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Volume 8 Additional Information

Appendix 26: Marine Mammals Results and Discussion

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Acronyms and Abbreviations

CES	Coastal East Scotland
CGNS	Celtic and Greater North Sea
EDR	Effective Deterrence Range
EEZ	Exclusive Economic Zone
EIA	Environment Impact Assessment
ES	East Scotland
GNS	Greater North Sea
iPCoD	Interim Population Consequences of Disturbance Model
JNCC	Joint Nature Conservation Committee
MU	Management Unit
NC&O	North Coast and Orkney
NS	North Sea
OWF	Offshore Wind Farm
SMU	Seal Monitoring Unit

1 Introduction

1.1.1.1 This appendix has been developed to fulfil the requirements set out by NatureScot in the determination response (letter dated 27 March 2025) and subsequent consultation on 04 June and 05 August 2025. Further, written feedback provided on 21 August was also incorporated.

1.1.1.2 For clarity, Caledonia Offshore Wind Farm (OWF) refers to the Array Area of the Proposed Development (Offshore). When referring to the Caledonia North Site and Caledonia South Site (i.e., Array Areas for Caledonia North and Caledonia South, respectively), these form part of the Caledonia OWF, which consists of up to 101 bottom-fixed and 39 floating Wind Turbine Generator (WTG) foundations in total, as well as four Offshore Substation Platforms (OSPs) on bottom-fixed foundations. Caledonia North and Caledonia South are separate projects, comprising up to 77 bottom-fixed WTG foundations and up to 39 bottom-fixed plus 39 floating WTG foundations, respectively (plus two OSPs on bottom-fixed foundations each). However, the total number of WTGs for the Proposed Development (Offshore) (i.e., Caledonia North and Caledonia South combined) will not exceed 140.

1.1.1.3 This appendix presents the re-assessment results and compares them with those reported in the Environmental Impact Assessment (EIA). It should be noted that the EIA findings for Proposed Development (Offshore), Caledonia North and Caledonia South were consistent in terms of magnitude, sensitivity and significance. Accordingly, this appendix discusses these collectively, with results separated where necessary. The methodology used in the re-assessment of piling and population modelling for the Proposed Development (Offshore), Caledonia North and Caledonia South alone, and cumulatively with other projects, can be found in Volume 8, Appendix 22: Marine Mammals Clarifications and Piling Re-assessment Methodology.

1.1.1.4 For the Proposed Development (Offshore), Caledonia North and Caledonia South alone, the re-assessment was carried out for harbour porpoise, bottlenose dolphins and minke whales using a range of different methodologies. The results are discussed in Section 2.

1.1.1.5 NatureScot requested the cumulative impact assessment to be carried out for harbour seal, harbour porpoise, bottlenose dolphins and minke whales, the results of which are provided in Section 3.

2 Proposed Development (Offshore), Caledonia North and Caledonia South Alone

2.1 Re-Assessment Results

2.1.1.1 The detailed information about assessment methodology and densities used in the assessment is provided in Volume 8, Appendix 22: Marine Mammals Clarifications and Piling Re-assessment Methodology.

2.1.1.2 The numbers of animals affected based on dose-response (Graham *et al.*, 2017[1]), deterrence function (Graham *et al.*, 2019[2]) and Effective Deterrence Ranges (EDRs) (Joint Nature Conservation Committee (JNCC), 2020[3]; Benhemma-Le Gall *et al.*, 2024[4]) are presented in Table 2-1 for harbour porpoise, Table 2-2 for bottlenose dolphin and Table 2-3 for minke whale. The results are presented against the North Sea (NS) Management Unit (MU) and UK portion of the NS MU for harbour porpoise, Celtic and Greater North Seas (CGNS) MU and UK portion of the CGNS MU for minke whale and Coastal East Scotland (CES) MU for bottlenose dolphin.

2.1.1.3 The number of animals affected within the whole MU for harbour porpoise and minke whale as well as UK portion of the MU is the same for deterrence function and EDR, as these methods do not reach beyond the UK Exclusive Economic Zone (EEZ).

Table 2-1: Number of harbour porpoises affected by disturbance at worst-case scenario locations; the worst-case scenario for Proposed Development (Offshore) is the highest number of animals affected across two locations.

Piling Location	Assessment Method	Number of Animals Affected	% NS MU	% UK NS MU
Location 3 (Caledonia North)	Dose-response*	7,274 (7,213 UK)	2.1%	4.5%
	Deterrence function	367	0.1%	0.2%
	26km EDR	597	0.2%	0.4%
	15km EDR	199	0.1%	0.1%
	9.4km EDR	78	0.0%	0.0%
Location 7 (Caledonia South)	Dose-response*	8,201 (8,111 UK)	2.4%	5.1%
	Deterrence function	388	0.1%	0.2%
	26km EDR	607	0.2%	0.4%
	15km EDR	199	0.1%	0.1%
	9.4km EDR	78	0.0%	0.0%
* Approach used in the original Environmental Impact Assessment (EIA) submission.				

