Marine Management Organisation

Seascape Character Assessment for the North East Inshore and Offshore marine plan areas

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MMO 1134: Seascape Character Assessment for the North East Inshore and Offshore marine plan areas

September 2018

LUC

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1 Introduction

The Marine Policy Statement (MPS, 2011) (2.6.5.2) states that, when developing marine plans, visual, cultural, historical and archaeological impacts should be considered for all coastal areas. The MPS adds that any wider social and economic impacts of a development or activity on coastal landscapes and seascapes should also be considered, taking into account existing character and quality (2.6.5.3). In addressing these requirements, this report presents a seascape assessment for the north east inshore and offshore marine plan areas.

1.1 Context

The first strategic-scale seascape assessment commissioned by the Marine Management Organisation (MMO) was undertaken for the south inshore and offshore marine plan areas in 2014. This followed the seascape character assessment for the east inshore and offshore marine plan areas commissioned by Natural England in 2011, further updated by the MMO in 2012 following a consultation exercise.

In 2015, the MMO commissioned desk-based seascape assessments for the south east, north east and north west marine plan areas. In the same year, Natural Resources Wales (NRW) and Welsh Government completed their own national study to identify and describe Marine Character Areas (MCAs) for the Welsh Marine Plan. In the following year, 2016, the MMO commissioned a desk-based seascape character assessment for the south west inshore and offshore marine plan area to complete coverage for England. Visual resource mapping (VRM) was undertaken for all marine plan areas in 2015 (see section 2.3).

This project developed MMO's desk-based seascape assessments for the south east, north east, north west and south west marine plan areas formulated in 2015/16 to undertake stakeholder verification through a series of workshops were held in 2018 to provide the opportunity for key stakeholders to input into the process. In addition to the workshops, further comments from stakeholders across the four regions were invited by email to supplement the information gathered at the workshops.

Following consultation, this study has produced a combined national seascape character map for all England's inshore and offshore areas, comprising a spatial framework of individual MCAs which 'flow across' marine plan area and administrative boundaries. The MCAs represent strategic patterns and variations in character across the national marine area.

This report for the north east comprises the baseline desk-based seascape assessments for the MCAs defined and described in 2016, further developed to account for comments received through the stakeholder verification process undertaken in 2018. Separate complementary reports are available for the south east, north west and south west marine plan areas. Existing studies are also available fort the east inshore and offshore marine plan areas and south inshore and offshore marine plan areas.

The MMO's seascape assessments have been broadly aligned with the guiding principles set out in Natural England's 2012 publication, An approach to Seascape Character Assessment (NECR105).

1.2 Objectives

The objectives of the overall study (for the north east, north west, south east and south west marine plan areas) were to:

- Undertake a desk-based seascape character assessment for the marine plan areas, comprising the spatial definition of strategic-scale MCAs and accompanying descriptions, with a focus on key characteristics.
- Create a single, unified Geographical Information System (GIS) data layer and a national map of seascape character for all marine plan areas in England.
- Hold stakeholder engagement workshops to refine and validate the combined seascape character assessment map and MCA descriptions.

1.3 Structure of the report

This report for the north east has been structured as follows:

- Section 2 describes the methodology developed and followed for this study
- Section 3 includes the MCA profiles and key characteristics for the north east.
- Section 4 has the References used in this report.
- Annex 1 is the project's data list.
- Annex 2 lists organisations consulted during this study in the north east.

2 Methodology

This section summarises the methodology used for the production of the north east seascape assessment. This process followed six main steps:

1) Gathering and assimilating data and information.
2) Undertaking a desk-based seascape character assessment.
3) Using the national visual resource mapping to inform the seascape character assessment.
4) Undertaking stakeholder verification.
5) Updating the MCA names, boundaries and descriptive information.
6) Creating a combined national seascape character GIS shapefile and map for England's inshore and offshore marine plan areas.

These steps are described in sections 2.1 to 2.6 below, with additional information relevant to this study for the north east described. This includes how the project considered spatial links with the adjacent east marine plan area.

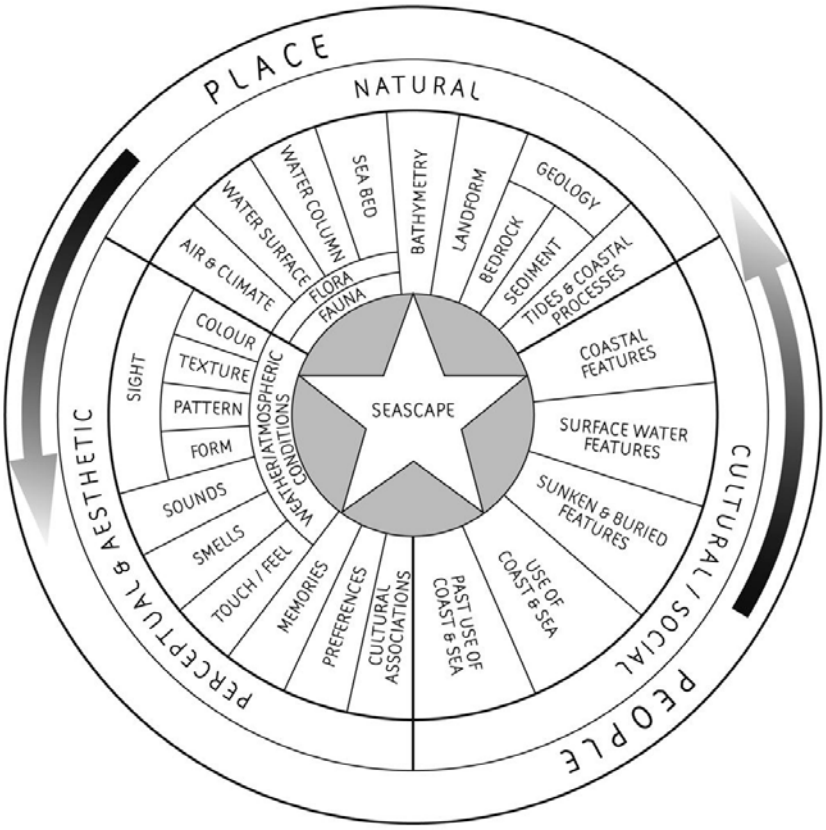
2.1 Gathering and assimilating data and information

The first stage involved gathering and assimilating the range of datasets, literature, plans and strategies available to inform the work. The majority of the required spatial data was provided by the MMO, organised in a GIS database structured according to the key themes of the 'seascape wheel', see Figure 1 from An approach to Seascape Character Assessment (NECR105). The wheel illustrates the different aspects which combine to create 'seascape character', under the three general themes of natural, cultural/social, and perceptual and aesthetic. General information layers such as base-mapping and administrative boundaries were also collated during this first stage.

Marine raster charts and marine themes vector data provided the backdrop onto which numerous other GIS layers (geology, bathymetry, designated sites, etc.) were overlaid. Particular attention was paid to aligning the coordinate systems of onshore and offshore datasets to ensure a seamless transition between the marine and terrestrial data, drawing on the experience of previous studies. A full data list for this work is provided in Annex 1, including groupings under the three general themes of the seascape wheel to show the range of data used by this study to inform each theme.

The work undertaken for this study was primarily desk-based and aligned more with the 'natural' and 'cultural/social' themes of the seascape wheel, rather than the 'perceptual and aesthetic' (e.g. sight, sounds, smells) which would be gained in further detail from field/boat survey work. However, more information on perceptual and aesthetic qualities were gathered through the stakeholder engagement process undertaken in 2018.

Figure 1: The Seascape Wheel (Natural England, 2012)



Relevant literature and other written references were also compiled to inform the project: a reference list is provided in Section 4. Of particular use in understanding sea conditions (e.g. tides and currents) and interpreting information on marine navigation are the relevant Coast Pilots published by Imray. These were used to gain a further understanding of seascape character from the perspective of the sea and sea users.

2.2 Undertaking a desk-based seascape character assessment

2.2.1 Identifying Marine Character Areas (MCAs)

The collated data and information relating to the different aspects of the seascape wheel were interrogated in order to begin to identify dominant patterns relevant to character across the inshore and offshore marine plan area. This process informed the identification of MCAs, defined in the box over the page. This definition is consistent with that provided for 'seascape character areas'[1] in Natural England's 2012 publication, An approach to Seascape Character Assessment, and applies to all of the other strategic-scale studies undertaken in England and Wales.

[1] Marine Character Areas (MCAs) are more widely known as Seascape Character Areas (SCAs) outside of the marine planning process in England.

Marine Character Areas (adapted from Natural England, 2012)

Definition: An MCA is an area of marine space has its own individual character and identity

Application: Although MCAs can share the same generic characteristics as other areas, the use of marine character areas provides a good framework within which to draw out patterns of local distinctiveness and those factors influencing sense of place. They can be used to develop more tailored policies or strategies, reflecting the things that make a particular area different, distinctive or special.

The boundaries drawn for the MCAs represent broad transitions (rather than immediate or abrupt changes) in character from MCA to MCA, tending to reflect natural breaks or the clustering of characteristics and/or features deciphered from available data and information. The use of GIS is a key tool in the process of seascape character assessment, enabling different information layers to be interrogated in tandem and therefore allowing spatial patterns relevant to character to be investigated.

Professional judgement by a consultancy team of landscape and seascape specialists was fundamental in deciding which aspects have greatest influence on the character of each MCA, considering in particular how they shape individual distinctiveness and sense of place. Additional sources of written information, as well as LUC's own knowledge of the north east (gained through other landscape/ seascape studies and fieldwork), were used alongside the GIS data to inform the boundary drawing process.

Draft MCA boundaries were digitised in GIS at a 1:250,000 scale with notes kept on the reasoning behind the boundaries drawn – including the use of GIS datasets. This draft classification was discussed with the MMO at this early stage, with comments made considered in a further detailed review of available information.

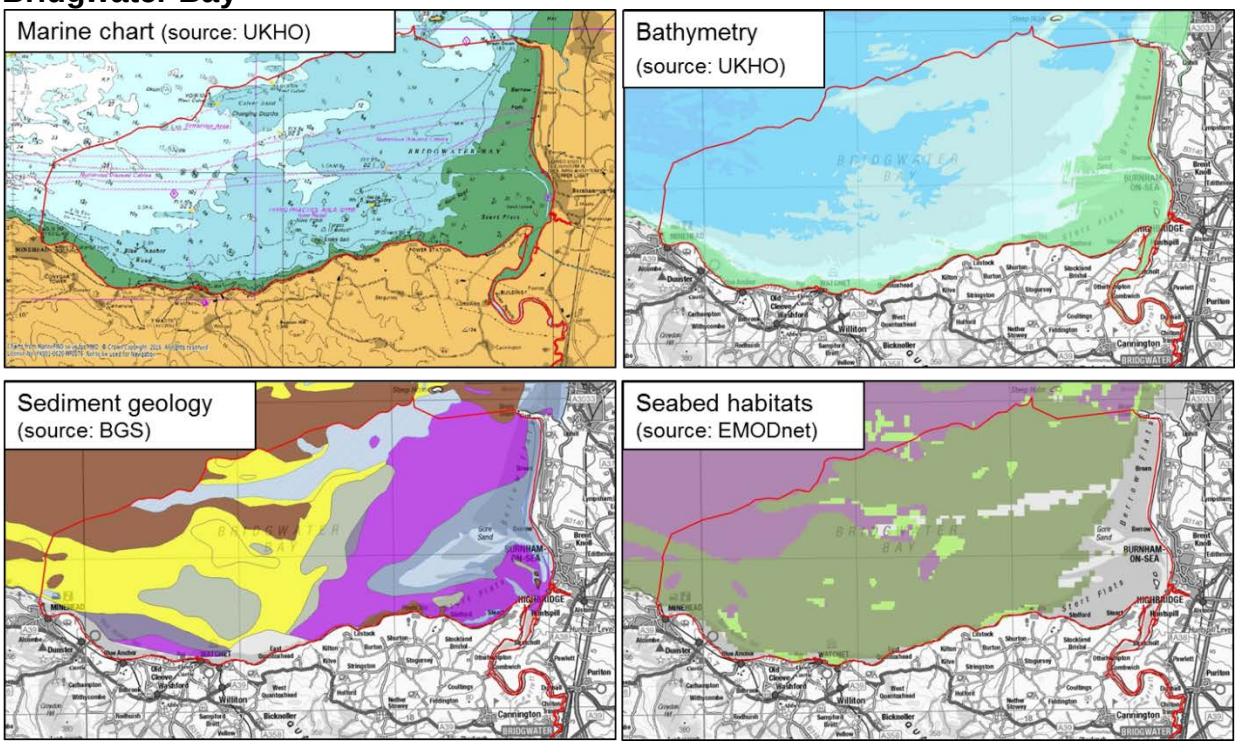
Figure 2 below illustrates how basemapping information detailed on the marine chart was used alongside other GIS datasets to help inform the MCA boundaries, using an example from the south west marine plan area (MCA 40: Bridgwater Bay). The character of this MCA, straddling between the Bristol Channel and Severn Estuary, is strongly influenced by natural and physical processes. Data representing the 'natural' theme of the seascape wheel therefore played a strong role in the boundary identification process for this MCA.

Further refinements to draft MCA boundaries resulted in the classification of nine MCAs for the north east, which were discussed at the stakeholder workshops undertaken in 2018 (see section 2.4 below). The final classification of MCAs for the north east inshore and offshore marine plan areas is illustrated at Figure 5 at the start of Section 3. A summary of the main information used to inform the boundaries is included in the 'location and boundaries' section of each MCA profile in Section 3.

As outlined above, **it is important to note that the MCA boundaries represent broad zones of transition (i.e. not immediate breaks in character)**, and that natural, visual, cultural and socio-economic relationships between adjacent MCAs

play a key role in shaping overall character. Therefore individual MCAs should not be considered in isolation.

Figure 2: Example of GIS data used to help inform the boundaries of MCA 40: Bridgwater Bay



2.2.2 Making spatial links to adjacent Marine Character Areas (MCAs)

This study forms part of a full national classification of MCAs across England, displaying seamless boundaries that are not constrained by the location of the different marine plan areas or administrative jurisdictions (in the case of Scotland).

For the north east, this required consideration of the published Seascape Characterisation around the English Coast (Marine Plan Areas 3 and 4 and Part of Area 6 Pilot Study) (Natural England, 2012). Where seascape character was deemed to continue (or 'flow') across the marine plan area boundaries, the definition of English MCA boundaries was extended across the border into other MCAs. MCAs including England in parentheses do so to clarify that the definition only refers to the part of that area which is within the English marine plan area.

The seascape character assessment for the east, commissioned by Natural England in 2012, had boundaries co-incident with the marine plan area boundary. As part of this study to develop a national seascape classification the MMO have, with the approval of Natural England, been able to consider the cross boundary linkages with seascape character areas (SCAs) defined in that report. In this study there is a transition across the north east and east inshore and offshore marine plan boundaries between: MCA 21 and SCA 05; MCA 24 and SCA 02; and MCA 27 and SCA 01.

Consideration was also given to how character flows into Scottish waters. Whilst work in Scotland is yet to commence, MCAs 23, 26, 28 and 29 are likely to continue into Scottish waters. Consultation as part of this study highlighted this and future studies should look in more detail at 'flow' across this boundary.

Where relevant, these connections are illustrated on the map and described in the 'location and boundaries' box at the beginning of each MCA profile in Section 3.

The MCA numbering in this report follows on from the south east, starting with MCA 21 North Yorkshire Coastal Waters. More information on the national seascape character map is provided at section 2.6.

