

Outer Dowsing Offshore Wind

Environmental Statement

Chapter 10 Fish and Shellfish Ecology

Volume 2 Figures

Part 2 of 2

Date: March 2024

Document Reference: 6.2.10

Pursuant to APFP Regulation: 5(2)(a)

Rev: 1.0

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Rev 1.0	March 2024	DCO Application	GoBe	GoBe	Shepherd and Wedderburn	ODOW

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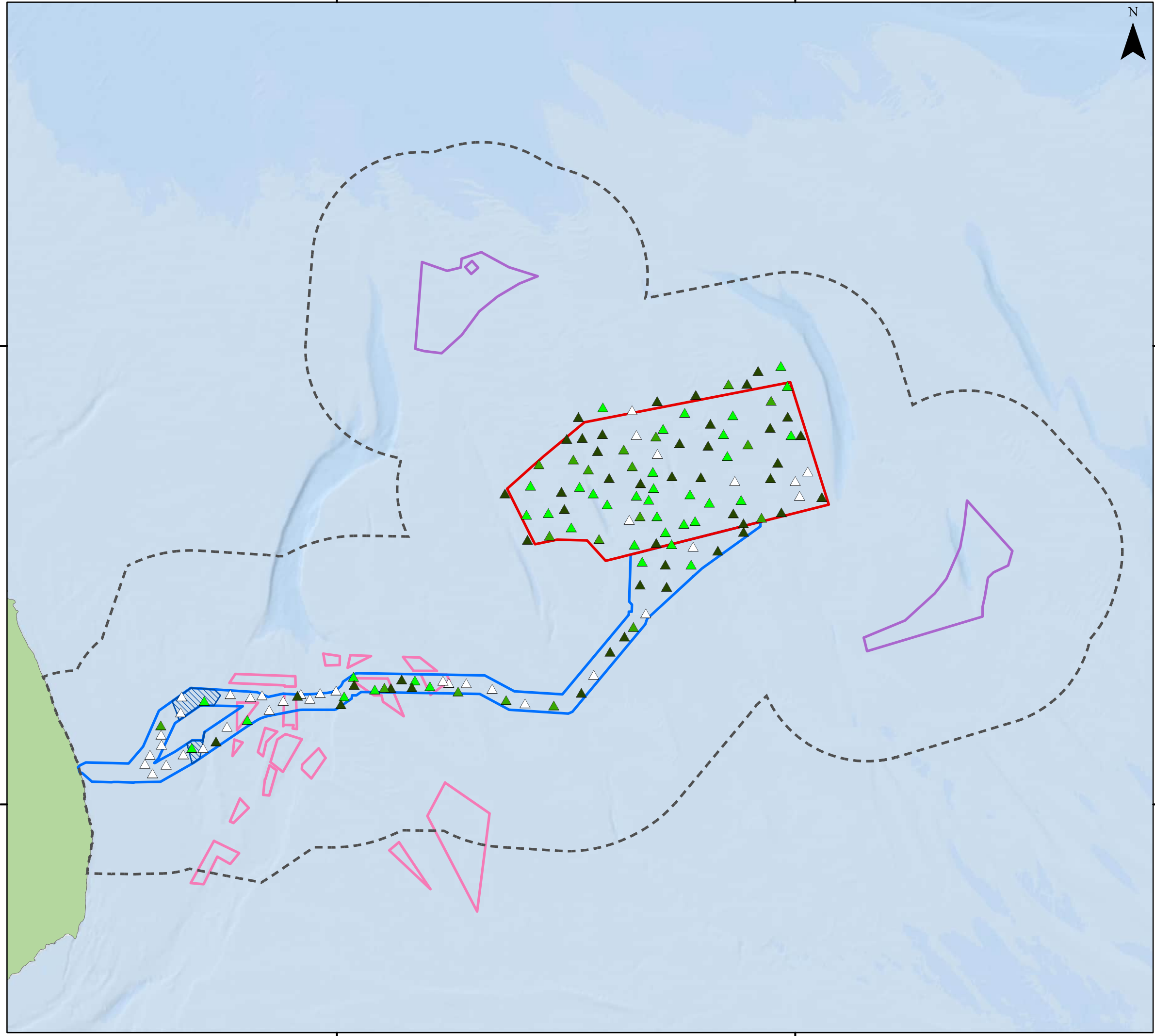
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- Legend**
- Array Area
 - Offshore Export Cable Corridor
 - ORCP Area
 - Artificial Nesting Structure Area
 - Biogenic Reef Restoration Area
 - Secondary Zone of Influence
- Sandeel Habitat Suitability (Latto *et al.*, 2013)**
- ▲ Prime, Preferred
 - ▲ Sub-Prime, Preferred
 - ▲ Suitable, Marginal
 - △ Unsuitable

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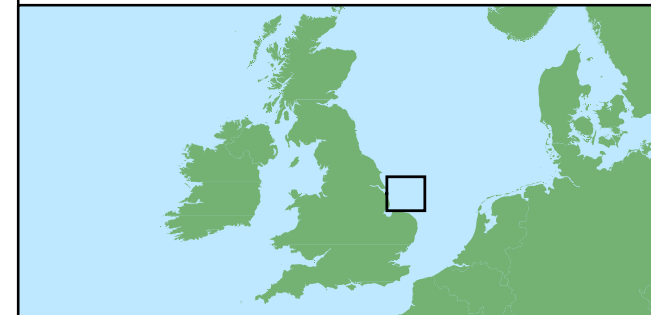
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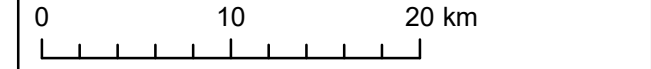
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Environmental Statement

Sandeel Habitat Suitability Site Specific Data

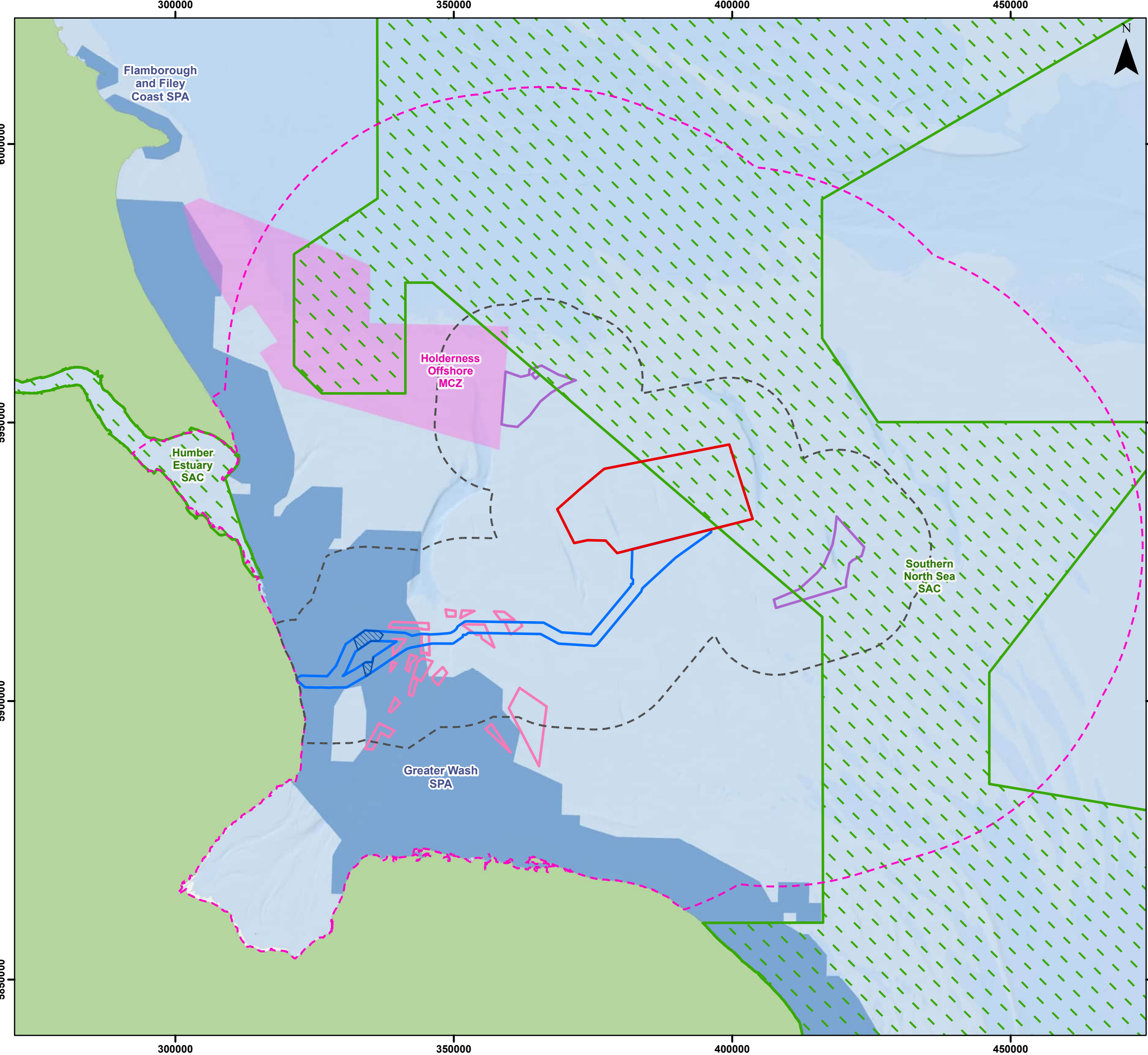
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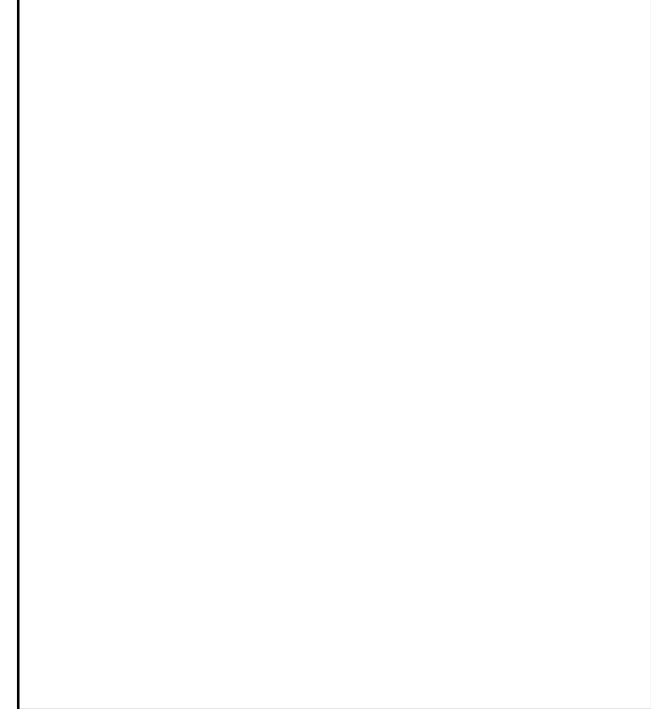
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- Legend**
- Array Area
 - Offshore Export Cable Corridor
 - ORCP Area
 - Artificial Nesting Structure Area
 - Biogenic Reef Restoration Area
 - Secondary Zone of Influence
 - Underwater Noise Impacts 50km Buffer
 - Special Area of Conservation
 - Special Protection Area
 - Marine Conservation Zone



Coordinate System: WGS 1984 UTM Zone 31N

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Environmental Statement

Relevant Designated Sites in Relation to the Project Fish and Shellfish Ecology Study Area

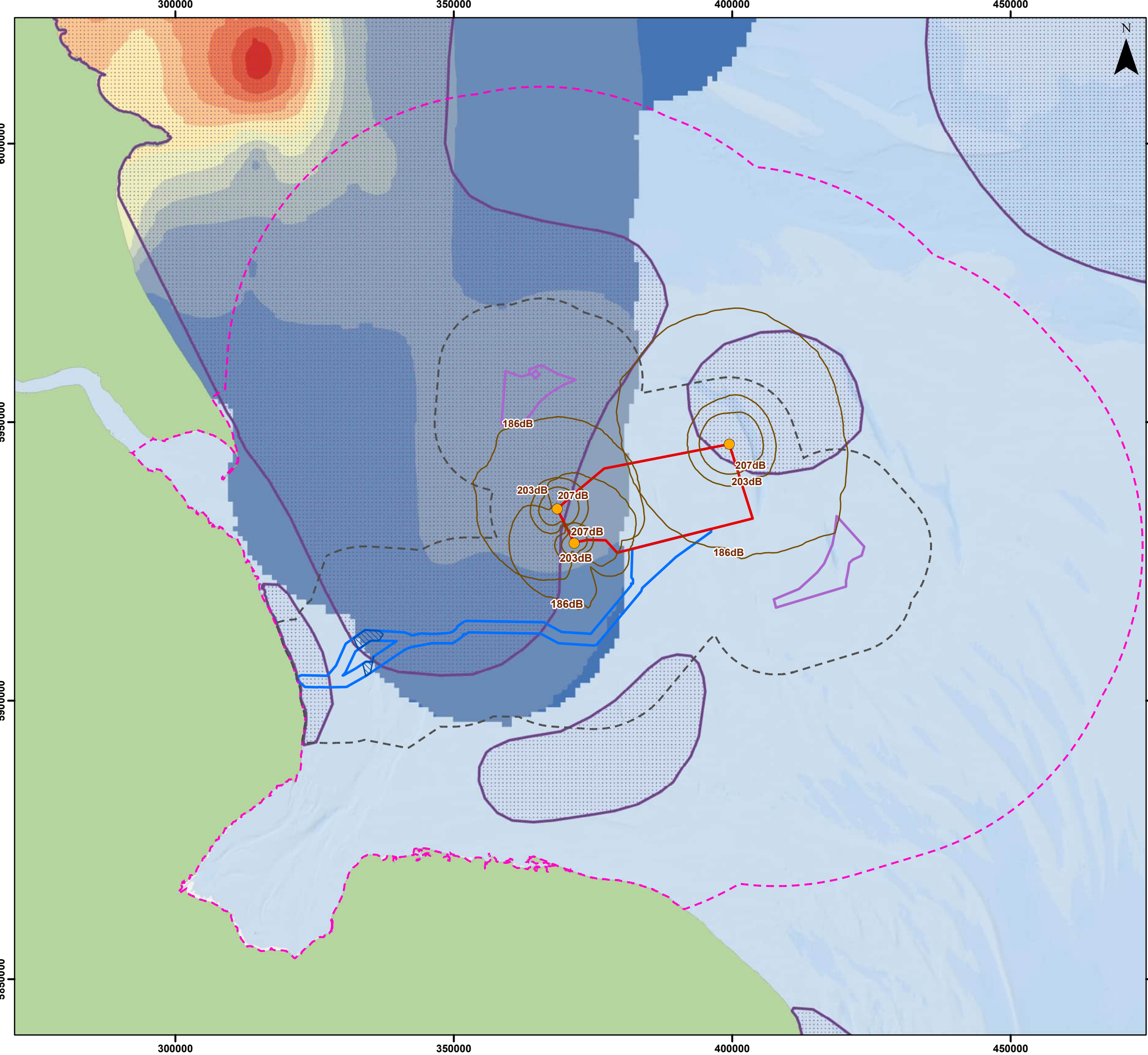
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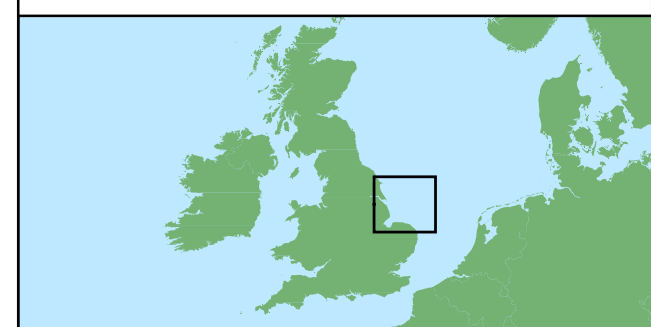
- Array Area
- Offshore Export Cable Corridor
- ORCP Area
- Artificial Nesting Structure Area
- Secondary Zone of Influence
- Underwater Noise Impacts 50km Buffer
- Underwater Noise Modelling Locations
- Pin Piles x6 Contours (dB SELcum) - Stationary Receptors

Spawning Grounds (Coull et al., 1998)
(Species, Intensity)

- Herring, Undetermined

IHLS 2009/2010-2020/2021 Banks Data - Total Larval Abundance Per m²

- 0
- 0.1 - 1,500
- 1,500.1 - 6,000
- 6,000.1 - 12,750
- 12,750.1 - 20,500
- 20,500.1 - 28,500
- 28,500.1 - 36,500
- 36,500.1 - 44,500
- 44,500.1 - 53,000
- 53,000.1 - 63,000
- 63,000.1 - 74,250
- 74,250.1 - 93,250



Coordinate System: WGS 1984 UTM Zone 31N

0 20 40 km

Scale: 1:650,000 A3 Page Size

Environmental Statement

Predicted Worst Case Impact Ranges for Spawning Herring from the Sequential Piling of Jacket Foundations within the Array Area (Stationary Receptor, 3,500kJ hammer energy, 5m pile diameter)

Figure 10.23

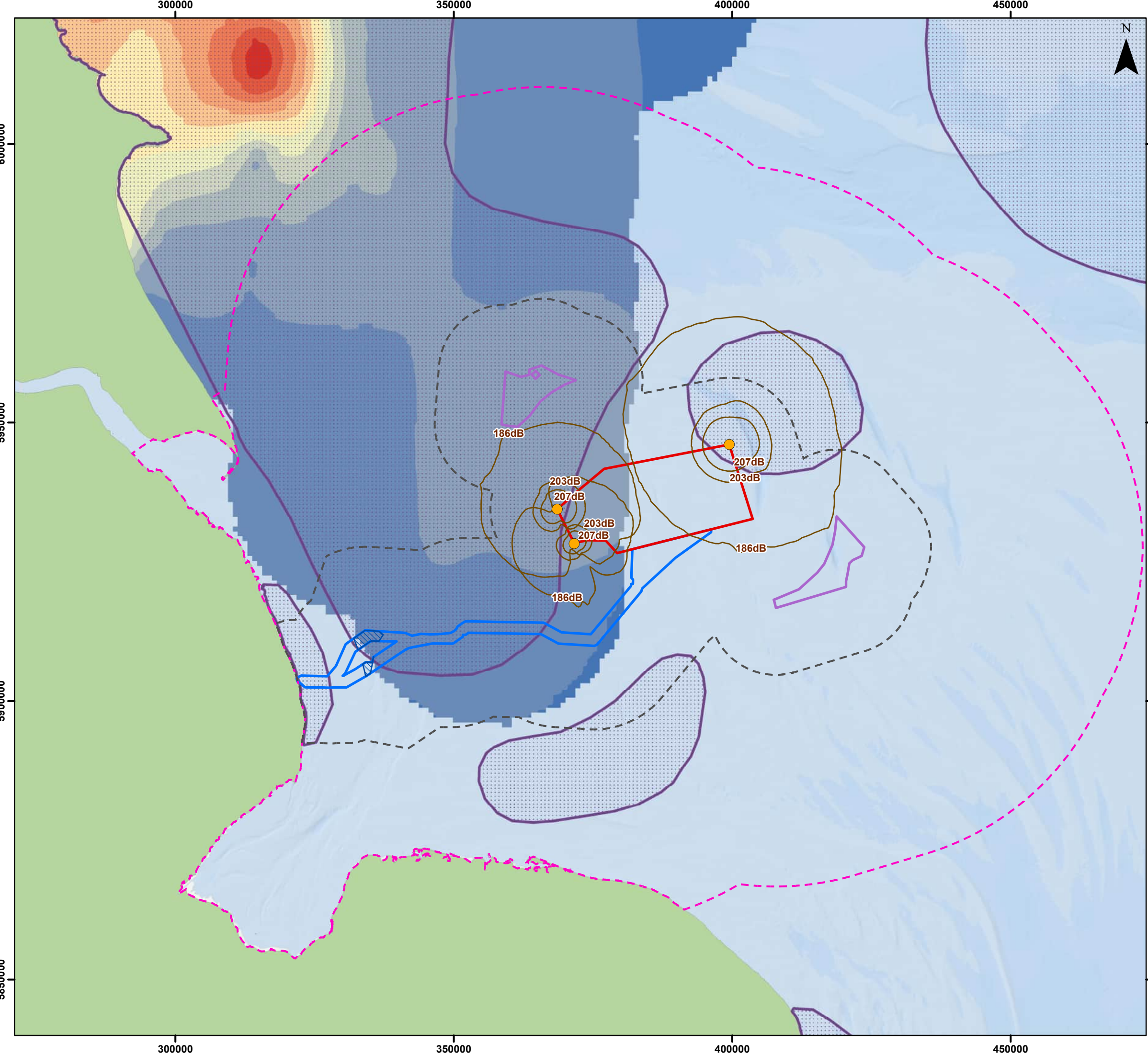
OUTER DOWSING
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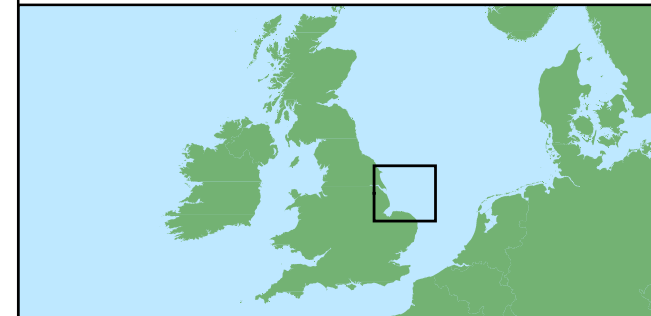
- Array Area
- Offshore Export Cable Corridor
- ORCP Area
- Artificial Nesting Structure Area
- Secondary Zone of Influence
- Underwater Noise Impacts 50km Buffer
- Underwater Noise Modelling Locations
- Monopile Contours (dB SELcum) - Stationary Receptors

Spawning Grounds (Coull et al., 1998)
(Species, Intensity)

- Herring, Undetermined

IHLS 2009/2010-2020/2021 Banks Data - Total Larval Abundance Per m²

- 0
- 0.1 - 1,500
- 1,500.1 - 6,000
- 6,000.1 - 12,750
- 12,750.1 - 20,500
- 20,500.1 - 28,500
- 28,500.1 - 36,500
- 36,500.1 - 44,500
- 44,500.1 - 53,000
- 53,000.1 - 63,000
- 63,000.1 - 74,250
- 74,250.1 - 93,250



Coordinate System: WGS 1984 UTM Zone 31N

0 20 40 km

Scale: 1:650,000 A3 Page Size

Environmental Statement

Predicted Worst Case Impact Ranges for Spawning Herring from the Sequential Piling of Monopile Foundations within the Array Area (Stationary Receptor, 6,600kJ hammer energy, 14m pile diameter)

Figure 10.24

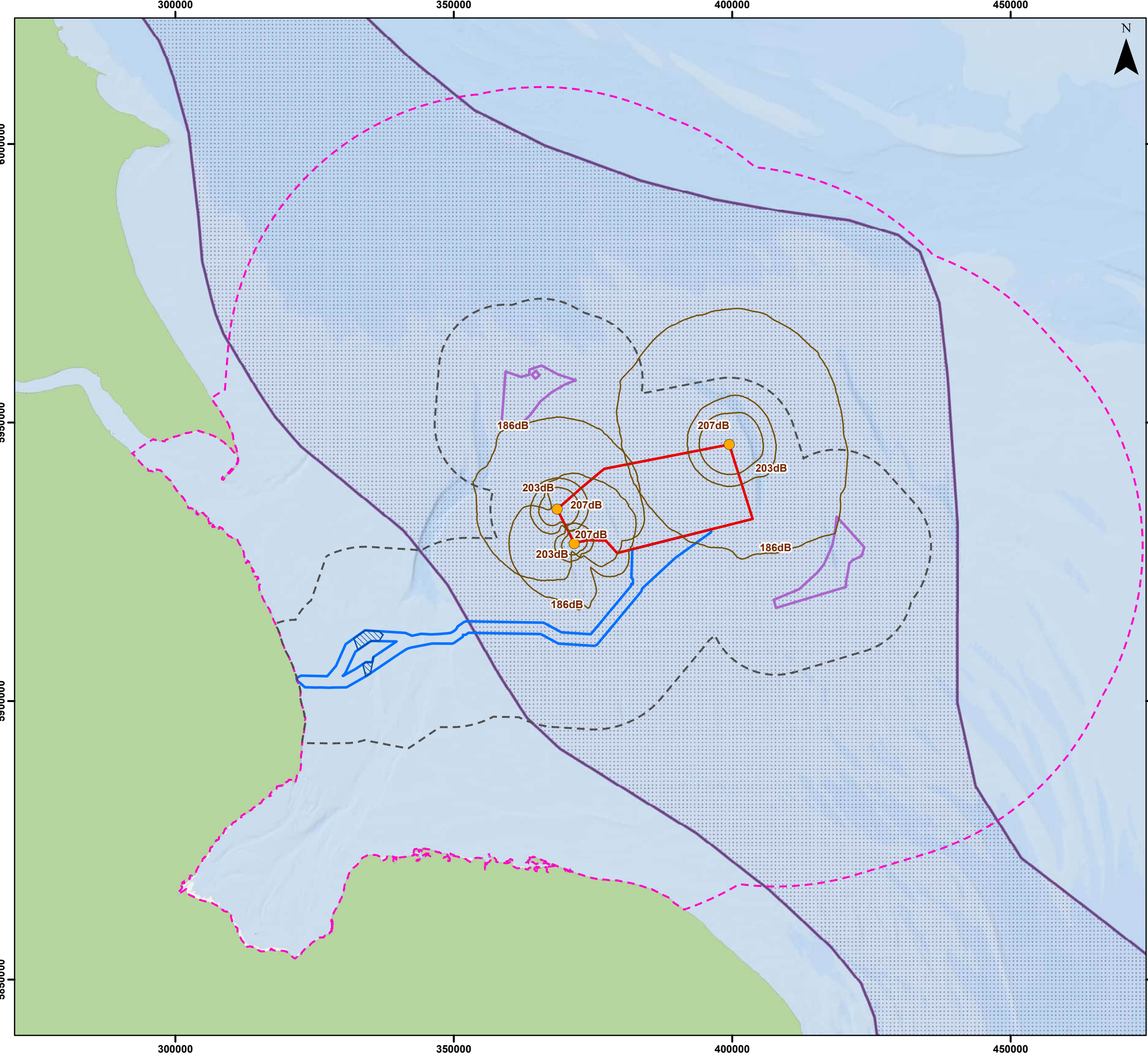




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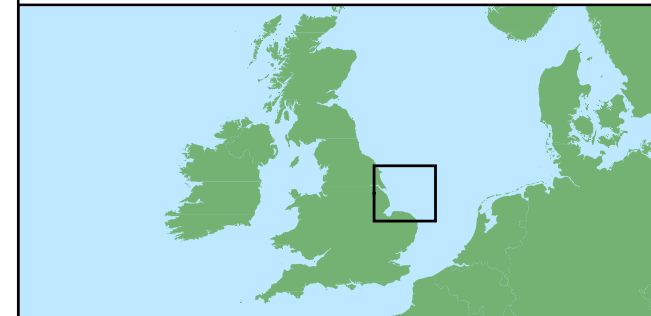


Legend

- Array Area
- Offshore Export Cable Corridor
- ORCP Area
- Artificial Nesting Structure Area
- Secondary Zone of Influence
- Underwater Noise Impacts 50km Buffer
- Underwater Noise Modelling Locations
- Pin Piles x6 Contours (dB SELcum) - Stationary Receptors

Spawning Grounds (Coull *et al.*, 1998)
(Species, Intensity)