Table 2-2: Number of bottlenose dolphins affected by disturbance at worst-case scenario locations; the worst-case scenario for Proposed Development (Offshore) is the highest number of animals affected across two locations.

Piling Location	Assessment Method	Number of Animals Affected	% CES MU
Location 4 (Caledonia North)	Dose-response: EIA*	48	21.2%
	Dose-response: re-assessment**	44	19.5%
	Deterrence function	5	2.2%
	26km EDR	1	0.4%
	15km EDR	1	0.4%
	9.4km EDR	1	0.4%
Location 8 (Caledonia South)	Dose-response – EIA*	52	23.0%
	Dose-response: re-assessment**	48	21.2%
	Deterrence function	6	2.7%
	26km EDR	2	0.9%
	15km EDR	1	0.4%
	9.4km EDR	1	0.4%

* Approach used in the EIA based on population size of 245 individuals.

** The same approach as used in the EIA but based on population size of 226 individuals.

Table 2-3: Number of minke whales affected by disturbance at worst-case scenario locations; the worst-case scenario for Proposed Development (Offshore) is the highest number of animals affected across two locations.

Piling Location	Assessment Method	Number of Animals Affected	% CGNS MU	% UK CGNS MU
Location 3 (Caledonia North)	Dose-response*	259 (257 UK)	1.3%	2.5%
	Deterrence function	36	0.2%	0.3%
	26km EDR	44	0.2%	0.4%
	15km EDR	22	0.1%	0.2%
	9.4km EDR	5	0.0%	0.0%
Location 7 (Caledonia South)	Dose-response*	298 (294 UK)	1.5%	2.9%
	Deterrence function	35	0.2%	0.3%
	26km EDR	45	0.2%	0.4%
	15km EDR	14	0.1%	0.1%
	9.4km EDR	6	0.0%	0.1%
* Approach used in the EIA.				

2.2 Harbour Porpoise and Minke Whale

2.2.1.1 For harbour porpoise and minke whale, the dose-response results are the same as presented in the EIA, as there were no changes to the density used. Based on the EIA assessment in Volumes 2, 3 and 4, Chapter 7: Marine Mammals, there was no risk to either population (NS MU and CGNS MU) trajectory. Subsequently, the overall effect of disturbance from piling during construction was concluded to be **Negligible** for harbour porpoise and **Minor** for minke whales, which are both **Not Significant in EIA terms.**

2.2.1.2 The number of harbour porpoise predicted to be disturbed per piling day using the deterrence function is only 4.7 - 5% of the number predicted by the dose-response function.

2.2.1.3 The number of minke whales predicted to be disturbed per piling day using the deterrence function is only 11.7 - 13.9% of the number predicted by the dose-response function.

2.2.1.4 Given that the re-assessment indicates considerably lower numbers of animals affected using the deterrence function (or EDRs) and considering a shorter piling duration associated with floating WTG foundations, the conclusions of the EIA remain valid. Accordingly, disturbance from piling at Caledonia North, Caledonia South and Proposed Development (Offshore) is not predicted to result in significant effects on harbour porpoise or minke whale populations.

2.3 Bottlenose Dolphin

2.3.1.1 Volume 8, Appendices 23, 24 and 25 present the results for the Interim Population Consequences of Disturbance (iPCoD) modelling for the different disturbance methods (presented in Table 2-2) for comparison purposes only, as requested by NatureScot. Given the most recent consultation from 03 September 2025, NatureScot advised that the deterrence function approach can be applied in the re-assessment for dolphin species. As such, the conclusions of the re-assessment are based on the deterrence function only.

2.3.1.2 The number of bottlenose dolphins predicted to be disturbed per piling day using the deterrence function is only 11 - 13% of the number predicted by the dose-response function. The comparison between results estimated in the EIA (based on dose-response approach) and re-assessment (based on deterrence function) is presented in Table 2-4.

2.3.1.3 The behavioural response as a result of piling is expected to occur over a medium spatial extent (disturbance impact out to a maximum of 60km) and over a medium duration (up to 79, 275 and 339 piling days for Caledonia North, Caledonia South and Proposed Development (Offshore), respectively, with construction over three to six years). The proportion of the population predicted to be impacted is Low (between 2.2% to 2.7% of the CES MU). The iPCoD modelling has shown no change to the population trajectory, with the mean impacted population size remaining at >98% of the mean size of the unimpacted population, which aligns with a low consequence score.

2.3.1.4 Overall, the magnitude of the effect has been conservatively assessed as **Medium.** Considering the **Low** sensitivity to behavioural response to piling, the overall effect is **Minor** and **Not Significant in the EIA terms**. This aligns with the results of the EIA presented in Volumes 2, 3 and 4, Chapter 7: Marine Mammals and corroborates that the conclusions of the EIA remain valid.

Table 2-4: Proposed Development (Offshore), Caledonia North and Caledonia South alone assessment for bottlenose dolphin CES MU comparison – EIA and re-assessment; C = concurrent, S = sequential with 5-years gap.

