

25th June 2009

Humber and Greater Wash Marine Aggregates Regional Environmental Assessment Scoping Study – Scoping Pack and Workshop

Dear Stakeholder,

The marine aggregates industry has made a voluntary commitment to undertake Marine Aggregates Regional Environmental Assessments (MAREA) for a number of strategic areas of offshore aggregate extraction. Environmental Resources Management (ERM) is undertaking the scoping phase of the MAREA in the Humber and Greater Wash region on behalf of the Humber Aggregate Dredging Association (HADA). We would like to take this opportunity to invite your inputs to this scoping phase of this study.

To assist with the provision of information and suggestions, please find enclosed a *Scoping Pack* for the MAREA in the Humber and Greater Wash region. The first sheet within the scoping pack provides some background information on the project and explains how we would like you to participate. The following 12 sheets cover a number of key topic areas and suggest potential information sources for the MAREA and a provide summary of the current baseline understanding; references for the scoping pack sheets and a glossary are provided on the final sheet. The scoping pack is accompanied by a list of organisations or representative bodies that have been identified as consultees for this project so far.

We would also like to invite your attendance at an afternoon *Stakeholder Workshop* to discuss key issues in the region and the proposed approach to the MAREA. The workshop will be held on:

Monday 20th July 2009: 14:00 - 17:00. Lincoln Cathedral, Lincoln
(please see attached map for directions).

The format for the stakeholder workshop will be an informal poster session so please feel free to attend any time during the afternoon. The aim is to give stakeholders an introduction to the MAREA process and to provide an opportunity to discuss the proposed approach for specific topics within the MAREA. The workshop will also be a chance to provide comment and feedback on the scoping pack and to identify key issues that are of concern to you.

As an important stakeholder in this region we would really appreciate your input to the scoping phase of this study. Accordingly, I am writing to ascertain whether your organisation wishes to be included in the ongoing consultation process for this project and to identify your anticipated areas of concern that can then be addressed in the Terms of Reference for the MAREA. We welcome comments by email or letter by **Friday 7th August** or at the scoping workshop on the **Monday 20th July**, which we very much hope you will be able to attend.

We would be grateful if you could please contact **Amy Harrison** on 01865 384846 or amy.harrison@erm.com to confirm your attendance/non attendance.

Yours sincerely,

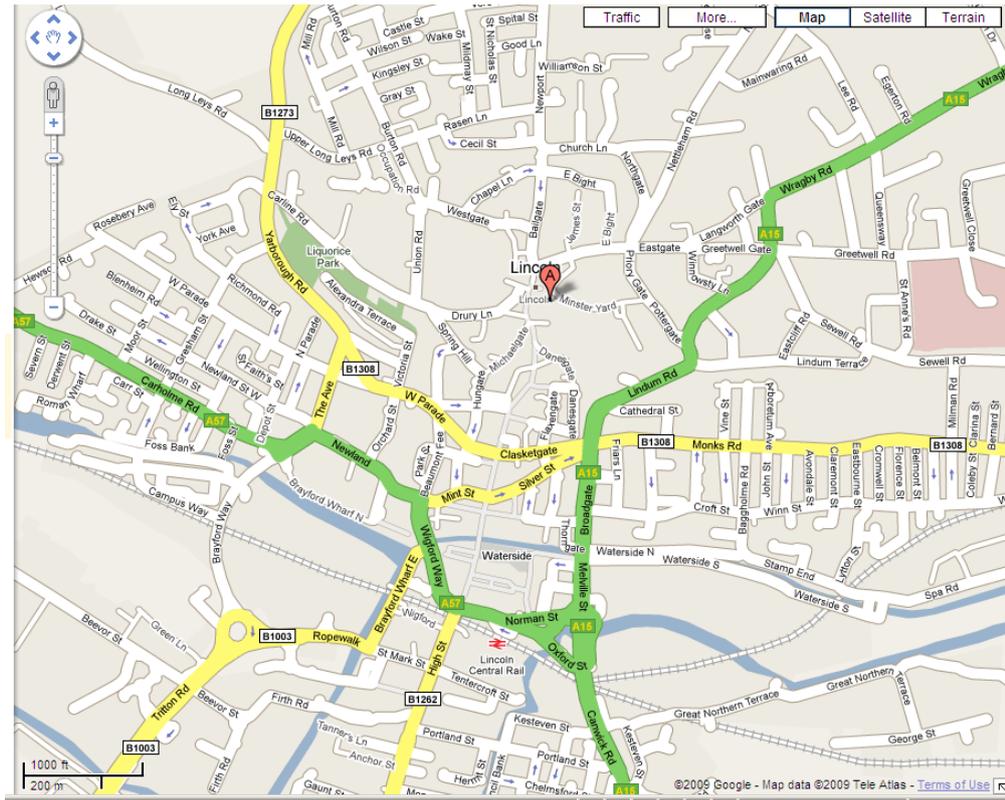
Helen Vaughan
Senior Consultant



How to get to Lincoln Cathedral

17 Minster Yard
Lincoln,
LN2 1PX

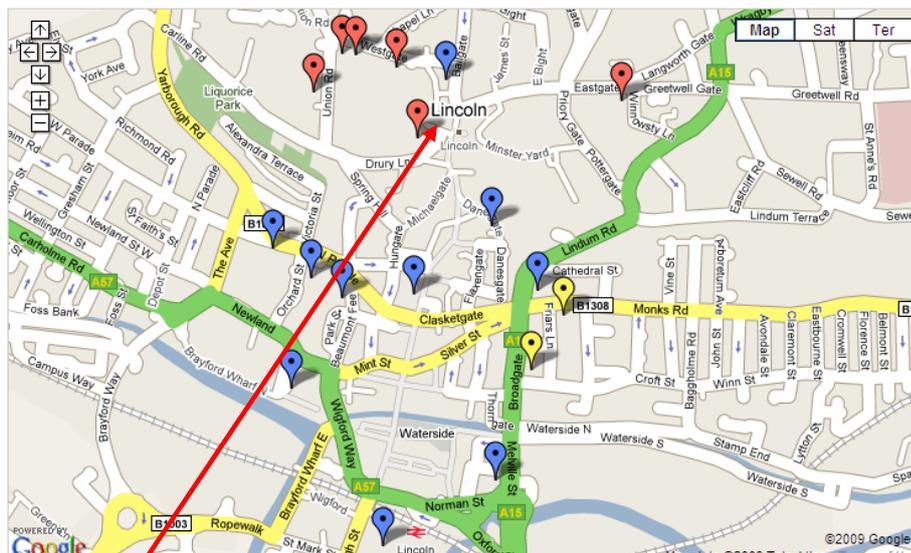
01522 561629



By Road

- A1 and A46 east from Newark
- A57 east from Sheffield
- A15 south from M180 Scunthorpe and Hull
- A15 north from Sleaford
- A46 south from Grimsby

Parking around the Cathedral is limited to short stay on the south side in Minster Yard or local car parks. There is no parking reserved for disabled visitors immediately adjacent to the Cathedral, although it is possible to drop off just outside the main entrance.



The nearest car park is Castle Hill – Post code: LN1 3AA

Price:

One hour £1.10

Two Hours £2.20

Four Hours £4.00

Over Four hours £6.00

The Council has a pricing strategy based on **SHOPPER (Blue)**, **VISITOR (Red)** and **COMMUTER (Yellow)**. Prices are set to cover costs and the costs of associated services

By Rail

Lincoln Central station with mainline connections from Newark. Regional connections include Nottingham, Grantham, Skegness and Grimsby.

Local Bus (Walk + Ride)

The bus stops are located at:

- Newport Arch
- Westgate (car parks)
- The Lawn
- Castle Hill
- Park Street
- Brayford Waterfront
- St. Marks Shopping Centre
- Railway Station (markets & bus station)
- Wigford Way
- The Stonebow
- The Collection (steep hill & the Strait)
- Cathedral
- Northgate

Fares:

- Adult single - £1.00p
- Buy an all day pass for £2.50.

Timetable:

- Mon - Sat 10am - 5pm (Every 20 minutes)

Stakeholders Identified for the Humber and Greater Wash MAREA Scoping Study

Organisation	First name	Surname
<i>ABP Humber</i>	Phil	Cowing
<i>Aggregate Levy Sustainability Fund (REC Project Manager)</i>	Patricia	Falconer
<i>Bass Anglers Sportsfishing Society (BASS)</i>	Phil	Arnott
<i>Bridlington & Flamborough Fishermens Society (B&FFS)</i>	Steve	Cowans
<i>British Sub Aqua Club</i>	Susannah	Calderan
<i>British Wind Energy Association (BWEA) *</i>	Duncan	Ayling
<i>Centre for Environment, Fisheries and Aquaculture Science</i>	Dave	Carlin
<i>Coastal Action Zone (Lincolnshire)</i>	Jo	Finlow
<i>Crown Estate</i>	Mark	Wrigley
<i>Crown Estate</i>	Prof Mike	Cowling
<i>Cruising Association</i>	Ted	Osborn
<i>Department for Energy and Climate Change</i>	Wendy	Kennedy
<i>Department for Transport</i>	Colin	Morris
<i>East Lindsey Council</i>	John	Green
<i>East Riding of Yorkshire Council - Coastal Explorer</i>	Neil	McLachlan
<i>Eastern Sea Fisheries Joint Committee</i>	Judith	Stout
<i>English Heritage</i>	Chris	Pater
<i>Environment Agency - Lincoln</i>	Ian	Russell
<i>Environment Agency - National Marine Service</i>	Alison	Miles
<i>Environment Agency - York</i>	Ben	Hughes
<i>Flamborough Head European Marine Site</i>	Leanne	Stockdale
<i>Graham Stuart (MP for Holderness)</i>	Graham	Stuart
<i>Greater Wash Fishing Industries Group **</i>	Andy	Roper
<i>Hornsea Fishermen</i>	Bob	Towers
<i>Humber Archaeology Partnership</i>	David	Evans
<i>Humber Cruising Association Fishing Club</i>	Tim	Burgess
<i>Humber European Marine Site c/o Humber INCA</i>	Kat	Sanders
<i>Hydrographic Office</i>	Andy	Winterbottom
<i>International Dolphin Watch</i>	Dr Horace	Dobbs
<i>Joint Nature Conservation Committee</i>	Simone	Pfeifer
<i>Lincolnshire Historic Environment Record, Lincolnshire County Council</i>	Alexandra	Thornton
<i>Lincolnshire Wildlife Trust</i>	Elizabeth	Biott
<i>Marine and Fisheries Agency</i>	Barrie	Smart
<i>Marine and Fisheries Agency</i>	Paul	Bryan
<i>Marine and Fisheries Agency</i>	Laura	Tolhurst
<i>Marine Biological Association</i>	Prof. C.	Brownlee
<i>Marine Conservation Society</i>	Richard	Harrington
<i>MARINET</i>	Pat	Gowen
<i>Maritime and Coastguard Agency</i>	Paul	Townsend
<i>Maritime and Coastguard Agency - Local Office</i>	Gwen	Evans
<i>Ministry of Defence</i>	Jonathan	Wilson
<i>National Federation of Fishermen's Organisations (NFFO)</i>	Dale	Rodmell
<i>National Trust</i>	Judy	Richmond
<i>Natural England</i>	Ian	Reach
<i>Norfolk Coast AONB</i>	Tim	Venes
<i>Norfolk Wildlife Trust</i>	Reg	Land
<i>North East Coastal Group - Shoreline Management Coastal Engineers</i>	John	Riby
<i>North East Lincolnshire Council- Coastal Defences</i>	Andy	Smith
<i>North East Lincolnshire Historic Environment Record, North East Lincolnshire Council</i>	Hugh	Winfield
<i>North Eastern Sea Fisheries Committee</i>	David	McCandless
<i>North Lincolnshire Sites & Monuments Record, North Lincolnshire Unitary Authority</i>	Alison	Williams
<i>North Norfolk District Council - Coastal Group</i>	Peter	Frew
<i>North Sea Regional Advisory Council (RAC)</i>	Joyce	Walker

Stakeholders Identified for the Humber and Greater Wash MAREA Scoping Study

Organisation	First name	Surname
<i>Paul Huetson (on behalf of Withernsea and Easington Fishermen)</i>	Paul	Huetson
<i>Port of Kings Lynn</i>	Alastair	MacFarlane
<i>Royal Ocean Racing Club</i>	Nick	Elliott
<i>Royal Society for Protection of Birds – Eastern England Regional Office</i>	Kirsty	Coutts
<i>Royal Yachting Association (Head Office)</i>	Susie	Tomson
<i>Sea Anglers Matchmen's Federation</i>	Rob	Neale
<i>Sea Mammal Research Unit (SMRU)</i>	Prof Phil	Hammond
<i>Sea Watch</i>	Dr Peter	Evans
<i>Shipping Policy Department of Department for Transport</i>	Theresa	Crossley
<i>The Chamber of Shipping</i>	Saurabh	Sachdeva
<i>Trinity House</i>	Roger	Barker
<i>United Kingdom Offshore Operators Association (UKOOA)</i>	Mick	Borwell
<i>University of East Anglia</i>	Dr John	Bacon
<i>University of Hull</i>	Mike	Elliott
<i>Wash Estuary Project</i>	Tammy	Smalley
<i>Wash North Norfolk European Marine Site</i>	Peter	Rushmer
<i>Wells & District Inshore Fishermen's association</i>	Ivan	Large
<i>Whale and Dolphin Society</i>	Dorothy	Gibb
<i>Wildfowl and Wetlands Trust</i>	Carrie	Hume
<i>Yorkshire Division - Angling Trust/Marine Section</i>	Stuart	Macpherson
<i>Yorkshire Wildlife Trust</i>	Kirsten	Smith

* BWEA offered to be the contact point for the offshore wind farm industry and will forward information to individual developers as appropriate.

** Greater Wash Fishing Industries Group represents the interests of The Boston Fishermen's Association, North Norfolk Shellfishermen's Association, King's Lynn Fishing Industry Co-operative, King's Lynn Fishing Vessel Owners & Skippers Association, King's Lynn Fishermen's Association & Brancaster Staithe Fishermen's Society



Humber and Greater Wash MAREA-Scoping Stage

1. INTRODUCTION

What is the Humber Aggregate Dredging Association?

The Humber Aggregate Dredging Association (HADA) is an association of 6 marine aggregate extraction companies. These companies each have licence areas, application areas and/or prospecting areas in the Humber and Greater Wash region.

The 6 companies of the HADA are:

- CEMEX UK Marine Ltd.
- DEME Building Materials Ltd.
- Hanson Aggregates Marine Ltd.
- United Marine Dredging Ltd.
- Van Oord UK Ltd.
- Westminster Gravels Ltd.

Marine Aggregates in the Humber and Greater Wash Region

Marine aggregates are a vital source of sand and gravel used by the construction industry (eg for housing, schools etc). Marine aggregates are also used for beach recharge and contract fill (eg civil engineering projects).

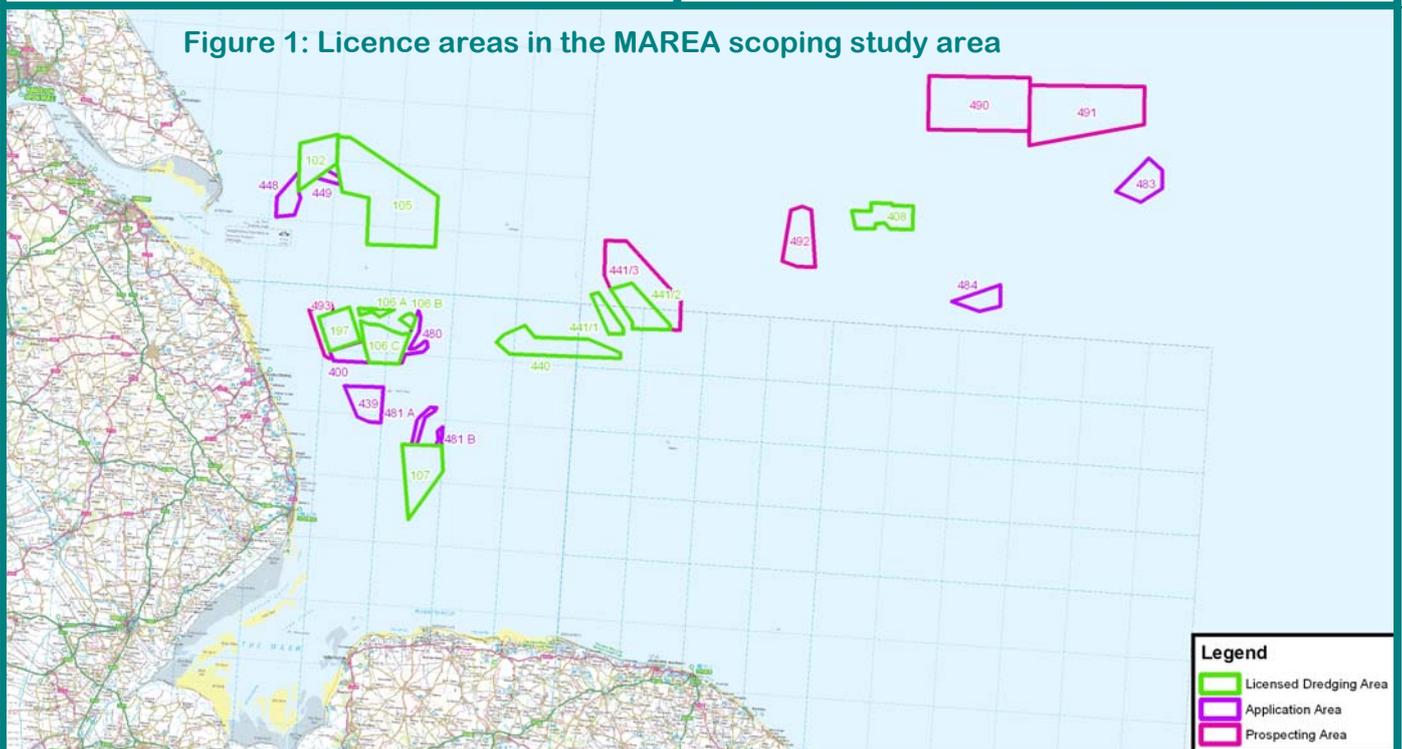
Aggregate extraction has been occurring in the Humber and Greater Wash region since the 1960s. Recent production from the region varies and during 2007, 3.18 million tonnes of construction aggregate were dredged. This constitutes around 14% of the total produced annually from the UK continental shelf ¹. (NB references for all information sheets and a glossary can be found on sheet 14).

Some of the production licences of the dredging areas are due for renewal, and some new applications will be submitted in the coming years to allow extraction of aggregates to continue. In preparation for this, the Humber Aggregate Dredging Association (HADA) has decided to undertake a Marine Aggregates Regional Environmental Assessment (MAREA).

Where is the MAREA Study Area?

The MAREA scoping study area for the Humber and Greater Wash region is shown in Figure 1. It includes 10 active marine aggregate extraction licences plus 6 application areas and 5 prospecting areas. The study area also includes the coastlines of North Norfolk, Lincolnshire and the East Riding of Yorkshire.

Figure 1: Licence areas in the MAREA scoping study area



Some of the licence areas are within the 12 nautical mile limit (approx 20 km offshore), while others are up to 150 km offshore in the southern North Sea. The large size of the study area means that environmental and socioeconomic features and sensitivities vary considerably within the region.

What is a MAREA and why is it carried out?

A Marine Aggregates Regional Environmental Assessment (MAREA) is a voluntary exercise, supported by the British Marine Aggregates Producers Association (BMAPA), the Crown Estate and the Marine and Fisheries Agency. Even though the MAREA process is non-statutory, guidance has been provided by the Regulatory Advisors Group (RAG), which includes members of Natural England, Cefas, JNCC and English Heritage (see below).

The main objectives of a MAREA are to describe the regional baseline characteristics in an area with several marine aggregate licence areas and to evaluate the potential cumulative and in-combination effects of all the existing and planned future dredging operations.

As part of the planning process, Environmental Impact Assessments (EIA) will still be carried out for individual licence applications. However the MAREA will allow the EIAs to be considered in a regional context and therefore allow a better understanding of the interaction with the surrounding environment and other sea users.

The first MAREA was completed in 2003 for the Eastern English Channel region and similar studies are underway for other marine aggregate areas in the UK; the Thames, South Coast and Anglian regions.

MAREA Guidance

The framework for MAREAs is governed by the Regulatory Advisors Group (RAG) framework document² which provides guidance and recommendations for the approach, whilst recognising the non-statutory and industry-led nature of the MAREA process. The RAG document was developed following a series of workshops with industry representatives, RAG and stakeholders³.

The document provides topic-specific guidance on nature conservation, coastal processes, marine ecology, fisheries and historical environment components of the MAREA.

Objectives of Scoping Phase

The objectives of the scoping phase are to identify data gaps and the significant issues of concern at an early stage in the MAREA process in order to focus the baseline data gathering and assessment. Conversely, it also identifies those topics that are unlikely to require assessment. In order to achieve the objectives the scoping phase includes:

- Review and audit of available literature and data.
- Identification, engagement and consultation with key stakeholders.
- Production of a scoping report with recommendations for the full MAREA including any survey and data collection requirements.

Objectives of Full MAREA

The full MAREA will provide information on the wider environmental context of the study area. The impacts on sensitive receptors from proposed dredging activities will be assessed cumulatively at a regional level in the MAREA. Potential in-combination impacts arising from interactions between the dredging sector and other offshore activities and developments will also be identified.

The MAREA will be used to inform site-specific EIA baselines, to identify areas of potential environmental sensitivity and/or interaction with other marine users, and to provide a guide to areas where a greater level of assessment is required through the later EIAs in order to determine whether marine aggregate dredging should be permitted.

Feedback on this Scoping Pack

The remainder of this scoping pack comprises a series of information sheets for each of the key topics that have been identified for this MAREA to date, followed by a final sheet (sheet 14) that provides references and a glossary. Each information sheet identifies the information sources that have been identified for the topic so far, a brief summary of the current baseline understanding, and a box on data gaps and recommendations for the full MAREA.

You are encouraged to provide feedback on the information provided for those topic areas that are of interest to you, and to identify any additional information sources to inform the MAREA.