- Sandeel, Undetermined



Coordinate System: WGS 1984 UTM Zone 31N

0 20 40 km

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Environmental Statement

Predicted Worst Case Impact Ranges for Spawning Sandeel from the Sequential Piling of Jacket Foundations within the Array Area (Stationary Receptor, 3,500kJ hammer energy, 5m pile diameter)

Figure 10.25

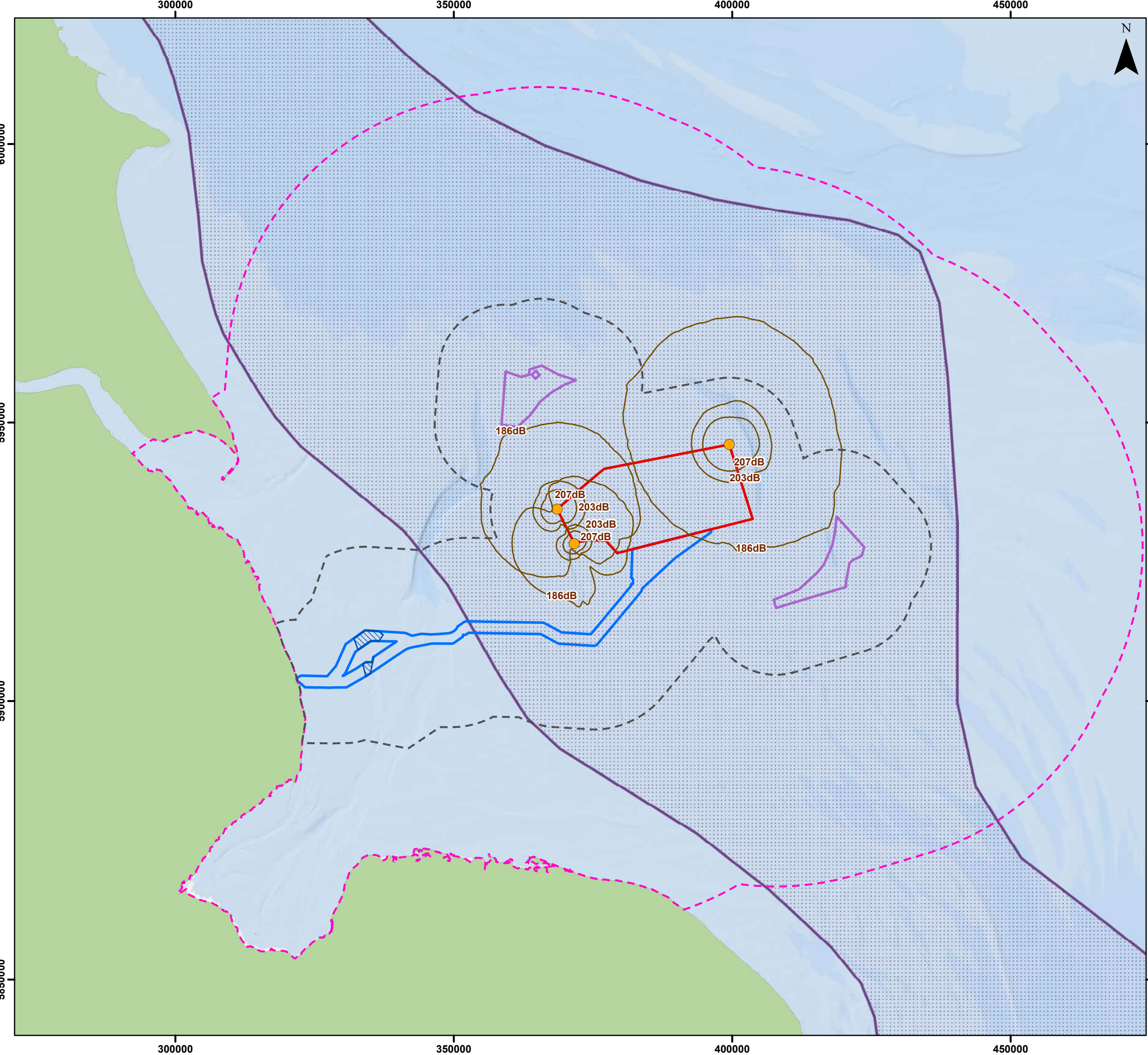




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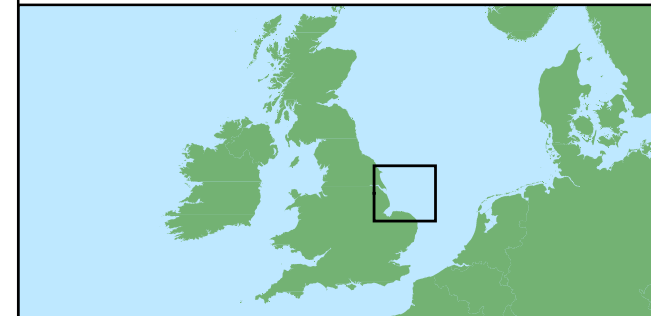


Legend

- Array Area
- Offshore Export Cable Corridor
- ORCP Area
- Artificial Nesting Structure Area
- Secondary Zone of Influence
- Underwater Noise Impacts 50km Buffer
- Underwater Noise Modelling Locations
- Monopile Contours (dB SEL_{cum}) - Stationary Receptors

Spawning Grounds (Coull *et al.*, 1998)
(Species, Intensity)

- Sandeel, Undetermined



Coordinate System: WGS 1984 UTM Zone 31N

0 20 40 km

Scale: 1:650,000 A3 Page Size

Environmental Statement

Predicted Worst Case Impact Ranges for Spawning Sandeel from the Sequential Piling of Monopile Foundations within the Array Area (Stationary Receptor, 6,600kJ hammer energy, 14m pile diameter)

Figure 10.26

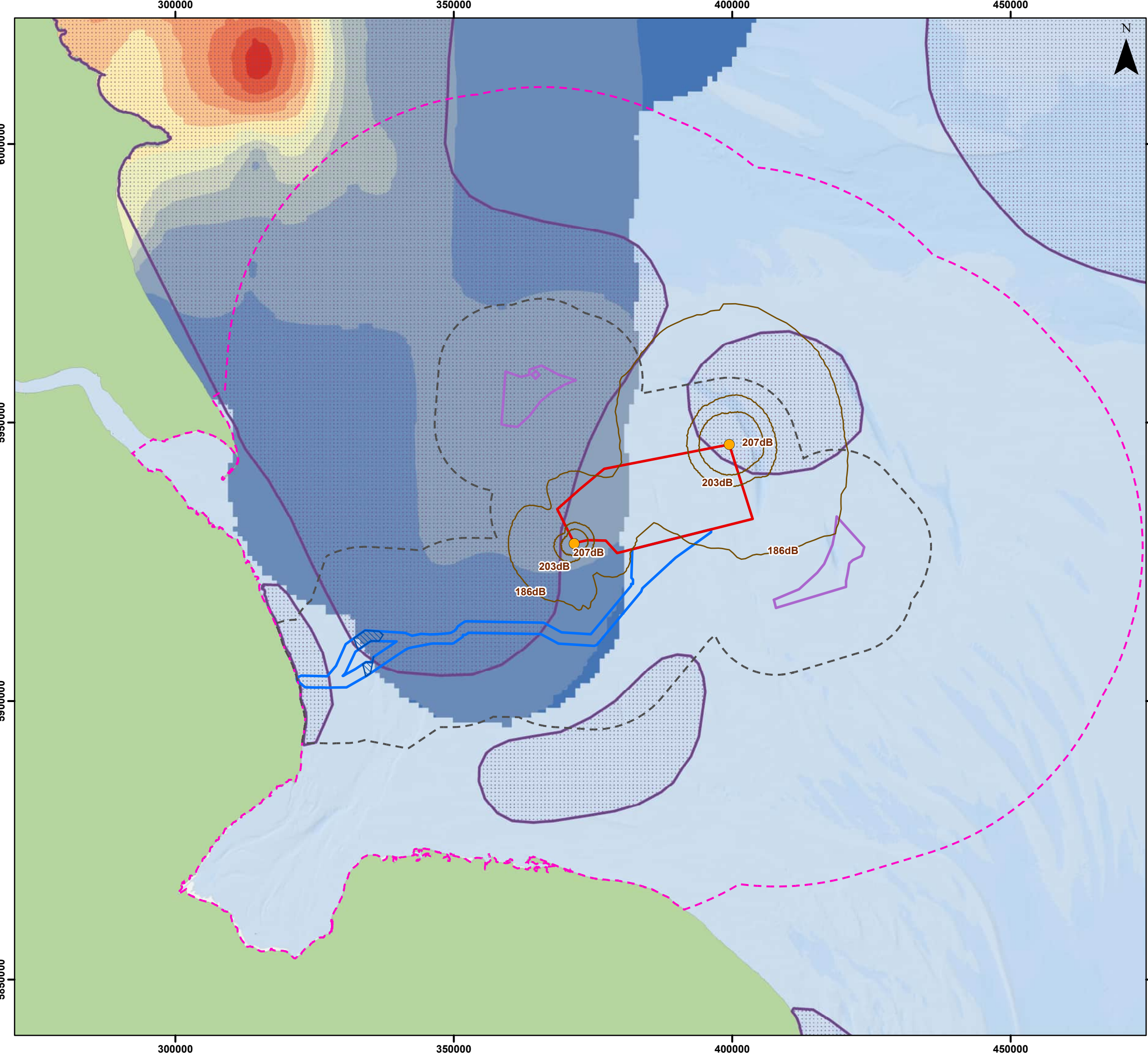




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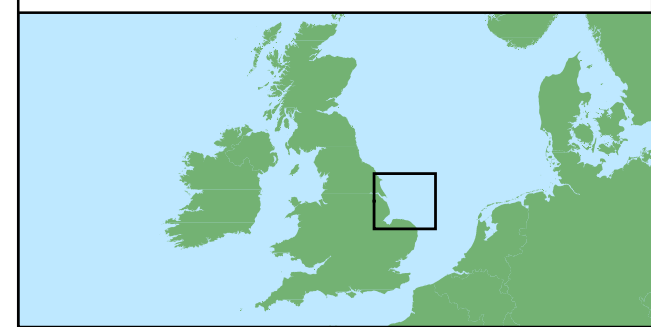
- Array Area
- Offshore Export Cable Corridor
- ORCP Area
- Artificial Nesting Structure Area
- Secondary Zone of Influence
- Underwater Noise Impacts 50km Buffer
- Underwater Noise Modelling Locations
- Simultaneous Jacket/Pin Piles Contours (dB SELcum) - Stationary Receptors

Spawning Grounds (Coull et al., 1998)
(Species, Intensity)

- Herring, Undetermined

IHLS 2009/2010-2020/2021 Banks Data - Total Larval Abundance Per m²

- 0
- 0.1 - 1,500
- 1,500.1 - 6,000
- 6,000.1 - 12,750
- 12,750.1 - 20,500
- 20,500.1 - 28,500
- 28,500.1 - 36,500
- 36,500.1 - 44,500
- 44,500.1 - 53,000
- 53,000.1 - 63,000
- 63,000.1 - 74,250
- 74,250.1 - 93,250



Coordinate System: WGS 1984 UTM Zone 31N
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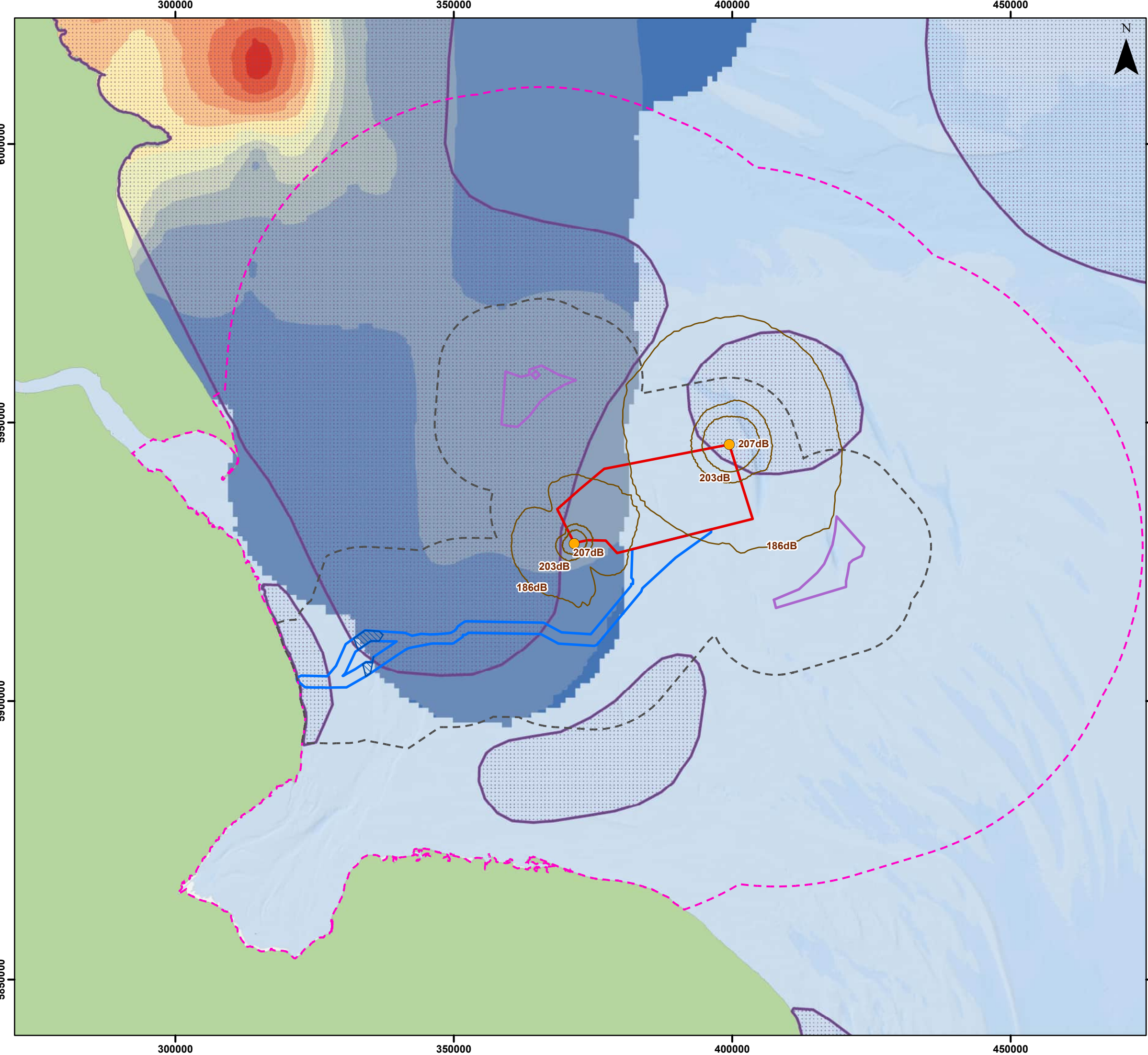
Environmental Statement

Predicted Worst Case Impact ranges for Spawning Herring from the Simultaneous Piling of Jacket Foundations within the Array Area (Stationary Receptor, 3,500kJ hammer energy, 5m pile diameter)

Figure 10.27



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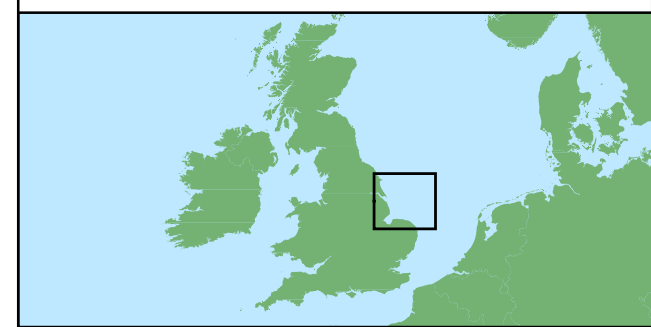
- Array Area
- Offshore Export Cable Corridor
- ORCP Area
- Secondary Zone of Influence
- Underwater Noise Impacts 50km Buffer
- Underwater Noise Modelling Locations
- Simultaneous Monopile Contours (dB SELcum) - Stationary Receptors

Spawning Grounds (Coull et al., 1998)
(Species, Intensity)

- Herring, Undetermined

IHLS 2009/2010-2020/2021 Banks Data - Total Larval Abundance Per m²

- 0
- 0.1 - 1,500
- 1,500.1 - 6,000
- 6,000.1 - 12,750
- 12,750.1 - 20,500
- 20,500.1 - 28,500
- 28,500.1 - 36,500
- 36,500.1 - 44,500
- 44,500.1 - 53,000
- 53,000.1 - 63,000
- 63,000.1 - 74,250
- 74,250.1 - 93,250



Coordinate System: WGS 1984 UTM Zone 31N

0 20 40 km

Scale: 1:650,000 A3 Page Size

Environmental Statement

Predicted Worst Case Impact ranges for Spawning Herring from the Simultaneous Piling of Monopile Foundations within the Array Area (Stationary Receptor, 6,600kJ hammer energy, 14m pile diameter)

Figure 10.28



OUTER DOWING
OFFSHORE WIND

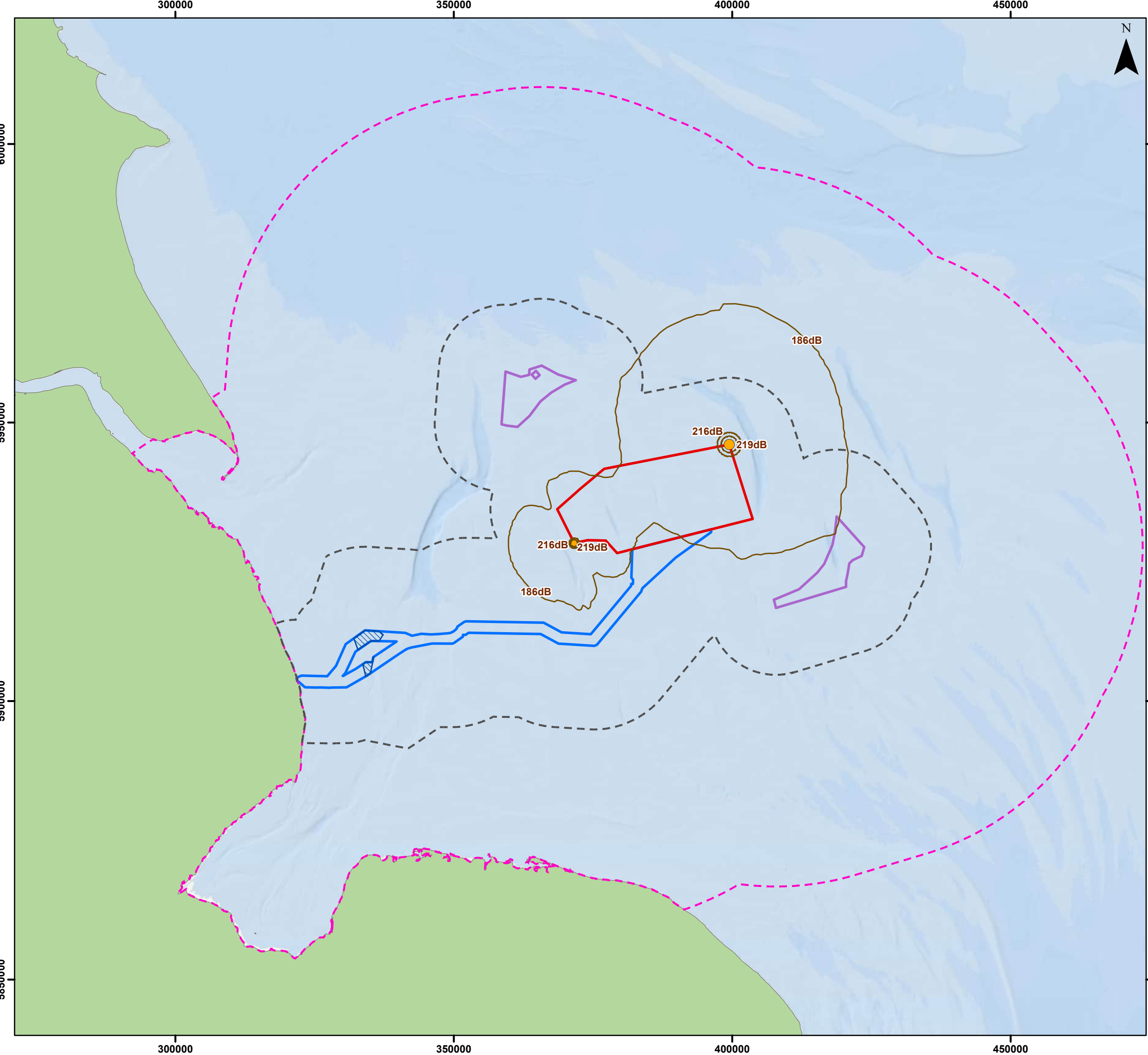


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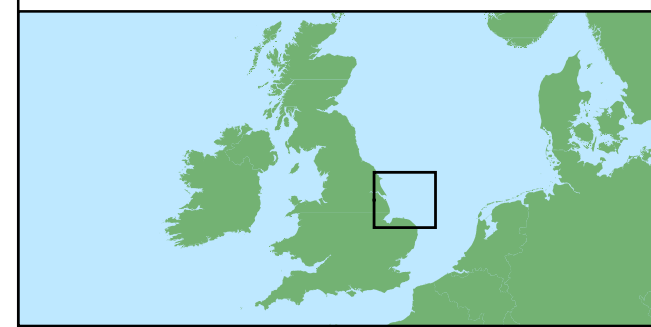
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- Legend**
- Array Area
 - Offshore Export Cable Corridor
 - ORCP Area
 - Artificial Nesting Structure Area
 - Secondary Zone of Influence
 - Underwater Noise Impacts 50km Buffer
 - Underwater Noise Modelling Locations
 - Simultaneous Jacket/Pin Piles Contours (dB SELcum) - Stationary Receptors



Coordinate System: WGS 1984 UTM Zone 31N
 0 20 40 km
 Scale: 1:650,000 A3 Page Size

Environmental Statement

Predicted Worst Case Impact ranges for Spawning Sandeel from the Simultaneous Piling of Jacket Foundations within the Array Area (Stationary Receptor, 3,500kJ hammer energy, 5m pile diameter)

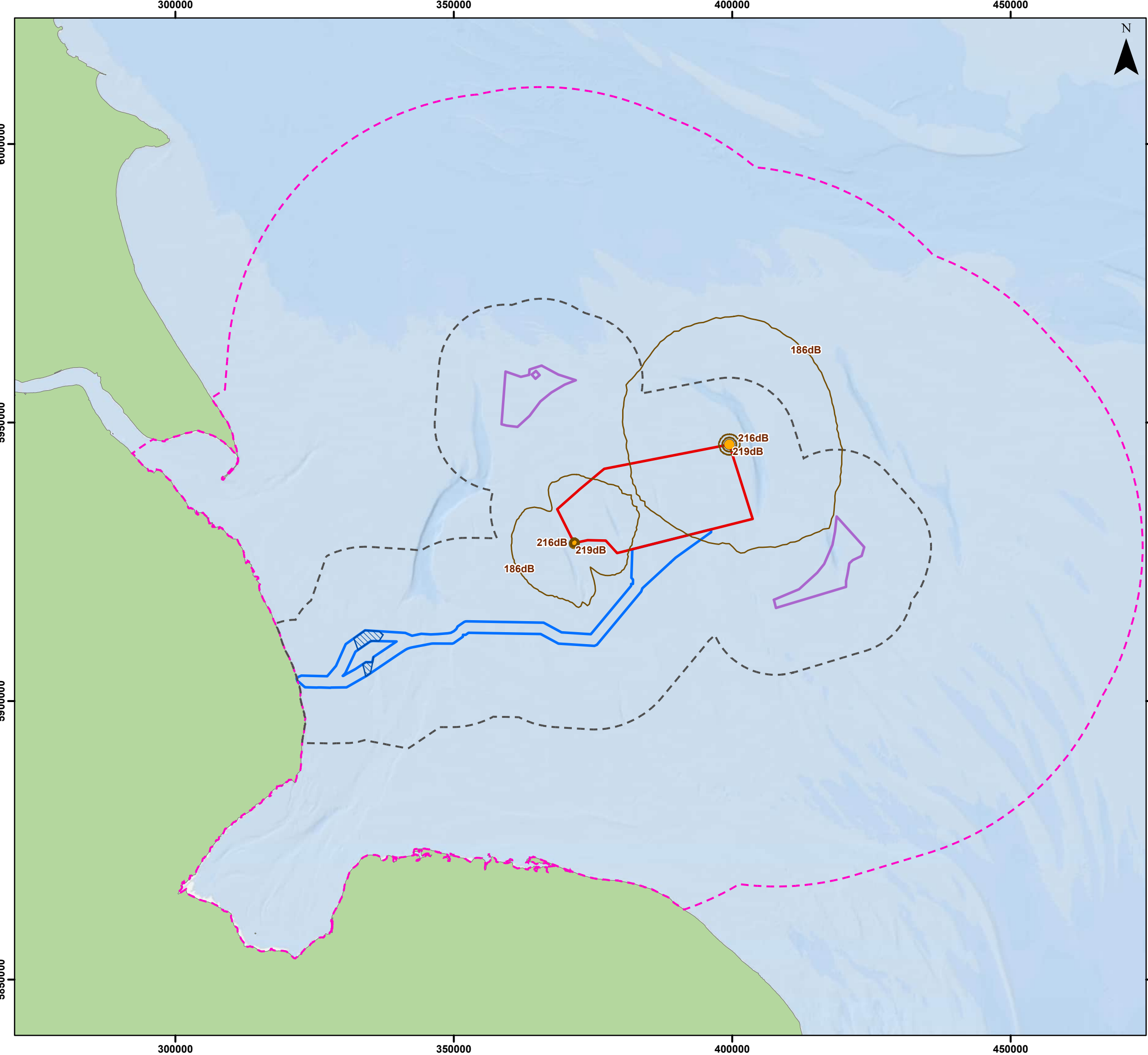
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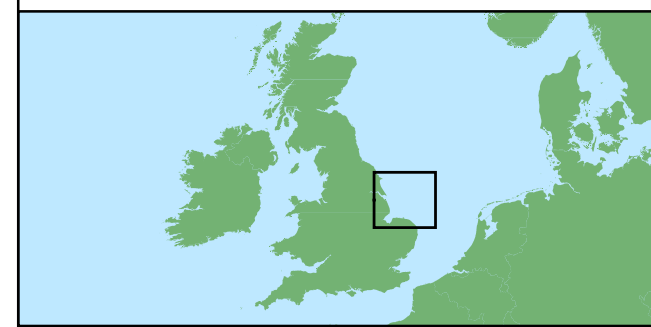
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- Legend**
- Array Area
 - Offshore Export Cable Corridor
 - ORCP Area
 - Artificial Nesting Structure Area
 - Secondary Zone of Influence
 - Underwater Noise Impacts 50km Buffer
 - Underwater Noise Modelling Locations
 - Simultaneous Monopile Contours (dB SELcum) - Stationary Receptors



Coordinate System: WGS 1984 UTM Zone 31N
 0 20 40 km
 Scale: 1:650,000 A3 Page Size

Environmental Statement

Predicted Worst Case Impact ranges for Spawning Sandeel from the Simultaneous Piling of Monopile Foundations within the Array Area (Stationary Receptor, 6,600kJ hammer energy, 14m pile diameter)

