	89							
Cenos OWF							-	-	-						
Marram Wind OWF									1	1	1	1	1	1	1
Morven OWF						0	0	0	0	0	0	0	0		
Muir Mhòr OWF					1	1	1								
Ossian OWF							-	-	-	-	-	-	-	-	
Seagreen Phase 1a Windfarm					1	1	1	1							
Stoura OWF						12	12	12	12	12	12				
Stromar OWF			3	3	3	3	3	3	3						
West of Orkney Wind Farm				158	158	158									
Total - Proposed Offshore Development Temporal Worst Case		3	6	249	251	**423**	330	329	237	15	14	2	1	1	1
% Relevant Seal MUs		0.04	0.08	3.24	3.26	**5.50**	4.29	4.28	3.08	0.20	0.18	0.03	0.01	0.01	0.01
Total - Proposed Offshore Development Spatial Worst Case		3	6	249	251	**423**	331	328	236	14	14	2	1	1	1
% Relevant Seal MUs		0.04	0.08	3.24	3.26	**5.50**	4.30	4.27	3.07	0.18	0.18	0.03	0.01	0.01	0.01
Total without Proposed Offshore Development		3	6	249	251	**423**	329	328	236	14	14	2	1	1	1
% Relevant Seal MUs		0.04	0.08	3.24	3.26	**5.50**	4.28	4.27	3.07	0.18	0.18	0.03	0.01	0.01	0.01

[18] For information, the number of harbour seals estimated to be disturbed from concurrent piling (spatial worst case scenario) using the 20 km EDR (JNCC, 2025) is 0.

5.6.3 Disturbance from Non-Piling Activities

5-119 Following the request in the RAEI issued by MD-LOT (18.12.2025), informed by representations from NatureScot (01.10.2025; see item **4a** and **4c** in **Table 5-1**), a quantitative assessment of the cumulative disturbance impacts from non-pile driving activities has been undertaken. In particular, this has focused on the potential behavioural responses from increased underwater noise from other construction activities (i.e. cable laying, backhoe dredging, suction dredging, horizontal directional drilling (HDD), rock placement and trenching), use of survey and positioning equipment and vessels following the approach used for the project alone assessment in the EIAR, Volume 2, Chapter 10 (Marine Mammals and Other Megafauna) for these impacts. UXO clearance is not considered here; as advised by NatureScot (01.10.2025) UXO Clearance will be further assessed post-consent and separate licencing will be required including further consideration of mitigation requirements. The Applicant is committed to using low-order deflagration as the primary method of disposal where possible.

5-120 The Applicant upholds the conclusions presented in the EIAR (see Section 10.13.3.2, Section 10.13.3.4 and Section 10.13.3.5 in EIAR, Volume 2, Chapter 10 (Marine Mammals and Other Megafauna)), which determine that the Proposed Offshore Development, when considered cumulatively with other projects, would not make a significant contribution to underwater noise arising from construction activities, survey and positioning equipment, or vessel use. Nonetheless, in response to the request from NatureScot and MD-LOT the Applicant has provided further information to support this conclusion.

5-121 As outlined in **Section 5.6.1** the cumulative project list was revisited for non-pile driving activities. All Tier 2 and Tier 3 projects have now been identified as having the potential to be undertaking non-piling construction work at the same time as the Proposed Offshore Development (2029 – 2036; one year before and one year after the anticipated construction dates for the Proposed Offshore Development (2030 – 2035)) and therefore have been screened in to the cumulative assessment (**Table 5-7**). This includes 16 Tier 2 OWFs, three Tier 2 subsea cable routes, eight Tier 3 OWFs and one tidal array development. This approach is highly conservative as it assumes that all of the projects may be undertaking non-piling construction activities at the same time, which is unlikely due to refinement of specific project timelines and access to suitable construction vessels. No smaller scale projects (i.e. harbour works and dredging projects) were identified as having temporal overlap with the Proposed Offshore Development due to a lack of long term temporal information (>5 years) on their construction schedules. Nonetheless, if any smaller scale projects were to be constructed at the same time as the Proposed Offshore Development the spatial footprint of any underwater noise generated would be de minimis in the context of the overall assessment assessing cumulative underwater noise impacts from offshore renewable energy developments and subsea pipelines and cables.

5-122 Non-piling activities (i.e. other construction activities, use of survey and positioning equipment and vessel movements) may produce underwater noise that could cause behavioural responses in marine mammals and other megafauna. Out of these non-piling activities the greatest potential source of underwater noise is from the use of survey and positioning equipment (see Section 10.12.2 of Volume 2, Chapter 10: Marine Mammals and Other Megafauna of the EIAR). This equipment has a recently updated 3 km EDR for the use of sub bottom profilers (SBPs),

ultra-short baseline (USBL) systems and low frequency (≤ 12 kHz) singlebeam and multibeam echo sounders (JNCC, 2025[19]). Considering that survey and/or positioning equipment (e.g. USBL) will be required for all other construction activities and will be in operation on most vessels the updated assessment of disturbance from non-piling activities has been undertaken using this EDR as a worst case scenario for all non-piling activities.

5-123 All marine mammal and megafauna species may be at risk of disturbance from non-pile driving activities. For all marine mammal species other than inshore bottlenose dolphins the worst case scenario would need to assume that all 28 projects screened into the assessment may be producing underwater noise at the same time from non-piling activities. Applying the 3 km EDR to these projects each one could impact an area of 28.27 km^2 at a single point in time (a total area of 791.68 km^2 for all projects; which for context is 0.25% of the area of whole UK portion of the North Sea MU for harbour porpoise). This level of impact is small in the context of the size of the reference populations for these species and is smaller than the area of impact assessed in the EIAR for geophysical survey and positioning equipment for a 2.5 km EDR assuming a moving source (908.6 km^2; see Table 10-94 in EIAR Volume 2, Chapter 10 (Marine Mammals and Other Megafauna)), which was concluded to be Not Significant (<1% of the animals in the UK portion of the MU for each species was impacted). Furthermore, for these species, behavioural responses that may occur will be short-term, sporadic, reversible, and will not result in long-term displacement. For example, research on harbour porpoise (which are particularly sensitive to underwater noise (Southall *et al.,* 2007; JNCC, 2020; Southall *et al.,* 2021)) disturbed by the decommissioning of an oil and gas platform (emitting comparable underwater noise sources to non-piling construction activities) shows that the occurrence of harbour porpoise was found to increase in the period immediately following the departure of the vessel involved in the activity (Fernandez-Betelu *et al*., 2024). Furthermore, harbour porpoise disturbed by a two-dimensional seismic survey (likely causing a greater level of disturbance than non-piling construction activities) were shown to return to affected sites within a few hours (Thompson *et al*., 2013).

5-124 An updated quantitative assessment has been undertaken on the east coast of Scotland bottlenose dolphin population. This population is particularly sensitive to disturbance from non-pile driving activities due to its restricted coastal range and is the key area of concern for the consultees in respect to this impact (see Figure 10-3 in EIAR Volume 2, Chapter 10 (Marine Mammals and Other Megafauna) and item **4a** and **4c** in **Table 5-1**). There is potential that non-piling construction activities may occur along all the screened in OWFs Export Cable Corridors (ECCs) and the three subsea cable routes which intersect with the range of this population at the same time. NatureScot are content that further assessment of the behavioural impacts from non-piling activities on the east coast of Scotland bottlenose dolphin population can be assessed on the Scottish scale, notwithstanding recent evidence that this population has expanded its range into northeast England (NatureScot Post-Workshop Memo, 28.04.2026). Therefore, the

[19] It is acknowledged that the JNCC's updated EDRs for assessing the significance of noise disturbance in harbour porpoise SACs is designed for use in English, Welsh and Northern Irish waters. However, without suitable alternative EDRs being available for Scottish waters these EDRs are deemed appropriate to use as they follow the most recent scientific evidence on underwater noise.

updated assessment of the potential impacts of non-piling activities has focused on the Scottish range of the east coast of Scotland bottlenose dolphin population.

5-125 Out of the 21 OWFs screened into the assessment in Scottish waters 16 have ECCs which overlap with the predicted range of the east coast of Scotland bottlenose dolphin population (this range was agreed during consultation for the EIAR and was assumed to extend from the Moray Firth SAC to the southern extent of the Coastal East Scotland MU; see Figure 10-3 in EIAR Volume 2, Chapter 10 (Marine Mammals and Other Megafauna)). The three screened in subsea cable routes also overlap with this range. Where the data is available, the ECCs and subsea cables which overlap with the predicted range of the east coast of Scotland bottlenose dolphin population is presented in **Figure 5-10**. Data on the ECCs for MarramWind OWF, Bellrock OWF and all Tier 3 projects (other than Arven OWF and Stromar OWF), was not available in the public domain. As a precautionary approach, it has therefore been assumed that the ECCs for MarramWind OWF, Bellrock OWF and the three Broadshore Hub OWFs may overlap with the predicted range of the east coast of Scotland bottlenose dolphin population.

5-126 Applying the 3 km EDR for the use of survey and positioning equipment to each of the 16 screened in OWFs' ECCs and the three subsea cable routes which overlap with the predicted range of the east coast of Scotland bottlenose dolphin population, as presented in **Figure 5-10**, a total area of 128.53 km^2 of this range may be impacted by non-piling construction activities at a single point in time. Applying the average density of dolphins in the predicted range of the east coast of Scotland bottlenose dolphin population (0.1019 animals per km^2; see Section 10.7.2 in EIAR Volume 2, Chapter 10 (Marine Mammals and Other Megafauna)), 13 inshore bottlenose dolphins may respond behaviourally (i.e. flee from the source of underwater noise) in this area at a single point in time (5.8% of the Coastal East Scotland MU (226 individuals, Cheney *et al*. (2024))[20]. Although construction work at the Proposed Offshore Development may last for a period of six years this level of disturbance will not be continuous and it is highly unlikely that all of the projects screened into this assessment will be producing underwater noise from non-piling construction activities at the same time (this will also mean there are unlikely to be any barriers to movement from underwater noise being generated from non-piling construction activities in the predicted range of the east coast of Scotland bottlenose dolphin population). Also, the EDRs applied here were designed for harbour porpoise which are more sensitive to underwater noise impacts than bottlenose dolphins meaning the number of animals impacted is considered to be highly conservative.

5-127 These results show that only a small number (13 individuals) of inshore bottlenose dolphins may be impacted by increased underwater noise created by non-piling activities at the Proposed Offshore Development cumulative with other projects. Furthermore, any potential behavioural effects for all species are considered temporary, intermittent and reversible. Therefore, the

[20] The number of dolphins impacted was calculated using the following formula where x is the number of inshore bottlenose dolphins which may respond behaviourally, A is the total area impacted (128.53 km^2) and B is the density of bottlenose dolphins in the predicted range of the east coast of Scotland bottlenose dolphin population (0.1019 animals per km^2): $x = A \times B$.

original EIAR conclusions (see Section 10.13.3.2, Section 10.13.3.4 and Section 10.3.3.5 in EIAR Volume 2, Chapter 10 (Marine Mammals and Other Megafauna)) of a not significant contribution from the Proposed Offshore Development cumulatively with the contribution of other projects for increased underwater noise from other construction activities, use of survey and positioning equipment and vessels is maintained.

8°0'W
4°30'W
1°0'W
2°30'E
6°0'E
60°0'N
58°30'N
57°0'N
55°30'N
54°0'N
6650000N
6500000N
6350000N
6200000N
6050000N
250000E
450000E
650000E
850000E
1050000E

Broadshore Hub - Sinclair OWF (INTOG)
Stoura OWF
Broadshore Hub - Broadshore OWF (ScotWind)
Arven OWF (ScotWind)
Ayre OWF (ScotWind)
Stromar OWF (ScotWind)
Broadshore Hub - Scaraben OWF (INTOG)
West of Orkney OWF (ScotWind)
Marram Wind OWF (ScotWind)
Pentland Floating OWF
Spittal to Peterhead
Salamander OWF (INTOG)
Aspen OWF (INTOG)
Muir Mhòr OWF (ScotWind)
Bowdun OWF (ScotWind)
Caledonia OWF (ScotWind)
Seagreen Phase 1a OWF
Cenos OWF (INTOG)
Bellrock OWF (ScotWind)
Ossian OWF (ScotWind)
Berwick Bank OWF
Morven OWF (ScotWind)
Eastern GreenLink 1
Eastern GreenLink 2

Project:

Buchan Offshore Wind EIA

Title:

Figure 5.10: Screened in cumulative projects for non-pile driving impacts in Scottish waters and their overlap with the east coast of Scotland bottlenose dolphin population

Key

- Array Area (Tier 1)
- Export Cable Corridor (ECC)
- Indicative IRC Area

Offshore renewable energy

- Tier 2
- Tier 3

Subsea cables and utilities

- Tier 2
- CEA Export Cable Corridor (ECC)

Bottlenose dolphin density per km²

- 0.1019

Scale @ A3: 1:3,250,000

Coordinate System: WGS 84 UTM Zone 30N
Graticules: WGS84

0 40 80 120 160 km

N

Date: 16-06-26	Prepared by: AC	Checked by: WB

EIA Ref No: BUC-C-MP-NP-0383
Map Ref: GB204095_M_401_A

BUCHAN OFFSHORE WIND

5.7 POTENTIAL SIGNIFICANT EFFECTS OF PILE DRIVING ON THE SOUTHERN TRENCH NATURE CONSERVATION MPA

5.7.1 Cumulative PTS (IRC)

5-128 This response relates to item **5a** in **Table 5-1**.

5-129 In their response to the Nature Conservation Marine Protected Area Assessment (Volume 3, Appendix 7.3), NatureScot concluded in their representation on the EIAR (01.10.2025) that underwater noise arising from IRC pile driving activities is capable of affecting, other than insignificantly, the minke whale feature of the Southern Trench Nature Conservation Marine Protected Area (MPA; herein referred to as Southern Trench MPA). However, they considered the risk of auditory injury from cumulative PTS could be avoided if installation of the IRC is conducted outside months with higher-than-average minke whale densities (May – October), unless further discussion and agreement on methods / timing is reached in consultation with NatureScot.

5-130 In Table 5-2 of the Nature Conservation Marine Protected Area Assessment (Volume 3, Appendix 7.3) the risk of auditory injury within the site as a result of increased underwater noise from pile driving was assessed in relation to the *'Species is conserved'* Conservation Objective. This assessment concluded that there was no risk of auditory injury (instantaneous PTS) to minke whale as a result of increased underwater noise from pile driving. The cumulative PTS ranges for the WTG anchors and OSP do not overlap with the Southern Trench MPA and therefore there is no risk of auditory injury to minke whales from piling these structures. The assessment also concluded that the risk of auditory injury (cumulative PTS) to minke whale as a result of increased underwater noise from pile driving the IRC is considered to be negligible. This conclusion was based on the fact that there is a small overlap between the cumulative PTS range (20 km assuming a 4.19 m/s flee speed) for the IRC and the Southern Trench MPA (the IRC modelling location is c.16 km from the Southern Trench MPA), there are several conservatisms with the assessing cumulative PTS impacts, and that construction of the IRC will only take a few days of piling.

5.7.1.1 Location of the IRC

5-131 The key issue raised by NatureScot in their representation on the EIAR (01.10.2025) is that the assessment was based on the IRC noise modelling location rather than on the worst case part of the indicative IRC area in regards to impacts to the Southern Trench MPA (i.e. the closest part of the indicative IRC is c.5 km from the Southern Trench MPA).

5-132 For the assessment of potential impacts of increased underwater noise from pile driving, modelling locations are selected on the basis of being representative. As stated in the Underwater Noise Modelling Assessment (EIAR Volume 3, Appendix 8.1) "…Modelling for foundation impact piling has been undertaken at five representative locations covering the extents of the Proposed Offshore Development. The five locations cover potential WTG, Offshore Platform (OSP), and Intermediate Reactive Compensation (IRC) locations, giving a spread of various water depths, distances to shore and into deeper water to the north and east the array…".

5-133 The modelling location used for the IRC will result in the largest noise impact contours because the water depth at this location (119 m) is greater than it is elsewhere within the indicative IRC area (the deeper the water the further sound travels).

5-134 Without modelling all possible locations, selection of a worst case noise modelling location requires understanding of the underlying drivers and assumptions that dictate model outputs. The worst case location for the Southern Trench MPA may not necessarily be the closest location – water depth at the closest location is c. 70 m. Furthermore, this location may not be the worst case for other reasons e.g. the location closest to greatest densities for each of the different marine mammal and other megafauna species assessed in the EIAR will not be the same.

5-135 The selected modelling location is therefore considered representative and is also considered the likely worst case location in terms of potential impacts due to depth of water, and location within the indicative IRC area.

5.7.1.2 Further Analysis Using the Current Cumulative PTS Modelling

5-136 As requested by NatureScot in their representation on the EIAR (01.10.2025), an overlap-based assessment with reference to higher density areas of minke whale within the MPA (**Figure 5-11**) has been conducted. Contextual information has also been provided regarding conservatisms in the approach used to model cumulative PTS.

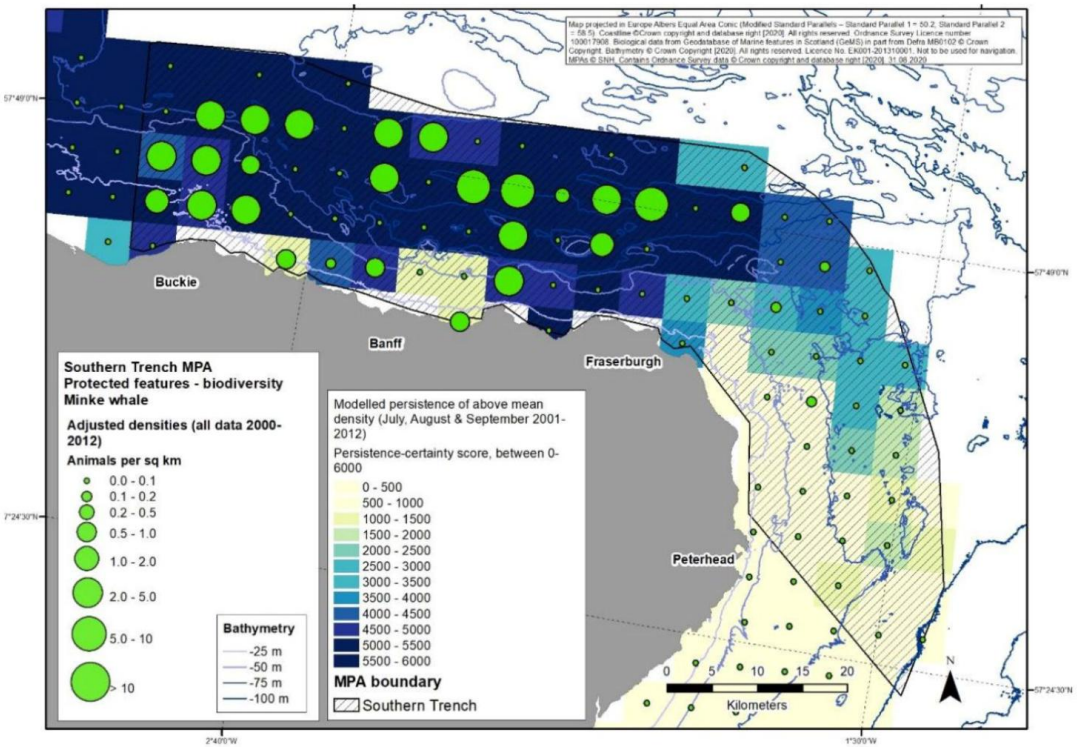
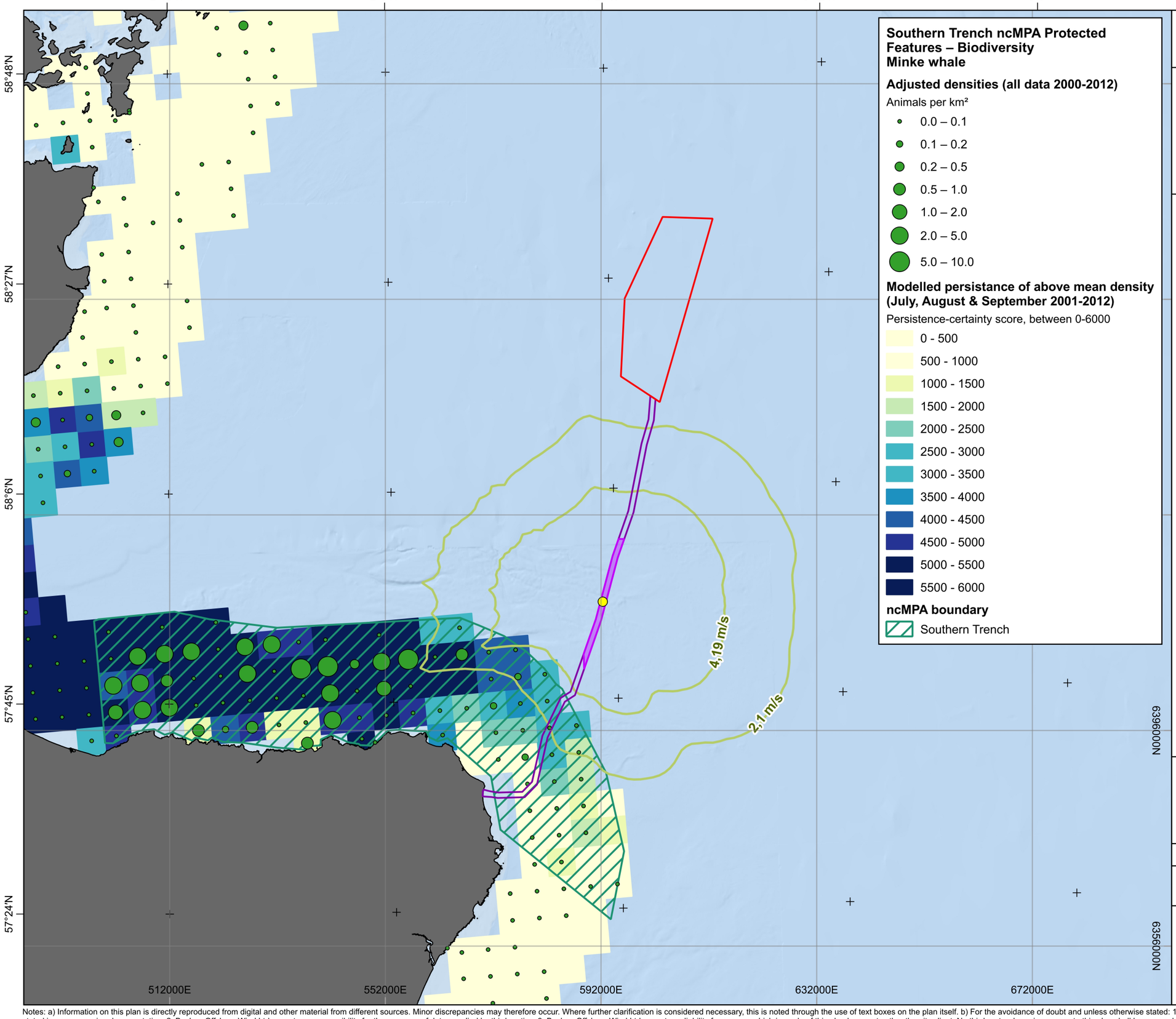


Figure 5-11: Minke whale density in Southern Trench MPA (image taken from NatureScot, 2025)

5-137 The 183 dB cumulative PTS contours for minke whale using the 4.19 m/s and 2.1 m/s flee speeds overlap c. 10.6 km^2 (0.44% of the total area) and c. 252 km^2 (10.5% of the total area) of the Southern Trench MPA respectively (**Figure 5-12**). These contours overlap an area of relatively lower adjusted densities of minke whales (0 – 0.971 animals per km^2).



Project:

Buchan Offshore Wind EIA

Title:

Figure 5.12: The 183 dB cumulative PTS contours for piling at the IRC modelling location using the 4.19 m/s and 2.1 m/s flee speeds for minke whale

Key

- Array Area
- Export Cable Corridor (ECC)
- Indicative IRC Area
- Indicative IRC noise modelling location

Noise modelling contour

- 183 dB

Scale @ A3: 1:700,000

Coordinate System: WGS 84 UTM Zone 30N

Graticules: WGS84

0 8 16 24 32 km

N

Date: 16-06-26	Prepared by: AC	Checked by: WB

EIA Ref No: BUC-C-MP-NP-0385

Map Ref: GB204095_M_403_A

BUCHAN OFFSHORE WIND

5-138 As outlined in Table 5-2 of the Nature Conservation Marine Protected Area Assessment (Volume 3, Appendix 7.3) the assessment approach used contains several conservatisms, including the following, which mean that results presented in **para 5-137** are precautionary:

- it has been assumed that all animals located within the PTS onset range will develop PTS. However, the threshold calculated for PTS is the 'onset' to these effects i.e., the threshold at which the effect starts to be detected in test species rather than where this effect is widespread (Donovan *et al*. (2017) using data presented in Finneran *et al*. (2005));
- impulsive noise impacts over large ranges have been considered although recent evidence shows that acoustic propagation over large ranges transforms impulsive characteristics in time and frequency (Southall, 2021); and
- hearing recovery as a result of breaks in piling (between hammer blows, piles at one group of locations, piling locations) (Finneran, 2015) has not been accounted for.

5-139 In Section 10.12.2.1 of Volume 2, Chapter 10: Marine Mammals and Other Megafauna an attempt to overcome some of these conservatisms (i.e., to account for hearing recovery as a result of breaks in piling) is outlined involving modelling additional +2 dB and +3 dB contours for low frequency and very high frequency cetaceans to account for noise being produced at a 25% duty cycle[21] (as suggested in Sinclair *et al*. (2023) and Sinclair and Verfuss (2021)). As presented in Table 10-27 of Volume 2, Chapter 10: Marine Mammals and Other Megafauna this results in a substantial reduction in cumulative PTS impact ranges. Illustration of the +2 dB (185 dB) and +3 dB (186 dB) cumulative PTS contours for minke whale using both the 4.19 m/s and 2.1 m/s flee speeds are presented in **Figure 5-13** and **Figure 5-14** respectively.

5-140 These contours illustrate the negligible overlap with the Southern Trench MPA and areas of varying minke whale density.

[21] Duty cycle is the ratio of the on versus off time and is usually expressed as a percentage.

2°48'W
2°6'W
1°24'W
0°42'W
0°0'
58°48'N
58°27'N
58°6'N
57°45'N
57°24'N
512000E
552000E
592000E
632000E
672000E
N0009639
N0009639

Southern Trench ncMPA Protected Features – Biodiversity
Minke whale

Adjusted densities (all data 2000-2012)
Animals per km²
- 0.0 – 0.1
- 0.1 – 0.2
- 0.2 – 0.5
- 0.5 – 1.0
- 1.0 – 2.0
- 2.0 – 5.0
- 5.0 – 10.0

Modelled persistance of above mean density (July, August & September 2001-2012)
Persistence-certainty score, between 0-6000
- 0 - 500
- 500 - 1000
- 1000 - 1500
- 1500 - 2000
- 2000 - 2500
- 2500 - 3000
- 3000 - 3500
- 3500 - 4000
- 4000 - 4500
- 4500 - 5000
- 5000 - 5500
- 5500 - 6000

ncMPA boundary
- Southern Trench

Project:
Buchan Offshore Wind EIA

Title:
Figure 5.13: The 183, 185 and 186 dB cumulative PTS contours for piling at the IRC modelling location using the 4.19 m/s flee speed for minke whale

Key
- Array Area
- Export Cable Corridor (ECC)
- Indicative IRC Area
- Indicative IRC noise modelling location

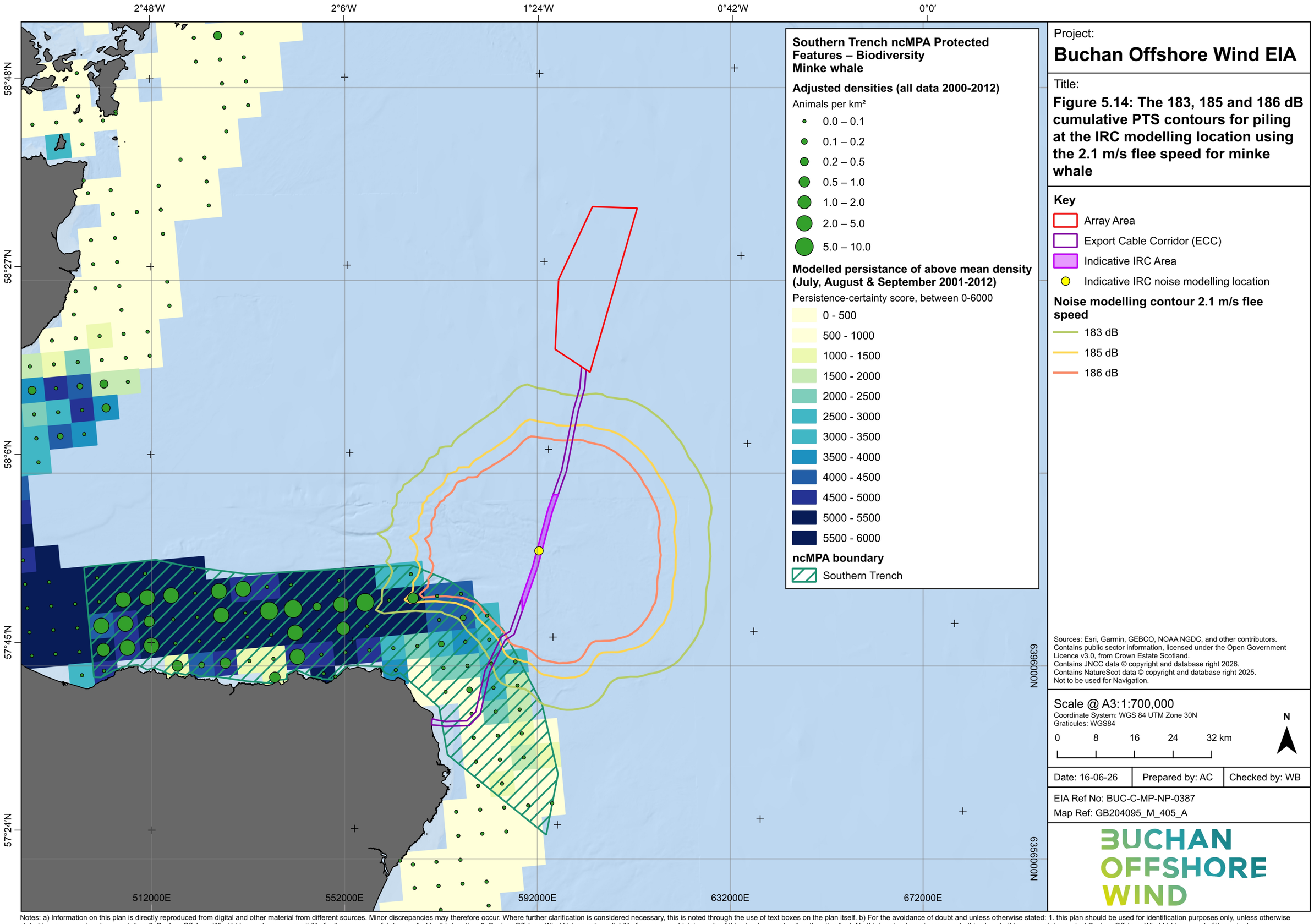
Noise modelling contour 4.19 m/s flee speed
- 183 dB
- 185 dB
- 186 dB

Scale @ A3: 1:700,000
Coordinate System: WGS 84 UTM Zone 30N
Graticules: WGS84
0 8 16 24 32 km
N

Date: 16-06-26	Prepared by: AC	Checked by: WB

EIA Ref No: BUC-C-MP-NP-0386
Map Ref: GB204095_M_404_A

BUCHAN OFFSHORE WIND



Project:

Buchan Offshore Wind EIA

Title:

Figure 5.14: The 183, 185 and 186 dB cumulative PTS contours for piling at the IRC modelling location using the 2.1 m/s flee speed for minke whale

Key

- Array Area
- Export Cable Corridor (ECC)
- Indicative IRC Area
- Indicative IRC noise modelling location

Noise modelling contour 2.1 m/s flee speed

- 183 dB
- 185 dB
- 186 dB

Scale @ A3: 1:700,000

Coordinate System: WGS 84 UTM Zone 30N

Graticules: WGS84

0 8 16 24 32 km

N

Date: 16-06-26	Prepared by: AC	Checked by: WB

EIA Ref No: BUC-C-MP-NP-0387

Map Ref: GB204095_M_405_A

BUCHAN OFFSHORE WIND

5-141 In order to rule out any perceived bias due to noise modelling location, the maximum 10 km cumulative PTS onset range, based on the findings of Hastie *et al.* (2019; as discussed in 'Conservatisms' in Section 10.12.2.1 in EIAR Volume 2, Chapter 10 (Marine Mammals and Other Megafauna)), has been plotted (**Figure 5-15**). This range overlaps c. 45 km^2 (1.9% of the total area) of the Southern Trench MPA. The maximum density of minke whales within this overlap is 0.03 animals per km^2 (average density of 0.016). As such, <1 (0.71) minke whale has potential to be exposed to noise levels sufficient to induce the onset of cumulative PTS in this overlap using this approach.

5-142 In line with the original assessment, there is no risk of killing or injuring minke whale in the Southern Trench MPA as a result of increased underwater noise from pile driving, and there is no significant risk of hindering achievement of the 'Species is conserved' Conservation Objective. The Applicant therefore concludes that a seasonal restriction on piling the IRC outside the months with higher-than-average minke whale densities (May – October) in the Southern Trench MPA is not required.

2°48'W
2°6'W
1°24'W
0°42'W
0°0'
58°48'N
58°27'N
58°6'N
57°45'N
57°24'N
512000E
552000E
592000E
632000E
672000E
6396000N
6356000N

Southern Trench ncMPA Protected Features – Biodiversity
Minke whale

Adjusted densities (all data 2000-2012)
Animals per km²
- 0.0 – 0.1
- 0.1 – 0.2
- 0.2 – 0.5
- 0.5 – 1.0
- 1.0 – 2.0
- 2.0 – 5.0
- 5.0 – 10.0

Modelled persistance of above mean density (July, August & September 2001-2012)
Persistence-certainty score, between 0-6000
- 0 - 500
- 500 - 1000
- 1000 - 1500
- 1500 - 2000
- 2000 - 2500
- 2500 - 3000
- 3000 - 3500
- 3500 - 4000
- 4000 - 4500
- 4500 - 5000
- 5000 - 5500
- 5500 - 6000

ncMPA boundary
- Southern Trench

Project:
Buchan Offshore Wind EIA

Title:
Figure 5.15: The maximum 10 km cumulative PTS onset range for piling at the IRC modelling location based on the findings of Hastie *et al.* (2019)

Key
- Array Area
- Export Cable Corridor (ECC)
- Indicative IRC Area
- Indicative IRC noise modelling location
- Hastie *et al.* (2019) 10 km PTS-Onset Range

Hastie, G., Merchant, N.D., Götz, T., Russell, D.J., Thompson, P. and Janik, V.M. (2019). Effects of impulsive noise on marine mammals: investigating range-dependent risk.
Not to be used for Navigation.