Please send comments to helen.vaughan@erm.com by Friday 7th August 2009.





Humber and Greater Wash MAREA- Scoping Stage

2. HYDRODYNAMICS

Potential Information Sources Currently identified for the MAREA:

- Historical tidal elevation data from the UK Tide Gauge Network.
- Historical measurements of tidal current speed and direction from the British Oceanographic Data Centre (BODC) data portal.
- Modelled wave, tidal and current data from the Renewables Atlas as developed by ABPmer, the Metoffice and Proudman Oceanographic Laboratory.
- Historical wave climate information from the Met Office (derived from numerical models) and from the DEFRA strategic wave monitoring network for England and Wales (Wavenet) programme (direct measurement in the field).
- Environmental Statements for previous marine aggregate licence applications and offshore wind farms.
- The Southern North Sea Sediment Transport Study.
- Regional maps of derivative quantities such as peak and residual tidal flows.



Tides

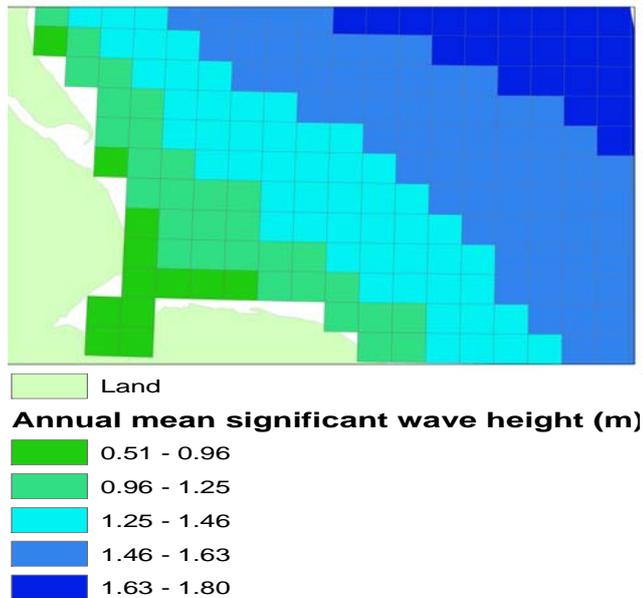
Within the Humber MAREA study area semi-diurnal tides (two per day) predominate. The Co-tidal Chart (5098) for the British Isles indicates that a tidal amphidrome (a position with zero tidal influence) governs the tidal conditions in the Southern North Sea, with the tidal wave rotating anticlockwise. This indicates that the flood tide sweeps down the Holderness and Lincolnshire coast from north to south and across the North Norfolk Coast from west to east.

The tidal range increases with distance from the amphidrome leading to a mean spring tidal range of approximately 4 to 6 m along the north Norfolk coast (increasing in an east to west direction), approximately 6.5 m along the Lincolnshire coast and around 5.5 m along the Holderness coast. The tidal range also increases further into The Wash and the Humber estuary.

Wave Regime

The North Sea is enclosed to the west, south and east (with a maximum fetch length of around 500 km) with a large open entrance to the north. Consequently the longest period and largest waves are expected to be from the north, although because of the fetch length, locally generated wind waves will also be important.

Figure 1 Mean significant wave height distribution from the Renewables Atlas ¹

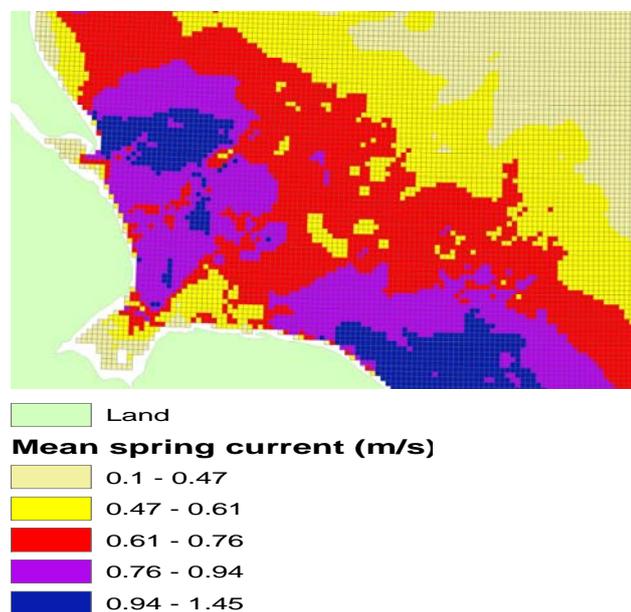


The spatial distribution of the modelled annual mean significant wave height has been sourced from the Renewables Atlas and is shown in Figure 1. This distribution shows that waves are larger offshore and generally decrease closer to the coast and range between 0.51 and 1.80 m.

Currents

The variations in near-bed current speed during a mean spring tide are shown in Figure 2. This shows that current speeds are generally lower offshore and increase in magnitude closer to the coast and range from 0.1 to 1.45 m/s.

Figure 2 Near-bed mean peak spring tidal currents from Renewables Atlas ¹



The spatial distribution of modelled currents due to tidal processes can be sourced from the Renewables Atlas³.

Sea Level Rise

Future sea level rise results from the net effect of global changes caused, for example, by glacio-eustasy (ice melt) or thermal expansion (changes in water volume due to warming) and the local change in land levels due to glacial rebound and subsidence. The guidance for coastal management within the study area suggests that the net sea level rise (currently 4 mm/yr) could increase to 15 mm/yr for the period 2085-2115².

Surges

The North Sea is particularly susceptible to storm surges and there is a long history of such events, with recorded evidence ranging back to at least the 13th Century³. Flather and Williams (2000) defined a 1 in 50 year return period storm surge as having a height of 1.93 m in the North Sea⁴.

The most intense surge of recent history took place between 31st January and 2nd February 1953 and resulted in the loss of almost 2,000 lives, mainly in the Netherlands. This surge elevated water levels up to 3 m above the astronomical tidal level. It was caused by an externally generated surge event propagating through the North Sea and becoming enhanced by an internally-generated surge caused by intense wind speeds.

Data Gaps and Recommendations based on Current Knowledge

No significant data gaps have been identified as the MAREA study area has good data coverage of both recorded and modelled hydrodynamic data.

Characterisation of the physical environment is a key component of the MAREA process. A comprehensive review of available data and consultation will inform the nature and scope of specialist studies (modelling etc) that will be required during the MAREA. Specialist studies are likely to include wave modelling to inform future Coastal Impact Studies and an assessment of the potential for changes to bathymetry to alter tidal flows.



Humber and Greater Wash MAREA-Scoping Stage

3. SEDIMENTS AND COASTAL PROCESSES

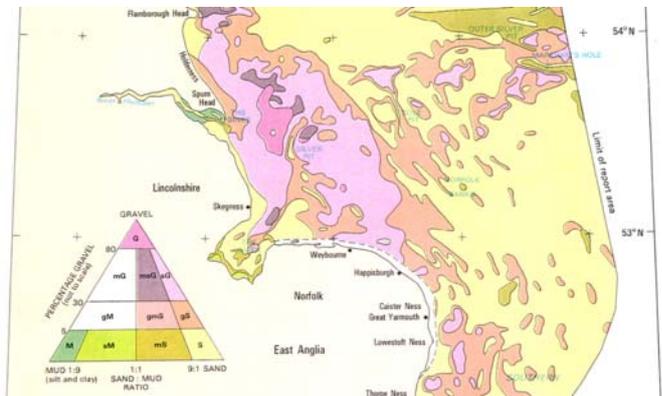
Potential Information Sources Currently Identified for the MAREA:

- British Geological Survey surface sediment and geological charts.
- Shoreline Management Plans and Futurecoast (2002).
- Southern North Sea Sediment Transport Study.
- Regional maps of derivative quantities such as peak and residual tidal flows and tidally induced sediment transport.
- Studies undertaken by ABPmer into the future management of Spurn Point.
- Reports on evolution of the coastline in this region (eg by University of Hull)
- Kenyon, N. H. and Cooper, W. S. 2004. Sandbanks, sand transport and offshore windfarms.
- Cooper, W.S., Townend, I.H., and Balson, P.S. (2008), A synthesis of current knowledge on the genesis of the Great Yarmouth and Norfolk Bank Systems.
- Defra Marine Protected Areas Datalayers research project (2009): Task 2a – Mapping of geological and geomorphological features.
- LiDAR, aerial photography or Ordnance Survey (OS) maps.
- Environmental Statements for previous marine aggregate licence applications; and offshore wind farms.

Offshore Sediments

A wide range of sea bed sediments are present within the Humber MAREA scoping study area (Figure 1). In general the estuary areas of The Wash and the Humber comprise sand and mud.

Figure 1 Seabed sediment distribution based on BGS data¹



Outside of the estuaries the western part of the study area comprises coarser gravelly sediments with sands present further to the east.

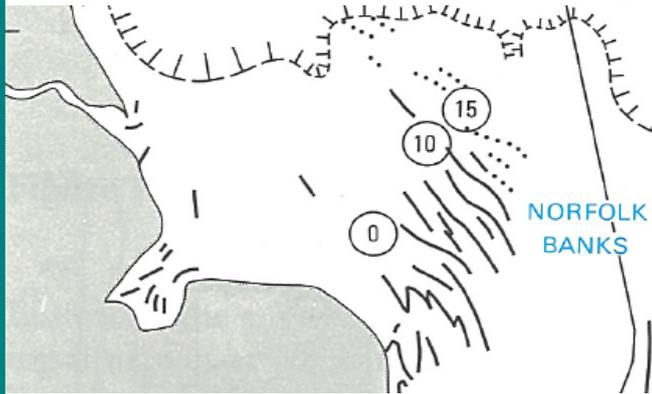
A number of sandwave fields are situated towards the eastern parts of the study area, with a large concentration to the north and east, around the Norfolk Bank system. The main distribution of sand banks is concentrated in the Norfolk Bank system (Figure 2 overleaf). These sandbanks are orientated sub-parallel to the Northeast Norfolk coastline and extend offshore.

Bedload transport pathways have been mapped at a regional scale as part of a number of projects^{1,2}. There is a trend of southerly directed coastal sand transport separated by a bedload parting from a northerly directed offshore sand pathway². The southerly directed sand transport carries sand from the Holderness Cliffs and offshore sources to the Humber Estuary and The Wash². Tidal currents dominate much of the shelf transport in this area.

Background suspended sediment concentrations (SSC) are typically greater during winter than summer, caused by a more energetic hydrodynamic regime which leads to enhanced vertical mixing. In summer, SSC tend to be higher in coastal regions and lower offshore (typically 0 to 4 mg/l). Peaks in SSC occur along the Lincolnshire coast, and The Wash and exceptionally high concentrations of 300 mg/l and higher are recorded in the Humber Estuary .

Figure 2
Distribution of sandbanks³

- Average depth in metres to top of bank
- Sandbank (with sand waves)
- Sandbank (without sand waves)
- TTT Slope down from 35m into deeper water. Short ticks represent relatively steep gradient.



A similar pattern is observed along the coast in winter although concentrations are typically doubled. A plume extending off the North Norfolk coast can be seen and extends in a north-easterly direction across the North sea, it is likely that this is caused by local resuspension arising from wave activity.

Coastal Processes

The Holderness coastline is characterised by an almost continuous stretch of eroding boulder clay cliffs. The finer fraction of sediment released from the cliffs (muds and clays) is transported offshore whilst coarser material (sands and gravels) moves southwards, parallel to the coast as littoral drift. Coastal defence structures have resulted in downdrift erosion both locally and at Spurn Point. The mouth of the Humber acts as a sink for sediments eroded from the Holderness coastline. Some of this is transported across the mouth and deposited at Donna Nook.

The Lincolnshire coast is typically low lying and is characterised by peat deposits, saltmarsh and sand dunes. Between Cleethorpes and Mablethorpe, the coast is fronted by a wide sandy foreshore and offshore banks. To the south of Mablethorpe, the width of the foreshore decreases and the beach is progressively depleted. Extensive stretches of coastal defences exist between Mablethorpe and Skegness. The Lincolnshire coast is vulnerable to coastal erosion and flooding, particularly during storm surge events. At the coast, sediment transport processes are predominantly wave driven.

Large scale accretion begins at the mouth of The Wash with extensive dune and saltmarsh development at Gibraltar Point. The Wash is a sink for the southerly longshore drift along the Lincolnshire coast and the westerly transport between Sheringham and Snettisham.

The Wash has gradually been infilled with fine sediment over time from several large rivers. The shores of The Wash are low and marshy and bordered by mudflats. The North Norfolk coastline from Snettisham to Sheringham consists predominantly of low lying marshland fronted by sandy beaches. Exceptions to this are the sand dunes between Hunstanton and Holme, chalk cliffs at Hunstanton, sand/clay cliffs between Weybourne and Sheringham and discontinuous shingle spits from Scolt Head Island to Weybourne. There is a moderate westerly transport from the drift divide at Sheringham. This reduces to zero at Snettisham. Coastal processes are wave dominated to the east of Blakeney with tidal currents becoming increasingly important towards Snettisham.

Sand/clay cliffs dominate from Sheringham to Great Yarmouth. These are fronted by predominantly sandy beaches with areas of shingle and sand dunes. Cliff erosion is widespread along this coast and much of the frontage between Happisburgh and Winterton is vulnerable. Coastal sediment transport processes are driven by waves transporting sediments southwards from the drift divide at Sheringham whilst residual tidal currents maintain sediment exchanges between the beaches and nearshore bank systems.

Data Gaps and Recommendations based on Current Knowledge

The scoping review did not identify any significant data gaps with respect to sediment data although coverage is more detailed in areas where offshore developments have been proposed. Sediment transport pathways are well described throughout the nearshore part of the study area but less so further offshore.

A comprehensive desk-based review and consultation will inform the scope of specialist studies that will be required during the MAREA. Specialist studies could include regional mapping of the distribution of sediments and bedforms, and modelling studies into sediment plume dispersion and changes to particle size.



Humber and Greater Wash MAREA-Scoping Stage

4. BENTHIC ECOLOGY

Potential Information Sources Currently Identified for the MAREA:

- Conner, D. W., Allen, J. H., Golding, N., Howell, K. I., Lieberknecht, L. M., Northen, K. O. and Reker, J. B. 2004. The Marine Habitat Classification for Britain and Ireland Version 04.05 JNCC, Peterborough.
- The Mapping European Seabed Habitats (MESH) tool that has been developed jointly by JNCC and European partners to map marine habitats off the coasts of the UK and North West Europe.
- The National Biodiversity Network (NBN) Gateway tool that shows spatial distribution of individual species.
- The Marine Life Information Network (MarLIN) database which provides information on the distribution, ecology, sensitivity and importance of key benthic marine species.
- Natural England Research Reports.
- DTI Strategic Environmental Assessment Reports (SEA 2 and 3).
- Environmental Statements for aggregate licence applications and wind farm developments in the region.
- Foster-Smith et al (1999, 2001, 2003), reports on *Sabellaria spinulosa* in The Wash and North Norfolk Coast cSAC.
- A range of reports carried out by Precision Marine Surveys Limited and key staff.
- Additional published reports and papers.

In addition benthic data will be collected as part of the ALSF-funded Regional Environmental Characterisation (REC) survey that is likely to be undertaken in summer 2009. Details of the specification for this survey will be reviewed when available to aid in informing the scope of the benthic ecology component of the full MAREA.



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Benthic Community Distribution

The distribution of benthic communities within the MAREA area is largely related to key environmental parameters including sediment type, water depth and sediment stability and quality, in conjunction with their proximity to transitional waters (the Humber estuary and The Wash).

The MAREA scoping study area predominantly consists of soft sediments (eg muds and silts) with areas of hard sediment (eg pebbles, cobbles and bedrock), where hard substrata and reef features may be present.

Each sediment type, from mud to gravel, and their particular benthic invertebrate fauna, cover sizeable areas in the region. These variable sediment types mean that benthic communities are relatively diverse and surveys in the region have recorded on average 40-50 species and several hundred individuals per sample in mixed sediments.

In parts of the study area the surface sediments are highly mobile as a result of strong tidal currents which have led to the formation of extensive sandbanks both inshore and offshore. In addition wave action and storm events cause high levels of re-suspension resulting in highly turbid waters, particularly in coastal areas. As a consequence the benthic communities are often characterised by species adapted to physical disturbance.

The communities may be loosely grouped into a smaller number of broad habitat complexes. Outside the main estuaries and embayments, shallow areas of infralittoral fine or mobile coarse sands are dominated by polychaetes and amphipods. Further offshore circalittoral coarse or muddier mixed sediments support a wider variety of species including a range of polychaetes, bivalves, crustacea and echinoderms (see Glossary on sheet 14 for biological terms) and some areas also support a diverse epifauna including commercially important species of shellfish such as lobster, edible crab, cockles and shrimp. These benthic species provide a key resource for other trophic levels.

Protected Benthic Habitats

The characteristic habitats or biotopes in the study area are generally widespread and are of relatively low sensitivity, however they can support areas of biogenic reef formed by the tube-building polychaete *Sabellaria spinulosa*. This species is predominantly found in areas of relatively high sediment loads and whilst it is more usually found in a low-lying encrusting form it can sometimes form reef structures, which are rare at the national and international scale and support a wide range of associated fauna.

Sabellaria reefs have been found in inshore areas along the Lincolnshire coast and off the Humber and also in The Wash SAC (Special Area of Conservation under the Habitats Directive), and the proposed North Norfolk Sandbanks and Saturn Reef SAC. These SACs are located in the south-west and south-east of the MAREA scoping study region.

Areas of *Sabellaria alveolata*, which can form larger, more extensive reefs, have recently been recorded in the outer Humber despite being primarily an intertidal west coast species.



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Commercially Important Benthic Species

The European lobster (*Homarus gammarus*) and edible crab (*Cancer pagurus*) are the most important shellfish species targeted by fishermen in the region. The lobster is found from the shoreline to depths of 150 m. It usually occurs on a hard substrate such as rock or hard mud, but high numbers are also associated with sand banks in the region. Lobsters are most active at night, and females lay eggs in July. Edible crabs are abundant on rocky grounds where they hide in holes and crevices, and they are also common on subtidal sandbanks. They are both active predators and scavengers, and spawning takes place between November and February, during which time the females remain in deeper waters offshore.

There is an important molluscan shell-fishery in The Wash targeting cockles (*Cerastoderma edule*) and mussels (*Mytilus edulis*). Cockles are suspension feeders that live on inter-tidal beaches of sand, muddy sand and fine gravel, where they burrow into the sediment and feed via a siphon. Mussels are suspension feeders generally found attached to hard substrates within the intertidal zone and shallow waters. Both species spawn in spring.

Other shellfish species, particularly the whelk (*Buccinum undatum*) and brown shrimp (*Crangon crangon*) are important within this region of the North Sea, although the whelk is increasingly being taken as by-catch from the crustacean fishery, with fewer dedicated whelk potting vessels operating from the coast. Whelks are carnivorous, mobile species found close to the coast along rocky shores and on soft sediments. They spawn in November, attaching eggs to the seabed. Brown shrimp are typically found in shallow waters, in bays and estuaries along the coast, and favour soft, sand sediments in which they can burrow.

Data Gaps and Recommendations based on Current Knowledge

Whilst there is good coverage of data for areas that have been targeted for commercial licensing for mineral extraction, exploration and developments (eg wind farms), there are data-gaps for the areas of non-targeted seabed in and around the MAREA area which will need further description. The REC survey will help to address these data gaps and the need for an additional regional benthic survey will be reviewed once the coverage of the REC Survey is available. Cefas, JNCC, Natural England and the relevant SAC project officers will be consulted to discuss the distributions and ecology of key benthic species within the MAREA area.



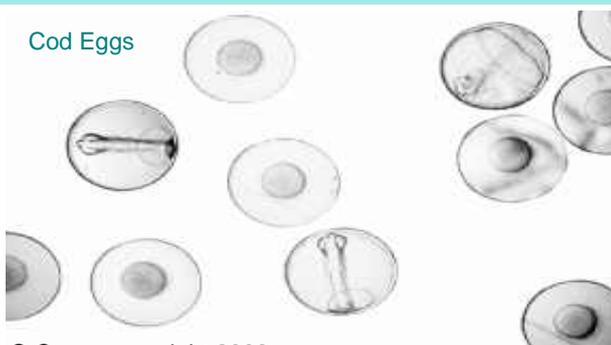
Humber and Greater Wash MAREA-Scoping Stage

5. FISH ECOLOGY

Potential Information Sources Currently Identified for the MAREA:

- Summaries of the ecology of commercial species from Cefas, ICES and FishBase.
- Information on the distribution of rare and protected species from JNCC and FishBase.
- Locations of spawning grounds and nursery areas from Cefas' interactive Spatial Explorer and Administrator (iSEA) database.
- ICES survey reports.
- Natural England Research Reports.
- Environmental Statements for aggregate licence applications and wind farm developments in the region.
- A range of reports carried out by Precision Marine Surveys Limited.
- Additional published reports and papers.

In addition it is understood that 2 m beam trawl data will be collected as part of the ALSF-funded Regional Environmental Characterisation (REC) survey that is likely to be undertaken in spring/summer 2009. However this is aimed at describing epifaunal communities and will not provide extensive information on demersal or pelagic fish populations. Nonetheless, the details of the collected survey data will be reviewed to help inform the scope of the fish ecology component for the full MAREA.



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Commercially Important Species

Overview

Numerous finfish species feed and spawn in the North Sea and use certain sites as nursery areas. An understanding of these ecologically important sites is vital for the MAREA as is a good understanding of the preferred prey for each species.

In recent decades populations of traditional target finfish species, such as cod (*Gadus morhua*), plaice (*Pleuronectes platessa*) and Dover sole (*Solea solea*), have declined in abundance due to anthropogenic impacts and environmental change. However, technical conservation measures have now been put in place in an attempt to halt population declines and recover stocks to more sustainable levels.

Within the MAREA region there is an indication at a local level that the cod recovery programme and the associated conservation measures may now be aiding the recovery of some local demersal finfish populations. Other species are exhibiting a significant expansion in their range of distribution, notably the sea bass (*Dicentrarchus labrax*).