Assessment	Number Impacted Per Day	iPCoD Result (%)				Magnitude	Sensitivity	Significance
		Caledonia North	Caledonia South	Proposed Development (Offshore) (C)	Proposed Development (Offshore) (S)			
EIA	Caledonia North: 48 Caledonia South: 52	>97.4	>93.0	>92.3	>90.5	Medium spatial extent Medium duration Medium proportion of population Medium probability/ frequency Medium consequence **Overall: Medium**	Low	Minor (not significant)
Re-assessment	Caledonia North: 5 Caledonia South: 6	>99.6	>98.8	>98.4	>98.7	Medium spatial extent Medium duration Low proportion of population Medium probability/ frequency Low consequence **Overall: Medium**	Low	Minor (not significant)
Note, a proportion of impacted population size to unimpacted population size, comparison presented for increasing population only as this was presented in the EIA.								

3 Cumulative Re-assessment

3.1 Overview

3.1.1.1 In line with the methodology presented in Volume 8, Appendix 22: Marine Mammals Clarifications and Piling Re-assessment Methodology, the cumulative impact re-assessment for cetaceans is based on deterrence function values for all OWFs. For seals, the assessment is based on EIA-specific values where assessment is available in the public domain or appropriate EDR as well as Carter *et al.* (2025[5]) at-sea density maps.

3.2 Harbour Porpoise

3.2.1 Tabulated Results

3.2.1.1 The projects screened into the cumulative re-assessment along with the number of animals affected are presented in Table 3-1. The total numbers of animals for Caledonia North, Caledonia South and Proposed Development (Offshore) (concurrent and sequential installation with no gap) are presented in Table 3-2.

Table 3-1: Number of harbour porpoise potentially disturbed by underwater noise from all projects.

Project	Tier	2027	2028	2029	2030	2031	2032	2033
Caledonia North	-		367	367	367			
Caledonia South	-		388	388	388			
Proposed Development (Offshore) – Concurrent	-		388	388	388			
Proposed Development (Offshore) – Sequential	-		367	367	388	388	388	
Berwick Bank*	1	732				732		
Cenos	1					1114	1114	1114
Green Volt	1	682						
Ossian*	1					733	733	733
Salamander	1		681					
West of Orkney	1		155	155	155			
Muir Mhòr	1			731	731	731		
Ayre	2				397	397	397	397
Bowdun	2			715	715	715	715	715
Broadshore	2		523	523	523			
Buchan	2		614	614	614			
Morven*	2	733	733	733	733	733	733	
Sinclair	2		543	543				
Bellrock	2		733	733	733	733		
Stromar	2				414	414	414	414

* Piling at some projects extend outside of the CIA 2027 – 2033 timeframes. The complete duration of piling at these projects, e.g. 2026 – 2032 for Morven, was included in the iPCoD modelling.

Table 3-2: Summary of number of harbour porpoise potentially disturbed by underwater noise from all projects.

Parameter	2027	2028	2029	2030	2031	2032	2033
Caledonia North							
Number of animals	2,147	4,349	5,114	5,382	6,302	4,106	3,373
% NS MU	0.62%	1.25%	1.48%	1.55%	1.82%	1.18%	0.97%
% UK NS MU	1.34%	2.72%	3.20%	3.37%	3.95%	2.57%	2.11%
Caledonia South							
Number of animals	2,147	4,370	5,135	5,403	6,302	4,106	3,373
% NS MU	0.62%	1.26%	1.48%	1.56%	1.82%	1.18%	0.97%
% UK NS MU	1.34%	2.74%	3.22%	3.38%	3.95%	2.57%	2.11%
Proposed Development (Offshore) Concurrent							
Number of animals	2,147	4,370	5,135	5,403	6,302	4,106	3,373
% NS MU	0.62%	1.26%	1.48%	1.56%	1.82%	1.18%	0.97%
% UK NS MU	1.34%	2.74%	3.22%	3.38%	3.95%	2.57%	2.11%
Proposed Development (Offshore) Sequential							
Number of animals	2,147	4,349	5,114	5,403	6,690	4,494	3,373
% NS MU	0.62%	1.25%	1.48%	1.56%	1.93%	1.30%	0.97%
% UK NS MU	1.34%	2.72%	3.20%	3.38%	4.19%	2.82%	2.11%

3.2.2 EIA Comparison

3.2.2.1 The cumulative number of harbour porpoises at risk of experiencing behavioural disturbance due to piling are lower in the re-assessment (Table 3-2) compared to the EIA submission (Volumes 2, 3 and 4, Chapter 7: Marine Mammals). For example, for the Proposed Development (Offshore) sequential scenario, the EIA predicted there to be impact to 21,407 porpoise in 2031 (6.18% NS MU), whereas the re-assessment predicts impact to only 6,690 porpoise in 2031 (1.93% NS MU). This is due to differences in the approach, described in detail in Volume 8, Appendix 22: Marine Mammals Clarifications and Piling Re-assessment Methodology.