Scale @ A3: 1:700,000
Coordinate System: WGS 84 UTM Zone 30N
Graticules: WGS84
0 8 16 24 32 km
N

Date: 16-06-26	Prepared by: AC	Checked by: WB

EIA Ref No: BUC-C-MP-NP-0388
Map Ref: GB204095_M_406_A

BUCHAN OFFSHORE WIND

5.7.2 Disturbance (WTG)

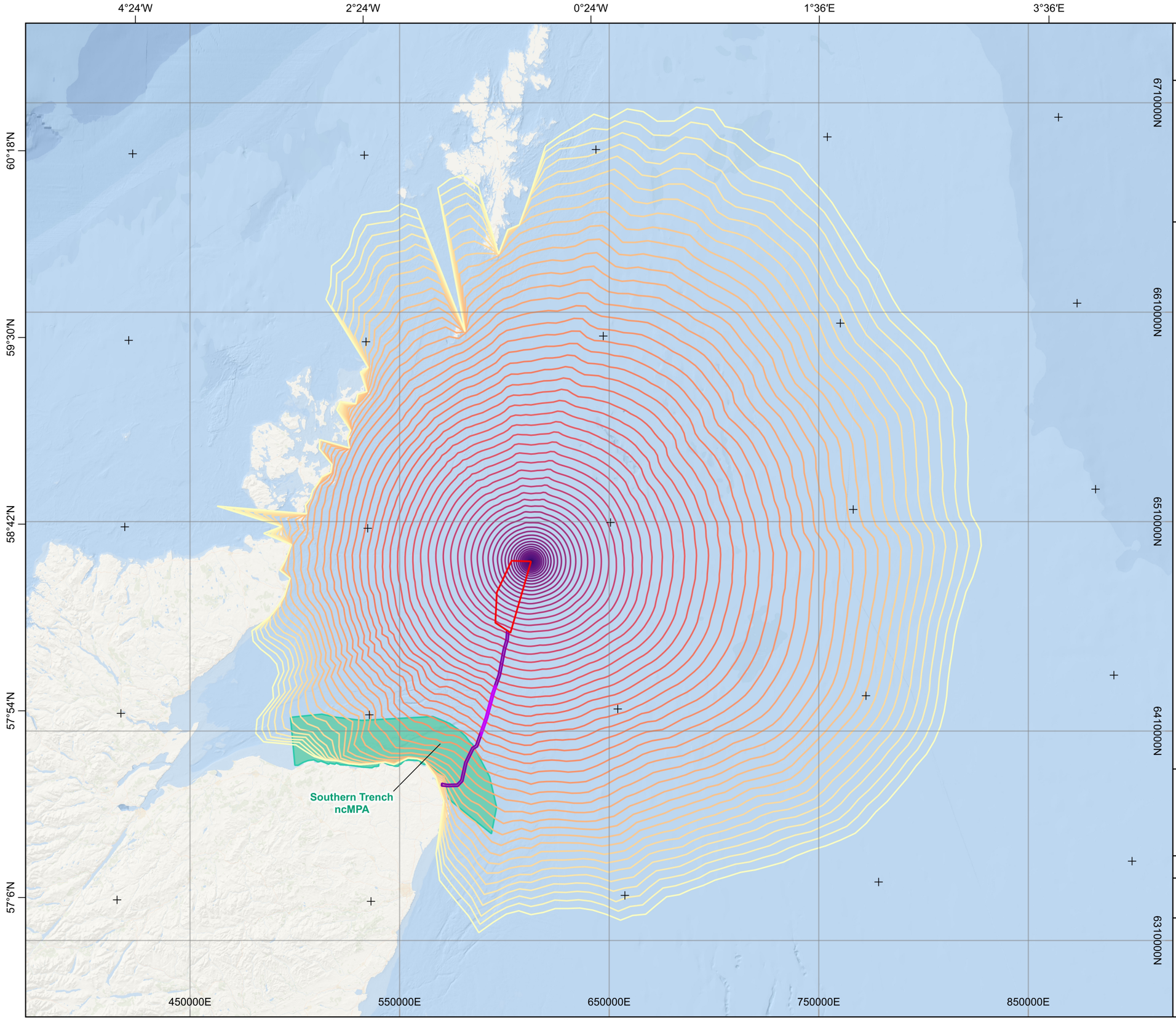
5.7.2.1 Project Alone

5-143 This response relates to item **5b** and **5c** in **Table 5-1**.

5-144 NatureScot have requested in their representation on the EIAR (01.10.2025) and subsequently through further consultation (NatureScot Post-Workshop Memo (28.04.2026)) that additional information is provided on the project alone disturbance impacts of pile driving on the Southern Trench MPA. In particular, additional information is required on the percentage area of the Southern Trench MPA that will be disturbed during pile driving activities, when and for what duration, as well as a visual representation of dose-response curve disturbance ranges.

5-145 In Table 5-2 of Volume 3, Appendix 7.3: Nature Conservation Marine Protected Area Assessment of the EIAR, significant disturbance within the site, as a result of increased underwater noise from pile driving, was assessed in relation to the *'Continued access by the species to resources provided by the MPA for, but not restricted to, feeding, courtship, spawning or use as nursery grounds'* Conservation Objective for minke whales for the Southern Trench MPA. This assessment concluded that the majority of the received noise level contours for disturbance (1 dB increments) from the Array Area do not overlap the Southern Trench MPA. Also, the 1 dB contours that do overlap a small proportion of the Southern Trench MPA, and their level, is such that the majority of individuals which may be present at the time are unlikely to respond. It was also noted that these estimates may be conservative for minke whale because the dose-response relationship was developed for harbour porpoise which are particularly sensitive to underwater noise (Southall *et al.,* 2007; JNCC, 2020; Southall *et al.,* 2021).

5-146 In response to the request from NatureScot in their representation on the EIAR (01.10.2025), the disturbance impacts from piling on the Southern Trench MPA have been reassessed using dose-response curves. The modelled received level contours (1 dB increments) from each of the three WTG noise modelling locations, at the NE, SE and W corners of the Array Area, and their overlap with the Southern Trench MPA are presented in **Figure 5-16** to **Figure 5-18**. The contours for the concurrent scenario (concurrent piling at the NE, SE and W locations) are presented in **Figure 5-19**. The maximum hammer energy under each of these scenarios (WTG pile driving) is 1,800 kJ (see Section 3.2.2 of the Underwater Noise Modelling Assessment (Volume 3, Appendix 8.1)). NatureScot have confirmed that they do not require any further information on the disturbance impacts from piling the IRC so these are not presented.



Project:

Buchan Offshore Wind EIA

Title:

Figure 5.16: Received levels (1 dB increments) for piling at the NE piling location and their overlap with the Southern Trench ncMPA

Key

- Array Area
- Export Cable Corridor (ECC)
- Indicative IRC Area
- Nature Conservation Marine Protected Area (ncMPA)

Received levels (1 dB increments)

190 dB

120 dB

Scale @ A3: 1:1,800,000

Coordinate System: WGS 84 UTM Zone 30N
Graticules: WGS84

0 25 50 75 100 km

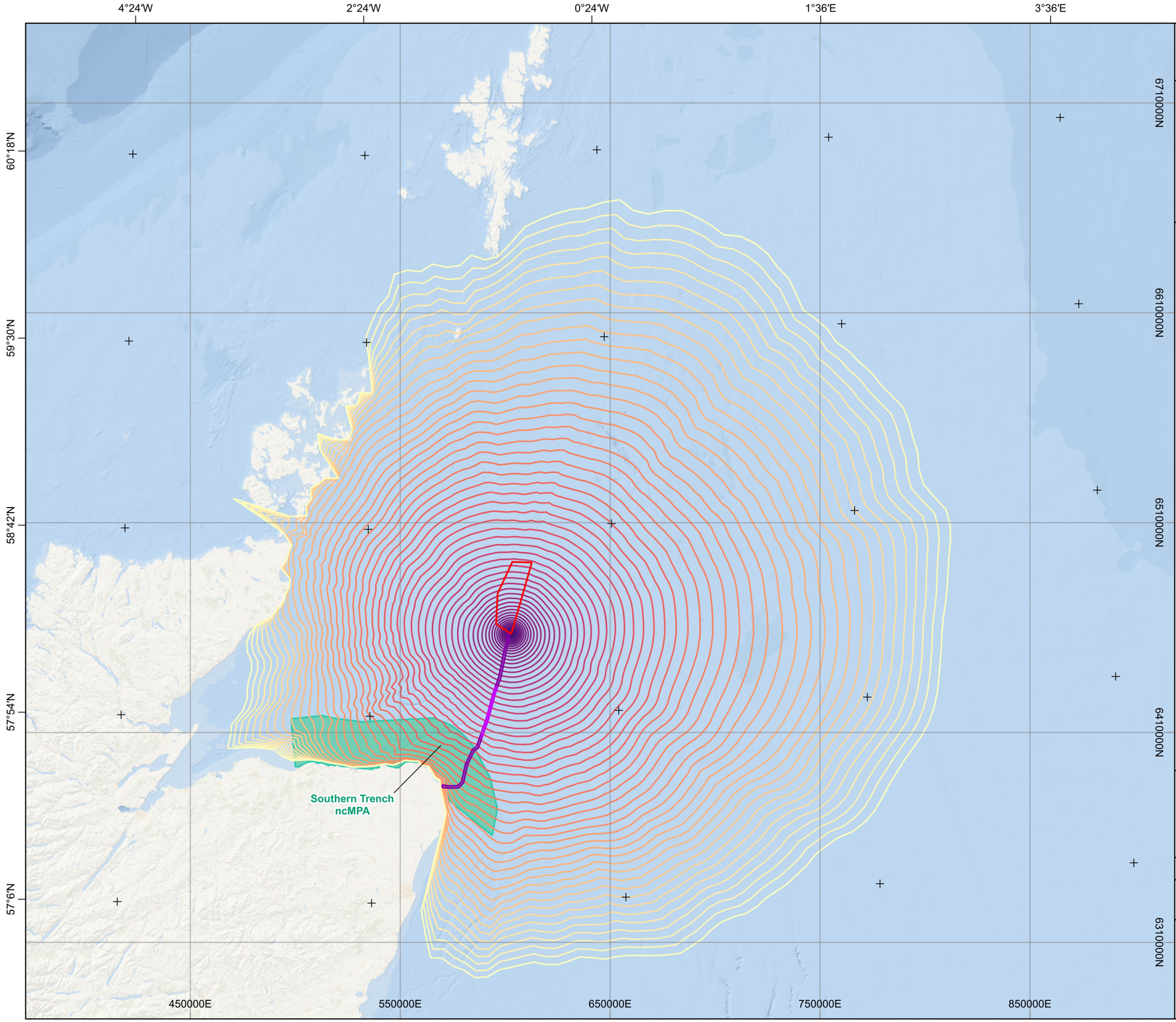
N

Date: 16-06-26	Prepared by: AC	Checked by: WB

EIA Ref No: BUC-C-MP-NP-0358

Map Ref: GB204095_M_376_A

BUCHAN OFFSHORE WIND



Project:

Buchan Offshore Wind EIA

Title:

Figure 5.17: Received levels (1 dB increments) for piling at the SE piling location and their overlap with the Southern Trench ncMPA

Key

- Array Area
- Export Cable Corridor (ECC)
- Indicative IRC Area
- Nature Conservation Marine Protected Area (ncMPA)

Received levels (1 dB increments)

190 dB

120 dB

Scale @ A3: 1:1,800,000

Coordinate System: WGS 84 UTM Zone 30N
Graticules: WGS84

0 25 50 75 100 km

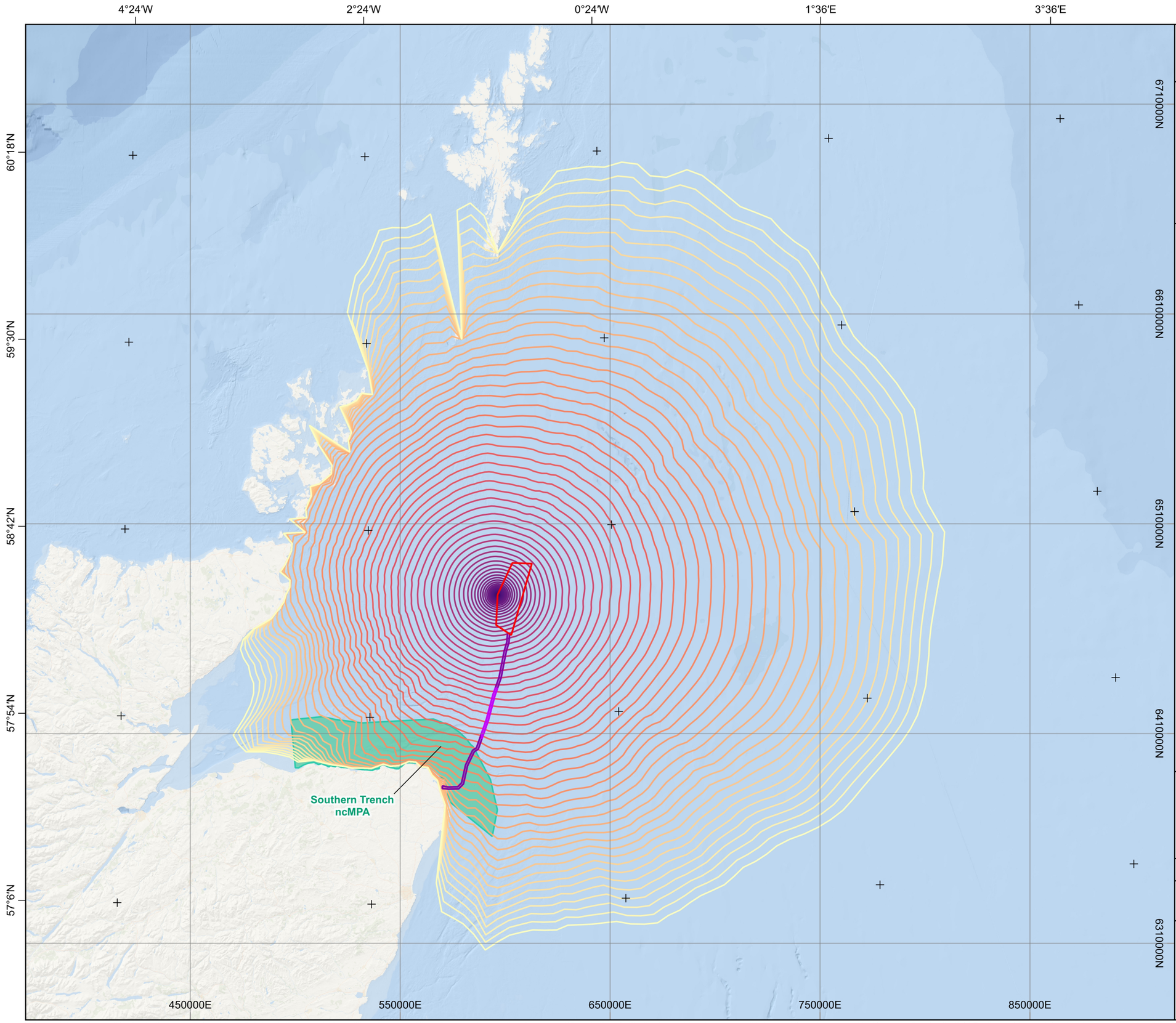
N

Date: 16-06-26	Prepared by: AC	Checked by: WB

EIA Ref No: BUC-C-MP-NP-0360

Map Ref: GB204095_M_378_A

BUCHAN OFFSHORE WIND



Project:

Buchan Offshore Wind EIA

Title:

Figure 5.18: Received levels (1 dB increments) for piling at the W piling location and their overlap with the Southern Trench ncMPA

Key

- Array Area
- Export Cable Corridor (ECC)
- Indicative IRC Area
- Nature Conservation Marine Protected Area (ncMPA)

Received levels (1 dB increments)

190 dB

120 dB

Scale @ A3: 1:1,800,000

Coordinate System: WGS 84 UTM Zone 30N
Graticules: WGS84

0 25 50 75 100 km

N

Date: 16-06-26	Prepared by: AC	Checked by: WB

EIA Ref No: BUC-C-MP-NP-0359
Map Ref: GB204095_M_377_A

BUCHAN OFFSHORE WIND

4°24'W
2°24'W
0°24'W
1°36'E
3°36'E
60°18'N
59°30'N
58°42'N
57°54'N
57°6'N
6710000N
6610000N
6510000N
6410000N
6310000N
450000E
550000E
650000E
750000E
850000E
Southern Trench ncMPA

Project:

Buchan Offshore Wind EIA

Title:

Figure 5.19: Received levels (1 dB increments) for piling at the NE, W and SE piling location and their overlap with the Southern Trench ncMPA

Key

- Array Area
- Export Cable Corridor (ECC)
- Indicative IRC Area
- Nature Conservation Marine Protected Area (ncMPA)

Received levels (1 dB increments)

190 dB

120 dB

Scale @ A3: 1:1,800,000

Coordinate System: WGS 84 UTM Zone 30N
Graticules: WGS84

0 25 50 75 100 km

N

Date: 16-06-26	Prepared by: AC	Checked by: WB

EIA Ref No: BUC-C-MP-NP-0361
Map Ref: GB204095_M_379_A

BUCHAN OFFSHORE WIND

5-147 In their representation on the EIAR (01.10.2025) NatureScot requested additional information is required on the percentage area of the Southern Trench MPA that will be disturbed during pile driving activities. Therefore, the proportion of animals expected to respond at the different received levels (using the first pile Graham *et al*. (2019) dose response relationship) and the area of overlap with the Southern Trench MPA for each 1 dB noise contour ≤146 dB (the greatest value noise contour which overlaps the MPA) was calculated for the worst case[22] single location piling (SE) and for concurrent piling (SE, NE and W) scenarios and is presented in **Table 5-29.**

5-148 The 'effective disturbance area', which is the area of the MPA within each noise contour multiplied by the proportion of animals expected to respond at that received level, is also presented. When totalled and expressed as a percentage of the area of the MPA (which is 2396.56 km^2 in size), the effective disturbance area provides an estimate of the percentage of the MPA within which minke whales may experience noise levels which may incite a behavioural response. The duration of impact for single location and concurrent piling is provided in **Section 5.3.4**.

Table 5-29: Calculation of the percentage of the Southern Trench MPA within which minke whales may be disturbed using the Graham *et al*. (2019) dose response relationship for pile driving at the SE noise modelling location and concurrent piling (at the SE, NE and W noise modelling locations).

dB Level	Proportion of animals expected to respond using the first pile Graham *et al.* (2019) dose-response relationship	Single location piling (SE)		Concurrent piling	
		Area of overlap with MPA (km^2)	Effective disturbance area (km^2)	Area of overlap with MPA (km^2)	Effective disturbance area (km^2)
146	0.28	22.66	6.42	22.66	6.42
145	0.27	85.04	22.98	85.04	22.98
144	0.26	129.16	33.24	129.16	33.24
143	0.24	162.96	39.89	162.96	39.89
142	0.23	190.53	44.32	190.53	44.32
141	0.22	211.09	46.59	211.09	46.59
140	0.21	223.79	46.82	223.79	46.82
139	0.20	231.78	45.90	231.78	45.90
138	0.19	212.79	39.84	212.79	39.84
137	0.18	172.50	30.50	172.50	30.50
136	0.17	103.54	17.27	104.41	17.41
135	0.16	92.13	14.48	94.70	14.88
134	0.15	86.64	12.81	88.09	13.02
133	0.14	82.47	11.46	82.85	11.51
132	0.13	76.92	10.03	77.93	10.16
131	0.12	70.14	8.57	71.27	8.71
130	0.11	66.43	7.60	66.91	7.65
129	0.11	39.46	4.22	39.44	4.22

[22] The SE location is considered to represent the worst case because its 1 dB noise contours have the largest area of overlap with the Southern Trench MPA out of the three single location piling locations modelled.

dB Level	Proportion of animals expected to respond using the first pile Graham *et al.* (2019) dose-response relationship	Single location piling (SE)		Concurrent piling	
		Area of overlap with MPA (km^2)	Effective disturbance area (km^2)	Area of overlap with MPA (km^2)	Effective disturbance area (km^2)
128	0.10	26.71	2.67	27.26	2.72
127	0.09	22.17	2.06	23.31	2.17
126	0.09	12.40	1.08	13.20	1.14
125	0.08	7.39	0.60	7.64	0.62
124	0.07	4.95	0.37	4.96	0.37
123	0.07	3.38	0.24	3.35	0.23
122	0.06	2.32	0.15	2.33	0.15
121	0.06	1.58	0.09	2.50	0.15
Total area of overlap (km^2)		2340.94	450.19	2352.47	451.64
Total area as a percentage of the area of the MPA		97.68%	18.78%	98.16%	18.85%

5-149 Received level contours from single location pile driving at the worst case location (SE) extend over 97.68% of the Southern Trench MPA. However, taking into account the probability that minke whales may respond to each received level (using the first pile (i.e., precautionary) Graham *et al*. (2019) dose-response relationship), the 'effective disturbance area' represents 18.78% of the MPA.

5-150 Received level contours from the concurrent piling scenario (concurrent piling at the NE, SE and W locations) extend over 98.16% of the Southern Trench MPA. However, taking into account the probability that minke whales may respond to each received level (using the first pile (i.e., precautionary) Graham et al. (2019) dose-response relationship), the 'effective disturbance area' represents 18.85% of the MPA.

5.7.2.2 Cumulative Impacts

5-151 This response relates to item **5d** in **Table 5-1**.

5-152 As requested in the RAEI issued by MD-LOT (18.12.2025), informed by representations from NatureScot (01.10.2025), additional information is provided on the cumulative disturbance impacts of pile driving on the Southern Trench MPA. It is requested that the percentage area of the Southern Trench MPA that will be disturbed cumulatively (through a spatial and / or temporal overlap) from pile driving activities from all relevant offshore wind developments is presented along with visual representation of disturbance ranges.

5-153 In regard to the temporal overlap of piling with the Proposed Offshore Development, projects were screened in if their piling dates fall one year before or after the piling dates for Buchan (i.e. 2030 – 2035 (piling activities at Buchan are 2031-2034); see **Section 5.6.1**). For projects which don't have published piling dates it is assumed that piling may occur in any year during their construction window. The screened in projects along with their construction and piling dates are presented in **Table 5-8.** Based on the submitted information from other projects, 21 projects

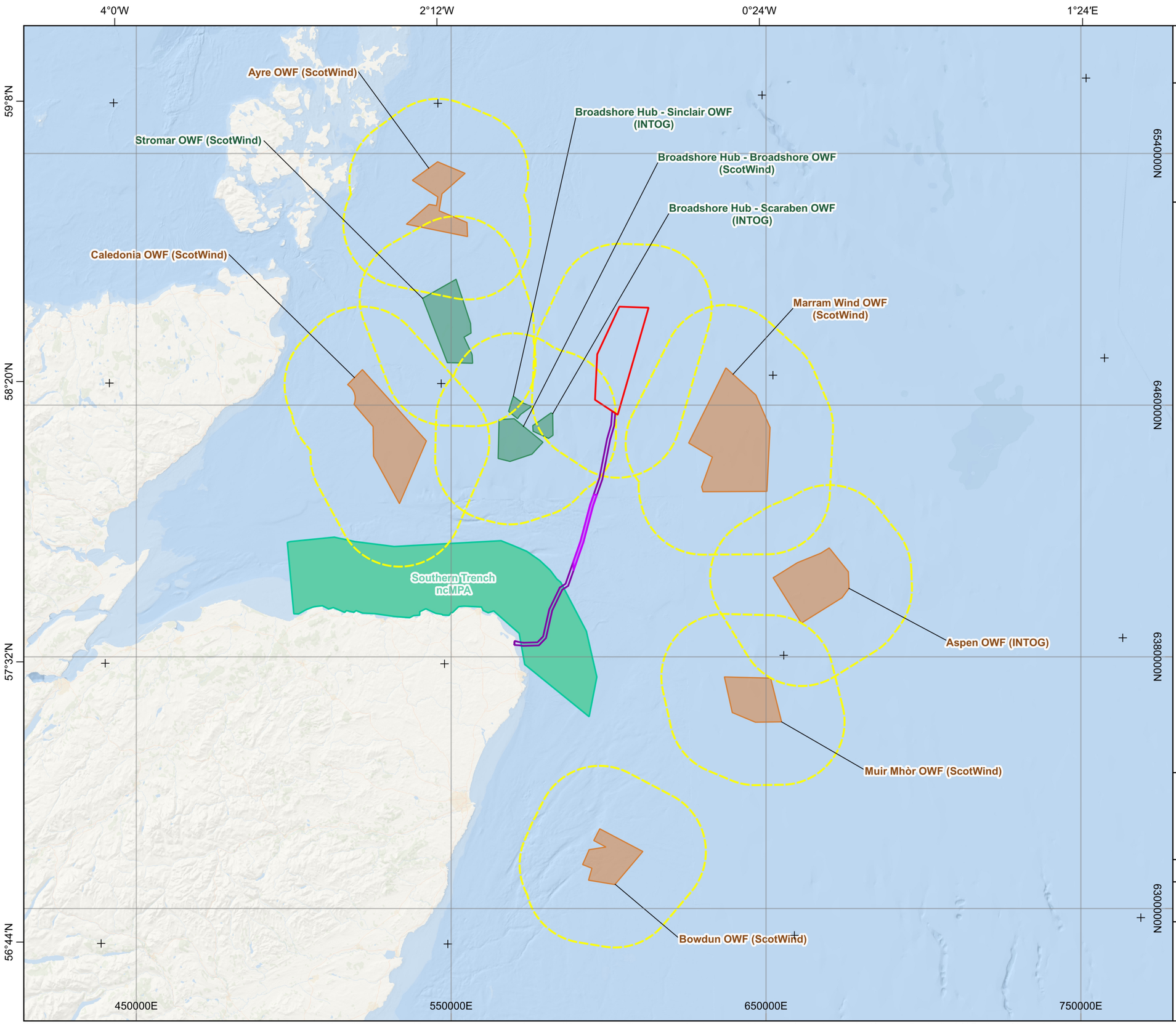
may be piling within one year of the Proposed Offshore Development's piling window. In 2031 19 of the screened in projects may be piling at the same time.

5-154 Out of these 21 projects, four have EIARs in the public domain (Tier 2 projects) and have calculated the potential overlap of noise disturbance contours with the Southern Trench MPA. These are Aspen OWF, Bowdun OWF, Caledonia OWF and Muir Mhòr OWF. The area of overlap with the Southern Trench MPA and the effective disturbance area for each project are presented in **Table 5-30**, although caution should be applied when comparing these results due to differences in the methodology used to generate them. Without access to the dose-response curves from the projects, it is not possible to calculate the total percentage of the MPA which might be impacted from all projects cumulatively due to the inability to accommodate for any overlap in dose-response contours between projects. Project specific information suggests that MarramWind OWF could also have potential overlap of noise disturbance contours with the Southern Trench MPA but specific dose-response values are not available. Ayre OWF concluded that at a distance of 67.9 km from the Southern Trench MPA the risk of behavioural effects to minke whales is low and therefore it was not assessed further in its MPA assessment.

Table 5-30: Percentage of the Southern Trench MPA within which minke whales may be disturbed by the Proposed Offshore Development cumulatively with other projects

Project	Disturbance Threshold Used	Effective disturbance area (km^2)	% MPA
Proposed Offshore Development	Dose-response	451.64	18.85%
Aspen OWF	Dose-response	289.5	12.0 %
Bowdun OWF	Dose-response	463.59	19.29 %
Caledonia OWF	Dose-response	1,656	65.3%
Muir Mhòr OWF	Dose-response	563.04	22.20%

5-155 Four Tier 4 projects are in close proximity to the Southern Trench MPA and have the potential to impact it if dose-response curves were applied. The four projects are Stromar OWF, Scaraben OWF, Sinclair OWF and Broadshore OWF. Without details of the dose-response curves used for each of these projects, the potential overlap with the Proposed Offshore Development has been calculated using the 20 km EDR for monopiles and pin piles without noise abatement (JNCC, 2025). The EDR approach has also been applied to the six Tier 2 projects in proximity to the MPA, and the Proposed Offshore Development for comparison (**Figure 5-20**). No Tier 3 projects have EDR disturbance contours overlapping the Southern Trench MPA. From all projects assessed, only the EDR disturbance contour from Caledonia OWF overlaps with the Southern Trench MPA (143.2 km^2 area of overlap), which can be discounted considering it is a Tier 2 project with dose-response results available (see **Table 5-30**).



Project:

Buchan Offshore Wind EIA

Title:

Figure 5.20: Cumulative behavioural responses from pile driving on minke whales in the Southern Trench MPA

Key

- Array Area (Tier 1)
- Export Cable Corridor (ECC)
- Indicative IRC Area

Effective Deterrence Range (EDR)

- 20 km

Designated site

- Nature Conservation Marine Protected Area (ncMPA)

Offshore renewable energy

- Tier 2
- Tier 3

Scale @ A3: 1:1,200,000

Coordinate System: WGS 84 UTM Zone 30N
Graticules: WGS84

N

0 15 30 45 60 km

Date: 16-06-26	Prepared by: AC	Checked by: WB

EIA Ref No: BUC-C-MP-NP-0384

Map Ref: GB204095_M_402_A

BUCHAN OFFSHORE WIND

5.7.3 Key Prey Species (Sandeel and Herring)

5-156 This response relates to item **5d** in **Table 5-1**.

5-157 MD-LOT requested in the RAEI (18.12.2025) (informed by representation from NatureScot (01.10.2025)) that the potential impacts to sandeel and herring as key prey species for minke whale as a result of piling activities is clarified. This in relation to the 'Extent and distribution of any supporting feature and Structure and function of any supporting feature, including any associated processes supporting the species' conservation objective for the Southern Trench MPA as assessed in Section 5.1.4 of the Nature Conservation Marine Protected Area Assessment (Volume 3, Appendix 7.3).

5-158 Minke whales have been observed feeding on a diverse variety of prey including sandeel, herring and other pelagic shoaling fish species such as sprat, mackerel, whiting and pout (Anderwald and Evans, 2007). However, sandeel and herring form the bulk of the minke whale diet in the Southern Trench MPA (MacDougall and Robinson, 2025). Sandeel appear to be a particularly important prey species for juvenile minke whales, which have been observed feeding almost exclusively on sandeel along the southern coastline of the Southern Trench MPA (Robinson *et al.,* 2023). The distribution of minke whale in the southern Moray Firth is significantly correlated with the ideal benthic habitat (sandy gravel sediment types) of sandeel, and the arrival of minke whales appears to coincide with the emergence of sandeel into the water column in April to July (Robinson *et al.,* 2009). In July to August sandeels enter their burrowing phase, therefore, minke whales switch their diet to emerging juvenile herring (MacDougall and Robinson, 2025). Considering the reliance on these prey species minke whales in the Southern Trench MPA may be impacted if the sandeel and herring numbers are reduced.

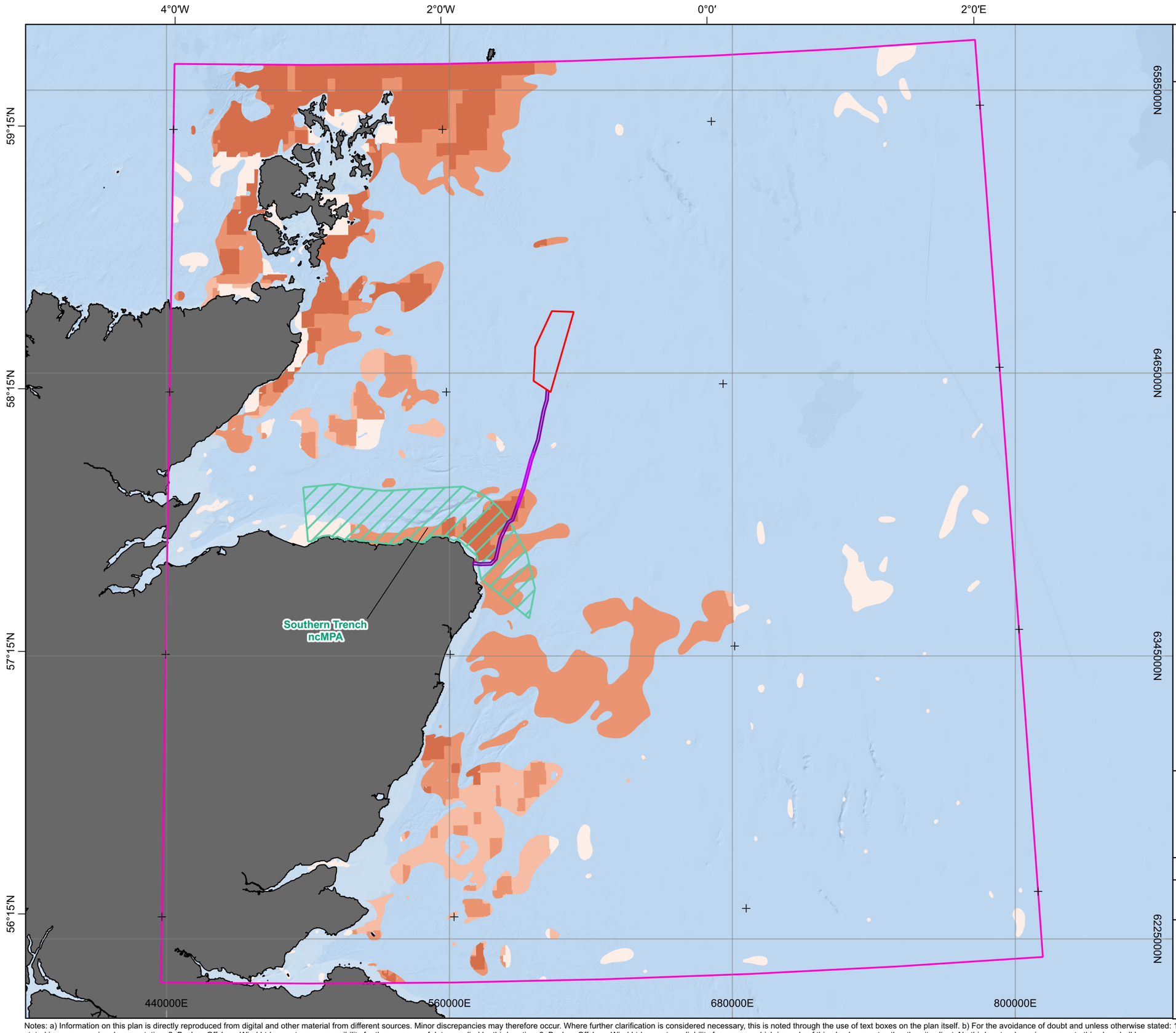
5-159 Herring are present in the Proposed Offshore Development Site, with spawning grounds (as defined by Coull *et al*., 1998) overlapping the Southern Trench MPA and the Proposed Offshore Development. The production of a heat map from non-site specific sources in line with Kyle-Henney *et al*. (2024) (**Figure 5-21**) demonstrates that the MPA is within an area with modelled high spawning potential, however project specific baseline data within the Proposed Offshore Development Site shows limited use by herring (baseline eDNA results), with few patches of preferred habitat available (baseline PSA results) (**AEIR, Chapter 3: Fish and Shellfish Ecology, Figure 3.1**). There is evidence that there is considerable alternative habitat for herring within wider area, notably the fish and shellfish regional Study Area and elsewhere in the MPA.

5-160 Sandeel are also present in the Proposed Offshore Development Site, with widespread spawning (and nursery) grounds (as defined by Ellis *et al*., 2012; Coull *et al.,* 1998) overlapping the MPA and the Proposed Offshore Development. The production of a heat map in line with Reach et al. (2024) (**Figure 5-22**) demonstrates the MPA overlaps a much larger area of high potential sandeel spawning habitat. Sandeel have limited movement and remain buried during the overwintering and spawning period (November to February) (Coull *et al.,* 1998). Baseline data show that the Proposed Offshore Development is used by sandeel (evidenced through presence in eDNA, DDV, benthic grab data) however, the sediment characteristics do not reflect suitable habitat throughout the Proposed Offshore Development (**AEIR, Chapter 3: Fish and Shellfish**

Ecology, Figure 3.10), noting that both unsuitable and suitable habitat is present where the Proposed Offshore Development overlaps the MPA.

5-161 Herring have high sensitivity to underwater noise, categorised as a Group 3 hearing species. Sandeel are less sensitive to underwater noise as a Group 1 hearing species (Popper *et al.*, 2014). The concurrent piling areas of effect for mortality and recoverable injury (for both Group 1 and Group 3 species) are small and considered not to impact herring or sandeel populations or the MPA (**AEIR, Chapter 3: Fish and Shellfish Ecology, Section 3.6.4** and **Section 3.7.4**, respectively). The TTS (186 dB) area of effect (for stationary receptors, considered the worst case) is the same for all fish species. This area overlaps with the MPA, indicating TTS and behavioural effects may be seen in both species within the MPA area. It is considered herring and sandeel are able to fully recover in a short period of time from such impacts with evidence demonstrating that fish will return to normal behaviours (e.g. spawning or feeding) and return to habitats, shortly (i.e. within 24 hrs) after disturbance and following cessation of noise (Popper *et al.*, 2014). Piling may impact fish receptors at this level at any point in the piling schedule, however any effects are temporary, highly intermittent (based on the temporal worst case 630 piling days required over the 4 year (1112 day) piling programme, with up to 4hrs 10 minutes of piling in any one 24 hour period – i.e. only 9.84% of the piling period will include noise impacts based on the temporal worst case scenario), and are not considered likely to inhibit spawning or any other behaviours in these species in a significant way. Therefore, prey availability or foraging opportunity for minke whales is not considered to be affected by impacts upon prey species. The greatest areas of critical habitat with the greatest potential as spawning habitat are also located some distance from the Proposed Offshore Development (**Figure 5-21** and **Figure 5-22**), with these greatest areas of suitable habitat for sandeel and herring located some distance south of the Proposed Offshore Development Site and thus highly unlikely to be impacted.