Figure 10.30

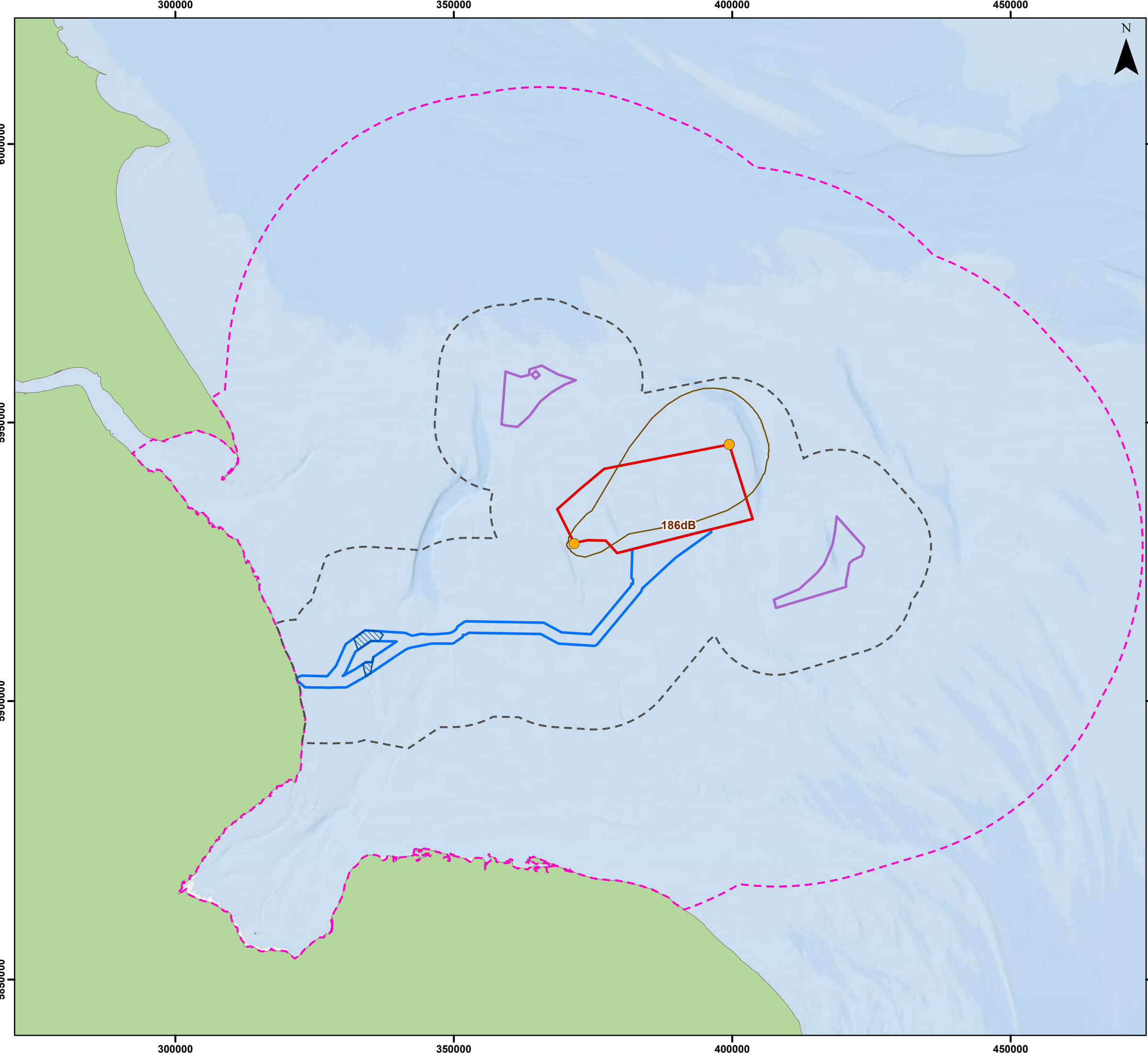




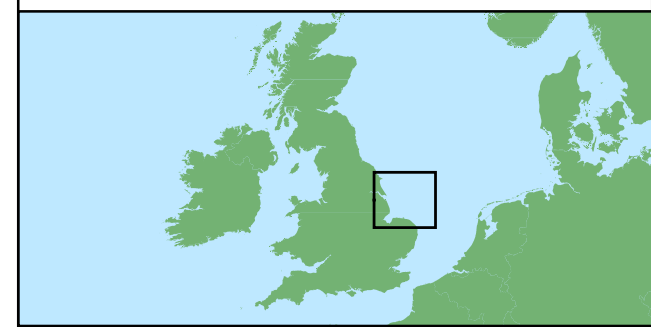
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- Legend**
- Array Area
 - Offshore Export Cable Corridor
 - ORCP Area
 - Artificial Nesting Structure Area
 - Secondary Zone of Influence
 - Underwater Noise Impacts 50km Buffer
 - Underwater Noise Modelling Locations
 - Simultaneous Jacket Contours (dB SELcum) - Fleeing Receptors



Coordinate System: WGS 1984 UTM Zone 31N
 0 20 40 km
 Scale: 1:650,000 A3 Page Size

Environmental Statement

Predicted Worst Case Impact Ranges for Fleeing Receptors from the Simultaneous Piling of Jacket Foundations within the Array Area (Fleeing receptor, 3,500kJ hammer energy, 5m pile diameter)

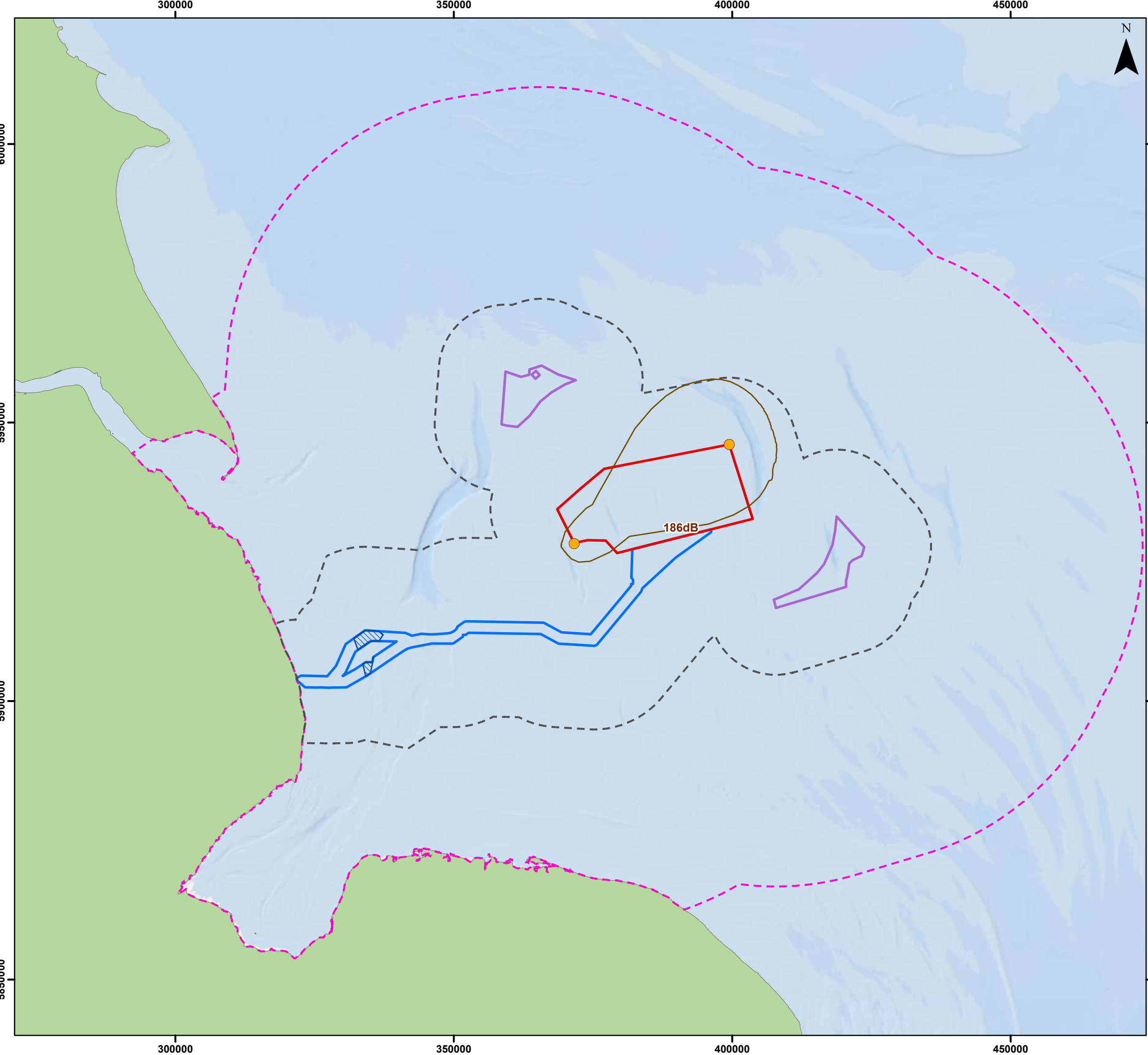
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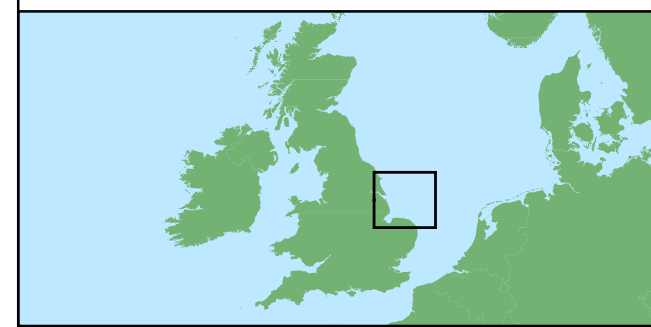
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- Legend**
- Array Area
 - Offshore Export Cable Corridor
 - ORCP Area
 - Artificial Nesting Structure Area
 - Secondary Zone of Influence
 - Underwater Noise Impacts 50km Buffer
 - Underwater Noise Modelling Locations
 - Simultaneous Monopile Contours (dB SELcum) - Fleeing Receptors



Coordinate System: WGS 1984 UTM Zone 31N
 0 20 40 km
 Scale: 1:650,000 A3 Page Size

Environmental Statement

Predicted Worst Case Impact Ranges for fleeing receptors from the Simultaneous Piling of Monopile Foundations within the Array Area (Fleeing receptor, 6,600kJ hammer energy, 14m pile diameter)

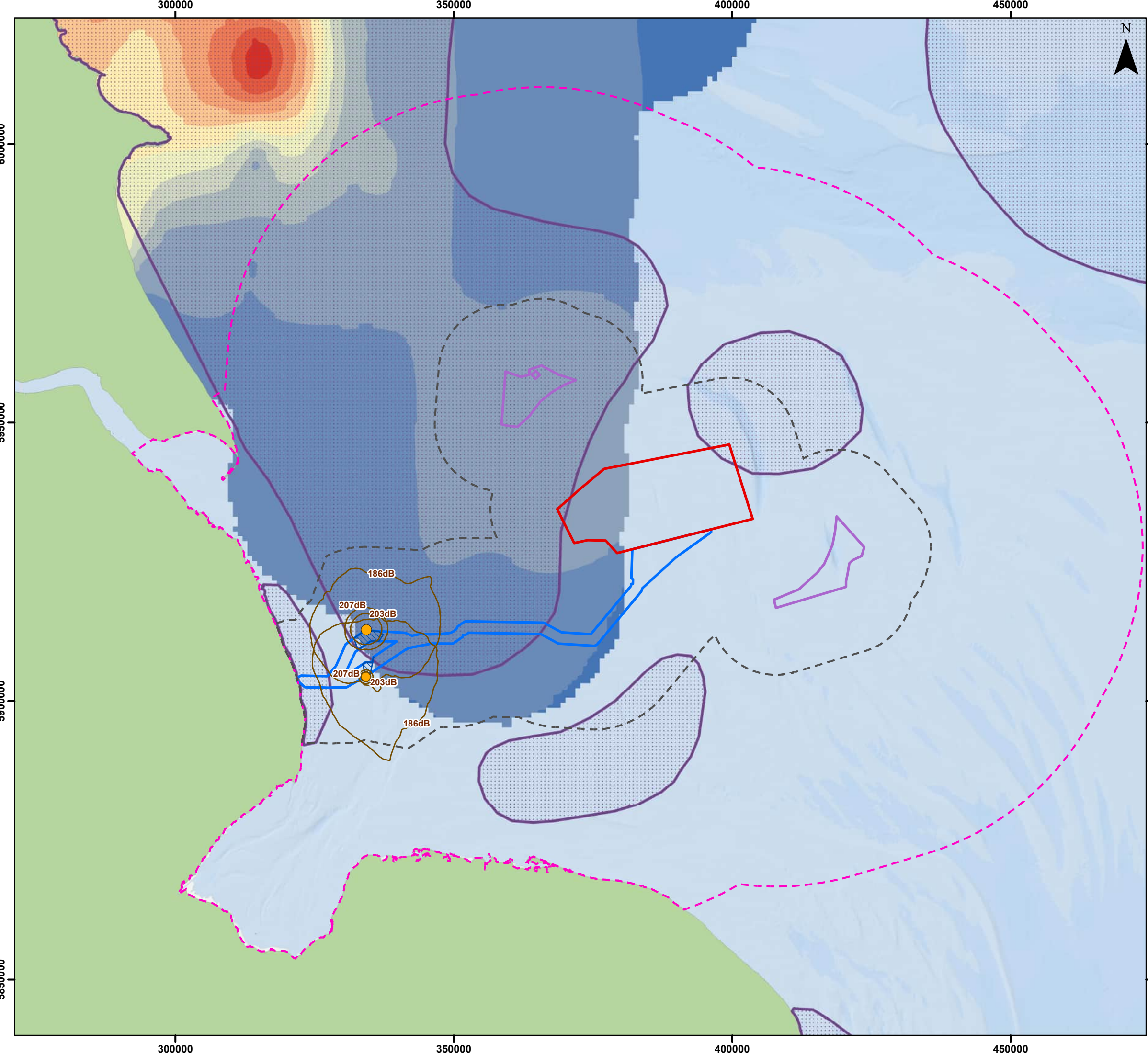
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Legend

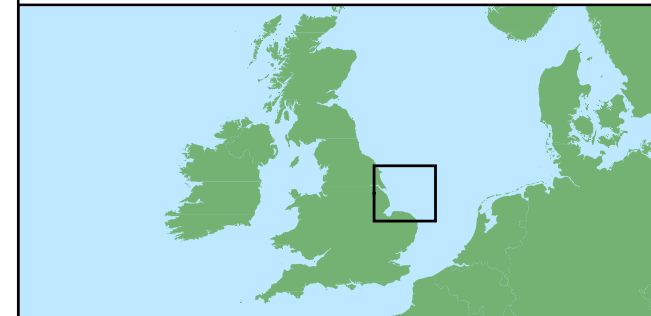
- Array Area
- Offshore Export Cable Corridor
- ORCP Area
- Artificial Nesting Structure Area
- Secondary Zone of Influence
- Underwater Noise Impacts 50km Buffer
- Underwater Noise Modelling Locations
- Simultaneous Jacket/Pin Piles Contours (dB SELcum) - Stationary Receptors

Spawning Grounds (Coull et al., 1998)
(Species, Intensity)

- Herring, Undetermined

IHLS 2009/2010-2020/2021 Banks Data - Total Larval Abundance Per m²

	0
	0.1 - 1,500
	1,500.1 - 6,000
	6,000.1 - 12,750
	12,750.1 - 20,500
	20,500.1 - 28,500
	28,500.1 - 36,500
	36,500.1 - 44,500
	44,500.1 - 53,000
	53,000.1 - 63,000
	63,000.1 - 74,250
	74,250.1 - 93,250



Coordinate System: WGS 1984 UTM Zone 31N

0 20 40 km

Scale: 1:650,000

A3 Page Size

Environmental Statement

Predicted Worst Case Impact Ranges for spawning herring from the sequential piling of jacket foundations within the ORCP search area (stationary receptor, 6,600kJ hammer energy, 5m pile diameter)

Figure 10.33

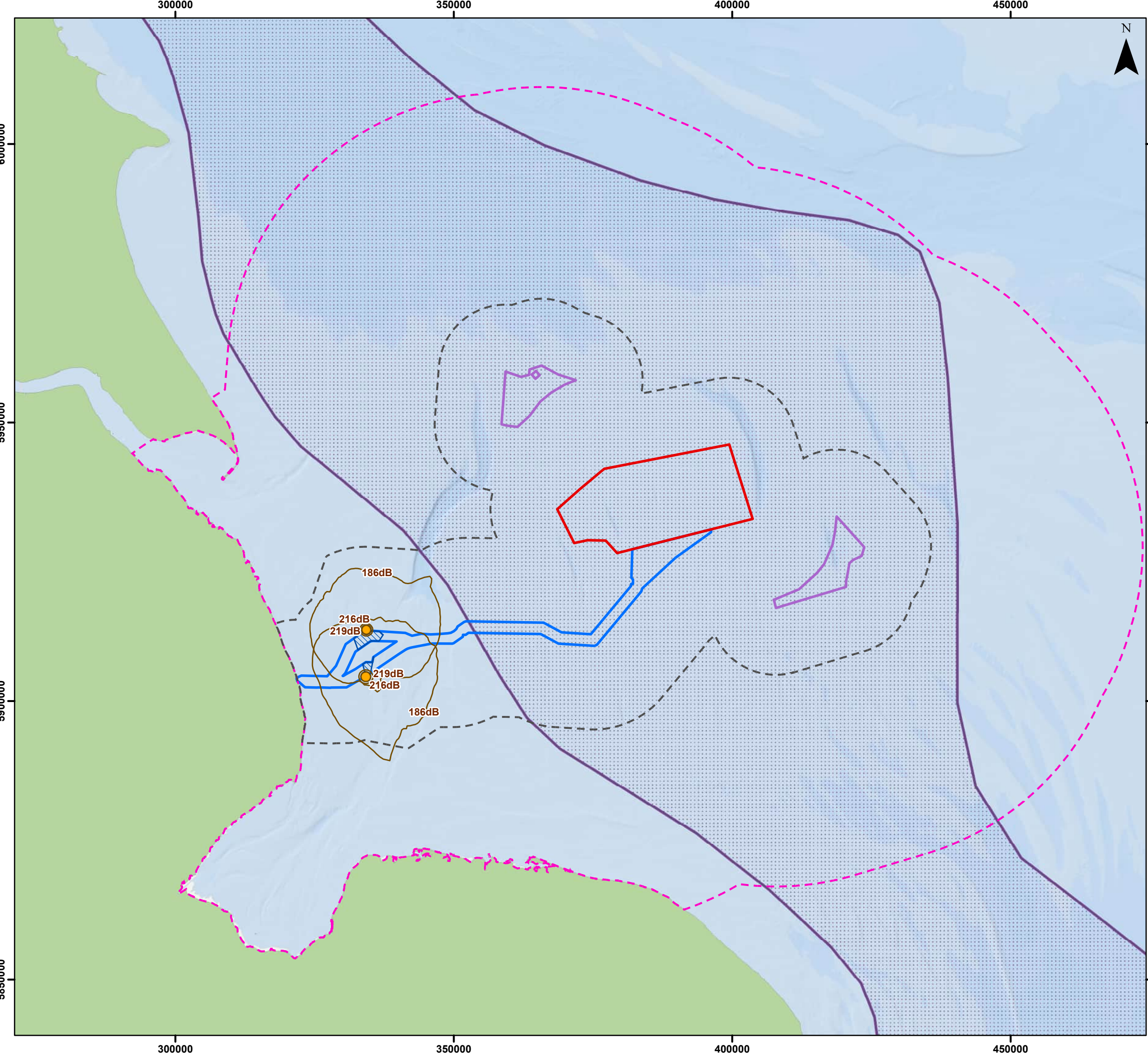




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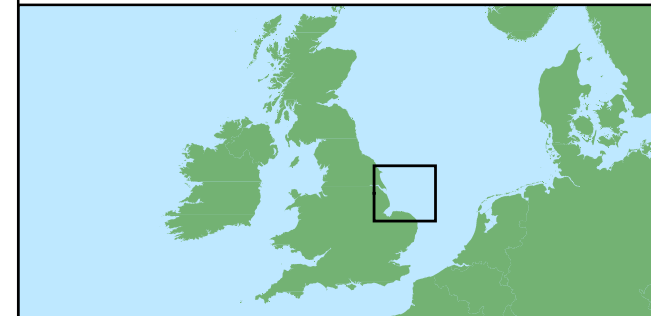


Legend

- Array Area
- Offshore Export Cable Corridor
- ORCP Area
- Artificial Nesting Structure Area
- Secondary Zone of Influence
- Underwater Noise Impacts 50km Buffer
- Underwater Noise Modelling Locations
- Simultaneous Jacket/Pin Piles Contours (dB SELcum) - Stationary Receptors

Spawning Grounds (Coull et al., 1998)
(Species, Intensity)

- Sandeel, Undetermined



Coordinate System: WGS 1984 UTM Zone 31N

0 20 40 km

Scale: 1:650,000 A3 Page Size

Environmental Statement

Predicted Worst Case Impact Ranges for Sandeel from the Sequential Piling of Jacket Foundations within the ORCP Search Area (Stationary Receptor, 3,500kJ hammer energy, 5m pile diameter)

Figure 10.34

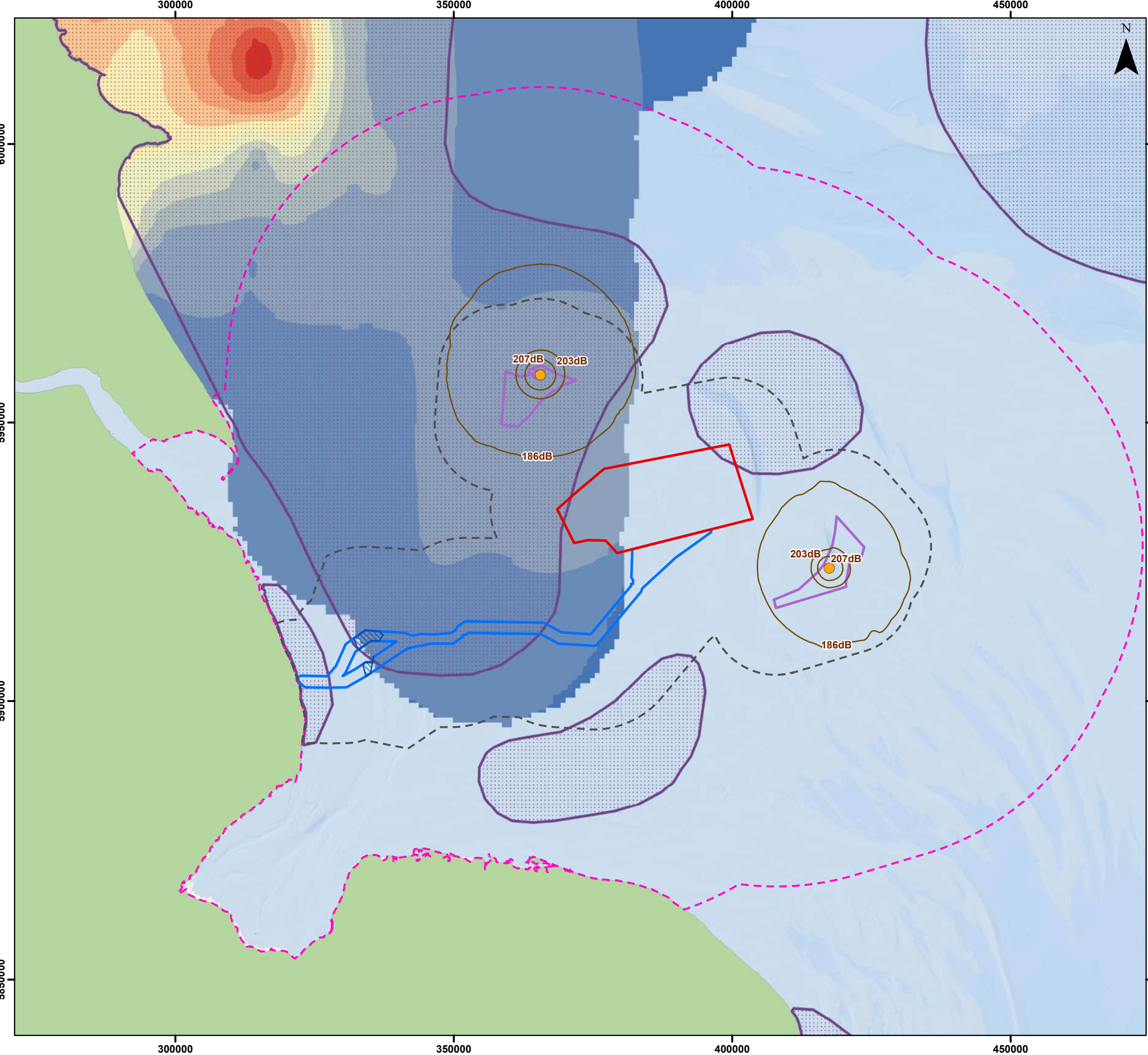




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Legend

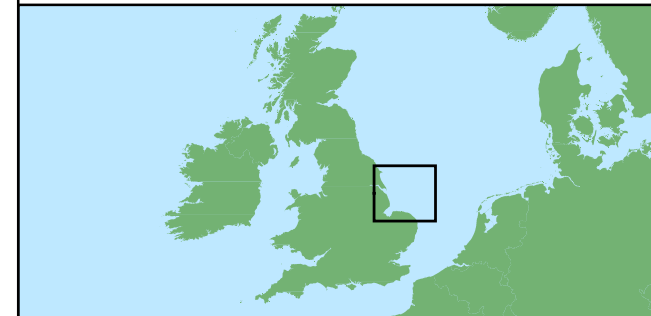
- Array Area
- Offshore Export Cable Corridor
- ORCP Area
- Artificial Nesting Structure Area
- Secondary Zone of Influence
- Underwater Noise Impacts 50km Buffer
- Underwater Noise Modelling Locations
- Monopile Contours (dB SELcum) - Stationary Receptors

Spawning Grounds (Coull et al., 1998)
(Species, Intensity)

- Herring, Undetermined

IHLS 2009/2010-2020/2021 Banks Data - Total Larval Abundance Per m²

	0
	0.1 - 1,500
	1,500.1 - 6,000
	6,000.1 - 12,750
	12,750.1 - 20,500
	20,500.1 - 28,500
	28,500.1 - 36,500
	36,500.1 - 44,500
	44,500.1 - 53,000
	53,000.1 - 63,000
	63,000.1 - 74,250
	74,250.1 - 93,250



Coordinate System: WGS 1984 UTM Zone 31N

0 20 40 km

Scale: 1:650,000

A3 Page Size

Environmental Statement

Predicted Worst Case Impact Ranges for spawning herring from the single piling of monopile foundations within the ANS search areas (Stationary receptor, 3,500kJ hammer energy, 8m pile diameter)