2.2.3 Describing the seascape character of the Marine Character Areas (MCAs)

Each MCA has its own descriptive profile, which is included in Section 3 of this report. The profiles are structured as follows:

- Map of the MCA, showing its position within the wider marine plan area(s)
- Overview of the MCA, with information against the following headings:
    - **Location and boundaries**: this includes information on how the MCA was defined with reference to key sources of data/information – noting that boundaries represent zones of transition, not immediate breaks in character.
    - **Overall character**: a summary snapshot of the overall seascape character of the MCA.
    - **Adjacent National Character Areas**: For those MCAs with an adjacent coastline, reference is made to the adjoining National Character Areas defined by Natural England which form the equivalent spatial and descriptive units for landscape as the MCAs are for seascape.
    - **Adjacent and inter-visible nationally designated and defined landscapes:** This section outlines which nationally designated or defined landscapes (National Parks, Areas of Outstanding Natural Beauty, Heritage Coasts, World Heritage Sites) are found along the adjacent coast or are visible to/from the MCA.
- **Key characteristics:** Seascape character is described using a set of bullet-pointed key characteristics which consider the main themes of the 'seascape wheel' (Figure 1). The key characteristics are designed to capture the main features, elements and attributes of the MCA which combine to produce its overall seascape character. The key characteristics are not intended to be an exhaustive list of every site or feature present within the MCA. More fine-grained information on character can be captured in local-scale seascape character assessments (see section 2.2.4 below).

The MCA profiles draw on a range of available literature (see References at the end of Section 3) and data (Annex 1) in order to compile the key characteristics.

2.2.4 Making links to local-scale seascape character assessments

Seascape character assessments prepared at a local scale provide more detailed evidence, and have been referred to where available. In the north east, reference

was made to the Northumberland Landscape Character Assessment (2010) and the Northumberland Coast Area of Outstanding Natural Beauty (AONB) Landscape Sensitivity & Capacity Study (2013), both of which consider seascape.

Nationally, it is envisaged that future local-scale assessments will consider the outputs of this assessment by seeking to nest smaller seascape units within the spatial framework of MCAs, where it is appropriate to do so.

2.3 Using the national visual resource mapping to inform the seascape assessment

An approach to visual resource mapping (VRM) was developed and methodology documented as part of the seascape assessment for the South marine plan areas (2014). This has subsequently been applied nationally by the MMO. All of the MMO's subsequent studies have referred to the VRM to help inform the 'perceptual and aesthetic' theme of the Seascape Wheel as relevant to visual character. Figure 3 presents the national VRM for England and Wales (showing both sea surface visibility from land and land with views of the sea). The north east section, showing the MCA framework, is included at Figure 6 in Chapter 3.

2.4 Undertaking stakeholder verification

2.4.1 Stakeholder workshops

LUC was re-commissioned in 2018 to undertake stakeholder verification on the draft seascape character assessments for the north east, north west, south east and south west. This included workshops held in each region. For the north east, two workshops were held as follows:

- Saltburn-by-the-Sea on Tuesday 1 May 2018
- Newcastle on Wednesday 2 May 2018

A range of different stakeholders attended the workshops. A list of organisations represented by participants at the two north east events is included at Annex 2. Those attending the workshops received an introductory presentation from the MMO on how seascape evidence is feeding into the marine planning process. This was followed by an overview of seascape work prepared to-date by LUC. Discussions were then facilitated to verify the MCA names, boundaries and key characteristics for consideration in the updated information provided in this report.

2.4.2 Comments submitted by email

Participants and invitees to the workshops were given a further opportunity to submit comments to the MMO via email. This consultation period ran until 25 May 2018. Those who submitted comments via email are also listed in Annex 2.

2.5 Updating the MCA names, boundaries and descriptive information

Responses made at the workshops and submitted by email were considered as part of an update to the MCA profiles (included in Section 3). Comments on MCA names

and boundaries fed into the process of creating the national seascape character map and combined GIS layer, as described in Section 2.6.

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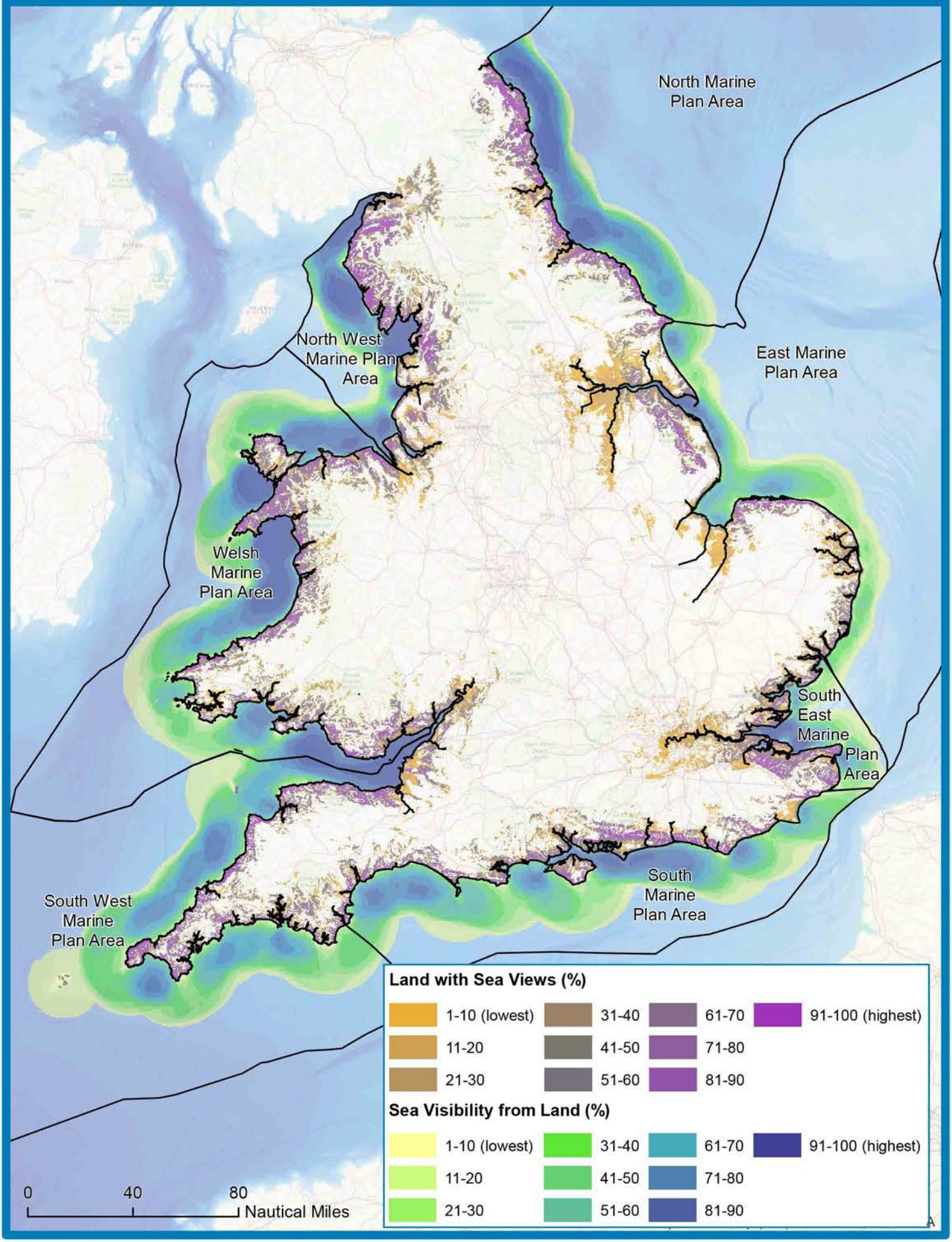
Figure 3: Visual Resource Mapping For England and Wales

ETRS89 UTM Zone 30N. Not to be used for navigation.



2.6 Creating a combined national seascape character GIS shapefile and map for England's inshore and offshore marine plan areas

An essential aim of this assessment was the creation of a single combined GIS layer and map of MCAs covering all of England's inshore and offshore waters, replacing previously available separate datasets for individual marine plan areas.

This required an understanding of how character 'flows' between marine plan areas – a consideration that was already part of the MMO's existing studies (see section 2.2.2). Relationships between Wales and the south west / north west marine plan areas were also considered during the preparation of the National Seascape Assessment for Wales (LUC, 2015).

This is the first time character has been mapped across all marine plan areas. It was essential to gain permission for the outputs from the north east and south east studies to supersede the seascape characterisation published for the east marine plan area by Natural England in 2012. The national seascape layer for England has, however, retained the numbering and naming of the SCAs identified by Natural England as separate to the MCAs for the remaining five marine plan areas. Otherwise the numbering is continuous, starting from the south marine plan area and running anti-clockwise around the coast to the south west marine plan area.

Using GIS, the National Marine Character Area layer for England was created by merging the individual datasets produced for the north east, east, south east, south, south west; and north west marine plan areas. Areas which overlap at either end of these individual datasets were merged or amended to reflect stakeholder comments on names and boundaries and desk-based interpretation of characteristics and features from available data and information.

The resultant national seascape character map for England is presented at Figure 4, showing how the MCAs relate to those defined for Wales. The combined GIS layer will be included on the MMO's online Marine Information System (MIS) and to inform the marine planning process,as well as downloadable from https://data.gov.uk/.

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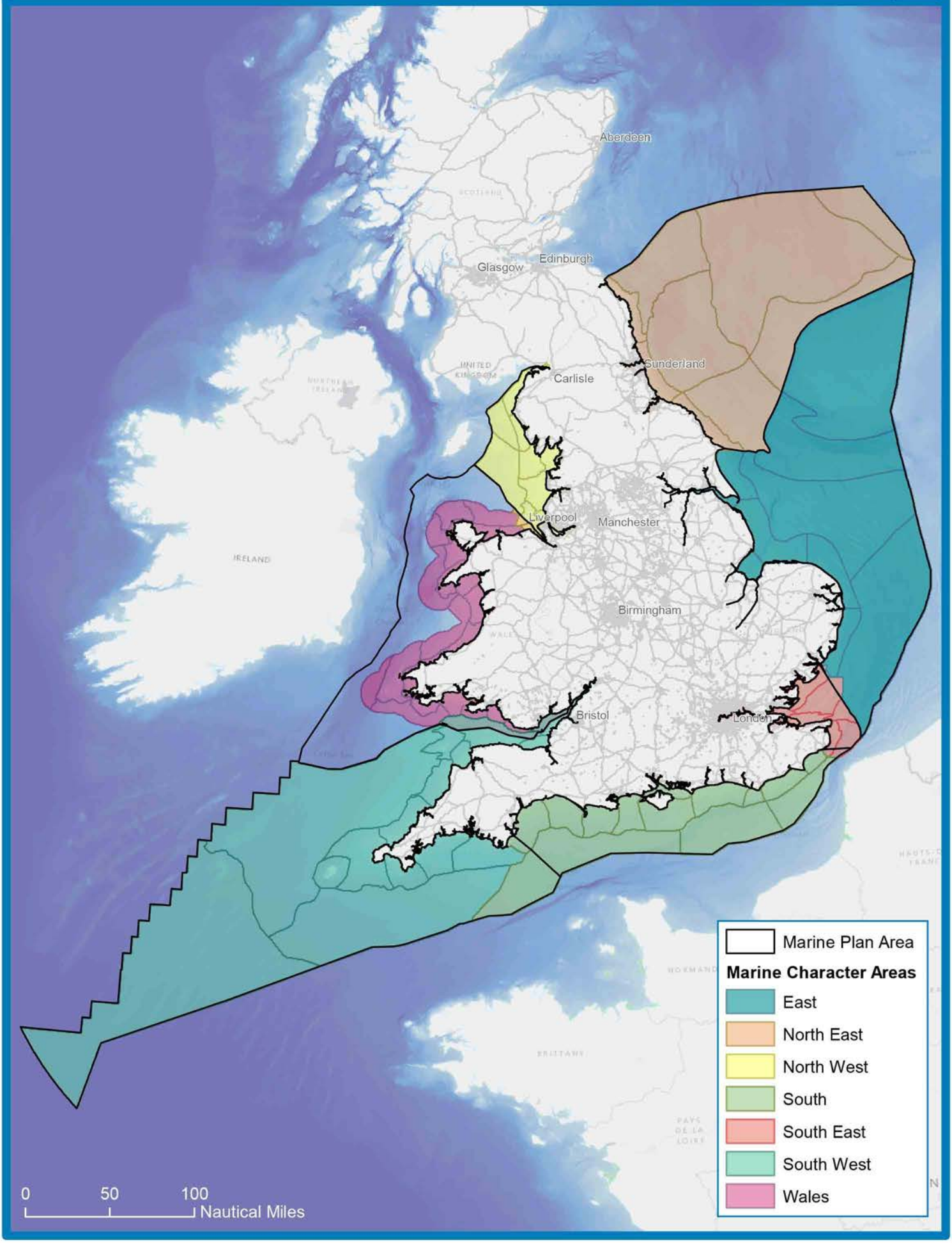
Figure 4: Marine Character Areas in England and Wales

ETRS89 UTM Zone 30N. Not to be used for navigation.



2.7 Limitations

The main limitations of this seascape assessment for the north east, and suggestions for further improvements, are summarised as follows:

- The time and resources available for this study enabled the production and verification of desk-based character descriptions only, with a focus on key characteristics.
- The MCA descriptions provide information on the current (baseline) character of the seascape. The majority of this information is from the 2015 desk-top study which preceded stakeholder consultation in 2018. The MCA profiles were updated in 2018 to account for stakeholder comments where available evidence allowed.
- The key characteristics are designed to capture elements of importance to seascape character at a strategic (marine plan area) level. They are not designed to be a comprehensive list of all sites and features present – designated or otherwise.
- An evaluation of quality, condition, sensitivity and capacity to accommodate change could be considered at a future date, which in turn could inform the production of tailored management and planning guidelines.
- The flow of character into Scottish Waters could not be assessed fully under the current contract due to lack of access to data and resources. Future studies should look in more detail at flow across this boundary.

3 Marine Character Area profiles for the north east inshore and offshore marine plan areas

3.1 Introduction

This chapter provides descriptive profiles for each MCA identified for the north east inshore and offshore marine plan areas. Figure 5 presents the spatial classification of all north east MCAs and Figure 6 shows the national Visual Resource Mapping results, overlain by the north east MCA framework.

Each stand-alone profile contains the following information:

A location map of the MCA (forming the front cover of each MCA profile)

Overview of the MCA

- Location and boundaries
- Overall character (summary)
- Adjacent National Character Areas (for those MCAs abutting the coast)
- Adjacent nationally designated and defined landscapes (National Parks, Areas of Outstanding Natural Beauty (AONBs), Heritage Coasts and World Heritage Sites).

Key characteristics

Comprising summary bullet points considering natural, cultural/social and perceptual/aesthetic influences on the MCA's character.