5-162 Based on the evidence available and the assessment methodology applied, it is concluded that there are no significant effects predicted for herring and sandeel for all impacts assessed, including as a result of increases in underwater noise leading to mortality, injury and behavioural effects arising during construction of the Proposed Offshore Development alone or cumulatively with other plans and projects. Therefore, there is no significant risk of hindering achievement of the 'Extent and distribution of any supporting feature and Structure and function of any supporting feature, including any associated processes supporting the species' conservation objective for minke whales for the Southern Trench MPA.



Project:

Buchan Offshore Wind EIA

Title:

Figure 5.21: Herring potential spawning habitat heat map (in accordance with Kyle-Henney *et al.*, 2024) in relation to the Southern Trench ncMPA

Key

- Array Area
- Indicative IRC Area
- Export Cable Corridor (ECC)
- ICES Regional Study Area
- Nature Conservation Marine Protected Area (ncMPA)

Potential Spawning Habitat (Kyle-Henney *et al.*, 2024)

- < 0.028
- 0.028 - 0.042
- 0.042 - 0.056
- 0.056 - 0.750

Sources: Esri, Garmin, GEBCO, NOAA NGDC, and other contributors.
Contains public sector information, licensed under the Open Government Licence v3.0, from Crown Estate Scotland.
Contains JNCC data © copyright and database right 2026.
Folk, R.L. (1954) The distance between grain size and mineral composition in sedimentary rock nomenclature. Journal of Geology.
Kyle-Henney, M., Reach I., Barr N., Warner I., Lowe S., and Lloyd Jones D., 2024. Identifying and Mapping Atlantic Herring Potential Spawning Habitat: An Updated Method Statement.
Not to be used for Navigation.

Scale @ A3: 1:1,600,000

Coordinate System: WGS 84 UTM Zone 30N
Graticules: WGS84

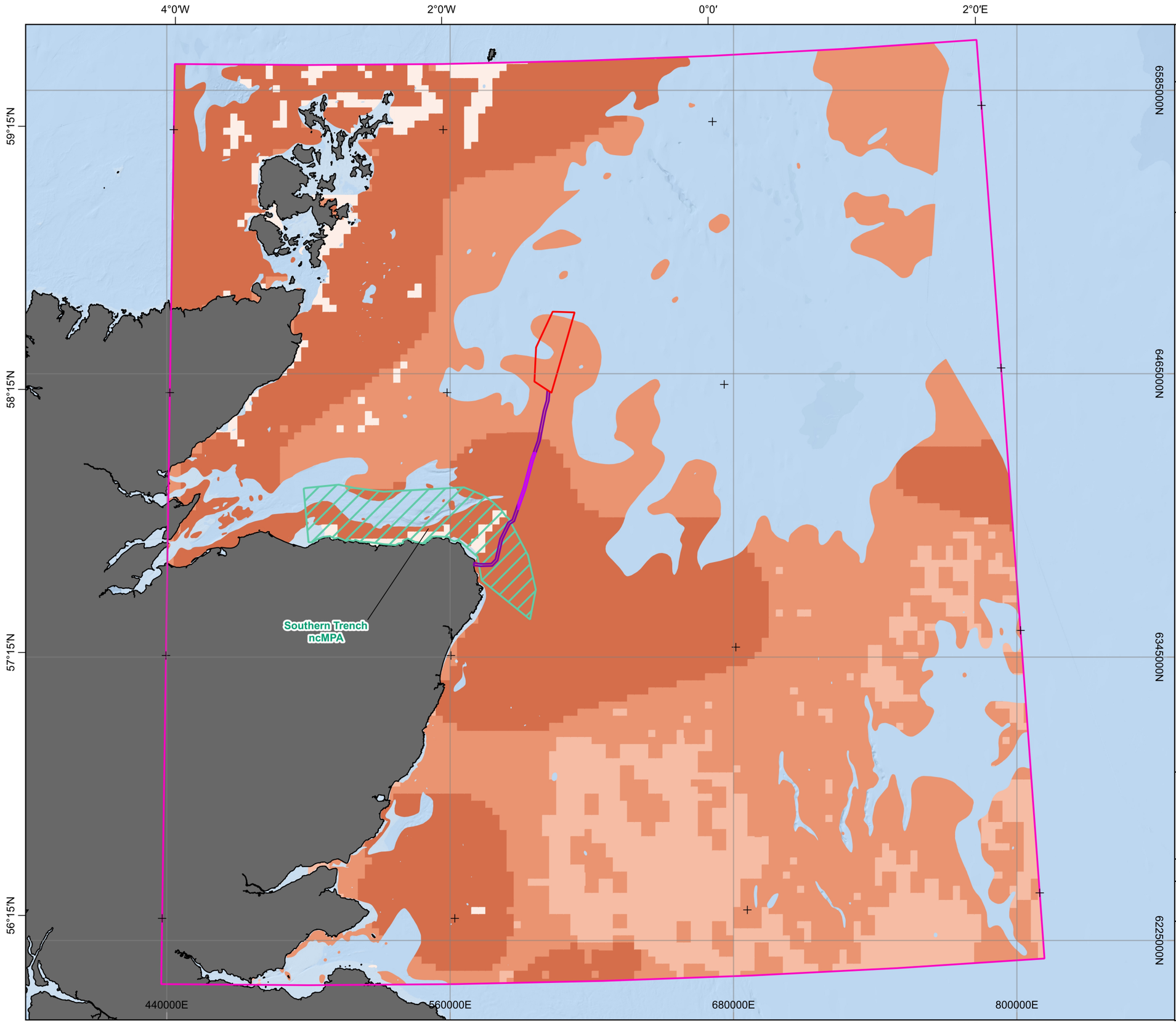
N

0 20 40 60 80 km

Date: 16-06-26	Prepared by: AC	Checked by: WB

EIA Ref No: BUC-C-MP-NP-0389
Map Ref: GB204095_M_407_A

BUCHAN OFFSHORE WIND



Project:

Buchan Offshore Wind EIA

Title:

Figure 5.22: Sandeel potential spawning habitat heat map (in accordance with Reach *et al.*, 2024) in relation to the Southern Trench ncMPA

Key

- Array Area
- Indicative IRC Area
- Export Cable Corridor (ECC)
- ICES Regional Study Area
- Nature Conservation Marine Protected Area (ncMPA)

Potential Spawning Habitat (Reach *et al.*, 2024)

- < 0.141
- 0.141 - 0.188
- 0.188 - 0.250
- 0.250 - 0.563

Sources: Esri, Garmin, GEBCO, NOAA NGDC, and other contributors.
Contains public sector information, licensed under the Open Government Licence v3.0, from Crown Estate Scotland.
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Folk, R.L. (1954) The distance between grain size and mineral composition in sedimentary rock nomenclature. Journal of Geology.
Kyle-Henney, M., Reach I., Barr N., Warner I., Lowe S., and Lloyd Jones D., 2024. Identifying and Mapping Atlantic Herring Potential Spawning Habitat: An Updated Method Statement.
Not to be used for Navigation.

Scale @ A3: 1:1,600,000
Coordinate System: WGS 84 UTM Zone 30N
Graticules: WGS84

N

0 20 40 60 80 km

Date: 16-06-26	Prepared by: AC	Checked by: WB

EIA Ref No: BUC-C-MP-NP-0390
Map Ref: GB204095_M_408_A

BUCHAN OFFSHORE WIND

5.8 SUMMARY OF CONCLUSIONS

5-169 This chapter of the AEIR has provided targeted additional information relating to marine mammals and other megafauna, specifically it has provided updated information and clarification on the maximum design scenario (including clarification on piling parameters and durations used), marine mammal flee speeds, iPCoD modelling parameters, the cumulative effects from piling and non-piling construction activities and the likely significant effects of pile driving on the Southern Trench MPA.

5-170 The Applicant has provided updated details of the maximum design scenario piling parameters, as well as a presentation of new concurrent scenarios (fast bounding and realistic concurrent scenarios) which are taken forward for further assessment. Also provided are the associated durations of each impact.

5-171 The Applicant also provided verification of the conclusions of the assessments in relation to flee speeds where the Applicant confirmed that the percentage of the UK MU which may be impacted is very similar to or smaller than that presented by NatureScot. The Applicant can therefore conclude that cumulative PTS is not significant in EIA terms for these species.

5-172 The Applicant presents information to outline each iPCoD modelling step and details how each assumption and modification influences the change in population trajectory. Additional information on grey seal reference populations and how these have been applied in the revised assessments is also provided.

5-173 An update to the cumulative effects assessment has been presented using an updated cumulative project list incorporating NatureScot advice during pre-determination consultation. Quantitative assessments of disturbance from pile driving noise (using iPCoD) and of disturbance from non-piling activities were undertaken, and concluded that the Proposed Offshore Development's contribution cumulatively with that of other projects was Not Significant.

5-174 An update to the likely significant effects of pile driving for the Southern Trench MPA were presented in terms of

- cumulative PTS (for the IRC) - in line with the original assessment, there is no risk of killing or injuring minke whale in the Southern Trench MPA as a result of increased underwater noise from pile driving, and there is no significant risk of hindering achievement of the Conservation Objectives
- disturbance (from WTGs) - visual representation of dose-response curve disturbance ranges are provided; and
- impacts on key prey species (sandeel and herring) - there is no significant risk of hindering achievement of the supporting feature Conservation Objective for minke whales for the Southern Trench MPA.

5-175 The information presented confirms the robustness of the assessment undertaken within the EIAR and supports the conclusions previously reported.

5.9 REFERENCES

Aarts, G., Brasseur, S. and Kirkwood, R. (2018). Behavioural response of grey seals to pile-driving (No. Wageningen University & Research report C006/18).

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APPENDIX 5.1 – CONSULTATION LOG

This appendix provides a comprehensive record of consultation undertaken with NatureScot during the determination phase relevant to the marine mammals and other megafauna AEIR.

Table 5-31: Consultation log

Consultee's response	Response from applicant
The EIA assessment for marine mammals and other megafauna concludes no significant impacts, both alone and cumulatively – we broadly support the conclusions reached, subject to further consideration of aspects around piling parameters, iPCoD modelling and cumulative assessment	Responses requested will be provided in the Additional Environmental Information Report.
Regarding the minke whale feature of the Southern Trench ncMPA, we agree with the conclusion that the proposal will not result in a significant risk of hindering the achievement of the Conservation Objectives of the MPA, subject to mitigation and clarification on specific aspects of the assessment.	Responses requested will be provided in the Additional Environmental Information Report.
We agree there will be no AEOSI to bottlenose dolphin associated with the Moray Firth SAC. Further advice is provided in Appendix B	Responses requested will be provided in the Additional Environmental Information Report.
Marine mammal / megafauna interests are considered in Chapter 10 (Volume 2) of the Buchan EIA Report and the following supporting appendices: • Marine Mammal Baseline, Appendix 10.1 • Marine Mammals Technical Appendix, Appendix 10.2 • UWN Assessment Report, Appendix 8.1 • Marine Protected Area Nature Conservation Assessment, Appendix 7.3 • Proposed Marine Mammal Mitigation Plan	Noted.

Consultee's response	Response from applicant
The EIA assessment for marine mammals and other megafauna concludes No Significant impacts, both alone and cumulatively. However, we do not necessarily support the rationale that has been presented to support some of the assessment conclusion reached and raise issue with the implementation of the CIEEM Approach used. Whilst we agree largely with the final conclusions, there are various aspects where we request the following: • Confirmation of piling parameters and durations used • Updated impact piling for cumulative PTS using agreed flees speeds • Further discussion on the inclusion of cumulative PTS within the iPCoD modelling • Re-evaluation of the cumulative effects assessment • Clarification on impacts to the Southern Trench ncMPA.	Noted. Additional information will be included in AEIR Chapter 5: Marine Mammals.
The Regional Study Area for all cetaceans and seals considered under EIA is based on the Harbour porpoise North Sea Management Unit (MU) (Figure 10-1). During Scoping we advised inclusion of the Celtic and Greater North Sea MU as part of the Regional Study Area for relevant species identified during DAS and desk-surveys, however this has not been followed. Although we usually expect use of species-specific MUs, we are content to accept this for the project alone assessment, on the basis that relevant SCANS IV blocks have been identified and the reference populations for the correct MUs have also been used, noting one exception that is discussed further below.	BOW acknowledges the expectation that species specific MU's should be used to define the regional study area for each species. Nonetheless, BOW acknowledges NatureScot's position of contentment with the approach taken for the project alone assessment, on the basis that relevant SCANS IV blocks have been identified and the reference populations for the correct MUs have also been used, noting one exception.
A combination of site-specific surveys and a desktop study were used to inform the baseline characterisation which we accept.	Noted.
The assessment of effects for marine mammals has used the CIEEM approach rather than the standard matrix approach. The implementation of this approach relies on expert judgement, and as such, each assessment of an impact should provide enough evidence and justification to support the conclusion reached. However, where this approach has been used across the EIA Report including Chapter 10, the consideration of evidence and provision of supporting justification has largely been lacking. Key concerns for marine mammals on this approach are discussed below.	BOW acknowledges the points of consideration raised by NatureScot. The methodology of approach to EIA was set out in the Scoping Report. Nevertheless, where specific points relating to provision of information have been highlighted, additional information has been presented within the AEIR Chapter 5 Marine Mammals and Other Megafauna.

Consultee's response	Response from applicant
An integral part of the assessment approach is 'Characterising the Impact' which considers the extent, magnitude, duration, timing, frequency and reversibility of the impact as outlined in Section 10.9.2. The Applicant has not adequately accounted for relevant factors which contribute to characterising the impact especially in consideration and assessment of the maximum design scenario (Table 10-16).	Noted. BOW has undergone follow up discussions regarding the maximum design scenario with NatureScot with updated assessments capturing this presented in the AEIR Chapter 5 Marine Mammals and Other Megafauna
The assessment approach used does not specifically consider the sensitivity of the receptor (e.g. ability to adapt, recover or tolerates effects) which we consider to be an important factor when carrying out an EIA for marine mammals, particularly where the assessment relies on a qualitative approach.	Though not set out separately, information on how marine mammal species tolerate effects, and how they may adapt or recover is inherent within the assessment.
The assessment approach considers two factors when determining significance of effect: • 'any removal or change of any process or key characteristic – which considers population level cycles, survival and reproduction rates, competition, predation, seasonal behaviour, dispersal and genetic exchange, predator-prey relationships and adaptation'. • 'any effect on the average population size or viability of component species'. Paragraph 10-96 states "In general, significance is assessed on a population level for receptor species, rather than impacts to individual animals, whereby a significant effect is only concluded should the impact affect the viability of the population within the Regional Study Area." We agree that population level effects are an important factor to consider in any assessment.	Noted.
However, we consider changes to key characteristics at an individual level to be an equally integral part of determining the significance of an effect - which seems to have had little consideration in the EIA - particularly as this will have a bearing on European Protected Species licencing post any consent, which considers both population and individual impacts.	Noted. The evaluation of whether an effect is ecologically significant has been undertaken in line with CIEEM (2024) guidance which includes the consideration of the removal or change of any process or key characteristic of a species or any effect on the average population size or viability of component species. Under CIEEM Guidelines, ecological significance is determined at the population or assemblage level, not the individual level. Evaluating impacts on individual animals is primarily more suited to determine the legal or welfare status of the animal but does not dictate the significance of an ecological effect in EIA terms. BOW considers that it is therefore appropriate that significance is assessed on a population level for receptor

Consultee's response	Response from applicant
	species, rather than impacts to individual animals, whereby a significant effect is only concluded should the impact affect the viability (i.e. the ability of a population of a species to persist over time specifically avoiding extinction) of the population within the Regional Study Area. Provision of information for any required EPS licences will consider the required level of assessment., i.e. injury or disturbance of individual animals.
It would have been helpful if the Applicant had provided clear definitions and methods to indicate what was considered to constitute a change of "any process or key characteristic". Expert judgment should be clearly explained to help justify and appropriately evidence assessments.	Noted.
We appreciate it can be useful to consider a range of assessment options and methods when assessing certain impacts, particularly whether there is inherent uncertainty in predictive models and behaviour responses. However, we note that across the EIA, ncMPA and RIAA documentation differing approaches have been used between documents and across impacts with no clear justification provided. Some approaches are also contrary to what was discussed and agreed during pre-application engagement.	Noted. BOW advises that, as discussed with NatureScot, additional information has been provided to support assessment conclusions (including in relation to designated site assessments) in the Additional Environmental Information Report Chapter 5: Marine Mammals and Other Megafauna
This has implications for the assessment and includes: • Faster (less precautionary) flee speeds have been used for low frequency and very high frequency hearing cetaceans within the pile driving assessment for cumulative PTS across the EIA, ncMPA and RIAA	Noted.

Consultee's response	Response from applicant
Disturbance from other constructions activities used a 5km Effective Deterrence Ranges (EDR) in the EIA and ncMPA but this approach was not used / assessed in the RIAA. Cumulative PTS was assessed using agreed flee speeds in the EIA and ncMPA but not in the RIAA.	Noted. As per our pre-application advice, we had agreed that the Moray Firth SAC is the only Scottish SAC screened in for marine mammals and that there will be no AEOSI to the bottlenose dolphin qualifying feature associated with the Moray Firth SAC from the proposed offshore development, either alone or in-combination. Therefore, it is not considered that additional information is required for the marine mammal component of the RIAA.
EDRs and first pile dose response curves were used in the EIA and RIAA but for the ncMPA assessment, last only pile dose response curves were used.	Noted. Potential piling behavioural responses on the Southern Trench ncMPA have been revisited in the AEIR Chapter 5: Marine Mammals and Other Megafauna using first pile dose response curves.
EDRs and TTS (as a proxy) were used to consider disturbance effects from UXO clearance within the EIA and RIAA, with only EDRs considered in the ncMPA assessment.	Noted. As per the RAEI, the impact from UXO clearance will be reassessed once more information is provided on the number, size, location and type of UXO located within the Proposed Offshore Development, including any cumulative impacts. This will be undertaken post consent.
Where underwater noise modelling was carried out, it is possible to initially compare results, however, this becomes more difficult for multiple step approaches.	Noted.
As with other Chapters of the EIA Report, we have found only limited information provided in the maximum design scenario (Table 10-16), particularly in relation to expected durations for each impact. This has made it difficult to fully consider the magnitude of effect. Nor is it clear what worst case scenario (for frequency and duration) of pile driving activities has been assessed. We note that these aspects can be clarified, if the project is consented, through the consideration of a Piling Strategy, but it is advisable that the limits of a worst-case scenario are acceptable prior to any consent.	Noted. Additional information will be included in AEIR Chapter 5: Marine Mammals.

Consultee's response	Response from applicant
Advice is provided below in respect of specific impact pathways where we have found fundamental issues with the assessment provided and that require clarifications or where we consider there to be greater merit in updating the assessment post consent. For all other impact pathways, while we do not always necessarily agree with the justification provided, we accept the conclusions reached.	Noted. Additional information will be included in AEIR Chapter 5: Marine Mammals.
The potential for concurrent piling with either the OSP / IRC and WTGs pile driving anchor option has not been modelled, we therefore assume this will not occur during the construction of the proposed Development. However, we request that: • Clarification is provided to confirm no concurrent piling between the OSP / IRC and WTGs is likely. If concurrent piling is required, then additional modelling will likely be required.	Noted. Additional information will be included in AEIR Chapter 5: Marine Mammals.
For low frequency cetaceans, high frequency cetaceans and seals the potential for instantaneous PTS is stated to be ≤60m (Paragraph 10-165). However, the Underwater Noise Modelling Report (Appendix 8.1 - Section 4.1.5) for the IRC location, identifies the instantaneous PTS for seals to be 1.4km. As such, we request: • Clarification is provided to confirm whether the 1.4km value for grey seals is an accurate output from the underwater noise modelling and if so, mitigation measures will need to be updated accordingly, as discussed below.	Noted. Additional information will be included in AEIR Chapter 5: Marine Mammals.

Consultee's response	Response from applicant
For very high frequency cetaceans, we note the maximum instantaneous PTS ranges from 570m (for IRC piles) to 620m (for WTG anchor piles at the NE modelling location). The duration of Acoustic Deterrent Device (ADD) usage employed to mitigate instantaneous PTS is based on the 1.97m/s flee speed of harbour porpoise (Paragraph 10-166). We had expected that ADD duration would be based on the more precautionary harbour porpoise flee speed as discussed and agreed during pre-application. This is because we do not expect animals to remain at flee speeds for extended periods of time and they may become habituated to some extent to pile driving activities.	Noted. Additional information will be included in AEIR Chapter 5: Marine Mammals.
As such, we would advise a slightly longer ADD duration pre-piling. This also accounts for context specific scenarios whereby individuals may be foraging and will not immediately flee the area when the ADD is activated. Finally, the use of ADDs for a 5.25-minute duration may cover the impact range for instantaneous PTS but a slighter long ADD duration would also help mitigate some of the cumulative PTS range. Agreement on specific ADD timings should be reached post any consent, taking account of up-to-date evidence on use of ADDs during piling.	Noted. Additional information will be included in AEIR Chapter 5: Marine Mammals.
We accept the conclusion of Not Significant but advise that: • The influence of flee speed and ADD duration is discussed further post any consent and during consideration of EPS licencing requirements, noting that the Applicant will also need to consider the accuracy of 1.4km impact range for instantaneous auditory injury to seal species.	The project will discuss flee-speed influence and ADD duration post-consent.
Post any consent, we encourage the Applicant to work strategically on their refinement of the project design envelope by reducing precaution in the marine mammal assessments: focusing on underwater noise monitoring, cumulative PTS, how repeated TTS can cause PTS and supporting research that focuses on how the impulsivity of noise changes with distance	The project will refine the PDE post consent and consider the issues raised.

Consultee's response	Response from applicant
For cumulative PTS, it was agreed during pre-application engagement that increased flee speeds could be modelled to provide additional context. We did not agree that the assessment would be carried out on the faster flee speeds for low frequency and very high frequency cetaceans. Before we can advise on whether we support the conclusion for impact piling for cumulative PTS, we request: • The number of individuals impacted from cumulative PTS across each of the piling scenarios (e.g. Tables 10-31 to 10-34) are updated using the agreed flee speeds for Low frequency and Very High Frequency cetaceans.	Noted. Additional information will be included in AEIR Chapter 5: Marine Mammals.
We note the use of a number of approaches to consider disturbance effects from pile driving including Effective Deterrence Ranges (EDRs), two different dose-response curves for cetaceans (first and last pile as per Graham et al., 2019) and the dose-response curve for seal species (as per Whyte et al., 2020) which has been helpful when considering the risk of disturbance.	Noted.
Using the first pile dose-response curve (noting the precaution in this approach) the percentage of the UK portion of the MU disturbed would be Significant in EIA terms for white-beaked dolphin (11.4%), Risso's dolphin (13.7%) and harbour porpoise (7.2%). These percentages further increase when considering concurrent WTG piling using this approach: 12.9%, 15.2% and 8.4% respectively. It is also challenging to advise on impacts from piling, when we have not been presented the maximum number of piling days.	Noted. Additional information will be included in AEIR Chapter 5: Marine Mammals.

Consultee's response	Response from applicant
Clarification is required on: • Maximum piling durations used in the modelling for individual piles (WTG anchor and OSP / IRC) as well as total duration and temporal spread across the construction period. This is important in understanding the significance of the impact as well as it being an influential factor in iPCoD outputs.	Noted. Additional information will be included in AEIR Chapter 5: Marine Mammals.
However, we appreciate that applying the harbour porpoise dose response to all species is highly precautionary and even with this precaution note that iPCoD outputs do not suggest an overall change in population trend for all assessed species. Acknowledging the inherent precaution and associated uncertainty within the assessment predictions and the difficulty in mitigating disturbance effects, we welcome the commitment to undertake further underwater noise monitoring. Post any consent, we encourage continued engagement to discuss ways that precaution could be reduced, such as developing species specific dose response curves and exploring the use of distance as a predictor of behavioural response.	Noted. BOW will continue to engage with NatureScot on this matter post consent where required.
For grey seals, it appears that six MUs, as outlined in Table 10-12, have been used to calculate a total reference population (Western Isles MU, North Coast and Orkney MU, Shetland MU, Moray Firth MU, East Scotland MU and Northeast England MU) upon which the percentage impact of the proposed Development from piling driving activities has been considered. We do not support this approach.	Noted.

Consultee's response	Response from applicant
The proposed Development is located between three MUs (North Coast and Orkney, Moray Firth and East Scotland) and these should instead have been used as the reference population. From our own calculations, this derives a reference population of 49,065. For the scenario with concurrent WTG piling, 4.46% of this collective MU would be impacted. Although we accept this is Not Significant in EIA terms, there are implications for the iPCoD modelling as discussed below as the larger grey seal reference population, based on 6 Mus, has been used. Please also note that the population estimate for seal MU's has now been updated as per SCOS 20248.	Noted.
For the IRC installation, the grey seal MU is the East Scotland MU - this has the potential to disturb 12% of the MU. However, due to limited duration of IRC installation (one day) we agree this is Not Significant in EIA terms.	Noted.
iPCoD modelling was undertaken for minke whale, inshore bottlenose dolphin, offshore bottlenose dolphin, harbour porpoise and grey seal populations to consider population level effects. We agree, based on the low number of individuals predicted to be disturbed (1-3 individuals) that iPCoD modelling was not required for harbour seals.	Noted.
Interestingly both disturbance and cumulative PTS effects have been included within the iPCoD modelling. The inclusion of cumulative PTS is relatively novel; is has been useful to consider and we would like to discuss further to better understand if / how this approach could improve the assessment of underwater noise impacts across the industry.	Noted. Additional information will be included in AEIR Chapter 5: Marine Mammals.
To include cumulative PTS within the iPCoD modelling runs, various assumptions have been made around the number of individuals which have the potential to experience cumulative PTS. In general, we have found it difficult to understand the likely influence of cumulative PTS on population response and by extension to therefore judge how reliable the outputs are. It also makes it difficult to consider the results in this assessment in the context of other developments. This is discussed below.	Noted. Additional information will be included in AEIR Chapter 5: Marine Mammals.

Consultee's response	Response from applicant
In reviewing the assumptions and modification used to accommodate cumulative PTS, we note the following points: • The additional context provided by the inclusions of thresholds that are +2dB and +3dB higher, based on the noise at a 25% duty cycle is helpful. However, we are mindful that this is not a peer-reviewed method and have therefore been cautious in how we interpret the results.	Noted.
The +3dB modification for cumulative PTS has been included in the iPCoD modelling for minke whale and harbour porpoise. The difference between the standard PTS threshold for cumulative PTS, and what has been included in the iPCoD modelling, is a 9km reduction in the impact range for minke whales and 3.6km for harbour porpoise.	Noted.
The use of the faster flee speeds for minke whale and harbour porpoise reduces the cumulative PTS impact ranges by 11km and 2.7km respectively.	Noted.
Additionally, an assumption that 18% of individuals are exposed to levels above the threshold experience PTS, has been applied to all species for which iPCoD modelling has been undertaken. This results in a substantial reduction in the number of individuals impacted.	Noted.
We appreciate that the first pile dose response curve (Graham et al., 2019) was used to estimate the number of individuals disturbed for all species modelled in iPCoD. This is precautionary, and that instantaneous PTS will be mitigated, which will partly reduce the number of individuals which will be within the impact ranges for cumulative PTS. However, it is unclear how this precautionary approach balances out the assumptions / modifications added to the modelling.	Noted.
From our own initial calculations, we note there appears to be considerable difference between the number of individuals predicted to experience cumulative PTS with and without the assumptions included by the Applicant.	Noted.

Consultee's response	Response from applicant
As a result, we request: • Further information and discussion with the Applicant to better understand: o The compounding effects of the modifications / assumptions used to include cumulative PTS within the iPCoD modelling	Noted. Additional information will be included in AEIR Chapter 5: Marine Mammals.
Further information and discussion with the Applicant to better understand: The impact each individual change has on the outputs for each species, particularly for minke whale and harbour porpoise.	Noted.
For grey seal, the reference population input parameter for iPCoD modelling was >100,000 individuals. As above, we do not consider this to be an accurate reflection of the MUs likely to be impacted, and as such consider that the outputs are likely to be an underestimate of the impacts to the grey seal population.	Noted. Additional information will be included in AEIR Chapter 5: Marine Mammals.

Consultee's response	Response from applicant
Before we can advise on whether we support the conclusion for disturbance effects, and in addition the request above, we consider: • A meeting would be helpful to run through each modelling step to clearly understand where and how each assumptions / modification influences the change in population trajectory. In doing so, this should cover: o Presentations of result both numerically as well as visually - currently this is just visually. o Clarification on the maximum number of piled days entered into iPCoD. o Clarification on the modelling start year. The iPCoD modelled outputs show results starting from 2036, labelled as piling year 1, however the Project Description states the construction period will begin in 2030 and over a period of up to three years and Table 2-2 of Appendix 10.2 Marine Mammals and Other Megafauna Technical Report) states that the input range was between 2031-2034. o Minke whale is the only receptor identified as being disturbed on the day of exposure plus one additional day of "residual disturbance". Please identify how the input was chosen for each of the four receptors for this parameter. o For the concurrent piling scenario input values, this was entered into iPCoD as a "combination of one pile per day and concurrent piling at three locations, based on eight piles a day at each". It appears that concurrent piling has only been run for September and October and only every 1 in 5 days is expected to be concurrent piling. This scenario seems very specific and hasn't been described anywhere else (Table 2-2, Appendix 10.2 - Marine Mammals and Other Megafauna Technical Report). Also, should concurrent piling happen more frequently than every 1 in 5 days then this scenario may need to be revisited as it may not account for the worst-case scenario. o How the reduction in reference population changes the outputs of iPCoD modelling for grey seals.	Noted. Additional information will be included in AEIR Chapter 5: Marine Mammals.
Increased underwater noise – other construction activities To note, the Applicant has reverted to the advised precautionary flee speeds for assessing this impact unlike the faster flee speeds used for minke whale and harbour porpoise in the pile driving assessment above.	Noted.

Consultee's response	Response from applicant
Behavioural disturbance It has been difficult to appraise the likely magnitude of impact from other construction activities as there is limited detail on what the duration / frequency of the seabed preparation and cable installation work is. An EDR of 5km has been used to assess disturbance from other construction activities. Although we do not support some of the justification presented, we accept the approach.	Noted.
The assessment concluded "that increased underwater noise from other construction activities will not remove or change any process or key characteristic". Overall, the assessment for this impact is lacking in detail and justification for the conclusion reached. Although we agree the conclusion reached, it is important to highlight that the assessment approach for this impact is flawed, and the need for a more comprehensive assessment description to be provided.	BOW acknowledges Nature Scot's requirement for a more comprehensive assessment description regarding underwater noise from other construction activities. AEIR Chapter 5: Marine Mammals and Megafauna will reassess non-piling construction activities in more detail.
Lastly, the significance of effect for disturbance from other constructions activities is heavily focused on population level effects. Whilst we consider this an important factor to consider, it is not the only factor, but this is an issue with the implementation of the CIEEM approach overall and not just for this impact.	Noted. BOW acknowledges NatureScot's comment regarding the consideration of impacts beyond population-level effects. The assessment has been undertaken in accordance with the relevant EIA framework, which places emphasis on population-level consequences when determining significance of effect for marine mammal receptors. However, the assessment also considers the wider ecological context, including the nature, duration, spatial extent and reversability of effects, alongside species-specific sensitivity and conservation status. BOW therefore considers the assessment approach to be appropriate and proportionate for the impact pathway assessed.
Increased underwater noise – unexploded ordnance (UXO) clearance work Auditory injury Only grey seal, harbour porpoise and minke whale have been assessed. We accept this approach on the basis that it covers the hearing frequency ranges of all species. Noting that dolphin species have a very small impact range (60m for low order deflagration) and we consider that mitigation for those species assessed will be relevant for all species.	Noted.

Consultee's response	Response from applicant
Disturbance A range of methods have been used to assess disturbance from UXO clearance including 26km Effective Deterrent Range (EDR) for high order clearance, 5km EDR for low order and TTS as a proxy for disturbance. Although using TTS as a proxy is our preferred approach, it is useful to see all three methods presented for comparison.	Noted.
Please note our preference and recommendation for low-order deflagration as the primary method of disposal, in line with UK and Scottish Government guidance. Low-order deflagration has been successfully concluded at another wind farm in Scottish9 waters as a viable method for reducing sound level and impact range. The assessment for injury and disturbance was based on indicative UXO types, and as acknowledged in Paragraph 10-225, further assessment and separate licencing will be required including further consideration of mitigation requirements.	Noted.
The Cumulative Effects Assessment (CEA) was particularly difficult to follow, or understand which projects were being screened in / out respectively. Overall, it is not as expected or advised in the Scoping Opinion.	Noted. Additional information will be included in AEIR Chapter 5: Marine Mammals.
Two spatial scales have been used for screening in projects for the CEA comprising the 'Cumulative Study Area' as well as impact ranges from various plans, projects and activities. The 'Cumulative Study Area' only accounts for the harbour porpoise MU and not for any of the other species in which a quantitative assessment has been carried out. We do not agree with this, and it was raised in pre application discussions. Whilst we are content with this approach for the proposed Development alone, it is not appropriate for the CEA.	Noted. Additional information will be included in AEIR Chapter 5: Marine Mammals.

