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Volume 8 Additional Information

Appendix 27: Marine Mammals Cumulative Offshore Export Cable Corridor Vessel Disturbance Technical Note

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OCEAN WINDS

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Acronyms and Abbreviations

CES	Coastal East Scotland
CIA	Cumulative Impact Assessment
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
MPA	Marine Protected Area
MU	Marine Unit
NCMPA	Nature Conservation Marine Protected Area
OEC	Offshore Export Cable
OECC	Offshore Export Cable Corridor
OWF	Offshore Wind Farm
VMP	Vessel Management Plan

1 Introduction

1.1.1.1 This appendix provides additional information to the assessment presented in Volumes 2, 3 and 4, Chapter 7: Marine Mammals of the Environmental Impact Assessment Report (EIAR) with respect to marine mammals vessel disturbance during the construction of the Offshore Export Cables (OECs) for the Caledonia Offshore Wind Farm (OWF) (hereafter referred to as the Proposed Development (Offshore)) cumulatively with other OWF Offshore Export Cable Corridors (OECCs).

1.1.1.2 As requested by NatureScot in the determination response (dated 27 March 2025) and detailed in the comments from NatureScot on 21 August 2025 on the draft Cumulative Impact Assessment (CIA) Methodology Note and subsequent workshop, this note focuses on bottlenose dolphins within the Coastal East Scotland (CES) Management Unit (MU) and on minke whales within the Southern Trench Nature Conservation Marine Protected Area (NCMPA). The assessment for bottlenose dolphin within the Moray Firth Special Area of Conservation (SAC) is provided separately in Volume 8, Appendix 28: Marine Mammals RIAA Updates.

1.1.1.3 There will be up to four OECs required for the Proposed Development (Offshore), with two associated with Caledonia North and two associated with Caledonia South. All OECs will be located in separate trenches within the respective OECCs. A single OECC is considered for Caledonia North and Caledonia South.

2 Screening Projects

2.1.1.1 The screening process involved consideration of known routes of OECCs on the east coast of Scotland which overlap with the CES MU and Southern Trench NCMPA. The screening identified a number of reasonably foreseeable projects and developments which may act cumulatively with the Proposed Development (Offshore).

2.1.1.2 The temporal worst-case scenario for OEC installation would involve a sequential approach with a five-year gap between Caledonia North and Caledonia South. In this scenario, seabed preparation would take place first, followed by a pause for other construction activities, after which the OECs would be laid and terminated in succession. Overall, this approach would result in approximately 18 months of OEC installation work spread across four years, within the 2029–2038 timeframe. In line with Section 7.8.4 of Volume 2, Chapter 7: Marine Mammals of the EIAR, the time period considered in this CIA for marine mammals includes projects constructing up to a year before or after the Proposed Development (Offshore) construction timeframe. For the construction of the OECs, the timeframe assessed therefore include years between 2028 and 2040.

2.1.1.3 The projects screened into the cumulative impact assessment of vessel disturbance associated with OEC construction for marine mammals and the detail on the offshore construction period (denoted as "C") for each is presented in Table 2-1. The timelines have been obtained from either the project specific EIARs, Scoping Reports and/or public domain (such as developer's website).

Table 2-1: List of projects and developments considered in this marine mammal CIA for vessel disturbance during activities associated with OECs installation ('C' denotes offshore construction).

Project	Technology	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
Proposed Development (Offshore)	Mixed		C	C	C	C	C	C	C	C	C	C	
Berwick Bank OWF	Bottom-fixed	C	C	C	C	C	C						
Salamander OWF	Floating	C	C										
Muir Mhòr OWF	Floating			C	C	C	C						
Cenos OWF	Floating			C	C	C	C	C	C				
Bowdun OWF	Floating		C	C	C	C	C						
Buchan OWF	Floating	C	C	C	C	C							
Stromar OWF	Floating			C	C	C	C						

3 Criteria for Assessment of Significance

3.1 Overview

3.1.1.1 In line with NatureScot's advice provided via the determination response (dated 27 March 2025), this note focuses on bottlenose dolphins within the CES MU and on minke whales within the Southern Trench NCMPA.

3.1.1.2 The assessment for bottlenose dolphin against the CES MU population has been carried out in Volumes 2, 3 and 4, Chapter 7: Marine Mammals of the EIAR under the Environmental Impact Assessment (EIA) process using magnitude and sensitivity criteria to assess the significance of the effect. The assessment for minke whale with respect to the Southern Trench NCMPA, however, was carried out in Application Document 9: Marine Protected Area Assessment, against the conservation objectives as set out in the Conservation and Management Advice (NatureScot, 2025[1]).

3.1.1.3 Considering the above, the cumulative assessment of vessel disturbance associated with OEC construction is carried out against the EIA criteria for bottlenose dolphin and CES MU (Section 3.2) and against the conservation objectives for minke whale within the Southern Trench NCMPA (Section 3.3).

3.2 EIA Terms (CES MU)

3.2.1 Magnitude of Impact

3.2.1.1 The magnitude of an impact is assessed based on the same criteria as per the EIAR documents (see Section 7.5.4 of Volume 2, Chapter 7: Marine Mammals (Table 7-10) of the EIAR). The criteria for defining magnitude are presented for clarity in Table 3-1.

Table 3-1: Impact magnitude criteria for marine mammals.

Impact Magnitude	Description
High	▪ Extent/Duration: The impact occurs over a large spatial extent and over long-term duration, with the potential to affect a large proportion of a receptor population. ▪ Probability/frequency: The effect is very likely to occur and/or will occur at a high frequency. ▪ Consequence: The effect could affect a large enough proportion of the population to alter the favourable conservation status and/or the long-term trajectory of the population in the long term.
Medium	▪ Extent/Duration: The impact occurs over a medium spatial extent and over medium-term duration, with potential affect a moderate proportion of a receptor population. ▪ Probability/frequency: The effect is likely to occur and/or will occur at a moderate frequency. ▪ Consequence: The effect could affect a moderate proportion of the population although not large enough to alter the population trajectory in the long term.
Low	▪ Extent/Duration: The impact is localised and temporary or short-term, with potential to result in a noticeable effect on a small proportion of a receptor population. ▪ Probability/frequency: The effect may occur but at low frequency. ▪ Consequence: The effect could affect a small proportion of the population and the population trajectory would not be altered.
Negligible	▪ Extent/Duration: The impact is highly localised and short-term, with potential to result in very slight or imperceptible changes to a receptor population. ▪ Probability/frequency: The effect is very unlikely to occur; if it does, it will occur at a very low frequency. ▪ Consequence: The effect will not alter the population trajectory.