3.2 List of Abbreviations

The following abbreviations are used throughout the MCA profiles:

AONB	Area of Outstanding Natural Beauty
MCA	Marine Character Area
MCZ	Marine Conservation Zone
NCA	National Character Area
SAC	Special Area of Conservation
cSAC	candidate Special Area of Conservation
SPA	Special Protection Area
WWI / WWII	World War I / World War II

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Figure 5: North East Marine Character Areas

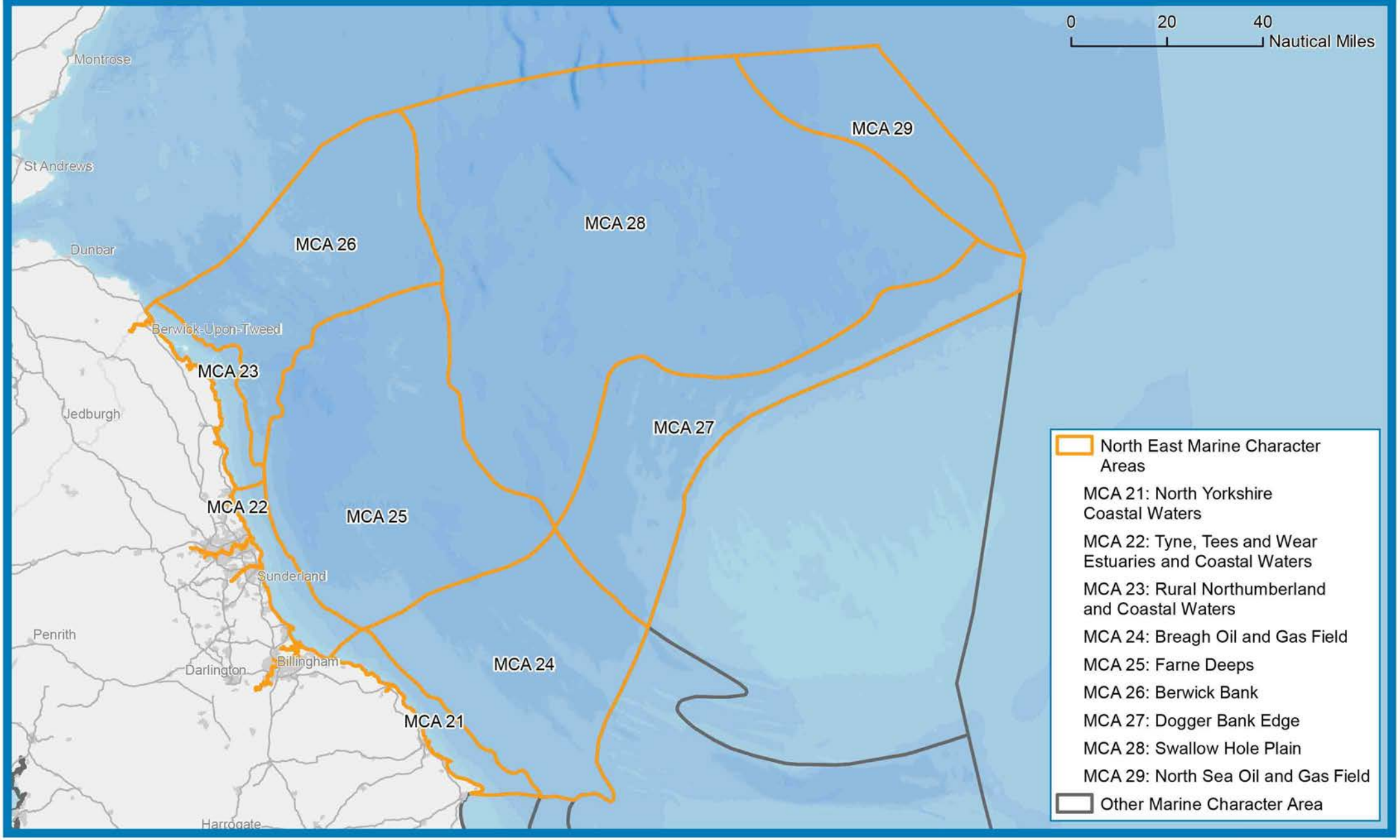

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Figure 6: Visual Resource Mapping for the North East

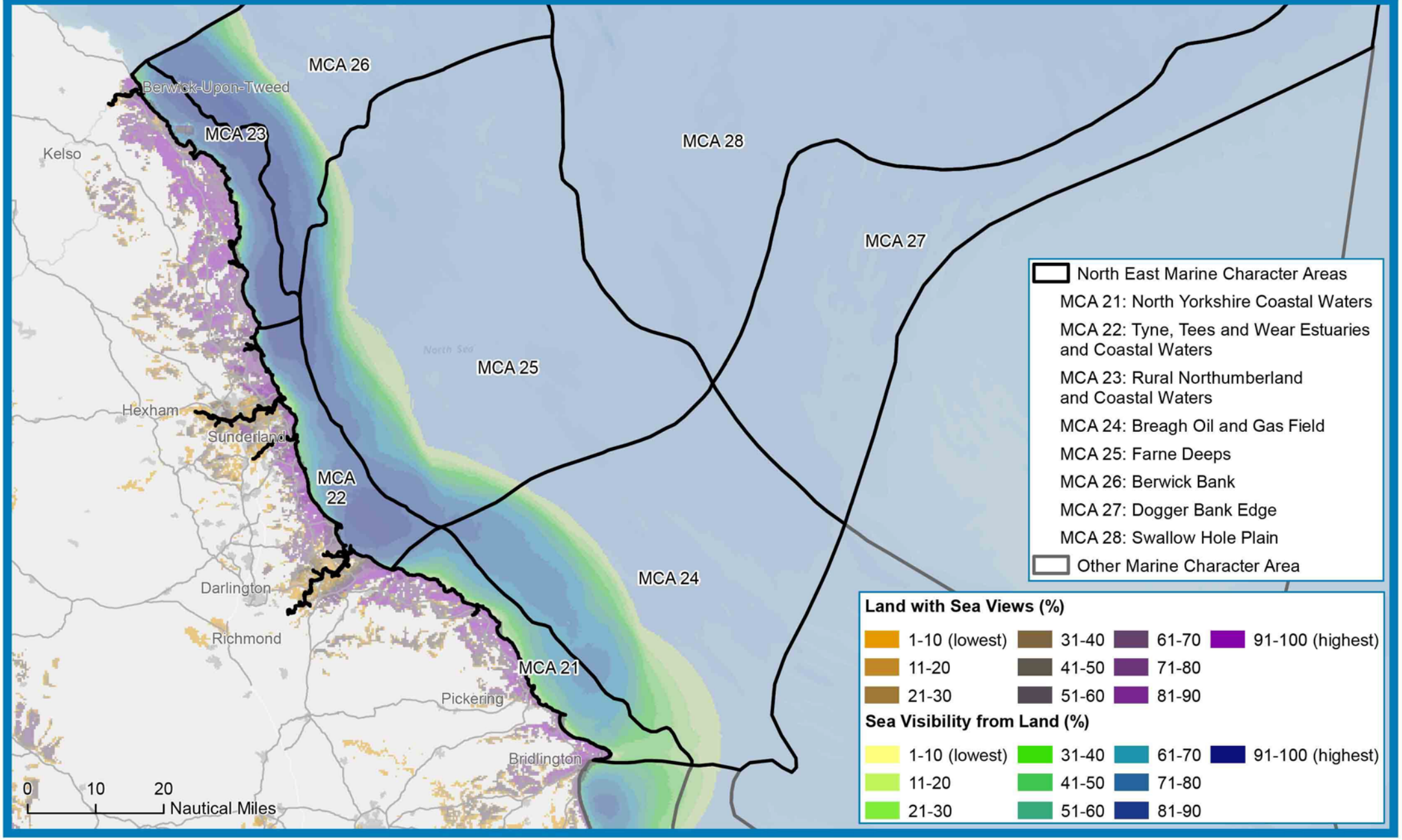

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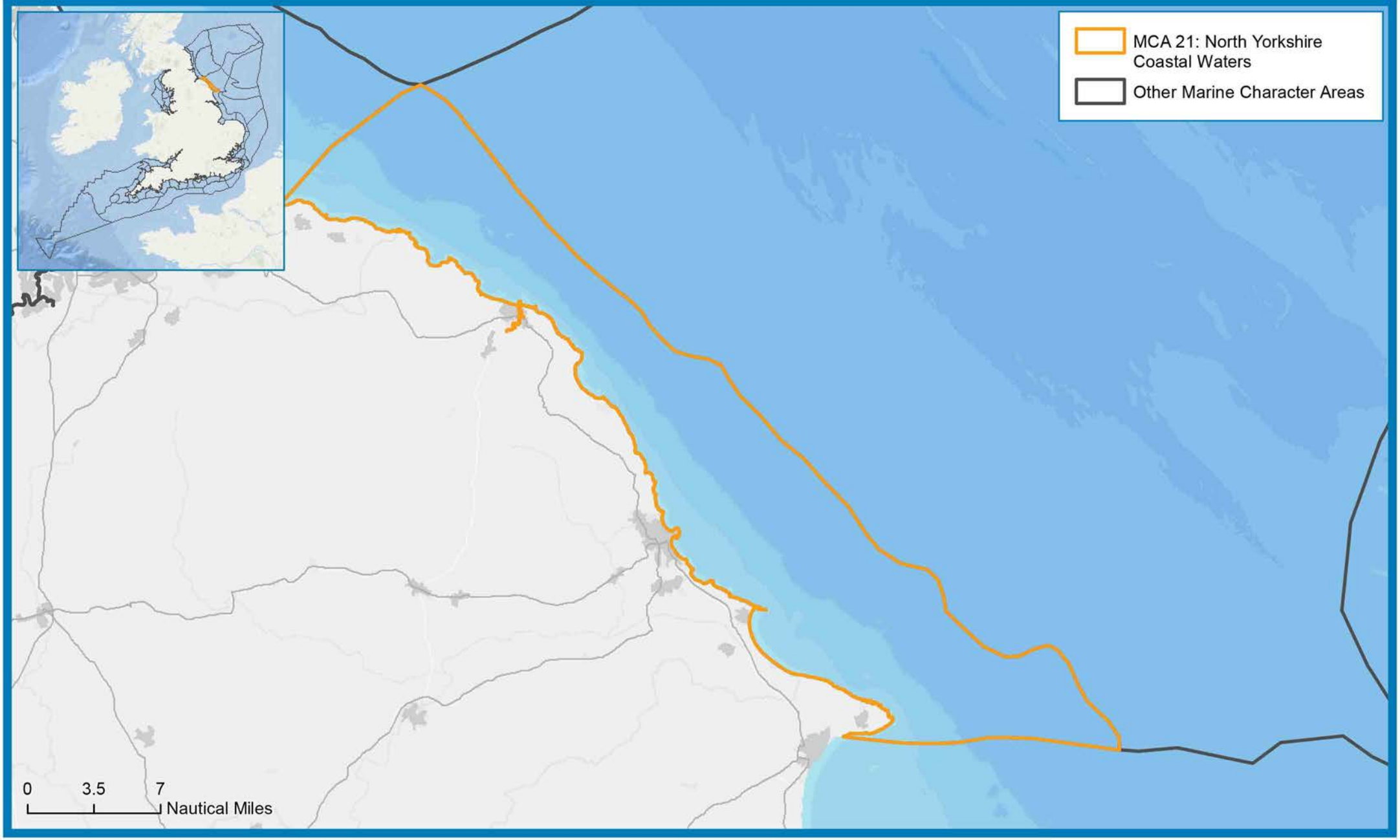
Figure 7 - MCA 21, North Yorkshire Coastal Waters



3.3.1 Profile for MCA 21: North Yorkshire Coastal Waters

Location and boundaries
MCA 21 extends from Flamborough Head to Saltburn-by-the-Sea, taking in the headlands and bays of Scarborough and Filey, and the rugged coast of the North York Moors. Its seaward boundary with MCA 24: Breagh Oil and Gas Field follows the 50m bathymetric contour, approximately 11km offshore, though it extends to 22km off Flamborough Head where the chalk bank makes the sea bed shallower, and is as close as 7.5km off Whitby where the seafloor drops away more steeply. This offshore boundary broadly corresponds to the extent of inshore fishing, modern coastal shipping and historic wrecks. The southern boundary with Holderness Coastal Waters (Area 5 from the East Seascape Character Assessment) lies at the natural break south of Flamborough Head, where the underlying chalk forming the Yorkshire Wolds drops in elevation at Bridlington Bay, and offshore forms a bank connecting with Dogger Bank. The northern boundary with MCA 22: Tyne, Tees and Wear Estuaries and Coastal Waters is linked to the landscape character change onshore, from the remote rural upland North York Moors to the largely settled lowlands of the Tees valley. The onshore character of the landscape along this coast is therefore very different from the settled character of the stretches of coast to the north, and is more rugged than the coast further south.
Overall character
This MCA comprises shelving coastal waters off the North Yorkshire coast. South of Scarborough the coast is relatively low lying, with the Yorkshire Wolds dropping down to Flamborough Head and Filey Point. Filey Bay is a broad crescent shaped sandy bay south of Filey Point. Further north, bays are small, and lie between cliffs and rocky beaches where the North York Moors National Park meets the coast, with rugged coastal upland plunging to the sea in the form of sheer vertical cliffs and rocky bays. Settlement in the form of small ports and harbours occurs in the sheltered bays, including the historic fishing villages that cling to the cliffs at Robin Hood's Bay and Runswick Bay. There are a number of small harbours, with Scarborough being the largest. Offshore, there are rocks and submerged obstacles including wrecks. The wrecks illustrate that this was a treacherous coast, particularly around Flamborough Head and Filey Point, and alludes to the area's rich maritime heritage and significant involvement in both World Wars. This area is linked to Dogger Bank, which is known to have been exposed during Palaeolithic times, when the UK was connected to Europe by dry land. Doggerland, of which this MCA would have been part, was inundated after the last Ice Age. Dark skies and high levels of tranquillity characterise the undeveloped stretches of the coastline and neighbouring coastal waters.
Adjacent National Character Areas (NCAs)
The adjacent coastline includes the following NCAs as defined by Natural England:

- 25: North Yorkshire Moors and Cleveland Hills (from Saltburn-by-the-Sea to Scarborough)
- 26: Vale of Pickering (from Scarborough to Filey Bay)
- 27: Yorkshire Wolds (from Filey Bay to Bridlington)

Adjacent and inter-visible nationally designated and defined landscapes

The North York Moors National Park meets the coastline for much of the MCA, from Long Nab by Cloughton to White Stones by Loftus, although excluding the Whitby area. Much of the coast is also defined as Heritage Coast, the Flamborough Headland Heritage Coast extending north to Filey Bay, and the North Yorkshire and Cleveland Heritage Coast covering the coast north of Scarborough.