Cod

Cod feed predominantly on invertebrates and fish. According to historical observations, they spawn in localised patches offshore within the MAREA scoping study area. A recent study has suggested that although many traditional spawning grounds, including Dogger Bank, remain active, evidence of spawning amongst some local populations such as those off Flamborough Head, have declined significantly¹. Nonetheless, the number of adult

cod recorded along the Yorkshire and Lincolnshire coasts has been relatively high in recent years.

Plaice

Plaice undergo a change in diet with development and increasing size; juveniles feed mainly on infaunal polychaetes and bivalves, and larger adult plaice eat more epibenthic crustaceans, small fish and echinoderms. Plaice spawning grounds are widespread offshore and overlap slightly with the MAREA study area.

Sole

Sole feed mainly at night, spending the day buried in fine sediments. The pelagic larvae feed on copepod nauplii whereas juveniles and adults feed mainly on polychaete worms. Sole spawning grounds are distributed along the Norfolk, Lincolnshire and Yorkshire coasts as far north as Bridlington.

Herring

Herring (*Clupea harengus*) feed on small pelagic copepods and they have a specific requirement for clean gravel substrates for spawning, which makes them especially vulnerable to habitat modifications. However, recruitment of herring in the North Sea has been poor in recent years and although the MAREA study area was important for spawning in the past, recent larval surveys have found no evidence of herring actively spawning in the area south of Flamborough Head.

Sea bass

The European sea bass (*Dicentrarchus labrax*) is a strongly migratory predator. They are attracted to warm water discharges and therefore are common inshore, close to the mouths of rivers. Spawning starts offshore in February and moves closer inshore in March to June, when large shoals are formed. Sea bass are opportunistic predators feeding on a wide range of fish, shellfish and plankton species.



Sea bass

Species of Nature Conservation Importance

Two species of fish that are protected by the Habitats Directive are known to occur within the southern North Sea region; the twaite shad (*Alosa fallax*) and the Atlantic salmon (*Salmo salar*). These species are anadromous i.e. they live their adult lives in the sea, but swim upstream into freshwater rivers to spawn. As a result, it is likely that they will be present periodically in the MAREA area during their migration, although the region is not nationally important for either of these species.

In addition to the migratory fish species, the short-snouted seahorse (*Hippocampus hippocampus*) has recently been afforded protection under Schedule 5 of the Wildlife and Countryside Act. This is a relatively uncommon, secretive species that blends in well with rocky and weedy habitats, and is thought to inhabit areas along the north Norfolk coast. It spends the spring and summer in shallow inshore areas, migrating into deeper waters in the winter.

Atlantic salmon



Data Gaps and Recommendations based on Current Knowledge

A desk-based assessment will be undertaken to review the existing data in the region and to produce a regional series of maps that show spatial and temporal patterns for species of interest. These will include spawning and nursery grounds plus key feeding area and migration routes where appropriate. Species that have a particular association with the substrates within marine aggregate areas will be a key focus of the MAREA.

Cefas, JNCC and Natural England will be consulted to discuss key species of commercial or conservation importance. In addition the fishermen of region will be contacted via the NESFC, ESFJC and fisheries associations to invite them to share their local knowledge of the ecology of the species in the MAREA study area.



Humber and Greater Wash MAREA-Scoping Stage

6. MARINE MAMMALS

Potential Information Sources Currently Identified for the MAREA:

- JNCC Atlas of Cetacean Distribution in northwest European waters.
- Small Cetaceans in the European Atlantic and North Sea (SCANS and SCANS II surveys).
- Seal distributions from the NBN Gateway, which for the Humber MAREA region is likely to comprise information from the following sources:
 - Biological Records Centre.
 - JNCC
 - Marine Biological Association
 - Marine Conservation Society
- Natural England's information on The Southern North Sea Marine Natural Area
- Information from the Sea Watch Foundation.
- Information from the Sea Mammal Research Unit

Cetaceans

The cetacean fauna (whales, dolphins and porpoises) of the southern North Sea is relatively poor, both in numbers and diversity of species. According to Natural England and the Sea Watch Foundation, there are between four and nine species of cetacean which have been sighted with any regularity in the southern North Sea.

Only two of these species are considered by the Sea Watch Foundation to be present off the east coast of England throughout the year or to be present annually as seasonal visitors; the harbour porpoise and white-beaked dolphin¹.

Harbour Porpoise

The harbour porpoise (*Phocoena phocoena*) is the most numerous cetacean found in the north-western continental shelf waters, commonly occurring in the shallow coastal seas around the UK.

They are small cetaceans up to 1.9 m in length, that are usually found in small groups of between one and three individuals. Harbour porpoises feed on a wide variety of small fish species including herring, sprat, mackerel, sandeel, whiting and hake as well as cephalopods such as squid. Calving is most common during the late spring however calves have also been observed during January and February.



White-beaked Dolphin

The white-beaked dolphin (*Lagenorhynchus albirostris*) is a large and very robust dolphin, measuring 2.5 - 3m when fully grown. It is the most common cetacean species in the northern and central North Sea; however it is only occasionally sighted south of the Humber estuary.

Peak numbers occur between June and October. White-beaked dolphins eat a variety of prey including cod, whiting, hake, haddock, mackerel, herring, cephalopods and some crustaceans.



Minke Whale

The only common species of baleen whale that is recorded in the vicinity of the MAREA area is the minke whale (*Balaenoptera acutorostrata*), which has been sighted particularly offshore of Flamborough Head in the late summer/early autumn. They are filter feeders which prey on schooling fish such as herring, cod, whiting and sandeels as well as free swimming crustaceans and gastropods, and can reach up to 7-8.5 m in length.



Pinnipeds

Two species of seal breed in the UK and are commonly found in UK coastal waters; the common seal and the grey seal.

Common Seal

The common seal (*Phoca vitulina*) is the smaller of the two UK seal species. They occur along all coasts of the UK, preferring sheltered sandy beaches to haul out on. An internationally important colony of common seals is found within the Southern North Sea Marine Natural Area on and around The Wash and north Norfolk Coast, and also at Donna Nook on the Lincolnshire coast. It is possible that smaller colonies are situated in the sand dunes along the coast, and further information on this will be sought during the MAREA.



Females haul out onto the intertidal sand and mudflats to give birth and suckle cubs between June and July. Their diet consists of a range of species including herring, sprat, whitefish and flatfish. The UK supports approximately 33,800 common seals which accounts for 40% of the world population².

Grey Seal

Grey seals (*Halichoerus grypus*) also occur around the coast of the UK although their distribution is centred around the northwest of Scotland and around Orkney and Shetland; they are less numerous than common seals within the southern North Sea Marine Natural Area.

Grey seals generally prefer more rocky coastlines however they will use sandy beaches for hauling out and pupping if the sites are suitable.

The main breeding site in the Humber MAREA scoping study area is at Donna Nook in Lincolnshire, although pups are born elsewhere, generally along the Norfolk coast including Blakeney Point, and they are frequently observed within the Flamborough Head SAC.



Data Gaps and Recommendations based on Current Knowledge

A desk-based assessment will be undertaken to review all the existing sightings data in the region and to produce a series of maps that show spatial distributions of the species of interest, and the relative importance of the region in context of the wider North Sea. Natural England and JNCC will be consulted to discuss the distribution and ecology of marine mammal species in the region; including the occurrence of seals along the Lincolnshire coastline.



Humber and Greater Wash MAREA-Scoping Stage

7. ORNITHOLOGY

Potential Information Sources Currently Identified for the MAREA:

- Southern North Sea Marine Natural Area Profile.
- DTI/DBERR Aerial Surveys of Waterbirds in Strategic Windfarm Areas 2004/05 and 2005/06.
- European Seabirds at Sea (ESAS) database.
- JNCC surveys, published reports and general website information.
- Consultation with JNCC, NE and RSPB.
- JNCC Seabird Colony Register.
- BTO Wetland Bird Survey (WeBS) counts.

Introduction

The coastal seas along the eastern English coast provide an important habitat for a range of seabirds. Distribution is largely dictated by

suitable nesting sites and prey availability¹, both of which are provided for a number of species within the HADA study area. This review will therefore focus on known breeding sites and foraging areas for seabirds within the study area.

Sites Designated for Bird Interest

There are a number of sites along the coast of the study area which have been designated as they support important populations of seabirds. These sites, along with their designated seabird interest features, are shown in Table 1 below.

Bempton Cliffs lies in the north of the study area, approximately 54 km from the closest licence area, however it is the largest seabird colony on the east coast of England and is important for birds both during the breeding season and over winter. The Humber Estuary, Spurn Head, Gibraltar Point, and The Wash all support breeding colonies of terns. The North Norfolk Coast, which also encompasses Holmes Dunes, Skolt Head Island and Blakeney NNRs supports a wide range of breeding terns as well as an important breeding population of Mediterranean

Table 1: Designated Site with Seabird Interest Features

Site Name	Designation	Seabird Interest
Flamborough Head and Bempton Cliffs	SPA and SSSI	Breeding kittiwake and a breeding assemblage of puffin, razorbill, guillemot herring gull and gannet.
Humber Estuary	SPA, Ramsar Site and SSSI	Breeding little tern.
Spurn Head	NNR	Breeding little tern.
Gibraltar Point	SPA, Ramsar Site, SSSI and NNR	Breeding little tern.
The Wash	SPA, Ramsar Site and SSSI	Breeding common tern and little tern.
North Norfolk Coast	SPA Ramsar Site and SSSI	Breeding common tern, little tern, sandwich tern, roseate tern and Mediterranean gull and a wintering assemblage containing common scoter, velvet scoter and cormorant.
Holmes Dunes	NNR	Breeding little tern.
Skolt Head Island	NNR	Breeding sandwich tern, common tern and little tern.
Blakeney	NNR	Breeding sandwich tern, common tern and little tern.

gull. Wintering populations of seaduck, especially common and velvet scoter are also found in this area.

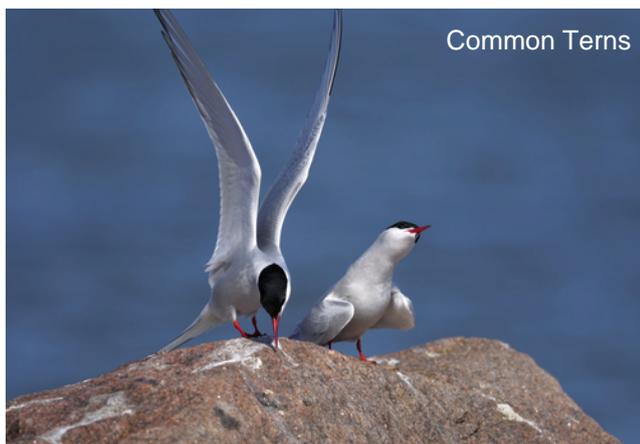
Species Distribution

Jones et al (2004)¹ list 33 species of seabird which used the southern North Sea marine coastal area which includes the Humber MAREA scoping study area. Aerial Surveys of waterbirds in the strategic wind farm areas undertaken from 2004 to 2006^{2,3} have provided seasonal data on the distribution of seabirds across the study area.

During the winter, these surveys revealed low distributions of divers and seaduck within the survey area, mostly located around the Wash and adjacent coastlines. Gull species were recorded wintering over the whole survey area at moderate densities, with certain concentrations along the north Norfolk coast and in the Wash.

Concentrations of wintering auk species were recorded offshore during the early winter, moving further inshore and north towards breeding sites at Bempton Cliffs at the end of the winter. During the early part of the winter, some auk species moult, losing their flight feathers and becoming flightless. At this time they are particularly sensitive to disturbance.

Wintering kittiwakes were recorded at low densities across much of the survey area and a concentration of little gull was recorded in coastal waters beyond the Wash. Little gull are known to pass through the area in internationally important numbers during the autumn migration.



In summer, low numbers of gulls and auks were recorded across the survey area with increases towards the end of the summer when birds disperse from breeding sites. High numbers of terns were recorded north of the north Norfolk coast, foraging from breeding colonies and later dispersing further offshore^{2,3}.

Important Habitats and Species

Many of the species found throughout the study area will forage widely in search of prey. However certain areas and habitats are known to be important for some species. Breeding terns are known to preferentially forage in areas close to their colonies in order to maintain an adequate supply of food to their chicks. Favoured foraging areas include shallow coastal areas, as well as shallow sand banks further offshore. Wintering divers and seaduck also tend to be found in association with shallower water where prey species are more abundant.

Diving birds hunt by sight and are therefore sensitive to increased turbidity and changes in benthic communities, both of which could affect their ability to forage for food. The species that are most sensitive to such changes are breeding terns, wintering auks and sea duck.

Data Gaps and Recommendations based on Current Knowledge

A significant amount of information on the baseline distribution of birds in the Humber MAREA scoping study area is known to exist. The DTI/BERR survey data will be a primary resource that will need to be fully analysed to inform the MAREA. Good data on number of birds nesting around the area are available from JNCC's Seabird Colony Register and the NBN Gateway. Good data on wader distribution and numbers in the Humber Estuary are also available from the British Trust for Ornithology's Wetland Bird Survey (WeBS) counts.

A significant amount of research into offshore and coastal bird populations in the study area is being undertaken, particularly by the offshore wind farm industry, at present. The MAREA will integrate the results of these recent studies to inform the ornithological baseline. JNCC, Natural England and RSPB will be consulted during the MAREA to identify and address any outstanding data gaps.



Humber Region MAREA- Scoping Stage

8. NATURE CONSERVATION

Potential Information Sources Currently Identified for the MAREA:

- Seazone Hydrospatial will be used as the primary baseline database.
- MAGIC interactive web-based mapping tool www.magic.gov.uk.
- The Joint Nature Conservation Committee (JNCC) website www.jncc.gov.uk and reports.
- The Centre for Environment, Fisheries and Aquaculture Science (Cefas) www.cefas.co.uk/ and reports.
- Natural England's information on The Southern North Sea Marine Natural Area.
- The Marine Life Information Network for Britain and Ireland (MarLIN) www.marlin.ac.uk.
- Site Selection Assessment for current and proposed SAC's and SPAs.
- Consultation with JNCC about Natural England to identify any forthcoming proposals for additional protected areas.

Introduction

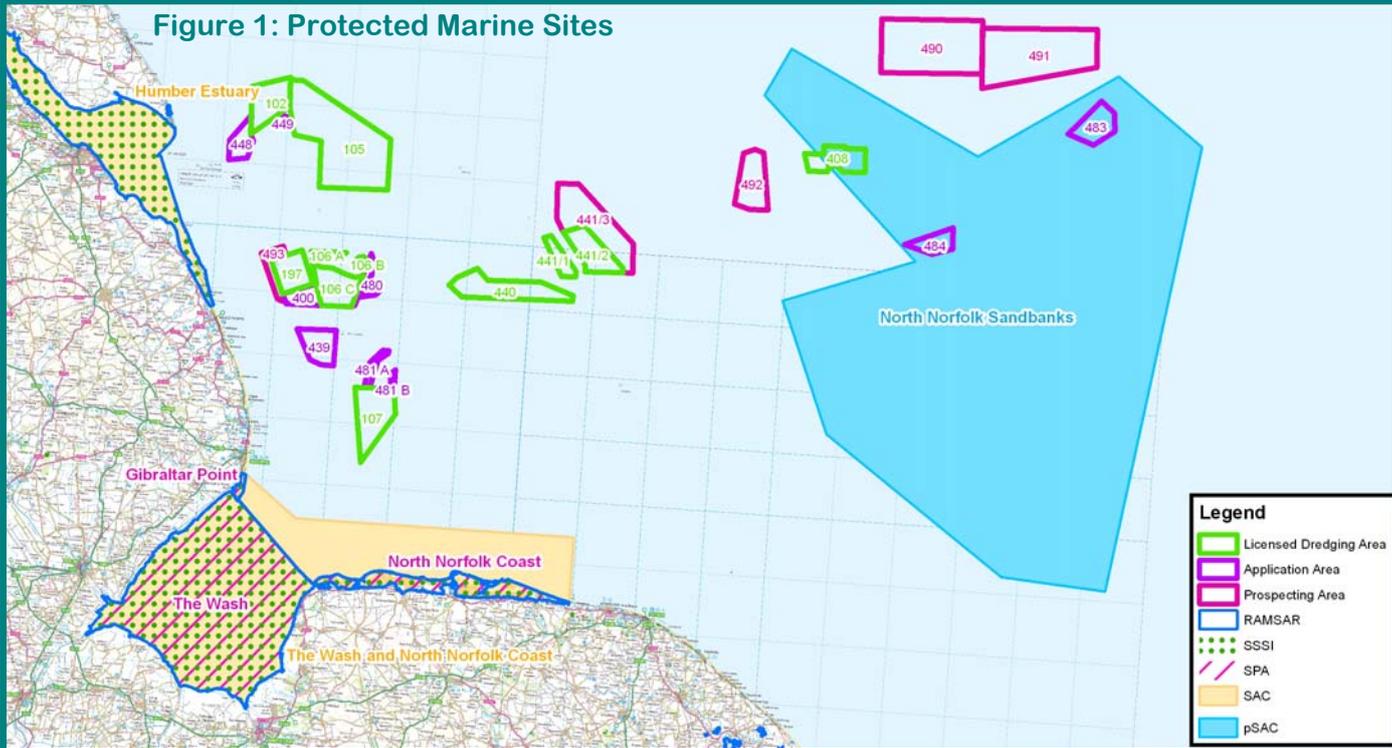
There are a number of existing and proposed protected areas close to and within the Humber MAREA scoping study area (Figure 1). These include Special Protection Areas (SPAs) and Ramsar sites which are particularly important for waterfowl and seabirds, Special Areas of Conservation (SACs) designated for their habitats, and Sites of Special Scientific Interest (SSSIs). Protected species are discussed separately in Scoping Pack sheets 4,5,6 and 7.

Two offshore habitats that are included in Annex I of the Habitats Directive are known to occur in the Humber MAREA scoping study area: Sandbanks which are slightly covered by sea water all the time and Reefs.

Natura 2000 Protected Areas

North Norfolk Sandbanks and Saturn Reef proposed SAC (pSAC) This large offshore pSAC consists of 10 main sandbanks and a number of smaller banks, which collectively form the most extensive example of offshore linear ridge sandbanks in UK waters. The pSAC site area is approximately 3,600 km². The sandbanks are

Figure 1: Protected Marine Sites



home to invertebrate communities typical of sandy sediments, such as polychaetes, crabs and brittlestars. One particular polychaete, the ross worm *Sabellaria spinulosa*, is capable of creating biogenic reef structures through consolidating thousands of fragile sand-tubes to create a solid structure that rises from the seabed. The Saturn Reef, which was recorded within the pSAC area was such a structure.

The Wash and North Norfolk Coast SAC is the second-largest area of intertidal flats in the UK. Sandy intertidal flats predominate, with some soft mudflats in the areas sheltered by barrier beaches and islands along the north Norfolk coast.

The biota include polychaetes, bivalves and crustaceans. On this site sandy sediments occupy most of the subtidal area, resulting in one of the largest expanses of sublittoral sandbanks in the UK. The site is also important for reefs, *Salicornia* and other annuals that colonise mud and sand, Atlantic salt meadows (*Glauco-Puccinellietalia maritima*), and as a habitat for the Common seal and Otter.

The Wash and North Norfolk Coast SAC overlaps geographically with the **North Norfolk Coast SPA** and **The Wash SPA**. The Wash and North Norfolk Coast SPA adjoin. Breeding terns, particularly sandwich tern (*Sterna sandvicensis*) and wintering sea-ducks regularly feed outside the North Norfolk Coast SPA, in the adjacent coastal waters of The Wash and North Norfolk Coast SAC. The North Norfolk SPA has some of the best examples of saltmarshes in Europe.

The Wash SPA is of outstanding importance for a large number of geese, ducks and waders, both in spring and autumn migration periods, as well as through the winter.

The **Gibraltar Point SPA** lies to the north of The Wash and consists of an actively accreting sand-dune system, saltmarsh and extensive intertidal flats. The site accommodates large numbers of overwintering birds and significant colonies of breeding terns. The site is also important for waders during the spring and autumn passage period.

The Humber Estuary SAC is the second-largest coastal plain estuary in the UK, and the largest coastal plain estuary on the east coast of Britain. Habitats within the Humber Estuary include Atlantic salt meadows and a range of sand dune types in the outer estuary, together with subtidal sandbanks, extensive intertidal

mudflats, glasswort beds, and coastal lagoons. The estuary is also an important habitat for Sea lamprey, River lamprey and Grey seals. Within the Humber SAC the **Humber Estuary SSSI** is designated. This site consists of seven biological and geological SSSIs which were previously designated separately. Components of this SSSI are similar to the Humber SAC components and include saline lagoons, sand dunes, invertebrate assemblage, wintering and passage waterfowl species, breeding bird assemblage, breeding colony of grey seals, river and sea lamprey plus the geomorphology of Spurn and the cliff and foreshore at South Ferriby.

The Humber Flats, Marshes and Coast (Ramsar site and SPA) are designated for vegetation interests including extensive reedbeds, areas of saltmarsh and brackish pools. They support internationally important numbers of various species of breeding and wintering water birds as well as many passage birds, notably internationally important populations of ringed plover *Charadrius hiaticula*, and sanderling *Caldris alba*. Donna Nook supports Britain's most southeasterly breeding colony of grey seal *Halichoerus grypus*.



Data Gaps and Recommendations based on Current Knowledge

The key species of conservation importance in the MAREA study area will be identified and maps will be produced illustrating the locations important to these species. This and information on the distribution of Annex I habitats within the protected areas will be assessed and analysed.

The site selection assessment reports for each SAC and pSAC will be reviewed and the conservation objectives for each will be requested from JNCC and Natural England. Any new draft SACs and SPAs that are identified within the study area will be included within the scope of the full MAREA.

The potential for dredging activities to interact with the conservation objectives of any of these sites will be assessed as part of the MAREA.