3.2.2 Sensitivity of Receptors

3.2.2.1 The sensitivity of marine mammal receptors is assessed based on the same criteria as per the EIAR documents (see Section 7.5.4 of Volume 2, Chapter 7: Marine Mammals (Table 7-11) of the EIAR). The criteria for defining sensitivity are presented for clarity in Table 3-2.

Table 3-2: Receptor sensitivity criteria for marine mammals.

Receptor Sensitivity	Description
High	▪ Adaptability: No ability to avoid or adapt to an impact so that individual survival and reproduction rates are affected. ▪ Tolerance: No tolerance – Effect will cause a change in both individual reproduction and survival rates. ▪ Recoverability: No ability for the animal to recover from any impact on vital rates (reproduction and survival rates).
Medium	▪ Adaptability: Limited ability to avoid or adapt to an impact so that individual survival and reproduction rates may be affected. ▪ Tolerance: Limited tolerance – Effect may cause a change in both individual reproduction and survival of individuals. ▪ Recoverability: Limited ability for the animal to recover from any impact on vital rates (reproduction and survival rates).
Low	▪ Adaptability: Reasonable ability to avoid or adapt to an impact so that individual reproduction rates may be affected but survival rates not likely to be affected. ▪ Tolerance: Some tolerance – Effect unlikely to cause a change in both individual reproduction and survival rates. ▪ Recoverability: Ability for the animal to recover from any impact on vital rates (reproduction and survival rates).
Negligible	▪ Adaptability: Receptor is able to avoid or adapt to an impact so that individual survival and reproduction rates are not affected. ▪ Tolerance: Receptor is able to tolerate the effect without any impact on individual reproduction and survival rates. ▪ Recoverability: Receptor is able to return to previous behavioural states/activities once the impact has ceased.

3.2.3 Significance of Effect

3.2.3.1 The significance of effect is assessed based on the same criteria as per the EIAR documents (see Section 7.5.4 of Volume 2, Chapter 7: Marine Mammals (Table 7-12) of the EIAR). The significance matrix is presented for clarity in Table 3-3, whereby outcomes which would give rise to significant effects are highlighted in grey.

Table 3-3: Relationship between impact magnitude and receptor sensitivity to assign significance of effect. Significant effects are highlighted in grey.

Significance of Effect		Sensitivity of Receptor			
		Negligible	Low	Medium	High
Impact Magnitude	Negligible	Negligible	Negligible	Negligible	Negligible
	Low	Negligible	Negligible	Minor	Minor
	Medium	Negligible	Minor	Moderate	Moderate
	High	Negligible	Minor	Moderate	Major

3.3 MPA Conservation Objectives (Southern Trench NCMPA)

3.3.1.1 The Southern Trench Nature Conservation Marine Protected Area Order 2020 lists the minke whale feature as a mobile species of marine fauna. The overarching conservation objectives for minke whale protected feature are:

- The species is conserved;
- Continued access by the species to resources provided by the MPA for, but not restricted to, feeding, courtship, spawning or use as nursery grounds; and
- Extent and distribution of any supporting feature and structure and function of any supporting feature, including any associated processes supporting the species.

3.3.1.2 It should be noted that the assessment in this document refers only to vessel disturbance and therefore, there is no direct impact-pathway that could affect some of the conservation objectives. With respect to the species conservation, the site-specific management advice is that minke whale are not at significant risk from injury or killing and there is no such risk associated with disturbance. Vessel disturbance also doesn't have an impact on prey distribution or the structure and function of supporting processes and therefore these will not be considered further.

3.3.1.3 The assessment for the Southern Trench NCMPA will be provided against conservation objective and site-specific advice discussed in Table 3-4.

Table 3-4: Conservation Objectives of the Southern Trench NCMPA with respect to minke whale applicable to the assessment of vessel disturbance.