3.2.2.2 With respect to the cumulative iPCoD re-assessment, detailed in Volume 8, Appendices 23, 24 and 25, the predicted difference between the mean impacted and mean unimpacted population sizes is smaller for the re-assessment compared to the EIA. The comparison between results estimated in the EIA (based on dose-response approach) and re-assessment (based on deterrence function) is presented in Table 3-3. Based on the cumulative impact assessment in Volumes 2, 3 and 4, Chapter 7: Marine Mammals, there was no risk to harbour porpoise NS MU trajectory.

3.2.2.3 Considering a range of criteria set out in the magnitude definition, the cumulative impact of behavioural disturbance from piling was concluded to be a **Medium** magnitude. Assuming **Low** sensitivity to disturbance, the overall effect of disturbance from cumulative piling during construction was concluded to be **Minor** and **Not Significant in EIA terms**. Given that the re-assessment indicates smaller numbers of harbour porpoise affected using the deterrence function methodology and smaller differences between the mean size of the impacted and impacted populations, the conclusions of the EIA remain valid. Accordingly, disturbance from piling at Caledonia North, Caledonia South, and Proposed Development (Offshore) is not predicted to result in significant effects on the harbour porpoise NS MU population.

Table 3-3: Cumulative assessment for harbour porpoise NS MU comparison – EIA and re-assessment; C = concurrent, S = sequential with no gap.

Assessment	iPCoD Result (%)				Magnitude	Sensitivity	Significance
	Caledonia North	Caledonia South	Proposed Development (Offshore) (C)	Proposed Development (Offshore) (S)			
EIA	>98.2	>98.8	>98.3	>98.4	Large spatial extent Medium duration Low proportion of population Medium probability/frequency Low consequence **Overall: Medium**	Low	Minor (not significant)
Re-assessment	>99.8	>99.8	>99.8	>98.7	Large spatial extent Medium duration Low proportion of population Medium probability/frequency Low consequence **Overall: Medium**	Low	Minor (not significant)
Note, a proportion of impacted population size to unimpacted population size, comparison presented for NS MU population only as this was presented in the EIA.							

3.3 Bottlenose Dolphin

3.3.1 Tabulated Results

3.3.1.1 The projects screened into the cumulative re-assessment along with the number of animals affected are presented in Table 3-4.The total numbers of animals for Caledonia North, Caledonia South and Proposed Development (Offshore) (concurrent and sequential installation with no gap) is presented in Table 3-5.

Table 3-4: Number of bottlenose dolphin potentially disturbed by underwater noise from all projects

Project	Tier	2027	2028	2029	2030	2031	2032	2033
Caledonia North	-		5	5	5			
Caledonia South	-		6	6	6			
Proposed Development (Offshore) – Concurrent	-		6	6	6			
Proposed Development (Offshore) – Sequential	-		5	5	6	6	6	
Berwick Bank*	1	12				12		
Ossian*	1					1	1	1
Salamander	1		8					
Green Volt	1	1						
Muir Mhòr	1			2	2	2		
Morven*	2	3	3	3	3	3	3	
Ayre	2				1	1	1	1
Bowdun	2			9	9	9	9	9
Broadshore	2		3	3	3			
Buchan	2		1	1	1			
Sinclair	2		1	1				
Stromar	2				1	1	1	1
* Piling at some projects extend outside of the CIA 2027 – 2033 timeframes. The complete duration of piling at these projects, e.g. 2026 – 2032 for Morven, was included in the iPCoD modelling.								

Table 3-5: Summary of number of bottlenose dolphin potentially disturbed by underwater noise from all projects

Parameter	2027	2028	2029	2030	2031	2032	2033
Caledonia North							
Number of animals	16	21	24	25	29	15	12
% CES MU	7.08%	9.29%	10.62%	11.06%	12.83%	6.64%	5.31%
Caledonia South							
Number of animals	16	22	25	26	29	15	12
% CES MU	7.08%	9.73%	11.06%	11.50%	12.83%	6.64%	5.31%
Proposed Development (Offshore) Concurrent							
Number of animals	16	22	25	26	29	15	12
% CES MU	7.08%	9.73%	11.06%	11.50%	12.83%	6.64%	5.31%
Proposed Development (Offshore) Sequential							
Number of animals	16	21	24	26	35	21	12
% CES MU	7.08%	9.29%	10.62%	11.50%	15.49%	9.29%	5.31%

3.3.2 EIA Comparison

3.3.2.1 In the re-assessment of bottlenose dolphin behavioural disturbance from piling, different approach to densities was used, discussed in detail in Volume 8, Appendix 22: Marine Mammals Clarifications and Piling Re-assessment Methodology. The number of projects with potential to disturb animals within the CES MU is higher in the re-assessment compared to the EIA. However, the cumulative number of animals affected within the CES MU is lower in the re-assessment compared to the EIA submission (Volumes 2, 3 and 4, Chapter 7: Marine Mammals). This is due to differences in the approach, see Volume 8, Appendix 22: Marine Mammals Clarifications and Piling Re-assessment Methodology.