Humber and Greater Wash MAREA-Scoping Stage

9. COMMERCIAL AND RECREATIONAL FISHERIES

Potential Information Sources Currently Identified for the MAREA

- Cefas Fisheries Research Technical Reports.
- Marine and Fisheries Agency landings data by ICES rectangle.
- North Eastern Sea Fisheries Committee Reports.
- Eastern Sea Fisheries Joint Committee Research Reports.
- Environmental Statements for aggregate licence applications and wind farm developments in the region.
- A range of reports carried out by Precision Marine Surveys Limited.
- Additional published reports and papers.
- Up-to-date overflight and VMS (Vessel Monitoring System Data).

The commercial inshore fisheries of the Holderness coast and Greater Wash, are reasonably well described; however, much of the information available is derived from anecdotal sources.



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Introduction

There is a clear distinction between the fisheries that take place inshore in the Humber and Greater Wash region, and those that take place offshore. They are therefore described separately within this information sheet.

Inshore Fisheries

The range of fishing activities within the Humber MAREA scoping study area is diverse, particularly in the inshore waters to the south of the area.

Given the lack of natural harbours throughout the region, many of the smaller vessels fishing inshore operate from the beach.

In the north of the MAREA scoping study area and along the Holderness coast, the inshore fishery is dominated by static gears, predominantly shellfish potting for brown crab (*Cancer pagurus*), velvet crab (*Necora puber*) and lobster (*Homarus gammarus*). Inshore fin fisheries along the Holderness coast tend to be dominated by gill nets targeting gadoids (cod and whiting), Dover sole (*Solea solea*) and sea bass (*Dicentrarchus labrax*). Recently, there has also been a trend towards the more traditional method of long-lining.

Fisheries activity in The Wash area and along the Lincolnshire and North Norfolk coast is similar to that of the Holderness coast, with shellfish, cod, rays and sea bass being particularly important. There are also a limited number of boats that beam-trawl for fin fish on a seasonal basis, particularly for flat fish species, and also for brown shrimp (*Crangon crangon*). There is an important molluscan shell-fishery in the region which targets cockles (*Cerastoderma edule*) and mussels (*Mytilus edulis*) and is predominantly targeted by larger (over 10 m) vessels. New fisheries are developing in the Wash for razor shells and other bivalves (*Spisula* and *Tapes*).

Offshore Fisheries

For the purpose of the MAREA fisheries description, it is suggested that 'offshore' will be classified as waters outside the 12 nautical mile limit.

A range of European member states fish offshore with the majority of effort being concentrated in the north-east of the Humber MAREA scoping study area. Offshore fishing effort in the south-east is also high, although there are no production licences, application or prospecting areas in this part of the MAREA study area. Vessels from Denmark and the Netherlands dominate the over-flight recordings data in the offshore region, and vessels from the UK, Belgium and France are also prevalent.

Over-flight data indicates that the principal mobile fishing activity taking place offshore in the MAREA area is beam trawling for cod, plaice and sole, with some limited otter and pair trawling for demersal species being carried out by Danish and French vessels.



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MSC Certified Fisheries



North Eastern Sea Fisheries Committee (NESFC) sea bass (*Dicentrarchus labrax*) has been certified as sustainable by the Marine Stewardship Council (MSC) since December 2007. It is fished along the Holderness coast between Flamborough Head and Spurn Point, using intertidal fixed gill-nets which run straight out from the shore up to a maximum distance of 180 m. The nets are shot from a series of permanent marked, fixed positions along the coast. They are examined and cleared of fish twice a day and because they are intertidal, they spend between 6 and 12 hours a day partially dry and therefore not fishing.

Southern North Sea nephrops (*Nephrops norvegicus*) is also fished in the region and is currently undergoing assessment to attain certification as an MSC fishery. The NESFC

Lobster (*Homarus gammarus*) fishery was also submitted for MSC certification, but was denied on the basis of data standards in 2007. The fishery was given three years to conduct an ecologically focussed fisheries study and to resubmit the data by 2010 for re-assessment.

Recreational Fisheries

Angling is regarded as being one of the largest participation sports in the UK. The Holderness coast supports the two largest shore angling matches in Europe. Shore anglers target a wide range of species including cod and whiting during the winter, and bass, rays, smoothhound and flatfish during the summer and autumn. Boat anglers will also target these species in addition to ling, haddock, Pollack and tope. Boat anglers, both charter and private owners, tend to fish features such as wrecks and reefs, however there are some sand banks and gravel beds that are key boat angling spots.

Data Gaps and Recommendations Based on Current Knowledge

To understand the offshore sector of the fishery a thorough review of the available data related to commercial fishing activity in the region is required using the data sources listed, and with a particular emphasis on the analysis of up-to-date MFA over-flight survey and VMS data.

At least 5 years (up to 2008) of overflight and satellite tracking (VMS) data for the MAREA survey area will be analysed; the data are available for all vessels over 10 m (overflight data) and over 15 m (VMS). Full analysis of the data (including seasonal trends and nationalities) will be undertaken during the MAREA using a standardised methodology recommended by Cefas. The use of GIS will provide a visual means of examining the fisheries data and can be used to determine spatial and temporal patterns in fishing for all vessels, those of a specific nationality and those using specific gears.

An economic analysis of key fisheries and ports is also required, including a consideration of seasonality. This will provide information on both the offshore and inshore fishing sectors.

In order to fully understand commercial fisheries in the Humber MAREA area, and particularly the inshore sector for which less data are available, it is imperative that the fishermen are consulted and asked to validate the collected data. Cefas, NESFC, ESFJC and fisheries associations will be consulted during the MAREA on the relevant fisheries issues in the region and the species that are targeted.



Humber and Greater Wash MAREA-Scoping Stage

10. ARCHAEOLOGY

Potential Information Sources Currently Identified for the MAREA

- Records of wrecks and obstructions listed by the UKHO.
- Records of Named Losses and terrestrial sites held by the National Monuments Record (NMR).
- Records regarding archaeological sites held by the Lincolnshire Historic Environment Record (LHER), the North Lincolnshire Historic Environment Record (NLHER), the North East Lincolnshire Historic Environment Record (NELHER) and the Humber Archaeology Partnership (HAP).
- Details of droits (eg flotsam and jetsam) held by the Receiver of Wreck.
- Sites protected under the Protection of Military Remains Act (1986), provided by the Ministry of Defence.
- Secondary sources relating to the palaeo-environment and to the Palaeolithic and Mesolithic archaeology of Northern Europe, including the following ALSF projects: *Seascapes: Southwold to Clacton* (Oxford Archaeology 2007), *Seabed Prehistory* (Wessex Archaeology 2008b) and *Artefacts from the Sea* (Wessex Archaeology 2003b, 2004).
- Secondary sources relating to historic shipping patterns, as well as those sources relating to known and potential wreck sites and casualties, including the ALSF *England's Shipping* (Wessex Archaeology 2003) and *Navigational Hazards* projects (Bournemouth University 2007).
- ALSF *Air Crash Sites at Sea* (Wessex Archaeology 2008) and various secondary sources relating to historic aviation patterns.
- Modern admiralty charts and geological maps
- Results from the Regional Environmental Characterisation geophysical surveys will be incorporated when available.



Prehistoric Archaeology

Information regarding Prehistoric Archaeology is separated into three main periods:

- Devensian (c.110,000 to 13,500 Before Present (BP)) - the last ice age in Britain.
- Pre-Devensian (c.700,000 to 110,000 BP).
- Post-Devensian (c.13,500 to 6,000 BP).

The known submerged prehistoric archaeology of the MAREA study area is sparse, with the exception of a relatively small number of sites and finds.

The effects of sea level fluctuations and the numerous glacial and marine transgressions and regressions have at times caused the floor of the North Sea to be dry and outside the limits of the ice. During these periods, an inhabitable environment may have been exposed in the MAREA scoping study area which was suitable for human exploitation.

Three major glaciations are known to have taken place since the date of the earliest record of human activity in Britain (c.700,000 BP); the Anglian glacial (478,000 to 423,000 BP), the Wolstonian glacial (380,000 to 130,000 BP) and the Devensian glacial (110,000 to 13,500 BP), and it is assumed that the study area was covered by ice during each of these glacial episodes. It has long been suggested that any archaeological deposit which was subsequently covered by an ice sheet would be completely destroyed and scattered¹. Consequently there is a limited potential for Pre-Devensian and Devensian archaeological sites and artefacts to remain *in situ* within the MAREA scoping study area, although the

potential remains for the presence of derived artefacts which were transported by the Devensian ice sheet.

Following the retreat of the Devensian ice sheet (c.13,500 BP), the climate began to ameliorate. Before its inundation in the Late Mesolithic (c.7,000 BP) the study area would have provided a temperate environment in which human activity may have occurred. There is thus the potential for both *in situ* and derived Post-Devensian archaeological material to be present within the MAREA scoping study area.

Maritime Archaeology

The known maritime resource (i.e. sites that have been located on the seabed) within the MAREA scoping study area is predominantly derived from United Kingdom Hydrographic Office (UKHO) records, although the National Monuments Record (NMR) and the relevant Historic Environment Records (HERs) may also hold some records of known sites. In these records there will be a bias towards vessels dating from the 19th century onwards due largely to the higher potential for structures of ferrous material to be identified on the seabed through geophysical survey. Consequently, the potential for maritime sites within the Humber MAREA study area cannot be reliably quantified based on the known maritime resource alone.

The potential maritime resource is partly based on reported shipping casualties and is compiled within the database held by the NMR. However, prior to the advent of the Lloyds list of shipping casualties in 1741, there was no official record of ship losses. As such the record of shipping casualties, including that held by the NMR, is biased towards wrecking incidents which occurred from the mid-18th century onwards.

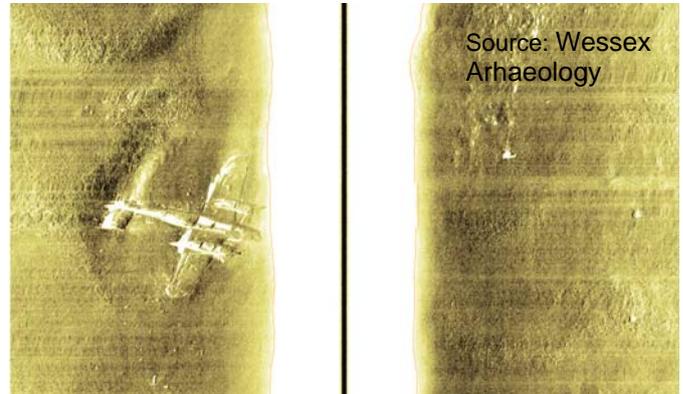
There is the potential for the remains of watercraft dating from the Mesolithic period onwards within the MAREA scoping study area.

Aviation Archaeology

Since the advent of powered human flight in the early 20th century, thousands of military and civilian aircraft have been lost around the UK. Although records of aircraft losses at sea are extensive, data regarding the physical location of their remains is limited. Records of known aircraft crash sites are predominantly held by the UKHO. There is no single definitive list of aircraft losses in UK territorial waters. The NMR lists records relating to aircraft crash sites as Named

Locations, comprising aircraft that are known to have crashed at sea, but for which there are currently no known remains on the seabed.

The physical remains of any aircraft which crashed while in military service are automatically protected by the Protection of Military Remains Act (1986).



Data Gaps and Recommendations based on Current Knowledge

A desk-based assessment will be undertaken to review all the existing archaeological and cultural heritage records and documents available for the MAREA study Area. Secondary data sources of prehistoric, maritime and aviation archaeology relevant to the MAREA study area and the wider Humber and Greater Wash Region will be reviewed to supplement known data.

With the exception of a relatively small number of sites and finds, the known submerged prehistoric archaeology of the MAREA study area is sparse. Terrestrial records will therefore be used to describe the potential for prehistoric archaeology within the adjacent offshore extent of the study area.

Potential sites of both maritime and aviation archaeology are also sparse. The potential for maritime sites within the Humber MAREA study area will be estimated from records of known wreck sites, recorded losses and knowledge of historic shipping patterns.

During the full MAREA the aircraft losses listed by the NMR will be reviewed against the records of WWII Air/Sea Rescue operations in the vicinity of the Humber MAREA study area to provide an assessment of the potential for aircraft crash sites within the region. This will be further supplemented by a review of secondary sources relating to aviation activity within the MAREA study area.

Maps will be provided illustrating any locations of known archaeological interest within the MAREA study area.



Humber and Greater Wash MAREA-Scoping Stage

11. SHIPPING AND NAVIGATION

Potential Information Sources Currently Identified for the MAREA:

- Admiralty charts and publications.
- Seazone Hydrospatial will be used as the primary baseline database.
- Associated British Ports (ABP) website <http://www.abports.co.uk/>.
- Passage plans obtained from Ship Operators.
- Consultation with local ports and pilots.
- AIS survey data for the region.
- Fisheries data (overflight and satellite data).
- Recreational activity data from RYA.
- Historical shipping accident data for region.

Ports

There are a number of ports along the coasts of Norfolk, Lincolnshire and East Riding of Yorkshire varying in size from small fishing ports to busy commercial ports. The five key ports in the MAREA study area are the Ports of Immingham, Hull, Grimsby, Goole and King's Lynn.



Associated British Ports (ABP) operates all of these ports and as the Harbour and Pilotage Authority, manages the navigational safety of the Humber Estuary and the rivers Ouse, Trent and the Humber. The management of safety navigation in The Wash is the responsibility of the King's Lynn Conservancy Board Port and Pilotage Authority.

Immingham is the largest port in the area and Immingham, Grimsby and Killingholme, are the UK's largest port group by tonnage (66.3 Mt)¹. Traffic on the River Humber totalled 92.9 million tonnes in 2007. The leading ports by tonnage are Grimsby & Immingham (71 %), Hull (13 %) and wharves on the Rivers Hull and Humber (10 %)¹.

At the present time there are no known plans or proposals for expansion of ports in the Humber MAREA area.

Navigation

The River Humber is the busiest estuary in the UK with approximately 40,000 vessel movements per year. Vessels contributing to this total include regular movements by cargo vessels, ferries, tankers as well as cruise ships, fishing vessels and dredgers.

Traffic in the region has increased by nearly 40 percent between 2005 and 2007¹. The density of yachting and pleasure craft activity fluctuates seasonally. Shipping traffic to and from the ports in the Humber Estuary and The Wash passes through the MAREA study area. Some of the world's busiest shipping lanes are found in this region with merchant vessels accounting for the majority of the vessels

using the area, followed by tankers. In addition to the ports previously mentioned, traffic associated with east coast ports such as Tees and Forth also pass through the area.

Ferries connecting the east coast of England to the Netherlands and Belgium run directly through the of the Humber MAREA study area on a daily basis. Ferries running from Newcastle to Amsterdam pass along the eastern boundary of the study area.

The main navigational feature in the Humber MAREA study area is the Humber Traffic Separation Scheme (TSS), which lies close to the mouth of the Humber. The TSS is an internationally recognized routing measure established by the International Maritime Organisation (IMO) in 2001, with the aim of separating opposing streams of shipping traffic and reducing the likelihood of ship-to-ship encounters and hence collisions.

The TSS has three sets of traffic lanes:

- Northeast approaches via New Sand Hole.
- Eastern approaches via Sea Reach.
- Southeast approaches via Rosse Reach.

The three sets of lanes converge in a Precautionary Area centred 5 miles east - southeast of Spurn Head (where pilots normally board), and all traffic is then routed via a single TSS west and northwest into the River Humber. Pilotage is compulsory for vessels over 60 m in length and all vessels carrying dangerous substances in bulk. The New Sand Hole TSS is due to be extended by 1.8' to the NE from 1st July 2009 and the Humber Deep Water Anchorage will be realigned and extended.

The statutory harbour authorities for the ports (eg ABP) in the area are responsible for navigational



safety to and from the ports. Maintenance dredging campaigns are periodically carried out to ensure water depths are sufficient to allow vessels to navigate and manoeuvre safely. Deepening of navigational channels may also be carried out in the area.

Navigational Hazards

There are numerous navigational hazards that exist within the Humber MAREA study area. These include ship wrecks on the seafloor, oil and gas infrastructure such as pipelines and associated wellheads.

Ship wrecks are found throughout the study area with densities increasing in areas of increased vessel traffic ie near the Humber TSS.

Offshore installations associated with the oil and gas industry are plentiful in the Greater Wash area. Pipelines used for the transportation of oil, gas and chemicals are found throughout the study area. Wellheads are in abundance in the region, particularly in the north and north east of the scoping study area.

There are also a number of approved and planned offshore wind farms within the study area. This includes developments in close proximity to the Humber Estuary (Humber Gateway & Westernmost Rough) as well as those off the Lincolnshire coast (Lynn, Inner Dowsing & Lincs) and further offshore at Docking Shoal, Race Bank and Triton Knoll.

In addition an RAF bombing range is in use at Donna Nook located on the Lincolnshire coast to the west of the study area. The study area is located within the area covered by the Air Defence Radars at Staxton Wold near Scarborough, north Yorkshire.

Navigation aids are found throughout the MAREA study area around potential hazardous features.

Data Gaps and Recommendations based on Current Knowledge

A desk based review of the existing activities relating to shipping and navigation will be undertaken using the data sources discussed above. The existing risk levels for the region will be established with an assessment of the future risks associated with the proposed dredging activities in the area. The overall impact on navigation in the region will then be quantified.



Humber and Greater Wash MAREA- Scoping Stage

12. OFFSHORE DEVELOPMENTS

Potential information sources currently identified for the MAREA:

- Environmental Impact Assessments for pipelines and Round 1 and 2 wind farms.
- The British Wind Energy Association.
- The Department of Energy and Climate Changes report: UK Offshore Energy Strategic Environmental Assessment, January 2009.
- Round 3 offshore wind proposed development zones.
- SEA reports 2 and 3 for North Sea Oil and Gas.
- Seazone Hydrosatial database and UK Deal database (www.ukdeal.co.uk).

Currently, there are two operational OWFs in the area: the Lynn and the Inner Dowsing OWFs (total 57 turbines). These are adjacent to one another in the south west of the study area and first supplied power to the National Grid in May 2008. The Inner Dowsing site is not fully operational at present and is currently undergoing final pre-commissioning.

Approval for construction has also been granted to Cromer OWF although the application was subsequently withdrawn. A significant number of additional Round 2 offshore wind farms are proposed for The Wash area, and the status of each is shown in Table 1 overleaf.

These proposed wind farm sites are all located within the Humber MAREA study area, directly adjacent to dredging areas or up to distances of 25 km away.

Three of the potential Round 3 zones identified by the Crown Estate are within, the southern north sea MAREA study area: Dogger, Hornsea and Norfolk. The exact positions of these development zones are likely be refined as a result of the UK Offshore Energy Strategic Environmental Assessment Report and consultation feedback on it.

Offshore Wind Farms

There are a number of proposed and existing offshore wind farms (OWFs) within the Humber MAREA study area (Figure 1).

Figure 1: Offshore wind farms and pipelines in the study area

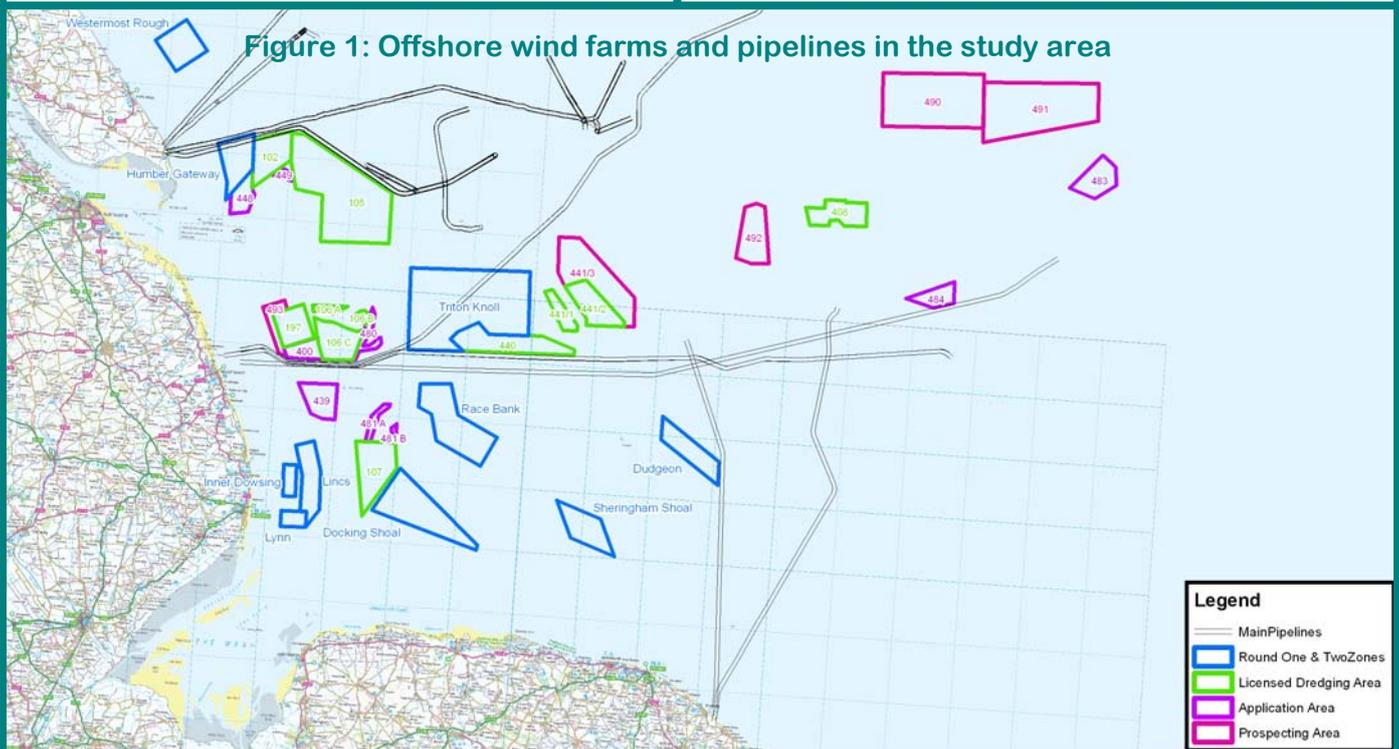


Table 1 Round 2 Offshore Wind Farms

Wind Farm	Status
Docking Shoal	Application Submitted
Dudgeon East	Application Submitted
Humber Gateway	Application Submitted
Inner Dowsing	Under construction
Lincs	Approved
Lynn	Under construction
Race Bank	Application Submitted
Sherringham Shoal	Approved
Triton Knoll	Pre-application
Westermost Rough	Pre-application



Oil and Gas Infrastructure

The Greater Wash area is a very important area in terms of gas exploration and exploitation. There are a number of oil and chemical pipelines passing through the MAREA study area. The main pipelines present are detailed in Table 2.