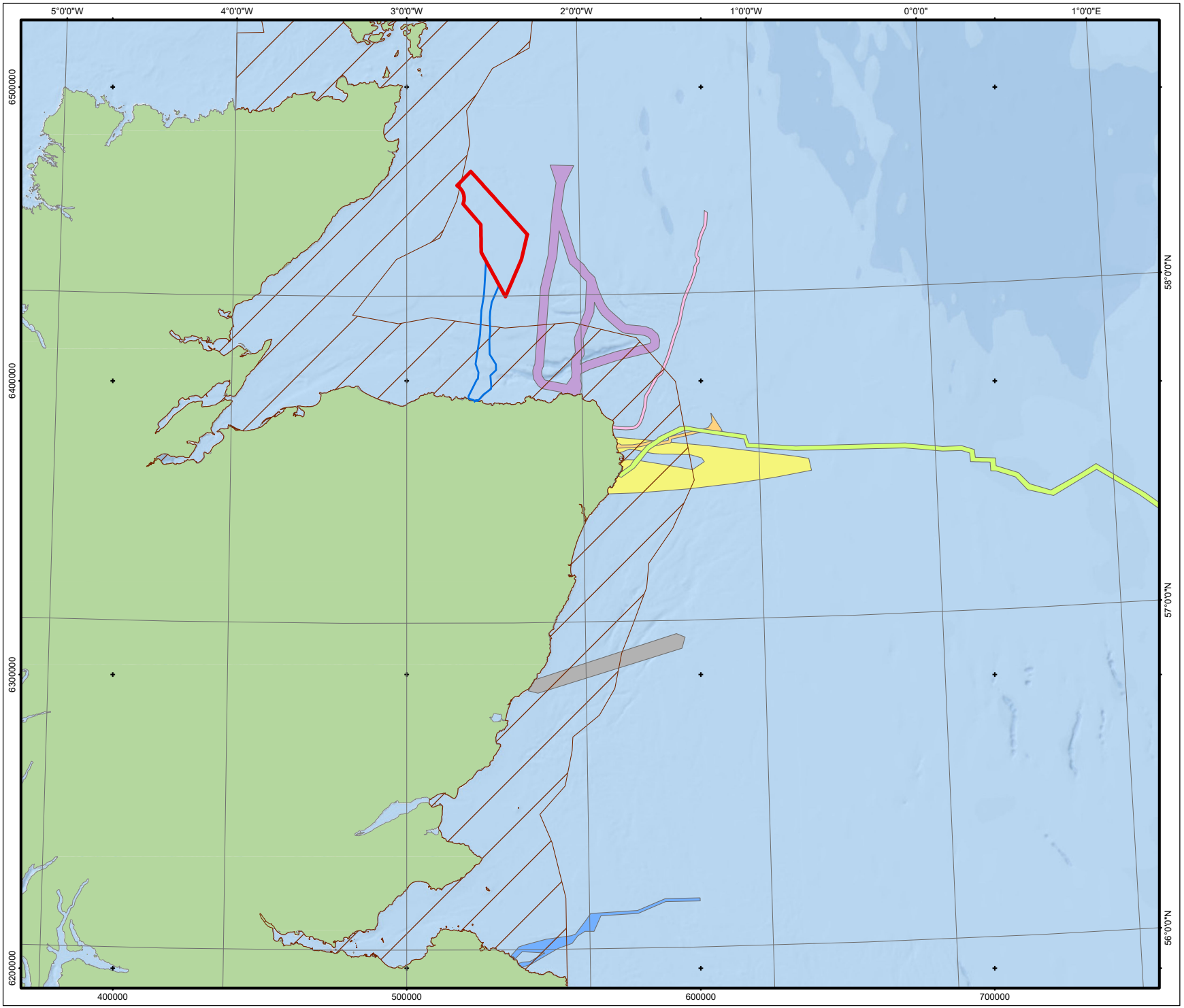
Overarching Conservation Objective	Site-specific Advice	Site-specific Information
Continued access by the species to resources provided by the MPA for, but not restricted to, feeding, courtship, spawning or use as nursery grounds	Conserve the access to resources (e.g., for feeding) provided by the MPA for various stages of the minke whale life cycle. ▪ Conserve the distribution of minke whale within the site by avoiding significant disturbance. There are two main ways in which minke whale's access to resources could be restricted and disturbance affected (i.e., large scale physical barriers, or significant disturbance).	Any activities, whether they take place within or outside the MPA, should be considered if they have the potential to reduce access to resources (prey or habitats that may be used during feeding and supporting various stages of their lifecycle) or cause disturbance of minke whale in the MPA. There are two main ways in which minke whale's access to resources could be restricted and disturbance affected. Large-scale physical barriers or obstructions within or outside the MPA may prevent or restrict access to resources to an extent that may result in significant impacts on stages of their life cycle, including feeding. Disturbance may arise from activities that cause underwater noise (including vessel presence). Significant disturbance is defined as resulting in: ▪ The contribution to long term decline in the use of the MPA; ▪ Changes to the distribution on a continuing or sustained basis; and ▪ Changes to the behaviour such that it reduces the ability of the species to feed efficiently, breed or survive.

4 Assessment

4.1 Overview

4.1.1.1 All projects with infrastructure overlapping with the CES MU and the Southern Trench NCMPA may contribute to increased vessel movements during the construction phase of these projects, which have the potential to result in behavioural disturbance within the CES MU and/or the Southern Trench NCMPA as vessels move in and out from ports and within the OECCs.

4.1.1.2 All projects screened into this CIA (see Section 2) overlap with the CES MU (Figure 4–1), whilst only the OECCs for Salamander, Buchan, Cenos, Muir Mhòr and Stromar OWFs overlap with the Southern Trench NCMPA boundary (Berwick Bank and Bowdun OWFs do not overlap) (Figure 4–2).



Caledonia OWF

Offshore Export Cable Corridor

Coastal East Scotland MU

Proposed OECCs (Scoping or In-Planning)

- Bowdun
- Berwick Bank
- Buchan
- Salamander
- Stromar
- Cenos
- Muir Mhor

0 10 20 30 40 50 km

REV	DATE	DOC STATUS	ORIGIN	REVIEW	APP
01	29/09/2025	Approved	EV	BB	DH

CALEDONIA Offshore Wind Farm

GoBe APEM Group

GEODETIC PARAMETERS
WGS 84 / UTM zone 30N (EPSG: 32630)

DRAWING TITLE

Figure 4-1: OWF OECCs Screened-in to the CIA in Relation to the CES MU Assigned for the Coastal Bottlenose Dolphin Population in Scotland