Figure 10.35

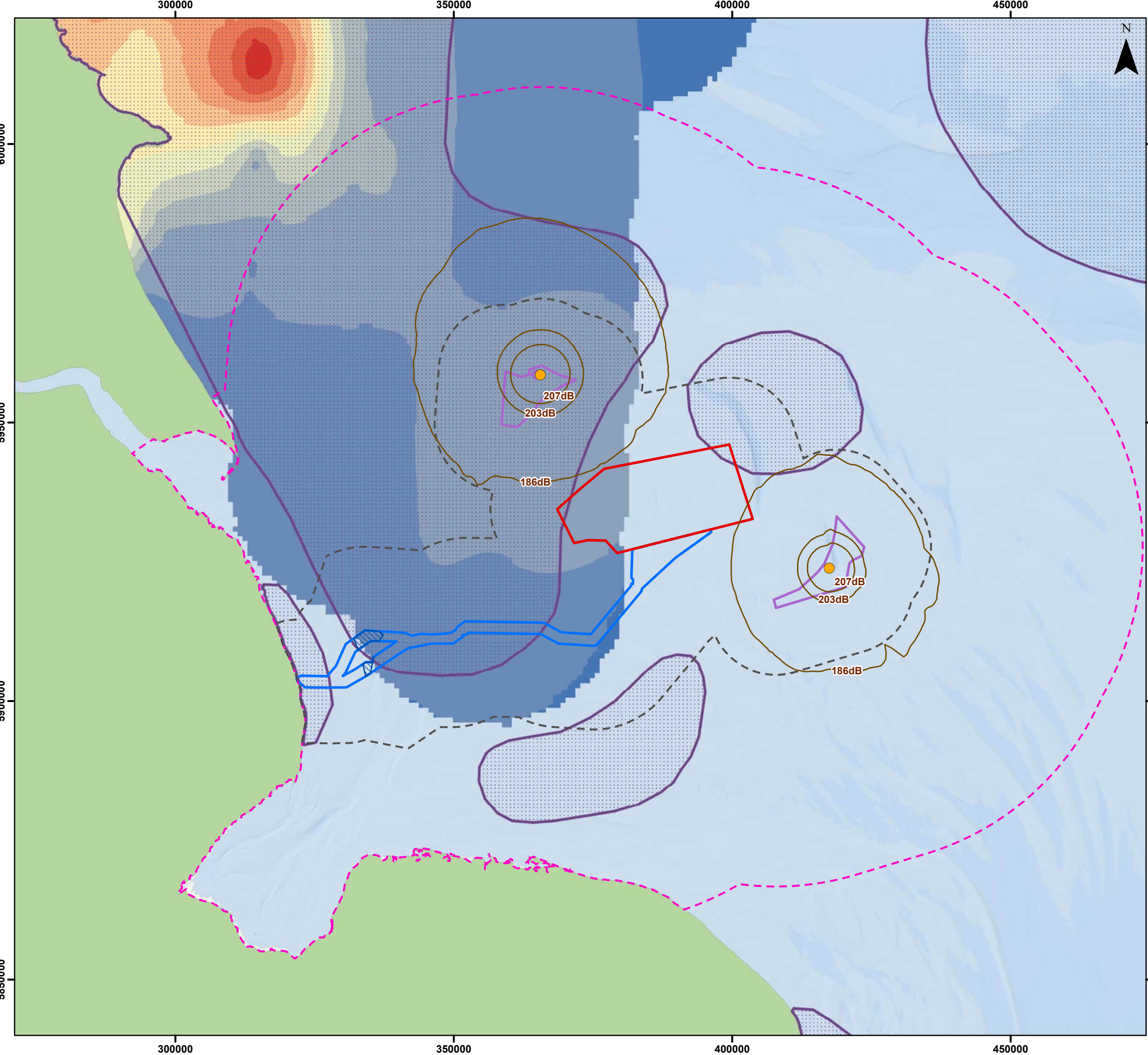




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Legend

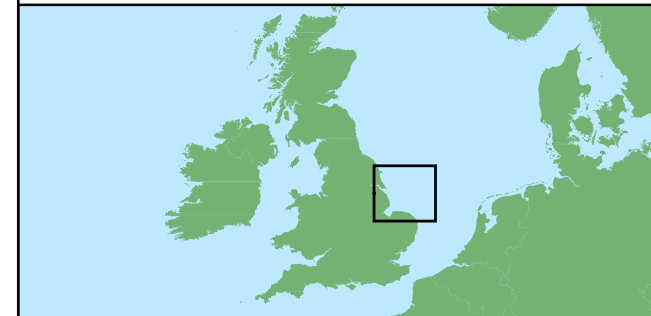
- Array Area
- Offshore Export Cable Corridor
- ORCP Area
- Artificial Nesting Structure Area
- Secondary Zone of Influence
- Underwater Noise Impacts 50km Buffer
- Underwater Noise Modelling Locations
- Simultaneous Jacket/Pin Piles Contours (dB SELcum) - Stationary Receptors

Spawning Grounds (Coull et al., 1998)
(Species, Intensity)

- Herring, Undetermined

IHLS 2009/2010-2020/2021 Banks Data - Total Larval Abundance Per m²

- 0
- 0.1 - 1,500
- 1,500.1 - 6,000
- 6,000.1 - 12,750
- 12,750.1 - 20,500
- 20,500.1 - 28,500
- 28,500.1 - 36,500
- 36,500.1 - 44,500
- 44,500.1 - 53,000
- 53,000.1 - 63,000
- 63,000.1 - 74,250
- 74,250.1 - 93,250



Coordinate System: WGS 1984 UTM Zone 31N

0 20 40 km

Scale: 1:650,000

A3 Page Size

Environmental Statement

Predicted Worst Case Impact Ranges for spawning herring from the sequential piling of jacket foundations within the ANS search area (Stationary receptor, 3,500kJ hammer energy, 5m pile diameter)

Figure 10.36

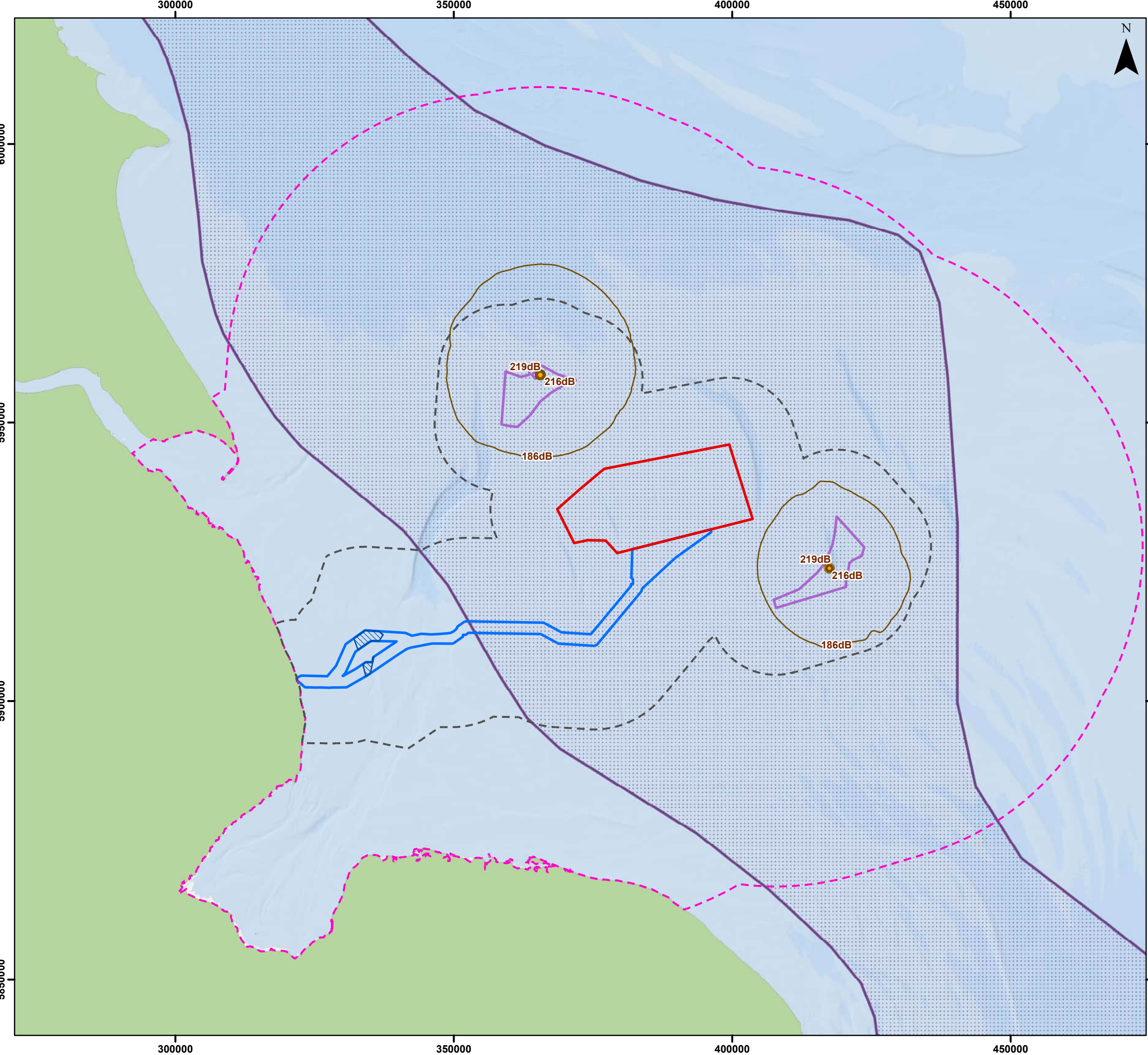
OUTER DOWSING
OFFSHORE WIND

GoBe

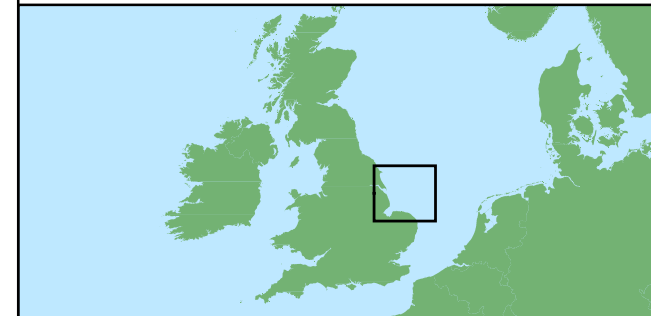
Date: 16/02/2024
Produced By: BPHB
Revision: 0.1

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- Legend**
- Array Area
 - Offshore Export Cable Corridor
 - ORCP Area
 - Artificial Nesting Structure Area
 - Secondary Zone of Influence
 - Underwater Noise Impacts 50km Buffer
 - Underwater Noise Modelling Locations
 - Monopile Contours (dB SELcum) - Stationary Receptors
- Spawning Grounds (Coull *et al.*, 1998)**
(Species, Intensity)
- Sandeel, Undetermined



Coordinate System: WGS 1984 UTM Zone 31N

0 20 40 km

Scale: 1:650,000 A3 Page Size

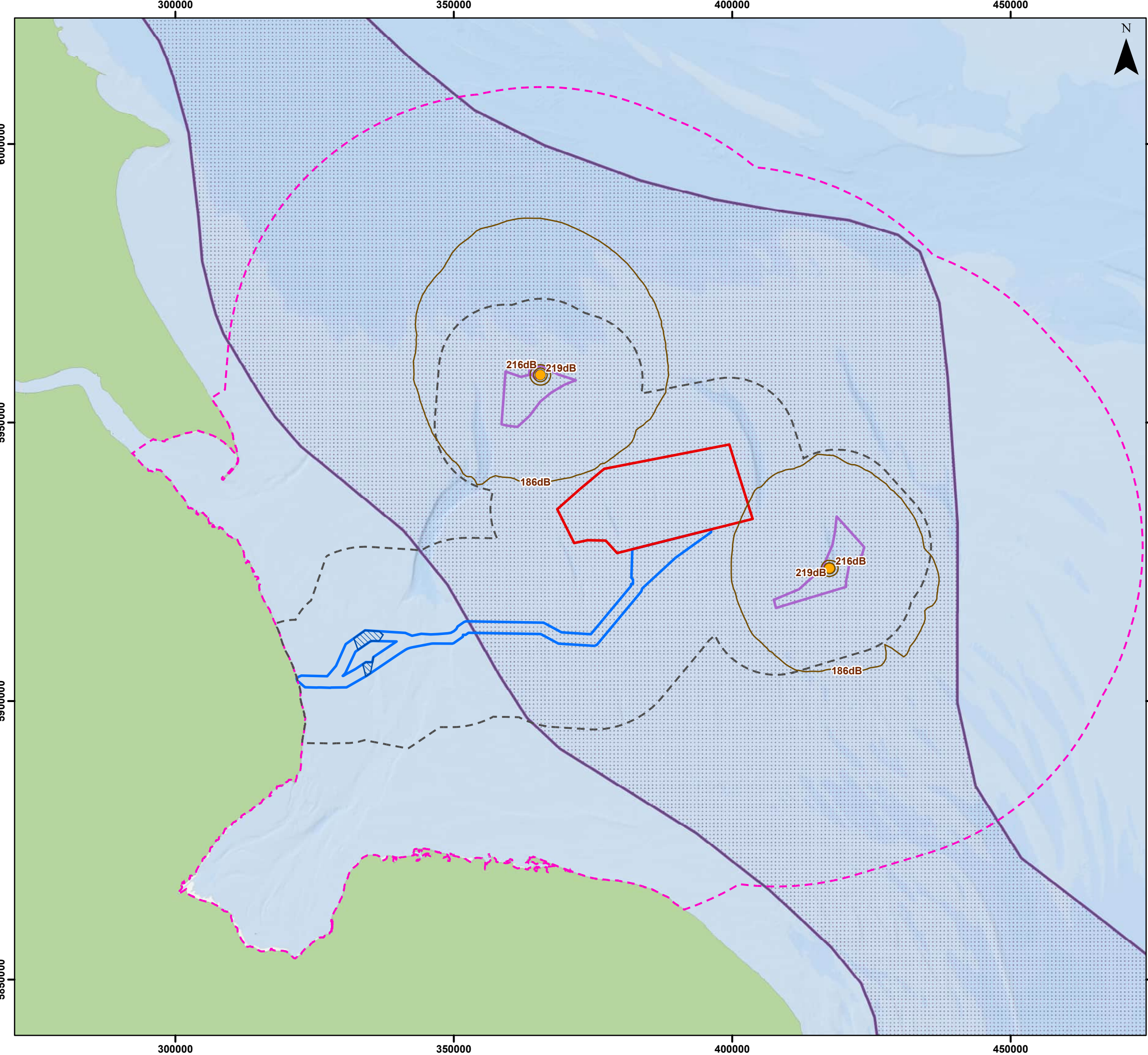
Environmental Statement

Predicted Worst Case Impact Ranges for sandeel from the single piling of monopile foundations within the ANS search areas (Stationary receptor, 3,500kJ hammer energy, 8m pile diameter)

Figure 10.37



Document Path: Z:\GIS\GIS - Projects\0152 Outer Dowsing ELA\GIS\Figures\Fish and Shellfish\ODOW_0152_FS_Fig10.37_Sandeel_Noise_ANS_Monopile_3500kJ_v1.mxd

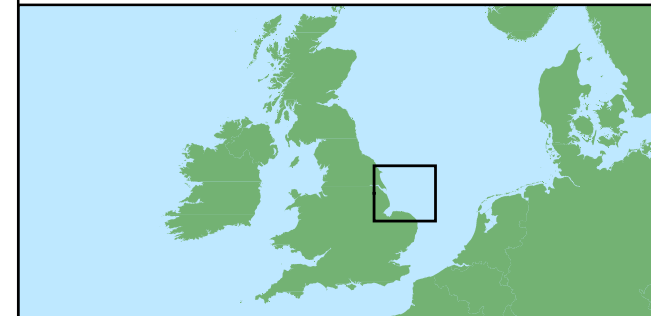


Legend

- Array Area
- Offshore Export Cable Corridor
- ORCP Area
- Artificial Nesting Structure Area
- Secondary Zone of Influence
- Underwater Noise Impacts 50km Buffer
- Underwater Noise Modelling Locations
- Simultaneous Jacket/Pin Piles Contours (dB SELcum) - Stationary Receptors

Spawning Grounds (Coull et al., 1998)
(Species, Intensity)

- Sandeel, Undetermined



Coordinate System: WGS 1984 UTM Zone 31N

0 20 40 km

Scale: 1:650,000 A3 Page Size

Environmental Statement

Predicted Worst Case Impact Ranges for sandeel from the sequential piling of jacket foundations within the ANS search area (Stationary receptor, 3,500kJ hammer energy, 5m pile diameter)

Figure 10.38

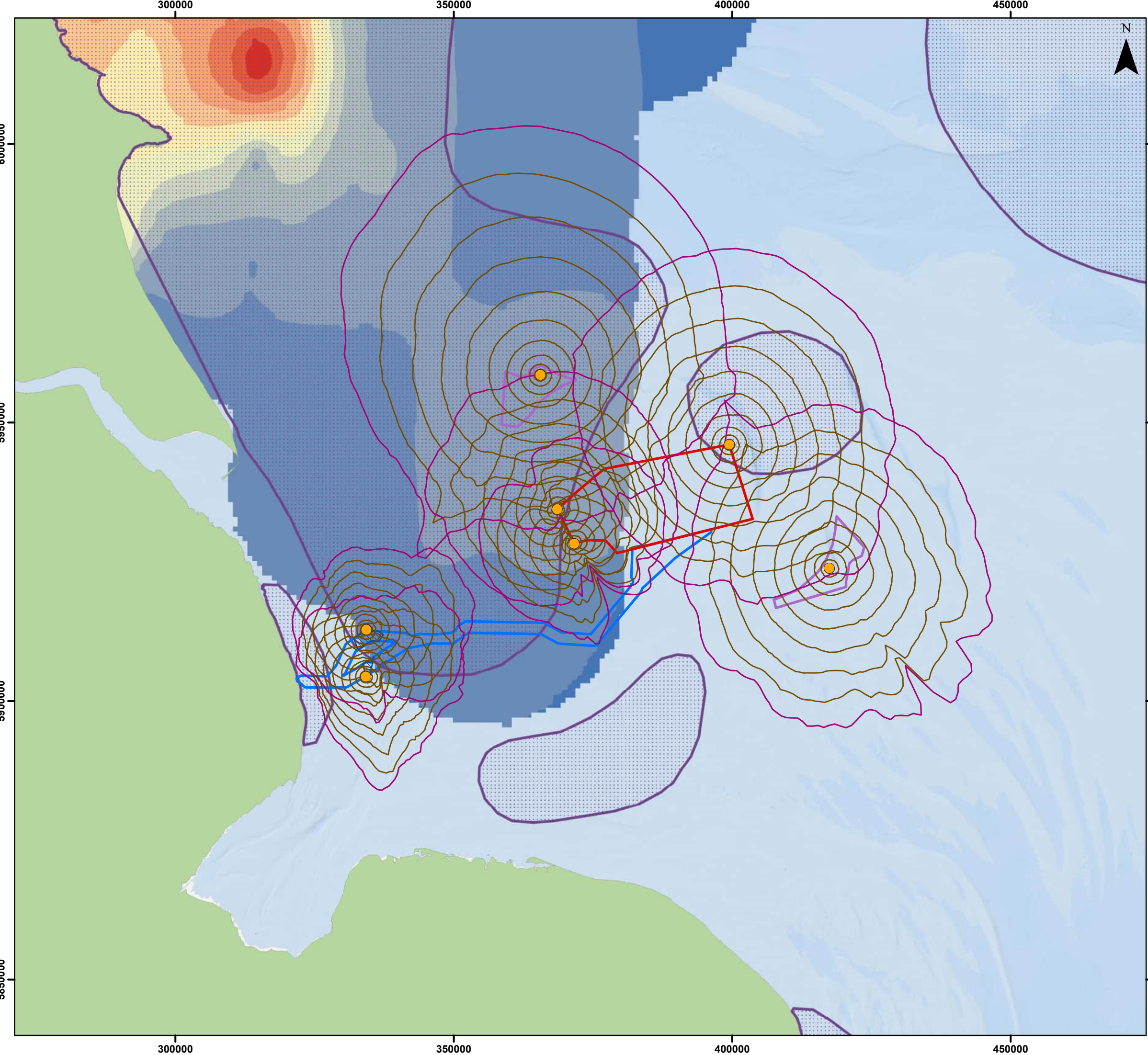




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Produced By: BPHB
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Legend

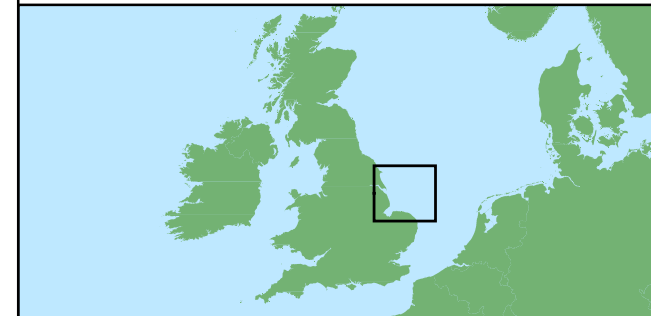
- Array Area
- Offshore Export Cable Corridor
- ORCP Area
- Artificial Nesting Structure Area
- Underwater Noise Modelling Locations
- Simultaneous Jacket/Pin Piles Contours (dB SELss) - Stationary Receptors
- 135dB Contour

Spawning Grounds (Coull et al., 1998)

- (Species, Intensity)**
- Herring, Undetermined

IHLS 2009/2010-2020/2021 Banks Data - Total Larval Abundance Per m²

- 0
- 0.1 - 1,500
- 1,500.1 - 6,000
- 6,000.1 - 12,750
- 12,750.1 - 20,500
- 20,500.1 - 28,500
- 28,500.1 - 36,500
- 36,500.1 - 44,500
- 44,500.1 - 53,000
- 53,000.1 - 63,000
- 63,000.1 - 74,250
- 74,250.1 - 93,250



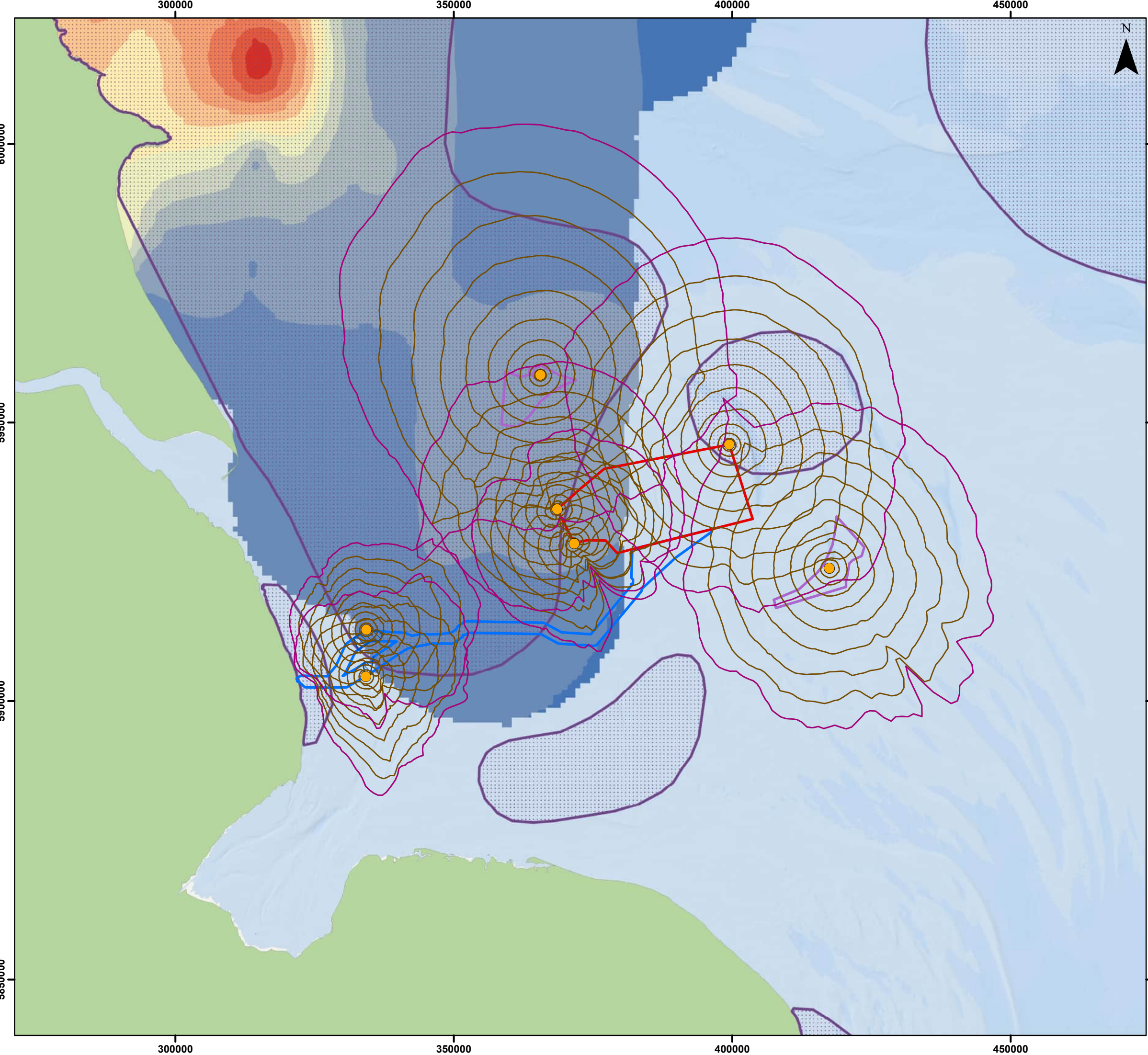
Coordinate System: WGS 1984 UTM Zone 31N
 0 20 40 km
 Scale: 1:650,000 A3 Page Size

Environmental Statement

Predicted Worst case Impact Ranges for herring from the piling of jacket foundations in the Array Area, ORCP and ANS search areas, 5dB increments (stationary receptors, 3,500kJ hammer energy, 5m pile diameter)
 Figure 10.39



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Legend

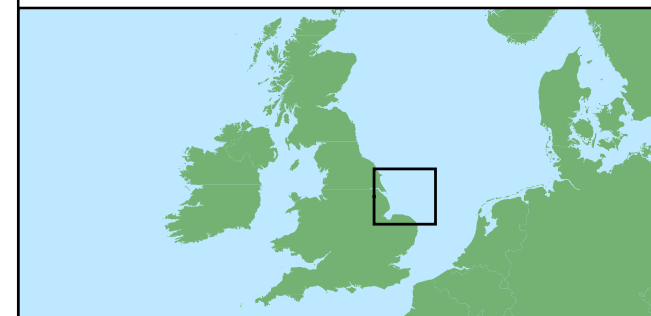
- Array Area
- Offshore Export Cable Corridor
- ORCP Area
- Artificial Nesting Structure Area
- Underwater Noise Modelling Locations
- Monopile Contours (dB SELss) - Stationary Receptors
- 135dB Contour

Spawning Grounds (Coull et al., 1998)
(Species, Intensity)

- Herring, Undetermined

IHLS 2009/2010-2020/2021 Banks Data - Total Larval Abundance Per m²

- 0
- 0.1 - 1,500
- 1,500.1 - 6,000
- 6,000.1 - 12,750
- 12,750.1 - 20,500
- 20,500.1 - 28,500
- 28,500.1 - 36,500
- 36,500.1 - 44,500
- 44,500.1 - 53,000
- 53,000.1 - 63,000
- 63,000.1 - 74,250
- 74,250.1 - 93,250



Coordinate System: WGS 1984 UTM Zone 31N

0 20 40 km

Scale: 1:650,000 A3 Page Size

Environmental Statement

Predicted Worst case Impact Ranges for herring from the piling of monopile foundations in the Array Area, ORCP and ANS search areas, 5dB increments (stationary receptors, 6,600kJ hammer energy, 14m pile diameter for Array Area and ORCP, 8m pile diameter for ANS) Figure 10.40