Many of these pipelines pass relatively close to the dredging extraction areas, and some lie within the boundaries of them eg. Viking to Mablethorpe passes through Area 484.

Wellheads are in abundance particularly in the north and north east of the study area, within or in close proximity to several dredging areas.

Table 2 Existing Gas and Chemical Pipelines

Name	Type	Operator
Amethyst to Easington	Gas	Britoil/BP
West Sole to Easington	Gas	British Petroleum
West Sole to Easington	Gas	British Petroleum
Rough to Easington	Gas	British Gas
Rough to Easington	Gas	British Gas
Murdoch to Theddlethorpe	Gas	Conoco
Loggs to Mablethorpe	Gas	Conoco
Viking to Mablethorpe	Gas	Conoco
Lancelot to Bacton	Gas	Phillips
Clipper Point to Bacton	Chemical	Shell UK E&P

Cables

Submarine cables are known to exist in the MAREA study area. These are associated with the oil and gas and energy industry. The main submarine cable of note extends from Sherringham to the north east of the dredging areas.



Source: Nord Stream AG

Military Activity

The study area is located within the area covered by the Air Defence Radars at Staxton Wold near Scarborough, north Yorkshire. An RAF bombing range is in use at Donna Nook located on the Lincolnshire coast to the west of the Humber MAREA scoping study area. This is used for target practise on weekdays and some winter evenings.

Data Gaps and Recommendations based on Current Knowledge

A desk-based assessment of proposed and existing developments in the MAREA study area such as offshore wind farms, pipelines other oil or gas related infrastructure and military operations will be carried out. Spatial distributions of these operations or facilities will be illustrated in respect of their proximity to the MAREA dredging areas and potential in-combination impacts will be identified as part of the MAREA.



Humber and Greater Wash MAREA- Scoping Stage

13. MARINE RECREATION AND COASTAL TOURISM

Potential Information Sources Currently Identified for the MAREA:

- JNCC Coastal Directories Project: Coasts and Seas of the United Kingdom.
- East of England Tourist Board.
- ENCAMS Seaside Awards.
- Blue Flag Campaign.
- Defra Digest of Environmental Statistics – Coastal and Marine Waters.
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- RYA and Cruising Association report 'Sharing the Wind: Recreational Boating in the Off-shore Wind Farm Strategic Areas'.
- Royal Yachting Association (RYA) GIS Atlas

Introduction

A range of recreational activities take place in the MAREA scoping study area and have a significant input into the local economy. These activities include yachting and boating, coastal tourism, watersports, sea angling and scuba diving.

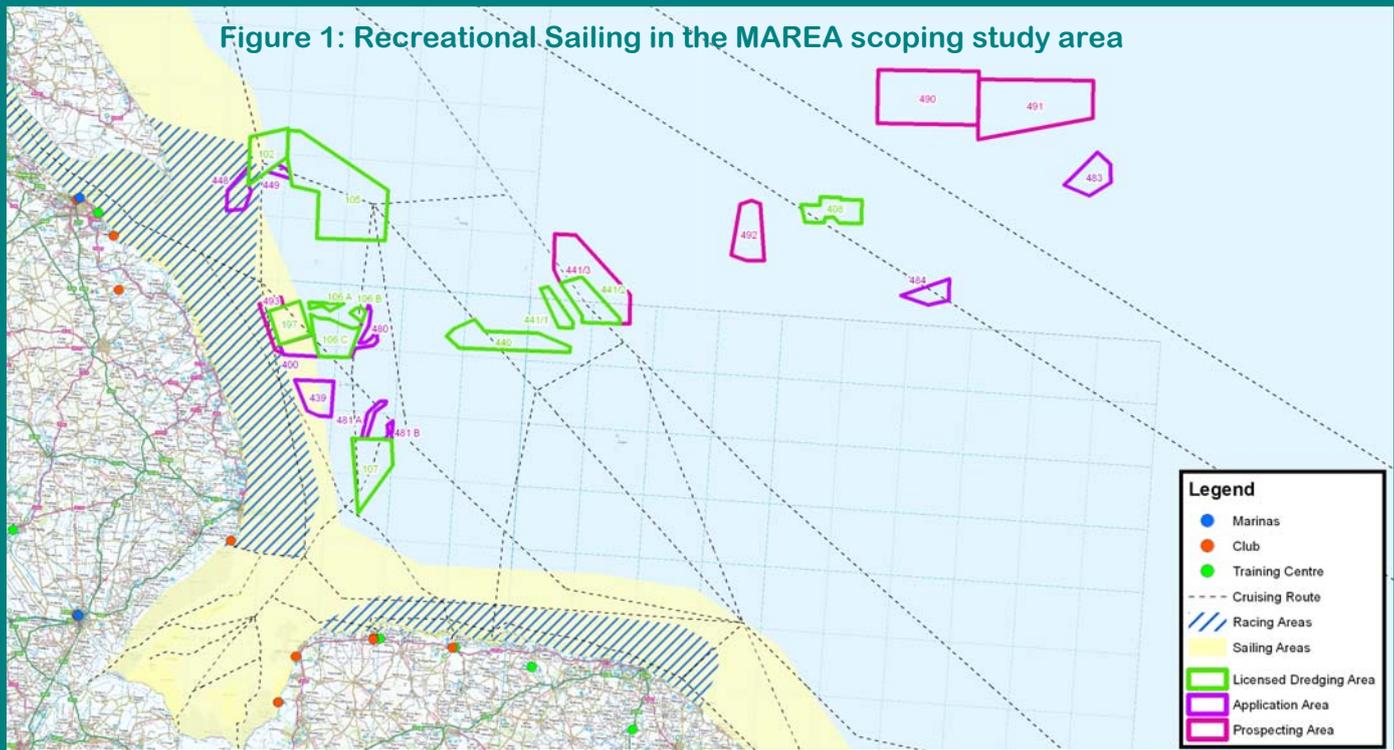
Yachting and Boating

There is a moderate level of recreational yachting and boating within the Humber and Greater Wash region, particularly in inshore areas.

There are considerable areas within the inshore Wash area and inshore along the Lincolnshire, Norfolk and Holderness coasts, that are described as 'general sailing areas' and racing areas by the Royal Yachting Association (RYA) as shown in Figure 1.

The North Norfolk coast is particularly popular with dinghy sailors and windsurfers and the region's coastal tourist resorts are notable on a national scale. However, the rough weather and lack of a weather and tide-safe port do limit recreational boating and yachting activity.

Figure 1: Recreational Sailing in the MAREA scoping study area



Coastal Tourism

Over the last 30 years infrastructure developments have taken place along the coast to support the recreational sector, including marinas, yacht moorings, dinghy parks and launching slips. Tourism in Lincolnshire and Norfolk is mostly based around small towns and villages and the study area boasts a number of seaside resorts including Bridlington, Cleethorpes, Mablethorpe, Skegness, Hunstanton, Sheringham, Cromer and Great Yarmouth.

Three beaches on the north Norfolk coast have been awarded Blue Flags; Cromer, Jubilee Beach and Mundesley. The Blue Flag is a prestigious international award scheme for sites which have achieved the highest standard in terms of water quality, facilities, safety, environmental education and management.

The coastline is also important for the wildlife tourism industry. Boat trips are available for tourists from Bridlington to Flamborough Head and Bempton RSPB Nature Reserve, and many visitors take trips to see the birds and seals at Blakeney Point and Scolt Head Island.



Marine Recreation and Watersports

Hunstanton on the Norfolk coast at the mouth of the inner Wash is a nationally important venue for power-boating and waterskiing is also popular; the town hosted the International Water Ski Championships in 2005.

A number of other marine recreational activities are known to occur in the MAREA scoping study region, including scuba diving and sea angling. Scuba diving is popular at wreck sites, particularly several in the north of the area, while sea angling takes place from the shoreline and by boat from the Yorkshire, Lincolnshire and Norfolk coasts. Bridlington in particular is important for boat-based sea angling, and there are two boat compounds at Bridlington south shore containing over 70 privately owned boats, which are used primarily for recreational sea angling.

Data Gaps and Recommendations based on Current Knowledge

A desk-based assessment of the recreational activity in the region will be undertaken using the data sources listed. Spatial distributions of recreational facilities and their use will be mapped and where possible seasonality for each activity will be identified.

The Royal Yachting Association will be consulted with regard to recreational boating and sailing activity in the region and it is hoped that the Cruising Association and the Royal Ocean Racing Club may be able to provide additional information that will inform the MAREA. The British Sub-Aqua Club will be invited to provide information on the extent to which the area is used by scuba divers.



Humber and Greater Wash MAREA- Scoping Stage

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Glossary of Technical Terms using in Scoping Pack Sheets

Amphipods: (Phylum Arthropoda, Class Malacostraca, Order Amphipoda) are small, shrimp-like crustaceans recognised by their laterally compressed bodies, lack of a carapace, and numerous, differently modified legs.

Benthic: The ecological zone at the lowest level of the water column including the surface layer of sediment.

Bivalves: (Phylum Mollusca, Class Bivalvia) are organisms with a shell consisting of two lateral plates or valves, joined together at the hinge by a ligament. Examples include mussels, clams etc.

Circalittoral: The subzone of the rocky sublittoral (see below) that is below the infralittoral and is dominated by animals.

Crustaceans: (Phylum Arthropoda, Sub-phylum Crustacea) are organisms characterised by having a hard outer shell and jointed appendages and usually live in the water and breathe through gills. They include lobsters, crabs, shrimps, and barnacles.

Demersal: The part of the water column that is near to the seabed and the benthos. Demersal fish are those that feed on organisms on or near the seabed.

Echinoderms: (Phylum Echinodermata) are invertebrate marine organisms usually characterised by a five-fold symmetry. Examples include: sea urchins and starfish.

Epibenthic: Organisms living on the surface of the seabed.

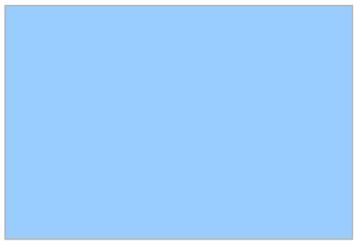
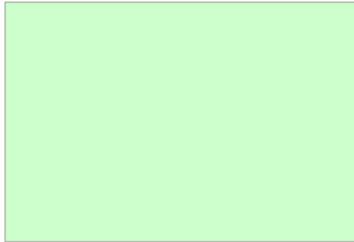
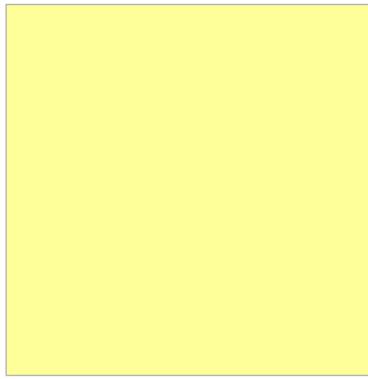
Infaunal: Benthic organisms which live within the seabed.

Infralittoral: A subzone of the sublittoral (see below) in which upward-facing rocks are dominated by algae, typically kelps.

Pelagic: The ecological zone in the open water column containing organisms that are not closely associated with the seabed.

Polychaetes: (Phylum Annelida, Class Polychaeta) are truly segmented worms, mostly marine, and are characterized by extensions of each segment with numerous bristles projecting from them.

Sublittoral: Zone exposed to air only at its upper limit by the lowest spring tides.



Marine Aggregate Regional Environmental Assessment Scoping Report

Humber and Greater Wash Region

April 2010

Humber Aggregate Dredging Association

Marine Aggregate Regional Environmental Assessment Scoping Report: Humber and Greater Wash Region

April 2010

For and on behalf of
Environmental Resources Management

Approved by: Kevin Murphy

Signed: 

Position: Partner

Date: 20 April 2010

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1 INTRODUCTION

1.1 PURPOSE OF THIS DOCUMENT

This document is the Scoping Report for a Marine Aggregates Regional Environmental Assessment (MAREA) for the Humber and Greater Wash Region. The Scoping Report provides information and, based on initial studies and consultation, sets out the key issues and proposed approach for undertaking the MAREA.

1.2 THE NEED FOR MARINE AGGREGATES

Marine aggregates are a vital source of sand and gravel used by the construction industry (eg for construction of housing, schools etc). Marine aggregates are also used in beach replenishment schemes to provide coastal protection, and for contract fill (eg civil engineering projects).

The majority of aggregate comes from land-based sources but since the 1960s developers have been increasingly reliant on marine sources to supplement demand and meet the UK's construction needs. Since then, aggregate extraction has been occurring in many areas of the UK continental shelf, including the Humber and Greater Wash region. Recent production of construction aggregate from the region varies annually and during 2009, 2.52 million tonnes were dredged. This constitutes around 12% of the total produced annually from the UK continental shelf (The Crown Estate, 2010).

Some of the production licences of the dredging areas are due for renewal, and some new applications will be submitted in the coming years to allow extraction of aggregates to continue. In preparation for this, the Humber Aggregate Dredging Association (HADA) has decided to undertake a Marine Aggregates Regional Environmental Assessment (MAREA) to inform and support the industry's applications.

1.3 INTERACTIONS BETWEEN MARINE AGGREGATES AND OTHER SEA USERS

In recognition of the potential for cumulative impacts of dredging in these areas and the potential for in-combination effects on the environment with other users such as wind farms, fishing, navigation channels and coastal protection, the marine aggregate dredging industry is undertaking a MAREA. This is a voluntary exercise that is being led by the Humber Aggregate Dredging Association (HADA).

HADA is an association of the following six marine aggregate extraction companies which each have licence areas, application areas and/or prospecting areas in the Humber and Greater Wash region:

- CEMEX UK Marine Ltd;
- DEME Building Materials Ltd;
- Hanson Aggregates Marine Ltd;
- Tarmac Marine Dredging Ltd;
- Van Oord UK Ltd; and
- Westminster Gravels Ltd.

1.4 WHAT IS A MARINE AGGREGATE REGIONAL ENVIRONMENTAL ASSESSMENT?

A Marine Aggregate Regional Environmental Assessment (MAREA) is a voluntary exercise, endorsed by the British Marine Aggregates Producers Association (BMAPA), The Crown Estate and the Marine Management Organisation (formerly Marine and Fisheries Agency). Even though the MAREA process is non-statutory, guidance has been provided by the Regulatory Advisors Group (RAG), which includes members of Natural England, Cefas, JNCC and English Heritage.

The main objectives of a MAREA are to describe the regional baseline characteristics in an area with several marine aggregate licence areas and to evaluate the potential cumulative and in-combination effects of all the existing and planned future dredging operations.

As part of the planning process, Environmental Impact Assessments (EIA) will still be carried out for individual licence applications. However the MAREA will allow the EIAs to be considered in a regional context and therefore allow a better understanding of the interaction with the surrounding environment and other sea users.

The first MAREA was completed in 2003 for the East Channel Region. Since this early study, guidance for MAREA has been provided by the Regulatory Advisors Group (see *Box 1.1*). The MAREA approach has been further developed during a number of similar studies that are currently underway for other marine aggregate areas in the UK: the Thames, South Coast and Anglian regions.

Box 1.1 MAREA Guidance

The informal framework for MAREAs is set out by the Regulatory Advisors Group (RAG) framework document (RAG, 2008) which provides guidance and recommendations for the approach, whilst recognising the non-statutory and industry-led nature of the MAREA process. The RAG document was developed following a series of workshops with industry representatives, RAG and stakeholders (RAG, 2007).

The document provides topic-specific guidance on nature conservation, coastal processes, marine ecology, fisheries and historical environment components of the MAREA. It provides additional information regarding key issues to consider during the MAREA process. The RAG Guidance document is provided in *Annex A* of this scoping report.

The remainder of this report comprises the following sections:

Section 2: Dredging in the Humber and Greater Wash Region. This section describes the history of dredging in the region, describes the licence areas and licence application areas that will be covered by the MAREA, together with an overview of current dredging techniques.

Section 3: Approach and Methodology. This section provides a summary of the MAREA process, of which this scoping study is the first step. It then provides a more detailed description of the approach taken within this scoping study and the feedback that was received during the scoping consultation period.

Section 4: Existing Environment in the Humber and Greater Wash Region. This section presents a brief overview of the current baseline understanding and key issues for each of the topic areas that have been identified for the full MAREA, based on the findings of the initial literature review and the feedback received during the consultation period. It then presents an initial list of information sources for each topic and identifies the potential impacts of aggregate extraction that are of concern.

Section 5: Terms of Reference for the Full MAREA. This section presents the terms of reference that will be applied during the full MAREA to ensure that the concerns and questions raised during the scoping study are adequately addressed. This section defines the study area that should be used for the full MAREA and presents a scoping matrix which shows the receptors that must be considered within the Humber and Greater Wash MAREA and the aspects of marine aggregate dredging that have the potential to affect them. It also outlines the proposed approach to specific studies and consultation for individual topics that should be undertaken to inform the MAREA.

Section 6: References. This provides a list of documents and datasets that have been cited within this scoping report. It does not include all of the information sources for the full MAREA that have been identified for individual topics in *Section 4*.

Annex A. Guidance Documents for Marine Aggregate Regional Environmental Assessment.

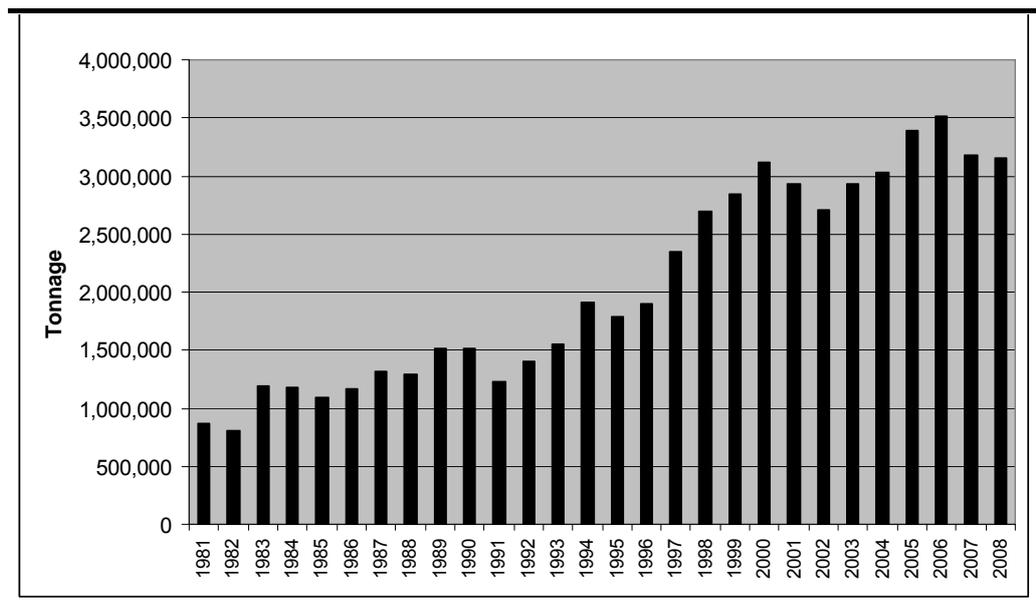
Annex B. Proposed List of Consultees for the Humber and Greater Wash MAREA.

2.1 HISTORY OF DREDGING IN THE HUMBER AND GREATER WASH REGION

Dredging has taken place in the Humber and Greater Wash Region since the 1960s and several of the licence areas that are included within this MAREA have been dredged for a number of decades. Licence renewals are being sought for a number of these licence areas. Almost all of the area licensed in the region is more than six nautical miles from the coast, with much of it being more than 12 nautical miles offshore.

Figure 2.1 shows the total annual tonnage extracted from the region between 1981 and 2008 (Glendinning, 2009). In contrast to this generally increasing trend, it is interesting to note that the area of 'new' (previously un-dredged) seabed that is dredged each year decreased significantly during the period 1998 to 2007, from approximately 19 km² in 1999 to 0.75 km² in 2007 (The Crown Estate and BMAPA, 2008).

Figure 2.1 *Annual Aggregate Tonnage Extracted from Humber and Greater Wash Region Between 1981 and 2008*



Source: Glendinning, 2009. The Crown Estate statistics

While the total tonnage extracted has generally increased over this time period, the total area of seabed that is licensed for aggregate extraction and the total area of seabed that is dredged have decreased in recent years (The Crown Estate and BMAPA, 2008). This reduction is due to a combination of companies relinquishing licence areas or parts of their licence areas, and also using improved survey techniques and geological understanding to enable smaller parts of the seabed to be licensed and dredged. The relinquished areas are predominantly located in the northwest part of the study area, off the Humber Estuary and the coasts of East Riding of Yorkshire and North

Lincolnshire. Parts of licence area 408 in the northeast of the study area were also relinquished. These are shown in *Figure 2.2* along with the areas that are currently licensed.

2.2 CURRENT AND PROPOSED ACTIVITIES IN THE HUMBER AND GREATER WASH REGION

The MAREA scoping study area for the Humber and Greater Wash region is shown in *Figure 2.3*. It includes 10 active marine aggregate extraction licences plus 6 application areas and 5 prospecting areas. *Table 2.1* shows the present status of each of the licence areas in the Humber and Greater Wash region.