3.3.2 Key characteristics of MCA 21: North Yorkshire Coastal Waters

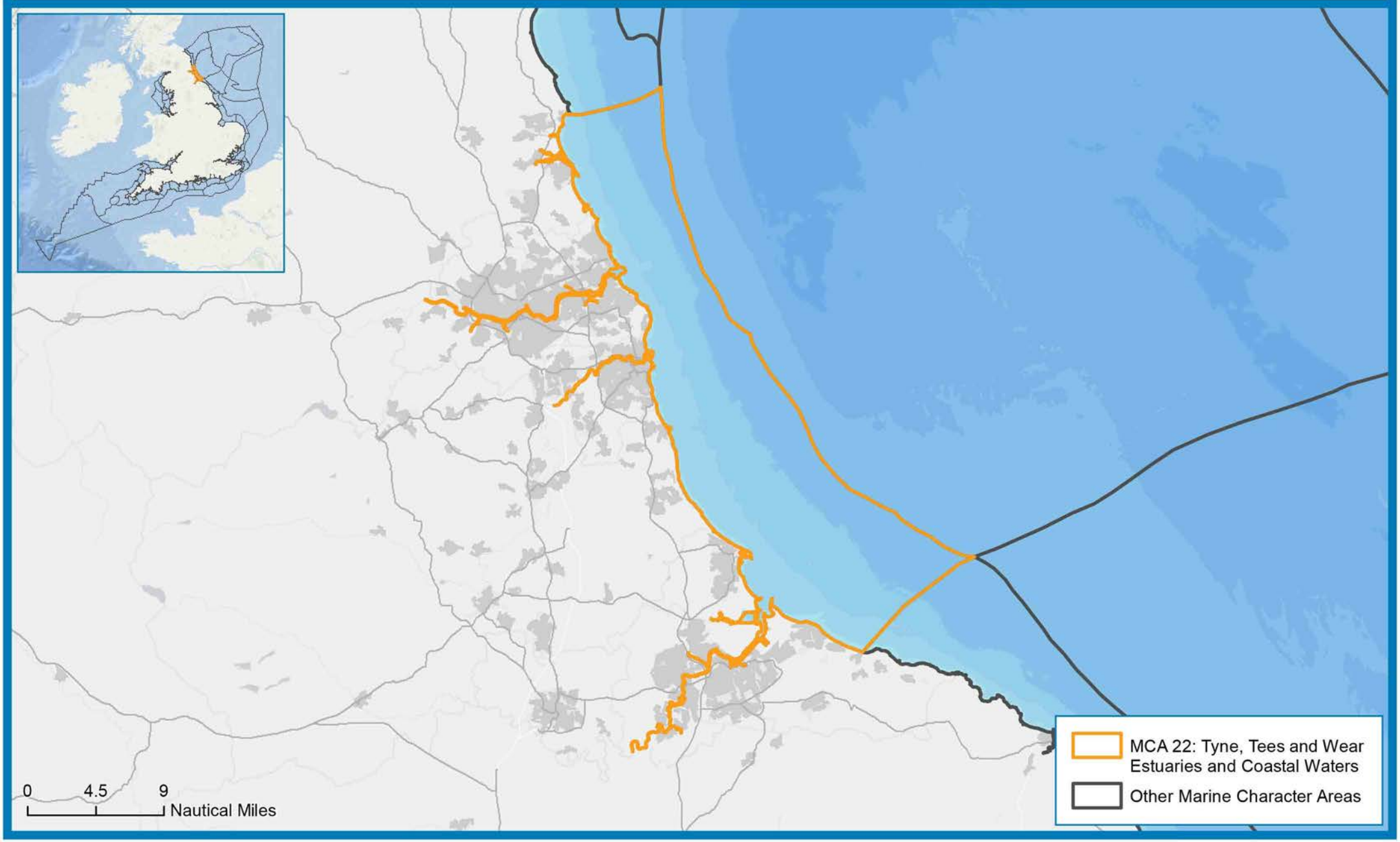
- Gently shelving coastal waters off the rugged coast of North Yorkshire between Flamborough Head and Saltburn-by-the-Sea.
- Flamborough Head, a prominent headland, is the northernmost coastal outcrop of chalk in Europe, forming a complex coastline of cliffs with numerous caves, arches and platforms.
- Low-lying coast south of Scarborough, including the broad and shallow crescent-shaped Filey Bay, contrasting with the high cliffs to the north.
- Unique combination of coastal and seabed limestone geology, with exposures of internationally important Jurassic and Cretaceous strata along the coast and evident in associated plant and animal fossil sites.
- Underlying seabed geology of chalk below Flamborough Head, and mudstones and limestones elsewhere.
- 'Aggressive' North Sea currents and tides actively erode the coastline, particularly at Scarborough and Runswick Bay, requiring intervention with extensive man-made sea defences.
- Important vegetated sea cliffs, chalk reef and sea cave communities around Flamborough Head (SAC). The area is also internationally important for its seabird populations (designated as a part of the Flamborough Head and Bempton Cliffs SPA) with nesting colonies of kittiwake, guillemot, fulmar, razorbill and puffins.
- Offshore, the Runswick Bay MCZ recognises diverse rocky and sediment seabed and sea cave habitats.
- Complex tidal patterns associated with Flamborough Head and Filey Point, as well as submerged rocks form hazards to navigation.
- This area was formerly part of Doggerland: dry land connecting the UK with Europe during Paleolithic times – inundated after the last Ice Age.
- Lighthouses (Flamborough Head and Whitby) provide prominent navigation marks, as do the ruined Whitby Abbey and Scarborough Castle which are prominent landmarks in views to and along the cliffs.
- Large number of wrecked merchant and fishing vessels, and minor warships – casualties of WWI and WWII or lost are testament to hazardous sea conditions. The protected site of the Filey Bay Wreck, Bonhomme Richard an American privateer, dates from the late 18th century.
- Major historic fishing ports include Scarborough and Whitby as well as smaller ports at Filey, Flamborough, Straithes and Robin Hood's Bay where large quantities of shellfish (crab and lobster) are landed. Brightly painted vernacular open coble fishing boats are still in use along parts of this coast.
- Historic importance of fishing to the local communities along the coast including whaling from Whitby, the great

herring fleets of the 19th and early 20th century and sport fishing for tuna out of Scarborough in the 1930s.

- War Channels of the East Coast (WWI & WWII), essential routes for the maritime traffic of coal and civilian shipping via mine-free channels connect the Tyne to the Thames, and beyond. The coast at Scarborough and Whitby was subject to bombardment by German warships in 1914.
- Important industrial heritage associated with coastal mining of both of Alum and ironstone. A number of quarries are designated Scheduled Monuments; Boulby mine being one of the best national examples of a technically advanced alum quarrying complex. A railway tunnel and harbour at Port Mulgrave are reminders of the area's important ironstone industry and links to coastal trade/shipping.
- Hilda of Whitby, Christian saint and founding abbess of the Whitby monastery, played a significant role in establishing Christianity in the North East, along with religious centres at Lindisfarne (MCA23) and Wearmouth-Jarrow (MCA22), all linked by waterborne route ways.
- Whitby, Filey and Scarborough are important historic ports/harbours and key religious/military sites and centres of trade, recognised in their built heritage and character. A long heritage as popular tourist destinations: today, the area continues to attract visitors to explore the local history, literary heritage or natural environment, with whale watching tours operating from Whitby.
- Popular walking route – the Cleveland Way National Trail forms part of the Filey Brigg to Newport Bridge section of the England Coast Path.
- Expansive views from the coast across undeveloped North Sea horizons, frequently marked by cargo ships, tankers and fishing vessels. Vistas along the coastline to settlements clinging to the cliffs such as to Robin Hood's Bay and Runswick Bay, as well as views back from the sea to the rugged coast with distinctive landmarks.
- The smooth elevated moorlands of the North York Moors National Park provide a remote and dramatic backdrop to the MCA, in turn this largely undeveloped seascape forms part of its setting, particularly views north of Flamborough.
- North Yorkshire and Cleveland Heritage Coast defines stretches of undeveloped coast, characterised by 'dark skies' and elevated levels of tranquillity.

Marine Management Organisation

Figure 8 - MCA 22, Tyne, Tees and Wear Estuaries and Coastal Waters



3.4.1 Profile for MCA 22: Tyne, Tees and Wear Estuaries and Coastal Waters

Location and boundaries

MCA 22 extends from Saltburn-by-the-Sea to Newbiggin Point, taking in the built up coast of the northeast and including the estuaries of the Tyne, Tees and Wear rivers. Its seaward boundary with MCA 25: Farne Deeps follows the 50m bathymetric contour, approximately 10-15km offshore. This offshore boundary broadly corresponds to the extent of inshore fishing, modern coastal shipping and historic wrecks.

The southern boundary with MCA 21: North Yorkshire Coastal Waters is linked to the landscape character change onshore, which marks the change from the rural upland North York Moors to the largely settled lowlands of the Tees valley. The northern boundary with MCA 23: Rural Northumberland and Coastal Waters is linked again to the change from largely settled to more open rural Northumberland coast, at the promontory to the north of Blyth, Newbiggin Point. The onshore character of the landscape along this coast is therefore very different from the onshore character of the stretches of coast to north or south.

Overall character

This MCA takes in the busiest coastal waters off the northeast coast of England, including shipping lanes to the two main ports, Port of Tyne and Teesport, as well as recreational boating areas. It is characterised by proximity to and views of an extensively developed lowland coast, and associated estuaries, rivers and shelving coastal waters. It is brightly lit at night, particularly as a result to the large industrial area at Middlesbrough. Lighthouses include Souter Point and St Mary's, although there are many other lights along this coast. It is relatively industrialised, with a rich heritage of mining, ship building and fishing, and many sections where sea defences or harbour walls provide coastal protection. Hadrian's Wall World Heritage Site follows the river Tyne through Newcastle, meeting the east coast at Wallsend. Between settlements are stretches of sandy shore, either straight or forming slight bays between rocky outcrops. Harbours are defended by walls, breakwaters and piers, particularly at Tees Mouth, Hartlepool, Seaham, Sunderland, Tynemouth and Blyth. Ecologically diverse with internationally and national important habitats and rare species – several areas designated.

Adjacent National Character Areas (NCAs)

The adjacent coastline includes the following NCAs as defined by Natural England:

- 13: South East Northumberland Coastal Plain (from Amble to Whitley Bay)
- 14: Tyne and Wear Lowlands (from Whitley Bay to South Shields)
- 15: Durham Magnesian Limestone Plateau (from South Shields to Hartlepool)

- 23: Tees Lowlands (from Hartlepool to Saltburn-by-the-Sea)

Adjacent and inter-visible nationally designated and defined landscapes

The adjacent coastline does not include any land designated as AONB or National Park. Three short stretches of the Durham Heritage Coast lie between Crimdon Park to Blackhall; from Howden Point to Nose's Point; and from Seaham Hall to Salterfen Rocks.

3.4.2 Key characteristics of MCA 22: Tyne, Tees and Wear Estuaries and Coastal Waters

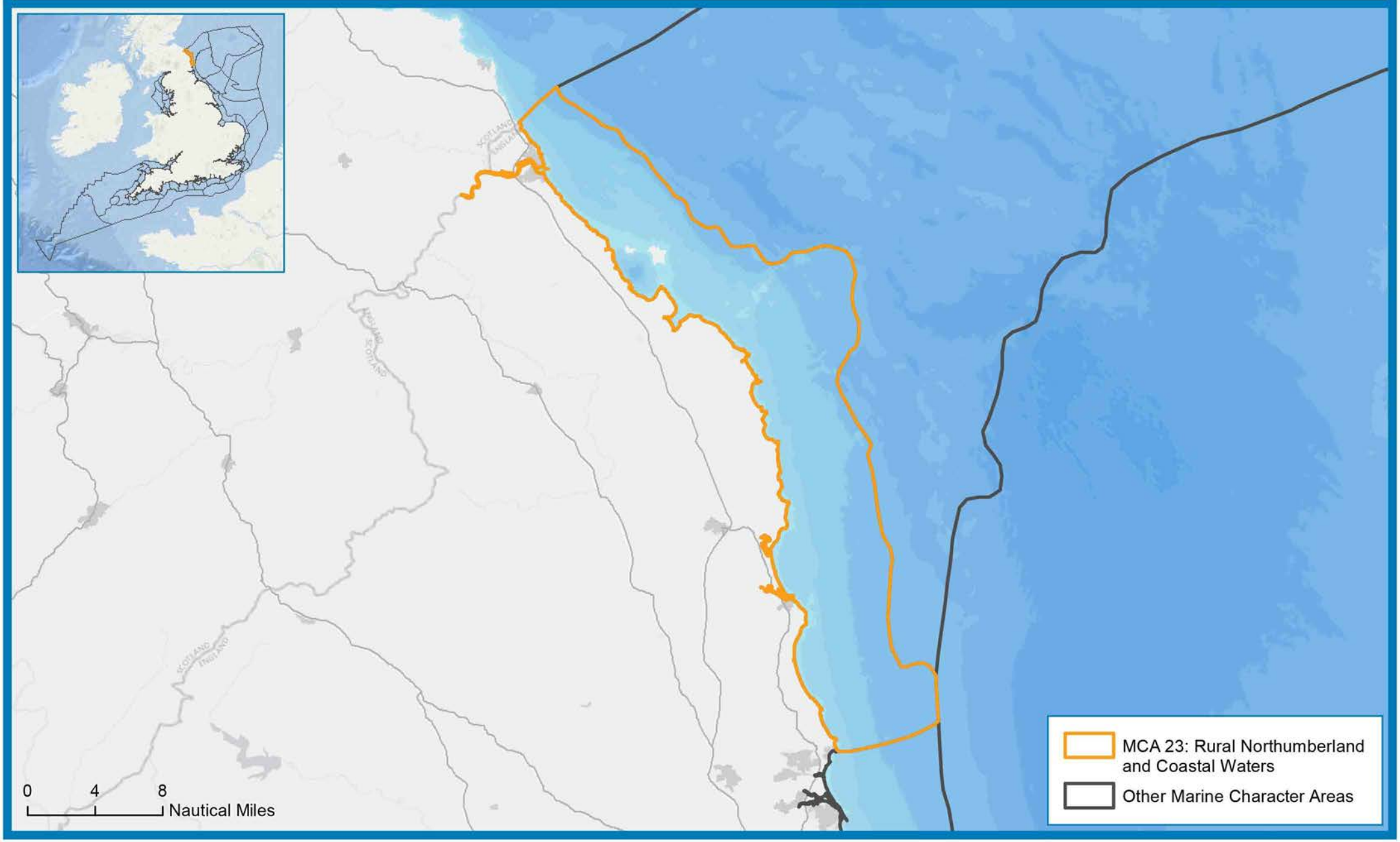
- Shelving coastal waters off the extensively developed coast of the Tyne, Tees and Wear lowlands encompassing Tynemouth, South Shields, Sunderland, Seaham, Hartlepool and Redcar, deepening to approximately 30-50 metres offshore. Encompassing the estuaries and tidal rivers inland.
- Contrasting areas of undeveloped exposed coastline of sweeping sandy beaches, punctuated by estuaries and rocky outcrops that form slight headlands between South Shields and Hartlepool.
- Mixed rocky inshore seabed of mudstone, sandstone and limestone, with bands of coal further north and areas of intertidal prehistoric peat beds at Seaton Carew and Redcar.
- Seafloor covered by mixed deposits of sand, mud or gravel sediments. Mud characterises the areas offshore around the Tyne, Wear and up to Newbiggin-by-the-Sea.
- Diverse ecological habitats and important populations of rare species including seabed habitats supporting corals, sea squirts, anemones and bryozoans (designated Coquet to St Mary's MCZ). Rocky foreshore and sandy beach that regularly supports internationally important numbers of purple sandpiper, ruddy turnstone and little tern (Northumbria Coast Ramsar site and Teesmouth and Cleveland Coast SPA).
- Kittiwake nesting on Tyne Bridge, Newcastle/Gateshead quayside, are the furthest inland colony in the world. The MCA is also home to common and grey seals and cetaceans.
- Complex mosaic grassland habitats, unique to the British Isles, designated as Durham Coast SAC being the only example of vegetated sea cliffs on Magnesian limestone exposures in the UK.
- A number of lighthouses provide markers for navigation. The National Trust's Souter Lighthouse is a popular visitor and educational attraction, and landmark in the wider seascape.
- Hadrian's Wall World Heritage Site meets the coast at Wallsend. The east coast was a major sea route, and the Tyne an important military supply base during the Roman occupation.
- Religious links to Lindisfarne (MCA 23) and Whitby Abbey (MCA 21) through the 7th Century Anglo-Saxon monastery of Wearmouth-Jarrow Abbey, all connected by waterborne routes.
- A long association with the post-medieval coal trade, where coal was transported by sea to the south. Evidence of 19th Century Ironstone mining at Huntcliff mine, Warsett Hill (Scheduled Monument).
- Historic wrecks in large numbers from all periods document the area's legacy of maritime trade, well established trading ports, and as a result of German attacks during the WWI and WWII.
- Offshore, the East Coast War Channels were vital for transporting coal and other goods from the Tyne to the Thames and France, during WWI and WWII. Additional protection was provided from Heugh Gun Battery

(Scheduled Monument) located on the Headland at Hartlepool and the ‘disappearing gun’ at Trow Point. The coast includes a range of important military heritage sites.

- The major ports of Tyne, Teesport and Blyth accommodate a variety of vessels, including ferries from the Port of Tyne. These shipping hubs combined with traffic from the smaller harbours and ports (Seaham, South Shields and Sunderland) generate large volumes of sea traffic and busy waters. Significant cultural and industrial heritage associated with ports and harbours represented in built character.
- Global influence of shipbuilding in the area, focused around Sunderland, Teesside, Hartlepool and Tyneside dating from the late 13th Century. Shipbuilding now largely replaced by vessel and marine structure decommissioning and the offshore wind industries.
- Large fishing fleets based at the region’s major commercial fishing and shellfish ports at North Shields, with other landings at smaller ports such as Hartlepool and Blyth.
- Recovering Durham coast, formally degraded by colliery waste: the ‘black beaches’ and landfill at Easington and Horden are now popular recreational areas, and form part of the undeveloped Durham Heritage Coast and a valuable buffer between industrial development associated with the estuaries to the north and south.
- Good coastal access along much of the coast providing increasing opportunities for recreation and tourism, including fishing from the now clean former industrial beaches and walking along stretches of the England Coast Path.
- Expansive views across the North Sea, particularly from the ‘Leas’ in South Tyneside, where vast horizons are frequently marked by cargo ships, tankers and fishing vessels, or the moving turbines of the Teeside and Blyth (Demonstrator) Offshore Wind Farms.
- Viewed from the sea, the coastline is perceived as a well-lit developed lowland, densely populated with several large coastal conurbations, including Sunderland, South Shields, and Tynemouth. The southern part of the MCA is intensely lit by the extensive industrial facilities at Middlesbrough.
- The exposure of the coast with general absence of sheltering headlands results in a wild and unforgiving seascape when storms sweep in from the North Sea.