3.3.2.2 In the re-assessment, a cumulative number of animals disturbed on any given day does not exceed 35 individuals, e.g., approximately 15.49% of the CES MU during sequential piling at the Caledonia OWF in 2031. This represents a reduction from up to 61 animals disturbed per day (approximately 24.90% of the CES MU population) presented in the EIA. It should be noted that the values in the EIA submission were based on the population size of 245 animals; if these values could be scaled to the population size of 226 individuals, the cumulative number of animals would be 57.

3.3.2.3 The comparison between results estimated in the EIA (based on dose-response approach) and re-assessment (based on deterrence function) is presented in Table 3-6. With respect to the cumulative iPCoD re-assessment, detailed in Volume 8, Appendices 23, 24 and 25, the iPCoD modelling indicated reduced deviation between impacted and un-impacted populations for Caledonia South and Proposed Development (Offshore), but not for Caledonia North. This outcome aligns with the reduction in piling days at Caledonia South and Proposed Development (Offshore); however, no change occurred at Caledonia North due to the absence of floating WTG foundations. Notably, the model output for Caledonia North could be considered unexpected, as it indicates smaller differences between impacted and un-impacted populations for the numbers presented in the EIA and re-assessment. However, the difference in deviation of only 1% is equivalent to two – three animals and, therefore, such difference can be related to variation due to simple stochastic nature of the iPCoD simulations.

3.3.2.4 Based on the cumulative impact assessment in Volumes 2, 3 and 4, Chapter 7: Marine Mammals, there was no risk of long-term effects on the CES MU population trajectory. Considering a range of criteria set out in the magnitude definition, the cumulative impact of behavioural disturbance from piling was concluded to be a **Medium** magnitude. Assuming **Low** sensitivity to disturbance, the overall effect of disturbance from cumulative piling during construction was concluded to be **Minor** and **Not Significant in EIA terms**. Given that the re-assessment indicates smaller numbers of bottlenose dolphin affected using the deterrence function methodology and smaller or similar differences between the mean size of the impacted and impacted populations, the conclusions of the EIA remain valid. Accordingly, disturbance from piling at Caledonia North, Caledonia South, and Proposed Development (Offshore) is not predicted to result in significant effects on the bottlenose dolphin CES MU population.

Table 3-6: Cumulative assessment for bottlenose dolphin CES MU comparison – EIA and re-assessment; C = concurrent, S = sequential with no gap.

Assessment	iPCoD Result (%)				Magnitude	Sensitivity	Significance
	Caledonia North	Caledonia South	Proposed Development (Offshore) (C)	Proposed Development (Offshore) (S)			
EIA	>95.9	>92.4	>91.1	>91.1	Large spatial extent Medium duration Medium proportion of population Medium probability/ frequency Medium consequence **Overall: Medium**	Low	Minor (not significant)
Re-assessment	>94.90	>94.6	>94.16	>94.16	Large spatial extent Medium duration Medium proportion of population Medium probability/ frequency Medium consequence **Overall: Medium**	Low	Minor (not significant)
Note, a proportion of impacted population size to unimpacted population size, comparison presented for increasing population only as this was presented in the EIA.							

3.4 Minke Whale

3.4.1 Tabulated Results

3.4.1.1 The projects screened into the cumulative re-assessment along with the number of animals affected are presented in Considering a range of criteria set out in the magnitude definition, the cumulative impact of behavioural disturbance from piling was concluded to be a **Low** magnitude. Assuming **Medium** sensitivity to disturbance, the overall effect of disturbance from cumulative piling during construction was concluded to be **Minor** and **Not Significant in EIA terms.** Given that the re-assessment indicates smaller numbers of minke whales affected using alternative deterrence function methodology and negligible differences between the mean size of the impacted and impacted populations, the conclusions of the EIA remain valid. Accordingly, disturbance from piling at Caledonia North, Caledonia South, and Proposed Development (Offshore) is not predicted to result in significant effects on minke whale CGNS MU population.

3.4.1.2 Table 3-7. The total numbers of animals for Caledonia North, Caledonia South and Proposed Development (Offshore) (concurrent and sequential installation with no gap) is presented in Table 3-8.

3.4.2 EIA Comparison

3.4.2.1 The cumulative number of minke whales at risk of experiencing behavioural disturbance due to piling were lower in the re-assessment (Table 3-11) compared to the EIA submission (Volumes 2, 3 and 4, Chapter 7: Marine Mammals). For example, for the Proposed Development (Offshore) sequential scenario, the EIA predicted there to be impact to 1,156 whales in 2031 (5.75% CGNS MU), whereas the re-assessment predicts impact to only 367 whales in 2031 (1.82% CGNS MU). This is due to differences in the approach, described in detail in Volume 8, Appendix 22: Marine Mammals Clarifications and Piling Re-assessment Methodology.

3.4.2.2 With respect to the cumulative iPCoD re-assessment, detailed in Volume 8, Appendices 23, 24 and 25, the predicted difference between the mean impacted and mean unimpacted population sizes is the same or smaller for the re-assessment compared to the EIA (Table 3-9). Based on the EIA assessment in Volumes 2, 3 and 4, Chapter 7: Marine Mammals, there was no risk to minke whale CGNS MU trajectory.