Table 2.1 Status of Dredging Areas in the MAREA Scoping Study Area*

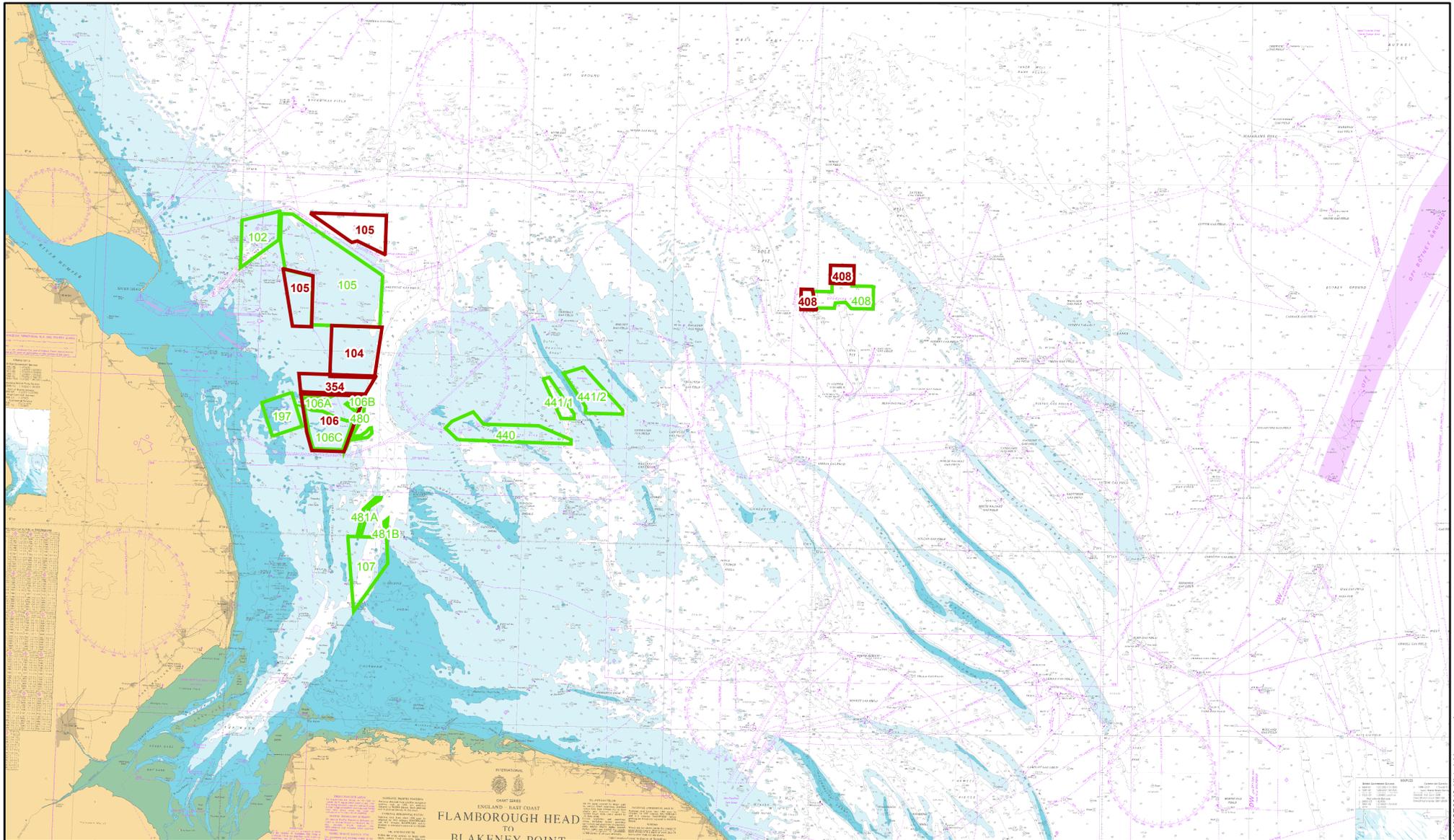
Licence Area	Current Status*	Operational Companies
102	Active licensed dredging area	CEMEX UK Marine Ltd.
105	Active licensed dredging area	CEMEX UK Marine Ltd.
106 A, 106 B, 106 C **	Active licensed dredging area	Hanson Aggregates Marine Ltd.
107	Active licensed dredging area	CEMEX UK Marine Ltd.
197	Active licensed dredging area	Tarmac Marine Dredging Ltd..
400	Application area	Hanson Aggregates Marine Ltd.
408	Active licensed dredging area	Hanson Aggregates Marine Ltd.
439	Application area	Hanson Aggregates Marine Ltd.
440	Active licensed dredging area	Westminster Gravels Ltd.
441 /1, 441 /2	Active licensed dredging area	Westminster Gravels Ltd.
441 /3	Application area	Westminster Gravels Ltd.
448	Application area	CEMEX UK Marine Ltd.
449	Application area	CEMEX UK Marine Ltd.
480	Active licensed dredging area	Hanson Aggregates Marine Ltd.
481 A, 481 B **	Active licensed dredging area	Tarmac Marine Dredging Ltd. and Van Oord UK Ltd.
483	Application area	DEME Building Materials Ltd.
484	Application area	DEME Building Materials Ltd.
490 and 491***	Application area	DEME Building Materials Ltd.
492	Application area	Hanson Aggregates Marine Ltd.
493	Application area	Tarmac Marine Dredging Ltd.

* Licence area status correct as of 19th April 2010.

** Prior to finalisation of this Scoping Report, Areas 106 A, B and C and 481 A and B formally changed name to Areas 106/1, /2 and /3 and 481/1 and /2 respectively. For the purposes of this report the former names have been used.

*** Areas 490 and 491 have recently been combined and are now known as Application Area 506. For the purposes of this report the areas are referred to as 490 and 491 as scoping stage consultation took place using these reference numbers.

During the scoping of the Humber and Greater Wash MAREA a key consideration has been that some of the licence areas are within the 12 nautical mile limit (approx 20 km offshore), while others are up to 150 km offshore in the southern North Sea. The large size of the study area means that environmental and socioeconomic features and sensitivities vary considerably within the region, as described in *Section 4*, and different aspects of dredging operations have the potential to impact different areas.



KEY:

- Surrendered Area
- Licence Area

0 20
Kilometres

CLIENT: **Humber Aggregate Dredging Association**

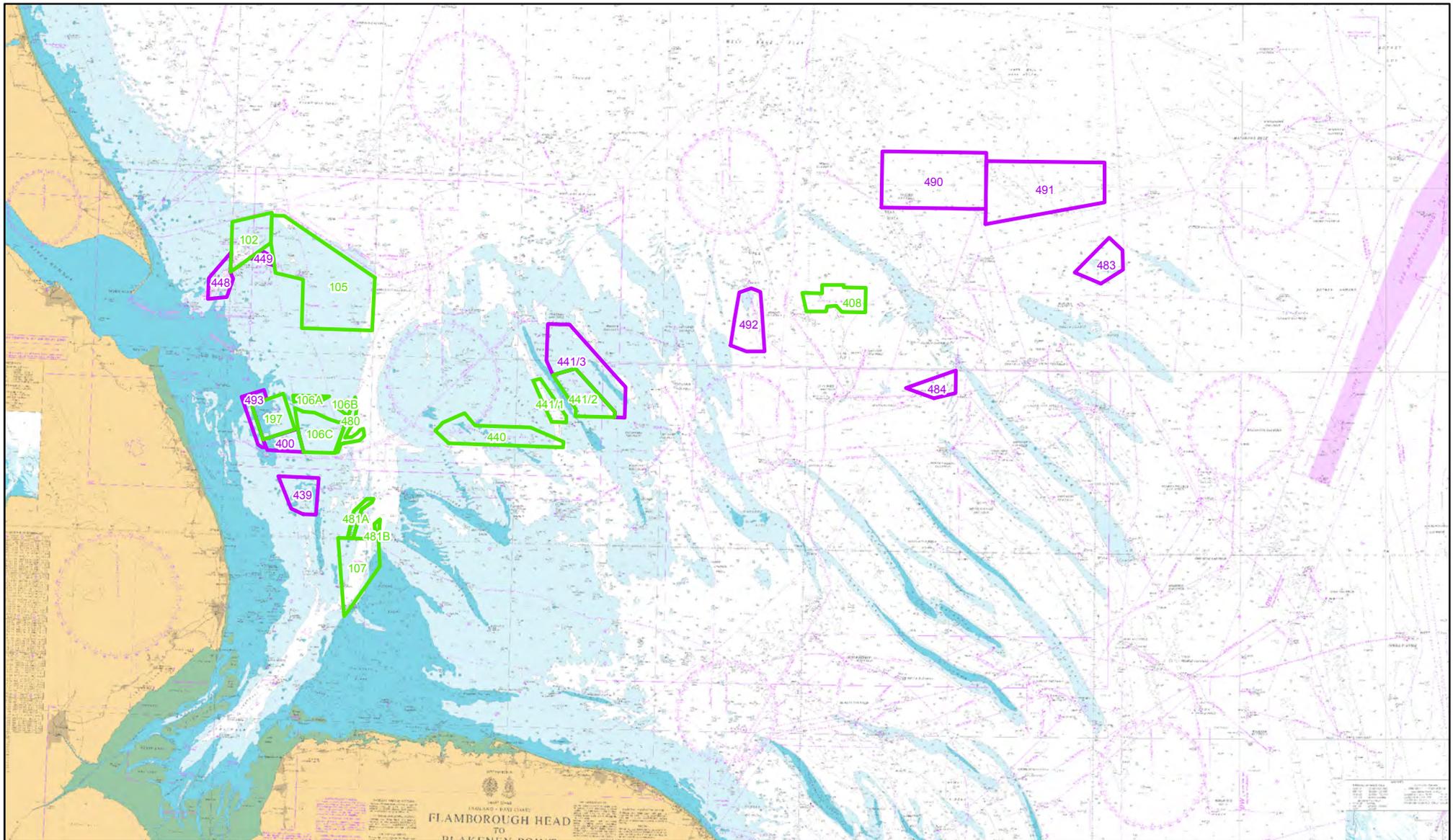
ERM
Eaton House
Wallbrook Court
North Hinksey Lane
Oxford, OX2 0QS
Tel: 01865 384800
Fax: 01865 204982

SOURCE: Copyright HMSO Admiralty Charts, Crown Estate.
PROJECTION: WGS 1984 UTM Zone 31N

SIZE: **A4**

TITLE: **Figure 2.2
Licensed and surrendered
Areas**

DATE: 22/04/2010	CHECKED: HV	PROJECT: 0098617
DRAWN: KM	APPROVED:	SCALE: As Scale Bar
DRAWING: SR0310_HistoricLicence.mxd		REV: 0



KEY:

- Licence Area
- Application Area

0 20

Kilometres

CLIENT: **Humber Aggregate Dredging Association**

SIZE: **A4**

ERM
 Eaton House
 Wallbrook Court
 North Hinksey Lane
 Oxford, OX2 0QS
 Tel: 01865 384800
 Fax: 01865 204982

SOURCE: Reproduced from Ordnance Survey digital map data. © Crown copyright. All rights reserved. 2009 License number 0100031673.
 PROJECTION: WGS 1984 UTM Zone 31N

TITLE: **Figure 2.3
Licence Areas in the MAREA
Scoping Study Area**

DATE: 26/03/2010	CHECKED: HV	PROJECT: 0098617
DRAWN: FS	APPROVED:	SCALE: As Scale Bar
DRAWING: SR0310_StudyArea.mxd		REV: 0

There are two techniques for the extraction of marine sand and gravel: static dredging and trailer dredging. The former normally involves a vessel anchoring over a deposit and is effective in working thick, localised reserves. Trailer dredging requires the dredger to trail its pipe along the seabed at speeds of up to 1.5 knots and is adopted for working thinner and more extensive deposits (BMAPA, 2009). Trailer dredging is the only method currently used in the Humber and Greater Wash region.

In many cases, the vessel will retain all the sediment dredged but on some occasions vessels may process the dredged sediment using a technique termed 'screening' in order to alter the ratio of sand to gravel retained onboard to meet market specifications. To increase the gravel content of the cargo, dredged material passes over a mesh screen before entering the cargo hopper; a proportion of the water and finer sediment falls through the screens and is returned to sea, while the coarser sediment is retained. This process can also be reversed to discharge the larger particles and load sand-only cargoes (BMAPA, 2009). The MAREA will consider the impacts of screening as well as those directly associated with the initial substrate removal.

Once the cargo hold of the dredger is full of sediment, the cargo gradually drains as the vessel steams to the wharf for unloading. Once the aggregate dredgers reach the wharf, they are able to self-discharge a dry cargo using a variety of techniques including bucket wheels, scrapers and wire-hoisted grabs (BMAPA, 2009).

3.1 OVERVIEW OF THE MAREA PROCESS

3.1.1 Step 1: Scoping Study

The objectives of the scoping phase of a MAREA are to identify data gaps and the significant issues of concern at an early stage in the MAREA process in order to focus the baseline data gathering and assessment. It also identifies those topics that are unlikely to require detailed assessment. In order to achieve these objectives a review and audit of available literature and data is initially undertaken, followed by consultation with key stakeholders, leading to production of the scoping report and terms of reference for the full MAREA. Section 3.2 provides more detail on the methodology used for the Humber and Greater Wash MAREA Scoping Study.

3.1.2 Step 2: Baseline Data Gathering and Specialist Studies

Following completion of the scoping phase, the next phase of the full MAREA will aim to provide information on the wider environmental and socioeconomic context of the study area through a combination of the following studies:

- Desk based literature searches and data reviews to integrate existing sources of information about the baseline characteristics of the region.
- Consultation with local groups and organisations that have specialist knowledge of certain topic areas.
- Field survey work to gather new baseline data or verify existing data.
- Specialist studies to predict potential changes to baseline conditions as a result of continued aggregate dredging.

3.1.3 Step 3: Cumulative and In-Combination Impact Assessment

The impacts on sensitive physical, biological and human receptors from the proposed dredging activities will be assessed cumulatively at a regional level in the MAREA. Potential in-combination impacts arising from interactions between the dredging sector and other offshore activities and developments such as wind farms and oil and gas infrastructure will also be identified.

A robust assessment methodology has been developed and applied for the MAREA's of the Thames Estuary and South Coast and this will be applied for the present work also.

The information presented within the final MAREA report will be used to inform site-specific EIA baseline studies, to identify areas of potential

environmental sensitivity and/or interaction with other marine users, and to identify any licence areas where a greater level of assessment may be required during licence-specific EIAs required for marine aggregate dredging applications.

3.2 *HUMBER AND GREATER WASH SCOPING STUDY APPROACH*

3.2.1 *Initial Information Review*

An initial literature review was undertaken in spring 2009 to provide a brief overview of the Humber and Greater Wash region within which the HADA licence areas lie, and to identify existing information sources that could inform the MAREA. The information gathered during the literature review was then incorporated into a Scoping Pack, comprising a series of 14 double sided topic-based information sheets and a proposed list of consultees.

3.2.2 *Dissemination of Information and Consultation*

The scoping packs were sent out in June 2009 to 74 consultees representing 68 different organisations. All consultees were invited to attend a scoping workshop at Lincoln Cathedral Centre on Monday 20th July 2009. Feedback was received from 34 consultees representing the 28 organisations or groups listed in *Box 3.1*.

Box 3.1 Organisations and Groups that Provided Responses during the Scoping Study

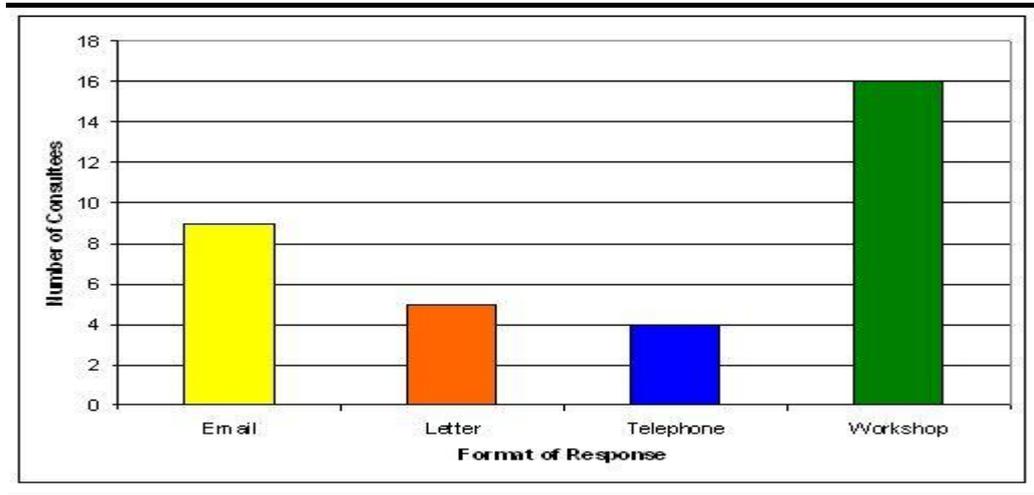
- ABP Humber;
- Centre for Environment, Fisheries and Aquaculture Science (Cefas);
- Chamber of Shipping;
- The Crown Estate;
- Department for Energy and Climate Change;
- East Riding of Yorkshire Council;
- English Heritage;
- Environment Agency;
- Greater Wash Fishermen's Association;
- Holderness Fishermen's representative;
- Hydrographic Office;
- International Dolphin Watch;
- Joint Nature Conservation Committee;
- Lincolnshire County Council;
- Lincolnshire Wildlife Trust;
- Marine Management Organisation (formerly Marine and Fisheries Agency);
- Maritime and Coastguard Agency;
- Natural England;
- Norfolk Coast AONB;
- North East Lincolnshire Council;
- North Eastern Sea Fisheries Committee;
- North Norfolk District Council;
- Residents of East Riding of Yorkshire;
- Royal Society for Protection of Birds;
- Trinity House;
- University of East Anglia;
- University of Hull; and
- Yorkshire Wildlife Trust.

3.2.3

Consultation Responses and Areas of Concern

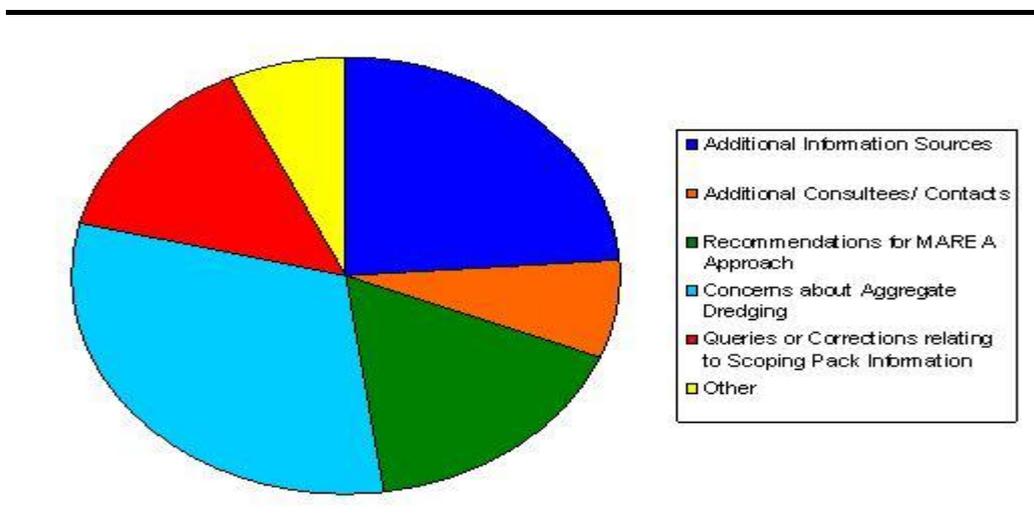
The greatest proportion of responses was received at the scoping workshop, with additional responses being provided by email, letter and telephone (the numbers of responses of each type are shown in *Figure 3.1*). In total, 40% of the organisations that were provided with a scoping pack provided comments to inform this scoping report and the full MAREA.

Figure 3.1 *Format of Consultation Responses Received during MAREA Scoping Study*



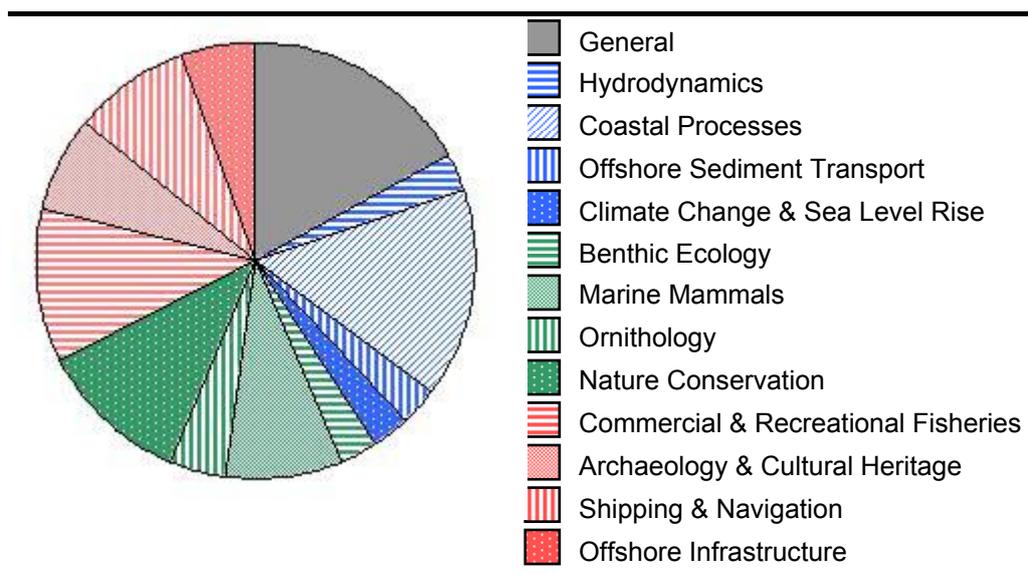
A breakdown of the type of responses received is shown in *Figure 3.2*. The highest percentage (31%) of responses came from consultees wishing to raise concerns about the potential impacts of existing or future dredging operations. The second most frequent type of response was suggestions for additional sources of information (24%). It should be noted that within their communications many consultees provided more than one type of response, for example explaining their concerns and then suggesting additional information sources, and each of these response types has been recorded separately within *Figure 3.2*.

Figure 3.2 *Breakdown of Consultee Responses by Type*



The responses described above could be broadly categorised into 13 different topics (Figure 3.3). Approximately 17% of responses were general comments about the MAREA process or the format of the scoping pack. The specific topic that received the highest number of comments was coastal processes, with approximately 16% of the total responses. Nature conservation and commercial and recreational fisheries also received relatively high numbers of responses. Overall, Figure 3.3 shows that the numbers of responses that were received in relation to the physical environment (blue), the biological environment (green) and the human environment (red) were fairly similar, at 24%, 27% and 32% of the total respectively.