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Approved	1:1,750,000	
DRAWING NUMBER	SHEET NO	REV
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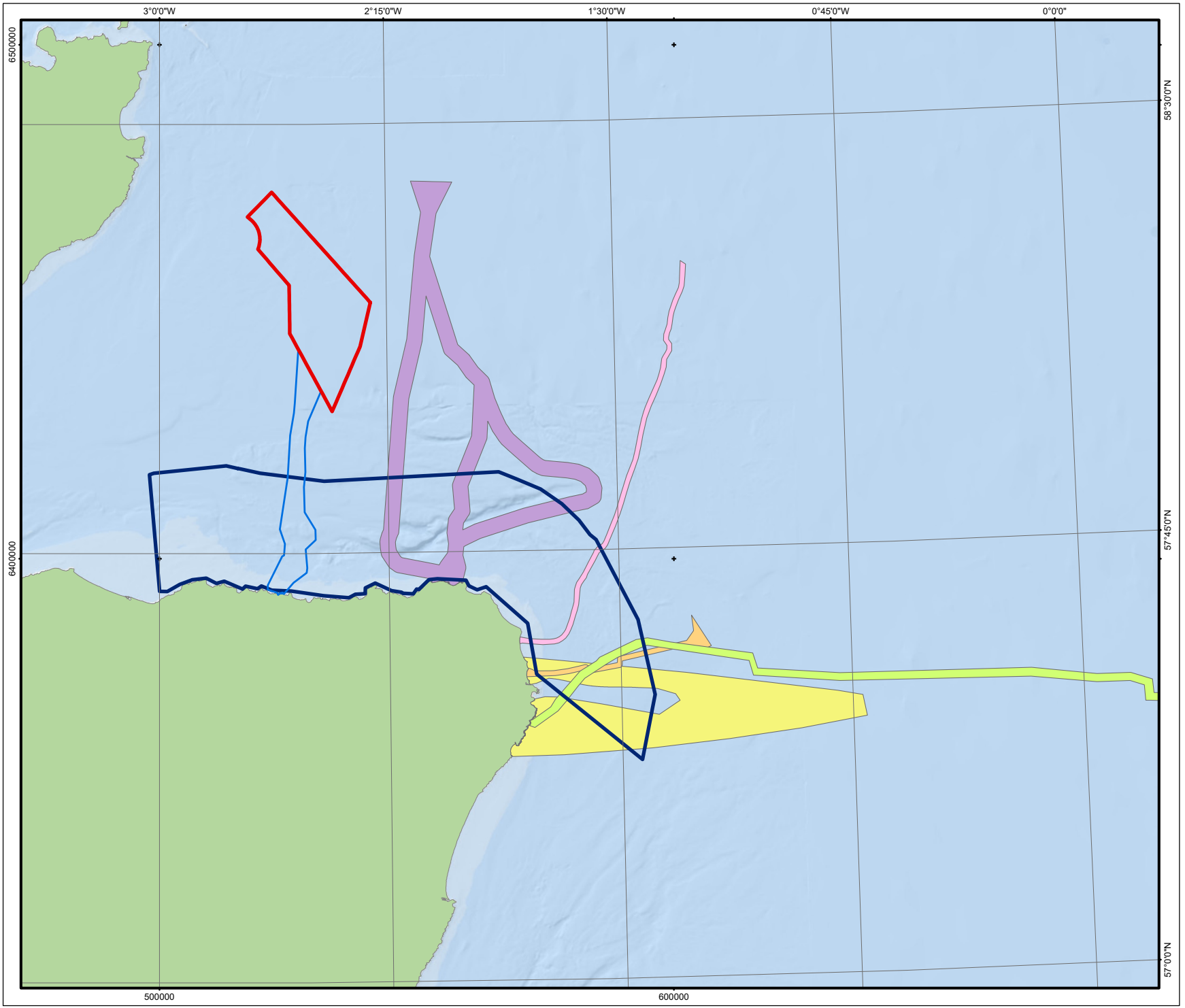


Caledonia OWF

Offshore Export Cable Corridor

Southern Trench NCMPA

Proposed OECCs (Scoping or In-Planning)

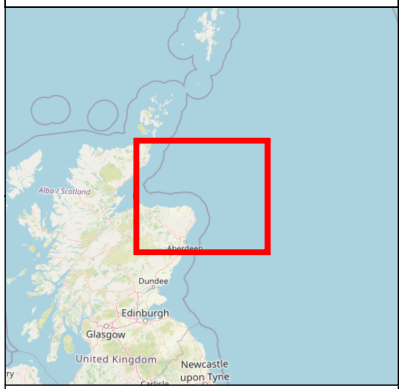
Buchan

Salamander

Stromar

Cenos

Muir Mhor



0 10 20 30 40 km

REV	DATE	DOC STATUS	ORIGIN	REVIEW	APP
01	29/09/2025	Approved	EV	BB	DH

CALEDONIA Offshore Wind Farm

GoBe APEM Group

GEODETIC PARAMETERS
WGS 84 / UTM zone 30N (EPSG: 32630)

DRAWING TITLE

Figure 4-2: OWF OECCs Screened-in to the CIA in Relation to the Southern Trench MPA Designated for Minke Whales

STATUS	SCALE	
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N/A	01 of 01	N/A

4.2 Bottlenose Dolphin within the CES MU

4.2.1 Magnitude of Impact

4.2.1.1 All projects screened into the CIA have OECCs intersecting the CES MU, meaning that any construction ('C') year could generate vessel activity within the MU (Table 2-1). The potential for cumulative disturbance is driven by temporal and spatial overlap of activities as well as the scale and character of vessel operations for each project. However, it should be noted that the construction timelines provided represent overall construction timeframes, and there is a paucity of information surrounding which construction years shall include OEC preparation and installation works within the OECC.

4.2.1.2 Temporally, peak activity occurs in 2029–2031, when seven projects are assumed to be constructing concurrently, producing the greatest temporal potential for sustained and repeated vessel presence within the CES MU. The temporal overlap of project OEC construction within the CES MU is shown in Table 4-1.

Table 4-1: Temporal overlap between projects which overlap the CES MU.

Year	Active Projects
2028	Berwick Bank, Salamander, Buchan, Bowdun
2029	Berwick Bank, Salamander, Buchan, Bowdun, Stromar, Muir Mhòr, Caledonia
2030	Berwick Bank, Buchan, Bowdun, Stromar, Muir Mhòr, Cenos, Caledonia
2031	Berwick Bank, Buchan, Bowdun, Stromar, Muir Mhòr, Cenos, Caledonia
2032	Berwick Bank, Bowdun, Stromar, Muir Mhòr, Cenos, Caledonia
2033	Berwick Bank, Bowdun, Stromar, Muir Mhòr, Cenos, Caledonia
2034	Cenos, Caledonia
2035	Cenos, Caledonia
2036	Caledonia
2037	Caledonia
2038	Caledonia

4.2.1.3 Spatially, several OECCs (Buchan, Muir Mhòr, Salamander, Stromar, Cenos and the Proposed Development (Offshore)) converge on a relatively limited stretch of coastline, within the eastern outer Moray Firth (Figure 4–1), creating high-overlap zones where repeated vessel transits could act as temporary barriers to movement. This is particularly prominent along the east coast of Scotland, close to Peterhead (where Buchan Cenos, Muir Mhòr, and Salamander all converge). For bottlenose dolphins in the CES MU, this could mean displacement from nearshore transit routes and localised changes in occurrence/distribution. For each project for which OEC installation activities overlap with the CES MU within the eastern outer Moray Firth between 2029 – 2031, the number of vessels anticipated during construction are outlined below:

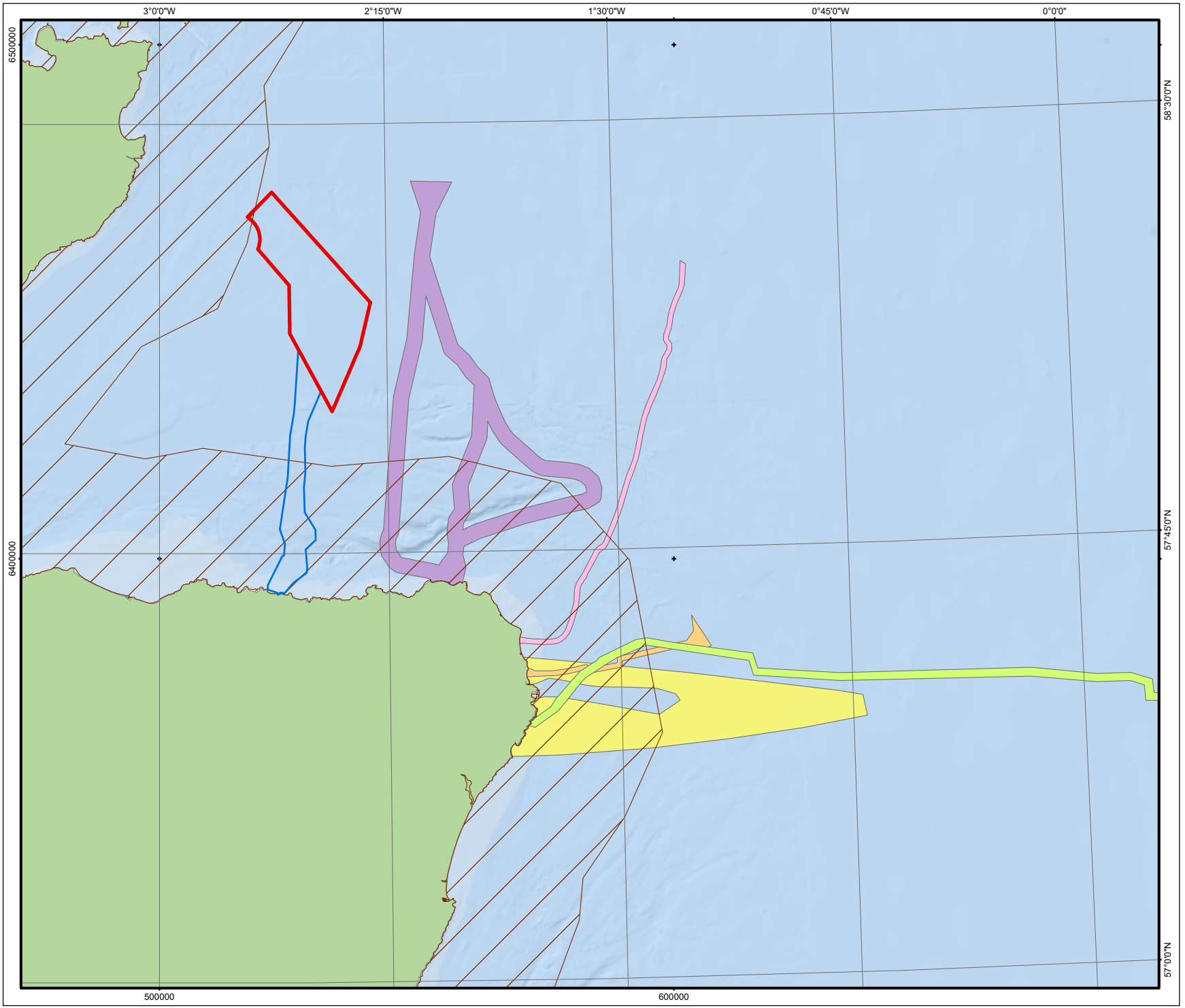
- Buchan, Stromar: EIAs not yet available, but the Scoping Reports note that injury and/or disturbance from vessel noise and presence could occur;
- Muir Mhòr: an average of 45 to 62 vessels per day were recorded during the baseline within the proposed OECC during winter and summer, respectively. Seven vessels shall be directly involved in export cable installation, representing a 11.3-15.5% increase from the baseline (SMRU Consulting, 2024[2])
- Salamander: baseline vessel traffic levels across the project area averaged 28 - 35 vessels per day during the winter and summer period, respectively. Twelve simultaneous vessels are anticipated to be present along the OECC, representing a 34.3 - 42.8% increase from the baseline (Salamander Offshore Wind Farm, 2024[3]);
- Cenos: baseline levels of shipping traffic were only recorded for the Cenos array area and thus, there is no data available to be able to predict the potential increase in vessel traffic across the OECC. Up to 22 vessels will be required to simultaneously operate for construction works for the OWF in general, though separate vessel numbers for OECC construction are not available (Flotation Energy, 2025[4]);
- Proposed Development (Offshore): Baseline vessel traffic levels recorded an average of 11 unique vessels per day in the OECC study area within both summer and winter (see Volumes 2, 3 and 4, Chapter 7: Marine Mammals of the EIAR). A maximum of eight vessels may be involved in the OEC construction at any one time, representing a 73% increase from the average baseline. However, it is anticipated that only two vessels will be working in coastal areas performing activities associated with export cable and connection to landfall.

4.2.1.4 Generally, for each project alone, effects are expected to impact only a small proportion of the CES MU population, and bottlenose dolphins may be partially habituated to existing vessel noise (Bejder *et al.*, 2009[5]). Average baseline vessel activity in the Muir Mhòr, Salamander and Caledonia OECC areas is approximately 36 vessels per day (daily counts ranging from 11–62), against which the additional construction-related traffic can be considered. During

peak construction years (2029–2031), cumulative vessel numbers are expected to increase substantially, with projected totals of seven vessels per day for Muir Mhòr, 12 per day for Salamander, and eight per day for Caledonia (an average of nine per day per project). Extending this average of nine vessels/day to Buchan, Stromar, and Cenos results in an estimated additional 54 vessels per day across the six OECCs, representing a 149% increase over baseline levels. Although these increases are notable, it is important to recognise that the construction timeframes reported for each project do not represent continuous OECC preparation or OEC installation works, but rather the overall project build-out period. Additionally, there are likely limitations associated with the availability of the cable laying vessels and projects considered may not be installing the OECs simultaneously. Therefore, it is highly unlikely that this number of vessels would be present within the CES MU across all six OECCs at the same time.