Marine Management Organisation

Figure 9 - MCA 23, Rural Northumberland and Coastal Waters



3.5.1 Profile for MCA 23: Rural Northumberland and Coastal Waters

Location and boundaries

MCA extends from Newbiggin Point to the Scottish border north of Berwick, off the rural Northumbrian coast. Its seaward boundary with MCA 26: Berwick Bank follows the 50m bathymetric contour, approximately 5.5-11km offshore. This offshore boundary broadly corresponds to the extent of inshore fishing and modern coastal shipping and historic wrecks.

The southern boundary with MCA 22: Tyne, Tees and Wear Estuaries and Coastal Waters is represented by the change from open rural Northumberland coast to the developed coast south of Newbiggin Point and Blyth. The northern boundary of this MCA is the limit to English waters, though the Berwickshire coastal waters have similarities with this MCA.

Overall character

A coastline made up of long crescent-shaped sandy bays and rocky headlands with offshore islands. The shallow inshore waters include the coastal lagoon behind Holy Island, and rocky out crops of the sea to form Coquet Island and the Farne Islands. Settlements and small harbours are scattered along the coast, associated with bays. This coast has a rich and often turbulent history, with fortified castles such as Warkworth, Dunstanburgh, Bamburgh and Lindisfarne forming distinctive historic features. Lindisfarne is one of the cradles of Christianity in England, associated with a number of well-known saints. The coastal waters are quieter than those found in MCA 22, with shipping lanes lying well off the coast, but smaller fishing vessels and recreational vessels characterise the inshore waters around Amble, Alnmouth, Craster, Seahouses, the Farnes, Holy Island, and Berwick. Lighthouses include Coquet Island, Longstone and Farne, although there are relatively few other lights along the coast and it is characterised by dark skies and elevated levels of tranquillity/sense of remoteness. Distinctive undeveloped coastal views encompassing open horizons and the low profile of offshore islands are a key feature of the MCA. Craster is famous for Craster Kippers, and Seahouses is said to be one of the places where this practice of smoking herrings originated.

Adjacent National Character Areas (NCAs)

The adjacent coastline includes the following NCAs as defined by Natural England:

- 1: Northumberland Coastal Plain (from Berwick to Amble)
- 13: South East Northumberland Coastal Plain (from Amble to Whitley Bay)

Adjacent and inter-visible nationally designated and defined landscapes

Much of this coastline falls within the Northumberland Coast AONB and North Northumberland Heritage Coast.

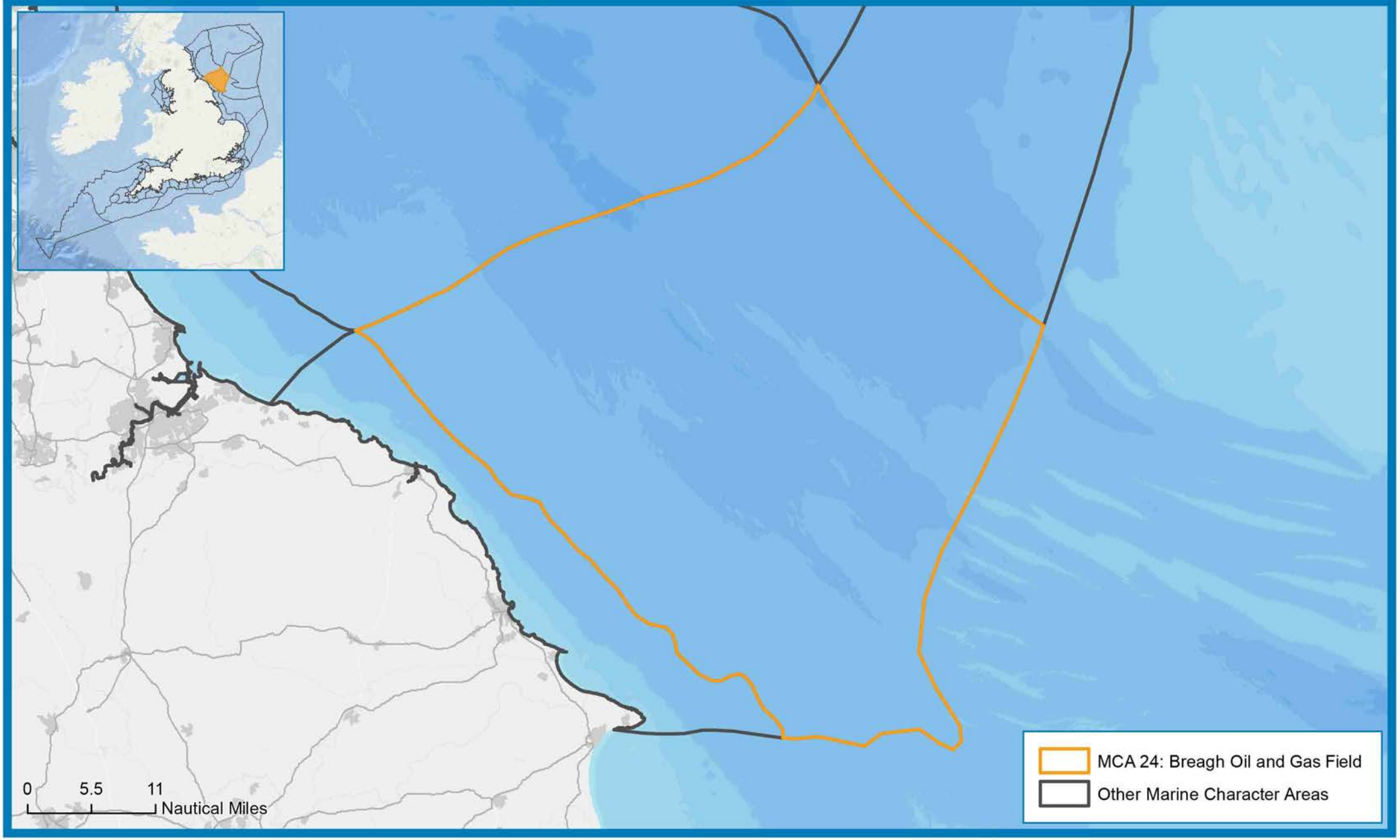
3.5.2 Key characteristics of MCA 23: Rural Northumberland and Coastal Waters

- Shelving coastal area off Northumberland, including the coastal islands of the Farnes, Coquet and Holy Island.
- Shelving sea floor with a shallow shelf around the islands of less than 20m depth. The shallow sandy lagoon of Fenham Flats lies landward of Holy Island.
- Coastline punctuated by estuaries and sandy bays. Bays defined by rocky headlands and outcrops. An outcrop of the Whin Sill (igneous gabbro) forms the Farne Islands and prominent headland at Dunstanburgh Castle, and supports distinctive vegetation, unique to Northumberland.
- Rocky seabed of Carboniferous sandstone, limestone, argillaceous rocks and Coal Measures, with a band of Millstone Grit south of Seahouses. Seafloor covered by shallow areas of sand, gravel or mud sediments.
- The islands are associated with moderate tide stress.
- Longshore drift (southbound) forms sandbanks within the bays, such as at Amble, Alnmouth, Goswick Sands and Berwick, and dunes backing the sandy beaches support a rich and varied flora and fauna.
- The Berwickshire and North Northumberland Coast SAC protects rocky reefs, sea caves and intertidal habitats, and populations of grey seals and sea/water birds of national and international importance, particularly at the Farne Islands and the extensive saltmarshes at Lindisfarne (largest system in England).
- Further ecological designations include the Coquet to St Mary's MCZ which protects corals, sea squirts, anemones and bryozoans and the larger proposed Berwick to St Mary's MCZ which is an important area for common eider.
- Windswept coast with frequent 'haar', or coastal fog, caused by warmer moist air moving over the relatively cooler North Sea.
- A number of lighthouses guide safe pilotage through these exposed and often rough waters, sited along the coast and on the islands.
- Historic wrecks, particularly around the Farne Islands. Grace Darling, daughter of the Longstone lighthouse keeper, helped rescue nine stranded sailors from the wreck of the *Forfarshire* in 1838.
- Rich heritage from a Mesolithic settlement site and Bronze Age cist cemetery at Howick, to 18th century lime kilns at Lindisfarne and Beadnell. The later recall busier days as coal and lime ports.
- Dramatic and iconic fortified castles including the 12th century Warkworth and Bamburgh Castles and 14th century Dunstanburgh Castle. The 16th century Lindisfarne Castle was remodelled as an Arts and Crafts house by Edwin Lutyens.
- Cultural and religious associations focused on Lindisfarne, also known as Holy Island, where St Aidan arrived in the 7th century at the behest of St Oswald, King of Northumbria, and where St Cuthbert was later Prior. The island is known as "the birthplace of English Christianity": known for the illuminated 8th century Lindisfarne Gospels, it was later subjected to devastating Viking raids.

- Rich seafaring and coastwise shipping heritage with traditional fishing harbours and associated traffic. Amble was a small coal port with a busy fishing industry, with Craster and Seahouses being famous for smoking herrings. Today, Holy Island supports a small area of oyster farming and the port of Berwick upon Tweed handles cargoes including fertiliser, malting barley and oilseed rape.
- Coastal open cast and deep coal mining associated with areas to the south (Druridge Bay) creating the infamous black beaches with waste material being dumped along the coast – now recovered.
- Popular tourist and recreation destination, both along the coast with large numbers of walkers and cyclists, and offshore for sea kayakers, surfers, in addition to boat trips, pleasure cruisers and diving boats.
- Northumberland Coast Path, St Oswald's Way National Trail and North Sea Long Distance Cycle Route/National Cycle Route 1, cross the coastline running its entire length, including to Holy Island.
- Expansive undeveloped vistas out to the wider North Sea and islands, marked by distant ships and fishing vessels, as well as views from the sea and islands (recreational boat routes) back to the coast where the fortified castles form dramatic and iconic features on the skyline. Scenic views gained along, the undeveloped Heritage Coast.
- High levels of intervisibility between inland high points, such as Halidon Hill or Ros Castle, low-lying sandy beaches (Goswick Sands and Budle Bay) and the Farne Islands offshore.
- The exposure and orientation of the coast results in a wild and unforgiving seascape when storms sweep in from the offshore North Sea.
- The MCA forms part of a wider maritime setting to the Northumberland Coast AONB and the North Northumberland Heritage Coast defined to conserve the best stretches of undeveloped coast, characterised by 'dark skies' and high levels of tranquillity, especially between Bamburgh to Scremerston.

Marine Management Organisation

Figure 10 - MCA 24, Breagh Oil and Gas Field



3.6.1 Profile for MCA 24: Breagh Oil and Gas Field

Location and boundaries
This MCA comprises the offshore waters between the North Yorkshire coast and Dogger Bank. The inshore boundary follows the 50m bathymetric contour off the North Yorkshire coast. A distinctive band of chalk bedrock marks the boundary to the west, and the transition from underlying Jurassic mudstones to Triassic clays marks the northern boundary. The southern boundary of this area is formed by the southern extent of the North East Offshore Marine Plan Area, where the MCA merges with Dogger Deep Water Channel and East Midlands Offshore Gas Field and (Areas 2 and 3 of the East Seascape Character Assessment).
Overall character
A transitional area from the coastal waters off North Yorkshire towards the distant offshore area of Dogger Bank. Sandy substrate provides rich benthic and pelagic environments that benefit from the Flamborough Front; an upwelling of nutrients due to the mixing of waters from north and south, offshore of Flamborough Head. These support rich fishing grounds and important spawning grounds for several species including cod. Busy shipping lanes running out of Teesport and Port of Tyne cross through this MCA. The area is associated with Palaeolithic history of exposed land, known as Doggerland, which was inundated after the last ice age. This area played an important role in both World War I and World War II with East Coast War Channels allowing the transportation of coal and goods between the North East and the South, and witnessed several naval engagements between the Royal Navy and German U-boats.
Adjacent National Character Areas (NCAs)
N/A - this offshore area does not have an adjacent coastline.
Adjacent and inter-visible nationally designated and defined landscapes
N/A - this offshore area does not have an adjacent coastline. It is likely to be visible from the North York Moors National Park and Flamborough Headland Heritage Coast.

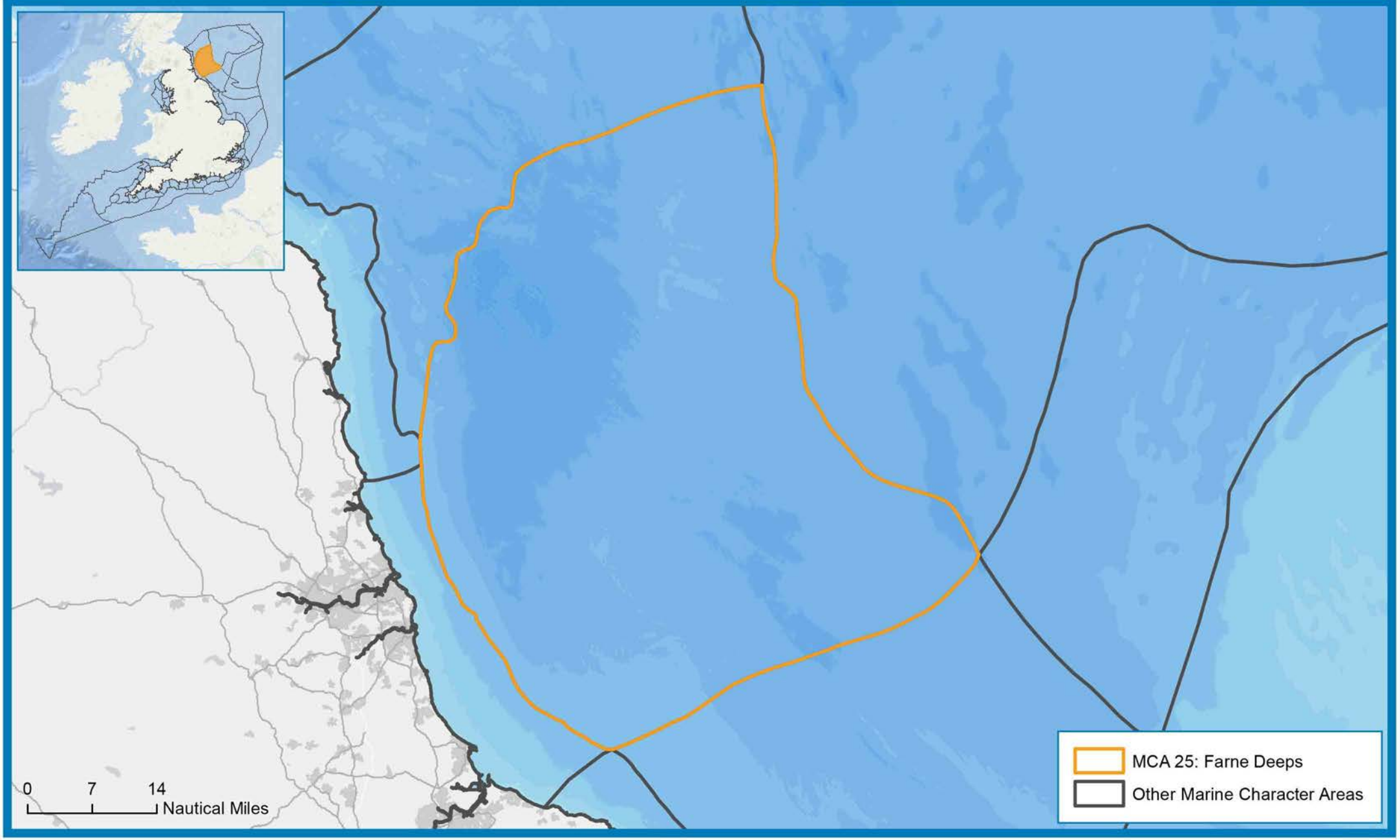
3.6.2. Key characteristics of MCA 24: Breagh Oil and Gas Field