Figure 3.3 Breakdown of Consultee Responses by Topic



The responses received during the consultation period have been incorporated into the appropriate topic areas within Section 4 of this scoping report. An updated account of the current baseline understanding for each topic area is presented, together with the key concerns about the potential impacts of aggregate dredging, an updated list of available information sources and an overview of the proposed approach to this topic within the full MAREA.

The feedback that was provided by consultees has been incorporated into the appropriate topic areas within Section 4 as follows:

- Queries and corrections about the information presented in the scoping pack have been addressed within *Regional Baseline Overview and Key Issues* sections.
- Concerns are identified within the *Regional Baseline Overview and Key Issues* and the *Potential Impacts of Aggregate Extraction* sections.
- Additional information sources for the MAREA are included within the *Information Sources* section.

- Additional contacts and consultees have been included within the consultee list in *Annex B*.
- Recommendations for the approach to specific topic areas are included in the *Proposed Approach* section.

4 *EXISTING ENVIRONMENT IN THE HUMBER AND GREATER WASH REGION*

4.1 *INTRODUCTION*

This chapter provides an overview of the environmental and socioeconomic features of the Humber and Greater Wash region. The Humber and Greater Wash region is generally a well studied region for which a large amount of data and local knowledge is already available. This section therefore draws on data from various sources, including published literature, the findings of previous studies conducted for projects in the region and feedback provided from specialists and local experts during consultation.

4.2 *PHYSICAL ENVIRONMENT*

4.2.1 *Introduction*

This section describes the physical environment of the Humber and Greater Wash region, including the hydrodynamic characteristics, sediment transport pathways and coastal processes. A glossary of technical terms used in this section is provided in **Box 4.1**.

Box 4.1 *Glossary of Technical Terms used in Physical Environment Baseline*

Amphidrome: A point within a tidal system where the tidal range is almost zero.

Bedform: A depositional feature on the bed of a river or other body of flowing water that is formed by the movement of bed material due to the flow. The shape of the surface of a bed of granular sediment, produced by the flow of air or water over the sediment.

Bedload: Particles of sand, gravel, or soil carried by the natural flow of a current on or immediately above its bed.

Ebb tide: The receding or outgoing tide. Tide passing from high to low.

Fetch: The horizontal distance over which wave-generating winds blow.

Flood tide: The advancing or incoming tide. Tide passing from low to high.

Glacial isostatic rebound: The rise of land masses following depression by glaciers when the glaciers have retreated.

Glacio-eustacy: Changes in sea level due to storage or release of water from glaciers.

Mean significant wave height: The average wave height (trough to crest) of the highest one-third of the waves in the wave spectrum.

Neap tide: This is when the tides are weakest and the lowest high tides occur. This occurs when the Moon and Sun are separated by 90° around the Earth.

Plume: Sediment that has been resuspended in the water column after disturbance.

Sediment sink: Physical processes in the coastal zone lead to the eventual deposition of sediment in new locations, or sinks. These can be low energy zones, such as harbours, tidal lagoons and offshore deep water, or natural barriers, such as headlands, breakwaters and jetties.

Sediment transport pathway: The pathway of sediment as it moves from a source to a 'sink'.

Semi-diurnal tides: Two tidal cycles in one day (two high tides and two low tides).

Spring tide: This is the strongest tide and when the highest high tides occur. This happens when the Moon and Sun are separated by 180° around the Earth.

Storm surge: Water that is pushed to shore as a result of an offshore rise of water associated with a low pressure weather system, high winds and high waves.

Thermal expansion: The dimensional expansion exhibited by solid, liquid or gas as a result of heating.

Tidal range: The vertical difference between the high tide and succeeding low tide.

Turbidity: The measure of the degree to which water loses transparency due to the presence of suspended particles.

4.2.2

Bathymetry and Hydrodynamics

Regional Baseline Overview and Key Issues

The Humber and Greater Wash MAREA scoping study area is relatively shallow, with most parts being less than 30 m deep, and generally not exceeding 50 m even in the offshore areas. There are a few areas where water depths exceed 50 m, most notably the Silver Pit (where water depths reach 75m), which is located immediately to the east of the relinquished area 354 and licence area 480. There are also a number of large intertidal or 'drying' areas, particularly around the Wash, the north coast of Norfolk and the north and south banks of the Humber estuary. Finally, sand banks have a large influence on the bathymetry of this region and areas less than 20 m deep occur as much as 100 km offshore in the east of the study area. *Figure 4.2* shows the bathymetry of the study area based on Seazone Hydrospatial data.

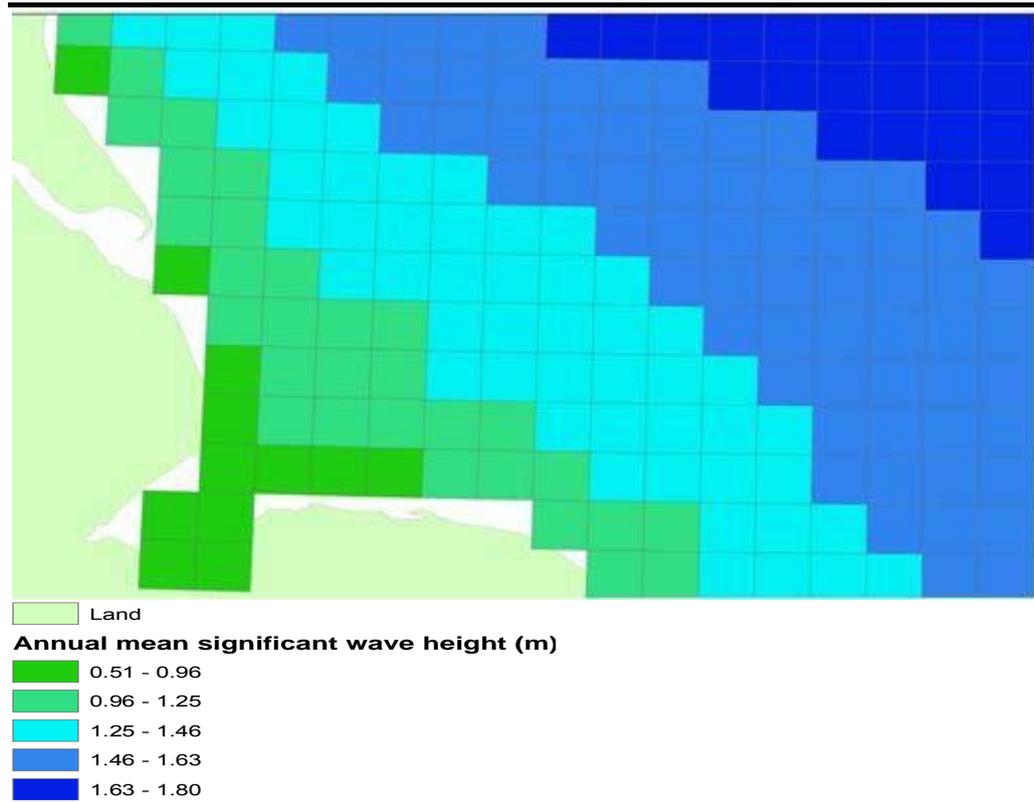
Within the Humber MAREA study area semi-diurnal tides (two per day) predominate. The Co-tidal Chart (5098) for the British Isles shows that a tidal amphidrome (a position with zero tidal influence) governs the tidal conditions in the Southern North Sea, with the tidal wave rotating anticlockwise. The flood tide therefore sweeps down the Holderness and Lincolnshire coast from north to south and across the North Norfolk Coast from west to east.

The tidal range increases with distance from the amphidrome leading to a mean spring tidal range of approximately 4 to 6 m along the north Norfolk coast (increasing in an east to west direction), approximately 6.5 m along the Lincolnshire coast and around 5.5 m along the Holderness coast. The tidal range also increases further into The Wash and the Humber estuary.

The North Sea is enclosed to the west, south and east (with a maximum fetch length of around 500 km) with a large open entrance to the north. Consequently the longest period and largest waves are expected to be from the north, although because of the fetch length, locally generated wind waves will also be important.

The spatial distribution of the modelled annual mean significant wave height has been sourced from the Renewables Atlas and is shown in *Figure 4.2*. This distribution shows that waves are larger offshore and generally decrease closer to the coast and range between 0.51 and 1.80 m.

Figure 4.1 *Mean Significant Wave Height Distribution*



Source: ABPmer, 2008

The variations in near-bed current speed during a mean spring tide are shown in which shows that current speeds are generally lower offshore and increase in magnitude closer to the coast and range from 0.1 to 1.45 m/s. The spatial distribution of modelled currents due to tidal processes can be sourced from the Renewables Atlas (ABPmer, Met Office and POL, 2008).



KEY:

 Licence Area	Depth
 Application Area	 Drying
	 <=10m
	 <=20m
	 <=50m
	 <=100m





Kilometres

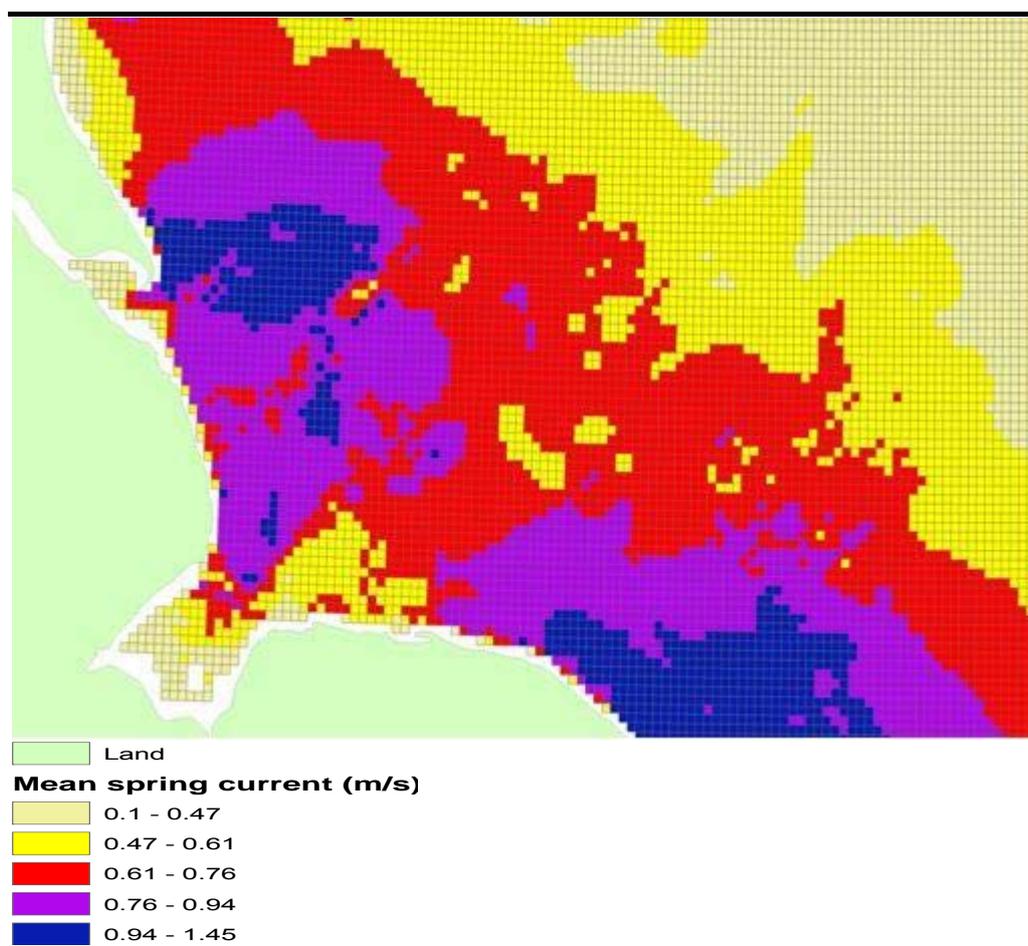
CLIENT: Humber Aggregate Dredging Association	SIZE: A4
ERM Eaton House Wallbrook Court North Hinksey Lane Oxford, OX2 0QS Tel: 01865 384800 Fax: 01865 204982	
SOURCE: Reproduced from Ordnance Survey digital map data. © Crown copyright. All rights reserved. 2009 License number 0100031673. PROJECTION: WGS 1984 UTM Zone 31N	

TITLE: Figure 4.2 Bathymetry		
DATE: 29/03/2010	CHECKED: HV	PROJECT: 0098617
DRAWN: FS	APPROVED:	SCALE: As Scale Bar
DRAWING: SR0310_Bathymetry.mxd		REV: 0

Future sea level rise will result from the net effect of global changes caused, for example, by glacio-eustasy (ice melt) or thermal expansion (changes in water volume due to warming) and the local change in land levels due to glacial isostatic rebound and subsidence. The guidance for coastal management within the study area suggests that the net sea level rise (currently 4 mm/yr) could increase to 15 mm/yr for the period 2085-2115 (DEFRA, 2006). The UK Climate Impacts Programme (UKCIP) has recently produced guidance for local authorities on climate change predictions from UKCIP09 (UKCIP, 2009). This report will be used to inform climate change issues within the Humber MAREA study area.

The North Sea is particularly susceptible to storm surges and there is a long history of such events, with recorded evidence ranging back to at least the 13th Century (Van Malde, 1997). Flather and Williams (2000) defined a 1 in 50 year return period storm surge as having a height of 1.93 m in the North Sea (Flather & Williams, 2000).

Figure 4.3 *Near-bed Mean Peak Spring Tidal Currents*



Source: ABPmer, 2008

The most intense surge of recent history took place between 31st January and 2nd February 1953 and resulted in the loss of almost 2,000 lives, mainly in the Netherlands. This surge elevated water levels up to 3 m above the

highest astronomical tidal level. It was caused by an externally generated surge event propagating through the North Sea and becoming enhanced by an internally-generated surge caused by intense wind speeds.

Potential Impacts of Aggregate Extraction

The potential impacts on hydrodynamics from aggregate extraction include:

- Changes to the local wave climate and to wave conditions at the coast.
- Change to tidal currents.

It is also important that potential future sea level rise from climate change is considered within the MAREA.

Information Sources

- Historical tidal elevation data from the UK Tide Gauge Network.
- Historical measurements of tidal current speed and direction from the British Oceanographic Data Centre (BODC) data portal.
- Modelled wave, tidal and current data from the Renewables Atlas as developed by ABPmer, the Meteorological Office (Met Office) and Proudman Oceanographic Laboratory.
- Historical wave climate information from the Met Office (derived from numerical models) and from the DEFRA strategic wave monitoring network for England and Wales (Wavenet) programme (direct measurement in the field).
- Environmental Statements for previous marine aggregate licence applications and offshore wind farms.
- The Southern North Sea Sediment Transport Study.
- Regional maps of derivative quantities such as peak and residual tidal flows.
- Tidal stream information printed on Admiralty Charts (also available from the Totaltide software package).

4.2.3

Coastal Processes

Regional Baseline Overview and Key Issues

The Holderness coastline is characterised by an almost continuous stretch of eroding boulder clay cliffs. The finer fraction of sediment released from the cliffs (muds and clays) is transported offshore whilst coarser material (sands and gravels) moves southwards, parallel to the coast as littoral drift. Coastal defence structures have resulted in downdrift erosion both locally and at

Spurn Point. The mouth of the Humber acts as a sink for sediments eroded from the Holderness coastline. Some of this is transported across the mouth and deposited at Donna Nook.

The Lincolnshire coast is typically low lying and is characterised by peat deposits, saltmarsh and sand dunes. Between Cleethorpes and Mablethorpe, the coast is fronted by a wide sandy foreshore and offshore banks. To the south of Mablethorpe, the width of the foreshore decreases and the beach is progressively depleted. Extensive stretches of coastal defences exist between Mablethorpe and Skegness. The Lincolnshire coast is vulnerable to coastal erosion and flooding, particularly during storm surge events. At the coast, sediment transport processes are predominantly wave driven.

Large scale accretion begins at the mouth of The Wash with extensive dune and saltmarsh development at Gibraltar Point. The Wash is a sink for the southerly longshore drift along the Lincolnshire coast and the westerly transport between Sheringham and Snettisham.

The Wash has gradually been infilled with fine sediment over time from several large rivers. The shores of The Wash are low and marshy and bordered by mudflats. The North Norfolk coastline from Snettisham to Sheringham consists predominantly of low lying marshland fronted by sandy beaches. Exceptions to this are the sand dunes between Hunstanton and Holme, chalk cliffs at Hunstanton, sand/clay cliffs between Weybourne and Sheringham and discontinuous shingle spits from Scolt Head Island to Weybourne. There is a moderate westerly transport from the drift divide at Sheringham. This reduces to zero at Snettisham. Coastal processes are wave dominated to the east of Blakeney with tidal currents becomingly increasingly important towards Snettisham.

Sand/clay cliffs dominate from Sheringham to Great Yarmouth. These are fronted by predominantly sandy beaches with areas of shingle and sand dunes. Cliff erosion is widespread along this coast and much of the frontage between Happisburgh and Winterton is vulnerable. Coastal sediment transport processes are driven by waves transporting sediments southwards from the drift divide at Sheringham whilst residual tidal currents maintain sediment exchanges between the beaches and nearshore bank systems.

Potential Impacts of Aggregate Extraction

The potential impacts on coastal processes from aggregate extraction include:

- Impacts to hydrodynamic processes (waves or tides) that could impact on sediment transport processes at the coast.
- Interrupting or disrupting sediment transport pathways that feed the coast.

There were also specific concerns about the effect of dredging on the movement of sediment down the Lincolnshire coast towards the North Norfolk coastline.

Information Sources

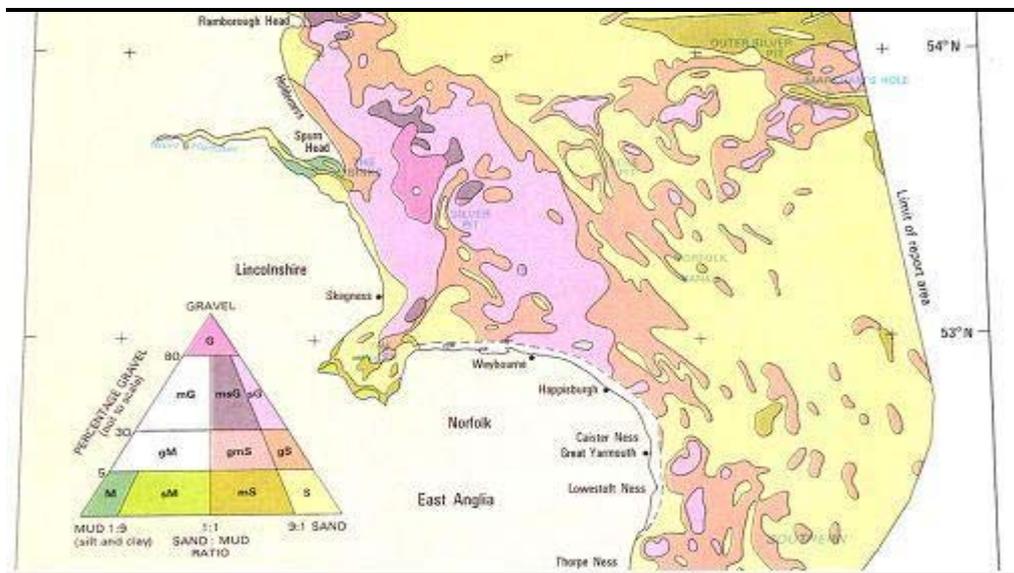
- Shoreline Management Plans and Futurecoast (2002). All updated shoreline Management Plan (SMPs) are due to be completed by April – July 2010. The Flamborough Head to Gibraltar Point draft SMP will be published in Oct/Nov 2009.
- Coastal monitoring programmes including the East Riding District Council Spurn to Sewerby monitoring programme and the Anglian Region Strategic Monitoring Programme.
- Data on long-term changes to the coastline from comparison of sequential surveys using LiDAR, aerial photography and OS mapping.
- Reports on evolution of the coastline in this region (eg by University of Hull).
- Studies undertaken by ABPmer into the future management of Spurn Point.
- EuroSION. 2004. Living with coastal erosion in Europe: Sediment and Space for Sustainability.
- Linkshore programme 2010-2015 (beach nourishment along Lincolnshire coastline). This is due to commence soon.
- The Southern North Sea Sediment Transport Study.
- Channel Coastal Observatory South Coast tracer experiment.
- Lincolnshire Coastal Study Group (LCSG) is carrying out research on the implications for sustainable development in the face of sea level rises, as a consequence of climate change. The LCSG is carrying out a review of the Regional Spatial Strategy (RSS) and this will be published for public consultation in March 2010.
- National Framework for Coastal Monitoring.
- Environmental Statements for previous marine aggregate licence applications and offshore wind farms.

Regional Baseline Overview and Key Issues

A wide range of sea bed sediments are present within the Humber MAREA scoping study area (Figure 4.4). In general the estuary areas of The Wash and the Humber comprise sand and mud. Outside of the estuaries the western part of the study area comprises coarser gravelly sediments with sands present further to the east.