4.2.1.5 Where the six OECCs converge along the same spatial area of the CES MU, this results in a 3.45% of the MU area where main vessel activity will occur (not including transfer to and from ports, however, the routes are currently unknown). However, there is limited certainty that multiple OECC works will converge concurrently in both space and time, even where several projects may be constructing within the same year. Moreover, impacts are expected to remain localised to the immediate vicinity of vessels and limited to the periods of OEC construction. Nevertheless, during years of high temporal overlap, the likelihood of cumulative, repeated short-term behavioural responses increases. If multiple large vessels are operating at low speed or holding position in narrow corridors, dolphins may be required to increase travel distances or temporarily alter habitat use within the CES MU. Even if these effects are temporary and localised, the peak construction years of 2029–2031 present the greatest potential for repeated disturbance, increased energetic costs and reduced access to habitats within these six OECCs (Figure 4–3). It is worth noting that current knowledge about habitat use alongside the Aberdeenshire coast where most projects will be constructing their OECCs is limited as studies on the CES MU population were focused on the Moray Firth SAC as well as Firth of Tay and Forth estuaries.

4.2.1.6 Projects are likely to adopt Vessel Management Plans (VMPs) and/or comply with the existing Scottish Marine Wildlife Watching Codes, such as Scottish Natural Heritage (now NatureScot, 2017a[6]; 2017b[7]), to minimise any potential effects on marine mammals. Given bottlenose dolphin demonstrated tolerance in certain level of vessel traffic in areas where vessel disturbance is a common feature of the environment (La Manna *et al*., 2010[8]; Pirotta *et al*., 2013[9]), as well as their large distributional range, long-term or population-level consequences are unlikely.



Caledonia OWF

Offshore Export Cable Corridor

Coastal East Scotland MU

Proposed OECCs (Scoping or In-Planning)

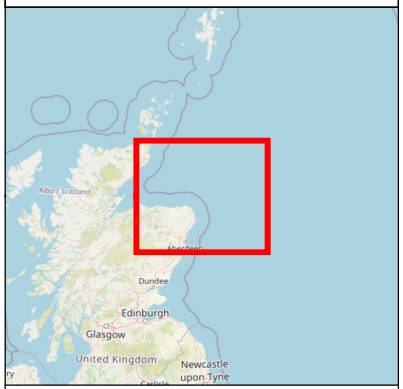
Buchan

Salamander

Stromar

Cenos

Muir Mhor



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CALEDONIA Offshore Wind Farm

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WGS 84 / UTM zone 30N (EPSG: 32630)

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Figure 4-3: OWF OECCs Overlapping the CES MU Likely to be Constructing in Peak Years Between 2029 and 2031

STATUS	SCALE	
Approved	1:1,000,000	
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N/A	01 of 01	N/A

4.2.1.7 In summary, OEC installation activities across the CES MU are expected to occur intermittently and at relatively low frequencies within individual projects, though the years 2029–2031 represent a peak period of spatial and temporal overlap when multiple developments could lead to repeated vessel activity in nearshore habitats. While individual projects alone are predicted to affect only a small proportion of the CES MU bottlenose dolphin population, cumulative effects during peak overlap may increase the likelihood of short-term behavioural responses and temporary reductions in habitat use over a medium spatial extent and a medium overall duration. However, given the adoption of standard mitigation measures and the demonstrated tolerance of bottlenose dolphins to high vessel traffic environments, impacts are expected to be temporary and reversible, and unlikely to give rise to significant population-level consequences. Considering the above, the magnitude of the cumulative disturbance from vessels during the OECC construction on bottlenose dolphins within the CES MU is precautionarily assessed as **Medium**.

4.2.2 Sensitivity of Receptors

4.2.2.1 As stated in Section 7.7.1 of Volume 2, Chapter 7: Marine Mammals of the EIAR, underwater noise generated by vessels has been shown to negatively affect bottlenose dolphin foraging activity and the physical presence of vessels can result in changes in bottlenose dolphin behaviour including increased swimming speeds (when resting or socialising), increased travelling time (less time resting, socialising and foraging) as well as characteristics of whistles (Constantine *et al*., 2004[10]; La Manna *et al*., 2013[11]; Pirotta *et al*., 2013[9]; 2015[12]; Marley *et al*., 2017a[13]; 2017b[14]; Piwetz, 2019[15]). These responses are typically temporary and reversible, with animals resuming normal activity once disturbance ceases. Evidence from areas of consistently high vessel traffic indicates that the species demonstrates a degree of tolerance to such pressures (Pirotta *et al*., 2013[9]).

4.2.2.2 As per the project alone assessment outlined in Section 7.7.1 of Volume 2, Chapter 7: Marine Mammals of the EIAR, the sensitivity of bottlenose dolphins to behavioural disturbance as a result of vessel activities and their presence is **Low**.

4.2.3 Significance of Effect

Bottlenose Dolphins and the CES MU

4.2.3.1 Taking the **Low** sensitivity of bottlenose dolphins to vessel disturbance and the **Medium** magnitude of impact predicted to take place both spatially and temporally, the overall effect of cumulative vessel disturbance as a result of construction activities taking place within OECCs in the CES MU is considered to be **Minor** and **Not Significant in EIA terms**. As such, the significance of the effect has not changed when compared with the assessment of vessel disturbance presented in the EIA.

4.3 Minke Whales and the Southern Trench NCMPA

4.3.1 Assessment of Risk to Achievement of Conservation Objectives

4.3.1.1 Seven projects screened into the CIA have OECCs intersecting the Southern Trench NCMPA, meaning that any construction ("C") year could generate vessel activity within the NCMPA (Table 2-1). The potential for cumulative disturbance is driven by temporal and spatial overlap of activities as well as the scale and character of vessel operations for each project. However, it should be noted that the construction timelines provided represent overall construction timeframes, and there is a paucity of information surrounding which construction years shall include OEC preparation and installation works within the OECC.

4.3.1.2 Temporally, peak activity occurs in 2029–2031, when five projects are assumed to be constructing concurrently, producing the greatest temporal potential for sustained and repeated vessel disturbance to minke whales within the Southern Trench NCMPA. The temporal overlap of project OEC construction within the Southern Trench NCMPA is shown in Table 4-2.

Table 4-2: Temporal overlap between projects which overlap the Southern Trench NCMPA.