OUTER DOWSING
OFFSHORE WIND



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300000

400000

500000



Legend

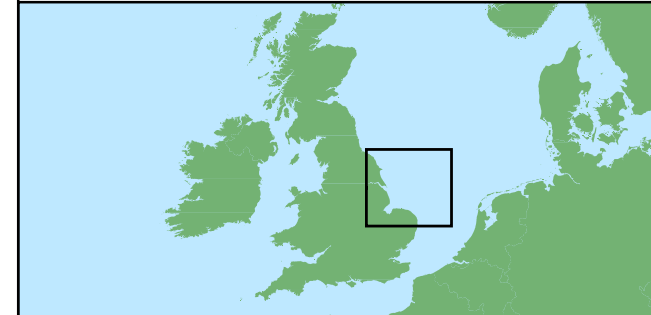
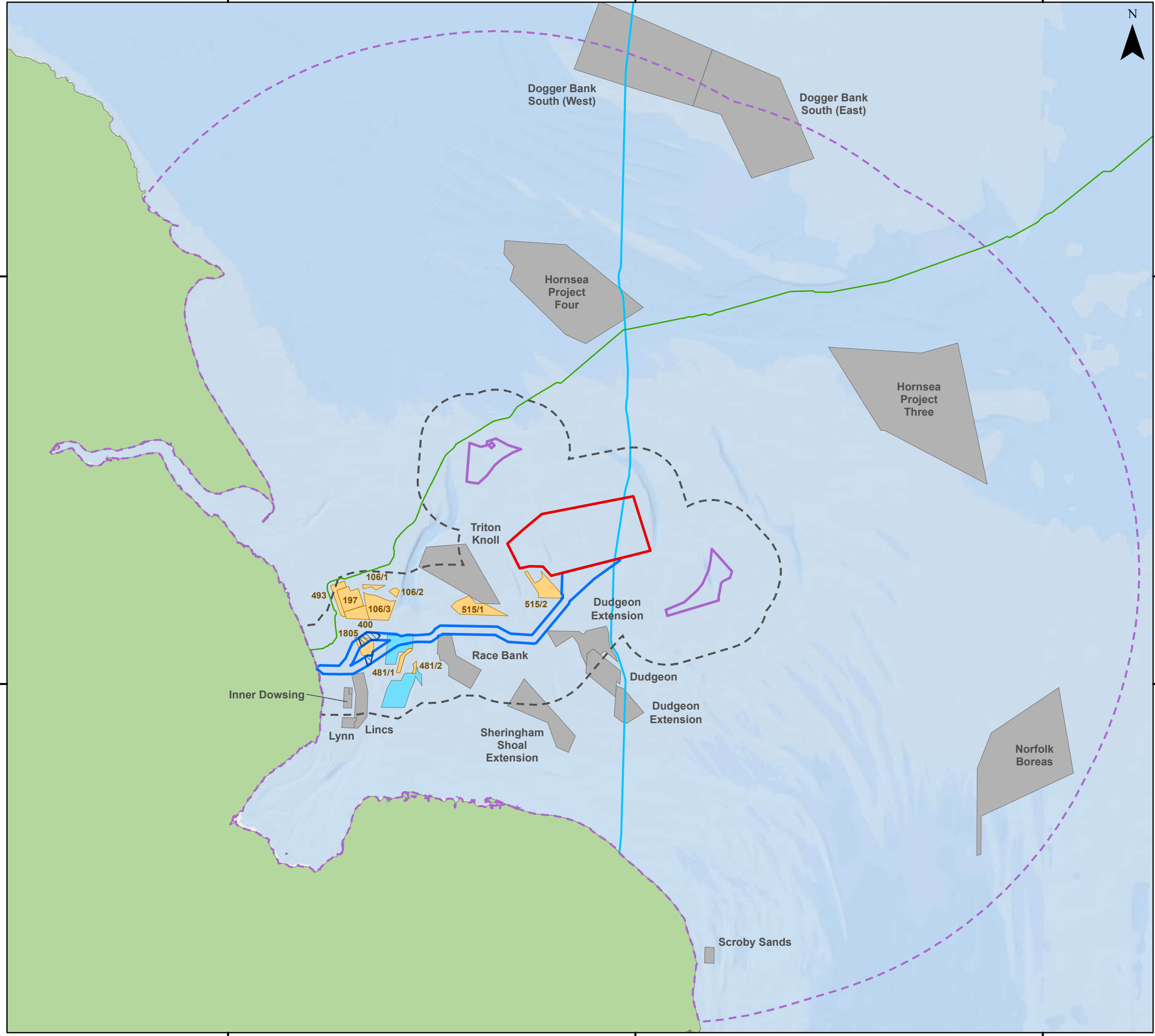
-  Array Area
-  Offshore Export Cable Corridor
-  ORCP Area
-  Artificial Nesting Structure Area
-  Secondary Zone of Influence
-  Underwater Noise Impacts 100km Buffer
-  Offshore Wind Farm Sites
-  Aggregate Area
-  Provisional Aggregates Area (2103)
-  Subsea Gas Pipeline - Shearwater to Bacton Seal Line (Shell)
-  Viking Link Interconnector

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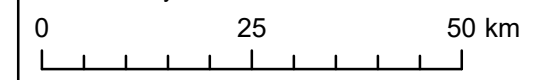
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Coordinate System: WGS 1984 UTM Zone 31N



Scale: 1:900,000 A3 Page Size

Environmental Statement

Projects and Plans Screened into the Project Fish and Shellfish Cumulative Assessment

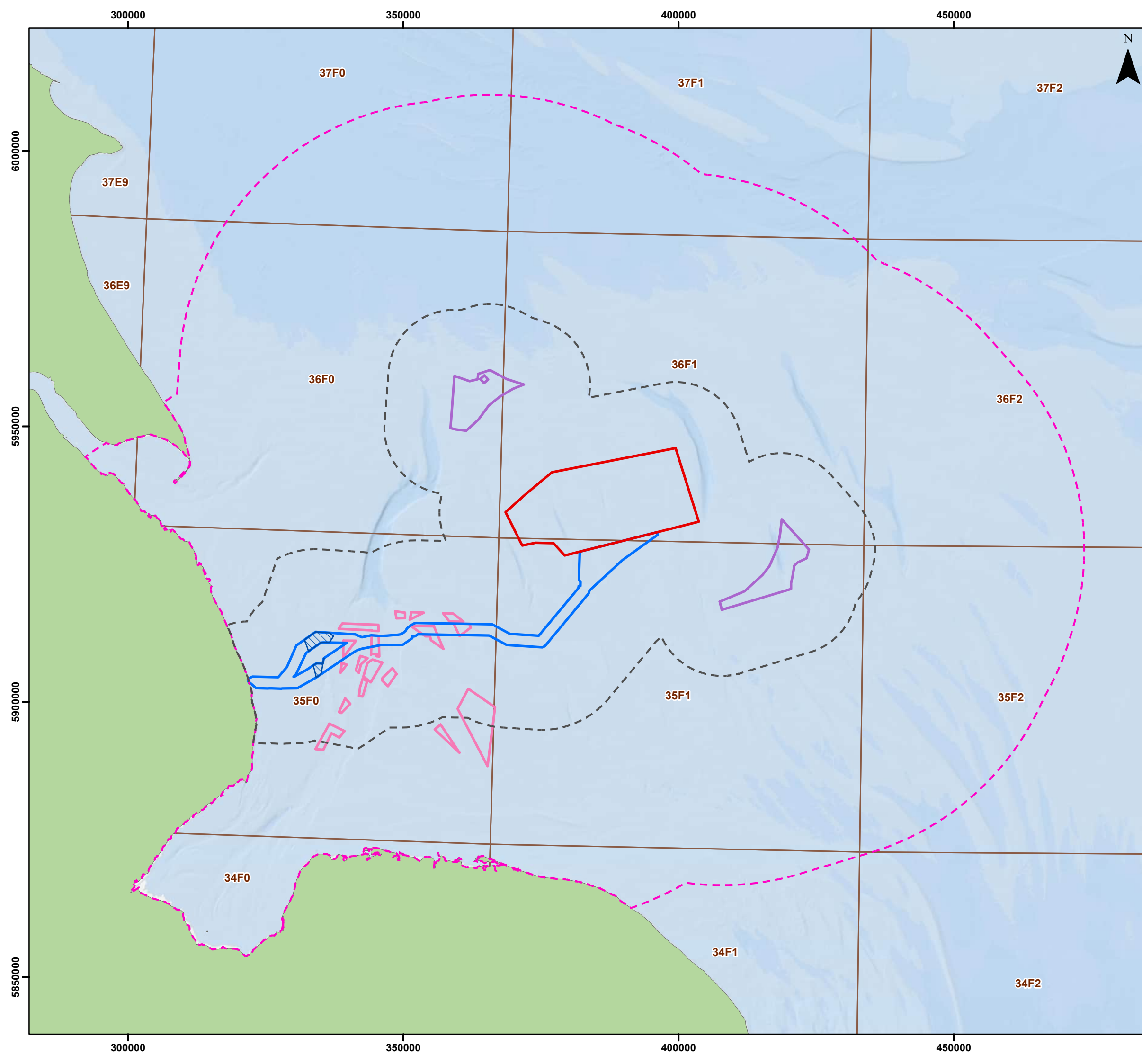
Figure 10.41



Date: 16/02/2024
 Produced By: BPHB
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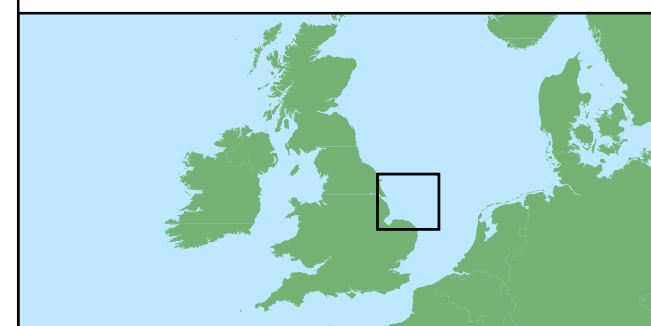
 Contains ESRI Basemapping; Esri, Garmin, GEBCO, NOAA NGDC, and other contributors

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Legend

- Array Area
- Offshore Export Cable Corridor
- ORCP Area
- Artificial Nesting Structure Area
- Biogenic Reef Restoration Area
- Secondary Zone of Influence
- Underwater Noise Impacts 50km Buffer
- ICES Rectangles



Coordinate System: WGS 1984 UTM Zone 31N

0 20 40 km

Scale: 1:650,000

A3 Page Size

Environmental Statement

Fish and Shellfish Ecology Study Area

Figure 10.1



OUTER DOWSING
OFFSHORE WIND

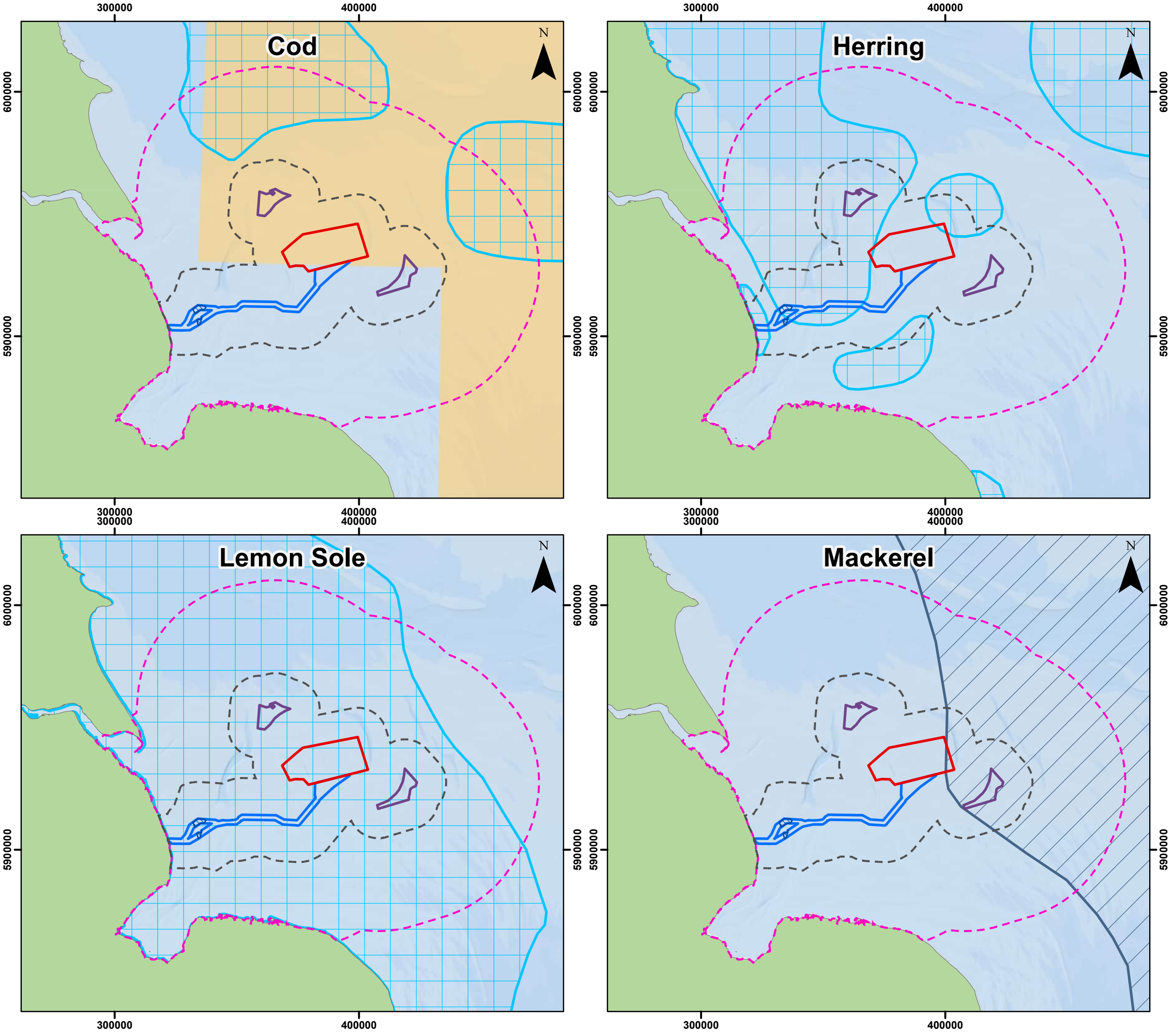


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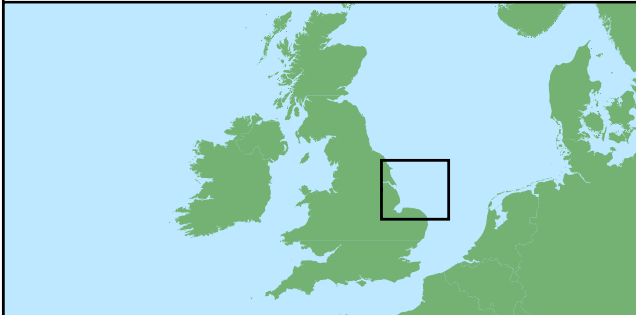
Date: 16/02/2024
Produced By: BPHB
Revision: 0.1

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- Legend**
- Array Area
 - Offshore Export Cable Corridor
 - ORCP Area
 - Artificial Nesting Structure Area
 - Secondary Zone of Influence
 - Underwater Noise Impacts 50km Buffer
- Spawning Grounds (Coull *et al.*, 1998) - Intensity**
- Higher
 - Lower
 - Undetermined
- Spawning Grounds (Ellis *et al.*, 2012) - Intensity**
- Higher
 - Lower



Coordinate System: WGS 1984 UTM Zone 31N

0 50 100 km

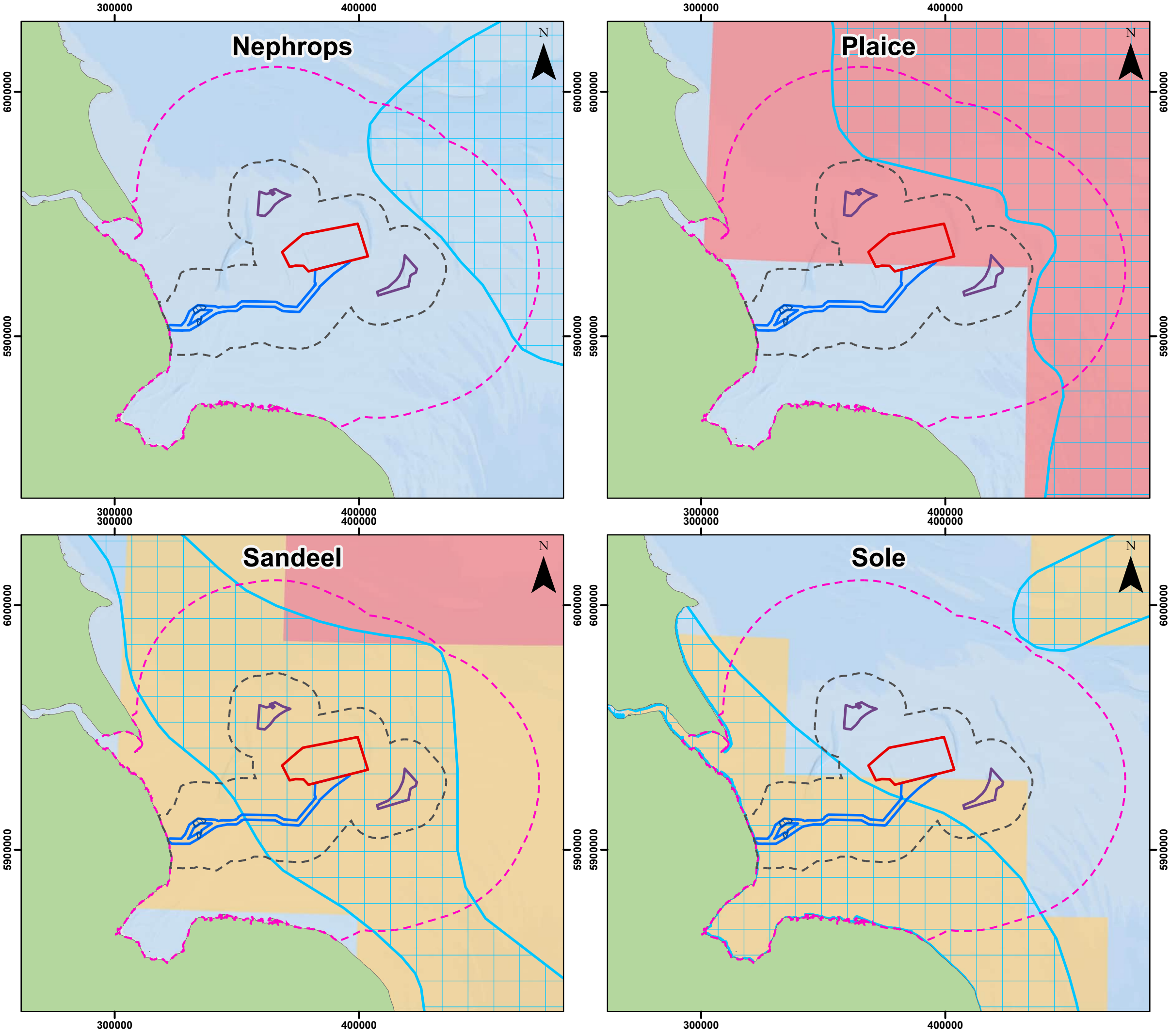
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Environmental Statement

Spawning Grounds Relative to the Project
(Coull *et al.*, 1998; Ellis *et al.*, 2012)

Figure 10.2





Legend

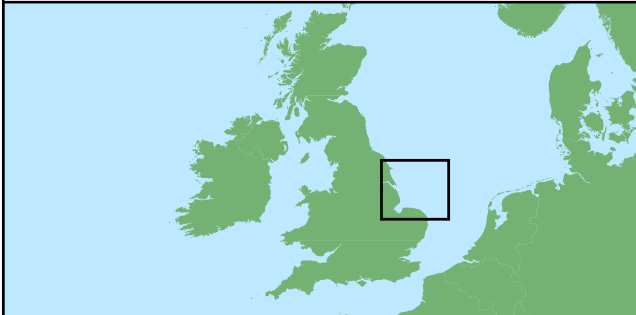
- Array Area
- Offshore Export Cable Corridor
- ORCP Area
- Artificial Nesting Structure Area
- Secondary Zone of Influence
- Underwater Noise Impacts 50km Buffer

Spawning Grounds (Coull *et al.*, 1998) - Intensity

- Higher
- Lower
- Undetermined

Spawning Grounds (Ellis *et al.*, 2012) - Intensity

- Higher
- Lower



Coordinate System: WGS 1984 UTM Zone 31N

0 50 100 km

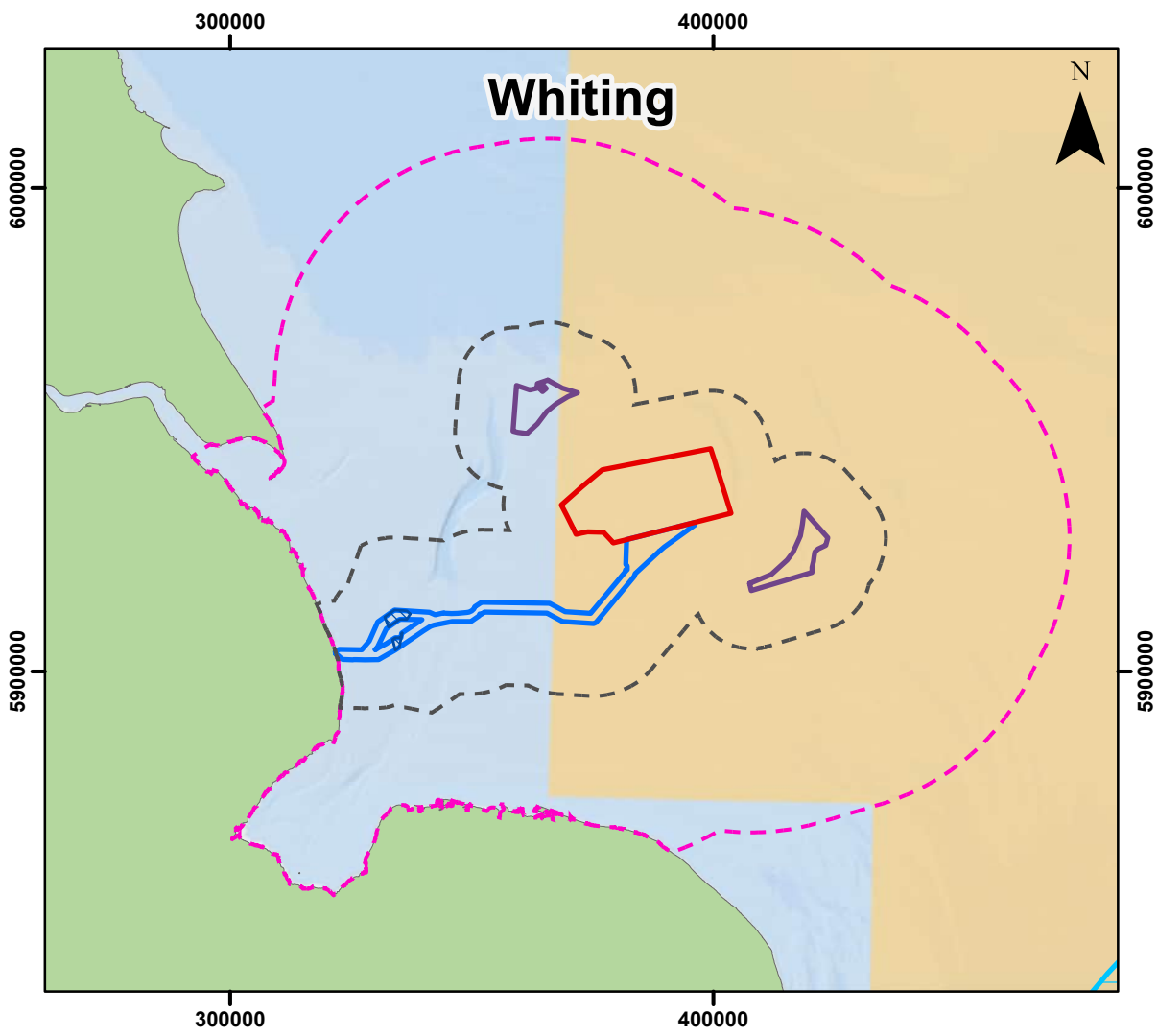
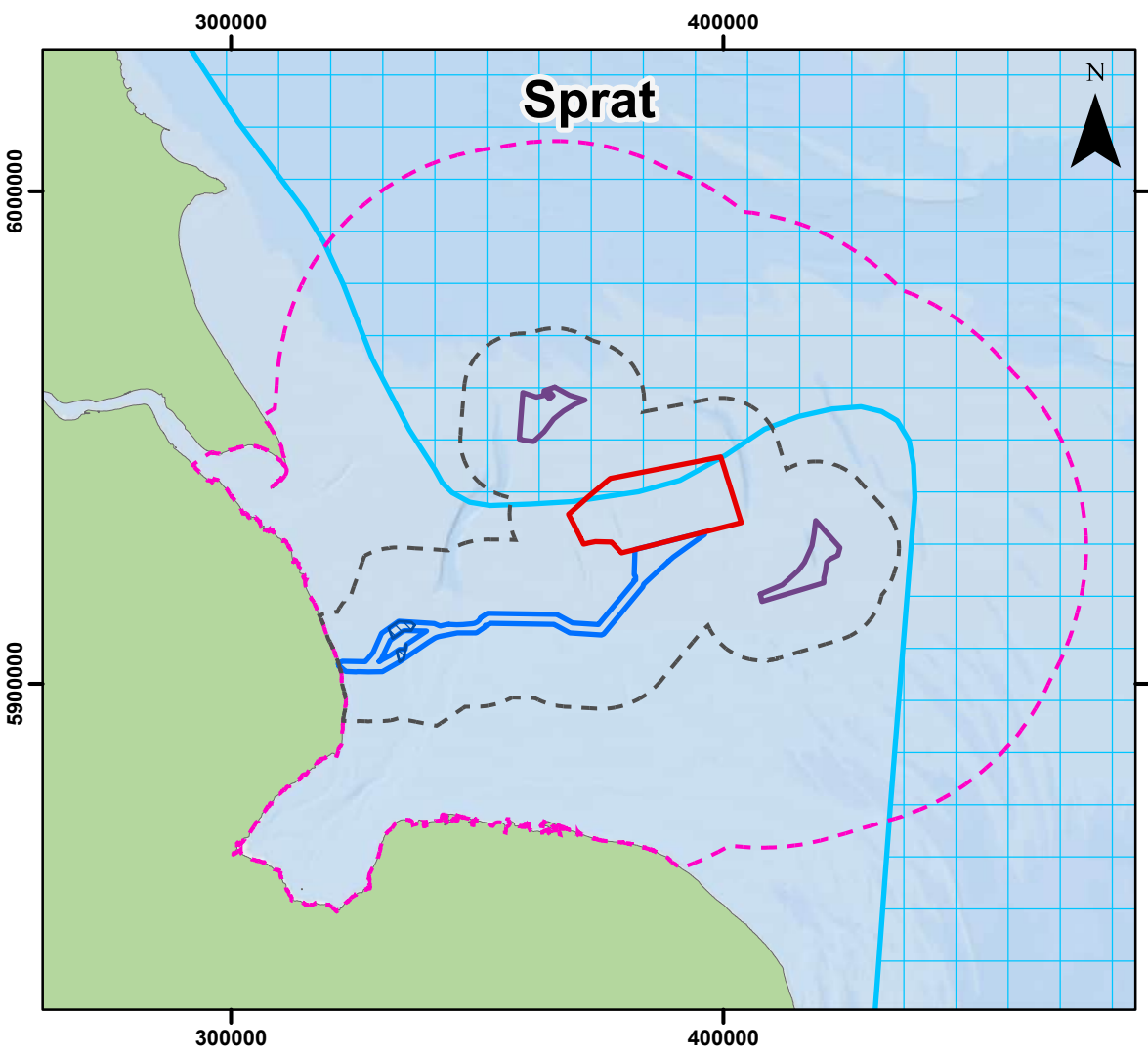
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Environmental Statement