3.4.2.3 Considering a range of criteria set out in the magnitude definition, the cumulative impact of behavioural disturbance from piling was concluded to be a **Low** magnitude. Assuming **Medium** sensitivity to disturbance, the overall effect of disturbance from cumulative piling during construction was concluded to be **Minor** and **Not Significant in EIA terms.** Given that the re-assessment indicates smaller numbers of minke whales affected using alternative deterrence function methodology and negligible differences between the mean size of the impacted and impacted populations, the conclusions of the EIA remain valid. Accordingly, disturbance from piling at Caledonia North, Caledonia South, and Proposed Development (Offshore) is not predicted to result in significant effects on minke whale CGNS MU population.

Table 3-7: Number of minke whale potentially disturbed by underwater noise from all projects.

Project	Tier	2027	2028	2029	2030	2031	2032	2033
Caledonia North	-		36	36	36			
Caledonia South	-		35	35	35			
Proposed Development (Offshore) – Concurrent	-		36	36	36			
Proposed Development (Offshore) – Sequential	-		36	36	36	35	35	
Berwick Bank*	1	28				28		
Cenos	1					54	54	54
Green Volt	1	34						
Ossian*	1					35	35	35
Salamander	1		26					
West of Orkney	1		31	31	31			
Muir Mhòr	1			34	34	34		
Ayre	2				25	25	25	25
Bowdun	2			29	29	29	29	29
Broadshore	2		30	30	30			
Buchan	2		32	32	32			
Morven*	2	32	32	32	32	32	32	
Sinclair	2		30	30				
Bellrock	2		41	41	41	41		
Stromar	2				31	31	31	31
Havbredey	2						27	27
Talisk	2			23	23	23		
Spiorad na Mara	2		17	17	17			

* Piling at some projects extend outside of the CIA 2027 – 2033 timeframes. The complete duration of piling at these projects, e.g. 2031 – 2038 for Ossian, was included in the iPCoD modelling.

Table 3-8: Summary of number of minke whale potentially disturbed by underwater noise from all projects.

	2027	2028	2029	2030	2031	2032	2033
Caledonia North							
Number of animals	94	275	335	361	332	233	201
% CGNS MU	0.47%	1.37%	1.67%	1.79%	1.65%	1.16%	1.00%
% UK CGNS MU	0.91%	2.67%	3.26%	3.51%	3.23%	2.26%	1.95%
Caledonia South							
Number of animals	94	274	334	360	332	233	201
% CGNS MU	0.47%	1.36%	1.66%	1.79%	1.65%	1.16%	1.00%
% UK CGNS MU	0.91%	2.66%	3.25%	3.50%	3.23%	2.26%	1.95%
Proposed Development (Offshore) Concurrent							
Number of animals	94	275	335	361	332	233	201
% CGNS MU	0.47%	1.37%	1.67%	1.79%	1.65%	1.16%	1.00%
% UK CGNS MU	0.91%	2.67%	3.26%	3.51%	3.23%	2.26%	1.95%
Proposed Development (Offshore) Sequential							
Number of animals	94	275	335	361	367	268	201
% CGNS MU	0.47%	1.37%	1.67%	1.79%	1.82%	1.33%	1.00%
% UK CGNS MU	0.91%	2.67%	3.26%	3.51%	3.57%	2.60%	1.95%

Table 3-9: Cumulative assessment for minke whale CGNS MU comparison – EIA and re-assessment; C = concurrent, S = sequential with no gap.

Assessment	iPCoD Result (%)				Magnitude	Sensitivity	Significance
	Caledonia North	Caledonia South	Proposed Development (Offshore) (C)	Proposed Development (Offshore) (S)			
EIA	>99.9	>99.9	>99.9	>99.9	Large spatial extent Medium duration Low proportion of population Medium probability/ frequency Negligible consequence **Overall: Low**	Medium	Minor (not significant)
Re-assessment	>99.9	>99.9	>99.9	>99.9	Large spatial extent Medium duration Low proportion of population Medium probability/ frequency Negligible consequence **Overall: Low**	Medium	Minor (not significant)
Note, a proportion of impacted population size to unimpacted population size, comparison presented for CGNS MU population only as this was presented in the EIA.							

3.5 Harbour Seal

3.5.1 Tabulated Results

3.5.1.1 The projects screened into the cumulative re-assessment for the Moray Firth (MF) Seal Monitoring Unit (SMU), North Coast and Orkney (NC&O) SMU and East Scotland (ES) SMU, along with the number of animals affected are presented in Table 3-10 to Table 3-13. The total numbers of animals for Caledonia North, Caledonia South and Proposed Development (Offshore) (concurrent and sequential installation with no gap) is presented in Table 3-14.

Table 3-10: Number of harbour seals potentially disturbed by underwater noise across MF, NC&O and ES SMUs.