Consultee's response	Response from applicant
In terms of the impact ranges as outlined in Table 10-99, we agree with most of the ranges chosen for the various projects except for the 50km used for coastal projects. The coastal bottlenose dolphin population has a wide-ranging home range as identified in the EIA Report. This has not been accounted for when screening in coastal projects using a 50km screening range. Many of the ScotWind and INTOG projects Export Cable Corridors will cut through the coastal bottlenose dolphin population range along the East Coast of Scotland – see RIAA advice below.	Noted. BOW will re-evaluate the potential effects on bottlenose dolphins in AEIR Chapter 5: Marine Mammals and Megafauna, **Section 5.6.2**. A new cumulative project list (**Section 5.6.1**) will be created to include a new screening range for coastal projects for bottlenose dolphins.
In considering the temporal overlap between projects, we advised screening should include projects constructing up to a year on either side of the proposed Development. This advice has not been followed.	Noted. Cumulative project impact list has been revised (AEIR Chapter 5: Marine Mammals and Megafauna, **Section 5.6.1**) to include projects constructing up to a year on either side of Proposed Development.
Additionally, small scale projects (such as coastal / harbour works) are screened out on the basis there is no potential for significant cumulative effects to arise. More information on projects which were deemed too small scale to be screened into the assessment should have been provided particularly in considering impacts to the coastal bottlenose dolphin population	Noted. The cumulative project list was agreed with MD-Lot in advance of submission. Notwithstanding this, a revised project cumulative assessment is presented in AEIR Chapter 5: Marine Mammals and Megafauna, **Section 5.6.1**, based upon recent discussions with NatureScot on projects to be included
At this stage, a long list of indicative Ports and Harbours has been identified for assembly and installation of WTGs and it is not clear how this has been factored into the assessment.	Noted. The cumulative assessment has been updated using the best available information for reasonably foreseeable projects, including associated offshore construction activities where information is available. BOW acknowledges that specific assembly and installation ports may not yet be confirmed for all cumulative projects at this stage of project development and therefore cannot be robustly incorporated on a project-specific basis. Where uncertainty remains, the assessment has adopted a proportionate and precautionary approach, consistent with the available project information.
We do not agree that only Tier 2 projects should be screened in.	Noted. The cumulative project list was agreed with MD-LOT in advance of submission. Notwithstanding this, a revised project cumulative assessment is presented in AEIR

Consultee's response	Response from applicant
	Chapter 5: Marine Mammals and Megafauna, **Section 5.6.1**, based upon recent discussions with NatureScot on projects to be included including Tier 2 and Tier 3 projects.
The CEA for disturbance from pile driving activities relies heavily on stating that the project-alone assessment concluded no significant impacts therefore cumulative impacts from multiple projects do not pose any risk. We do not support this conclusion.	Noted. Additional information will be included in AEIR Chapter 5: Marine Mammals.
Table 10-102 outlines the number of individuals for species populations that have the potential to be susceptible to the onset of 'cumulative PTS and disturbance' from increased underwater noise from pile driving, however for the 'Buchan OWF' column, the values used are for the single location WTG piling scenario and not the overall worst-case scenario of concurrent WTG piling in the Array Area. No justification or reasoning for this has been provided. We would also expect the CEA for disturbance from pile driving activities to provide the total number of individuals impacted alongside the percentage of the MU impacted.	Following consultation with NatureScot, the concurrent scenario has been revisited and two new piling schedules (i.e. a fast bounding scenario and a realistic concurrent scenario) developed in conjunction with BOW's engineers to ensure that the worst-case scenario has been accounted for and presented in assessment in the Additional Environmental Information Report Chapter 5: Marine Mammals and Other Megafauna.
No cumulative iPCoD has been carried out in the CEA for pile driving activities, therefore we cannot agree that disturbance is unlikely to affect the viability of the populations of the species assessed. We cannot agree with the evidence presented that likely behavioural impacts arising from a cumulative scenario of six projects constructing simultaneously will be short-term or sporadic. Additionally, based on our understanding of which projects were screened in, we are not confident that these are all the projects which should have been included in the CEA.	Noted. Cumulative iPCoD has been carried out for pile driving activities using updated cumulative projects list.
While we are content for the Applicant to use EDRs in lieu of project specific information if not available, we are unclear if agreement was sought from MD LOT that only projects that had submitted their EIA by the end of December 2023 should have been included in the assessment.	Noted. The cumulative assessment methodology has been updated following consultation with NatureScot and MD-LOT, including consideration of projects with potential temporal overlap with the Proposed Offshore Development. The AEIR now screens in projects with piling dates falling one year before or after Buchan piling, i.e. 2030-2035, with piling assumed to occur in any year of the construction window where published piling dates are unavailable. For Tier 2 projects,

Consultee's response	Response from applicant
	project-specific information has been used where available. For Tier 3 projects, EDRs and relevant species-specific densities have been used where project-specific information is unavailable.
Overall, we require the CEA to be updated considering our comments and points of clarification above, including assessment through iPCoD modelling.	Noted. Additional information will be included in AEIR Chapter 5: Marine Mammals.
However, we are mindful that further assessment will be required post consent to satisfy European Protected Species licensing requirements and that this will be considered alongside the development and adherence to a Piling Strategy (EM12). As such, we advise a condition is attached to any consent requiring: • Cumulative effects from disturbance are re-evaluated through the development of the Piling Strategy once there is greater certainty around project specific parameters as well as temporal overlap with other projects. Parameters for updated modelling should be agreed in advance.	Noted. Additional information will be included in AEIR Chapter 5: Marine Mammals.
Behavioural impacts from increased underwater noise from other construction activities, vessels and use of survey and positioning equipment has not been adequately assessed. The magnitude of the projects being considered cumulatively under this impact has not been set out and therefore we have difficulty supporting the conclusion of Not Significant in EIA terms. However, we are mindful that further assessment will be required post consent to satisfy European Protected Species licensing requirements, and this should be based on updated project parameters.	BOW notes NatureScot's concern regarding cumulative behavioural disturbance from other construction activities, vessels and survey and positioning equipment. The AEIR provides further consideration of cumulative disturbance and additional supporting narrative where appropriate. BOW considers the assessment proportionate to the level of certainty currently available regarding project-specific construction programmes and parameters. The assessment concludes that effects remain Not Significant in EIA terms, taking account of the predicted magnitude, duration, spatial extent and reversibility of effects, together with the temporary and intermittent nature of the activities and the mobility of marine mammal receptors. We note that further assessment at

Consultee's response	Response from applicant
	an appropriate scale for EPS licensing processes will be required post consent.
Embedded mitigation measures are outlined in Table 10-17, Section 10.11. Overall, we are content with the proposed embedded mitigation but note that most measures are related to the development of plans, which does not constitute mitigation. In respect of the Marine Mammal Mitigation Protocol (EM11), all mitigation measures should be applied to all marine mammals assessed regardless of whether they have been assessed quantitatively or qualitatively.	Noted. BOW acknowledges NatureScot's comment regarding the application of mitigation measures. The Marine Mammal Mitigation Protocol (EM11) has been developed to minimise the potential for injury and disturbance to marine mammals during construction activities, and will apply to all relevant marine mammal receptors where there is potential for interaction with the Proposed Offshore Development. BOW notes that a number of measures referenced within Table 10-17 relate to the development of project plans and procedures which form part of the wider embedded mitigation and environmental management framework for the Proposed Offshore Development.
Noting the commitments set out in Table 10-17 which we support, we further advise that underwater noise monitoring should be carried out on a subset of piles (including some that are representative of higher hammer energies and in likely areas of difficult ground conditions). This will validate the predictions presented the EIA and Piling Strategy and provide reassurance around the efficacy of the mitigation measures in preventing instantaneous PTS and reducing some of the cumulative PTS impact.	Noted. BOW acknowledges NatureScot's recommendation regarding underwater noise monitoring. The requirement for underwater noise modelling during piling activities will be considered as part of the final Piling Strategy and associated mitigation measures developed post consent. BOW recognises the value of targeted monitoring in validating predicted noise levels and confirming the effectiveness of mitigation measures in reducing the potential for auditory injury and disturbance to marine mammals.
For secondary entanglement, we support the development of and adherence to an Entanglement Management Plan (Paragraph 10-342). It will be useful to better understand what can be learnt from use of tension monitors and how sensitive these are to additional load from fishing gear.	Noted.

Consultee's response	Response from applicant
The Array Area is located approximately 52km northeast of the Southern Trench ncMPA for which minke whale is the only marine mammal protected feature. The indicative area for siting the IRC is stated (Appendix 7.3 - Paragraph 5) to be approximately 6km from the edge of ncMPA however, we note that the modelling location used for the IRC falls further offshore and as such may underestimate the impact of underwater noise on the minke whale feature of the ncMPA.	Noted. Additional information will be included in AEIR Chapter 5: Marine Mammals.
Advice is provided below for each of the impact pathways assessed, where appropriate this includes advice specific to individual elements of the Conservation Objectives10.	Noted.
The Southern Trench ncMPA is an important feeding ground for minke whales with higher-thanaverage densities at certain times of the year (Paxton et al., 2014). Narrative provided within the assessment suggests that some animals will continue using the area during construction periods or will return to the area immediately following activities, or once activities cease. However, this is based on evidence from harbour porpoise and bottlenose dolphins, rather than low frequency cetacean species like minke whale.	Noted. Additional information will be included in AEIR Chapter 5: Marine Mammals.
From the assessment provided, the duration and timing of pile driving activities that could result in underwater noise reaching the ncMPA is unclear, however as pile driving activities are expected to take approximately 3 years, we have concluded that the activity is likely to overlap with periods of high minke whale density.	Noted. Additional information will be included in AEIR Chapter 5: Marine Mammals.
We note that cumulative PTS ranges outlined in Table 5-2 of the ncMPA Assessment are based on a flee speed of 4.19m/s rather than the 2.1m/s. However, even considering the larger impact ranges using the slower flee speeds, we note there is no risk of cumulative PTS from construction of the OSP (s) and WTGs	Noted.

Consultee's response	Response from applicant
However, we disagree that there is no potential to cause cumulative PTS to minke whale within the Southern Trench ncMPA from underwater noise arising from IRC piling activities. The closest potential distance of the IRC to the ncMPA is circa 5km (value used in Table 5-2), whilst the mean cumulative PTS range is 32km using a flee speed of 2.1m/s. Given that cumulative PTS is modelled for a 24-hour period, we consider that there is potential for minke whales within the ncMPA to receive levels capable of causing auditory injury (cumulative PTS).	Noted. Additional information will be included in AEIR Chapter 5: Marine Mammals.
The justification that impulsive noise impacts over large ranges are thought to transform into nonimpulsive noise is valid, however, circa 5km is a relatively short range and the transition period between impulsive to non-impulsive noise is still under active research.	Noted. BOW notes that the justification for impulsive to non-impulsive noise ranges are presented in Volume 3, Appendix 8.1 Underwater Noise Assessment Report of the EIAR and are based on the study by Matei et al (2024) which presents a clear assessment that there is a substantial reduction in impulsiveness within the first 5km. BOW will continue to review research and industry advice for future underwater noise studies post-consent.
We conclude that underwater noise arising from pile driving activities is capable of affecting, other than insignificantly, the minke whale feature of the Southern Trench ncMPA.	Noted. Additional information will be included in AEIR Chapter 5: Marine Mammals.
Consequently, Marine Directorate is required to carry out an assessment to determine if there is a significant risk of hindering the achievement of the Conservation Objectives of the MPA. However, we consider the risk could be avoided if: • Installation of the IRC is conducted outside months with higher-than-average minke whale densities (May – October), unless further discussion and agreement on methods / timing is reached in consultation with NatureScot.	Noted. Additional information will be included in AEIR Chapter 5: Marine Mammals.

Consultee's response	Response from applicant
To assess disturbance the Applicant has used EDRs and the dose-response curve from the last pile as per Graham et al. (2019). Table 3-4 in the Marine Mammals Technical Report (Appendix 10.2) provides number of animals predicted to be disturbed, but as there is no visual representation of dose-response curve disturbance ranges, it is difficult to conclude what percentage of the ncMPA area will be disturbed, when and for what length of time for both concurrent piling and piling at single location scenarios. As there is no overall population estimate for the ncMPA, it is not possible to predict the number of minke whales as a percentage of the population. We acknowledge that using the Graham et al. (2019) dose-response curve is likely to be overly precautionary.	Noted. Additional information will be included in AEIR Chapter 5: Marine Mammals.
As such, there is currently insufficient information to determine whether the proposed Development is capable of affecting, other than insignificantly, the minke whale protected feature of the Southern Trench ncMPA, therefore we request the following information: • The percentage area of the Southern Trench ncMPA that will be disturbed during pile driving activities, when and for what duration. We request visual representation of disturbance ranges to be provided.	Noted. Additional information will be included in AEIR Chapter 5: Marine Mammals.
Modelling outputs presented in the Underwater Noise Assessment (Appendix 8.1) for the IRC as well as the OSP and WTGs piling locations (Scenario 1) suggest that there is potential for some disturbance effects to key prey species for minke whale e.g. sandeel and herring. The narrative provided in Table 5-2 does not place the disturbance ranges within the context of impacts to spawning or nursery habitat within the ncMPA for these species, rather it relies on a Not Significant conclusion from the Chapter 8 (Fish and Shellfish), which we do not support (see below - Appendix C).	Noted. Additional information will be included in AEIR Chapter 5: Marine Mammals.

Consultee's response	Response from applicant
As such, there is insufficient information to determine whether the proposed Development is capable of affecting, other than insignificantly, the minke whale protected feature of the Southern Trench ncMPA, therefore we request the following information: • That potential impacts to sandeel and herring as key prey species for minke whale as result of piling activities are clarified.	Noted. Additional information will be included in AEIR Chapter 5: Marine Mammals.
As advised during Scoping, TTS impact range should be used as a proxy for assessing disturbance from UXO clearance activities. However, we note that EDRs have been used instead, resulting in 3.3% of the ncMPA predicted to be disturbed for low order clearance (5km EDR) and 29.5% of the ncMPA for high order clearance with noise abatement (15km EDR). If the TTS proxy was used, then a single pulse impact range would be 3.2km for low order and 90km for high order clearance.	BOW confirms that TTS was used as a proxy for behavioural disturbance from UXO clearance as part of the EIAR in response to consultation. This is located in Section 10.12.2.3 of Chapter 10 of the EIAR. Based on the UXO clearance from a variety of potential charge weights the spatial extent for TTS was modelled for impulsive (Table 10-82 of the EIAR) and non-impulsive sounds (Table 10-83 of the EIAR). See also Volume 3, Appendix 8.1: Underwater Noise Modelling Assessment for detail of the UXOs modelled as part of the underwater noise assessment.
We conclude that underwater noise arising from UXO clearance activities is capable of affecting, other than insignificantly, the minke whale feature of the Southern Trench ncMPA. Consequently, Marine Directorate is required to carry out an assessment to determine if there is a significant risk of hindering the achievement of the Conservation Objectives of the MPA. However, we are mindful that the assessment is based on indicative information and that further European Protected Species and Marine Licensing will be required, therefore we request: • The impact from UXO clearance is reassessed once more information is provided on the number, size, location and type of UXO located within the proposed Development, including any cumulative impacts. Noting that it is likely that we will recommend seasonal restrictions for UXO clearance within the ncMPA.	Noted. BOW acknowledges NatureScot's request regarding UXO clearance impacts on the minke whale of the Southern Trench ncMPA. As recognised within the assessment, the UXO assessment is currently based on indicative information and further project-specific assessment will be required once additional information is available regarding the number, size, type and location of UXO requiring clearance. Further consideration of mitigation requirements, cumulative impacts and any seasonal restrictions will be undertaken as part of the subsequent Licence and EPS consenting process, as appropriate.
For all other project alone impact pathways assessed (Tables 5-17, 5-8, 5-9, 5-10, 5-11, 5-12), we support the conclusion reached that activities are, capable of affecting, other than insignificantly, the protected minke whale feature of the Southern Trench ncMPA but there is no significant risk of hindering the achievement of the Conservation Objectives.	Noted.

Consultee's response	Response from applicant
EDRs have been used to assess the potential for cumulative disturbance effects from pile driving activities on the minke whale feature. In reviewing the information that has been provided, we note that Figure 5-2 illustrates that the Buchan 15km EDR contour overlaps spatially with the Salamander 15km EDR contour for a 2.20km2 area of the ncMPA. Table 5-15 provides 26km EDR values for Caledonia only and combined with the 15km EDRs for Buchan and Salamander, predicts that 27.68% of the Southern Trench ncMPA area would be impacted. This is considered to represent the worst case scenario, noting that only a small number of piling days are required for the Buchan IRC.	Noted.
We conclude that disturbance effects from underwater noise arising from cumulative pile driving activities is capable of affecting, other than insignificantly, the minke whale feature of the Southern Trench ncMPA. Consequently, Marine Directorate is required to carry out an assessment to determine if there is a significant risk of hindering the achievement of the Conservation Objectives. However, we are mindful that while lacking, the assessment was also based on incomplete and indicative information and that the modelling approach used encompasses many sources of precaution, therefore we advise that: • The assessment is revisited to provide the percentage area of the Southern Trench ncMPA that will be disturbed cumulatively (through a spatial and / or temporal overlap) from pile driving activities from all relevant offshore wind developments. It would be helpful if visual representation of disturbance ranges are also provided.	Noted. Additional information will be included in AEIR Chapter 5: Marine Mammals.
Post any consent, we request the following: • Monitoring of minke whale behaviour pre-, during, and post-construction will be required to validate predicted impacts. We recommend that the Applicant contributes to the strategic minke whale monitoring partnership study focusing on broadband acoustics that is already underway in the Southern Trench ncMPA.	BOW has committed to using MMOs and will consult on marine mammals monitoring with NatureScot. BOW is happy to explore opportunities for strategic minke whale monitoring.

Consultee's response	Response from applicant
For all other cumulative impact pathways assessed Table 5-14, we support the conclusion reached that activities are, capable of affecting, other than insignificantly, the minke whale protected feature but that the proposal will not result in a significant risk of hindering the achievement of the Conservation Objectives of the MPA.	Noted.
Marine Mammal (HRA) interests are considered in the following supporting appendices: • Report to Inform Appropriate Assessment – Part 1 - Introduction • Report to Inform Appropriate Assessment - Part 2.1 – Introduction to special areas of conservation assessment • Report to Inform Appropriate Assessment – Part 2.3 – Annex II Marine Mammals	Noted.
Construction activities from the proposed Development are likely to cause disturbance effects and as such is likely to have a significant effect (LSE) on the bottlenose dolphin feature of the Moray Firth SAC. Bottlenose dolphins from this SAC, belonging to the inshore / coastal ecotype, are regularly sighted along the east coast, from the Tay Estuary and St Andrews Bay, the Firth of Forth, to Northumberland waters and are mainly found within the 20m depth contour. This known ranging behaviour is reflected in the current extent of the Coastal East Scotland MU. We are content, as per our pre-application advice, that this is the only Scottish SAC screened in for marine mammals. As such, our advice as provided below, is in relation to the bottlenose dolphin qualifying species of the Moray Firth SAC only.	Noted.
Six impact pathways were assessed with three related to the potential for increase in underwater noise – Pile driving, UXO clearance and surveys. Table 5-2 and Table 6-4 considers project alone and in-combination effects against each of the Conservation Objectives respectively. We support the assessment conclusion for operational noise, entanglement risk and EMF effects.	Noted.

Consultee's response	Response from applicant
For underwater noise impacts, we consider the screening of projects for the in-combination assessment has not always been consistently applied. We do not support the use of EDRs for assessing disturbance and advise that the number of individuals predicted to be disturbed is obtained using dose response curves. Nevertheless, it was useful to review Figure 6-1 particularly in relation to the 20m depth contour and consider this together with the underwater noise modelling outputs (Appendix 8.1) for high frequency cetaceans, noting that predicted instantaneous PTS, cumulative PTS and TTS ranges all less than 100m.	BOW acknowledges NatureScot's comment regarding the cumulative assessment methodology for underwater noise disturbance. The AEIR includes further refinement of the cumulative assessment methodology, including greater use of project-specific information and dose-response approaches where available, together with presentation of the predicted numbers of individuals potentially disturbed, where appropriate and supported by the available project-specific information. The assessment methodology has been developed using the best available evidence and proportionate assumptions for projects at varying stages of development. Where project specific information is unavailable, proportionate precautionary assumptions remain necessary for Tier 3 projects.
In our view, there will be no Adverse Effect on Site Integrity (AEOSI) to the bottlenose dolphin qualifying feature associated with the Moray Firth SAC from the proposed Development, either alone or in-combination.	Noted.
There are several projects with export cable routes that are anticipated to transverse the CES MU area along the east coast of Scotland (e.g. GreenVolt, Caledonia, Salamander, Muir Mhòr, Inch Cape, Ossian, Cenos, Broadshore etc) alongside existing pipeline operations and therefore could interact with bottlenose dolphins from the Moray Firth SAC. The potential for in-combination impacts cannot be overlooked. However, we note ongoing uncertainty around grid connections dates and locations.	Noted.

APPENDIX 5.2 – iPCoD PILING SCENARIOS

All piling scenarios used in both project alone and cumulative iPCoD modelling are presented in the supplementary Microsoft Excel Worksheet titled “Appendix 5.2 iPCoD Piling Scenario Appendix”.

APPENDIX 5.3 – IPCOD RESULTS FOR THE PROJECT ALONE SCENARIOS

This appendix relates to items addressed in **Section 5.5.2** and **Section 5.5.6** and provides additional iPCoD outputs not presented in the original EIAR**.**

Definitions of piling scenarios are presented in **Table 5-2**.

A.1 MINKE WHALE

A.1.1 EIA WTG anchor piling Scenario 1

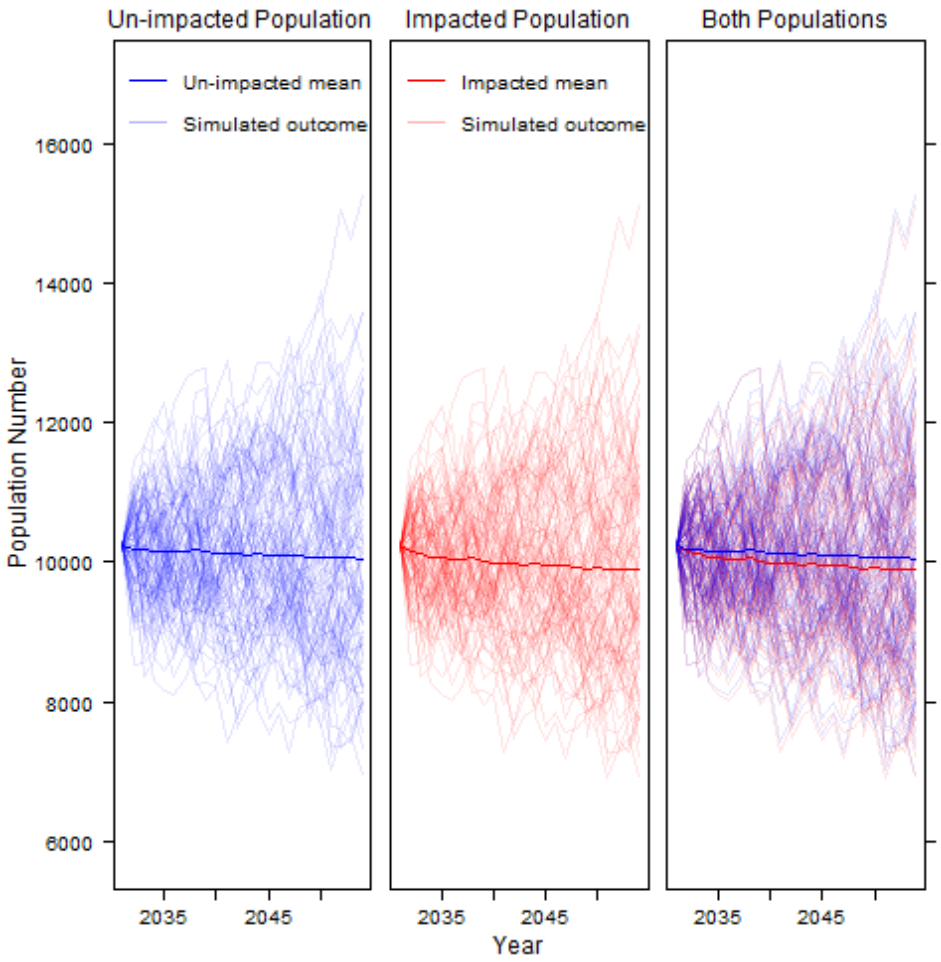

Figure 5-23: Simulated unimpacted and impacted population trajectories for minke whale in the UK portion of the Celtic and Greater North Seas MU: WTG anchor Scenario 1

Table 5-32: Mean and median (± 95% confidence intervals) predicted population sizes for minke whale in the UK portion of the Celtic and Greater North Seas MU: WTG anchor Scenario 1, and the counterfactual population size

Year	Description	Unimpacted population		Impacted population		Counterfactual population size	
		Mean	Median	Mean	Median	Mean	Median
2031	Piling year 1	10174	10225 (9030 - 11066)	10167	10215 (9027 - 11064)	0.999	0.999
2032	Piling year 2	10173	10164 (8824 - 11504)	10132	10134 (8740 - 11464)	0.996	0.997
2033	One year following piling	10146	10172 (8590 - 11571)	10080	10119 (8504 - 11516)	0.993	0.995
2034	Two years following piling	10144	10108 (8742 - 11786)	10061	10024 (8609 - 11662)	0.992	0.992
2035	Three years following piling	10149	10142 (8586 - 11923)	10054	10045 (8509 - 11813)	0.991	0.99
2036	Five years following piling	10151	10108 (8515 - 12054)	10045	10006 (8377 - 11922)	0.99	0.99
2037	Six years following piling	10176	10125 (8422 - 12178)	10061	10015 (8298 - 12134)	0.989	0.989
2042	Ten years following piling	10107	10005 (8076 - 12485)	9961	9875 (7981 - 12320)	0.986	0.987
2047	Fifteen years following piling	10098	9941 (7720 - 13097)	9938	9788 (7618 - 12940)	0.984	0.985
2052	Twenty years following piling	10068	9970 (7559 - 13470)	9905	9804 (7392 - 13270)	0.984	0.983
2055	Twenty-three years following piling	10018	9902 (7146 - 13443)	9854	9730 (7038 - 13266)	0.984	0.983

Table 5-33: Mean and median (± 95% confidence intervals) predicted population growth rates for minke whale in the UK portion of the Celtic and Greater North Seas MU: WTG anchor Scenario 1, and the counterfactual population growth rate

Year	Description	Unimpacted population		Impacted population		Counterfactual population growth rate	
		Mean	Median	Mean	Median	Mean	Median
2031	Piling year 1	0.995	1.000 (0.883 - 1.082)	0.994	0.999 (0.883 - 1.082)	0.999	0.999
2032	Piling year 2	0.997	0.997 (0.929 - 1.061)	0.995	0.995 (0.924 - 1.059)	0.998	0.999
2033	One year following piling	0.997	0.998 (0.943 - 1.042)	0.995	0.996 (0.940 - 1.040)	0.998	0.998
2034	Two years following piling	0.997	0.997 (0.962 - 1.036)	0.995	0.995 (0.958 - 1.033)	0.998	0.998
2035	Three years following piling	0.998	0.998 (0.966 - 1.031)	0.996	0.996 (0.964 - 1.029)	0.998	0.998
2036	Five years following piling	0.998	0.998 (0.970 - 1.028)	0.996	0.996 (0.967 - 1.026)	0.998	0.998
2037	Six years following piling	0.999	0.999 (0.973 - 1.025)	0.997	0.997 (0.971 - 1.025)	0.998	0.998
2042	Ten years following piling	0.999	0.998 (0.981 - 1.017)	0.997	0.997 (0.980 - 1.016)	0.999	0.999
2047	Fifteen years following piling	0.999	0.998 (0.984 - 1.015)	0.998	0.997 (0.983 - 1.014)	0.999	0.999
2052	Twenty years following piling	0.999	0.999 (0.986 - 1.013)	0.998	0.998 (0.985 - 1.012)	0.999	0.999
2055	Twenty-three years following piling	0.999	0.999 (0.986 - 1.011)	0.998	0.998 (0.985 - 1.010)	0.999	0.999

A.1.2 EIA WTG anchor piling Scenario 2

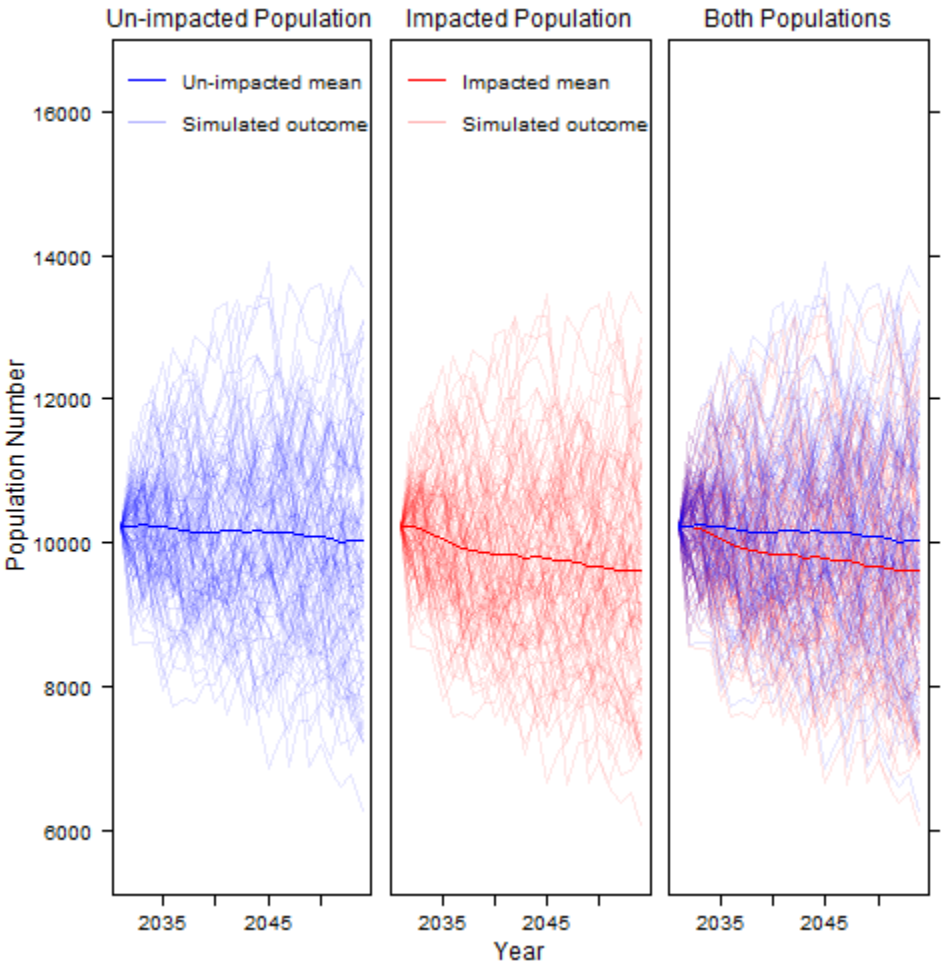

Figure 5-24: Simulated unimpacted and impacted population trajectories for minke whale in the UK portion of the Celtic and Greater North Seas MU: WTG anchor Scenario 2

Table 5-34: Mean and median (± 95% confidence intervals) predicted population sizes for minke whale in the UK portion of the Celtic and Greater North Seas MU: WTG anchor Scenario 2, and the counterfactual population size

Year	Description	Unimpacted population		Impacted population		Counterfactual population size	
		Mean	Median	Mean	Median	Mean	Median
2031	Piling year 1	10237	10274 (9106 - 11132)	10226	10264 (9106 - 11130)	0.999	0.999
2032	Piling year 2	10250	10285 (8866 - 11436)	10193	10226 (8839 - 11373)	0.994	0.994
2033	One year following piling	10220	10264 (8696 - 11734)	10103	10152 (8526 - 11641)	0.989	0.989
2034	Two years following piling	10219	10196 (8632 - 11836)	10045	10021 (8438 - 11719)	0.983	0.983
2035	Three years following piling	10194	10144 (8578 - 12028)	9982	9937 (8358 - 11799)	0.979	0.98
2036	Five years following piling	10164	10123 (8516 - 11862)	9920	9875 (8218 - 11656)	0.976	0.976
2037	Six years following piling	10155	10080 (8461 - 12058)	9884	9801 (8151 - 11830)	0.973	0.972
2042	Ten years following piling	10149	10075 (8002 - 12538)	9794	9731 (7678 - 12175)	0.965	0.966
2047	Fifteen years following piling	10114	10033 (7748 - 12860)	9721	9621 (7397 - 12532)	0.961	0.959
2052	Twenty years following piling	10022	9934 (7364 - 13244)	9620	9508 (7027 - 12905)	0.96	0.957
2055	Twenty-three years following piling	10064	9986 (7250 - 13480)	9656	9612 (6924 - 13109)	0.959	0.963

Table 5-35: Mean and median (± 95% confidence intervals) predicted population growth rates for minke whale in the UK portion of the Celtic and Greater North Seas MU: WTG anchor Scenario 2, and the counterfactual population growth rate

Year	Description	Unimpacted population		Impacted population		Counterfactual population growth rate	
		Mean	Median	Mean	Median	Mean	Median
2031	Piling year 1	1.001	1.004 (0.890 - 1.088)	1	1.004 (0.890 - 1.088)	0.999	0.999
2032	Piling year 2	1.001	1.003 (0.931 - 1.057)	0.998	1.000 (0.930 - 1.054)	0.997	0.997
2033	One year following piling	0.999	1.001 (0.947 - 1.047)	0.995	0.998 (0.941 - 1.044)	0.996	0.996
2034	Two years following piling	0.999	0.999 (0.958 - 1.037)	0.995	0.995 (0.953 - 1.035)	0.996	0.996
2035	Three years following piling	0.999	0.998 (0.965 - 1.033)	0.995	0.994 (0.960 - 1.029)	0.996	0.996
2036	Five years following piling	0.998	0.998 (0.970 - 1.025)	0.994	0.994 (0.964 - 1.022)	0.996	0.996
2037	Six years following piling	0.998	0.998 (0.973 - 1.024)	0.995	0.994 (0.968 - 1.021)	0.996	0.996
2042	Ten years following piling	0.999	0.999 (0.980 - 1.017)	0.996	0.996 (0.976 - 1.015)	0.997	0.997
2047	Fifteen years following piling	0.999	0.999 (0.984 - 1.014)	0.997	0.996 (0.981 - 1.012)	0.998	0.998
2052	Twenty years following piling	0.999	0.999 (0.985 - 1.012)	0.997	0.997 (0.983 - 1.011)	0.998	0.998
2055	Twenty-three years following piling	0.999	0.999 (0.986 - 1.011)	0.997	0.998 (0.985 - 1.010)	0.998	0.998

A.1.3 EIA concurrent WTG anchor piling scenario

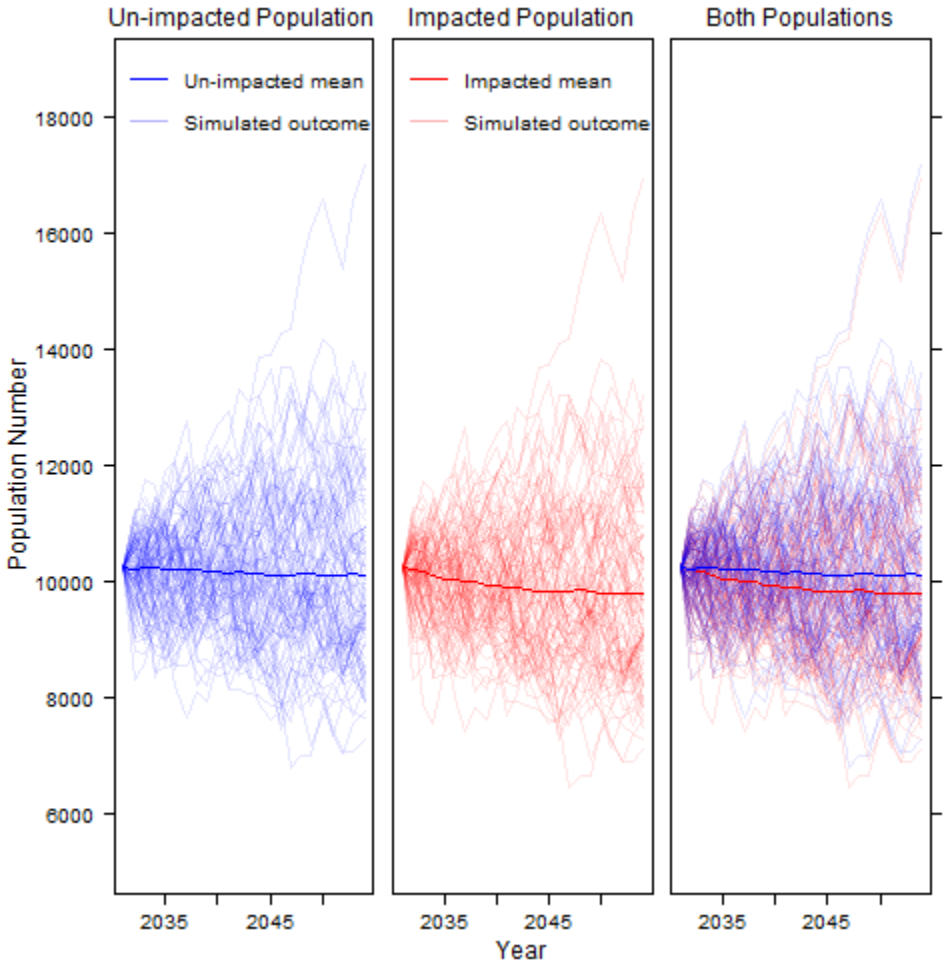

Figure 5-25: Simulated unimpacted and impacted population trajectories for minke whale in the UK portion of the Celtic and Greater North Seas MU: EIA concurrent WTG anchor piling scenario

Table 5-36: Mean and median (± 95% confidence intervals) predicted population sizes for minke whale in the UK portion of the Celtic and Greater North Seas MU: EIA concurrent WTG anchor piling scenario, and the counterfactual population size

Year	Description	Unimpacted population		Impacted population		Counterfactual population size	
		Mean	Median	Mean	Median	Mean	Median
2031	Piling year 1	10216	10250 (9068 - 11120)	10201	10241 (9044 - 11106)	0.999	0.999
2032	Piling year 2	10227	10268 (8890 - 11516)	10154	10192 (8810 - 11475)	0.993	0.993
2033	One year following piling	10226	10217 (8704 - 11676)	10100	10097 (8541 - 11578)	0.988	0.988
2034	Two years following piling	10200	10215 (8634 - 11878)	10043	10037 (8476 - 11732)	0.985	0.983
2035	Three years following piling	10194	10185 (8486 - 11786)	10011	9990 (8292 - 11654)	0.982	0.981
2036	Five years following piling	10194	10134 (8489 - 11926)	9990	9938 (8294 - 11838)	0.98	0.981
2037	Six years following piling	10200	10151 (8492 - 12071)	9977	9946 (8226 - 11893)	0.978	0.98
2042	Ten years following piling	10137	10070 (8040 - 12667)	9855	9753 (7732 - 12454)	0.972	0.969
2047	Fifteen years following piling	10149	9992 (7798 - 13258)	9842	9673 (7536 - 12963)	0.97	0.968
2052	Twenty years following piling	10116	9969 (7479 - 13736)	9802	9659 (7259 - 13234)	0.969	0.969
2055	Twenty-three years following piling	10101	9935 (7249 - 13854)	9783	9604 (6992 - 13383)	0.969	0.967

Table 5-37: Mean and median (± 95% confidence intervals) predicted population growth rates for minke whale in the UK portion of the Celtic and Greater North Seas MU: EIA concurrent WTG anchor piling scenario, and the counterfactual population size