Spawning Grounds Relative to the Project
(Coull *et al.*, 1998; Ellis *et al.*, 2012)

Figure 10.3





Legend

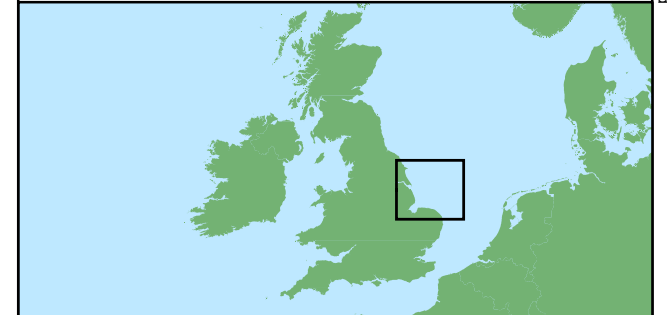
- Array Area
- Offshore Export Cable Corridor
- ORCP Area
- Artificial Nesting Structure Area
- Secondary Zone of Influence
- Underwater Noise Impacts 50km Buffer

Spawning Grounds (Coull *et al.*, 1998) - Intensity

- Higher
- Lower
- Undetermined

Spawning Grounds (Ellis *et al.*, 2012) - Intensity

- Higher
- Lower



Coordinate System: WGS 1984 UTM Zone 31N

0 50 100 km

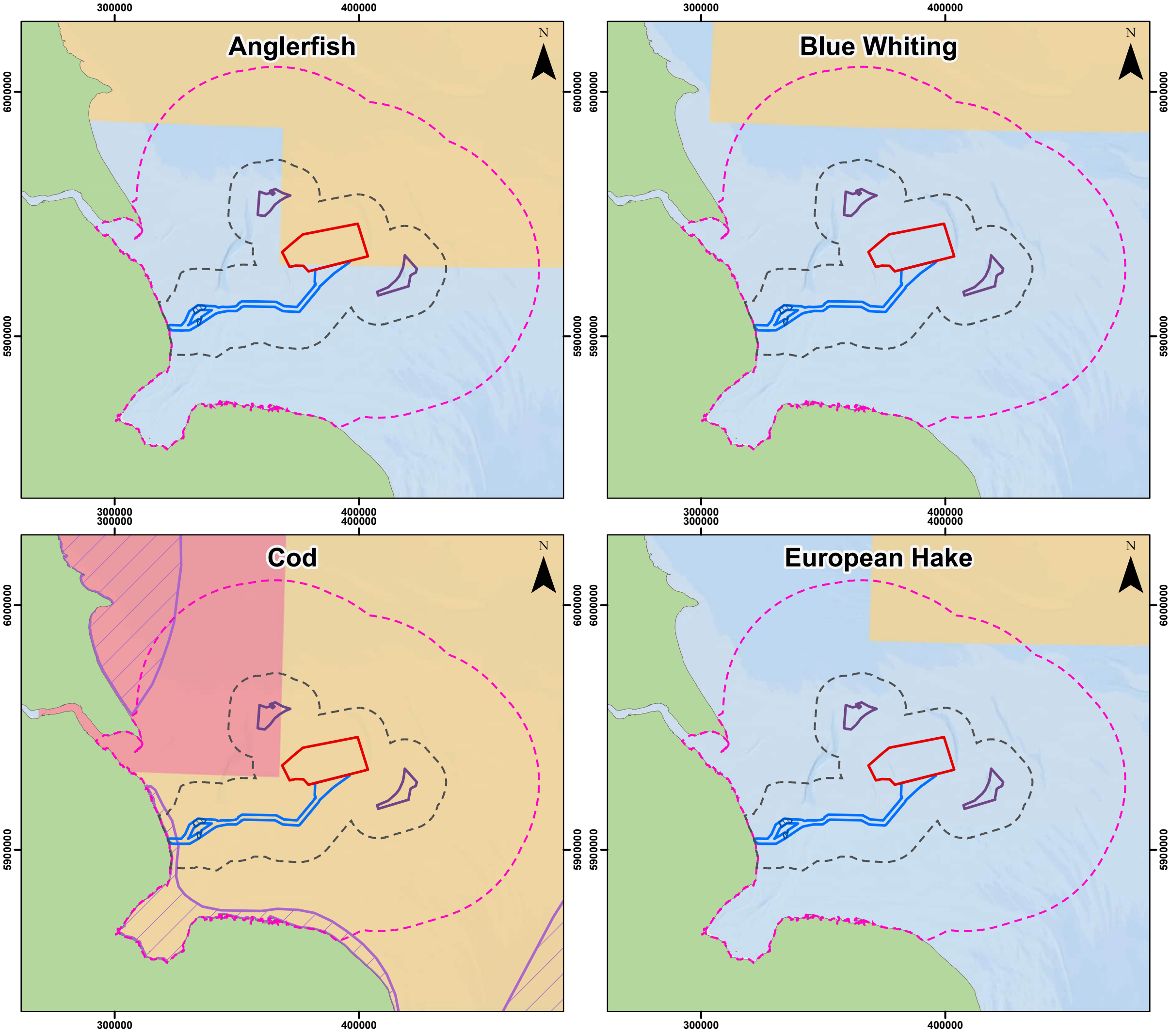
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Environmental Statement

Spawning Grounds Relative to the Project
(Coull *et al.*, 1998; Ellis *et al.*, 2012)

Figure 10.4



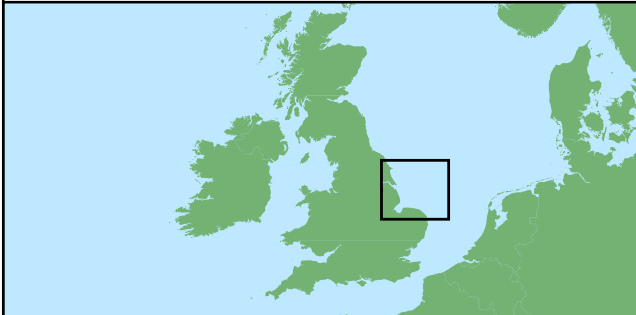


Legend

- Array Area
- Offshore Export Cable Corridor
- ORCP Area
- Artificial Nesting Structure Area
- Secondary Zone of Influence
- Underwater Noise Impacts 50km Buffer
- Nursery Grounds (Coull *et al.*, 1998)

Nursery Grounds (Ellis *et al.*, 2012) - Intensity

- Higher
- Lower



Coordinate System: WGS 1984 UTM Zone 31N

0 50 100 km

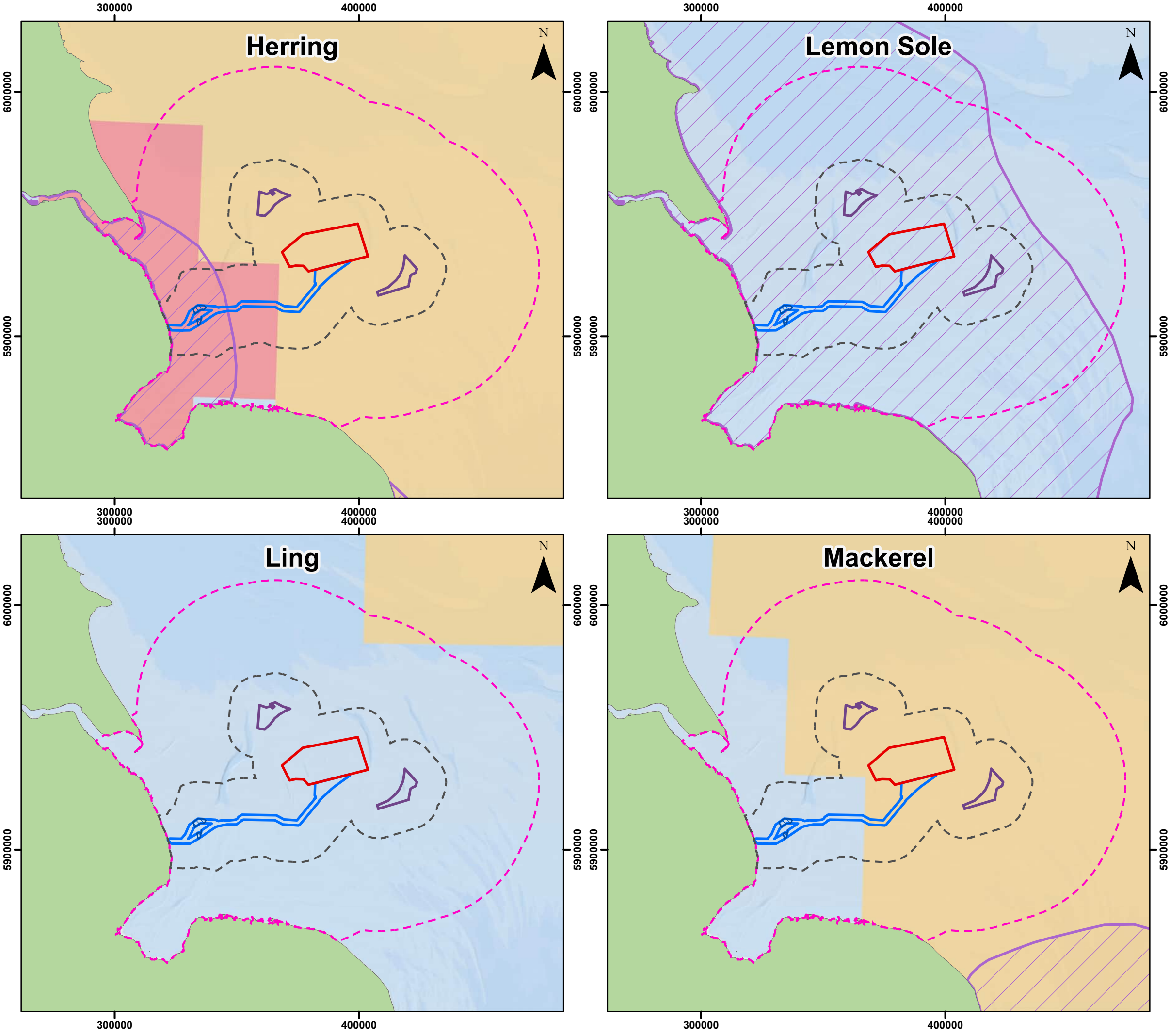
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Environmental Statement

Nursery Grounds Relative to the Project
(Coull *et al.*, 1998; Ellis *et al.*, 2012)

Figure 10.5



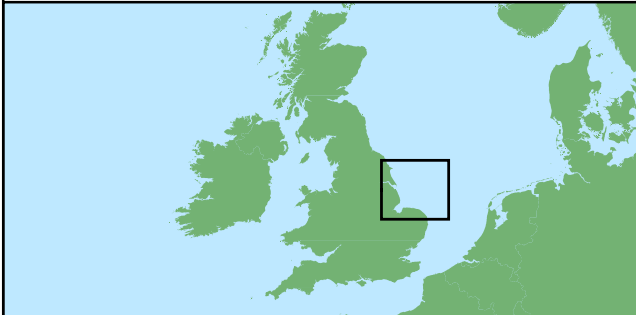


Legend

- Array Area
- Offshore Export Cable Corridor
- ORCP Area
- Artificial Nesting Structure Area
- Secondary Zone of Influence
- Underwater Noise Impacts 50km Buffer
- Nursery Grounds (Coull *et al.*, 1998)

Nursery Grounds (Ellis *et al.*, 2012) - Intensity

- Higher
- Lower



Coordinate System: WGS 1984 UTM Zone 31N

0 50 100 km

Scale: 1:1,500,000 A3 Page Size

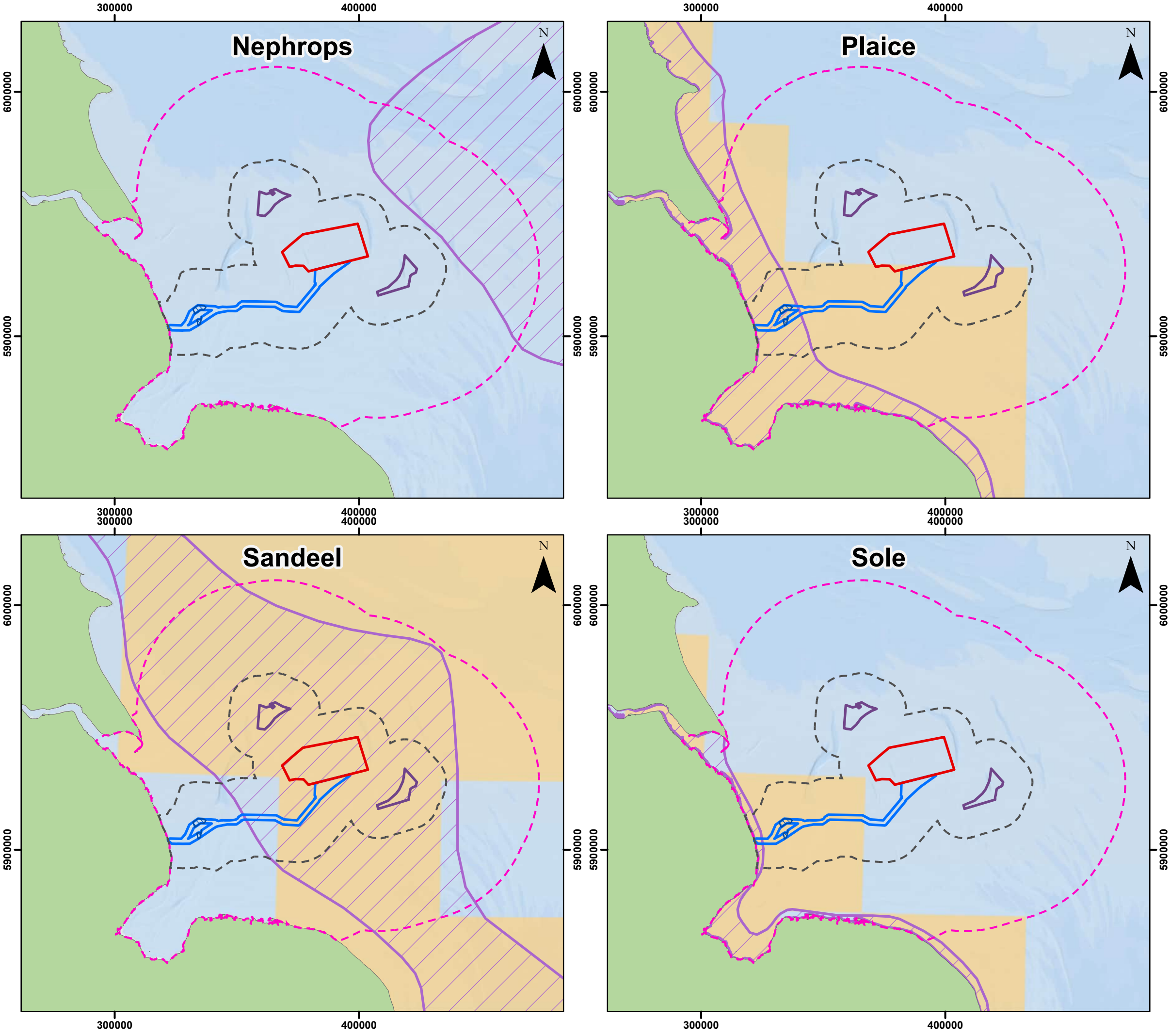
Environmental Statement

Nursery Grounds Relative to the Project
(Coull *et al.*, 1998; Ellis *et al.*, 2012)

Figure 10.6

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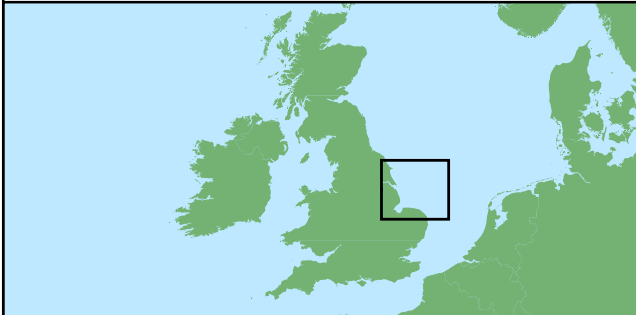


Legend

- Array Area
- Offshore Export Cable Corridor
- ORCP Area
- Artificial Nesting Structure Area
- Secondary Zone of Influence
- Underwater Noise Impacts 50km Buffer
- Nursery Grounds (Coull *et al.*, 1998)

Nursery Grounds (Ellis *et al.*, 2012) - Intensity

- Higher
- Lower



Coordinate System: WGS 1984 UTM Zone 31N

0 50 100 km

Scale: 1:1,500,000 A3 Page Size

Environmental Statement

Nursery Grounds Relative to the Project
(Coull *et al.*, 1998; Ellis *et al.*, 2012)

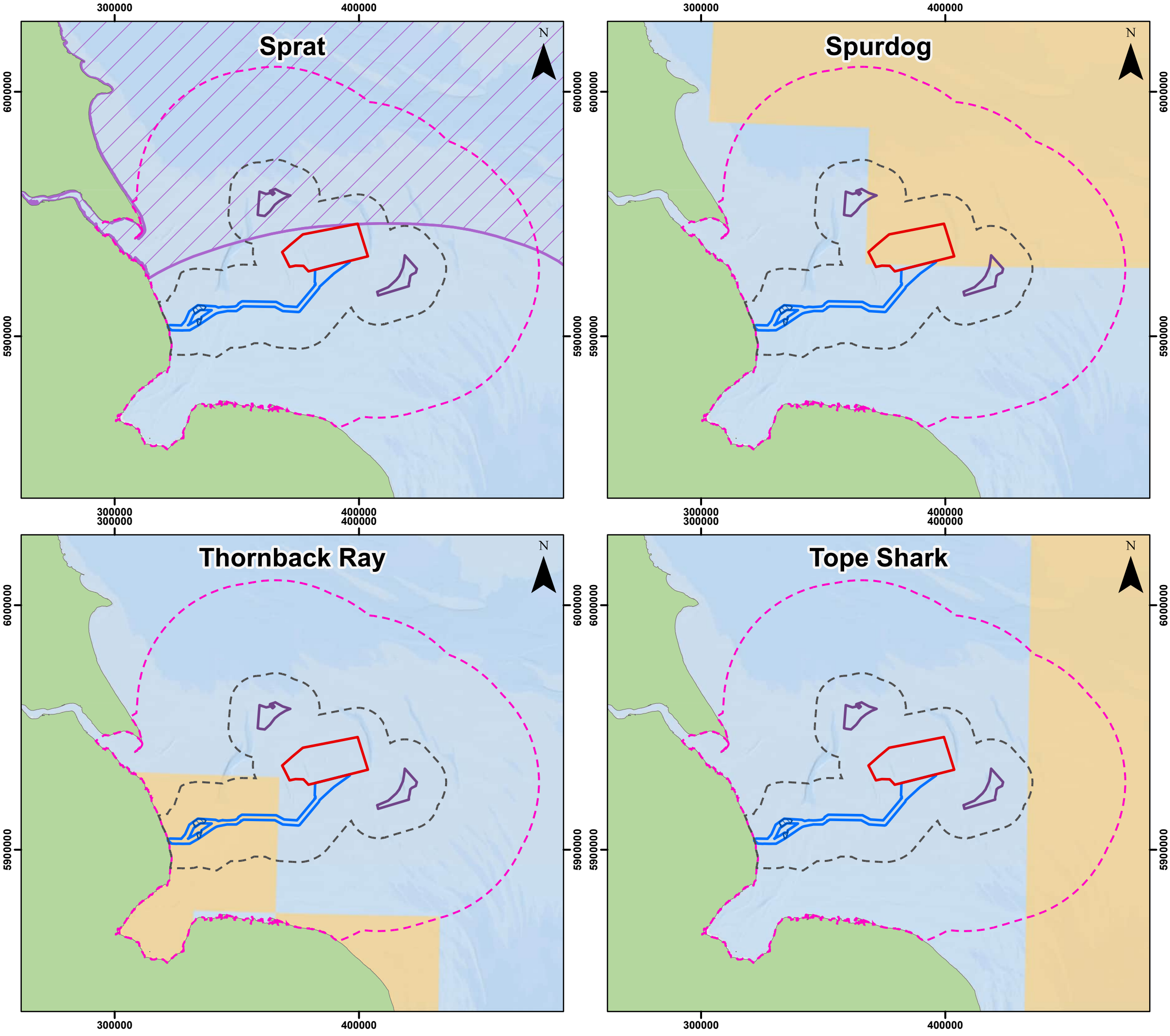
Figure 10.7

OUTER DOWSING OFFSHORE WIND

Gobe

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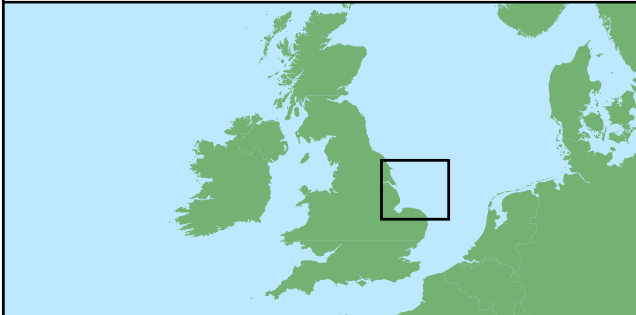
Contains ESRI Basemapping; Esri, Garmin, GEBCO, NOAA NGDC, and other contributors



Legend

- Array Area
- Offshore Export Cable Corridor
- ORCP Area
- Artificial Nesting Structure Area
- Secondary Zone of Influence
- Underwater Noise Impacts 50km Buffer
- Nursery Grounds (Coull *et al.*, 1998)
- Higher
- Lower

Nursery Grounds (Ellis *et al.*, 2012) - Intensity



Coordinate System: WGS 1984 UTM Zone 31N

0 50 100 km

Scale: 1:1,500,000 A3 Page Size

Environmental Statement

Nursery Grounds Relative to the Project
(Coull *et al.*, 1998; Ellis *et al.*, 2012)

Figure 10.8

OUTER DOWSING OFFSHORE WIND

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Revision: 0.1

Contains ESRI Basemapping; Esri, Garmin, GEBCO, NOAA NGDC, and other contributors

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
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Whiting

Legend

-  Array Area
-  Offshore Export Cable Corridor
-  ORCP Area
-  Artificial Nesting Structure Area
-  Secondary Zone of Influence
-  Underwater Noise Impacts 50km Buffer
-  Nursery Grounds (Coull *et al.*, 1998)
- Nursery Grounds (Ellis *et al.*, 2012) - Intensity**
-  Higher
-  Lower

6000000

000009

5900000

000065

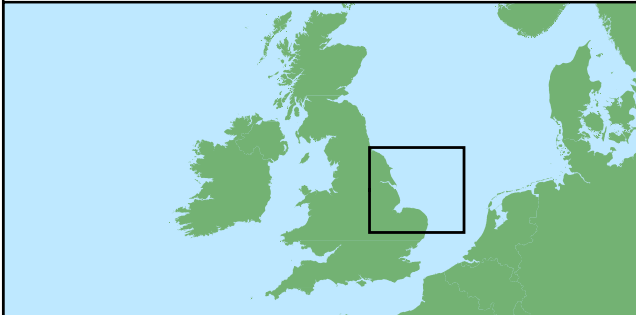
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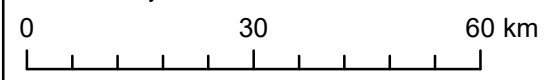
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400000

500000



Coordinate System: WGS 1984 UTM Zone 31N



Scale: 1:1,000,000 A3 Page Size

Environmental Statement

Nursery Grounds Relative to the Project
(Coull *et al.*, 1998; Ellis *et al.*, 2012)

Figure 10.9

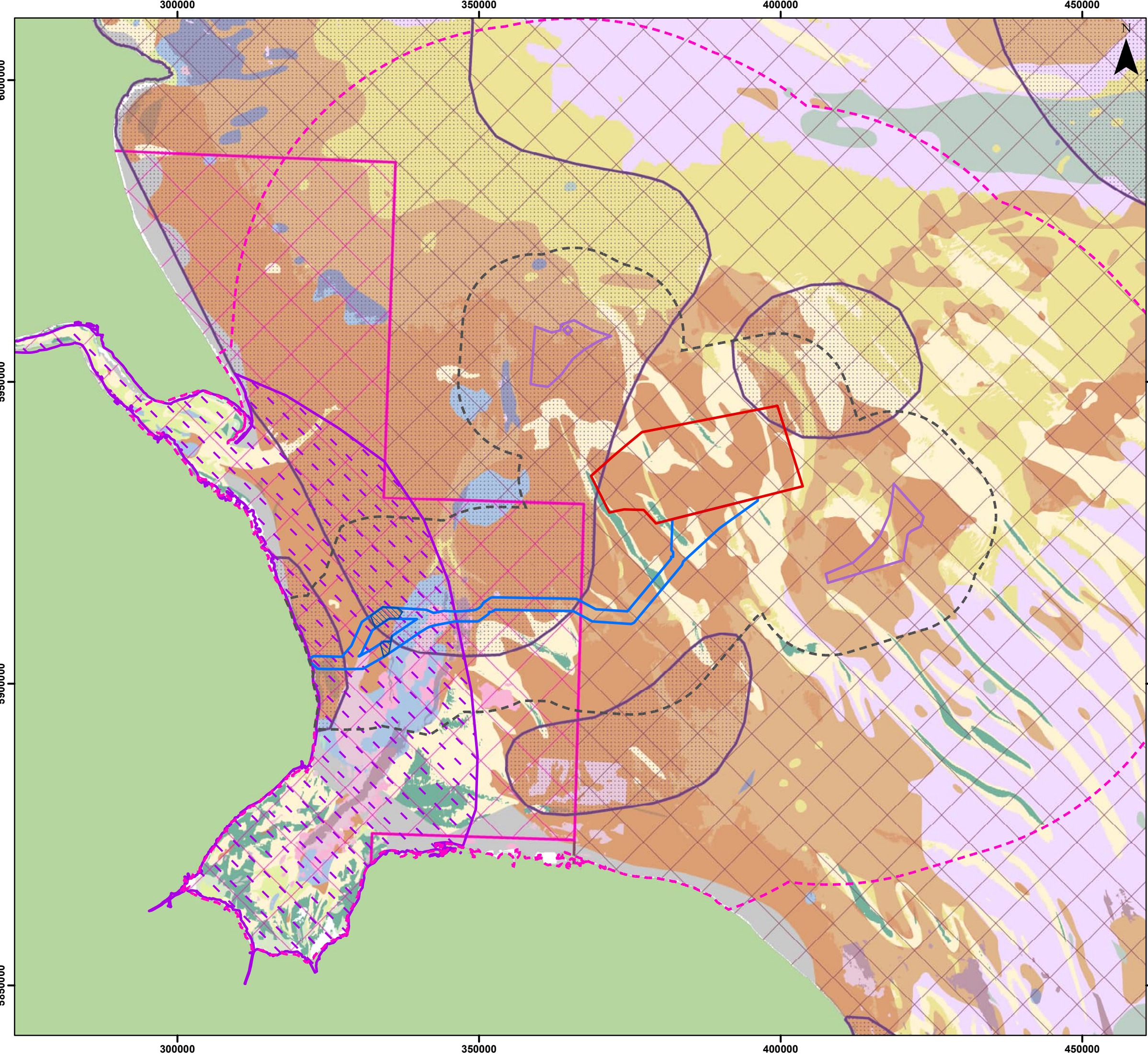


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NGDC, and other contributors

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Legend

- Array Area
- Offshore Export Cable Corridor
- ORCP Area
- Artificial Nesting Structure Area
- Secondary Zone of Influence
- Underwater Noise Impacts 50km Buffer
- Herring Nursery Grounds (Coull et al., 1998)
- Herring Spawning Grounds (Coull et al., 1998)
- Herring Nursery Grounds - High Intensity (Ellis et al., 2010)
- Herring Nursery Grounds - Low Intensity (Ellis et al., 2010)