- Undulating marine plain of approximately 50-70m depth, the deepest waters associated with Whitby Fine Ground in the north.
- Area formerly part of the Palaeolithic landscape of Doggerland – dry land connecting the UK with Europe, subsequently inundated following the last Ice Age. Peat and remains of a mammoth dredged up by fishing trawlers, are evidence for Doggerland's ancient location above sea level.
- Chalk seabed beneath Flamborough Head Ground; a band extending from the coast to Dogger Bank and running beneath the eastern part of the MCA. The remainder is underlain by mudstones. Seafloor topped by sand and gravel sediments.
- The area experiences moderate wave action with weak tidal currents. Low wave heights are characteristic across the MCA.
- Stable environment and uniform sea temperatures of the North Sea allow spring and autumn phytoplankton blooms.
- Area influenced by the Flamborough Front, an upwelling of nutrients where the cooler northern and warmer southern waters of the North Sea mix, providing an important food source for marine mammals.
- Southern North Sea cSAC, covering a vast area (36,951km^2), is important for its harbour porpoise population. Atlantic white-sided dolphin are also present.
- Historically important as part of the wider North Sea: early Roman explorations recorded in 12 BC; Viking raiding for two centuries from 793 AD; and maritime trade between the North East and Scandinavia and the Baltic from the medieval period onwards.
- WWI naval engagements, including the First Battle of the Atlantic, marking the first submarine war patrols in history when German U-boats attacked the Royal Navy, and the later Battle of Dogger Bank – *Blucher* sunk by British battlecruisers in the North Sea.
- The East Coast War Channels were vital for transporting coal and other goods from the Tyne to the Thames and France, during WWI and WWII.
- The Greater North Sea is one of the busiest sea areas in the world, important for marine transport with busy shipping lanes linking ports in Europe with the North East.
- Relatively small number of recorded wrecks due to the vast open, deep seas and calmer waters.
- Popular fishing area, despite part of the area being known as 'Heartbreak Ridge' due to the unpredictable fish catches in this area. The wider MCA is also exploited for stocks of Queen scallops, deep water prawns and whelks.
- Important spawning area for commercially fished cod and plaice across Flamborough Head Ground, with herring, lemon sole, sand eel and sprat also spawning in the MCA.

- Breagh oil and gas field is located in the centre of the MCA, with additional wells associated with Flamborough Head Ground. These sites are connected to the mainland by submerged pipelines crossing the seafloor.
- Busy waters for shipping, with major routes crossing from the Port of Tyne and Teesport, connecting to mainland Europe or southern English ports.
- Waters licenced for military use, including air-to-air firing practice at Staxton and submarine exercise areas at Castle and Scarborough Grounds.
- Uniform, open waters with high levels of tranquillity and remoteness in spite of the range of dynamic human activities present.
- MCA forms part of the wider, remote maritime setting to the eastern edge of North York Moors National Park and Flamborough Headland Heritage Coast

Marine Management Organisation

Figure 11 - MCA 25, Farne Deeps



3.7.1 Profile for MCA 25: Farne Deeps

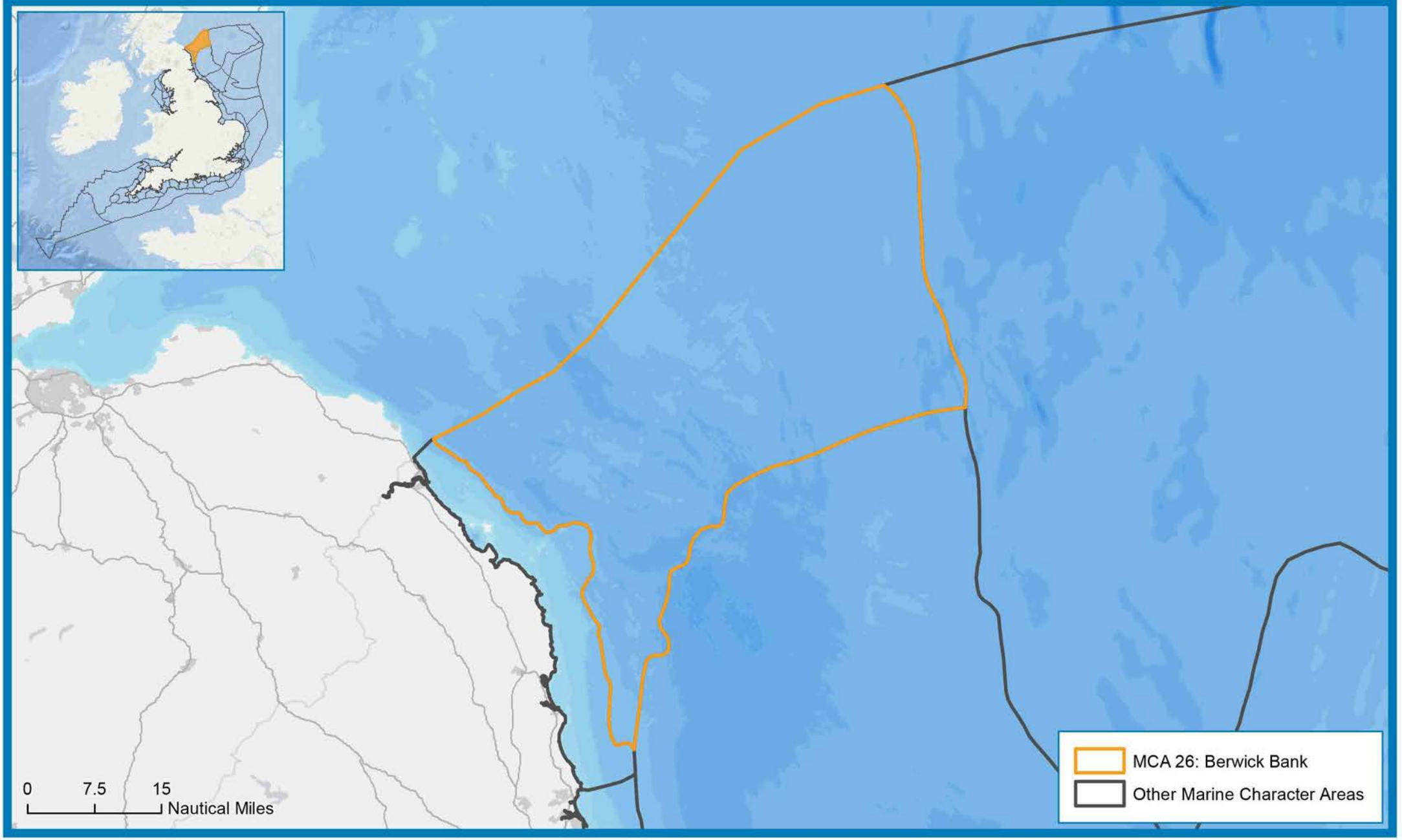
Location and boundaries
This MCA covers an area of water located off the coast of Newcastle upon Tyne and Sunderland in the central part of the North East Offshore Marine Plan Area. The eastern boundary is coincident with the chalk bedrock, which runs in a north-south band down the eastern side of the UK. The western, inshore boundary follows the 50m bathymetric contour off the coast. The area can be distinguished from MCA 26: Berwick Bank to the north as the water is generally deeper and often is over 80m in depth. To the south, the boundary lies at the transition from underlying Triassic clays to Jurassic mudstones under MCA 24: Breagh Oil and Gas Field.
Overall character
Transitional character due to the central location of the MCA within the marine plan area. A distant visual relationship with the coast and Tyne Estuary is evident in the west. Further out to sea, there is a strong character of transit as large ships travel across the North Sea and smaller recreational yachts on their way to Europe. The seafloor is highly influenced by glacial action and contains the deepest open water in the region, which is highly productive and results in a high biodiversity value, attracting numerous fishing vessels exploiting the rich resources found in these waters. Oil and gas pipelines connect the oilrigs located further offshore. The combination of steady sea temperatures and nutrient upwelling creates ideal conditions for phytoplankton blooms which support populations of fish, bird and cetaceans, resulting in large areas being covered by ecological conservation designations. This rich environment also supports a productive fishing industry.
Adjacent National Character Areas (NCAs)
N/A - this offshore area does not have an adjacent coastline
Adjacent and inter-visible nationally designated and defined landscapes
N/A - this offshore area does not have an adjacent coastline, but is likely to be visible from parts of the Northumberland National Park and North Northumberland Heritage Coast.

3.7.2. Key characteristics of MCA 25: Farne Deeps

- This area is named after the Farne Deeps, a series of glacial trenches which drop to 108m.
- Bedrock geology of argillaceous rocks and sandstone, with areas of mudstone and gypsum nearer to the shore in the west.
- The eastern boundary of the MCA coincides with the eastern edge of a band of late Cretaceous chalk known as ‘The Chalk’.
- Mosaic seafloor habitats of rock, mixed and coarse sediment, sand, mud, peat and clay, which support a diverse range of marine life.
- The area is exposed to moderate wave action and weak tidal currents of 0.5-0.7 knots on spring tides, flowing generally south-east to north-west and in reverse.
- Tidal races occur between the Farne Deeps and the North East Bank.
- Steady sea temperatures providing a stable environment for spring and autumn phytoplankton blooms which start offshore before moving west towards the coast.
- Nutrient upwelling around the Farne Deeps results in waters rich in food and plankton attracting foraging seabirds including gannets, razorbills and puffins.
- Regular sightings of cetaceans and marine mammals, including populations of white-beaked dolphins, harbour porpoises, minke whales and grey seals.
- Includes the North East of Farnes Deep MCZ, with coarse sediments supporting a large faunal community, particularly of burrowing species.
- Farnes East MCZ recognised for its mud habitats, valued for delicate blonde and red sea pens and ocean quahog.
- Wrecks are frequent in these waters, including an area aptly marked as ‘Graveyard’ on the marine charts, littered with wrecks.
- Seafloor crossed by oil and gas pipelines and electricity cables associated with the North Sea oil and gas fields.
- Fishing boats associated with the shallower waters closer to the shore, exploiting a range of species including cod, herring, plaice and whiting.
- MCA used by recreational sailing yachts travelling between Newcastle and the Netherlands.
- Military practice zones cover much of this area and include Druridge Bay and Staxton areas, used for firing practice operations.
- Generally remote to the east, with views of the settled coast in the west. Frequent shipping movement and military activity can dilute the overriding sense of remoteness and isolation.

Marine Management Organisation

Figure 12 - MCA 26, Berwick Bank



3.8.1 Profile for MCA 26: Berwick Bank

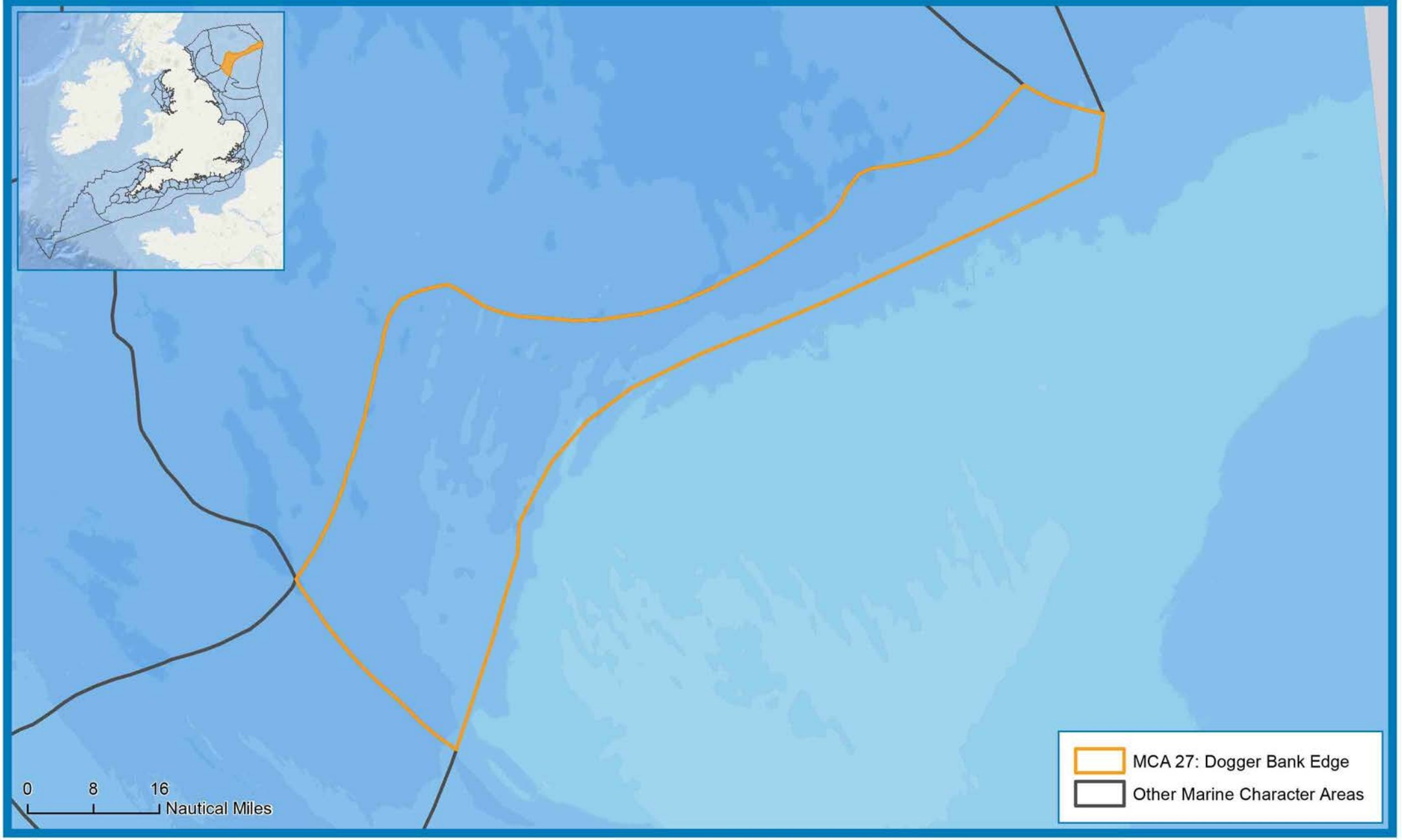
Location and boundaries
This MCA covers an offshore area of water located off the coast of Northumberland, in the northern part of the North East Offshore Marine Plan Area. The eastern boundary is coincident with the chalk bedrock, which runs in north-south direction down the eastern side of the UK. The inshore boundary follows the 50m bathymetric contour. The area can be distinguished from MCA 25: Farne Deeps to the south as the water is generally shallower and does not reach below 80m.
Overall character
The character of this area is not uniform; a coastal influence remains clear in the west of the area, whilst in the east a typical exposed and remote offshore character dominates. Commercially important fishing grounds and numerous wrecks are located closer to the coast – part of the area is now used by the military as a firing practice range. Tidal races and currents occur in the west and north of the MCA and are associated with sudden changes in depth and undersea glacial features such as Berwick Bank. Rich marine habitats, including rocky reefs, sea caves and subtidal peat exposures, and diverse species, are nationally and internationally protected within large areas of this MCA. The area is also important for large populations of cetaceans.
Adjacent National Character Areas (NCAs)
N/A - this offshore area does not have an adjacent coastline.
Adjacent and inter-visible nationally designated and defined landscapes
N/A - this offshore area does not have an adjacent coastline, but it is inter-visible with the Northumberland Coast AONB and North Northumberland Heritage Coast.