Year	Description	Unimpacted population		Impacted population		Counterfactual population growth rate	
		Mean	Median	Mean	Median	Mean	Median
2031	Piling year 1	0.999	1.002 (0.887 - 1.087)	0.997	1.001 (0.884 - 1.086)	0.999	0.999
2032	Piling year 2	0.999	1.002 (0.932 - 1.061)	0.996	0.998 (0.928 - 1.059)	0.996	0.996
2033	One year following piling	0.999	1.000 (0.948 - 1.045)	0.995	0.996 (0.942 - 1.042)	0.996	0.996
2034	Two years following piling	0.999	1.000 (0.959 - 1.038)	0.995	0.995 (0.954 - 1.035)	0.996	0.996
2035	Three years following piling	0.999	0.999 (0.963 - 1.029)	0.995	0.995 (0.959 - 1.026)	0.996	0.996
2036	Five years following piling	0.999	0.998 (0.969 - 1.026)	0.996	0.995 (0.966 - 1.025)	0.997	0.997
2037	Six years following piling	0.999	0.999 (0.974 - 1.024)	0.996	0.996 (0.969 - 1.022)	0.997	0.997
2042	Ten years following piling	0.999	0.999 (0.980 - 1.018)	0.996	0.996 (0.977 - 1.017)	0.998	0.997
2047	Fifteen years following piling	0.999	0.999 (0.984 - 1.015)	0.997	0.997 (0.982 - 1.014)	0.998	0.998
2052	Twenty years following piling	0.999	0.999 (0.986 - 1.013)	0.998	0.997 (0.985 - 1.012)	0.999	0.999
2055	Twenty-three years following piling	0.999	0.999 (0.986 - 1.012)	0.998	0.997 (0.985 - 1.011)	0.999	0.999

A.1.4 New Fast Bounding concurrent WTG anchor piling scenario

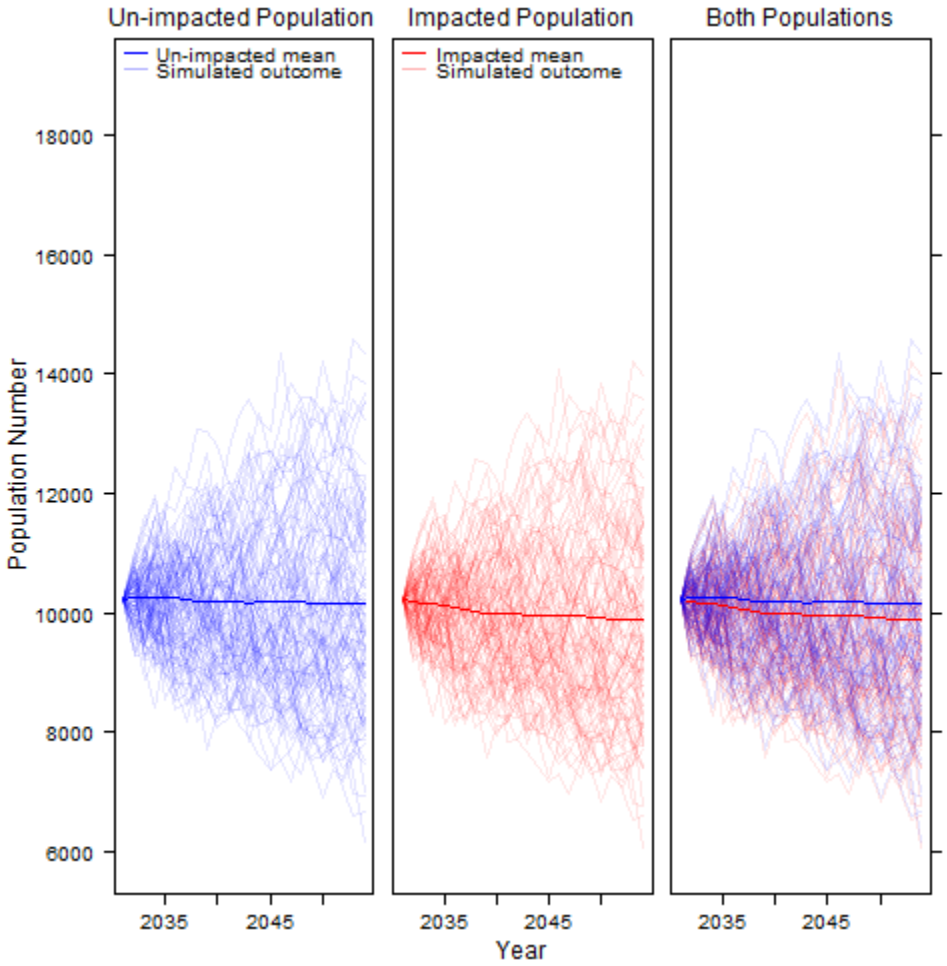

Figure 5-26: Simulated unimpacted and impacted population trajectories for minke whale in the UK portion of the Celtic and Greater North Seas MU: New Fast Bounding concurrent WTG anchor piling scenario

Table 5-38: Mean and median (± 95% confidence intervals) predicted population sizes for minke whale in the UK portion of the Celtic and Greater North Seas MU: New Fast Bounding concurrent WTG anchor piling scenario

Year	Description	Unimpacted population		Impacted population		Counterfactual population size	
		Mean	Median	Mean	Median	Mean	Median
2031	Piling year 1	10242	10306 (9094 - 11076)	10189	10250 (9040 - 11022)	0.995	0.995
2032	Piling year 2	10258	10286 (8880 - 11534)	10172	10200 (8824 - 11454)	0.992	0.992
2033	One year following piling	10266	10276 (8892 - 11750)	10153	10170 (8812 - 11629)	0.989	0.99
2034	Two years following piling	10247	10228 (8716 - 11952)	10111	10090 (8574 - 11777)	0.987	0.987
2035	Three years following piling	10241	10252 (8648 - 12151)	10086	10096 (8484 - 11986)	0.985	0.985
2036	Five years following piling	10229	10216 (8501 - 12187)	10058	10045 (8284 - 11959)	0.983	0.983
2037	Six years following piling	10207	10150 (8400 - 12160)	10022	9986 (8242 - 11926)	0.982	0.984
2042	Ten years following piling	10171	10071 (8043 - 12656)	9944	9843 (7805 - 12370)	0.978	0.977
2047	Fifteen years following piling	10189	10118 (7828 - 13148)	9944	9882 (7618 - 12830)	0.976	0.977
2052	Twenty years following piling	10155	10044 (7466 - 13388)	9905	9793 (7280 - 13069)	0.975	0.975
2055	Twenty-three years following piling	10162	10035 (7338 - 13881)	9910	9766 (7204 - 13521)	0.975	0.973

Table 5-39: Mean and median (± 95% confidence intervals) predicted population growth rates for minke whale in the UK portion of the Celtic and Greater North Seas MU: New Fast Bounding concurrent WTG anchor piling scenario

Year	Description	Unimpacted population		Impacted population		Counterfactual population growth rate	
		Mean	Median	Mean	Median	Mean	Median
2031	Piling year 1	1.001	1.008 (0.889 - 1.083)	0.996	1.002 (0.884 - 1.078)	0.995	0.995
2032	Piling year 2	1.001	1.003 (0.932 - 1.062)	0.997	0.999 (0.929 - 1.058)	0.996	0.996
2033	One year following piling	1.001	1.002 (0.954 - 1.047)	0.997	0.998 (0.952 - 1.044)	0.996	0.997
2034	Two years following piling	1	1.000 (0.961 - 1.040)	0.997	0.997 (0.957 - 1.036)	0.997	0.997
2035	Three years following piling	1	1.000 (0.967 - 1.035)	0.997	0.997 (0.963 - 1.032)	0.997	0.997
2036	Five years following piling	0.999	1.000 (0.970 - 1.030)	0.997	0.997 (0.965 - 1.026)	0.997	0.997
2037	Six years following piling	0.999	0.999 (0.972 - 1.025)	0.997	0.997 (0.970 - 1.022)	0.997	0.998
2042	Ten years following piling	0.999	0.999 (0.980 - 1.018)	0.997	0.997 (0.978 - 1.016)	0.998	0.998
2047	Fifteen years following piling	0.999	0.999 (0.984 - 1.015)	0.998	0.998 (0.983 - 1.013)	0.999	0.999
2052	Twenty years following piling	0.999	0.999 (0.986 - 1.012)	0.998	0.998 (0.985 - 1.011)	0.999	0.999
2055	Twenty-three years following piling	0.999	0.999 (0.987 - 1.012)	0.998	0.998 (0.986 - 1.011)	0.999	0.999

A.1.5 Updated realistic concurrent WTG anchor piling scenario

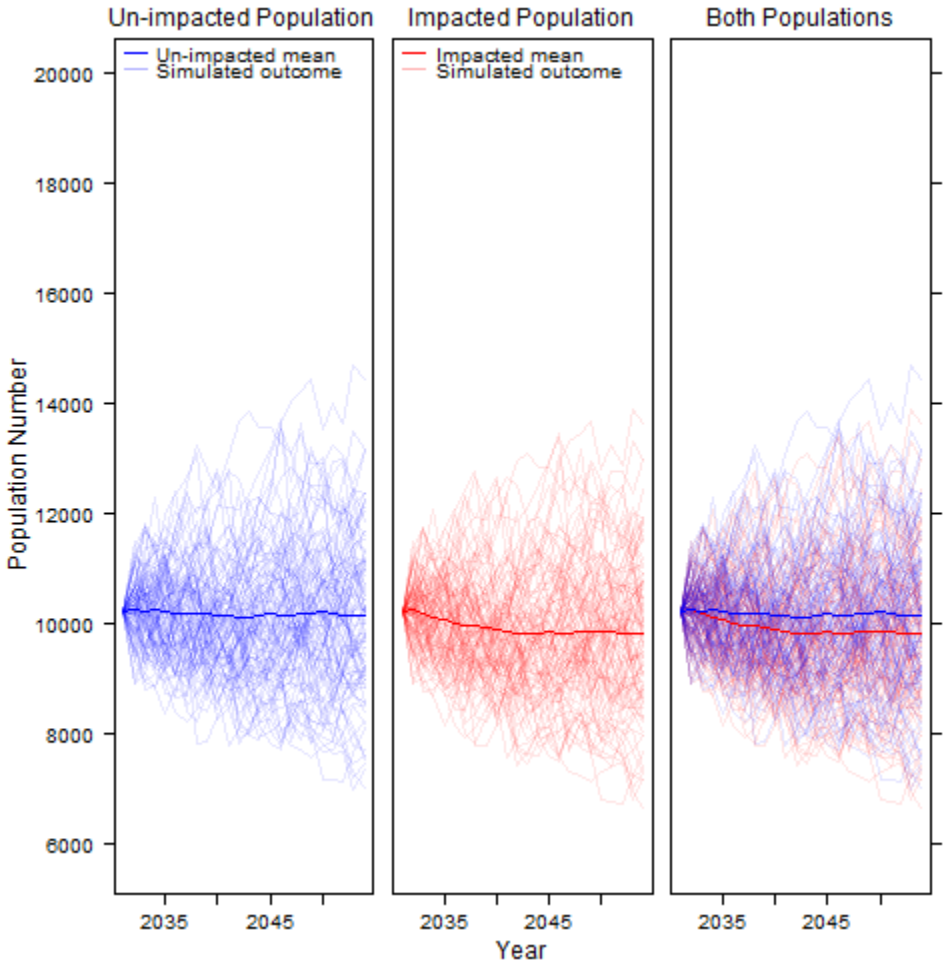

Figure 5-27: Simulated unimpacted and impacted population trajectories for minke whale in the UK portion of the Celtic and Greater North Seas MU: Updated realistic concurrent WTG anchor piling scenario

Table 5-40: Mean and median (± 95% confidence intervals) predicted population sizes for minke whale in the UK portion of the Celtic and Greater North Seas MU: Updated realistic concurrent WTG anchor piling scenario

Year	Description	Unimpacted population		Impacted population		Counterfactual population size	
		Mean	Median	Mean	Median	Mean	Median
2031	Piling year 1	10256	10289 (9176 - 11098)	10244	10277 (9132 - 11084)	0.999	0.999
2032	Piling year 2	10236	10271 (8849 - 11432)	10171	10197 (8766 - 11358)	0.994	0.993
2033	One year following piling	10242	10241 (8706 - 11662)	10121	10130 (8574 - 11566)	0.988	0.989
2034	Two years following piling	10225	10196 (8692 - 11884)	10066	10035 (8484 - 11732)	0.984	0.984
2035	Three years following piling	10185	10129 (8668 - 12023)	9994	9950 (8435 - 11852)	0.981	0.982
2036	Five years following piling	10198	10176 (8530 - 12078)	9981	9957 (8280 - 11817)	0.979	0.978
2037	Six years following piling	10201	10146 (8404 - 12078)	9962	9944 (8176 - 11918)	0.977	0.98
2042	Ten years following piling	10123	10059 (7986 - 12717)	9818	9731 (7774 - 12342)	0.97	0.967
2047	Fifteen years following piling	10172	10048 (7903 - 13044)	9839	9725 (7532 - 12726)	0.967	0.968
2052	Twenty years following piling	10158	10013 (7483 - 13384)	9815	9652 (7218 - 13050)	0.966	0.964
2055	Twenty-three years following piling	10119	9912 (7356 - 13767)	9775	9606 (7081 - 13454)	0.966	0.969

Table 5-41: Mean and median (± 95% confidence intervals) predicted population growth rates for minke whale in the UK portion of the Celtic and Greater North Seas MU: Updated realistic concurrent WTG anchor piling scenario

Year	Description	Unimpacted population		Impacted population		Counterfactual population growth rate	
		Mean	Median	Mean	Median	Mean	Median
2031	Piling year 1	1.003	1.006 (0.897 - 1.085)	1.002	1.005 (0.893 - 1.084)	0.999	0.999
2032	Piling year 2	1	1.002 (0.930 - 1.057)	0.997	0.998 (0.926 - 1.054)	0.997	0.996
2033	One year following piling	1	1.000 (0.948 - 1.045)	0.996	0.997 (0.943 - 1.042)	0.996	0.996
2034	Two years following piling	0.999	0.999 (0.960 - 1.038)	0.995	0.995 (0.954 - 1.035)	0.996	0.996
2035	Three years following piling	0.999	0.998 (0.967 - 1.033)	0.995	0.995 (0.962 - 1.030)	0.996	0.996
2036	Five years following piling	0.999	0.999 (0.970 - 1.028)	0.995	0.996 (0.965 - 1.024)	0.996	0.996
2037	Six years following piling	0.999	0.999 (0.972 - 1.024)	0.996	0.996 (0.969 - 1.022)	0.997	0.997
2042	Ten years following piling	0.999	0.999 (0.980 - 1.018)	0.996	0.996 (0.977 - 1.016)	0.997	0.997
2047	Fifteen years following piling	0.999	0.999 (0.985 - 1.014)	0.997	0.997 (0.982 - 1.013)	0.998	0.998
2052	Twenty years following piling	0.999	0.999 (0.986 - 1.012)	0.998	0.997 (0.984 - 1.011)	0.998	0.998
2055	Twenty-three years following piling	0.999	0.999 (0.987 - 1.012)	0.998	0.997 (0.985 - 1.011)	0.999	0.999

A.2 INSHORE BOTTLENOSE DOLPHIN

A.2.1 EIA WTG anchor piling Scenario 1

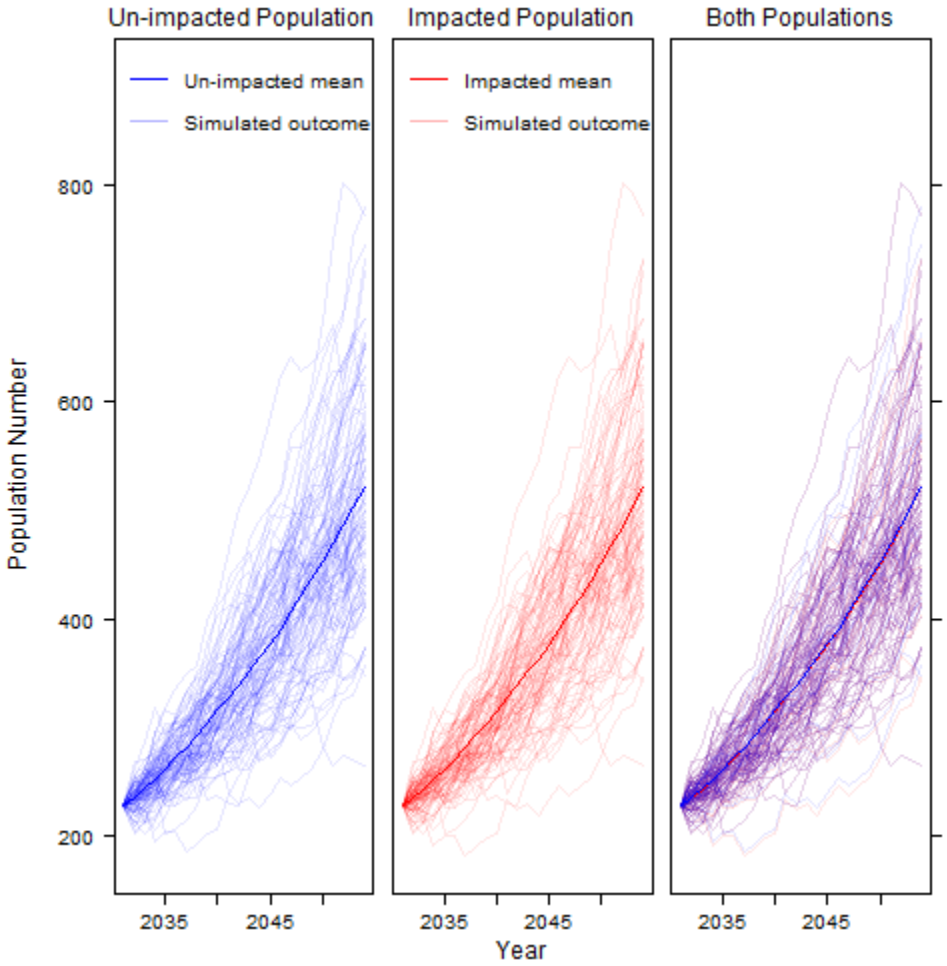

Figure 5-28: Simulated unimpacted and impacted population trajectories for inshore bottlenose dolphin in the Coastal East Scotland MU: WTG anchor Scenario 1

Table 5-42: Mean and median (± 95% confidence intervals) predicted population sizes for inshore bottlenose dolphin in the Coastal East Scotland MU: WTG anchor Scenario 1, and the counterfactual population size

Year	Description	Unimpacted population		Impacted population		Counterfactual population size	
		Mean	Median	Mean	Median	Mean	Median
2031	Piling year 1	236	236 (210 - 256)	236	236 (210 - 256)	1	1
2032	Piling year 2	244	244 (210 - 274)	244	244 (210 - 274)	0.997	1
2033	One year following piling	253	252 (214 - 288)	252	252 (212 - 288)	0.997	1
2034	Two years following piling	262	262 (218 - 302)	261	262 (218 - 302)	0.997	1
2035	Three years following piling	272	272 (222 - 318)	271	272 (222 - 318)	0.997	1
2036	Five years following piling	282	282 (228 - 334)	281	282 (228 - 334)	0.997	1
2037	Six years following piling	293	294 (234 - 352)	292	292 (234 - 350)	0.997	0.993
2042	Ten years following piling	352	351 (264 - 444)	351	350 (264 - 442)	0.997	0.997
2047	Fifteen years following piling	421	420 (304 - 550)	420	420 (302 - 546)	0.997	1
2052	Twenty years following piling	504	498 (346 - 670)	502	498 (346 - 666)	0.997	1
2055	Twenty-three years following piling	562	555 (382 - 770)	560	554 (378 - 766)	0.997	0.998

Table 5-43: Mean and median (± 95% confidence intervals) predicted population growth rates for inshore bottlenose dolphin in the Coastal East Scotland MU: WTG anchor Scenario 1, and the counterfactual population growth rate

Year	Description	Unimpacted population		Impacted population		Counterfactual population growth rate	
		Mean	Median	Mean	Median	Mean	Median
2031	Piling year 1	1.034	1.035 (0.921 - 1.123)	1.033	1.035 (0.921 - 1.123)	1	1
2032	Piling year 2	1.034	1.034 (0.960 - 1.096)	1.033	1.034 (0.960 - 1.096)	0.999	1
2033	One year following piling	1.034	1.034 (0.979 - 1.081)	1.033	1.034 (0.976 - 1.081)	0.999	1
2034	Two years following piling	1.035	1.035 (0.989 - 1.073)	1.034	1.035 (0.989 - 1.073)	0.999	1
2035	Three years following piling	1.035	1.036 (0.995 - 1.069)	1.034	1.036 (0.995 - 1.069)	0.999	1
2036	Five years following piling	1.035	1.036 (1.000 - 1.066)	1.035	1.036 (1.000 - 1.066)	1	1
2037	Six years following piling	1.036	1.037 (1.004 - 1.064)	1.035	1.036 (1.004 - 1.063)	1	0.999
2042	Ten years following piling	1.036	1.037 (1.012 - 1.057)	1.036	1.036 (1.012 - 1.057)	1	1
2047	Fifteen years following piling	1.036	1.037 (1.017 - 1.053)	1.036	1.037 (1.017 - 1.053)	1	1
2052	Twenty years following piling	1.036	1.036 (1.019 - 1.050)	1.036	1.036 (1.019 - 1.050)	1	1
2055	Twenty-three years following piling	1.036	1.036 (1.021 - 1.050)	1.036	1.036 (1.020 - 1.050)	1	1

A.2.2 EIA WTG anchor piling Scenario 2

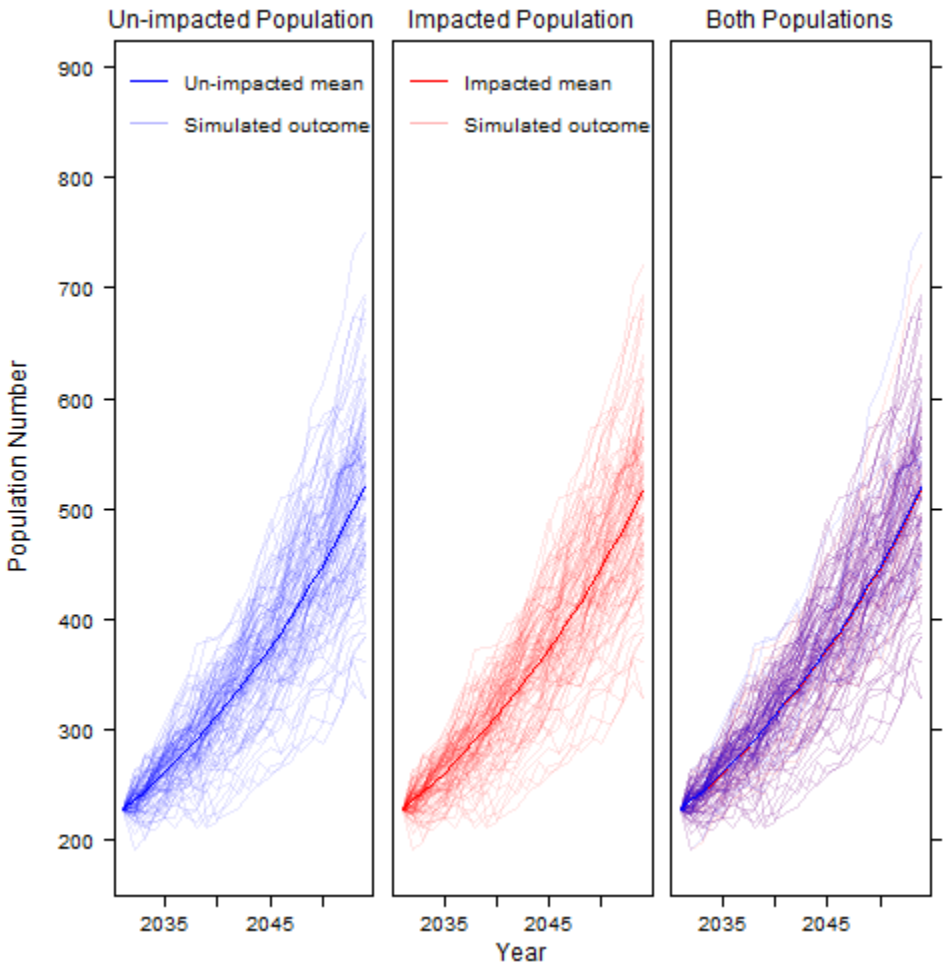

Figure 5-29: Simulated unimpacted and impacted population trajectories for inshore bottlenose dolphin in the Coastal East Scotland MU: WTG anchor Scenario 2

Table 5-44: Mean and median (± 95% confidence intervals) predicted population sizes for inshore bottlenose dolphin in the Coastal East Scotland MU: WTG anchor Scenario 2, and the counterfactual population size

Year	Description	Unimpacted population		Impacted population		Counterfactual population size	
		Mean	Median	Mean	Median	Mean	Median
2031	Piling year 1	237	236 (214 - 258)	237	236 (214 - 258)	1	1
2032	Piling year 2	244	244 (214 - 274)	244	244 (212 - 274)	0.997	1
2033	One year following piling	253	252 (214 - 288)	252	252 (212 - 288)	0.995	1
2034	Two years following piling	262	262 (218 - 304)	260	262 (214 - 304)	0.995	1
2035	Three years following piling	272	272 (220 - 320)	271	272 (218 - 318)	0.995	1
2036	Five years following piling	282	282 (228 - 336)	281	282 (228 - 336)	0.995	1
2037	Six years following piling	292	292 (228 - 350)	291	290 (228 - 350)	0.996	0.993
2042	Ten years following piling	349	350 (260 - 436)	347	348 (258 - 436)	0.996	0.994
2047	Fifteen years following piling	417	416 (298 - 542)	415	416 (294 - 542)	0.996	1
2052	Twenty years following piling	500	500 (342 - 680)	498	498 (340 - 674)	0.996	0.996
2055	Twenty-three years following piling	557	560 (370 - 752)	555	554 (368 - 752)	0.996	0.989

Table 5-45: Mean and median (± 95% confidence intervals) predicted population growth rates for inshore bottlenose dolphin in the Coastal East Scotland MU: WTG anchor Scenario 2, and the counterfactual population growth rate

Year	Description	Unimpacted population		Impacted population		Counterfactual population growth rate	
		Mean	Median	Mean	Median	Mean	Median
2031	Piling year 1	1.038	1.035 (0.938 - 1.132)	1.038	1.035 (0.938 - 1.132)	1	1
2032	Piling year 2	1.035	1.034 (0.969 - 1.096)	1.034	1.034 (0.964 - 1.096)	0.999	1
2033	One year following piling	1.034	1.034 (0.979 - 1.081)	1.033	1.034 (0.976 - 1.081)	0.998	1
2034	Two years following piling	1.034	1.035 (0.989 - 1.075)	1.033	1.035 (0.984 - 1.075)	0.999	1
2035	Three years following piling	1.035	1.036 (0.993 - 1.070)	1.034	1.036 (0.991 - 1.069)	0.999	1
2036	Five years following piling	1.035	1.036 (1.000 - 1.067)	1.034	1.036 (1.000 - 1.067)	0.999	1
2037	Six years following piling	1.035	1.036 (1.000 - 1.063)	1.034	1.035 (1.000 - 1.063)	0.999	0.999
2042	Ten years following piling	1.035	1.036 (1.011 - 1.056)	1.035	1.036 (1.010 - 1.056)	1	1
2047	Fifteen years following piling	1.035	1.036 (1.016 - 1.052)	1.035	1.036 (1.015 - 1.052)	1	1
2052	Twenty years following piling	1.036	1.036 (1.019 - 1.051)	1.035	1.036 (1.018 - 1.051)	1	1
2055	Twenty-three years following piling	1.036	1.037 (1.020 - 1.049)	1.036	1.036 (1.019 - 1.049)	1	1

A.2.3 EIA concurrent WTG anchor piling scenario

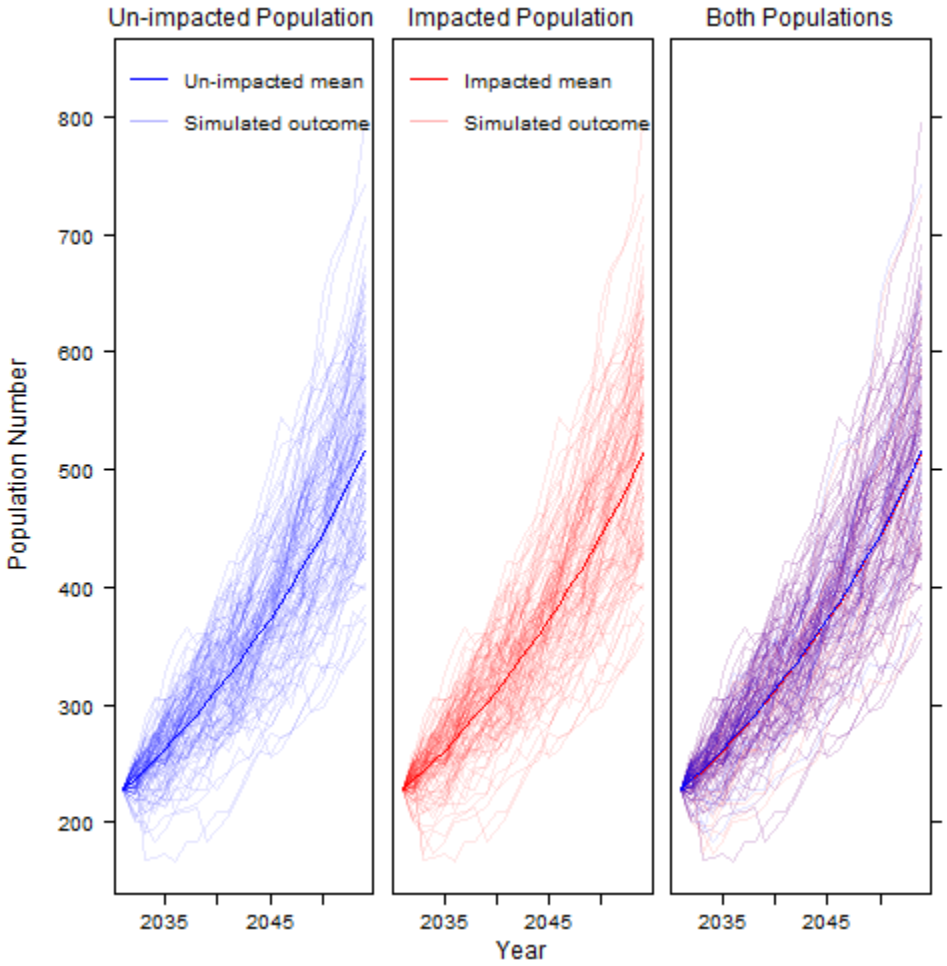

Figure 5-30: Simulated unimpacted and impacted population trajectories for inshore bottlenose dolphin in the Coastal East Scotland MU: EIA concurrent WTG anchor piling scenario

Table 5-46: Mean and median (± 95% confidence intervals) predicted population sizes for inshore bottlenose dolphin in the Coastal East Scotland MU: EIA concurrent WTG anchor piling scenario, and the counterfactual population size

Year	Description	Unimpacted population		Impacted population		Counterfactual population size	
		Mean	Median	Mean	Median	Mean	Median
2031	Piling year 1	236	236 (212 - 254)	236	236 (212 - 254)	1	1
2032	Piling year 2	244	246 (210 - 270)	244	244 (208 - 270)	0.997	0.992
2033	One year following piling	253	254 (214 - 286)	252	254 (212 - 286)	0.996	1
2034	Two years following piling	262	264 (214 - 302)	261	262 (212 - 300)	0.997	0.992
2035	Three years following piling	272	274 (218 - 316)	271	272 (218 - 316)	0.997	0.993
2036	Five years following piling	282	282 (226 - 334)	281	282 (222 - 334)	0.997	1
2037	Six years following piling	292	292 (232 - 346)	291	292 (230 - 344)	0.997	1
2042	Ten years following piling	348	350 (266 - 428)	347	348 (264 - 428)	0.997	0.994
2047	Fifteen years following piling	414	413 (294 - 530)	413	412 (294 - 530)	0.997	0.998
2052	Twenty years following piling	496	496 (338 - 652)	494	496 (338 - 652)	0.997	1
2055	Twenty-three years following piling	554	556 (374 - 742)	552	554 (374 - 742)	0.997	0.996

Table 5-47: Mean and median (± 95% confidence intervals) predicted population growth rates for inshore bottlenose dolphin in the Coastal East Scotland MU: EIA concurrent WTG anchor piling scenario, and the counterfactual population growth rate

Year	Description	Unimpacted population		Impacted population		Counterfactual population growth rate	
		Mean	Median	Mean	Median	Mean	Median
2031	Piling year 1	1.035	1.035 (0.930 - 1.114)	1.034	1.035 (0.930 - 1.114)	1	1
2032	Piling year 2	1.035	1.039 (0.960 - 1.088)	1.033	1.034 (0.955 - 1.088)	0.998	0.996
2033	One year following piling	1.035	1.037 (0.979 - 1.078)	1.034	1.037 (0.976 - 1.078)	0.999	1
2034	Two years following piling	1.035	1.037 (0.984 - 1.073)	1.034	1.035 (0.982 - 1.071)	0.999	0.998
2035	Three years following piling	1.035	1.037 (0.991 - 1.067)	1.034	1.036 (0.991 - 1.067)	0.999	0.999
2036	Five years following piling	1.035	1.036 (0.998 - 1.066)	1.035	1.036 (0.996 - 1.066)	1	1
2037	Six years following piling	1.035	1.036 (1.002 - 1.061)	1.035	1.036 (1.001 - 1.061)	1	1
2042	Ten years following piling	1.035	1.036 (1.013 - 1.054)	1.035	1.036 (1.012 - 1.054)	1	1
2047	Fifteen years following piling	1.035	1.036 (1.015 - 1.051)	1.035	1.035 (1.015 - 1.051)	1	1
2052	Twenty years following piling	1.035	1.036 (1.018 - 1.049)	1.035	1.036 (1.018 - 1.049)	1	1
2055	Twenty-three years following piling	1.036	1.036 (1.020 - 1.048)	1.035	1.036 (1.020 - 1.048)	1	1

A.2.4 New Fast Bounding concurrent WTG anchor piling scenario

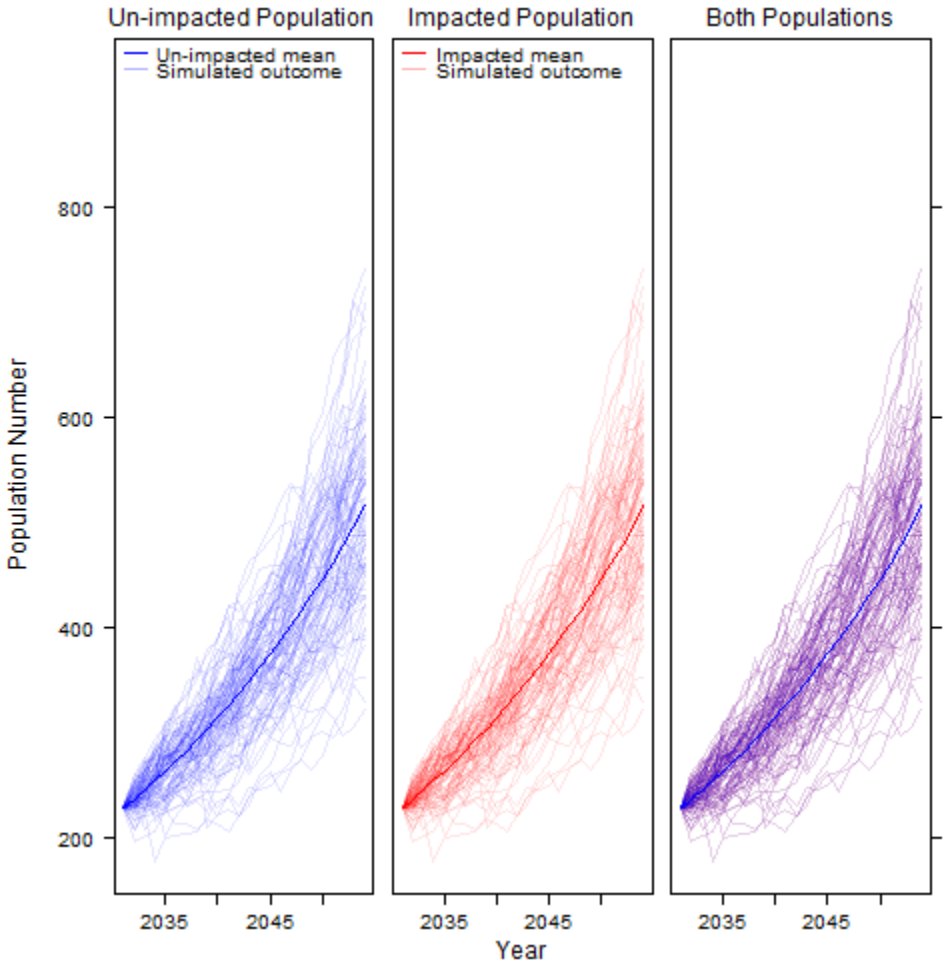

Figure 5-31: Simulated unimpacted and impacted population trajectories for inshore bottlenose dolphin in the Coastal East Scotland MU: New Fast Bounding concurrent WTG anchor piling scenario