EUSeaMap 2021 (EMODnet, 2021)

- A3.1: Atlantic and Mediterranean high energy infralittoral rock
- A3.2: Atlantic and Mediterranean moderate energy infralittoral rock
- A4.1: Atlantic and Mediterranean high energy circalittoral rock
- A4.2: Atlantic and Mediterranean moderate energy circalittoral rock
- A4.27: Faunal communities on deep moderate energy circalittoral rock
- A5.13: Infralittoral coarse sediment
- A5.14: Circalittoral coarse sediment
- A5.15: Deep circalittoral coarse sediment
- A5.23 or A5.24: Infralittoral fine sand or Infralittoral muddy sand
- A5.25 or A5.26: Circalittoral fine sand or Circalittoral muddy sand
- A5.27: Deep circalittoral sand
- A5.33: Infralittoral sandy mud
- A5.34: Infralittoral fine mud
- A5.35: Circalittoral sandy mud
- A5.36: Circalittoral fine mud
- A5.37: Deep circalittoral mud
- A5.43: Infralittoral mixed sediments
- A5.44: Circalittoral mixed sediments
- A5.45: Deep circalittoral mixed sediments
- A5.6: Sublittoral biogenic reefs
- A5.61: Sublittoral polychaete worm reefs on sediment
- A5.611: [Sabellaria spinulosa] on stable circalittoral mixed sediment
- No EUNIS habitat assigned

Coordinate System: WGS 1984 UTM Zone 31N

0 10 20 km



Scale: 1:600,000

A3 Page Size

Environmental Statement

Herring Spawning and Nursery Grounds with EUSeaMap 2021 Relative to the Project

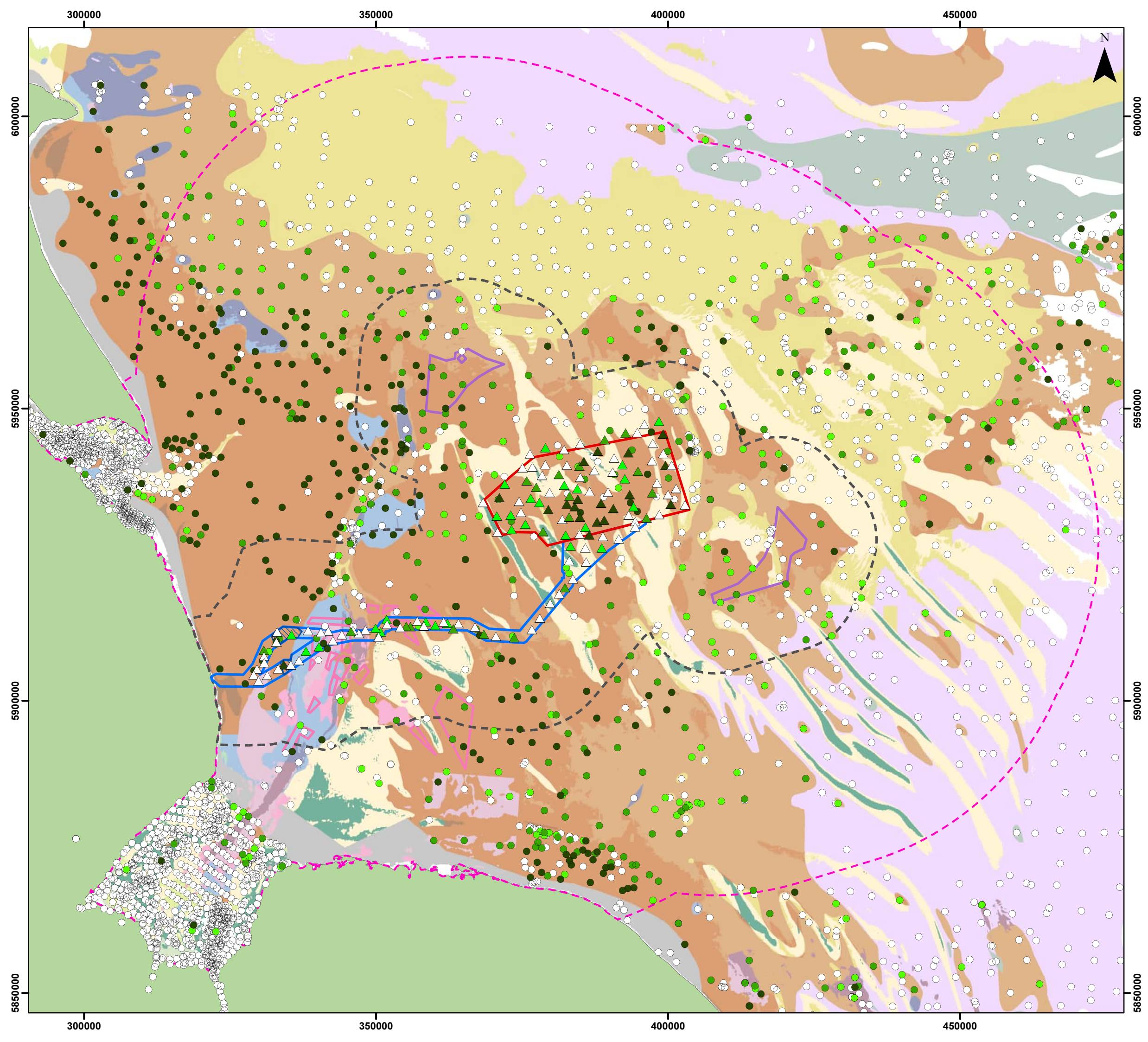
Figure 10.10

Date: 16/02/2024
 Produced By: BPHB
 Revision: 0.1

Contains ESRI Basemapping; EMODnet 2020 bathymetry

Document Path: Z:\GIS\GIS - Projects\0152 Outer Dowsing EIA\GIS\Figures\Fish and Shellfish\ODOW_0152_FS_Fig10.10 Herring Spawning EUSeaMap2021_v1.mxd



Legend

- Array Area
- Offshore Export Cable Corridor
- ORCP Area
- Artificial Nesting Structure Area
- Biogenic Reef Restoration Area
- Secondary Zone of Influence
- Underwater Noise Impacts 50km Buffer

EUSeaMap 2021 (EMODnet, 2021)

- A3.1: Atlantic and Mediterranean high energy infralittoral rock
- A3.2: Atlantic and Mediterranean moderate energy infralittoral rock
- A4.1: Atlantic and Mediterranean high energy circalittoral rock
- A4.2: Atlantic and Mediterranean moderate energy circalittoral rock
- A4.27: Faunal communities on deep moderate energy circalittoral rock
- A5.13: Infralittoral coarse sediment
- A5.14: Circalittoral coarse sediment
- A5.15: Deep circalittoral coarse sediment
- A5.23 or A5.24: Infralittoral fine sand or Infralittoral muddy sand
- A5.25 or A5.26: Circalittoral fine sand or Circalittoral muddy sand
- A5.27: Deep circalittoral sand
- A5.33: Infralittoral sandy mud
- A5.34: Infralittoral fine mud
- A5.35: Circalittoral sandy mud
- A5.36: Circalittoral fine mud
- A5.37: Deep circalittoral mud
- A5.43: Infralittoral mixed sediments
- A5.44: Circalittoral mixed sediments
- A5.45: Deep circalittoral mixed sediments
- A5.6: Sublittoral biogenic reefs
- A5.61: Sublittoral polychaete worm reefs on sediment
- A5.611: [Sabellaria spinulosa] on stable circalittoral mixed sediment
- No EUNIS habitat assigned

Herring Habitat Suitability (Reach et al., 2013)

- Prime, Preferred
- Sub-Prime, Preferred
- Suitable, Marginal
- Unsuitable

Data Source:

- BGS, 2015
- Outer Dowsing, 2022

Coordinate System: WGS 1984 UTM Zone 31N

0 10 20 km



Scale: 1:600,000

A3 Page Size

Environmental Statement

Herring Habitat Suitability Data with EUSeaMap 2021 Relative to the Project

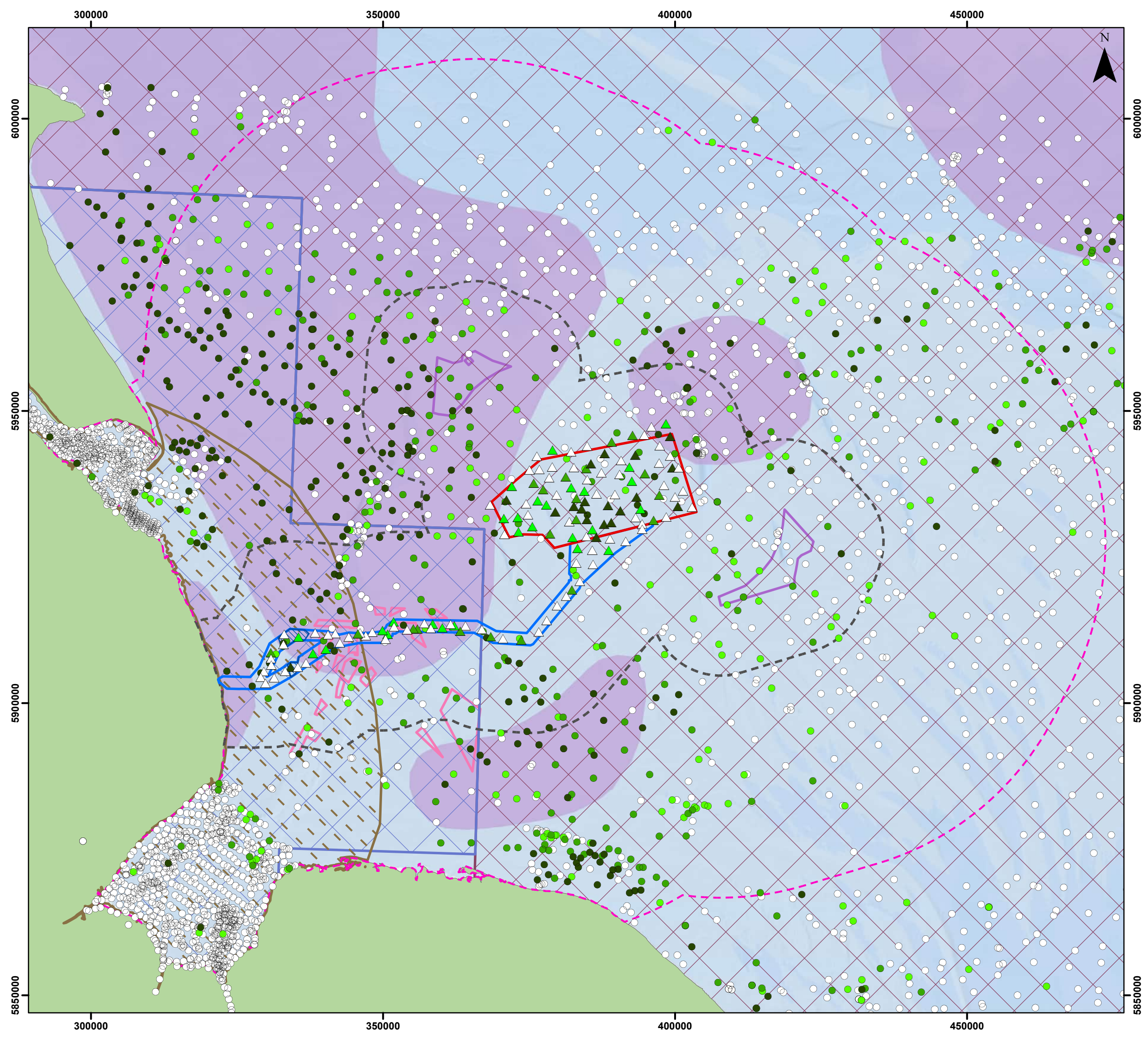
Figure 10.11

Date: 16/02/2024
 Produced By: BPHB
 Revision: 0.1

Contains ESRI Basemapping; EMODnet 2020 bathymetry

Document Path: Z:\GIS\GIS - Projects\0152 Outer Dowsing EIA\GIS\Figures\ES\Fish and Shellfish\ODOW_0152_FS_Fig10_11_Herring_EUSeaMap2021_v3.mxd



Legend

- Array Area
- Offshore Export Cable Corridor
- ORCP Area
- Artificial Nesting Structure Area
- Biogenic Reef Restoration Area
- Secondary Zone of Influence
- Underwater Noise Impacts 50km Buffer
- Herring Nursery Grounds (Coull et al., 1998)
- Herring Spawning Grounds (Coull et al., 1998)
- Herring Nursery Grounds - High Intensity (Ellis et al., 2012)
- Herring Nursery Grounds - Low Intensity (Ellis et al., 2012)

Herring Habitat Suitability (Reach et al., 2013)

- Prime, Preferred
- Sub-Prime, Preferred
- Suitable, Marginal
- Unsuitable

Data Source:

- BGS, 2015
- Outer Dowsing, 2022

Coordinate System: WGS 1984 UTM Zone 31N

0 10 20 km

Scale: 1:600,000

A3 Page Size

Environmental Statement

Herring Spawning and Nursery Grounds
with BGS and Site Specific Data
Relative to the Project

Figure 10.12

Date: 16/02/2024
Produced By: BPHB
Revision: 0.1

Contains ESRI Basemapping;
Esri, Garmin, GEBCO, NOAA
NGDC, and other
contributorsEMDOnet 2020

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350000

400000



- Legend**
- Array Area
 - Offshore Export Cable Corridor
 - ORCP Area
 - Artificial Nesting Structure Area
 - Biogenic Reef Restoration Area
 - Secondary Zone of Influence
- Herring Habitat Suitability (Reach et al., 2013)**
- ▲ Prime, Preferred
 - ▲ Sub-Prime, Preferred
 - ▲ Suitable, Marginal
 - △ Unsuitable

Document Path: Z:\GIS\GIS - Projects\0152 Outer Dowsing ELA\GIS\Figures\ES\Fish and Shellfish\ODOW_0152_FS_Fig10.13 Herring Site Data v1.mxd



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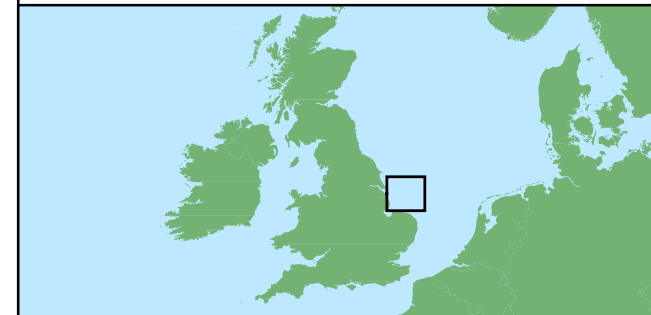
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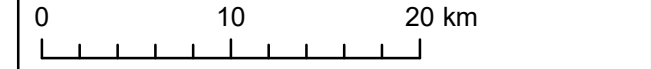
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Coordinate System: WGS 1984 UTM Zone 31N



Scale: 1:400,000 A3 Page Size

Environmental Statement

Herring Habitat Suitability Site Specific Data

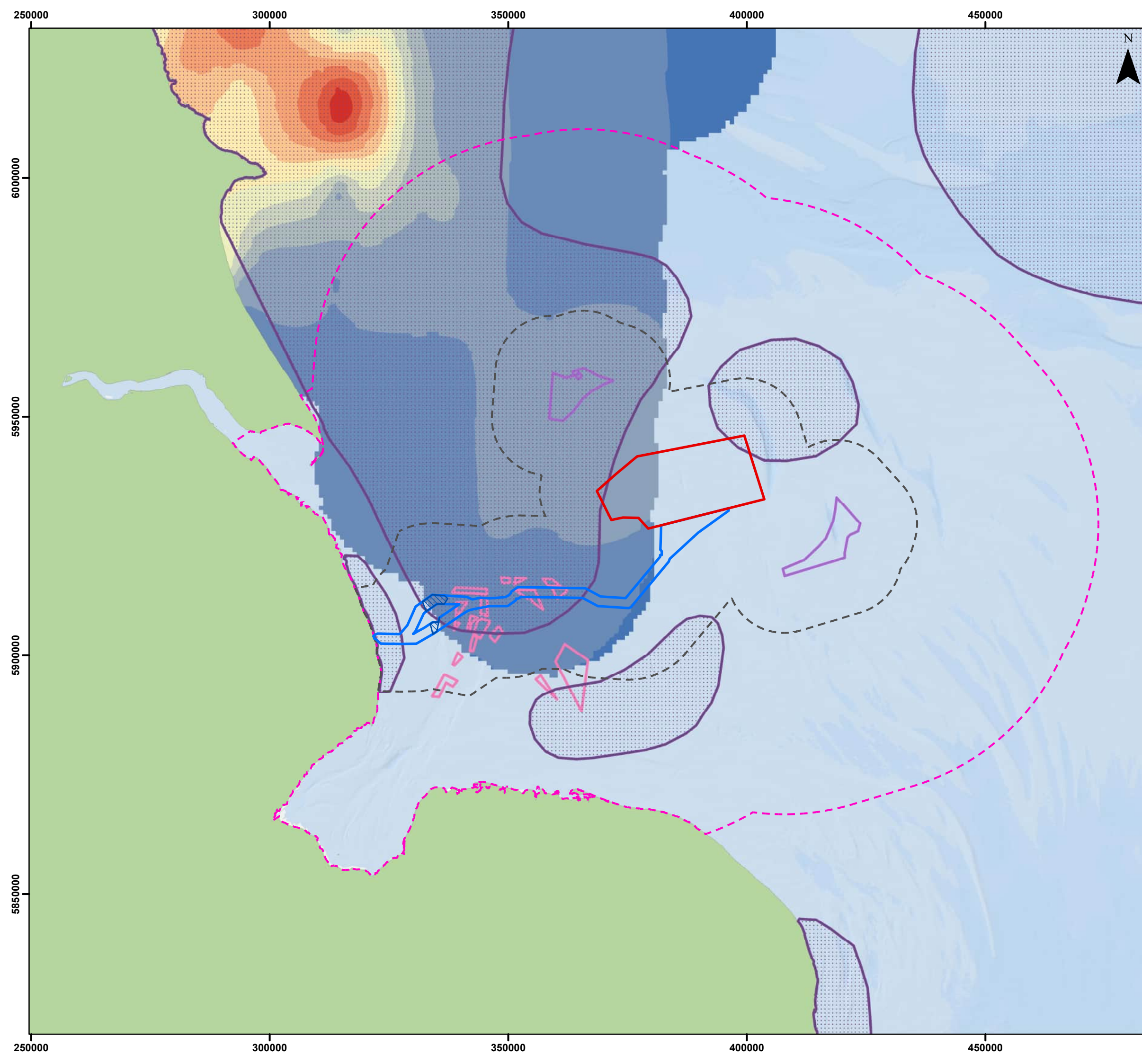
Figure 10.13



Date: 16/02/2024
 Produced By: BPHB
 Revision: 0.1

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Contains ESRI Basemapping;
 Esri, Garmin, GEBCO, NOAA
 NGDC, and other
 contributorsEMDOnet 2020



Legend

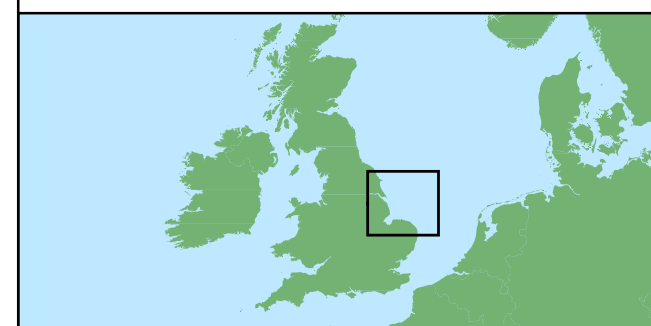
- Array Area
- Offshore Export Cable Corridor
- ORCP Area
- Artificial Nesting Structure Area
- Biogenic Reef Restoration Area
- Secondary Zone of Influence
- Underwater Noise Impacts 50km Buffer

Spawning Grounds (Coull *et al.*, 1998)
(Species, Intensity)

- Herring, Undetermined

IHLS 2009/2010-2020/2021 Banks Data - Total Larval Abundance Per m²

- 0
- 0.1 - 1,500
- 1,500.1 - 6,000
- 6,000.1 - 12,750
- 12,750.1 - 20,500
- 20,500.1 - 28,500
- 28,500.1 - 36,500
- 36,500.1 - 44,500
- 44,500.1 - 53,000
- 53,000.1 - 63,000
- 63,000.1 - 74,250
- 74,250.1 - 93,250



Coordinate System: WGS 1984 UTM Zone 31N

0 25 50 km

Scale: 1:750,000 A3 Page Size

Environmental Statement

Herring Spawning Grounds
IHLS Comparison

Figure 10.14

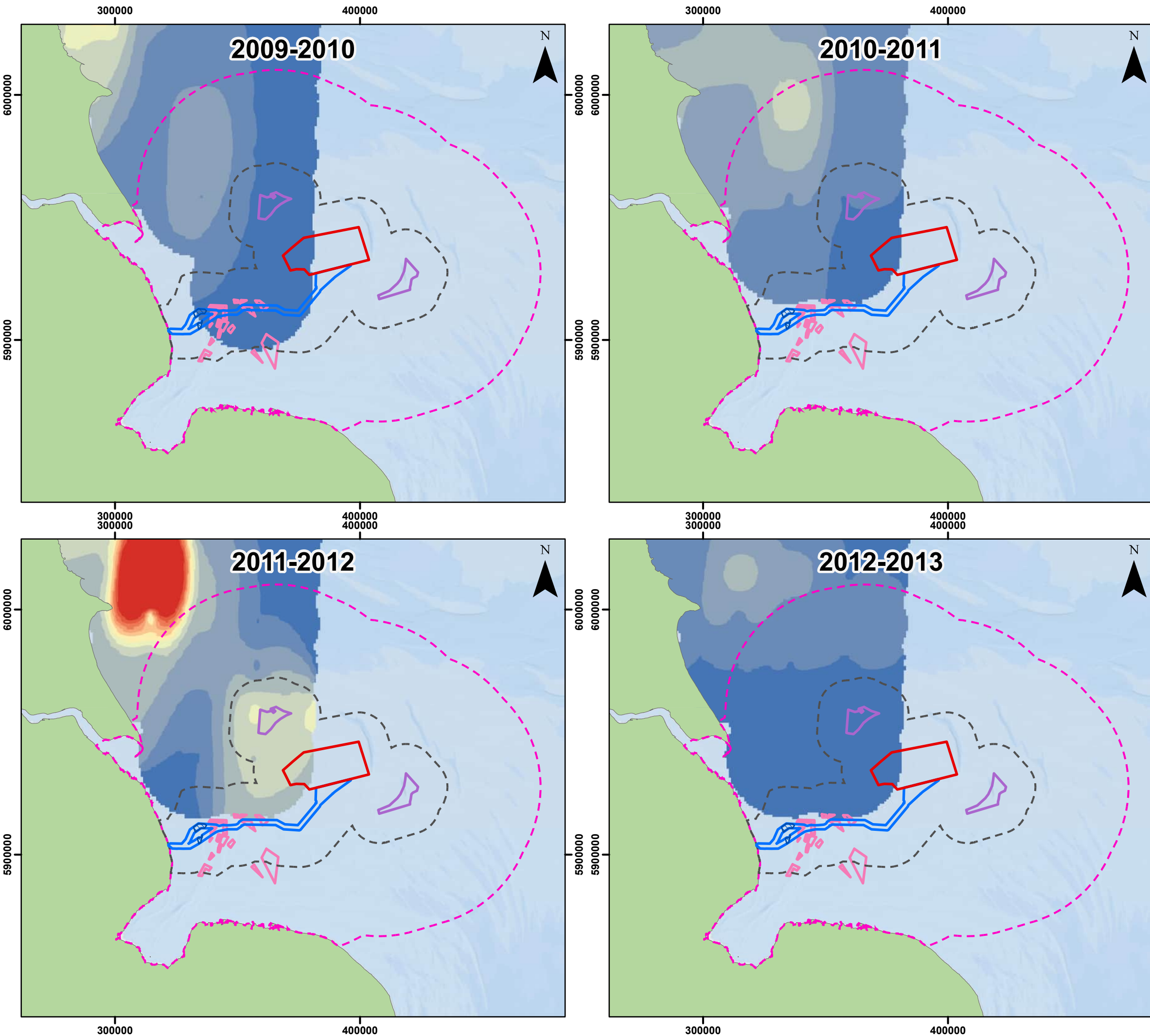
OUTER DOWSING
OFFSHORE WIND

Date: 16/02/2024
Produced By: BPHB
Revision: 0.1

GoBe

Contains ESRI Basemapping;
Esri, Garmin, GEBCO, NOAA
NGDC, and other
contributorsEMDOnet 2020

Document Path: Z:\GIS\GIS - Projects\0152 Outer Dowsing EIA\GIS\Figures\ES\Fish and Shellfish\ODOW_0152_FS_Fig10.14_Herring_IHLS_v2.mxd

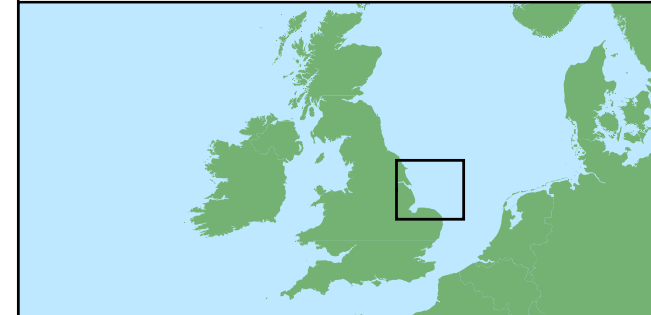


Legend

- Array Area
- Offshore Export Cable Corridor
- ORCP Area
- Artificial Nesting Structure Area
- Biogenic Reef Restoration Area
- Secondary Zone of Influence
- Underwater Noise Impacts 50km Buffer

IHLs Banks Data - Larval Abundance Per m²

- 0
- 0.1 - 150
- 150.1 - 600
- 600.1 - 1,275
- 1,275.1 - 2,050
- 2,050.1 - 2,850
- 2,850.1 - 3,650
- 3,650.1 - 4,450
- 4,450.1 - 5,300
- 5,300.1 - 6,300
- 6,300.1 - 7,425
- 7,425.1 - 9,325