Project	Tier	2027	2028	2029	2030	2031	2032	2033
Moray Firth SMU								
Caledonia North	-		77	77	77			
Caledonia South	-		87	87	87			
Proposed Development (Offshore) – Concurrent	-		87	87	87			
Proposed Development (Offshore) – Sequential	-		77	77	87	87	87	
Broadshore	2		1	1	1			
Sinclair	2		1	1				
North Coast and Orkney SMU								
Caledonia North	-		6	6	6			
Caledonia South	-		1	1	1			
Proposed Development (Offshore) – Concurrent	-		6	6	6			
Proposed Development (Offshore) – Sequential	-		6	6	6	1	1	
West of Orkney	1		176	176	176			
Ayre	2				12	12	12	12
Buchan	2		1	1	1			

Project	Tier	2027	2028	2029	2030	2031	2032	2033
Stromar	2				1	1	1	1
East Scotland SMU								
Caledonia North	-		1	1	1			
Caledonia South	-		1	1	1			
Proposed Development (Offshore) – Concurrent	-		1	1	1			
Proposed Development (Offshore) – Sequential	-		1	1	1	1	1	
Berwick Bank*	1	3				3		
Cenos	1					0	0	0
Green Volt	1	1						
Ossian	1					0	0	0
Salamander	1		4					
Muir Mhòr	1			1	1	1		
Bowdun	2			1	1	1	1	1
Morven*	2	1	1	1	1	1	1	
* Piling at some projects extend outside of the CIA 2027 – 2033 timeframes. The complete duration of piling at these projects, e.g. 2026 – 2032 for Morven, was included in the iPCoD modelling.								

Table 3-11: Summary of number of harbour seal potentially disturbed by underwater noise for projects within the MF SMU.

Parameter	2027	2028	2029	2030	2031	2032	2033
Caledonia North							
Number of animals	0	79	79	78	0	0	0
% MF SMU	0.00%	5.79%	5.79%	5.71%	0.00%	0.00%	0.00%
Caledonia South							
Number of animals	0	89	89	88	0	0	0
% MF SMU	0.00%	6.52%	6.52%	6.45%	0.00%	0.00%	0.00%
Proposed Development (Offshore) Concurrent							
Number of animals	0	89	89	88	0	0	0
% MF SMU	0.00%	6.52%	6.52%	6.45%	0.00%	0.00%	0.00%
Proposed Development (Offshore) Sequential							
Number of animals	0	79	79	88	87	87	0
% MF SMU	0.00%	5.79%	5.79%	6.45%	6.37%	6.37%	0.00%

Table 3-12: Summary of number of harbour seal potentially disturbed by underwater noise for projects within the NC&O SMU.

Parameter	2027	2028	2029	2030	2031	2032	2033
Caledonia North							
Number of animals	0	183	183	196	13	13	13
% NC&O SMU	0.00%	9.38%	9.38%	10.05%	0.67%	0.67%	0.67%
Caledonia South							
Number of animals	0	178	178	191	13	13	13
% NC&O SMU	0.00%	9.12%	9.12%	9.79%	0.67%	0.67%	0.67%
Proposed Development (Offshore) Concurrent							
Number of animals	0	183	183	196	13	13	13
% NC&O SMU	0.00%	9.38%	9.38%	10.05%	0.67%	0.67%	0.67%
Proposed Development (Offshore) Sequential							
Number of animals	0	183	183	196	14	14	13
% NC&O SMU	0.00%	9.38%	9.38%	10.05%	0.72%	0.72%	0.67%

Table 3-13: Summary of number of harbour seal potentially disturbed by underwater noise for projects within the ES SMU

Parameter	2027	2028	2029	2030	2031	2032	2033
Caledonia North							
Number of animals	5	6	4	4	6	2	1
% ES SMU	1.31%	1.57%	1.04%	1.04%	1.57%	0.52%	0.26%
Caledonia South							
Number of animals	5	6	4	4	6	2	1
% ES SMU	1.31%	1.57%	1.04%	1.04%	1.57%	0.52%	0.26%
Proposed Development (Offshore) Concurrent							
Number of animals	5	6	4	4	6	2	1
% ES SMU	1.31%	1.57%	1.04%	1.04%	1.57%	0.52%	0.26%
Proposed Development (Offshore) Sequential							
Number of animals	5	6	4	4	7	3	1
% ES SMU	1.31%	1.57%	1.04%	1.04%	1.83%	0.78%	0.26%

Table 3-14: Summary of number of harbour seal potentially disturbed by underwater noise for projects within all three SMUs combined

Parameter	2027	2028	2029	2030	2031	2032	2033
Caledonia North							
Number of animals	5	268	266	278	19	15	14
% SMUs	0.14%	7.25%	7.19%	7.52%	0.51%	0.41%	0.38%
Caledonia South							
Number of animals	5	273	271	283	19	15	14
% SMUs	0.14%	7.38%	7.33%	7.65%	0.51%	0.41%	0.38%
Proposed Development (Offshore) Concurrent							
Number of animals	5	278	276	288	19	15	14
% SMUs	0.14%	7.52%	7.46%	7.79%	0.51%	0.41%	0.38%
Proposed Development (Offshore) Sequential							
Number of animals	5	268	266	288	108	104	14
% SMUs	0.14%	7.25%	7.19%	7.79%	2.92%	2.81%	0.38%