Table 5-48: Mean and median (± 95% confidence intervals) predicted population sizes for inshore bottlenose dolphin in the Coastal East Scotland MU: New Fast Bounding concurrent WTG anchor piling scenario

Year	Description	Unimpacted population		Impacted population		Counterfactual population size	
		Mean	Median	Mean	Median	Mean	Median
2031	Piling year 1	237	237 (214 - 256)	237	238 (214 - 256)	1	1.004
2032	Piling year 2	245	246 (210 - 274)	245	246 (210 - 274)	1	1
2033	One year following piling	254	254 (212 - 288)	254	254 (212 - 288)	1	1
2034	Two years following piling	263	264 (216 - 302)	263	264 (216 - 302)	1	1
2035	Three years following piling	273	274 (222 - 320)	273	274 (222 - 320)	1	1
2036	Five years following piling	282	284 (224 - 334)	282	284 (224 - 334)	1	1
2037	Six years following piling	293	294 (230 - 352)	293	294 (230 - 352)	1	1
2042	Ten years following piling	349	350 (260 - 436)	348	350 (260 - 436)	1	1
2047	Fifteen years following piling	415	414 (296 - 538)	415	414 (296 - 538)	1	1
2052	Twenty years following piling	495	494 (344 - 670)	495	494 (344 - 670)	1	1
2055	Twenty-three years following piling	552	547 (376 - 750)	552	547 (376 - 750)	1	1

Table 5-49: Mean and median (± 95% confidence intervals) predicted population growth rates for inshore bottlenose dolphin in the Coastal East Scotland MU: New Fast Bounding concurrent WTG anchor piling scenario

Year	Description	Unimpacted population		Impacted population		Counterfactual population growth rate	
		Mean	Median	Mean	Median	Mean	Median
2031	Piling year 1	1.037	1.039 (0.939 - 1.123)	1.037	1.044 (0.939 - 1.123)	1	1.004
2032	Piling year 2	1.037	1.039 (0.960 - 1.096)	1.037	1.039 (0.960 - 1.096)	1	1
2033	One year following piling	1.036	1.037 (0.976 - 1.081)	1.036	1.037 (0.976 - 1.081)	1	1
2034	Two years following piling	1.036	1.037 (0.987 - 1.073)	1.036	1.037 (0.987 - 1.073)	1	1
2035	Three years following piling	1.036	1.037 (0.995 - 1.070)	1.036	1.037 (0.995 - 1.070)	1	1
2036	Five years following piling	1.036	1.037 (0.997 - 1.066)	1.036	1.037 (0.997 - 1.066)	1	1
2037	Six years following piling	1.036	1.037 (1.001 - 1.064)	1.036	1.037 (1.001 - 1.064)	1	1
2042	Ten years following piling	1.035	1.036 (1.011 - 1.056)	1.035	1.036 (1.011 - 1.056)	1	1
2047	Fifteen years following piling	1.035	1.036 (1.015 - 1.052)	1.035	1.036 (1.015 - 1.052)	1	1
2052	Twenty years following piling	1.035	1.036 (1.019 - 1.050)	1.035	1.036 (1.019 - 1.050)	1	1
2055	Twenty-three years following piling	1.035	1.036 (1.020 - 1.049)	1.035	1.036 (1.020 - 1.049)	1	1

A.2.5 Updated realistic concurrent WTG anchor piling scenario

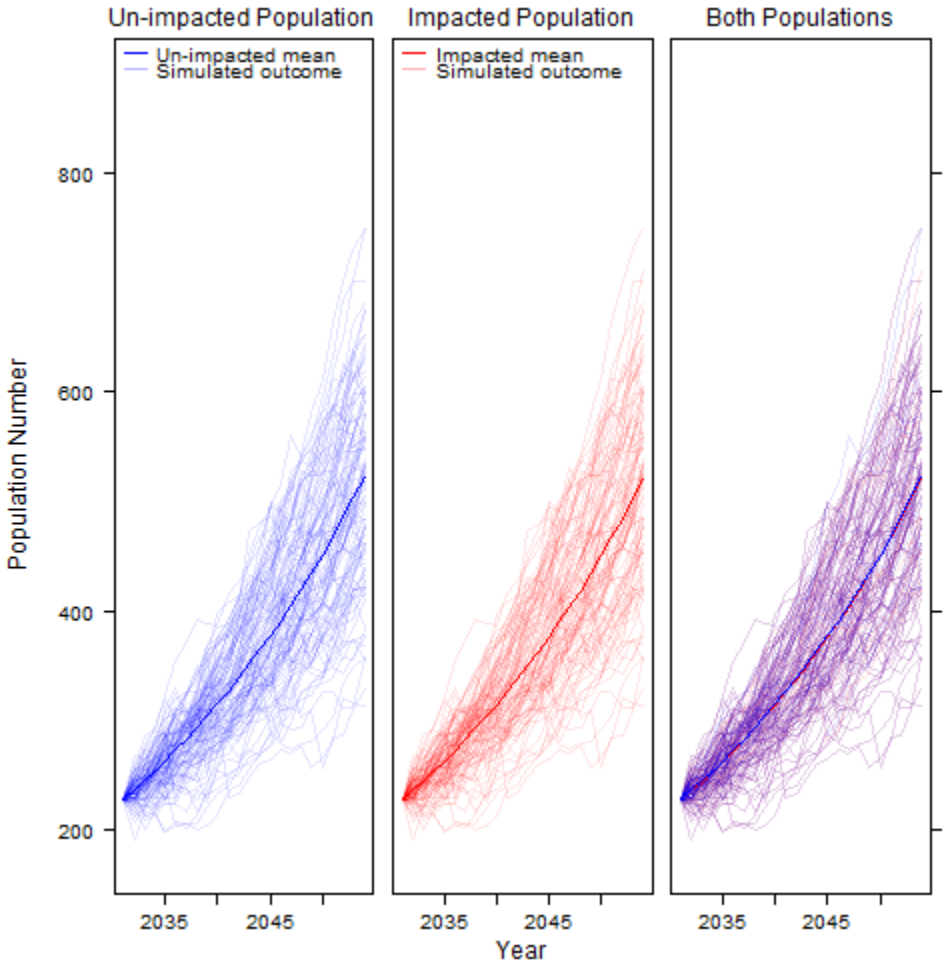

Figure 5-32: Simulated unimpacted and impacted population trajectories for inshore bottlenose dolphin in the Coastal East Scotland MU: Updated realistic concurrent WTG anchor piling scenario

Table 5-50: Mean and median (± 95% confidence intervals) predicted population sizes for inshore bottlenose dolphin in the Coastal East Scotland MU Updated realistic concurrent WTG anchor piling scenario

Year	Description	Unimpacted population		Impacted population		Counterfactual population size	
		Mean	Median	Mean	Median	Mean	Median
2031	Piling year 1	237	236 (214 - 256)	236	236 (214 - 256)	1	1
2032	Piling year 2	245	246 (212 - 274)	245	246 (212 - 274)	0.997	1
2033	One year following piling	254	256 (214 - 288)	253	254 (212 - 288)	0.996	0.992
2034	Two years following piling	263	264 (216 - 306)	262	264 (214 - 304)	0.997	1
2035	Three years following piling	273	274 (222 - 318)	272	272 (220 - 318)	0.997	0.993
2036	Five years following piling	283	284 (226 - 334)	282	284 (224 - 334)	0.997	1
2037	Six years following piling	294	296 (236 - 350)	293	294 (234 - 348)	0.997	0.993
2042	Ten years following piling	351	352 (262 - 438)	350	350 (260 - 436)	0.997	0.994
2047	Fifteen years following piling	420	419 (292 - 540)	418	418 (292 - 540)	0.997	0.998
2052	Twenty years following piling	503	502 (334 - 668)	502	502 (334 - 666)	0.997	1
2055	Twenty-three years following piling	560	558 (368 - 758)	559	558 (368 - 756)	0.997	1

Table 5-51: Mean and median (± 95% confidence intervals) predicted population growth rates for inshore bottlenose dolphin in the Coastal East Scotland MU: Updated realistic concurrent WTG anchor piling scenario

Year	Description	Unimpacted population		Impacted population		Counterfactual population growth rate	
		Mean	Median	Mean	Median	Mean	Median
2031	Piling year 1	1.038	1.035 (0.939 - 1.123)	1.037	1.035 (0.939 - 1.123)	1	1
2032	Piling year 2	1.037	1.039 (0.964 - 1.096)	1.035	1.039 (0.964 - 1.096)	0.999	1
2033	One year following piling	1.036	1.039 (0.979 - 1.081)	1.034	1.037 (0.976 - 1.081)	0.999	0.997
2034	Two years following piling	1.035	1.037 (0.987 - 1.076)	1.035	1.037 (0.984 - 1.075)	0.999	1
2035	Three years following piling	1.036	1.037 (0.995 - 1.069)	1.035	1.036 (0.993 - 1.069)	0.999	0.999
2036	Five years following piling	1.036	1.037 (0.999 - 1.066)	1.036	1.037 (0.997 - 1.066)	1	1
2037	Six years following piling	1.036	1.038 (1.005 - 1.063)	1.036	1.037 (1.004 - 1.062)	1	0.999
2042	Ten years following piling	1.036	1.037 (1.012 - 1.056)	1.036	1.036 (1.011 - 1.056)	1	1
2047	Fifteen years following piling	1.036	1.036 (1.015 - 1.052)	1.036	1.036 (1.015 - 1.052)	1	1
2052	Twenty years following piling	1.036	1.037 (1.017 - 1.050)	1.036	1.037 (1.017 - 1.050)	1	1
2055	Twenty-three years following piling	1.036	1.036 (1.019 - 1.049)	1.036	1.036 (1.019 - 1.049)	1	1

A.3 OFFSHORE BOTTLENOSE DOLPHIN

A.3.1 EIA WTG anchor piling Scenario 1

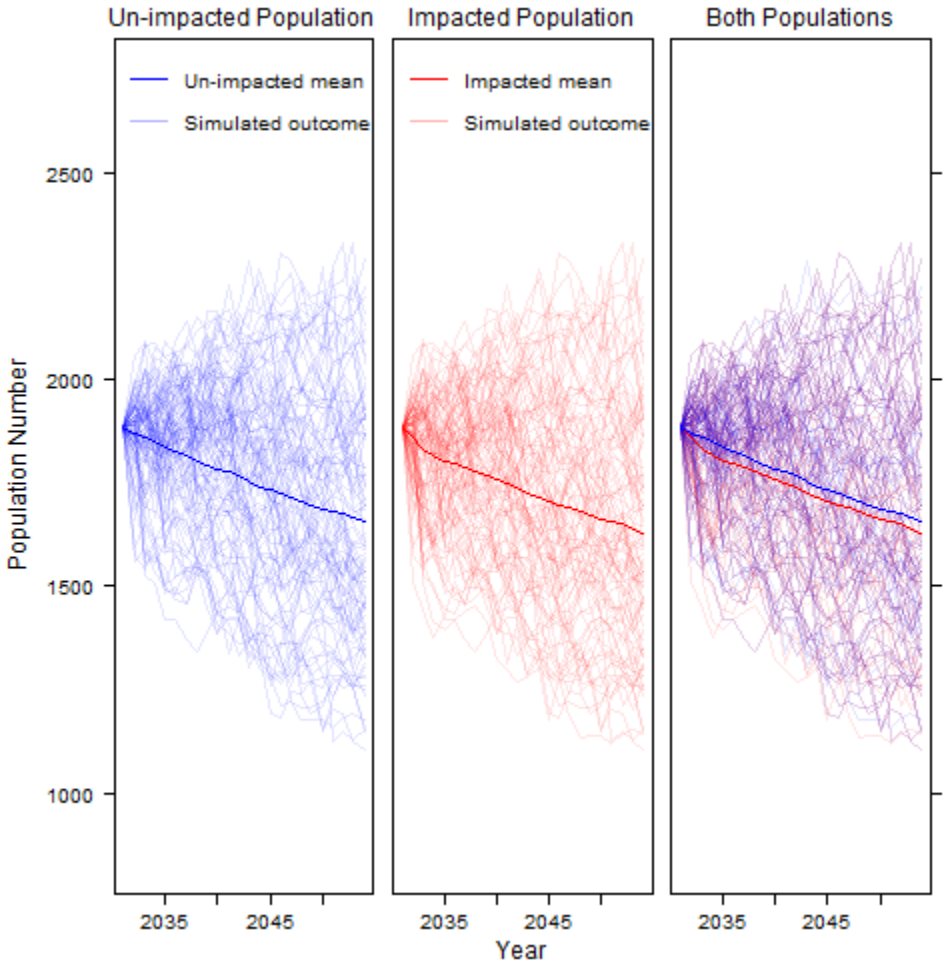

Figure 5-33: Simulated unimpacted and impacted population trajectories for offshore bottlenose dolphin in the UK portion of the Greater North Sea MU: WTG anchor Scenario 1

Table 5-52: Mean and median (± 95% confidence intervals) predicted population sizes for offshore bottlenose dolphin in the UK portion of the Greater North Sea MU: WTG anchor Scenario 1, and the counterfactual population size

Year	Description	Unimpacted population		Impacted population		Counterfactual population size	
		Mean	Median	Mean	Median	Mean	Median
2031	Piling year 1	1871	1878 (1664 - 1996)	1863	1874 (1660 - 1986)	0.996	0.998
2032	Piling year 2	1861	1876 (1610 - 2032)	1833	1853 (1532 - 2026)	0.985	0.988
2033	One year following piling	1849	1861 (1566 - 2056)	1815	1832 (1488 - 2048)	0.981	0.984
2034	Two years following piling	1835	1850 (1540 - 2068)	1803	1816 (1458 - 2064)	0.983	0.982
2035	Three years following piling	1827	1840 (1514 - 2086)	1797	1810 (1452 - 2078)	0.984	0.984
2036	Five years following piling	1817	1831 (1458 - 2096)	1789	1806 (1430 - 2088)	0.985	0.986
2037	Six years following piling	1802	1816 (1444 - 2096)	1776	1786 (1416 - 2080)	0.985	0.983
2042	Ten years following piling	1753	1756 (1346 - 2152)	1726	1727 (1314 - 2146)	0.985	0.983
2047	Fifteen years following piling	1707	1698 (1262 - 2180)	1681	1678 (1224 - 2136)	0.985	0.988
2052	Twenty years following piling	1665	1650 (1196 - 2216)	1640	1624 (1156 - 2192)	0.985	0.984
2055	Twenty-three years following piling	1635	1618 (1134 - 2216)	1610	1595 (1112 - 2196)	0.985	0.986

Table 5-53: Mean and median (± 95% confidence intervals) predicted population growth rates for offshore bottlenose dolphin in the UK portion of the Greater North Sea MU: WTG anchor Scenario 1, and the counterfactual population growth rate

Year	Description	Unimpacted population		Impacted population		Counterfactual population growth rate	
		Mean	Median	Mean	Median	Mean	Median
2031	Piling year 1	0.992	0.996 (0.882 - 1.058)	0.988	0.994 (0.880 - 1.053)	0.996	0.998
2032	Piling year 2	0.993	0.997 (0.924 - 1.038)	0.985	0.991 (0.901 - 1.036)	0.992	0.994
2033	One year following piling	0.993	0.996 (0.940 - 1.029)	0.987	0.990 (0.924 - 1.028)	0.993	0.995
2034	Two years following piling	0.993	0.995 (0.951 - 1.023)	0.988	0.991 (0.938 - 1.023)	0.996	0.995
2035	Three years following piling	0.993	0.995 (0.957 - 1.020)	0.99	0.992 (0.949 - 1.020)	0.997	0.997
2036	Five years following piling	0.993	0.995 (0.958 - 1.018)	0.991	0.993 (0.955 - 1.017)	0.997	0.998
2037	Six years following piling	0.993	0.995 (0.963 - 1.015)	0.991	0.992 (0.960 - 1.014)	0.998	0.998
2042	Ten years following piling	0.993	0.994 (0.972 - 1.011)	0.992	0.993 (0.970 - 1.011)	0.999	0.999
2047	Fifteen years following piling	0.994	0.994 (0.977 - 1.009)	0.993	0.993 (0.975 - 1.007)	0.999	0.999
2052	Twenty years following piling	0.994	0.994 (0.980 - 1.007)	0.993	0.993 (0.978 - 1.007)	0.999	0.999
2055	Twenty-three years following piling	0.994	0.994 (0.980 - 1.006)	0.993	0.993 (0.979 - 1.006)	0.999	0.999

A.3.2 EIA WTG anchor piling Scenario 2

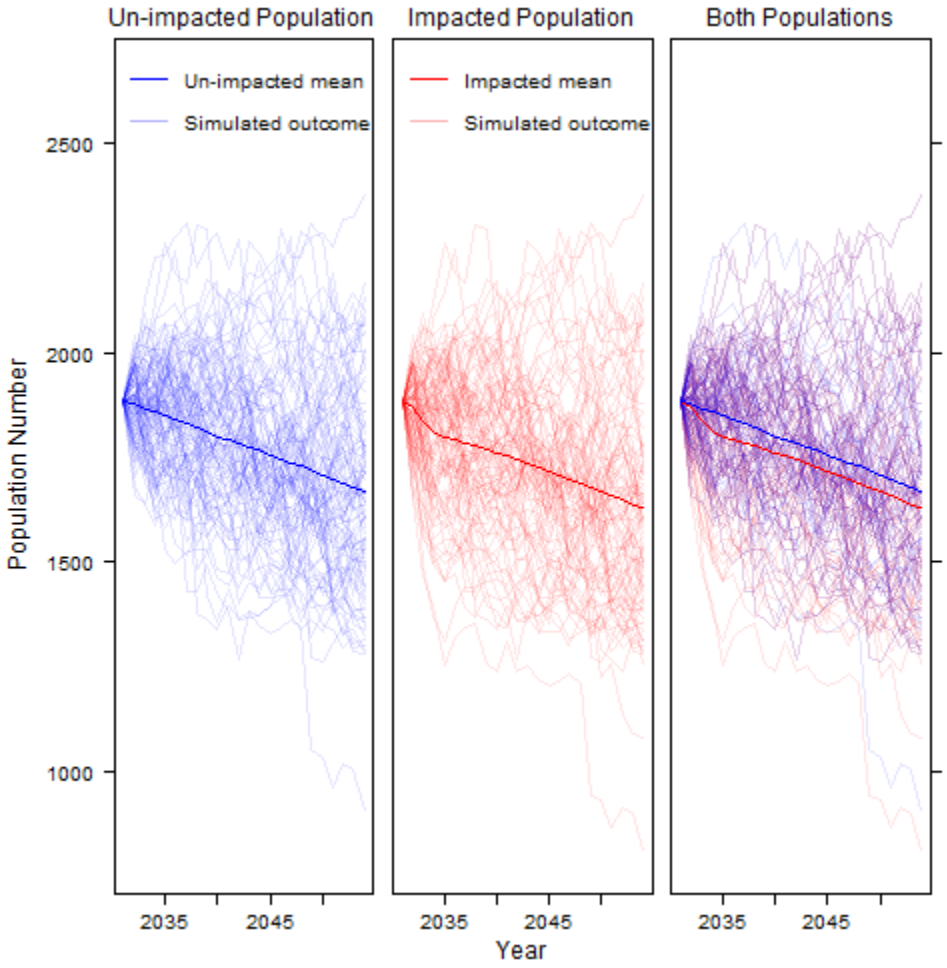

Figure 5-34: Simulated unimpacted and impacted population trajectories for offshore bottlenose dolphin in the UK portion of the Greater North Sea MU: WTG anchor Scenario 2

Table 5-54: Mean and median (± 95% confidence intervals) predicted population sizes for offshore bottlenose dolphin in the UK portion of the Greater North Sea MU: WTG anchor Scenario 2, and the counterfactual population size

Year	Description	Unimpacted population		Impacted population		Counterfactual population size	
		Mean	Median	Mean	Median	Mean	Median
2031	Piling year 1	1878	1884 (1702 - 2012)	1869	1876 (1686 - 2008)	0.995	0.996
2032	Piling year 2	1866	1874 (1630 - 2050)	1835	1852 (1550 - 2048)	0.983	0.988
2033	One year following piling	1858	1867 (1604 - 2066)	1813	1832 (1476 - 2060)	0.976	0.981
2034	Two years following piling	1849	1854 (1560 - 2096)	1796	1820 (1402 - 2082)	0.971	0.982
2035	Three years following piling	1839	1850 (1512 - 2112)	1791	1815 (1406 - 2092)	0.974	0.981
2036	Five years following piling	1831	1840 (1494 - 2112)	1785	1801 (1410 - 2096)	0.975	0.979
2037	Six years following piling	1820	1822 (1472 - 2136)	1777	1788 (1392 - 2118)	0.976	0.981
2042	Ten years following piling	1775	1776 (1360 - 2172)	1734	1736 (1310 - 2158)	0.977	0.977
2047	Fifteen years following piling	1729	1730 (1246 - 2210)	1688	1688 (1200 - 2200)	0.976	0.976
2052	Twenty years following piling	1677	1672 (1168 - 2234)	1637	1636 (1116 - 2230)	0.976	0.978
2055	Twenty-three years following piling	1656	1657 (1106 - 2228)	1616	1608 (1070 - 2192)	0.976	0.97

Table 5-55: Mean and median (± 95% confidence intervals) predicted population growth rates for offshore bottlenose dolphin in the UK portion of the Greater North Sea MU: WTG anchor Scenario 2, and the counterfactual population growth rate

Year	Description	Unimpacted population		Impacted population		Counterfactual population growth rate	
		Mean	Median	Mean	Median	Mean	Median
2031	Piling year 1	0.996	0.999 (0.902 - 1.067)	0.991	0.995 (0.894 - 1.065)	0.995	0.996
2032	Piling year 2	0.994	0.997 (0.930 - 1.043)	0.986	0.991 (0.907 - 1.042)	0.991	0.994
2033	One year following piling	0.995	0.997 (0.947 - 1.031)	0.986	0.990 (0.922 - 1.030)	0.992	0.994
2034	Two years following piling	0.995	0.996 (0.954 - 1.027)	0.987	0.991 (0.929 - 1.025)	0.992	0.995
2035	Three years following piling	0.995	0.996 (0.957 - 1.023)	0.989	0.992 (0.943 - 1.021)	0.994	0.996
2036	Five years following piling	0.995	0.996 (0.962 - 1.019)	0.99	0.992 (0.953 - 1.018)	0.996	0.996
2037	Six years following piling	0.994	0.995 (0.965 - 1.018)	0.991	0.992 (0.958 - 1.017)	0.996	0.997
2042	Ten years following piling	0.994	0.995 (0.973 - 1.012)	0.992	0.993 (0.970 - 1.011)	0.998	0.998
2047	Fifteen years following piling	0.994	0.995 (0.976 - 1.009)	0.993	0.993 (0.974 - 1.009)	0.999	0.999
2052	Twenty years following piling	0.994	0.995 (0.978 - 1.008)	0.993	0.994 (0.976 - 1.008)	0.999	0.999
2055	Twenty-three years following piling	0.994	0.995 (0.979 - 1.007)	0.993	0.994 (0.978 - 1.006)	0.999	0.999

A.3.3 EIA concurrent WTG anchor piling scenario

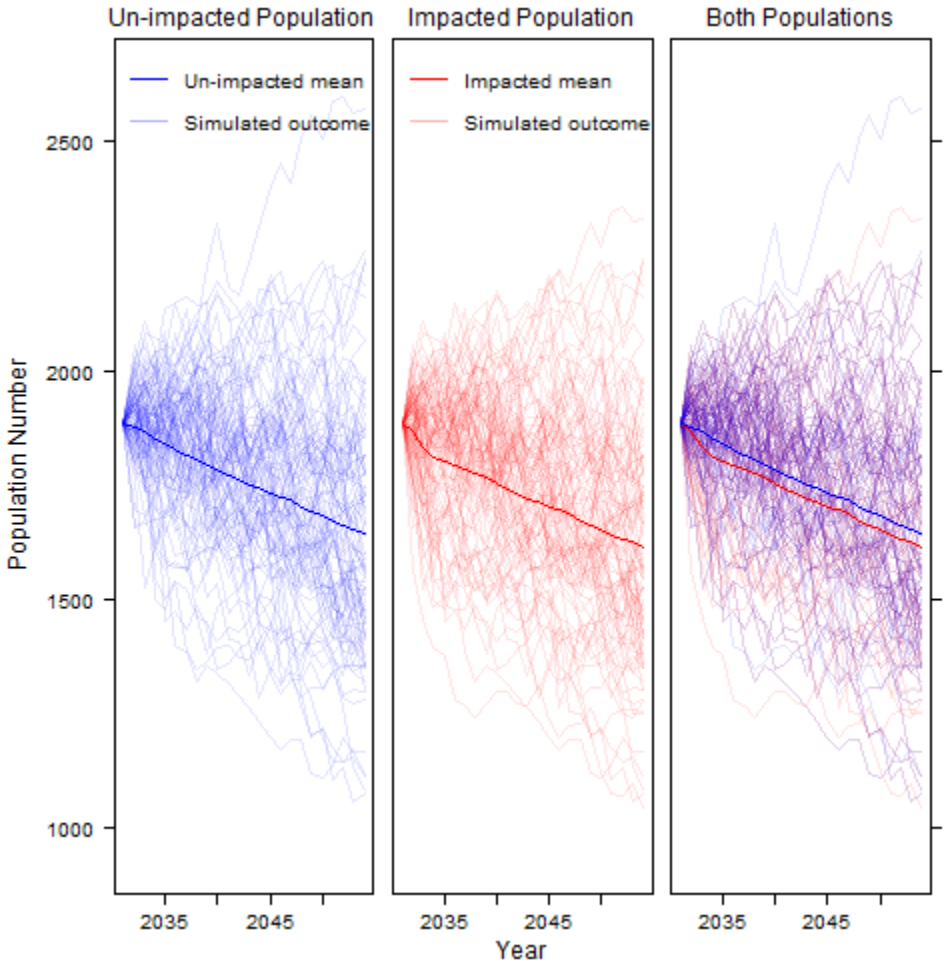

Figure 5-35: Simulated unimpacted and impacted population trajectories for offshore bottlenose dolphin in the UK portion of the Greater North Sea MU: EIA concurrent WTG anchor piling scenario

Table 5-56: Mean and median (± 95% confidence intervals) predicted population sizes for offshore bottlenose dolphin in the UK portion of the Greater North Sea MU: EIA concurrent WTG anchor piling scenario, and the counterfactual population size

Year	Description	Unimpacted population		Impacted population		Counterfactual population size	
		Mean	Median	Mean	Median	Mean	Median
2031	Piling year 1	1876	1882 (1672 - 2004)	1865	1874 (1658 - 2000)	0.994	0.996
2032	Piling year 2	1867	1878 (1646 - 2048)	1833	1850 (1542 - 2036)	0.982	0.985
2033	One year following piling	1851	1860 (1572 - 2080)	1809	1832 (1492 - 2070)	0.977	0.985
2034	Two years following piling	1841	1856 (1532 - 2084)	1803	1822 (1490 - 2082)	0.98	0.982
2035	Three years following piling	1827	1840 (1492 - 2098)	1792	1808 (1446 - 2092)	0.981	0.983
2036	Five years following piling	1816	1828 (1466 - 2110)	1783	1804 (1420 - 2104)	0.982	0.987
2037	Six years following piling	1807	1820 (1440 - 2140)	1777	1790 (1420 - 2124)	0.983	0.984
2042	Ten years following piling	1750	1744 (1336 - 2174)	1720	1715 (1306 - 2150)	0.983	0.983
2047	Fifteen years following piling	1702	1686 (1232 - 2218)	1672	1659 (1212 - 2200)	0.983	0.984
2052	Twenty years following piling	1654	1628 (1182 - 2194)	1625	1601 (1156 - 2174)	0.983	0.983
2055	Twenty-three years following piling	1627	1604 (1124 - 2218)	1599	1583 (1104 - 2202)	0.983	0.987

Table 5-57: Mean and median (± 95% confidence intervals) predicted population growth rates for offshore bottlenose dolphin in the UK portion of the Greater North Sea MU: EIA concurrent WTG anchor piling scenario, and the counterfactual population growth rate

Year	Description	Unimpacted population		Impacted population		Counterfactual population growth rate	
		Mean	Median	Mean	Median	Mean	Median
2031	Piling year 1	0.995	0.998 (0.886 - 1.063)	0.989	0.994 (0.879 - 1.060)	0.994	0.996
2032	Piling year 2	0.994	0.998 (0.934 - 1.042)	0.985	0.990 (0.904 - 1.039)	0.991	0.993
2033	One year following piling	0.993	0.995 (0.941 - 1.033)	0.985	0.990 (0.925 - 1.032)	0.992	0.995
2034	Two years following piling	0.993	0.996 (0.949 - 1.025)	0.988	0.991 (0.943 - 1.025)	0.995	0.995
2035	Three years following piling	0.993	0.995 (0.954 - 1.022)	0.989	0.992 (0.948 - 1.021)	0.996	0.996
2036	Five years following piling	0.993	0.995 (0.959 - 1.019)	0.99	0.993 (0.954 - 1.018)	0.997	0.998
2037	Six years following piling	0.993	0.995 (0.962 - 1.018)	0.991	0.993 (0.960 - 1.017)	0.997	0.998
2042	Ten years following piling	0.993	0.993 (0.972 - 1.012)	0.992	0.992 (0.970 - 1.011)	0.999	0.999
2047	Fifteen years following piling	0.993	0.993 (0.975 - 1.010)	0.992	0.992 (0.974 - 1.009)	0.999	0.999
2052	Twenty years following piling	0.993	0.993 (0.979 - 1.007)	0.993	0.993 (0.978 - 1.006)	0.999	0.999
2055	Twenty-three years following piling	0.994	0.994 (0.980 - 1.007)	0.993	0.993 (0.979 - 1.006)	0.999	0.999

A.3.4 New Fast Bounding concurrent WTG anchor piling scenario

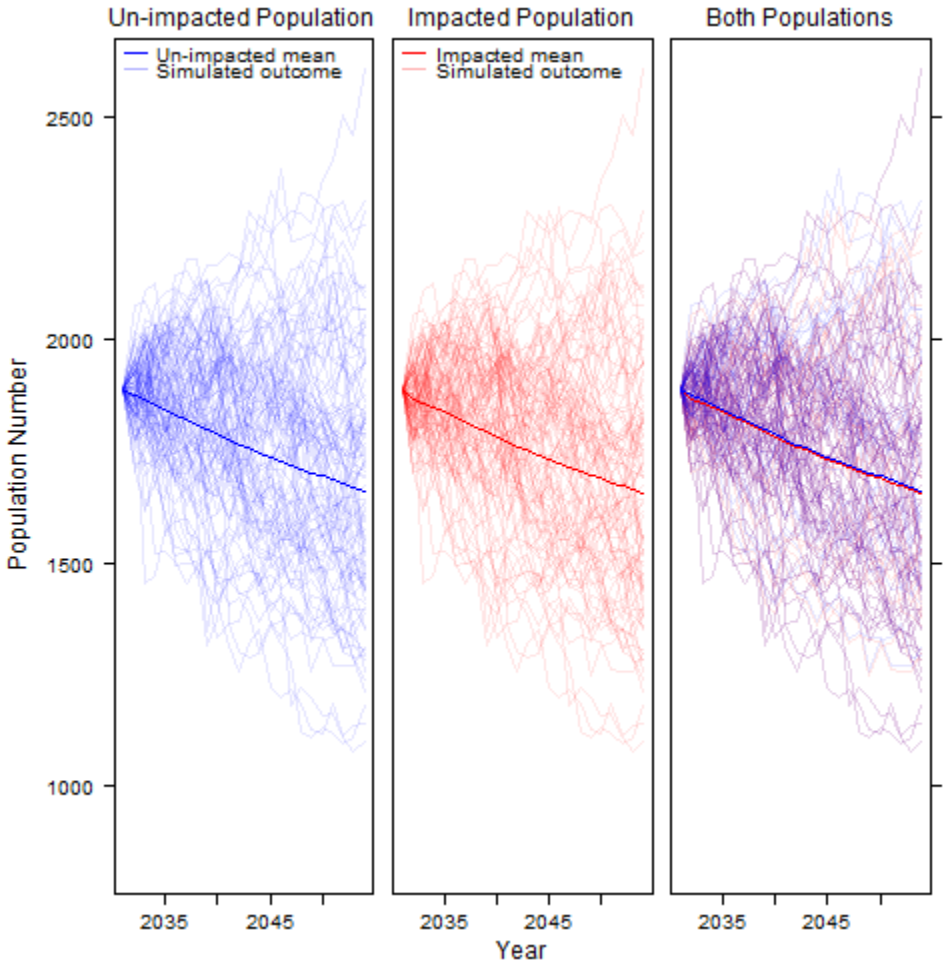

Figure 5-36: Simulated unimpacted and impacted population trajectories for offshore bottlenose dolphin in the UK portion of the Greater North Sea MU: New Fast Bounding concurrent WTG anchor piling scenario

Table 5-58: Mean and median (± 95% confidence intervals) predicted population sizes for offshore bottlenose dolphin in the UK portion of the Greater North Sea MU: New Fast Bounding concurrent WTG anchor piling scenario

Year	Description	Unimpacted population		Impacted population		Counterfactual population size	
		Mean	Median	Mean	Median	Mean	Median
2031	Piling year 1	1875	1880 (1704 - 2010)	1866	1874 (1692 - 2008)	0.995	0.997
2032	Piling year 2	1866	1874 (1628 - 2036)	1858	1868 (1624 - 2036)	0.996	0.997
2033	One year following piling	1853	1860 (1596 - 2064)	1846	1854 (1586 - 2056)	0.996	0.997
2034	Two years following piling	1843	1850 (1548 - 2076)	1837	1840 (1548 - 2074)	0.997	0.995
2035	Three years following piling	1830	1838 (1534 - 2100)	1824	1836 (1530 - 2098)	0.997	0.999
2036	Five years following piling	1821	1825 (1496 - 2118)	1815	1818 (1488 - 2116)	0.997	0.996
2037	Six years following piling	1809	1811 (1468 - 2122)	1804	1806 (1468 - 2120)	0.997	0.997
2042	Ten years following piling	1757	1756 (1328 - 2164)	1752	1752 (1326 - 2160)	0.997	0.998
2047	Fifteen years following piling	1708	1708 (1224 - 2189)	1703	1705 (1222 - 2182)	0.997	0.998
2052	Twenty years following piling	1667	1659 (1136 - 2230)	1662	1655 (1134 - 2218)	0.997	0.998
2055	Twenty-three years following piling	1642	1625 (1090 - 2230)	1637	1614 (1072 - 2214)	0.997	0.993

Table 5-59: Mean and median (± 95% confidence intervals) predicted population growth rates for offshore bottlenose dolphin in the UK portion of the Greater North Sea MU: New Fast Bounding concurrent WTG anchor piling scenario