Year	Active Projects
2028	Salamander, Caledonia
2029	Salamander, Buchan, Stromar, Muir Mhòr, Caledonia
2030	Buchan, Stromar, Muir Mhòr, Cenos, Caledonia
2031	Buchan, Stromar, Muir Mhòr, Cenos, Caledonia
2032	Stromar, Muir Mhòr, Cenos, Caledonia
2033	Stromar, Muir Mhòr, Cenos, Caledonia
2034	Cenos, Caledonia
2035	Cenos, Caledonia
2036	Caledonia
2037	Caledonia
2038	Caledonia

4.3.1.3 Spatially, several OECCs (Buchan, Muir Mhòr, Salamander, Stromar, Cenos and Caledonia) overlap with the Southern Trench NCMPA (21.7% overlap between OECCs and the area of the NCMPA, Figure 4–3), creating high-overlap zones where repeated vessel transits could act as temporary barriers to movement. The peak years of 2029–2031 present the greatest likelihood of repeated energetic costs and reduced access to preferred habitats for minke whales and the Southern Trench NCMPA (see Table 4-2). As the same projects which contribute to the worst-case spatial scenario for bottlenose dolphins and the CES MU occur also overlap with the Southern Trench NCMPA between 2029 – 2031, the number of additional vessels anticipated during construction within the OECC shall be the same (see Paragraph 4.2.1.3).

4.3.1.4 In high-overlap years, vessel presence in key corridors could create barrier effects, delaying or deterring whales from accessing high-prey-density areas. Average baseline vessel activity in the area is approximately 36 vessels (annual counts ranging from 11–62), against which the additional construction-related traffic can be considered. During peak construction years (2029–2031), cumulative vessel numbers are expected to increase by 149% over baseline levels.

4.3.1.5 While overlapping OECCs through the NCMPA raise the likelihood of extended vessel presence (particularly from slow-moving or stationary cable-lay vessels) it is unlikely that multiple projects would converge simultaneously in the same space and timeframe (see Paragraph 4.2.1.4). Further, it is important to note that the mapped OECCs reflect the OECC scoping areas for each OWF and do not reflect the likely actual size of the OECC construction areas. Thus, the actual percentage overlap between OECCs and the area of the NCMPA is likely to be less than that reported in paragraph 5.3.1.3. Nevertheless, the persistence of elevated vessel traffic during 2029–2031 represents the period of highest cumulative risk for whales using the NCMPA, with Buchan, Salamander, Cenos and Muir Mhòr OECCs most likely to overlap with the areas where minke whales are present (Figure 4–2). It should be however noted, that based on modelled distribution of minke whale within the MPA presented in the MPA data confidence assessment report, OECCs for Buchan, Salamander and Cenos are likely to overlap with areas where minke whale usage is very low (NatureScot, 2020[16]) (Figure 4–4). The Caledonia OECC and Stromar OECC are likely to overlap with the areas of the highest minke whale density where up to 10 animals may be present at any one time (Figure 4–4).

4.3.1.6 All projects are likely to adopt VMPs and/or comply with the existing Scottish Marine Wildlife Watching Codes, such as Scottish Natural Heritage (2017b[6]; 2017a[7]), to minimise any potential effects on marine mammals.