3.8.2 Key characteristics of MCA 26: Berwick Bank

- Named after Berwick Bank, a shelf bank located in the north of the area which shallows to approximately 40m depth – related to similar features in Scottish waters.
- Mostly flat seabed (excepting Berwick Bank) which gently undulates between 50m and 80m and gradually deepens towards the east.
- Bedrock geology consists of (west to east) mudstone and gypsum, argillaceous rocks, and a band of late Jurassic chalk known as 'The Chalk'.
- Seabed defined by circalittoral rock with coarse sediment, mud, sand, as well as peat and clay. The sediments support diverse communities of benthic burrowing fauna.
- The western MCA falls within the wider Berwickshire and North Northumberland Coast SAC; important for its rocky reefs, sea caves, breeding grey seals and large numbers of sea birds.
- Farnes East MCZ is notable for its nationally rare subtidal peat and clay exposures – habitats which have a limited distribution in the North Sea area.
- Part of the North East of Farnes Deep MCZ extends into the MCA; recognised for its mud habitats, valued for delicate blonde and red sea pens and populations of ocean quahog.
- Tidal races are associated with sudden changes in depth and undersea glacial features such as Berwick Bank.
- Productive fishing areas located closer to shore, with species such as cod, plaice and herring being targeted.
- Steady sea temperatures providing a stable environment for spring and autumn phytoplankton blooms which start offshore before moving west towards the coast.
- The burrowing bivalves and molluscs in the mud and sediment are an important source of food for seabirds including guillemots and razorbills, which also feed on sandeels, sprats and herring.
- Regular sightings of cetaceans, including white-beaked dolphin, harbour porpoise, killer whale, and bottlenose dolphin, which forage in the area.
- Wrecks are concentrated closer to the coast, often the remains of cargo vessels that foundered in this historically busy shipping area.
- Shipping activity is more limited than that of the southern MCAs in this marine plan area, creating a quieter open seascape.
- Military firing area of Druridge Bay located to the south – an air gunnery and bombing range. During times of live firing, the area's overriding sense of isolation and tranquillity is temporary broken.
- The Northumberland coast is visible from the westernmost parts of the MCA, with coastal landmarks providing orientation for seafarers.
- The MCA forms part of a wider maritime setting to the Northumberland Coast AONB and North Northumberland Heritage Coast.

Marine Management Organisation

Figure 13 - MCA 27, Dogger Bank Edge



3.9.1. Profile for MCA 27: Dogger Bank Edge

Location and boundaries
MCA 27 comprises the shallower offshore waters associated with the flanks of Dogger Bank. Located in the southern half of the marine plan area the southern and eastern boundaries of the MCA are consistent with the outer extent of the marine plan area, and mark the international boundary with the Netherlands. The northern boundary also follows bathymetry marking the deeper waters of MCA 28: Swallow Hole Plain. A distinctive band of chalk bedrock marks the boundary to the west. To the south this area meets the Dogger Bank (Area 1 of the East Seascape Character Assessment). This MCA is particularly related to MCA 29: North Sea Oil and Gas Field and MCA 28: Swallow Hole Plain; together forming an expansive area of offshore waters.
Overall character
Gently shelving edge of Dogger Bank sandbank, descending northwards from 50m to 70m. Sandy to muddy substrate provides rich benthic and pelagic environments. Part of the distant offshore North Sea with rich fishing grounds and shipping that connects different parts of Europe and the productive petrochemical platforms further north-east. Fringes on Dogger Bank, which is known to have been exposed during Palaeolithic times, when the UK was connected to Europe by dry land. This area, known as Doggerland, was inundated after the last Ice Age.
Adjacent National Character Areas (NCAs)
N/A - this offshore area does not have an adjacent coastline.
Adjacent and inter-visible nationally designated and defined landscapes
N/A - this offshore area does not have an adjacent coastline.

3.9.2. Key characteristics of MCA 27: Dogger Bank Edge

- Named after a large offshore sandbank in the neighbouring East Marine Plan Area, this MCA represents the sandbank slopes.
- Dogger Bank as a whole is a significant shallow area formed by glacial processes.
- Area formerly part of the Palaeolithic landscape of Doggerland – dry land connecting the UK with Europe, subsequently inundated following the last Ice Age.
- Bathymetry gently shelves from Dogger Bank in the south to Swallow Hole Plain at approximately 70m deep.
- Uniform bedrock geology of argillaceous rocks and sandstone, with a wedge of mudstone in the MCA's southern corner. Seafloor topped by sands with high shell content, and small isolated pockets of muddy sand.
- The area experiences moderate wave action with weak tidal currents of 0.5-0.7 knots on spring tides. The furthest offshore areas are associated with a low wave height.
- Stable environment created by the MCA's large body of water, with stable sea temperatures allowing the development of spring and autumn phytoplankton blooms.
- Rich marine habitats supporting segmented polychaete worms, shrimp-like amphipods and small burrowing clams; hermit crabs and flatfish; and seabirds, whales and dolphins which feed on the smaller creatures.
- Small section of the Swallow Sand MCZ to the north, important for its subtidal coarse sediment and sand habitats.
- Most northerly part of the Southern North Sea cSAC, important location for the North Sea harbour porpoise population and grey and common seal populations.
- Peat and remains of a mammoth have been dredged up by fishing trawlers, evidence for Doggerland's ancient location above sea level.
- Historically important area: early Roman explorations recorded in 12BC; Viking raiding for two centuries from 793; and maritime trade from the medieval period onwards.
- Small number of recorded wrecks due to the vast open, deep seas and relatively calm character of the waters.
- Battle of Dogger Bank during WWI saw battles between the Royal Navy and German High Seas Fleet.
- Productive fishing area; fishing boats can land sizable quantities of plaice, cod, haddock and turbot. Dogger Bank takes its name from 17th century Dutch fishing boats called doggers.
- Busy waters with significant numbers of vessel movements between Dogger Bank, the oil platforms, the nearby ports and mainland Europe, including recreational sailing yachts travelling between Newcastle and the Netherlands.
- Pipelines cross the seafloor connecting the oil and gas platforms to the mainland.

- Dogger Bank Offshore Wind Farm, planned to comprise 200 turbines, will be located in the southern part of the MCA.
- Military practice area of Staxton used for air-to-air firing practice. At these times an overriding sense of tranquillity and remoteness is broken.

- Isolated and remote open waters provide a uniform character with high levels of tranquillity.
- Human presence can be perceptible in calm conditions that allow visibility of other vessels, oil platforms and the moving blades of the offshore windfarm.

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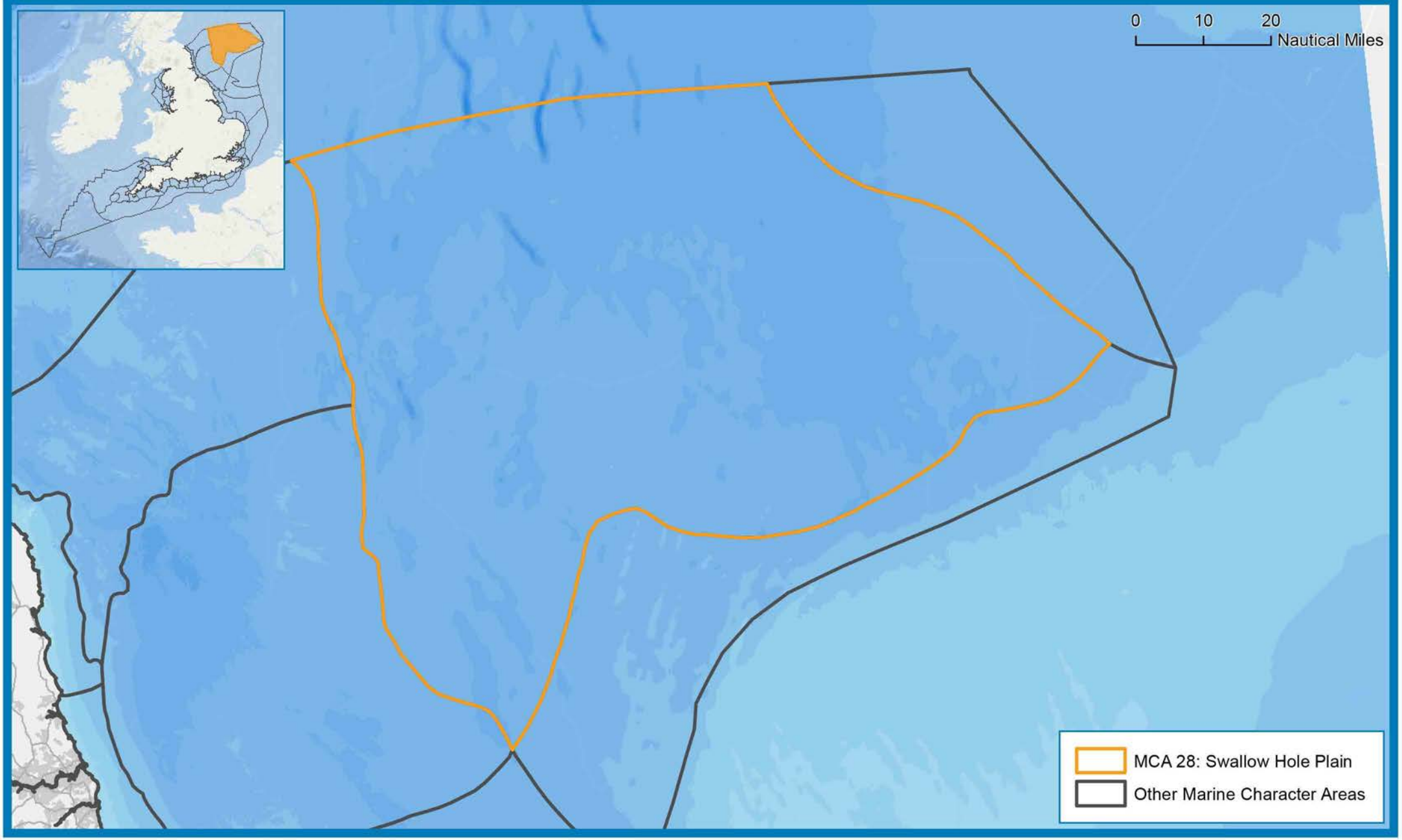
Figure 14 - MCA 28, Swallow Hole Plain



3.10.1 Profile for MCA 28: Swallow Hole Plain

Location and boundaries
This MCA covers a large area of waters in the eastern part of the North East Offshore Marine Plan Area. Its outer, eastern boundary follows the bathymetry of the shallower waters associated with the offshore North Sea oilfields. The MCA's southern boundary also follows bathymetry marking the reduced water depth of Dogger Bank. A distinctive band of chalk bedrock marks the boundary to the west, and the northern boundary is defined by the northern limit of the North East offshore marine plan area and the transition to Scottish waters. This MCA is particularly related to MCA 29: North Sea Oil and Gas Field and MCA 27: Dogger Bank Edge; together providing a description of the expansive area of offshore waters.
Overall character
Extensive distant offshore area with open waters over a deep plain of approximately 70-90m with occasional deeply incised troughs. Swallow Hole descends to 160m deep, Devil's Hole is 238m deep, and another unnamed trough is 305m deep. Sandy with pockets of gravelly substrate provides rich benthic and pelagic environments. Part of the distant offshore North Sea with shipping that connects continental European ports and the productive petrochemical platforms further east. Rich fishing grounds, and an important area for marine biodiversity.
Adjacent National Character Areas (NCAs)
N/A - this offshore area does not have an adjacent coastline
Adjacent and inter-visible nationally designated and defined landscapes
N/A - this offshore area does not have an adjacent coastline.

3.10.2 Key characteristics of MCA 28: Swallow Hole Plain

- Extensive distant offshore area with open waters over a deep plain with occasional troughs.
- MCA named after Swallow Hole, a glacial tunnel valley in the western part of this MCA. This deep trough plummets to 160m.
- Other tunnel valleys in this area lie towards the north of the MCA, including Devil's Hole at 238m deep and another (unnamed) at 305m deep.
- Away from the deep troughs, this area has a gently undulating plain-like seabed, with at a depth of approximately 70-90m.
- Moderate wave action and weak tidal currents of 0.5-0.7 knots on spring tides flowing generally south-east to north-west and in reverse. Characterised by low wave height under westerly to south-westerly offshore winds.
- Uniform bedrock geology of argillaceous rocks and sandstone, with a distinct band of mudstone, sandstone and lignite which roughly follows the western boundary.
- Holocene marine sediments of glacial till (sand and gravel). Muddy sand is associated with Swallow Hole and Devil's Hole areas.
- Diverse range of habitats created by the mix of sediments supporting polychaete worms and bivalves, sea urchins and anemones.
- Swallow Sand MCZ, the largest in English waters, covers areas of subtidal coarse sediment, subtidal sand and Swallow Hole.
- Fulmar MCZ extends into this MCA from the north-east, designated for its rich deep waters and mixed sediment habitats which support a range of species. Southern North Sea cSAC, covering a vast area (36,951km^2), is important for its harbour porpoise population.
- Steady sea temperatures providing a stable environment for spring and autumn phytoplankton blooms which start offshore before moving west towards the coast.
- Large numbers of worms, molluscs and crustaceans provide good hunting for fish species which further support offshore seabird species (including fulmar, black-legged kittiwake, common guillemot, razorbill, and puffin).
- Cetacean species such as Minke whales, harbour porpoises and dolphins present in offshore water. Other notable species include undulate ray and benthic deep sea shrimp.
- Wrecks scattered widely across the MCA, although relatively few in number compared to the busier coastal waters.
- Historically important area: early Roman explorations recorded in 12BC; Vikings raiding for two centuries from 793; and maritime trade from the medieval period onwards.
- Large numbers of fishing boats patrol these productive waters, landing species including cod, plaice and anglerfish.

- Busy shipping routes, with significant number of vessel movements. Vessels pass through this MCA on route to the North Sea oil platforms and further afield to continental Europe, including recreational sailing yachts travelling between Newcastle and the Netherlands.
- Pipelines cross the seafloor connecting North Sea oil and gas platforms (e.g. in MCA 29) to the UK mainland.
- Military practice zones to the west of this area include Druridge Bay and Staxton areas, used for air to ship firing practice operations.
- Isolated and remote open waters create a uniform character with high levels of tranquillity.