Year	Description	Unimpacted population		Impacted population		Counterfactual population growth rate	
		Mean	Median	Mean	Median	Mean	Median
2031	Piling year 1	0.994	0.997 (0.903 - 1.066)	0.99	0.994 (0.897 - 1.065)	0.995	0.997
2032	Piling year 2	0.994	0.997 (0.929 - 1.039)	0.992	0.995 (0.928 - 1.039)	0.998	0.998
2033	One year following piling	0.994	0.995 (0.946 - 1.031)	0.992	0.994 (0.944 - 1.029)	0.999	0.999
2034	Two years following piling	0.994	0.995 (0.952 - 1.024)	0.993	0.994 (0.952 - 1.024)	0.999	0.999
2035	Three years following piling	0.993	0.995 (0.960 - 1.022)	0.993	0.995 (0.959 - 1.022)	0.999	1
2036	Five years following piling	0.994	0.995 (0.962 - 1.020)	0.993	0.994 (0.961 - 1.019)	0.999	0.999
2037	Six years following piling	0.993	0.994 (0.965 - 1.017)	0.993	0.994 (0.965 - 1.017)	1	1
2042	Ten years following piling	0.994	0.994 (0.971 - 1.012)	0.993	0.994 (0.971 - 1.011)	1	1
2047	Fifteen years following piling	0.994	0.994 (0.975 - 1.009)	0.993	0.994 (0.975 - 1.009)	1	1
2052	Twenty years following piling	0.994	0.994 (0.977 - 1.008)	0.994	0.994 (0.977 - 1.007)	1	1
2055	Twenty-three years following piling	0.994	0.994 (0.978 - 1.007)	0.994	0.994 (0.978 - 1.006)	1	1

A.3.5 Updated realistic concurrent WTG anchor piling scenario

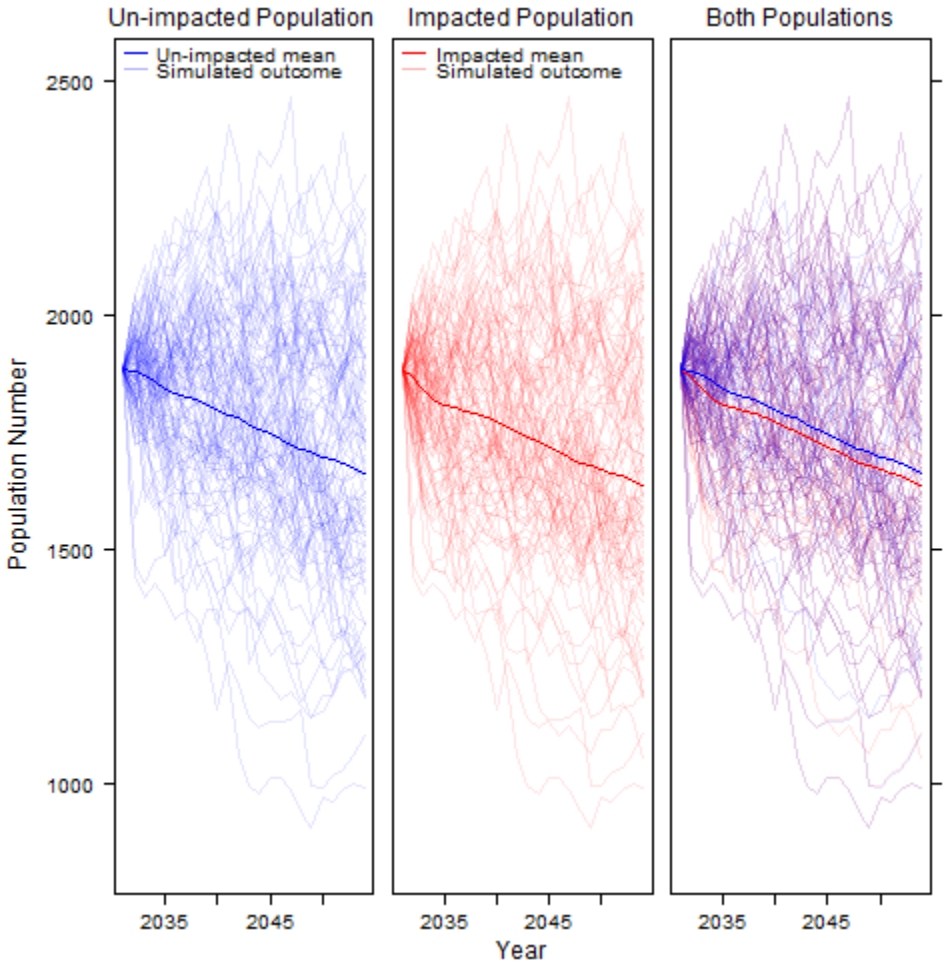

Figure 5-37: Simulated unimpacted and impacted population trajectories for offshore bottlenose dolphin in the UK portion of the Greater North Sea MU: Updated realistic concurrent WTG anchor piling scenario

Table 5-60: Mean and median (± 95% confidence intervals) predicted population sizes for offshore bottlenose dolphin in the UK portion of the Greater North Sea MU: Updated realistic concurrent WTG anchor piling scenario

Year	Description	Unimpacted population		Impacted population		Counterfactual population size	
		Mean	Median	Mean	Median	Mean	Median
2031	Piling year 1	1879	1882 (1694 - 2016)	1869	1876 (1670 - 2014)	0.995	0.997
2032	Piling year 2	1870	1882 (1658 - 2046)	1840	1858 (1560 - 2044)	0.984	0.987
2033	One year following piling	1859	1873 (1600 - 2076)	1822	1844 (1482 - 2070)	0.98	0.985
2034	Two years following piling	1843	1853 (1556 - 2102)	1810	1820 (1460 - 2098)	0.982	0.982
2035	Three years following piling	1834	1840 (1530 - 2116)	1803	1806 (1462 - 2104)	0.983	0.982
2036	Five years following piling	1827	1832 (1498 - 2134)	1797	1798 (1466 - 2126)	0.984	0.981
2037	Six years following piling	1819	1820 (1464 - 2162)	1790	1790 (1434 - 2152)	0.984	0.984
2042	Ten years following piling	1767	1772 (1352 - 2192)	1739	1742 (1334 - 2178)	0.984	0.983
2047	Fifteen years following piling	1714	1716 (1230 - 2176)	1686	1686 (1210 - 2172)	0.984	0.983
2052	Twenty years following piling	1674	1676 (1170 - 2208)	1647	1651 (1142 - 2170)	0.984	0.985
2055	Twenty-three years following piling	1643	1637 (1108 - 2216)	1616	1616 (1086 - 2162)	0.984	0.987

Table 5-61: Mean and median (± 95% confidence intervals) predicted population growth rates for offshore bottlenose dolphin in the UK portion of the Greater North Sea MU: Updated realistic concurrent WTG anchor piling scenario

Year	Description	Unimpacted population		Impacted population		Counterfactual population growth rate	
		Mean	Median	Mean	Median	Mean	Median
2031	Piling year 1	0.996	0.998 (0.898 - 1.069)	0.991	0.995 (0.885 - 1.068)	0.995	0.997
2032	Piling year 2	0.995	0.999 (0.938 - 1.042)	0.987	0.993 (0.909 - 1.041)	0.992	0.994
2033	One year following piling	0.995	0.998 (0.947 - 1.033)	0.988	0.993 (0.923 - 1.032)	0.993	0.995
2034	Two years following piling	0.994	0.996 (0.953 - 1.027)	0.989	0.991 (0.938 - 1.027)	0.995	0.996
2035	Three years following piling	0.994	0.995 (0.959 - 1.023)	0.99	0.991 (0.950 - 1.022)	0.996	0.996
2036	Five years following piling	0.994	0.995 (0.962 - 1.021)	0.991	0.992 (0.959 - 1.020)	0.997	0.997
2037	Six years following piling	0.994	0.995 (0.964 - 1.020)	0.992	0.993 (0.962 - 1.019)	0.998	0.998
2042	Ten years following piling	0.994	0.995 (0.973 - 1.013)	0.993	0.993 (0.972 - 1.012)	0.999	0.999
2047	Fifteen years following piling	0.994	0.994 (0.975 - 1.008)	0.993	0.993 (0.974 - 1.008)	0.999	0.999
2052	Twenty years following piling	0.994	0.995 (0.979 - 1.007)	0.993	0.994 (0.977 - 1.006)	0.999	0.999
2055	Twenty-three years following piling	0.994	0.994 (0.979 - 1.006)	0.993	0.994 (0.978 - 1.005)	0.999	0.999

A.4 HARBOUR PORPOISE

A.4.1 EIA WTG anchor piling Scenario 1

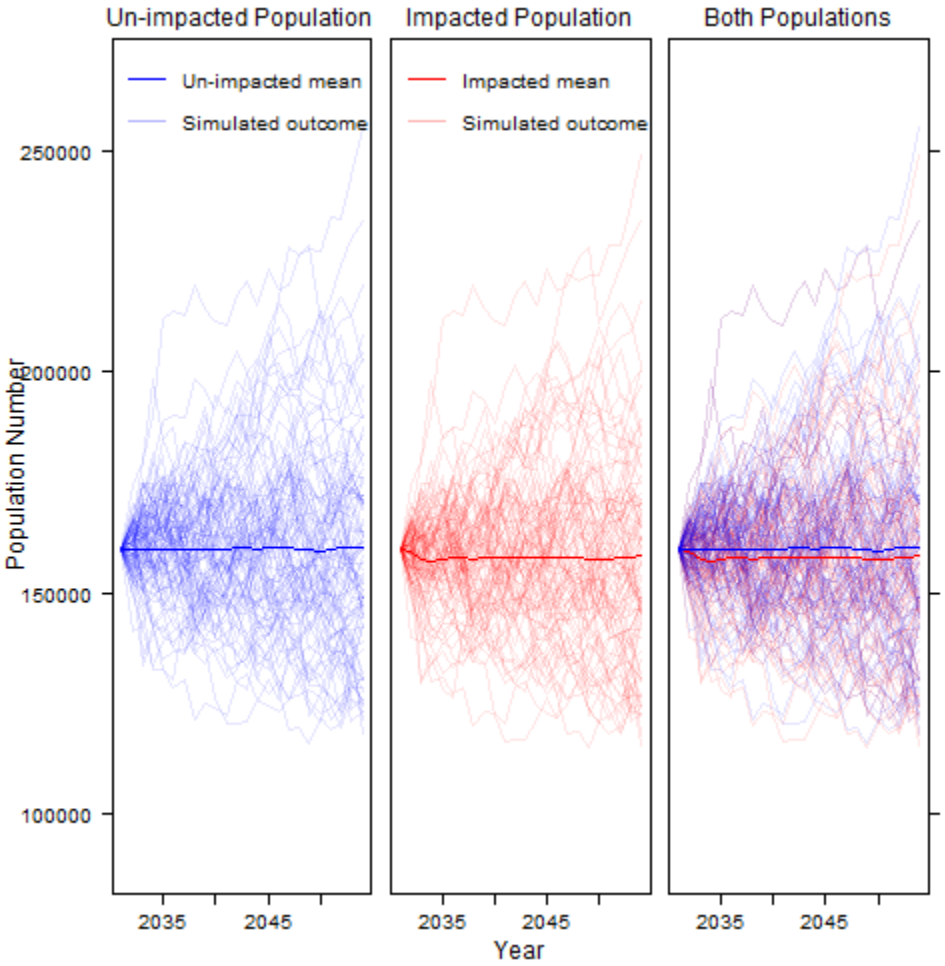

Figure 5-38: Simulated unimpacted and impacted population trajectories for harbour porpoise in the UK portion of the North Sea MU: WTG anchor Scenario 1

Table 5-62: Mean and median (± 95% confidence intervals) predicted population sizes for harbour porpoise in the UK portion of the North Sea MU: WTG anchor Scenario 1, and the counterfactual population size

Year	Description	Unimpacted population		Impacted population		Counterfactual population size	
		Mean	Median	Mean	Median	Mean	Median
2031	Piling year 1	159659	160012 (146001 - 170932)	159168	159591 (145461 - 170404)	0.997	0.997
2032	Piling year 2	159832	159999 (143383 - 174817)	157657	158128 (141040 - 172550)	0.986	0.988
2033	One year following piling	159868	159662 (141073 - 179351)	157079	156864 (138161 - 175836)	0.983	0.982
2034	Two years following piling	159969	160068 (138504 - 183069)	157607	157856 (136611 - 179382)	0.985	0.986
2035	Three years following piling	159859	159993 (136569 - 183375)	157814	158161 (134833 - 179272)	0.987	0.989
2036	Five years following piling	159889	159758 (135170 - 184532)	157934	157919 (133576 - 183963)	0.988	0.988
2037	Six years following piling	159666	159731 (134640 - 187444)	157665	157589 (132285 - 185039)	0.987	0.987
2042	Ten years following piling	160150	159007 (127585 - 200710)	158083	156604 (126026 - 196771)	0.987	0.985
2047	Fifteen years following piling	159964	157474 (122406 - 205417)	157888	155799 (120895 - 200523)	0.987	0.989
2052	Twenty years following piling	160109	158572 (118785 - 212402)	158037	156698 (116424 - 209450)	0.987	0.988
2055	Twenty-three years following piling	160639	158185 (115441 - 214533)	158555	156492 (113638 - 211077)	0.987	0.989

Table 5-63: Mean and median (± 95% confidence intervals) predicted population growth rates for harbour porpoise in the UK portion of the North Sea MU: WTG anchor Scenario 1, and the counterfactual population growth rate

Year	Description	Unimpacted population		Impacted population		Counterfactual population growth rate	
		Mean	Median	Mean	Median	Mean	Median
2031	Piling year 1	1	1.002 (0.915 - 1.071)	0.997	1.000 (0.911 - 1.067)	0.997	0.997
2032	Piling year 2	1	1.001 (0.948 - 1.046)	0.993	0.995 (0.940 - 1.040)	0.993	0.994
2033	One year following piling	1	1.000 (0.960 - 1.040)	0.994	0.994 (0.953 - 1.033)	0.994	0.994
2034	Two years following piling	1	1.001 (0.965 - 1.035)	0.996	0.997 (0.962 - 1.030)	0.996	0.997
2035	Three years following piling	1	1.000 (0.969 - 1.028)	0.997	0.998 (0.967 - 1.023)	0.997	0.998
2036	Five years following piling	1	1.000 (0.973 - 1.024)	0.998	0.998 (0.971 - 1.024)	0.998	0.998
2037	Six years following piling	1	1.000 (0.976 - 1.023)	0.998	0.998 (0.974 - 1.021)	0.998	0.998
2042	Ten years following piling	1	1.000 (0.981 - 1.019)	0.999	0.998 (0.980 - 1.018)	0.999	0.999
2047	Fifteen years following piling	1	0.999 (0.985 - 1.015)	0.999	0.999 (0.984 - 1.014)	0.999	0.999
2052	Twenty years following piling	1	1.000 (0.987 - 1.013)	0.999	0.999 (0.986 - 1.012)	0.999	0.999
2055	Twenty-three years following piling	1	1.000 (0.987 - 1.012)	0.999	0.999 (0.986 - 1.011)	0.999	1

A.4.2 EIA WTG anchor piling Scenario 2

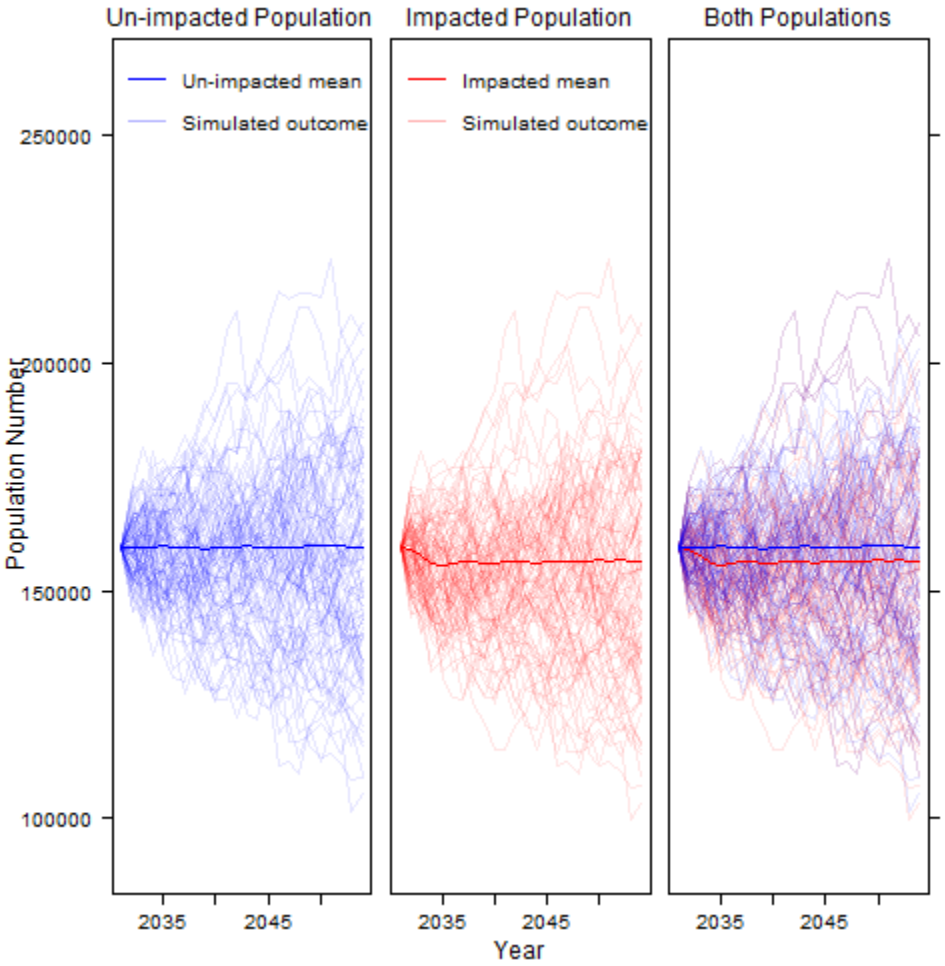

Figure 5-39: Simulated unimpacted and impacted population trajectories for harbour porpoise in the UK portion of the North Sea MU: WTG anchor Scenario 2

Table 5-64: Mean and median (± 95% confidence intervals) predicted population sizes for harbour porpoise in the UK portion of the North Sea MU: WTG anchor Scenario 2, and the counterfactual population size

Year	Description	Unimpacted population		Impacted population		Counterfactual population size	
		Mean	Median	Mean	Median	Mean	Median
2031	Piling year 1	159651	160028 (146596 - 171111)	159174	159547 (146119 - 170829)	0.997	0.997
2032	Piling year 2	159668	159885 (143667 - 175676)	157555	157968 (140307 - 173964)	0.987	0.988
2033	One year following piling	159574	159374 (141407 - 177876)	156074	156170 (136252 - 175038)	0.978	0.98
2034	Two years following piling	159676	159576 (138292 - 180635)	155619	155833 (133605 - 178160)	0.975	0.977
2035	Three years following piling	159436	159600 (137975 - 183715)	155944	155884 (133368 - 180291)	0.978	0.977
2036	Five years following piling	159422	158797 (135414 - 184566)	156240	156048 (133095 - 180748)	0.98	0.983
2037	Six years following piling	159344	159187 (133065 - 188401)	156233	155731 (131212 - 185250)	0.98	0.978
2042	Ten years following piling	159727	158345 (128143 - 198518)	156486	155276 (125673 - 193662)	0.98	0.981
2047	Fifteen years following piling	159516	157346 (122226 - 206499)	156254	154568 (119247 - 202079)	0.98	0.982
2052	Twenty years following piling	159495	158191 (116937 - 211518)	156227	155233 (115478 - 206504)	0.98	0.981
2055	Twenty-three years following piling	159846	158527 (114499 - 217945)	156562	155811 (112496 - 211722)	0.979	0.983

Table 5-65: Mean and median (± 95% confidence intervals) predicted population growth rates for harbour porpoise in the UK portion of the North Sea MU: WTG anchor Scenario 2, and the counterfactual population growth rate

Year	Description	Unimpacted population		Impacted population		Counterfactual population growth rate	
		Mean	Median	Mean	Median	Mean	Median
2031	Piling year 1	1	1.002 (0.918 - 1.072)	0.997	0.999 (0.915 - 1.070)	0.997	0.997
2032	Piling year 2	1	1.001 (0.949 - 1.049)	0.993	0.995 (0.938 - 1.044)	0.993	0.994
2033	One year following piling	0.999	0.999 (0.960 - 1.037)	0.992	0.993 (0.949 - 1.031)	0.993	0.993
2034	Two years following piling	1	1.000 (0.965 - 1.031)	0.993	0.994 (0.956 - 1.028)	0.994	0.994
2035	Three years following piling	0.999	1.000 (0.971 - 1.028)	0.995	0.995 (0.965 - 1.025)	0.996	0.995
2036	Five years following piling	0.999	0.999 (0.973 - 1.024)	0.996	0.996 (0.970 - 1.021)	0.997	0.997
2037	Six years following piling	0.999	1.000 (0.974 - 1.024)	0.996	0.996 (0.972 - 1.021)	0.997	0.997
2042	Ten years following piling	1	0.999 (0.982 - 1.018)	0.998	0.998 (0.980 - 1.016)	0.998	0.998
2047	Fifteen years following piling	0.999	0.999 (0.984 - 1.015)	0.998	0.998 (0.983 - 1.014)	0.999	0.999
2052	Twenty years following piling	0.999	1.000 (0.986 - 1.013)	0.999	0.999 (0.985 - 1.012)	0.999	0.999
2055	Twenty-three years following piling	1	1.000 (0.987 - 1.013)	0.999	0.999 (0.986 - 1.011)	0.999	0.999

A.4.3 EIA concurrent WTG anchor piling scenario

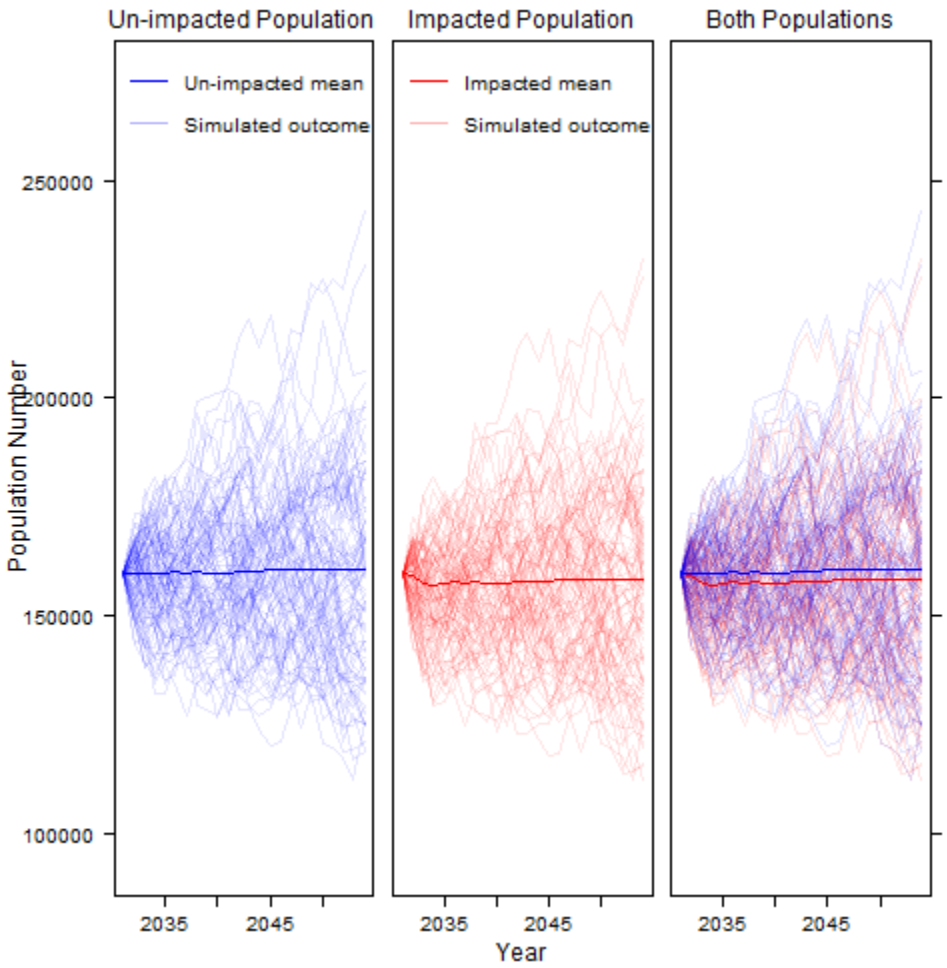

Figure 5-40: Simulated unimpacted and impacted population trajectories for harbour porpoise in the UK portion of the North Sea MU: EIA concurrent WTG anchor piling scenario

Table 5-66: Mean and median (± 95% confidence intervals) predicted population sizes for harbour porpoise in the UK portion of the North Sea MU: EIA concurrent WTG anchor piling scenario, and the counterfactual population size

Year	Description	Unimpacted population		Impacted population		Counterfactual population size	
		Mean	Median	Mean	Median	Mean	Median
2031	Piling year 1	159704	160140 (146210 - 171113)	159162	159592 (145691 - 170391)	0.997	0.997
2032	Piling year 2	159613	159936 (141844 - 175647)	157234	157888 (139059 - 173494)	0.985	0.987
2033	One year following piling	159746	159708 (140387 - 179535)	156712	156635 (136644 - 174817)	0.981	0.981
2034	Two years following piling	159743	159586 (138900 - 182266)	157137	156699 (136419 - 178441)	0.984	0.982
2035	Three years following piling	159902	159403 (137148 - 183042)	157617	157250 (135449 - 182097)	0.986	0.986
2036	Five years following piling	159689	159142 (136042 - 185790)	157504	157512 (134574 - 183343)	0.986	0.99
2037	Six years following piling	159949	159241 (133888 - 188821)	157696	157077 (131887 - 186364)	0.986	0.986
2042	Ten years following piling	160175	159643 (127274 - 199914)	157860	157497 (125375 - 196397)	0.986	0.987
2047	Fifteen years following piling	160446	159039 (123144 - 204186)	158121	156420 (120971 - 201890)	0.986	0.984
2052	Twenty years following piling	160408	158818 (116675 - 213419)	158077	156453 (114300 - 210323)	0.985	0.985
2055	Twenty-three years following piling	160480	159484 (114821 - 213802)	158149	156360 (113055 - 210136)	0.985	0.98

Table 5-67: Mean and median (± 95% confidence intervals) predicted population growth rates for harbour porpoise in the UK portion of the North Sea MU: EIA concurrent WTG anchor piling scenario, and the counterfactual population growth rate

Year	Description	Unimpacted population		Impacted population		Counterfactual population growth rate	
		Mean	Median	Mean	Median	Mean	Median
2031	Piling year 1	1	1.003 (0.916 - 1.072)	0.997	1.000 (0.913 - 1.067)	0.997	0.997
2032	Piling year 2	1	1.001 (0.943 - 1.049)	0.992	0.995 (0.933 - 1.043)	0.993	0.994
2033	One year following piling	1	1.000 (0.958 - 1.040)	0.993	0.994 (0.949 - 1.031)	0.994	0.994
2034	Two years following piling	1	1.000 (0.966 - 1.034)	0.996	0.995 (0.961 - 1.028)	0.996	0.995
2035	Three years following piling	1	1.000 (0.970 - 1.028)	0.997	0.997 (0.968 - 1.027)	0.997	0.997
2036	Five years following piling	1	0.999 (0.974 - 1.026)	0.997	0.998 (0.972 - 1.023)	0.998	0.998
2037	Six years following piling	1	1.000 (0.975 - 1.024)	0.998	0.998 (0.973 - 1.022)	0.998	0.998
2042	Ten years following piling	1	1.000 (0.981 - 1.019)	0.999	0.999 (0.980 - 1.017)	0.999	0.999
2047	Fifteen years following piling	1	1.000 (0.985 - 1.015)	0.999	0.999 (0.984 - 1.014)	0.999	0.999
2052	Twenty years following piling	1	1.000 (0.986 - 1.013)	0.999	0.999 (0.985 - 1.013)	0.999	0.999
2055	Twenty-three years following piling	1	1.000 (0.987 - 1.012)	0.999	0.999 (0.986 - 1.011)	0.999	0.999

A.4.4 New Fast Bounding concurrent WTG anchor piling scenario

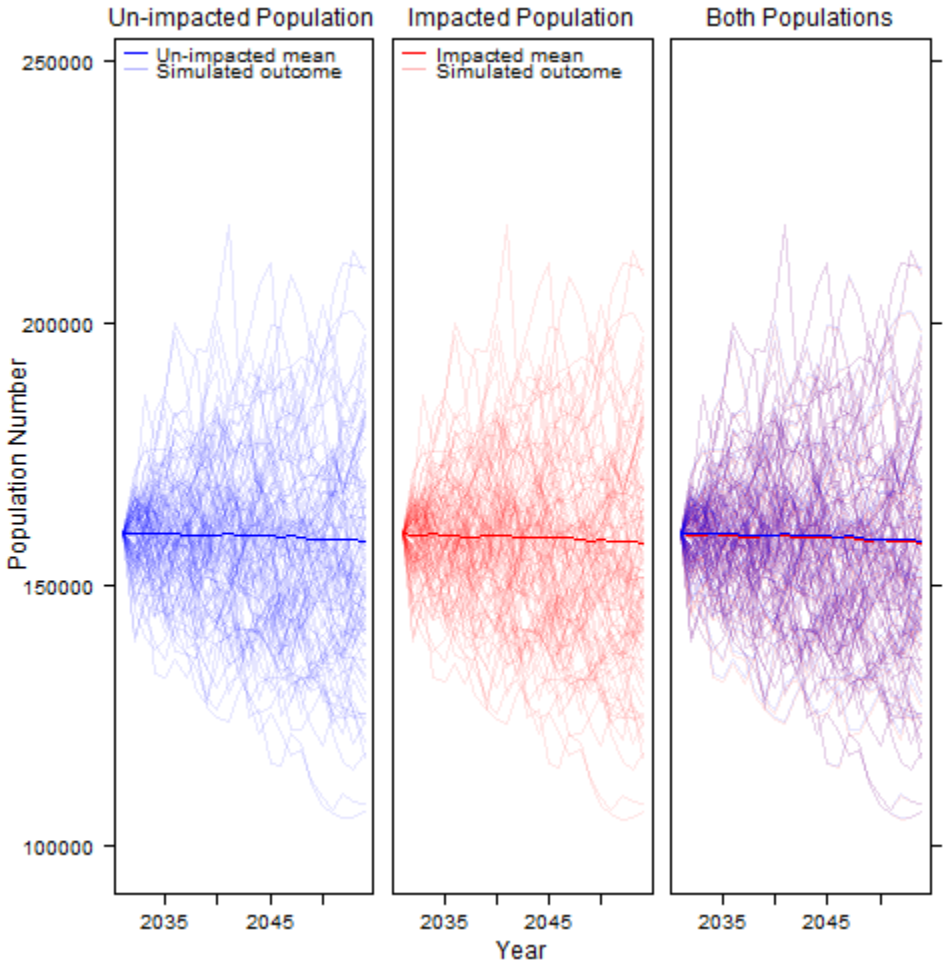

Figure 5-41: Simulated unimpacted and impacted population trajectories for harbour porpoise in the UK portion of the North Sea MU: New Fast Bounding concurrent WTG anchor piling scenario

Table 5-68: Mean and median (± 95% confidence intervals) predicted population sizes for harbour porpoise in the UK portion of the North Sea MU: New Fast Bounding concurrent WTG anchor piling scenario

Year	Description	Unimpacted population		Impacted population		Counterfactual population size	
		Mean	Median	Mean	Median	Mean	Median
2031	Piling year 1	159732	160018 (146276 - 170228)	159321	159541 (145645 - 169588)	0.997	0.997
2032	Piling year 2	159753	160236 (142695 - 175382)	159398	159924 (142489 - 174899)	0.998	0.998
2033	One year following piling	159904	160230 (138992 - 178189)	159596	159917 (138794 - 178185)	0.998	0.998
2034	Two years following piling	159689	159484 (138380 - 181109)	159426	159218 (138093 - 180934)	0.998	0.998
2035	Three years following piling	159779	159374 (136767 - 183423)	159515	159110 (136724 - 183095)	0.998	0.998
2036	Five years following piling	159304	158907 (134541 - 185037)	159028	158472 (134259 - 184549)	0.998	0.997
2037	Six years following piling	159240	158509 (134318 - 186822)	158958	158172 (133871 - 186245)	0.998	0.998
2042	Ten years following piling	159364	159176 (127568 - 195353)	159083	158798 (127349 - 195182)	0.998	0.998
2047	Fifteen years following piling	159010	157602 (124670 - 204094)	158728	157413 (123833 - 204090)	0.998	0.999
2052	Twenty years following piling	158432	155919 (118082 - 210587)	158150	155550 (117638 - 210024)	0.998	0.998
2055	Twenty-three years following piling	158048	155461 (116639 - 211626)	157766	155195 (116218 - 211481)	0.998	0.998

Table 5-69: Mean and median (± 95% confidence intervals) predicted population growth rates for harbour porpoise in the UK portion of the North Sea MU: New Fast Bounding concurrent WTG anchor piling scenario

Year	Description	Unimpacted population		Impacted population		Counterfactual population growth rate	
		Mean	Median	Mean	Median	Mean	Median
2031	Piling year 1	1.001	1.002 (0.916 - 1.066)	0.998	0.999 (0.912 - 1.062)	0.997	0.997
2032	Piling year 2	1	1.002 (0.945 - 1.048)	0.999	1.001 (0.945 - 1.047)	0.999	0.999
2033	One year following piling	1	1.001 (0.955 - 1.037)	1	1.001 (0.954 - 1.037)	0.999	0.999
2034	Two years following piling	1	1.000 (0.965 - 1.032)	0.999	0.999 (0.964 - 1.032)	1	1
2035	Three years following piling	1	1.000 (0.970 - 1.028)	0.999	0.999 (0.969 - 1.028)	1	1
2036	Five years following piling	0.999	0.999 (0.972 - 1.025)	0.999	0.999 (0.972 - 1.024)	1	1
2037	Six years following piling	0.999	0.999 (0.976 - 1.023)	0.999	0.999 (0.975 - 1.022)	1	1
2042	Ten years following piling	0.999	1.000 (0.981 - 1.017)	0.999	1.000 (0.981 - 1.017)	1	1
2047	Fifteen years following piling	0.999	0.999 (0.986 - 1.015)	0.999	0.999 (0.985 - 1.015)	1	1
2052	Twenty years following piling	0.999	0.999 (0.986 - 1.013)	0.999	0.999 (0.986 - 1.013)	1	1
2055	Twenty-three years following piling	0.999	0.999 (0.988 - 1.011)	0.999	0.999 (0.987 - 1.011)	1	1

A.4.5 Updated realistic concurrent WTG anchor piling scenario

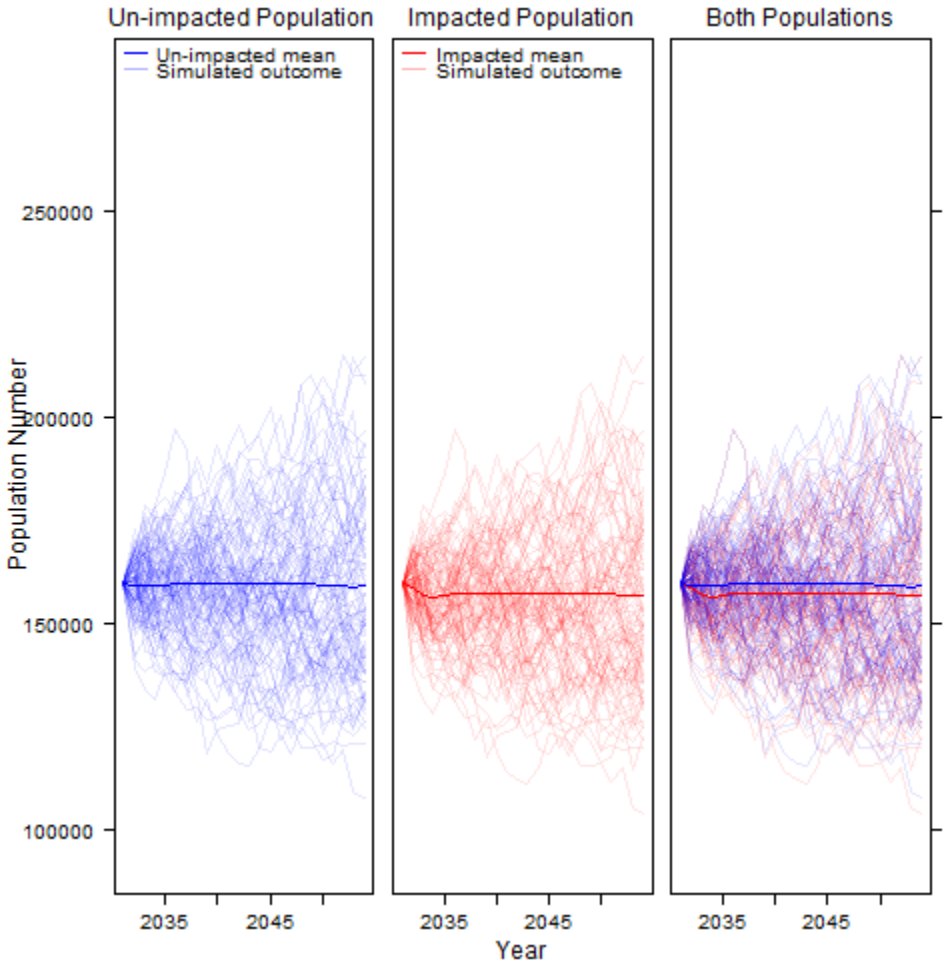

Figure 5-42: Simulated unimpacted and impacted population trajectories for harbour porpoise in the UK portion of the North Sea MU: Updated realistic concurrent WTG anchor piling scenario