Coordinate System: WGS 1984 UTM Zone 31N

0 50 100 km

Scale: 1:1,500,000 A3 Page Size

Environmental Statement

Outer Dowsing with Herring Spawning Grounds IHLs Comparison, 2009 – 2013

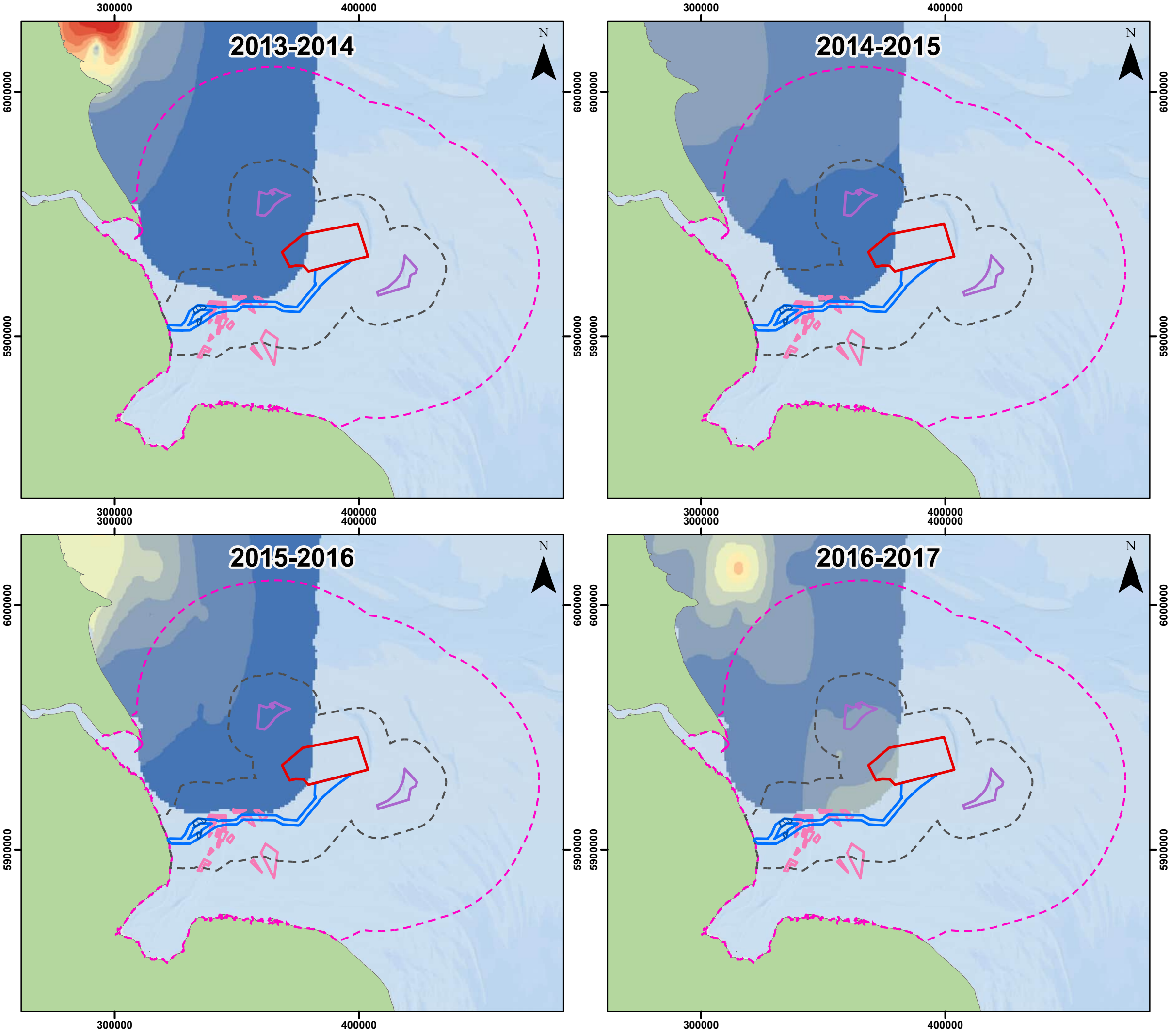
Figure 10.15

OUTER DOWSING OFFSHORE WIND

Date: 16/02/2024
 Produced By: BPHB
 Revision: 0.1

GoBe

Contains ESRI Basemapping; Esri, Garmin, GEBCO, NOAA NGDC, and other contributors

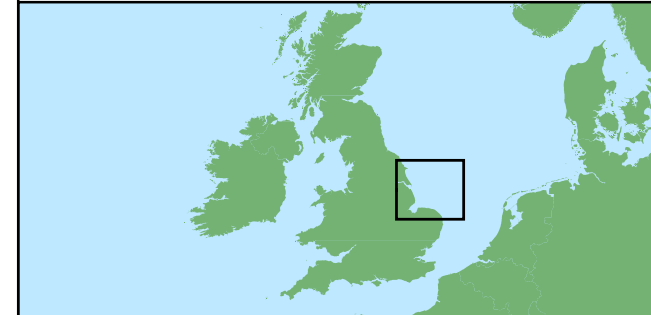


Legend

- Array Area
- Offshore Export Cable Corridor
- ORCP Area
- Artificial Nesting Structure Area
- Biogenic Reef Restoration Area
- Secondary Zone of Influence
- Underwater Noise Impacts 50km Buffer

IHLS Banks Data - Larval Abundance Per m²

- 0
- 0.1 - 150
- 150.1 - 600
- 600.1 - 1,275
- 1,275.1 - 2,050
- 2,050.1 - 2,850
- 2,850.1 - 3,650
- 3,650.1 - 4,450
- 4,450.1 - 5,300
- 5,300.1 - 6,300
- 6,300.1 - 7,425
- 7,425.1 - 9,325



Coordinate System: WGS 1984 UTM Zone 31N

0 50 100 km

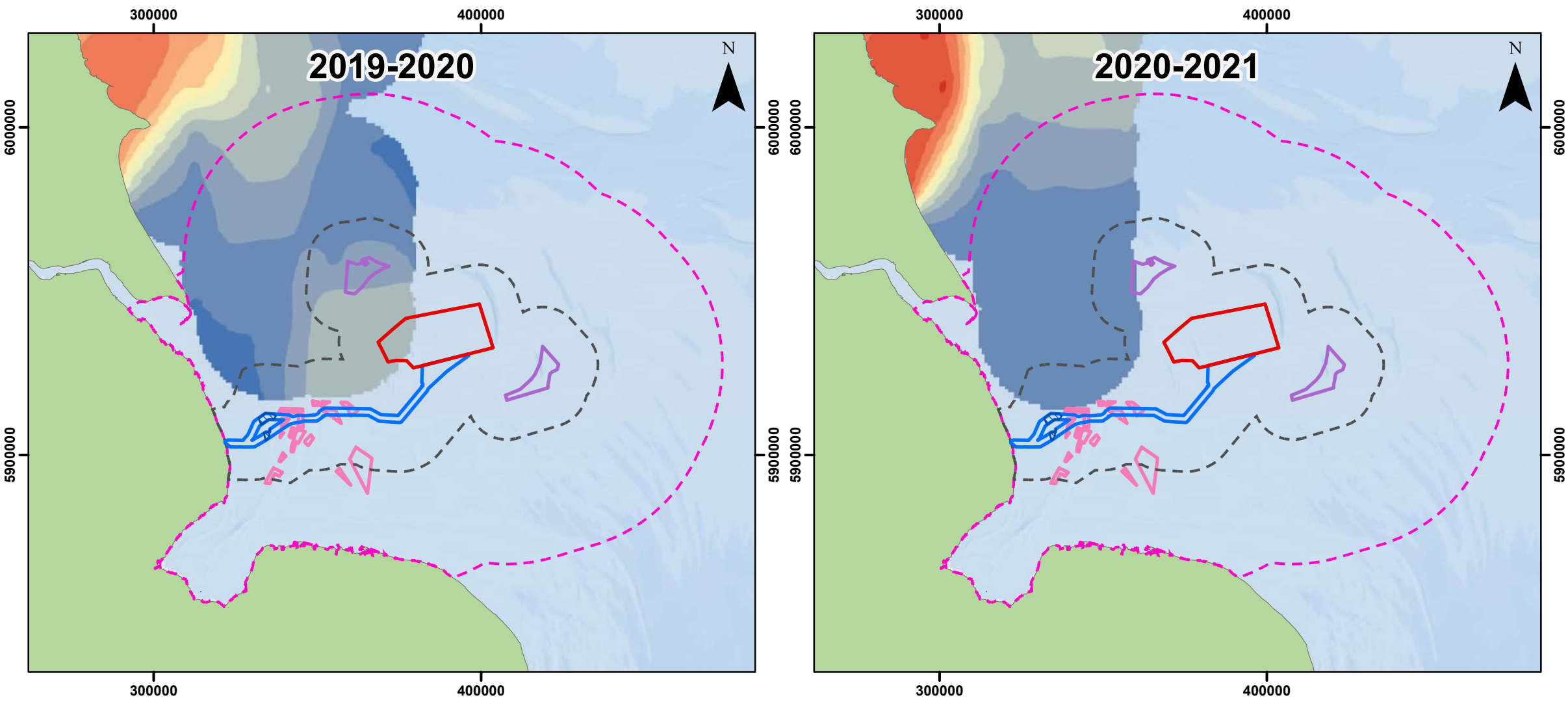
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Environmental Statement

Outer Dowsing with Herring Spawning Grounds IHLS Comparison, 2013 – 2017

Figure 10.16



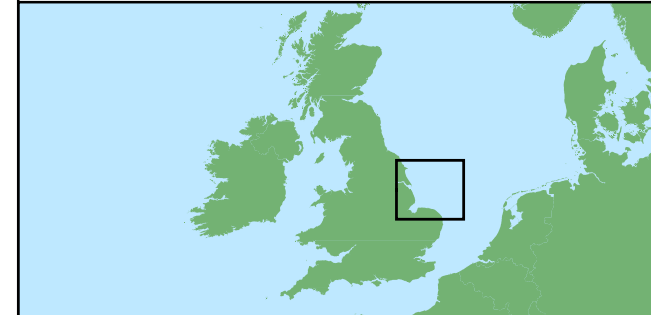


Legend

- Array Area
- Offshore Export Cable Corridor
- ORCP Area
- Artificial Nesting Structure Area
- Biogenic Reef Restoration Area
- Secondary Zone of Influence
- Underwater Noise Impacts 50km Buffer

IHLS Banks Data - Larval Abundance Per m²

- 0
- 0.1 - 150
- 150.1 - 600
- 600.1 - 1,275
- 1,275.1 - 2,050
- 2,050.1 - 2,850
- 2,850.1 - 3,650
- 3,650.1 - 4,450
- 4,450.1 - 5,300
- 5,300.1 - 6,300
- 6,300.1 - 7,425
- 7,425.1 - 9,325



Coordinate System: WGS 1984 UTM Zone 31N

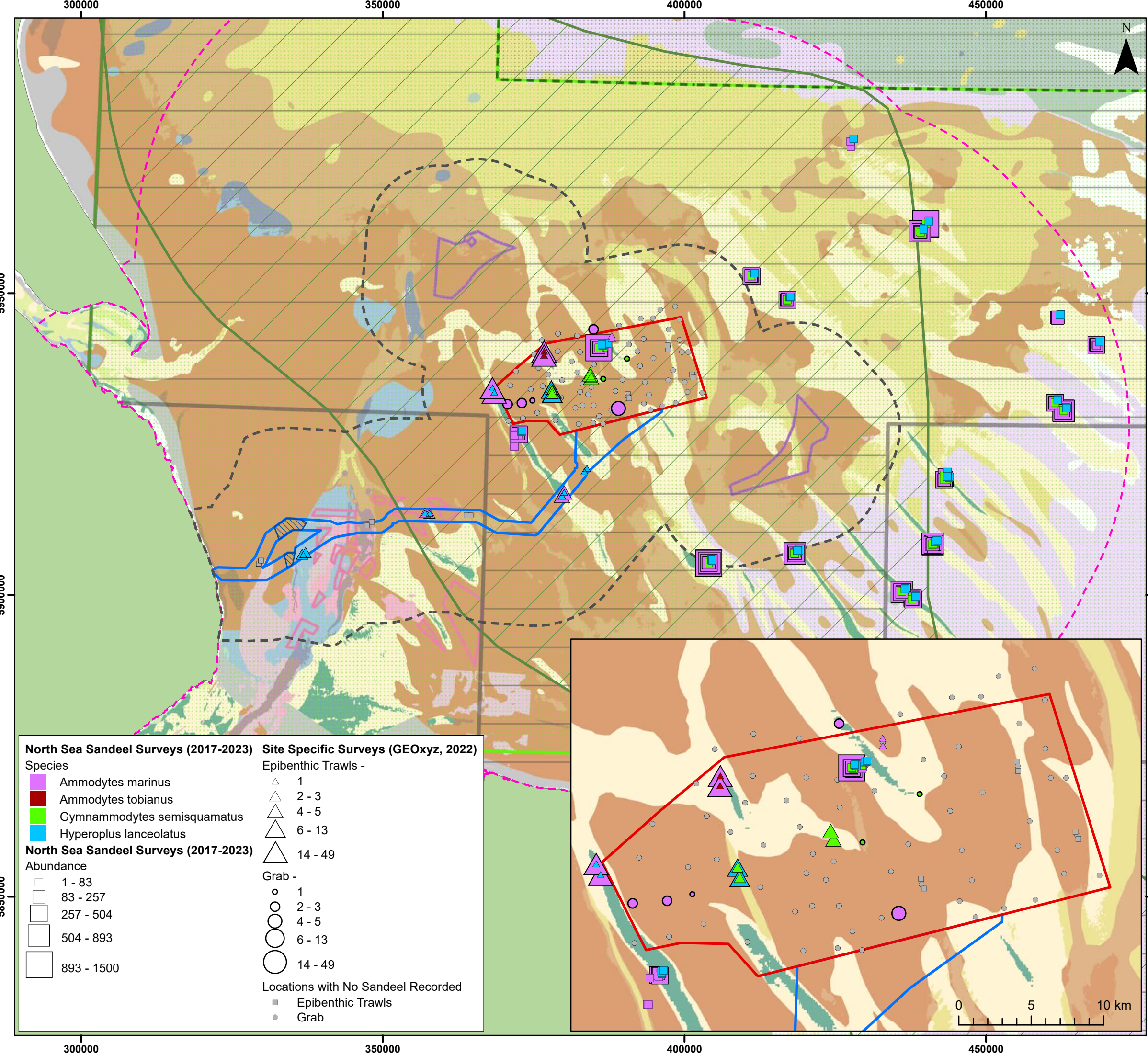
0 50 100 km

Scale: 1:1,500,000 A3 Page Size

Environmental Statement

Outer Dowsing with Herring
Spawning Grounds IHLS Comparison,
2019 – 2021
Figure 10.17





Legend

- Array Area
- Offshore Export Cable Corridor
- ORCP Area
- Artificial Nesting Structure Area
- Biogenic Reef Restoration Area
- Secondary Zone of Influence
- Underwater Noise Impacts 50km Buffer
- Sandeel Nursery and Spawning Grounds (Coull et al., 1998)
- Sandeel, High Intensity (Ellis et al., 2012)
- Sandeel, How Intensity (Ellis et al., 2012)
- Sandeel Low Intensity Nursery Grounds (Ellis et al., 2012)

EUNIS Map 2021 (EMODnet, 2021)

- A4.2: Atlantic and Mediterranean moderate energy circalittoral rock
- A4.27: Faunal communities on deep moderate energy circalittoral rock
- A5.13: Infralittoral coarse sediment
- A5.14: Circalittoral coarse sediment
- A5.15: Deep circalittoral coarse sediment
- A5.23 or A5.24: Infralittoral fine sand or Infralittoral muddy sand
- A5.25 or A5.26: Circalittoral fine sand or Circalittoral muddy sand
- A5.27: Deep circalittoral sand
- A5.33: Infralittoral sandy mud
- A5.34: Infralittoral fine mud
- A5.35: Circalittoral sandy mud
- A5.36: Circalittoral fine mud
- A5.37: Deep circalittoral mud
- A5.43: Infralittoral mixed sediments
- A5.44: Circalittoral mixed sediments
- A5.45: Deep circalittoral mixed sediments
- A5.6: Sublittoral biogenic reefs
- A5.61: Sublittoral polychaete worm reefs on sediment
- A5.611: [Sabellaria spinulosa] on stable circalittoral mixed sediment
- No EUNIS habitat assigned

North Sea Sandeel Surveys (2017-2023)

Species

- Ammodytes marinus*
- Ammodytes tobianus*
- Gymnammodytes semisquamatus*
- Hyperoplus lanceolatus*

Abundance

- 1 - 83
- 83 - 257
- 257 - 504
- 504 - 893
- 893 - 1500

Site Specific Surveys (GEOxyz, 2022)

Epibenthic Trawls -

- 1
- 2 - 3
- 4 - 5
- 6 - 13
- 14 - 49

Grab -

- 1
- 2 - 3
- 4 - 5
- 6 - 13
- 14 - 49

Locations with No Sandeel Recorded

- Epibenthic Trawls
- Grab

Coordinate System: WGS 1984 UTM Zone 31N

0 10 20 km

Scale: 1:600,000

A3 Page Size

Environmental Statement

Sandeel Spawning and Nursery Grounds with EUNIS Map 2021 Relative to the Project

Figure 10.18

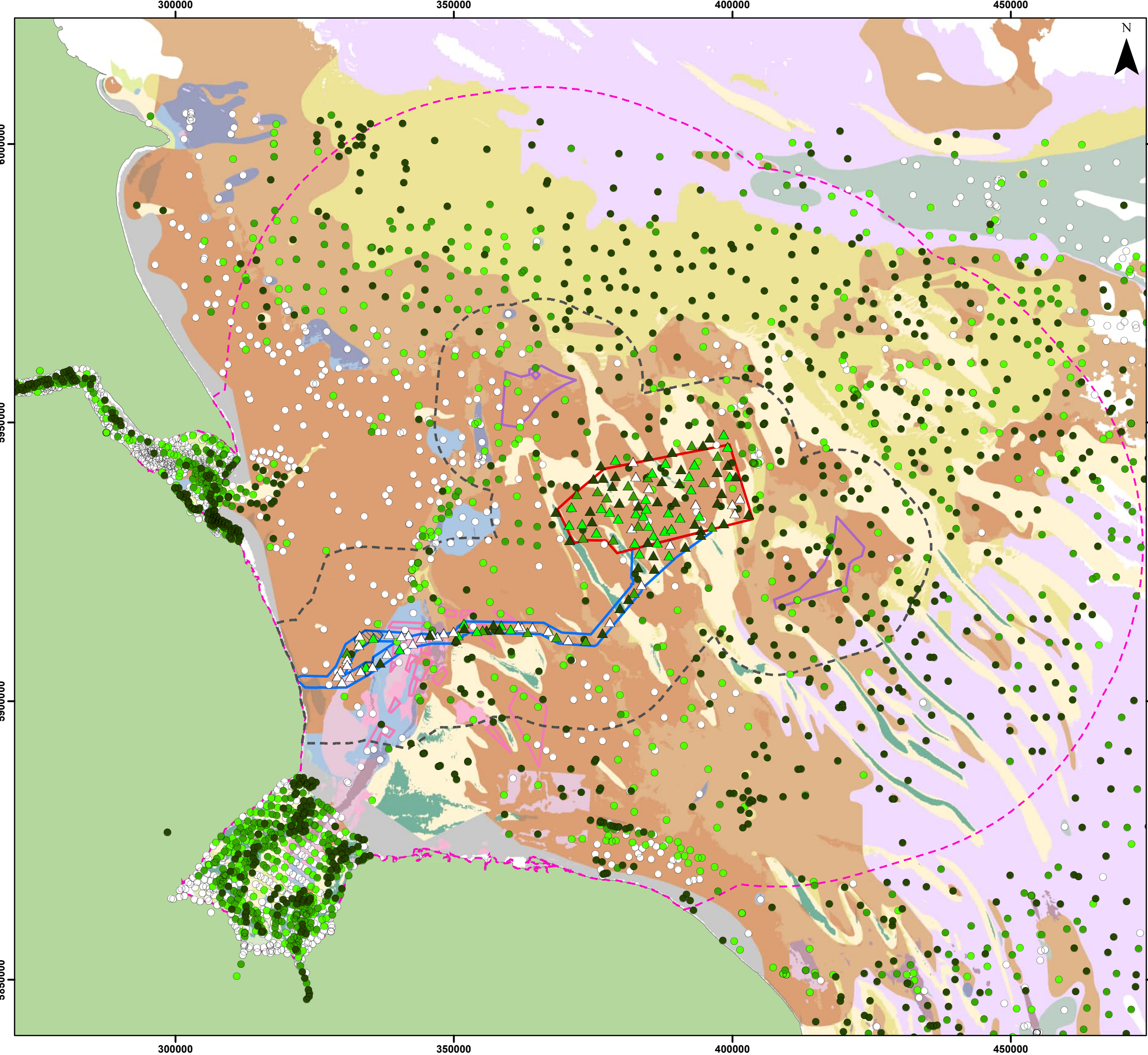


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 EMDnet 2020 bathymetry

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Legend

- Array Area
- Offshore Export Cable Corridor
- ORCP Area
- Artificial Nesting Structure
- Biogenic Reef Restoration
- Secondary Zone of Influence
- Underwater Noise Impacts 50km Buffer

EUSeaMap 2021 (EMODnet, 2021)

- A3.1: Atlantic and Mediterranean high energy infralittoral rock
- A3.2: Atlantic and Mediterranean moderate energy infralittoral rock
- A4.1: Atlantic and Mediterranean high energy circalittoral rock
- A4.2: Atlantic and Mediterranean moderate energy circalittoral rock
- A4.27: Faunal communities on deep moderate energy circalittoral rock
- A5.13: Infralittoral coarse sediment
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- A5.25 or A5.26: Circalittoral fine sand or Circalittoral muddy sand
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- A5.33: Infralittoral sandy mud
- A5.34: Infralittoral fine mud
- A5.35: Circalittoral sandy mud
- A5.36: Circalittoral fine mud
- A5.37: Deep circalittoral mud
- A5.43: Infralittoral mixed sediments
- A5.44: Circalittoral mixed sediments
- A5.45: Deep circalittoral mixed sediments
- A5.6: Sublittoral biogenic reefs
- A5.61: Sublittoral polychaete worm reefs on sediment
- A5.611: [Sabellaria spinulosa] on stable circalittoral mixed sediment
- No EUNIS habitat assigned

Sandeel Habitat Suitability (Latto et al., 2013)

- Prime, Preferred
- Sub-Prime, Preferred
- Suitable, Marginal
- Unsuitable

Data Source:

- BGS, 2015
- Outer Dowsing, 2022

Coordinate System: WGS 1984 UTM Zone 31N



0 20 40 km

Scale: 1:650,000 A3 Page Size

Environmental Statement

Sandeel Habitat Suitability Data with EUSeaMap 2021 Relative to the Project

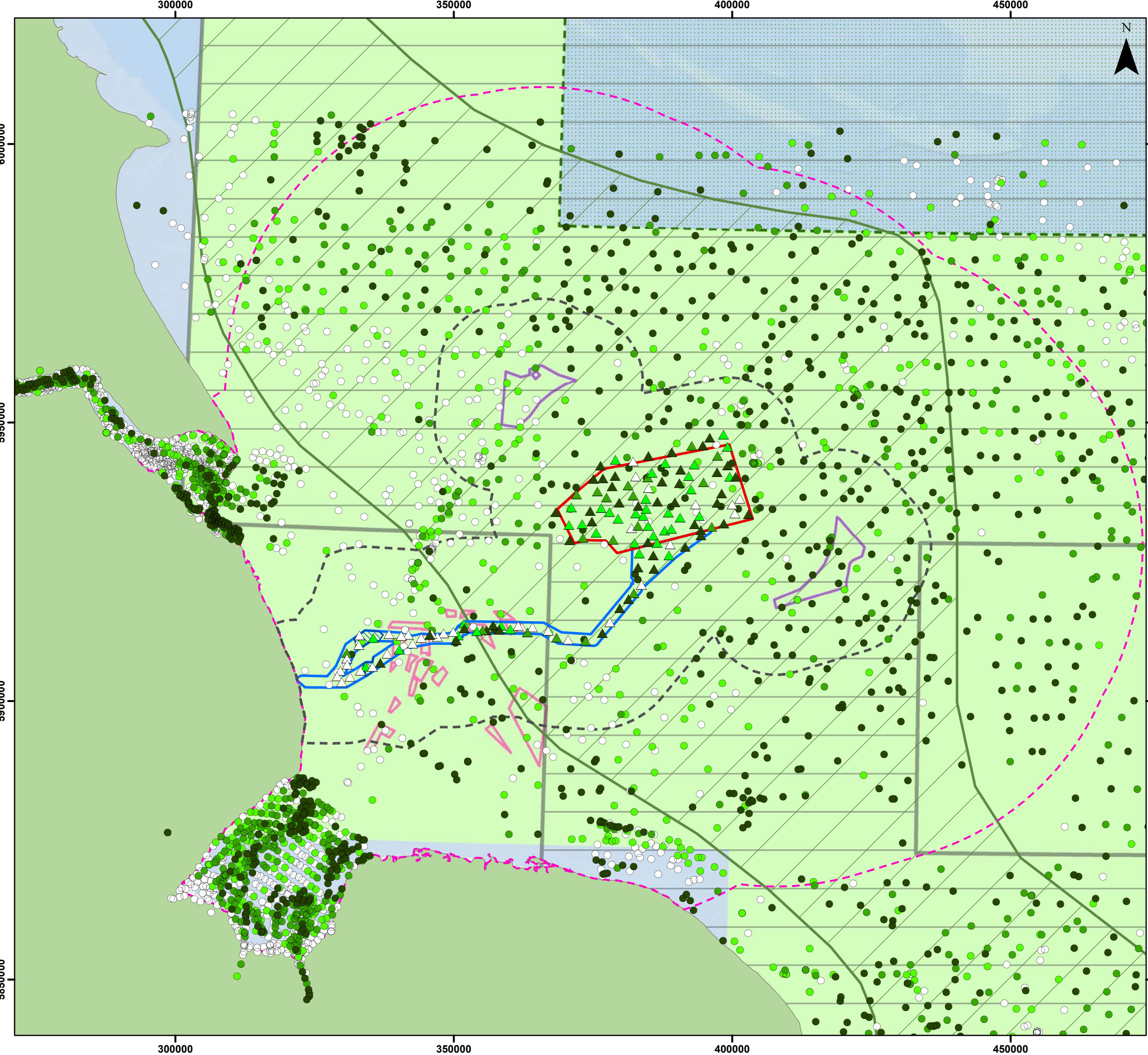
Figure 10.19

Date: 16/02/2024
 Produced By: BPHB
 Revision: 0.1

Contains ESRI Basemapping; EMDnet 2020 bathymetry

Document Path: Z:\GIS\GIS - Projects\0152 Outer Dowsing EIA\GIS\Figures\Fish and Shellfish\ODOW_0152_FS_Fig10_19 Sandeel EUSeaMap2021_v3.mxd



Legend

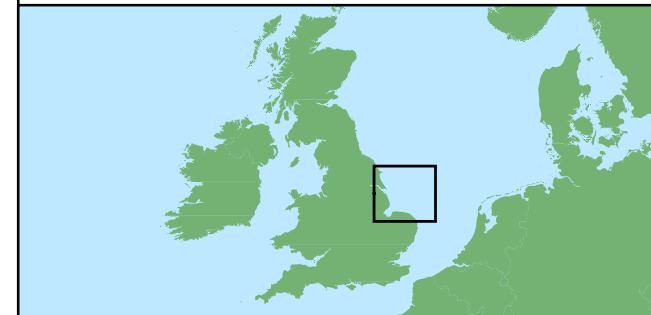
- Array Area
- Offshore Export Cable Corridor
- ORCP Area
- Artificial Nesting Structure Area
- Biogenic Reef Restoration Area
- Secondary Zone of Influence
- Underwater Noise Impacts 50km Buffer
- Sandeel Nursery and Spawning Grounds (Coull et al., 1998)
- Sandeel Spawning Grounds, High Intensity (Ellis et al., 2012)
- Sandeel Spawning Grounds, Low Intensity (Ellis et al., 2012)
- Sandeel Low Intensity Nursery Grounds (Ellis et al., 2012)

Sandeel Habitat Suitability (Latto et al., 2013)

- Prime, Preferred
- Sub-Prime, Preferred
- Suitable, Marginal
- Unsuitable

Data Source:

- BGS, 2015
- Outer Dowsing, 2022



Coordinate System: WGS 1984 UTM Zone 31N
 0 20 40 km
 Scale: 1:650,000 A3 Page Size

Environmental Statement
 Sandeel Spawning and Nursery Grounds with BGS and Site Specific Data Relative to the Project
 Figure 10.20



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