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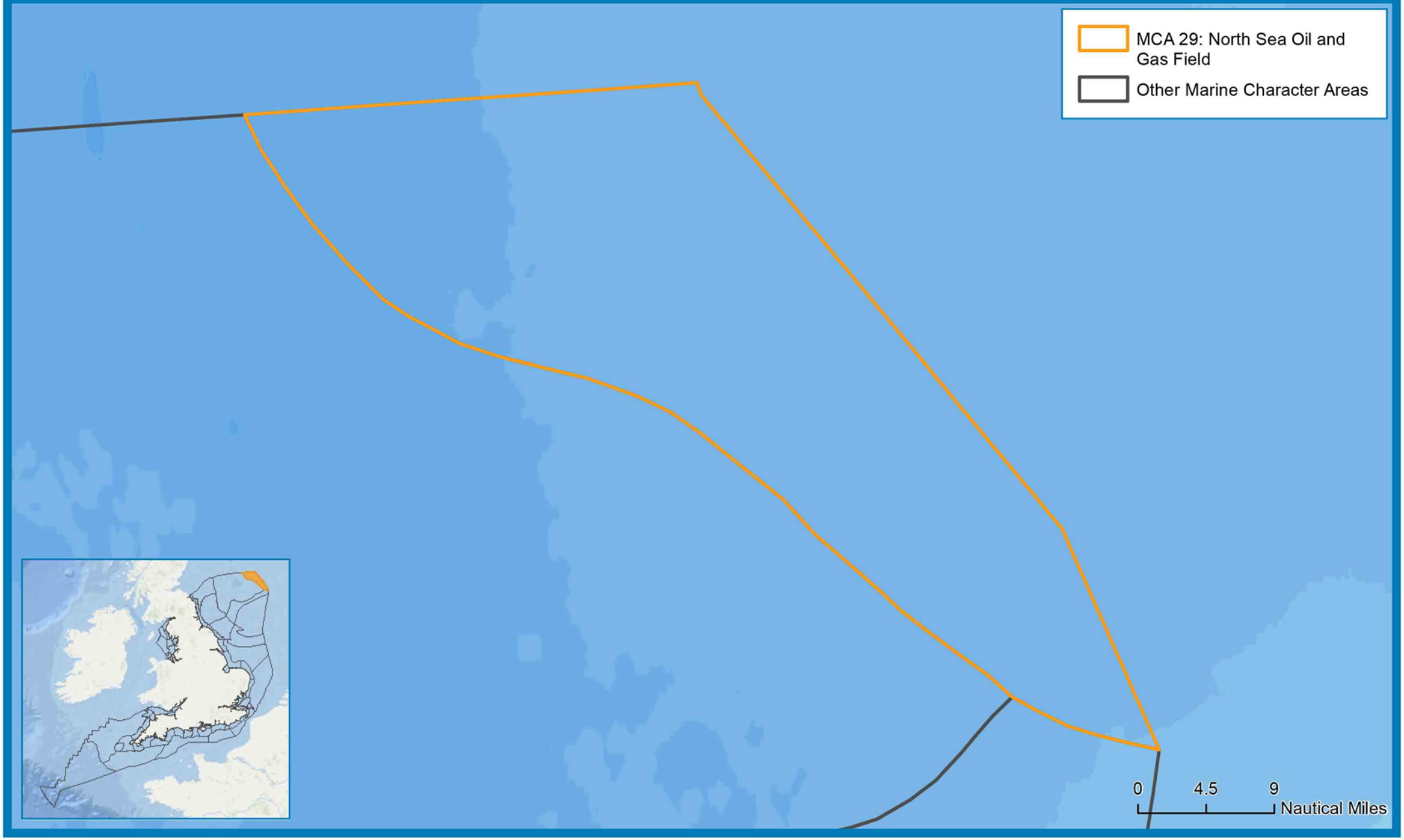
Figure 15 - MCA 29, North Sea Oil and Gas Field



3.11.1 Profile for MCA 29: North Sea Oil and Gas Field

Location and boundaries
This MCA covers the most eastern part of the North East Offshore Marine Plan Area with the outer boundaries following the offshore boundary between the UK and Norway. The internal boundary follows bathymetry enclosing the outer deeper waters and the associated offshore North Sea oil and gas fields. This MCA is particularly related to MCA 27: Dogger Bank Edge and MCA 28: Swallow Hole Plain; together providing a description of the expansive area of offshore waters.
Overall character
Furthest reaches of UK waters, adjoining Norwegian and Dutch international waters. Gently undulating sands of 50m to 70m deep. Rich benthic and pelagic environments, but a key area for petrochemical production. This MCA forms a small part of the North Sea oil and gas fields, with four platforms and a network of oil and gas pipelines. Busy shipping area connecting the platforms and different parts of Europe, with fishing occurring away from platforms. It is isolated and remote, away from the platforms. Fringes on Dogger Bank, which is known to have been exposed during Palaeolithic times, when the UK was connected to Europe by dry land. This area, known as Doggerland, was inundated after the last Ice Age.
Adjacent National Character Areas (NCAs)
N/A - this offshore area does not have an adjacent coastline.
Adjacent and inter-visible nationally designated and defined landscapes
N/A - this offshore area does not have an adjacent coastline.

3.11.2 Key characteristics of MCA 29: North Sea Oil and Gas Field

- Gently undulating sea bed, sloping south-east to north-west from 57m at outer edges of Dogger Bank to approximately 80m to the north.
- Underlying bedrock geology of Eocene argillaceous rocks and sandstone.
- Seafloor topped by Holocene marine sediments of glacial till, comprising sand, gravel, shells and mud.
- Sediments provide varied habitats for bivalves such as clams, cockles, ocean quahog, native oysters and other molluscs.
- Moderate tidal streams of 0.7 knots on spring tides flowing generally south-east to north-west and in reverse. Low wave height under westerly to south-westerly offshore winds.
- Seas attract cetacean species such as minke whales, harbour porpoises and dolphins. Other notable species include undulate ray and benthic deep-sea shrimp.
- Important foraging grounds for offshore seabird species including fulmar, black-legged kittiwake, common guillemot, razorbill, and puffin.
- Steady sea temperatures providing a stable environment for spring and autumn phytoplankton blooms which develop offshore before moving west towards the coast.
- Fulmar MCZ located in the south, valued for its rich deep waters and mixed sediment habitats supporting a range of species.
- Historically important area: early Roman explorations recorded in 12BC; Vikings raiding for two centuries from 793; and maritime trade from the medieval period onwards.
- Small number of recorded wrecks due to the vast open and deep seas and relatively calm character of the water.
- The productive waters produce high numbers of cod, herring and mackerel – important for commercial fishing enterprises.
- Offshore oil and natural gas production area with restricted areas around platforms demarcated by lights and buoys.
- Drilling for hydrocarbons including platforms at Janice, Clyde, Auk and Fulmar in the Central North Sea. A floating production unit and exploration zones are also found within the MCA.
- Relatively busy character around the oil platforms with the daily movement of boats and helicopters.
- Significant vessel traffic between the UK and mainland Europe, and between the offshore oil and gas terminals and nearby ports.
- Sea floor pipelines cross this area servicing platforms and carrying the petroleum products to land.
- North-west corner is part of a military practice area used for offshore practice operations.
- MCA used by recreational sailing yachts travelling between Newcastle and the Netherlands.

- Generally, isolated and remote away from platforms and when vessels are not visible. Open waters provide a uniform character with high levels of tranquillity.

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Annex 1: Data list

These columns set out how the data layers were used. Some data provided context (i.e. background mapping), some has informed boundary choice/definition, and some has informed the descriptions and key characteristics.

Theme	Data Layers	Source (obtained from)	Basemap / Context	Boundaries	Descriptions
Baseline Information					
Maps and Charts	Admiralty Charted Raster - various scales	UKHO (MMO)	Y	Y	Y
	OS maps - 1:250,000	Ordnance Survey (MMO)	Y		
	OS maps – 1:25,000	Ordnance Survey (MMO)	Y	Y	Y
Boundaries/Extent of Jurisdictions	Mean High Water Mark	Ordnance Survey Open Data (MMO)	Y		
	12 nautical mile limit (UKHO)	UKHO (MMO)	Y	Y	
	UK Continental Shelf Limit (UKHO)	UKHO (MMO)	Y		
	UK Exclusive Economic Zone (2013)	UKHO (MMO)	Y		
	UK Territorial Sea limits	UKHO (MMO)	Y		
	S57 - UKHO Administrative and Regulations boundaries	UKHO (MMO)	Y		
	Local Authority boundaries	Ordnance Survey Open Data (MMO)	Y		
	Harbour limits	UKHO (MMO)	Y		
	Marine Plan Areas	MMO	Y	Y	
Character					
Landscape/ Seascape Character	National Character Areas (England)	Natural England (Magic)			Y
	Terrestrial Natural Areas	Natural England (Magic)			Y
	Historic Seascape Characterisation	Historic England	Y		

Theme	Data Layers	Source (obtained from)	Basemap / Context	Boundaries	Descriptions
Natural					
Landscape Designations	National Parks	Natural England (Magic)			Y
	AONBs	Natural England (Magic)			Y
	Heritage Coasts	Natural England (Magic)			Y
Bathymetry and Elevation	S57 - UKHO Depth Areas (line/area)	UKHO (MMO)		Y	Y
	S57 - UKHO Bathymetry - dredged areas	UKHO (MMO)			Y
	S57 - UKHO Bathymetry lines	UKHO (MMO)		Y	Y
	DTM for the Ocean bed from EU and patched with GEBCO Bathymetry for missing areas	European Marine Observation and Data Network	Y		Y
Biodiversity Designations	Special Areas of Conservation (SAC)	Natural England (Magic)			Y
	Marine Candidate SAC	Natural England (Magic)			Y
	National Nature Reserves (NNR)	Natural England (Magic)			Y
	Ramsar sites	Natural England (Magic)			Y
	Site of Special Scientific Interest (SSSI)	Natural England (Magic)			Y
	Marine Conservation Zones	Natural England (Magic)			Y
	Recommended Marine Conservation Zones	Natural England (Magic)			Y
	Important Bird Areas/RSPB Reserves	RSPB			Y
	UK SACs with marine components (Natura 2000)	JNCC			Y

Theme	Data Layers	Source (obtained from)	Basemap / Context	Boundaries	Descriptions
	UK SPAs with marine components (Natura 2000)	JNCC			Y
	OSPAR MPAs Inshore + Offshore	JNCC			Y
	Priority Habitat Inventory	Natural England (Magic)			Y
	Special Protection Area (SPA)	Natural England (Magic)			Y
	Potential Marine SPA	Natural England (Magic)			Y
	Fish Nursery Grounds (CEFAS)	CEFAS (MMO)			Y
	Fish Spawning Grounds (CEFAS)	CEFAS (MMO)			Y
	Harbour Seal density (lower/upper) (MS)	Marine Scotland (MMO)			Y
	LNR	Natural England (Magic)			Y
	UKSeaMap2010_predictive_habitat_model_v8 (Broadscale habitat mapping)	JNCC		Y	Y
	EUSeaMap 2012	European Marine Observation and Data Network	Y		
	Biosphere reserves	Natural England (Magic)	Y		
	Seabird summer/winter density (WWT)	WWT (MMO)	Y		
Geology and Geomorphology	Bedrock and Superficial, Faults and Dykes	BGS free download 1:625,000		Y	Y
	Offshore sediment geology	BGS (MMO)		Y	Y
	Offshore bedrock geology	BGS (MMO)		Y	Y
Landcover/ Vegetation	OSPAR Habitats	EMODnet -funded by DG MARE			Y

Theme	Data Layers	Source (obtained from)	Basemap / Context	Boundaries	Descriptions
Cultural/Social					
Heritage	Historic Parks and Gardens	Historic England			Y
	Listed Buildings	Historic England	Y		
	Protected Wreck Sites/Other wrecks	Historic England /UKHO (EH/MMO)			Y
	Historic casualties (point and area) - England & Scotland	Historic England (MMO)			Y
	Historic shipwrecks (point and area) - England	Historic England (MMO)			Y
	Scheduled Monuments	Historic England			Y
Recreation	National Trails	Natural England (Magic)			Y
	Country Park	Natural England (Magic)			Y
	Blue Flag Beaches	EA, Blue Flag (MMO)			Y
	Marinas	RYA (MMO)			Y
	RYA clubs	RYA (MMO)			Y
	RYA cruising routes	RYA (MMO)			Y
	RYA racing area	RYA (MMO)			Y
	RYA sailing area	RYA (MMO)			Y
	RYA training centre	RYA (MMO)			Y
	Boat Launch and Slipways UK	www.boatlaunch.co.uk (MMO)			Y
	Bathing water compliance	Environment Agency (MMO)			Y
	Recreational Craft Slipway	www.boatlaunch.co.uk (MMO)			Y
	Recreational Craft Marinas	www.boatlaunch.co.uk (MMO)			Y

Theme	Data Layers	Source (obtained from)	Basemap / Context	Boundaries	Descriptions
Shipping and Navigation	Ports	UKHO (MMO)		Y	Y
	S57 - UKHO Activity and Licence Installation (point/area)	UKHO (MMO)		Y	Y
	S57 - UKHO Navigational Aids (buoy, light, etc.)	UKHO (MMO)			Y
	S57 - UKHO Obstructions (point/area)	UKHO (MMO)		Y	Y
	S57 - UKHO Offshore installations (offshore platform/buoy) (point/line/area)	UKHO (MMO)		Y	Y
	S57 - UKHO Transportation and routes - installations (rescue station, anchorage area, caution area, small craft facility) (point/line/area)	UKHO (MMO)			Y
	S57 - UKHO Wrecks (point/area)	UKHO (MMO)			Y
	Shipping	AIS/Anatec (MMO)			Y
	Ferry routes and infrastructure	UKHO (MMO)			Y
	AIS Shipping density 2011 and 2012	AIS (MMO)			Y
	IMO Routing (line and buffer area)	International Maritime Organization (MMO)			Y
Industry, Energy and Infrastructure	Oil and Gas, aggregates	The Crown Estate (MMO)			Y
	The Crown Estate Aggregate Licence Area	The Crown Estate (MMO)			Y
	The Crown Estate Aggregate Application Area	The Crown Estate (MMO)			Y
	The Crown Estate AggregateOptionArea_TCE	The Crown Estate (MMO)			Y

Theme	Data Layers	Source (obtained from)	Basemap / Context	Boundaries	Descriptions
	CCO Buoy Sites	Channel Coastal Observatory (MMO)			Y
	Tidal power	REA			Y
	Tide	REA			Y
	Tidal flow	REA			Y
	Wave	REA			Y
Military Activity	MOD areas (within Activity and Licence areas)	UKHO (MMO)			Y
Fishing	UK Fishing Limit	UKHO (MMO)			Y
	Days Fished 2005-2007	IFCA (MMO)			Y
	Fish Nursery Grounds	IFCA (MMO)			Y
	National shoreline management plan (SMP)	MMO			Y
	Fishermap data (Dredges & Activity)	MMO	Y		
	Fish Spawning Grounds	IFCA (MMO)			Y
Perceptual/aesthetic					
Light Pollution	Night skies	CPRE			Y
Intrusion	Intrusion mapping	CPRE			Y
Tranquillity	Tranquil Areas	CPRE			Y
Visibility	Land with sea views	MMO			Y
	Sea visibility from land	MMO			Y

Annex 2: Stakeholder Consultation

List of organisations attending the Stakeholder Workshop, Saltburn-by-the-Sea, 1 May 2018:

- North Eastern Inshore Fisheries and Conservation Authority
- National Trust
- Durham Heritage Coast Partnership
- North York Moors National Park Authority
- Tyne to Tees SeaScapes Partnership
- Natural England

List of organisations attending the Stakeholder Workshop, Newcastle, 2 May 2018:

- South Tyneside Council
- Wardell Armstrong
- Sunderland City Council
- Northumbrian Water / Durham Seascape Development Partnership
- Marine Management Organisation
- Historic England
- National Trust

List of organisations who provided additional comments in relation to the north east marine plan areas:

- Northumbria Area Team, Natural England
- Fjordr Ltd.
- Environment Agency

Annex 3: Acknowledgement for use of EMODNet data in publications

The bathymetric metadata and Digital Terrain Model data products have been derived from the EMODnet Bathymetry portal - http://www.emodnet-bathymetry.eu.

This portal was initiated by the European Commission as part of developing the European Marine Observation and Data Network (EMODNet). The overall objective of EMODnet is to create pilots to migrate fragmented and inaccessible marine data into interoperable, continuous and publicly available data streams for complete maritime basins. The Bathymetry portal development started in June 2009 and now provides a range of options for freely browsing and downloading new Digital Terrain Models (DTM) for a large part of the European seas. The downloadable tiles are freely available in a number of formats. The EMODnet digital bathymetry has been produced from bathymetric survey data and aggregated bathymetry data sets collated from public and private organizations. These are processed and quality controlled. A further refinement and expansion is underway, by gathering additional survey data sets, expanding geographical coverage to all European sea regions and upgrading the DTM grid resolution, and will result in new releases in time. The portal also includes a metadata discovery service that gives clear information about the background survey data used for the DTMs, their access restrictions, originators and distributors.