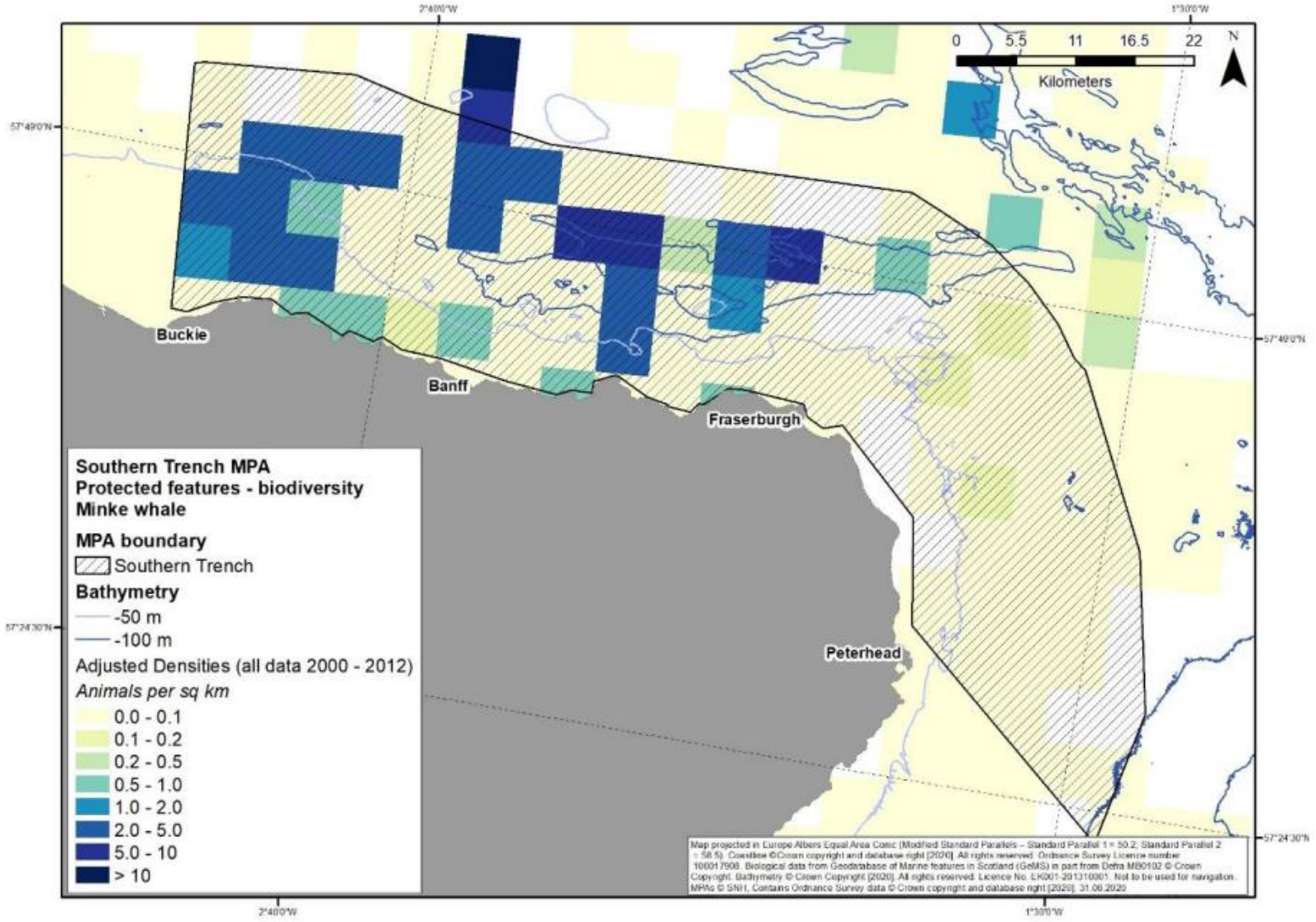

Figure 4–4: The known/modelled distribution of protected features within the Southern Trench MPA – minke whale (Source: NatureScot, 2020).

4.3.1.7 Minke whales, which use the Southern Trench NCMPA for foraging, are especially sensitive to reductions in foraging efficiency if disturbed by vessel presence. Evidence on vessel disturbance in minke whales indicate reduced foraging activity, altered dive behaviour, and decreased net energy intake in response to close vessel interactions from whale-watching vessels (Christiansen *et al*., 2013[17]; Sullivan and Torres, 2018[18]). While effects from whale-watching vessels are not directly comparable to those anticipated from construction vessels due to differences in activity type and noise characteristics, sensitivity remains a consideration given the importance of the Southern Trench NCMPA as a foraging area. As capital breeders, minke whales rely on efficient energy acquisition to support reproductive success, and disruption of feeding opportunities could therefore have biologically meaningful consequences (Stephens *et al*., 2009[19]; Christiansen *et al*., 2013[17]). Any reduction in net energy intake during this period is therefore of concern given the species' capital breeding strategy, where feeding success underpins biological fitness.

4.3.1.8 There is limited certainty that multiple OECC works will converge concurrently within the Southern Trench NCMPA in both space and time, even where several projects may be constructing within the same year. Moreover, impacts are expected to remain localised to the immediate vicinity of vessels and limited to the periods of OEC construction. Nevertheless, during years of high temporal overlap, the likelihood of cumulative, repeated short-term behavioural responses increases. If multiple large vessels are operating at low speed or holding position in narrow corridors, minke whales may be required to increase travel distances or temporarily alter habitat use within the NCMPA. An assessment of cumulative vessel disturbance and presence against the Conservation Objectives of the Southern Trench NCMPA is presented in Table 4-3. The overall conclusion has not changed when compared with the assessment of vessel disturbance impact presented in Application Document 9: Marine Protected Area Assessment.

Table 4-3: Assessment against conservation objective "Continued access by the species to resources" for cumulative disturbance from vessel activities within OWF OECCs, during the construction phase.

Overarching Conservation Objective	Site-specific Advice	Assessment Conclusion
Continued access by the species to resources provided by the MPA for, but not restricted to, feeding, courtship, spawning or use as nursery grounds	Conserve the access to resources (e.g., for feeding) provided by the MPA for various stages of the minke whale life cycle.	Access to resources within the Southern Trench NCMPA could be restricted during peak construction years due to repeated vessel presence in foraging areas. While effects are likely to be localised and temporary, the timing (summer feeding season) and the concentration of activity in 2029–2031 present a risk of reduced access to feeding opportunities and subsequent energetic costs.
	Conserve the distribution of minke whale within the site by avoiding significant disturbance. There are two main ways in which minke whale's access to resources could be restricted and disturbance affected (i.e., large scale physical barriers, or significant disturbance).	Disturbance to minke whale distribution within the Southern Trench NCMPA may arise from the presence of multiple large construction vessels operating at low speeds or holding position in narrow corridors during OECC works. Evidence from whale–vessel interactions suggests that repeated exposure to vessels can alter dive behaviour, reduce feeding activity, and displace whales from preferred habitats, even if effects are short-term. While large-scale physical barriers are unlikely, the risk of significant disturbance exists during periods of high temporal overlap (2029–2031), when multiple projects may contribute to repeated, short-term behavioural responses.

Overall conclusion:

During peak construction overlap years (2029–2031), cumulative vessel activity within the Southern Trench NCMPA has the potential to result in short-term behavioural disturbance, leading to localised displacement from preferred habitats. While effects are expected to be temporary and spatially restricted, the ecological importance of the site as a key foraging ground for capital-breeding minke whales means that both conservation objectives are at risk during high-overlap years.

However, due to the highly conservative assumptions associated with the baseline data, this assessment concludes that the risk of hindering the Conservation Objectives is **uncertain**. To address this, the Applicant is involved in a campaign which deployed three Passive Acoustic Monitoring (PAM) devices (as of June 2025) at strategic locations within the Southern Trench NCMPA. These devices are intended to remain in-situ for up to 24 months, spanning two summer seasons during peak minke whale presence in the Moray Firth. This campaign will provide dedicated year-round monitoring to increase understanding of local minke whale presence in coastal waters along the currently considered cable routes and within the wider MPA. Caledonia is committed to collaborating with stakeholders, academic institutions and other developers to address knowledge gaps regarding minke whale behavioural response to disturbance through ongoing research and monitoring efforts.

5 Conclusions

5.1.1.1 The assessment indicates that overlapping OECCs, including the Caledonia OECC, within the CES MU and the Southern Trench NCMPA increase the potential for extended vessel presence, particularly from slow-moving or stationary cable-lay vessels, with peak construction activity anticipated between 2029 and 2031. However, it remains unlikely that multiple projects will concurrently construct within the same space and timeframe, and impacts are expected to be localised and temporary in nature. While periods of high temporal overlap could raise the likelihood of short-term behavioural responses to bottlenose dolphins and minke whales with potential for energetic consequences, these outcomes are not certain and depend on the precise scheduling and distribution of works.

5.1.1.2 The assessment conclusions for bottlenose dolphins and minke whales has not changed when compared with the assessment of vessel disturbance presented in the EIA (Volume 2, Chapter 7: Marine Mammals of the EIAR and Application Document 9: Marine Protected Area Assessment).

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