3.5.2 EIA Comparison

3.5.2.1 In the re-assessment of harbour seal behavioural disturbance from piling, the Carter *et al.* (2025[5]) density surface was applied, compared to the Carter *et al.* (2022[6]) density surface used in the EIA. Consequently, the number of animals predicted to be affected increased for some projects relative to the EIA (e.g., Proposed Development (Offshore) within the MF SMU), while for others the predicted numbers decreased. Cumulative effects within the ES SMU were also included in the re-assessment.

3.5.2.2 The iPCoD model for all scenarios included in the re-assessment for the MF and NC&O SMUs showed that the MF SMU is predicted to continue at a stable trajectory and at the same size as the un-impacted population, and the NC&O SMU population is expected to continue at a decreasing trajectory and at the same size as the un-impacted population. For the ES SMU, the results of the cumulative iPCoD modelling for Caledonia North, Caledonia South and Proposed Development (Offshore) (concurrent and sequential scenarios) in the re-assessment show that the impacted population for harbour seals in the ES SMU is predicted to continue at a stable trajectory, the same as the un-impacted population, and at 100% the size of the un-impacted population.

3.5.2.3 The comparison between results estimated in the EIA and re-assessment is presented in Table 3-15.

MF and NC&O SMUs

3.5.2.4 Based on the EIA assessment in Volumes 2, 3 and 4, Chapter 7: Marine Mammals, there was no change to harbour seal MF and NC&O SMUs trajectories. Considering a range of criteria set out in the magnitude definition, the cumulative impact of behavioural disturbance from piling for MF and NC&O SMUs was concluded to be a Low magnitude. Assuming **Low** sensitivity to disturbance for harbour seal within the MF SMU and **Medium** sensitivity within the NC&O SMU, the overall effect of cumulative piling disturbance during construction was assessed as **Negligible** and **Minor**, respectively, and in both cases **Not Significant in EIA terms**. The re-assessment included higher number of projects considered cumulatively with the Caledonia North, Caledonia South and Proposed Development (Offshore). However, the iPCoD modelling showed negligible differences between the mean size of the impacted and impacted populations. As such, it is considered that the conclusions of the EIA remain valid. Accordingly, disturbance from piling at Caledonia North, Caledonia South, and Proposed Development (Offshore) is not predicted to result in significant effects on harbour seal MF and NC&O SMUs populations.

ES SMU

3.5.2.5 In terms of the ES SMU, no assessment of significance was provided in the EIA. The behavioural response as a result of piling is expected to occur over a large spatial extent and over a medium term. As shown by the iPCoD modelling, although the cumulative piling could affect a small proportion of the ES SMU population (Table 3-13), the population trajectory would not be altered (see Volume 8 Appendices 22-25 for more details). As such the magnitude of the effect for the ES SMU has been conservatively assessed as **Low**. Considering **Low** sensitivity to behavioural response to piling, the overall effect is assessed **Negligible** and **Not Significant in the EIA terms**.

Table 3-15: Cumulative assessment for harbour seal – MF, NC&O and ES SMUs comparison – EIA and re-assessment; C = concurrent, S = sequential with no gap.

Seal Monitoring Unit	Assessment	iPCoD Result (%)				Magnitude	Sensitivity	Significance
		Caledonia North	Caledonia South	Proposed Development (Offshore) (C)	Proposed Development (Offshore) (S)			
MF SMU	EIA	100%	100%	100%	100%	Large spatial extent Medium duration Low proportion of population Medium probability/ frequency Negligible consequence **Overall: Low**	Low	Negligible (not significant)
	Re-assessment	100%	100%	>99.9%	100%	Large spatial extent Medium duration Low proportion of population Medium probability/ frequency Negligible consequence **Overall: Low**	Low	Negligible (not significant)
NC&O SMU	EIA	100%	>99.9%	100%	100%	Large spatial extent Medium duration Medium proportion of population Medium probability/ frequency	Medium	Minor (not significant)

Seal Monitoring Unit	Assessment	iPCoD Result (%)				Magnitude	Sensitivity	Significance
		Caledonia North	Caledonia South	Proposed Development (Offshore) (C)	Proposed Development (Offshore) (S)			
						Negligible consequence **Overall: Low**		
	Re-assessment	100%	100%	100%	100%	Large spatial extent Medium duration Medium proportion of population Medium probability/ frequency Negligible consequence **Overall: Low**	Medium	Minor (not significant)
ES SMU	Re-assessment	100%	100%	100%	100%	Large spatial extent Medium duration Low proportion of population Medium probability/ frequency Negligible consequence **Overall: Low**	Low	Negligible (not significant)
Note, a proportion of impacted population size to unimpacted population size; EIA values are not presented for the ES SMU population as this was not included in the EIA.								

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