Table 5-70: Mean and median (± 95% confidence intervals) predicted population sizes for harbour porpoise in the UK portion of the North Sea MU: Updated realistic concurrent WTG anchor piling scenario

Year	Description	Unimpacted population		Impacted population		Counterfactual population size	
		Mean	Median	Mean	Median	Mean	Median
2031	Piling year 1	159512	159725 (146487 - 171255)	158955	159247 (145574 - 170826)	0.997	0.997
2032	Piling year 2	159319	159618 (141708 - 175728)	156913	157154 (138213 - 173453)	0.985	0.985
2033	One year following piling	159583	159639 (139471 - 177994)	156465	156671 (136079 - 175968)	0.98	0.981
2034	Two years following piling	159520	159443 (137866 - 180311)	156856	156921 (135493 - 177996)	0.983	0.984
2035	Three years following piling	159786	159856 (137831 - 182391)	157467	157829 (135599 - 179854)	0.985	0.987
2036	Five years following piling	159619	159704 (135278 - 184597)	157402	157059 (133295 - 182025)	0.986	0.983
2037	Six years following piling	159824	159908 (133486 - 186913)	157537	157425 (131126 - 184420)	0.986	0.984
2042	Ten years following piling	159788	159640 (129584 - 195906)	157434	156716 (125926 - 192080)	0.985	0.982
2047	Fifteen years following piling	159729	158491 (123719 - 203180)	157371	156044 (121992 - 199776)	0.985	0.985
2052	Twenty years following piling	159048	156560 (120151 - 209760)	156697	154333 (117309 - 207191)	0.985	0.986
2055	Twenty-three years following piling	159591	157837 (119174 - 214348)	157228	155132 (117658 - 210983)	0.985	0.983

Table 5-71: Mean and median (± 95% confidence intervals) predicted population growth rates for harbour porpoise in the UK portion of the North Sea MU: Updated realistic concurrent WTG anchor piling scenario

Year	Description	Unimpacted population		Impacted population		Counterfactual population growth rate	
		Mean	Median	Mean	Median	Mean	Median
2031	Piling year 1	0.999	1.001 (0.918 - 1.073)	0.996	0.998 (0.912 - 1.070)	0.997	0.997
2032	Piling year 2	0.999	1.000 (0.942 - 1.049)	0.991	0.992 (0.930 - 1.042)	0.992	0.992
2033	One year following piling	0.999	1.000 (0.956 - 1.037)	0.993	0.994 (0.948 - 1.033)	0.993	0.994
2034	Two years following piling	0.999	1.000 (0.964 - 1.031)	0.995	0.996 (0.960 - 1.028)	0.996	0.996
2035	Three years following piling	1	1.000 (0.971 - 1.027)	0.997	0.998 (0.968 - 1.024)	0.997	0.997
2036	Five years following piling	1	1.000 (0.973 - 1.025)	0.997	0.997 (0.970 - 1.022)	0.998	0.997
2037	Six years following piling	1	1.000 (0.975 - 1.023)	0.998	0.998 (0.972 - 1.021)	0.998	0.998
2042	Ten years following piling	1	1.000 (0.983 - 1.017)	0.998	0.998 (0.980 - 1.016)	0.999	0.998
2047	Fifteen years following piling	1	1.000 (0.985 - 1.014)	0.999	0.999 (0.984 - 1.013)	0.999	0.999
2052	Twenty years following piling	0.999	0.999 (0.987 - 1.012)	0.999	0.998 (0.986 - 1.012)	0.999	0.999
2055	Twenty-three years following piling	1	1.000 (0.988 - 1.012)	0.999	0.999 (0.988 - 1.011)	0.999	0.999

A.5 GREY SEAL

A.5.1 EIA WTG anchor piling Scenario 1

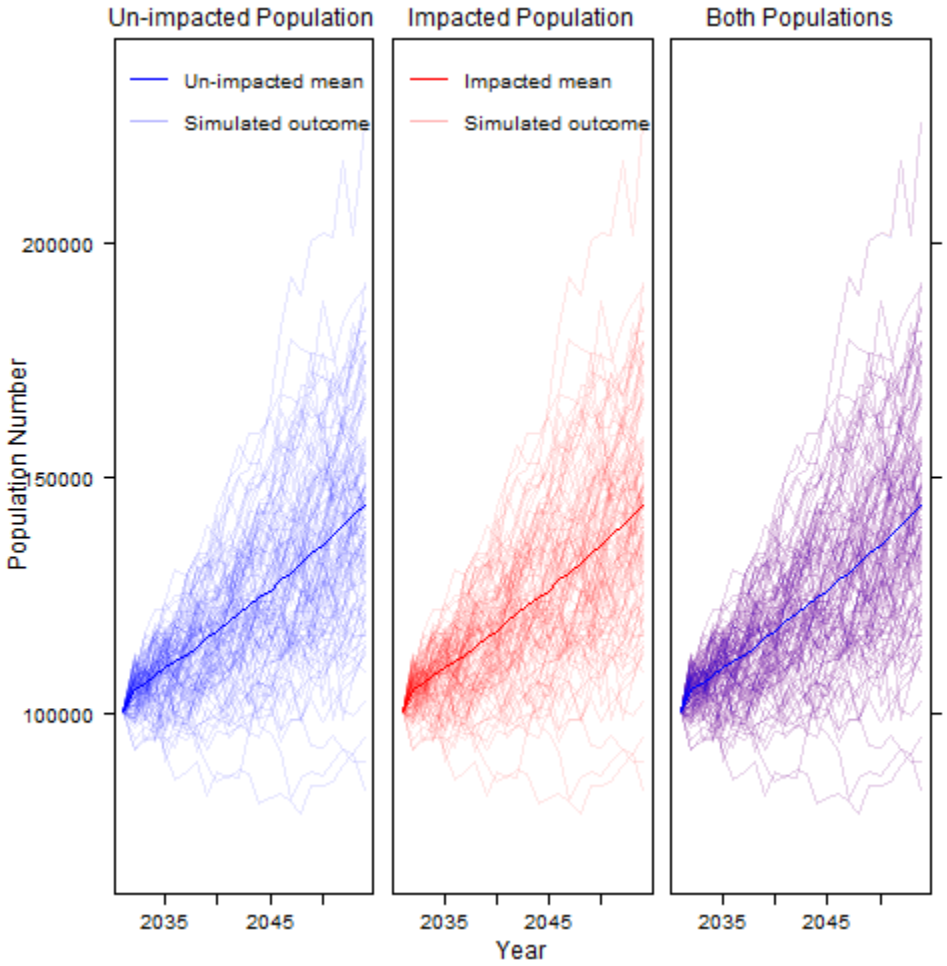

Figure 5-43: Simulated unimpacted and impacted population trajectories for grey seal in the relevant seal MUs: WTG anchor Scenario 1

Table 5-72: Mean and median (± 95% confidence intervals) predicted population sizes for grey seal in the relevant seal MUs: WTG anchor Scenario 1, and the counterfactual population size

Year	Description	Unimpacted population		Impacted population		Counterfactual population size	
		Mean	Median	Mean	Median	Mean	Median
2031	Piling year 1	104803	105199.5 (95517 - 111757)	104803	105199.5 (95517 - 111757)	1	1
2032	Piling year 2	106164	106631 (94113 - 115373)	106164	106631 (94113 - 115373)	1	1
2033	One year following piling	107893	108429.5 (93898 - 118893)	107893	108429.5 (93898 - 118893)	1	1
2034	Two years following piling	109455	110232 (93105 - 123049)	109455	110232 (93105 - 123049)	1	1
2035	Three years following piling	110733	111327 (93831 - 125150)	110733	111327 (93831 - 125150)	1	1
2036	Five years following piling	112330	112580 (92634 - 129501)	112329	112580 (92634 - 129501)	1	1
2037	Six years following piling	113858	114363 (92598 - 133378)	113858	114363 (92598 - 133378)	1	1
2042	Ten years following piling	122779	122748.5 (93774 - 154936)	122779	122748.5 (93774 - 154936)	1	1
2047	Fifteen years following piling	131906	131092 (94481 - 175096)	131906	131092 (94481 - 175096)	1	1
2052	Twenty years following piling	141882	140366.5 (98546 - 190989)	141882	140366.5 (98546 - 190989)	1	1
2055	Twenty-three years following piling	148075	146700.5 (98647 - 208122)	148075	146700.5 (98647 - 208122)	1	1

Table 5-73: Mean and median (± 95% confidence intervals) predicted population growth rates for grey seal in the relevant seal MUs: WTG anchor Scenario 1, and the counterfactual population growth rate

Year	Description	Unimpacted population		Impacted population		Counterfactual population growth rate	
		Mean	Median	Mean	Median	Mean	Median
2031	Piling year 1	1.045	1.049 (0.953 - 1.115)	1.045	1.049 (0.953 - 1.115)	1	1
2032	Piling year 2	1.029	1.031 (0.969 - 1.073)	1.029	1.031 (0.969 - 1.073)	1	1
2033	One year following piling	1.024	1.026 (0.978 - 1.058)	1.024	1.026 (0.978 - 1.058)	1	1
2034	Two years following piling	1.022	1.024 (0.982 - 1.053)	1.022	1.024 (0.982 - 1.053)	1	1
2035	Three years following piling	1.02	1.021 (0.987 - 1.045)	1.02	1.021 (0.987 - 1.045)	1	1
2036	Five years following piling	1.019	1.020 (0.987 - 1.044)	1.019	1.020 (0.987 - 1.044)	1	1
2037	Six years following piling	1.018	1.019 (0.989 - 1.042)	1.018	1.019 (0.989 - 1.042)	1	1
2042	Ten years following piling	1.016	1.017 (0.994 - 1.037)	1.016	1.017 (0.994 - 1.037)	1	1
2047	Fifteen years following piling	1.016	1.016 (0.997 - 1.033)	1.016	1.016 (0.997 - 1.033)	1	1
2052	Twenty years following piling	1.015	1.015 (0.999 - 1.030)	1.015	1.015 (0.999 - 1.030)	1	1
2055	Twenty-three years following piling	1.015	1.015 (0.999 - 1.030)	1.015	1.015 (0.999 - 1.030)	1	1

A.5.2 EIA WTG anchor piling Scenario 2

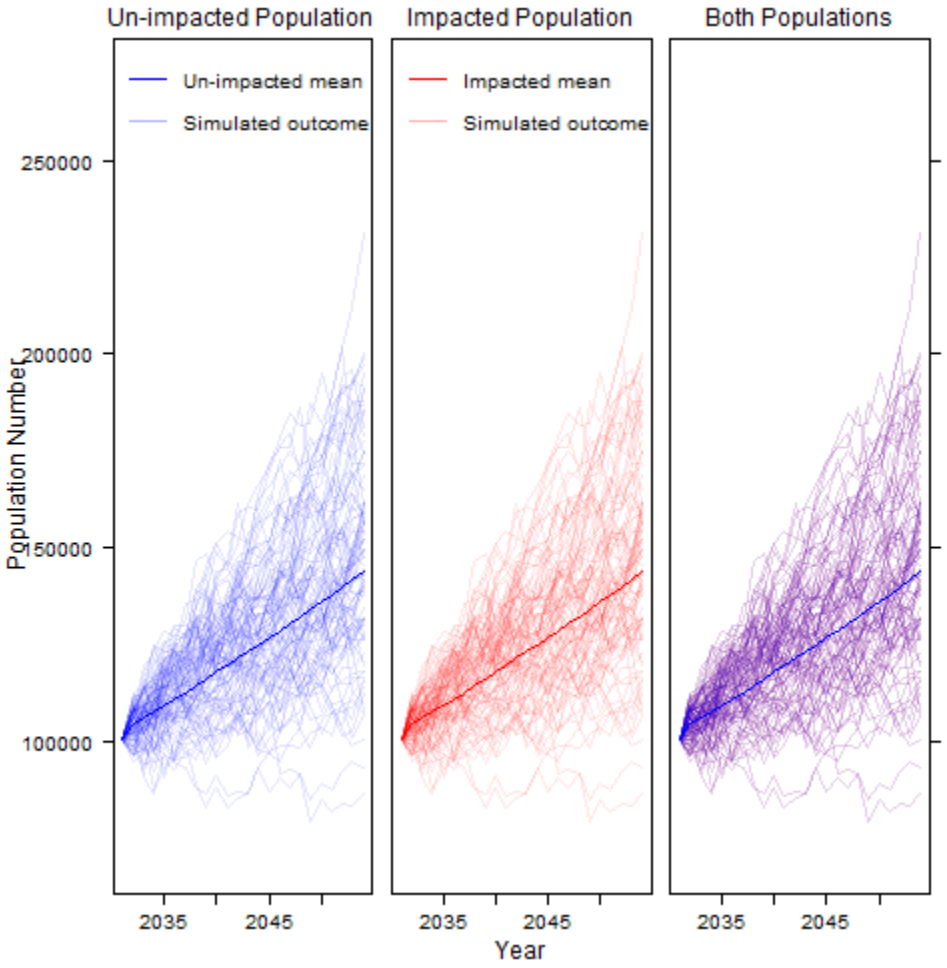

Figure 5-44: Simulated unimpacted and impacted population trajectories for grey seal in the relevant seal MUs: WTG anchor Scenario 2

Table 5-74: Mean and median (± 95% confidence intervals) predicted population sizes for grey seal in the relevant seal MUs: WTG anchor Scenario 2, and the counterfactual population size

Year	Description	Unimpacted population		Impacted population		Counterfactual population size	
		Mean	Median	Mean	Median	Mean	Median
2031	Piling year 1	104810	105338 (94800 - 111874)	104810	105338 (94800 - 111874)	1	1
2032	Piling year 2	106296	106853 (93469 - 115521)	106296	106853 (93469 - 115521)	1	1
2033	One year following piling	107820	108461 (92052 - 119702)	107820	108461 (92052 - 119702)	1	1
2034	Two years following piling	109441	110076 (93402 - 122379)	109441	110076 (93402 - 122379)	1	1
2035	Three years following piling	110975	111547.5 (93556 - 126720)	110975	111547.5 (93556 - 126720)	1	1
2036	Five years following piling	112508	112938 (93029 - 129569)	112508	112926 (93029 - 129569)	1	1
2037	Six years following piling	114344	114622.5 (92634 - 134102)	114344	114622.5 (92634 - 134102)	1	1
2042	Ten years following piling	123127	122944 (93693 - 153053)	123127	122944 (93693 - 153053)	1	1
2047	Fifteen years following piling	132022	131002 (95695 - 172391)	132022	131002 (95695 - 172391)	1	1
2052	Twenty years following piling	141573	140223 (96971 - 190521)	141573	140223 (96971 - 190521)	1	1
2055	Twenty-three years following piling	148586	147669 (98724 - 204550)	148586	147669 (98724 - 204550)	1	1

Table 5-75: Mean and median (± 95% confidence intervals) predicted population growth rates for grey seal in the relevant seal MUs: WTG anchor Scenario 2, and the counterfactual population growth rate

Year	Description	Unimpacted population		Impacted population		Counterfactual population growth rate	
		Mean	Median	Mean	Median	Mean	Median
2031	Piling year 1	1.045	1.051 (0.946 - 1.116)	1.045	1.051 (0.946 - 1.116)	1	1
2032	Piling year 2	1.029	1.032 (0.966 - 1.073)	1.029	1.032 (0.966 - 1.073)	1	1
2033	One year following piling	1.024	1.027 (0.972 - 1.061)	1.024	1.027 (0.972 - 1.061)	1	1
2034	Two years following piling	1.022	1.024 (0.982 - 1.051)	1.022	1.024 (0.982 - 1.051)	1	1
2035	Three years following piling	1.02	1.022 (0.986 - 1.048)	1.02	1.022 (0.986 - 1.048)	1	1
2036	Five years following piling	1.019	1.020 (0.988 - 1.044)	1.019	1.020 (0.988 - 1.044)	1	1
2037	Six years following piling	1.018	1.019 (0.989 - 1.042)	1.018	1.019 (0.989 - 1.042)	1	1
2042	Ten years following piling	1.017	1.017 (0.994 - 1.036)	1.017	1.017 (0.994 - 1.036)	1	1
2047	Fifteen years following piling	1.016	1.016 (0.997 - 1.032)	1.016	1.016 (0.997 - 1.032)	1	1
2052	Twenty years following piling	1.015	1.015 (0.998 - 1.030)	1.015	1.015 (0.998 - 1.030)	1	1
2055	Twenty-three years following piling	1.015	1.016 (0.999 - 1.029)	1.015	1.016 (0.999 - 1.029)	1	1

A.5.3 EIA concurrent WTG anchor piling scenario

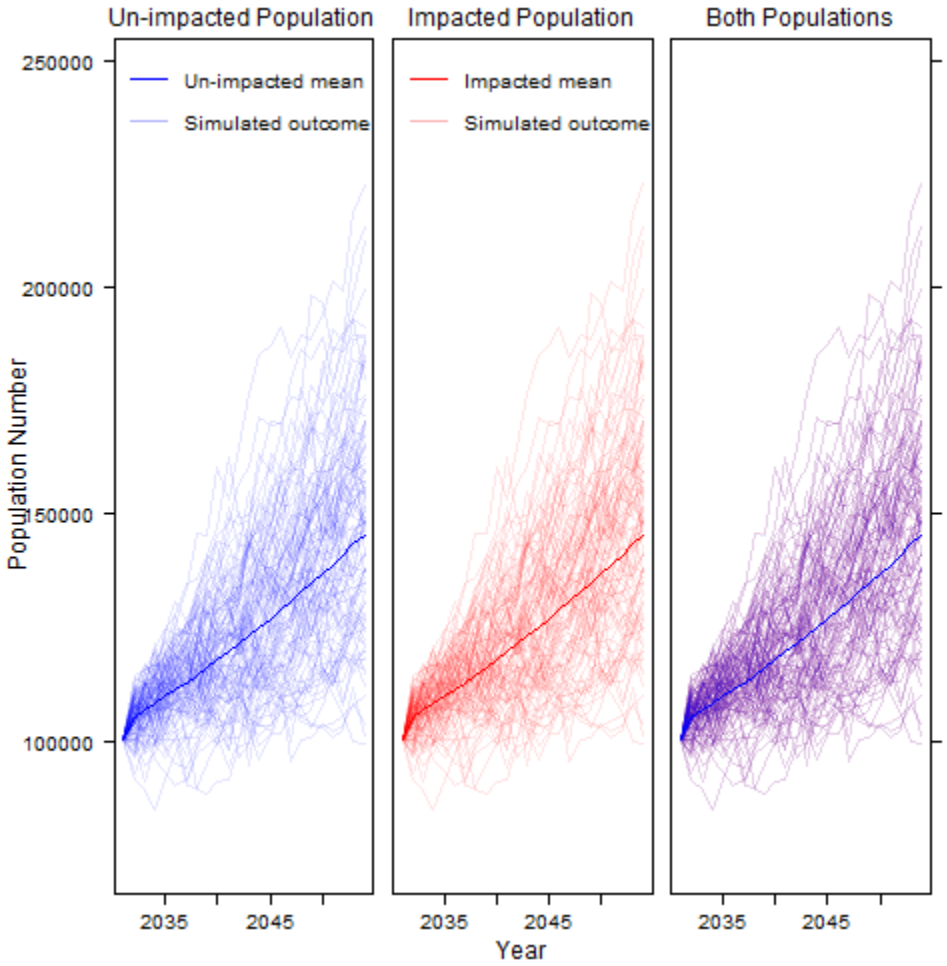

Figure 5-45: Simulated unimpacted and impacted population trajectories for grey seal in the relevant seal MUs: EIA concurrent WTG anchor piling scenario

Table 5-76: Mean and median (± 95% confidence intervals) predicted population sizes for grey seal in the relevant seal MUs: EIA concurrent WTG anchor piling scenario, and the counterfactual population size

Year	Description	Unimpacted population		Impacted population		Counterfactual population size	
		Mean	Median	Mean	Median	Mean	Median
2031	Piling year 1	105081	105396.5 (95258 - 112303)	105081	105396.5 (95258 - 112303)	1	1
2032	Piling year 2	106752	107381.5 (94851 - 115808)	106751	107381.5 (94851 - 115808)	1	1
2033	One year following piling	108218	108715 (94491 - 119511)	108216	108717.5 (94484 - 119506)	1	1
2034	Two years following piling	109949	110345.5 (93388 - 123212)	109946	110342 (93382 - 123217)	1	1
2035	Three years following piling	111467	112157 (94868 - 126099)	111464	112155 (94875 - 126093)	1	1
2036	Five years following piling	112872	113392.5 (93944 - 129009)	112868	113393.5 (93951 - 129010)	1	1
2037	Six years following piling	114436	114763 (94643 - 133967)	114433	114765.5 (94631 - 133961)	1	1
2042	Ten years following piling	123332	122981.5 (94666 - 151602)	123328	122975.5 (94654 - 151610)	1	1
2047	Fifteen years following piling	133016	132666.5 (95803 - 172879)	133011	132658 (95803 - 172879)	1	1
2052	Twenty years following piling	143363	142058.5 (99692 - 192930)	143358	142063 (99666 - 192940)	1	1
2055	Twenty-three years following piling	149577	148007 (98575 - 203888)	149572	147983 (98575 - 203888)	1	1

Table 5-77: Mean and median (± 95% confidence intervals) predicted population growth rates for grey seal in the relevant seal MUs: EIA concurrent WTG anchor piling scenario, and the counterfactual population growth rate

Year	Description	Unimpacted population		Impacted population		Counterfactual population growth rate	
		Mean	Median	Mean	Median	Mean	Median
2031	Piling year 1	1.048	1.051 (0.950 - 1.120)	1.048	1.051 (0.950 - 1.120)	1	1
2032	Piling year 2	1.032	1.035 (0.973 - 1.075)	1.032	1.035 (0.973 - 1.075)	1	1
2033	One year following piling	1.025	1.027 (0.980 - 1.060)	1.025	1.027 (0.980 - 1.060)	1	1
2034	Two years following piling	1.023	1.024 (0.982 - 1.053)	1.023	1.024 (0.982 - 1.053)	1	1
2035	Three years following piling	1.021	1.023 (0.989 - 1.047)	1.021	1.023 (0.989 - 1.047)	1	1
2036	Five years following piling	1.019	1.021 (0.989 - 1.043)	1.019	1.021 (0.989 - 1.043)	1	1
2037	Six years following piling	1.019	1.019 (0.992 - 1.042)	1.019	1.020 (0.992 - 1.042)	1	1
2042	Ten years following piling	1.017	1.017 (0.995 - 1.035)	1.017	1.017 (0.995 - 1.035)	1	1
2047	Fifteen years following piling	1.016	1.017 (0.997 - 1.033)	1.016	1.017 (0.997 - 1.033)	1	1
2052	Twenty years following piling	1.016	1.016 (1.000 - 1.030)	1.016	1.016 (1.000 - 1.030)	1	1
2055	Twenty-three years following piling	1.015	1.016 (0.999 - 1.029)	1.015	1.016 (0.999 - 1.029)	1	1

A.5.4 New Fast Bounding concurrent WTG anchor piling scenario

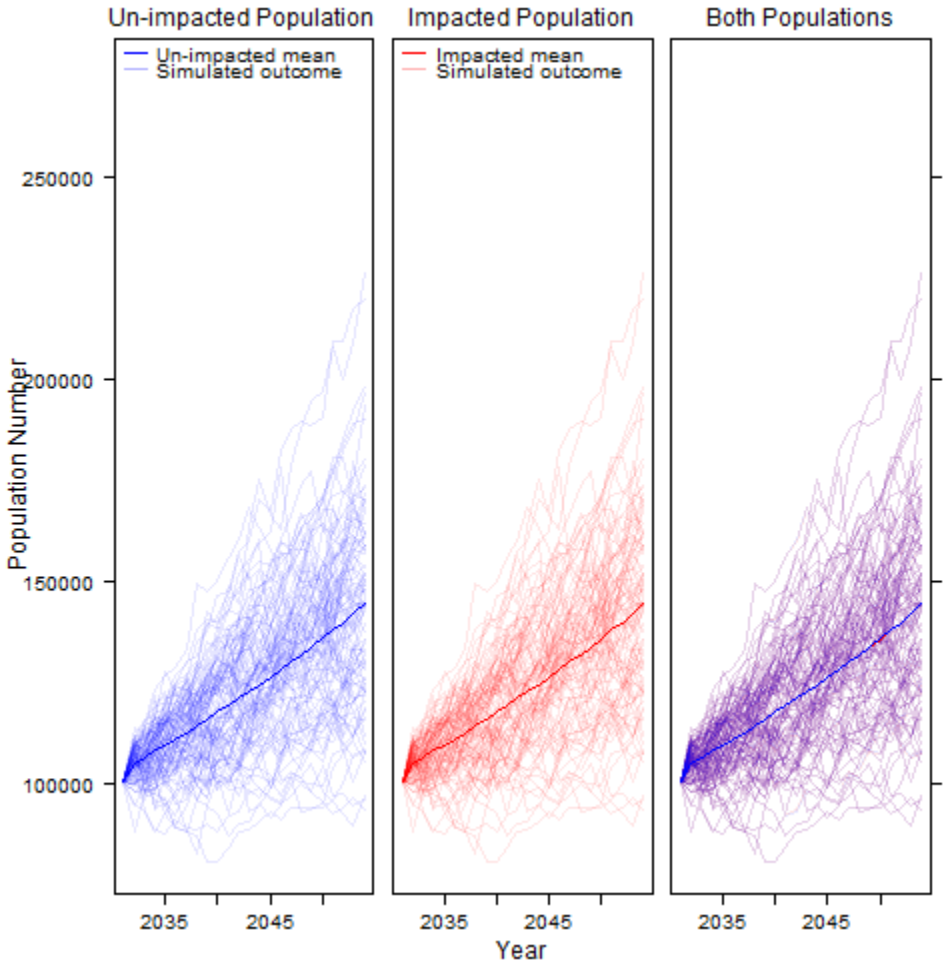

Figure 5-46: Simulated unimpacted and impacted population trajectories for grey seal in the relevant seal MUs: New Fast Bounding concurrent WTG anchor piling scenario

Table 5-78: Mean and median (± 95% confidence intervals) predicted population sizes for grey seal in the relevant seal MUs: New Fast Bounding concurrent WTG anchor piling scenario

Year	Description	Unimpacted population		Impacted population		Counterfactual population size	
		Mean	Median	Mean	Median	Mean	Median
2031	Piling year 1	104889	105289.5 (94723 - 111974)	104882	105286.5 (94719 - 111967)	1	1
2032	Piling year 2	106340	107009 (93784 - 116516)	106329	107003 (93785 - 116517)	1	1
2033	One year following piling	107988	108566.5 (93060 - 119522)	107974	108555.5 (93048 - 119519)	1	1
2034	Two years following piling	109214	110091 (92990 - 122717)	109198	110075.5 (92988 - 122714)	1	1
2035	Three years following piling	110650	110633.5 (93321 - 126357)	110632	110616.5 (93283 - 126325)	1	1
2036	Five years following piling	112298	112527.5 (92969 - 129824)	112278	112492.5 (92960 - 129791)	1	1
2037	Six years following piling	114013	114401 (94172 - 134298)	113993	114394.5 (94173 - 134135)	1	1
2042	Ten years following piling	122728	122811.5 (94040 - 152628)	122707	122802 (94007 - 152601)	1	1
2047	Fifteen years following piling	131578	130729 (97086 - 169772)	131555	130707 (97061 - 169746)	1	1
2052	Twenty years following piling	141915	140711.5 (101575 - 188868)	141891	140726 (101575 - 188859)	1	1
2055	Twenty-three years following piling	148458	146178 (102409 - 205789)	148432	146162.5 (102409 - 205702)	1	1

Table 5-79: Mean and median (± 95% confidence intervals) predicted population growth rates for grey seal in the relevant seal MUs: New Fast Bounding concurrent WTG anchor piling scenario

Year	Description	Unimpacted population		Impacted population		Counterfactual population growth rate	
		Mean	Median	Mean	Median	Mean	Median
2031	Piling year 1	1.046	1.050 (0.945 - 1.117)	1.046	1.050 (0.945 - 1.117)	1	1
2032	Piling year 2	1.03	1.033 (0.967 - 1.078)	1.029	1.033 (0.967 - 1.078)	1	1
2033	One year following piling	1.025	1.027 (0.975 - 1.060)	1.025	1.027 (0.975 - 1.060)	1	1
2034	Two years following piling	1.021	1.024 (0.981 - 1.052)	1.021	1.024 (0.981 - 1.052)	1	1
2035	Three years following piling	1.019	1.020 (0.986 - 1.047)	1.019	1.020 (0.986 - 1.047)	1	1
2036	Five years following piling	1.019	1.019 (0.988 - 1.044)	1.019	1.019 (0.987 - 1.044)	1	1
2037	Six years following piling	1.018	1.019 (0.991 - 1.043)	1.018	1.019 (0.991 - 1.042)	1	1
2042	Ten years following piling	1.016	1.017 (0.995 - 1.036)	1.016	1.017 (0.995 - 1.036)	1	1
2047	Fifteen years following piling	1.016	1.016 (0.998 - 1.031)	1.016	1.016 (0.998 - 1.031)	1	1
2052	Twenty years following piling	1.015	1.016 (1.001 - 1.029)	1.015	1.016 (1.001 - 1.029)	1	1
2055	Twenty-three years following piling	1.015	1.015 (1.001 - 1.029)	1.015	1.015 (1.001 - 1.029)	1	1

A.5.5 Updated realistic concurrent WTG anchor piling scenario

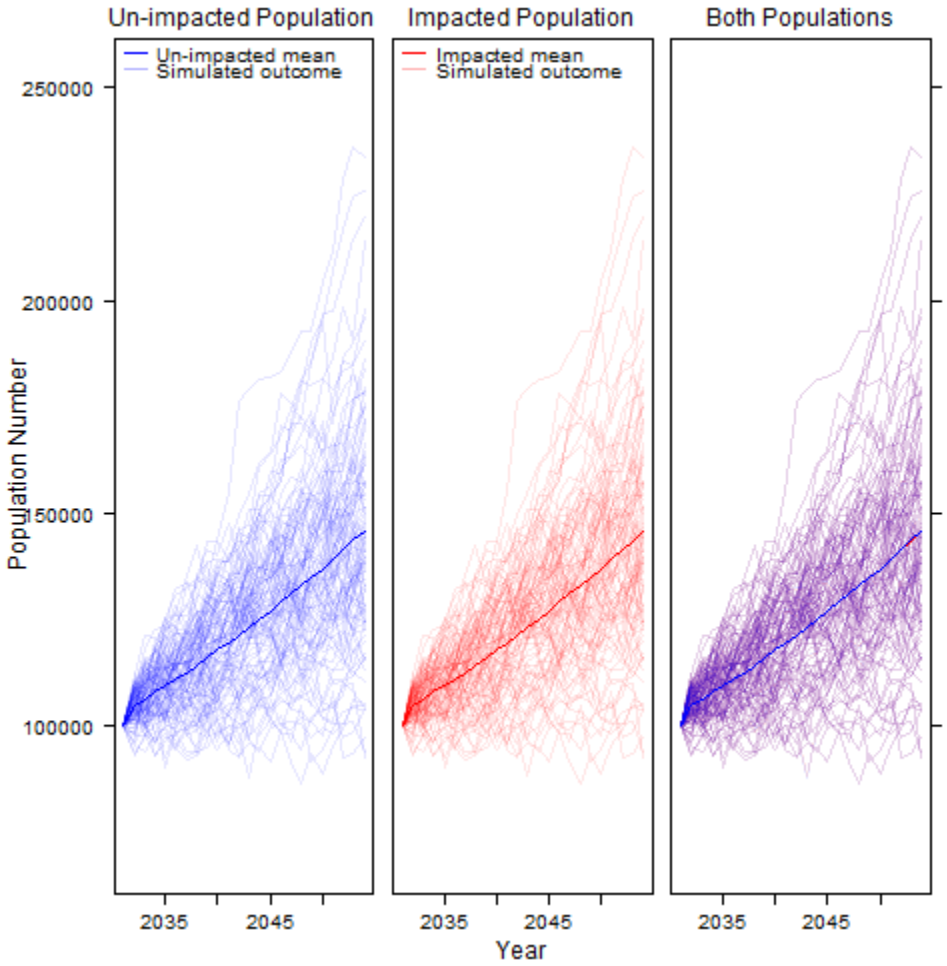

Figure 5-47: Simulated unimpacted and impacted population trajectories for grey seal in the relevant seal Mus Updated realistic concurrent WTG anchor piling scenario

Table 5-80: Mean and median (± 95% confidence intervals) predicted population sizes for grey seal in the relevant seal MUs: Updated realistic concurrent WTG anchor piling scenario

Year	Description	Unimpacted population		Impacted population		Counterfactual population size	
		Mean	Median	Mean	Median	Mean	Median
2031	Piling year 1	104980	105454.5 (94940 - 111986)	104980	105454.5 (94940 - 111986)	1	1
2032	Piling year 2	106398	106818.5 (95231 - 115638)	106397	106816.5 (95228 - 115638)	1	1
2033	One year following piling	108043	108446.5 (95183 - 119273)	108040	108446 (95184 - 119273)	1	1
2034	Two years following piling	109523	110111.5 (94239 - 122894)	109518	110104.5 (94239 - 122888)	1	1
2035	Three years following piling	110953	111303 (94226 - 126529)	110948	111301.5 (94205 - 126535)	1	1
2036	Five years following piling	112485	112673.5 (92565 - 129788)	112479	112666.5 (92560 - 129798)	1	1
2037	Six years following piling	114099	114436.5 (93414 - 133736)	114093	114411.5 (93406 - 133741)	1	1
2042	Ten years following piling	123419	122953 (93189 - 154221)	123413	122945 (93187 - 154221)	1	1
2047	Fifteen years following piling	133064	132174.5 (94841 - 176134)	133057	132163.5 (94841 - 176134)	1	1
2052	Twenty years following piling	143655	142438 (98106 - 197756)	143647	142411.5 (98095 - 197765)	1	1
2055	Twenty-three years following piling	149999	148754.5 (98927 - 213704)	149991	148746.5 (98918 - 213699)	1	1

Table 5-81: Mean and median (± 95% confidence intervals) predicted population growth rates for grey seal in the relevant seal MUs: Updated realistic concurrent WTG anchor piling scenario

Year	Description	Unimpacted population		Impacted population		Counterfactual population growth rate	
		Mean	Median	Mean	Median	Mean	Median
2031	Piling year 1	1.047	1.052 (0.947 - 1.117)	1.047	1.052 (0.947 - 1.117)	1	1
2032	Piling year 2	1.03	1.032 (0.975 - 1.074)	1.03	1.032 (0.975 - 1.074)	1	1
2033	One year following piling	1.025	1.027 (0.983 - 1.060)	1.025	1.027 (0.983 - 1.060)	1	1
2034	Two years following piling	1.022	1.024 (0.985 - 1.052)	1.022	1.024 (0.985 - 1.052)	1	1
2035	Three years following piling	1.02	1.021 (0.988 - 1.048)	1.02	1.021 (0.988 - 1.048)	1	1
2036	Five years following piling	1.019	1.020 (0.987 - 1.044)	1.019	1.020 (0.987 - 1.044)	1	1
2037	Six years following piling	1.018	1.019 (0.990 - 1.042)	1.018	1.019 (0.990 - 1.042)	1	1
2042	Ten years following piling	1.017	1.017 (0.994 - 1.037)	1.017	1.017 (0.994 - 1.037)	1	1
2047	Fifteen years following piling	1.016	1.016 (0.997 - 1.034)	1.016	1.016 (0.997 - 1.034)	1	1
2052	Twenty years following piling	1.016	1.016 (0.999 - 1.031)	1.016	1.016 (0.999 - 1.031)	1	1
2055	Twenty-three years following piling	1.016	1.016 (0.999 - 1.031)	1.016	1.016 (0.999 - 1.031)	1	1