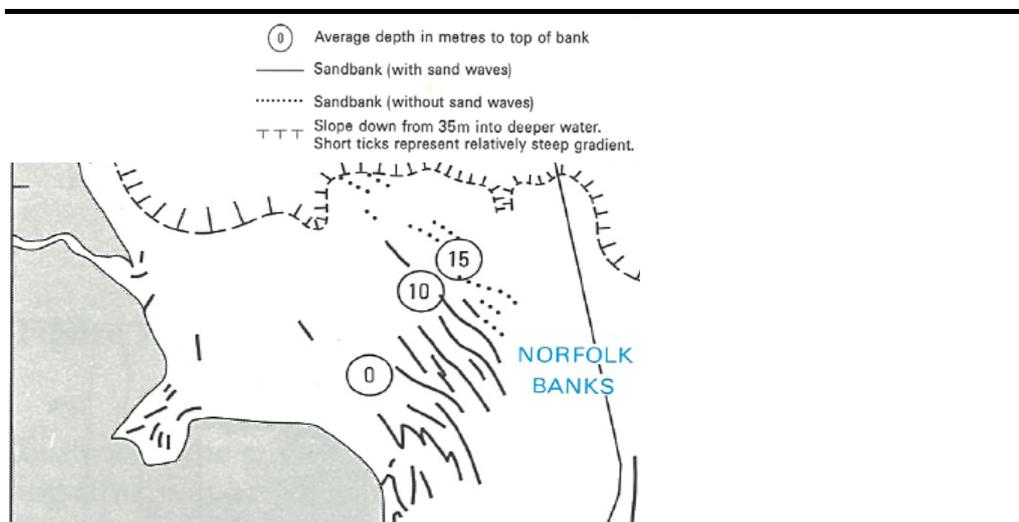
A number of sandwave fields are situated towards the eastern parts of the study area, with a large concentration to the north and east, around the Norfolk Bank system. The main distribution of sandbanks is concentrated in the Norfolk Bank system (Figure 4.5). These sandbanks are orientated sub-parallel to the northeast Norfolk coastline and extend offshore.

Figure 4.4 Seabed Sediment Distribution based on BGS Data



Source: HR Wallingford et.al, 2002

Figure 4.5 Distribution of Sandbanks



Source: Cameron et. al, 1992

Bedload transport pathways have been mapped at a regional scale as part of a number of projects (HR Wallingford, 2002) and (Kenyon, 2005). There is a trend of southerly directed coastal sand transport separated by a bedload parting from a northerly directed offshore sand pathway (Kenyon, 2005). The southerly directed sand transport carries sand from the Holderness Cliffs and offshore sources to the Humber Estuary and The Wash (Kenyon, 2005). Tidal currents dominate much of the shelf transport in this area.

Background suspended sediment concentrations (SSC) are typically greater during winter than summer, caused by a more energetic hydrodynamic regime which leads to enhanced vertical mixing. In summer, SSC tend to be higher in coastal regions and lower offshore (typically 0 to 4 mg/l). Peaks in SSC occur along the Lincolnshire coast, and The Wash and exceptionally high concentrations of 300 mg/l and higher are recorded in the Humber Estuary.

A similar pattern is observed along the coast in winter although concentrations are typically doubled. A plume extending off the North Norfolk coast can be seen and extends in a north-easterly direction across the North Sea; it is likely that this is caused by local resuspension arising from wave activity.

Potential Impacts of Aggregate Extraction

The potential impacts of marine aggregate extraction on the seabed include:

- Changes to the gradient of the seabed.
- Changes to the depth of the seabed.
- Changes to the sediment distribution on the seabed as a result of targeting specific sediment types and grades and returning the unwanted fraction to the seabed through screening.

The potential impacts on offshore sediment transport from aggregate extraction include:

- disruption to sediment transport pathways; and
- increases in turbidity in the water column.

The dredging process will result in increased fine sediment in the water column creating a turbid plume. This plume may stay in suspension for some time before it is deposited.

Information Sources

- British Geological Survey surface sediment and geological charts.
- Southern North Sea Sediment Transport Study.

- Bathymetric surveys conducted by the UKHO.
- Regional maps of derivative quantities such as peak and residual tidal flows and tidally induced sediment transport.
- Kenyon, N. H. and Cooper, W. S. 2004. Sandbanks, sand transport and offshore windfarms.
- Cooper, W.S., Townend, I.H., and Balson, P.S. 2008. A synthesis of current knowledge on the genesis of the Great Yarmouth and Norfolk Bank Systems.
- Cameron, T. D. J., Crosby, A., Balson, P. S., Jeffrey, D. H., Lott, G. K., Bulat, J. and Harrison, D. J. 1992. The geology of the Southern North Sea, United Kingdom Offshore Regional Report.
- Evans, C. D. R., Crosby, A., Wingfield, R. T. R., James, J. W. C., Slater, M. P. and Newsham, R. 1998. Inshore seabed characterisation of selected sectors of the English coast.
- Defra Marine Protected Areas Datalayers research project. 2009: Task 2a - Mapping of geological and geomorphological features.
- Environmental Statements for previous marine aggregate licence applications and offshore wind farms.

4.3 *BIOLOGICAL ENVIRONMENT*

4.3.1 *Introduction*

This section describes the marine fauna of the Humber and Greater Wash region and the sites that are designated for their nature conservation interest. A glossary of ecological terms used within this section is provided in *Box 4.2*.

Box 4.2 Glossary of Biological Terms

Amphipods: (Phylum Arthropoda, Class Malacostraca, Order Amphipoda) are small, shrimp-like crustaceans recognised by their laterally compressed bodies, lack of a carapace, and numerous, differently modified legs.

Benthic: The ecological zone at the lowest level of the water column including the surface layer of sediment.

Bivalves: (Phylum Mollusca, Class Bivalvia) are organisms with a shell consisting of two lateral plates or valves, joined together at the hinge by a ligament (eg mussels, clams etc).

Circalittoral: The subzone of the rocky sublittoral (see below) that is below the infralittoral and is dominated by animals.

Crustaceans: (Phylum Arthropoda, Sub-phylum Crustacea) are organisms characterised by having a hard outer shell and jointed appendages and usually live in the water and breathe through gills. They include lobsters, crabs, shrimps, and barnacles.

Demersal: The part of the water column that is near to the seabed and the benthos. Demersal fish are those that feed on organisms on or near the seabed.

Echinoderms: (Phylum Echinodermata) are invertebrate marine organisms usually characterised by a five-fold symmetry. Examples include: sea urchins and starfish.

Epibenthic: Organisms living on the surface of the seabed.

Infaunal: Benthic organisms which live within the seabed.

Infralittoral: A subzone of the sublittoral (see below) in which upward-facing rocks are dominated by algae, typically kelps.

Keystone species: A species that plays a critical role in maintaining the structure of an ecological community and whose impact on the community is greater than would be expected based on its relative abundance or biomass.

Macrobenthic: Marine invertebrates measuring at least 1mm in size that live within the seabed sediments

Pelagic: The ecological zone in the open water column containing organisms that are not closely associated with the seabed.

Polychaetes: (Phylum Annelida, Class Polychaeta) are truly segmented worms, mostly marine, and are characterized by extensions of each segment with numerous bristles projecting from them.

Siphon: Tube connected to the anterior end of a bivalve or gastropod mollusc through which water is conducted into the gill cavity.

Sublittoral: Zone exposed to air only at its upper limit by the lowest spring tides.

4.3.2

Benthic and Epibenthic Communities

Regional Baseline Overview and Key Issues

The distribution of benthic communities within the MAREA area is largely related to key environmental parameters including sediment type, water depth and sediment stability and quality, in conjunction with their proximity to transitional waters (the Humber estuary and The Wash). The offshore parts of the MAREA scoping study area predominantly consist of sandy sediments, mixed sediments and coarse sediments. There are also some limited areas where hard substrate (eg pebbles, cobbles and bedrock) and biogenic reef features may be present. Nearshore areas are dominated by fine sediments (eg muds and silts).

Each sediment type, from mud to gravel, and its particular benthic invertebrate fauna, covers sizeable areas in the region. These variable sediment types mean that benthic communities are relatively diverse at a regional scale and surveys in the region have recorded on average 40-50 macrobenthic species and with abundances at several hundred individuals per sample in mixed sediments.

In parts of the study area the surface sediments are highly mobile as a result of strong tidal currents which have led to the formation of extensive sandbanks both inshore and offshore. In addition wave action and storm events cause high levels of re-suspension resulting in highly turbid waters, particularly in coastal areas. As a consequence the benthic communities are often characterised by species adapted to physical disturbance.

The communities may be loosely grouped into a smaller number of broad habitat complexes. Outside the main estuaries and embayments, shallow areas of infralittoral fine or mobile coarse sands are dominated by polychaetes and amphipods. Further offshore circalittoral coarse or muddier mixed sediments support a wider variety of species including a range of polychaetes, bivalves, crustacea and echinoderms and some areas also support a diverse epifauna including commercially important species of shellfish such as lobster, edible crab, cockles and shrimp. These benthic species provide a key resource for other trophic levels.

Figure 4.6 shows the distribution of habitat types within the Humber and Greater Wash MAREA scoping study area. The characteristic habitats or biotopes in the study area are generally widespread and are of relatively low sensitivity, however they can support areas of biogenic reef formed by the tube-building polychaete *Sabellaria spinulosa*. This species is predominantly found in areas of relatively high sediment loads and whilst it is more usually found in a low-lying encrusting form it can sometimes form reef structures in this region.

Sabellaria reefs have been identified as a priority habitat under the UK Biodiversity Action Plan (BAP), and are included under the Habitats Regulations list of Annex I reef habitats. Although this species is widely distributed in UK waters, areas of reef cover a relatively small geographic area (Gubbay, 2007). Areas with high densities of *Sabellaria* (including reefs) have been shown to correlate closely with areas of high species diversity in the Wash (Foster-Smith & Hendrick, 2003). The conservation and management of *Sabellaria spinulosa* reefs is therefore considered to be an important part of biodiversity conservation in UK waters.

Sabellaria reefs have been found in inshore areas along the Lincolnshire coast, off the Humber and also in The Wash SAC (Special Area of Conservation under the Habitats Directive), and the proposed North Norfolk Sandbanks and Saturn Reef SAC. These SACs are located in the south-west and south-east of the MAREA scoping study region. Areas of *Sabellaria alveolata*, which can form larger, more extensive reefs, have recently been recorded in the outer Humber despite being primarily an intertidal west coast species.



KEY:

Licence Area	Deep circalittoral mud
Application Area	Deep circalittoral sand
Habitat Types	
Circalittoral coarse sediment	Infralittoral coarse sediment
Circalittoral fine sand or circalittoral muddy sand	Infralittoral fine sand or infralittoral muddy sand
Circalittoral mixed sediments	Infralittoral mixed sediments
Circalittoral sandy mud or circalittoral fine mud	Infralittoral sandy mud or infralittoral fine mud
Deep circalittoral coarse sediment	Low energy circalittoral rock
Deep circalittoral mixed sediments	Low energy infralittoral rock
	Moderate energy infralittoral rock

CLIENT: **Humber Aggregate Dredging Association**

SIZE: **A4**

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 PROJECTION: WGS 1984 UTM Zone 31N

TITLE: **Figure 4.6
Habitat types**

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Potential Impacts of Aggregate Extraction

The key potential impacts associated with the extraction of aggregates on the benthic community are expected to result from the direct removal of sediment and the resident fauna, increased turbidity in the water column, smothering as a result of screening, overspill and gradual redistribution of fine particulates. Any changes in the nature and stability of sediments will also affect the benthic community. The potential for in combination impacts to marine communities due to offshore development, climate change and fishing pressure must also be considered.

The recovery rates of disturbed seabed habitats and their associated benthic communities is a key issue of concern to consultees.

Information Sources

- Conner, D. W., Allen, J. H., Golding, N., Howell, K. I., Lieberknecht, L. M., Northen, K. O. and Reker, J. B. 2004. The Marine Habitat Classification for Britain and Ireland Version 04.05 JNCC, Peterborough.
- The Mapping European Seabed Habitats (MESH) tool that has been developed jointly by JNCC and European partners to map marine habitats off the coasts of the UK and North West Europe.
- The National Biodiversity Network (NBN) Gateway tool that shows spatial distribution of individual species.
- The Marine Life Information Network (MarLIN) database which provides information on the distribution, ecology, sensitivity and importance of key benthic marine species.
- Natural England Research Reports.
- DTI Strategic Environmental Assessment Reports (SEA 2 and 3).
- Environmental Statements for aggregate licence applications and wind farm developments in the region.
- Foster-Smith et al (1999, 2001, 2003), reports on *Sabellaria spinulosa* in The Wash and North Norfolk Coast cSAC.
- A range of reports carried out by Precision Marine Surveys Limited and key staff.
- Additional published reports and papers.

In addition, benthic data was collected as part of the ALSF-funded Regional Environmental Characterisation (REC) survey in June 2009. A final report is expected in February 2011, however data are expected to be made available in

the first half of 2010. Details of the specification for this survey should be reviewed when available to aid in informing the scope of the benthic ecology component of the full MAREA.

4.3.3 *Shellfish*

Regional Baseline Overview and Key Issues

The European lobster (*Homarus gammarus*) and edible crab (*Cancer pagurus*) are the most important commercially targeted shellfish species in the region. The lobster is found from the shoreline to depths of 150 m, and is therefore expected to occur in all parts of the study area. It usually occurs on a hard substrate such as rock or hard mud, but high numbers are also associated with sand banks in the region. Lobsters are most active at night, and females lay eggs in July. Edible crabs are abundant on rocky grounds where they hide in holes and crevices, and they are also common on subtidal sandbanks. They are both active predators and scavengers, and spawning takes place between November and February, during which time the females remain in deeper waters offshore.

There is an important molluscan shell-fishery in The Wash targeting cockles (*Cerastoderma edule*) and mussels (*Mytilus edulis*). Cockles are suspension feeders that live on intertidal beaches of sand, muddy sand and fine gravel, where they burrow into the sediment and feed via a siphon. Mussels are suspension feeders generally found attached to hard substrates within the intertidal zone and shallow waters. Both species spawn in spring, and mussels can also occasionally spawn in autumn.

Other shellfish species, particularly the whelk (*Buccinum undatum*) and brown shrimp (*Crangon crangon*) are important within this region of the North Sea, although the whelk is increasingly being taken as by-catch from the crustacean fishery, with fewer dedicated whelk potting vessels operating from the coast. Whelks are carnivorous, mobile species found close to the coast along rocky shores and on soft sediments. They spawn in November, attaching eggs to the seabed. Brown shrimp are typically found in shallow waters, in bays and estuaries along the coast, and favour soft, sand sediments in which they can burrow.

Potential Impacts of Aggregate Extraction

Small numbers of shellfish may be injured or killed by the passage of the drag head. In addition a specific concern was raised by consultees about potential impacts on commercially important shellfish species due to increased suspended sediment concentrations and sediment deposition. Increased concentrations of suspended sediment can affect the distance at which crustaceans react to stimuli, including the prey capture success of visual predators and scavengers, and can cause avoidance behaviour. The settlement of suspended sediments can affect reproductive success of crabs and lobsters through impacts to their eggs.

Information Sources

- The Marine Life Information Network (MarLIN) database which provides information on the distribution, ecology, sensitivity and importance of key benthic marine species.
- Natural England Research Reports.
- DTI Strategic Environmental Assessment Reports (SEA 2 and 3).
- Environmental Statements for aggregate licence applications and wind farm developments in the region.

4.3.4

Fish

Regional Baseline Overview and Key Issues – Commercially Important Species

Numerous finfish species feed and spawn in the North Sea and use certain sites as nursery areas. The key main commercially important and ecologically sensitive species are identified within this section, but a complete review of fish species in the study area should be undertaken as part of the full MAREA. An understanding of the ecologically important sites for finfish populations within the study area is vital for the MAREA as is a good understanding of the preferred prey for each species.

In recent decades populations of traditional target finfish species, such as cod (*Gadus morhua*), plaice (*Pleuronectes platessa*) and Dover sole (*Solea solea*), have declined in abundance due to anthropogenic impacts and environmental change. However, technical conservation measures have now been put in place in an attempt to halt population declines and recover stocks to more sustainable levels. Within the MAREA region there is an indication at a local level that the cod recovery programme and the associated conservation measures may now be aiding the recovery of some local demersal finfish populations. Other species are exhibiting a significant expansion in their range of distribution, notably the sea bass (*Dicentrarchus labrax*).

Cod feed predominantly on invertebrates and fish. According to historical observations, they spawn in localised patches offshore within the MAREA scoping study area. A recent study has suggested that although many traditional spawning grounds, including Dogger Bank, remain active, evidence of spawning amongst some local populations such as those off Flamborough Head, have declined significantly (Fox et. al, 2008). Nonetheless, the number of adult cod recorded along the Yorkshire and Lincolnshire coasts has been relatively high in recent years.

Plaice undergo a change in diet with development and increasing size; juveniles feed mainly on infaunal polychaetes and bivalves, and larger adult plaice eat more epibenthic crustaceans, small fish and echinoderms. Plaice spawning grounds are widespread offshore and overlap slightly with the

MAREA study area.

Sole feed mainly at night, spending the day buried in fine sediments. The pelagic larvae feed on copepod nauplii whereas juveniles and adults feed mainly on polychaete worms. Sole spawning grounds are distributed along the Norfolk, Lincolnshire and Yorkshire coasts as far north as Bridlington.

The North Sea herring (*Clupea harengus*) stock is dominated by autumn-spawners comprising three separate spawning stocks that mix during their migrations and are managed as a single unit (Cefas, 2009). Herring are considered to be a high sensitivity species because they have very specific requirements for spawning. Unlike other pelagic fish species in the North Sea which reproduce by spawning directly into the water column, herring have a highly restricted spawning habitat. They generally spawn in clean gravelly sediments in a well oxygenated environment with a relatively high current speed (De Groot, 1980). Such habitats are relatively scarce and there is therefore concern that if they are significantly altered the viability of herring populations will decrease.

During the collapse of the North Sea herring stocks in the late 1970s due to over-fishing and recruitment failure, the spatial extent of spawning grounds declined (Cefas, 2009; Corten, 2001). ICES Herring Assessment Working Group (HAWG) larvae surveys between 2002 and 2007 have shown no evidence of recent spawning in the MAREA study area. These surveys have found that the main spawning ground is further north, off the North Yorkshire coast, between the River Tees and Flamborough Head. Nonetheless, the future likelihood of herring returning to spawn within the MAREA study area, and particularly within the licence areas, should be a key consideration of the MAREA.

The European sea bass (*Dicentrarchus labrax*) is a strongly migratory predator. They are attracted to warm water discharges and therefore are common inshore, close to the mouths of rivers. Spawning starts offshore in February and moves closer inshore in March to June, when large shoals are formed. Sea bass are opportunistic predators feeding on a wide range of fish, shellfish and plankton species.

Figure 4.7 and Figure 4.8 show indicative spawning grounds and nursery areas respectively for a number of key commercially important species (Coull *et al.*, 1998). The exact locations and extent of spawning and nursery grounds is known to change over time and the MAREA will therefore need to verify the current extents of these areas through consultation with marine scientists and fishermen in the region.

Regional Baseline Overview and Key Issues – Protected Species

Two species of fish that are protected by the Habitats Directive are known to occur within the southern North Sea region; the twaite shad (*Alosa fallax*) and the Atlantic salmon (*Salmo salar*). These species are anadromous i.e. they live

their adult lives in the sea, but swim upstream into freshwater rivers to spawn. As a result, it is likely that they will be present periodically in the MAREA area during their migration, although the region is not nationally important for either of these species.

In addition to the migratory fish species, the short-snouted seahorse (*Hippocampus hippocampus*) has recently been afforded protection under Schedule 5 of the Wildlife and Countryside Act. This is a relatively uncommon, secretive species that blends in well with rocky and weedy habitats, and is thought to inhabit areas along the north Norfolk coast. It spends the spring and summer in shallow inshore areas, migrating into deeper waters in the winter.

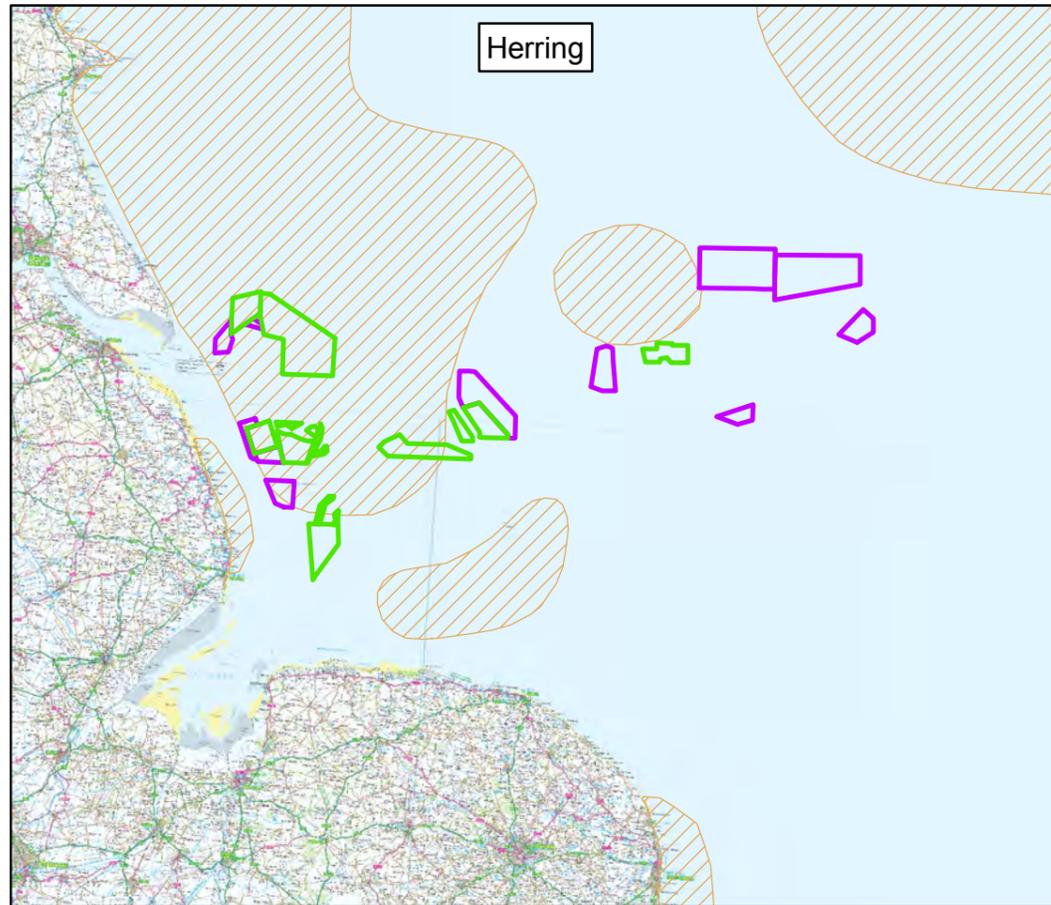
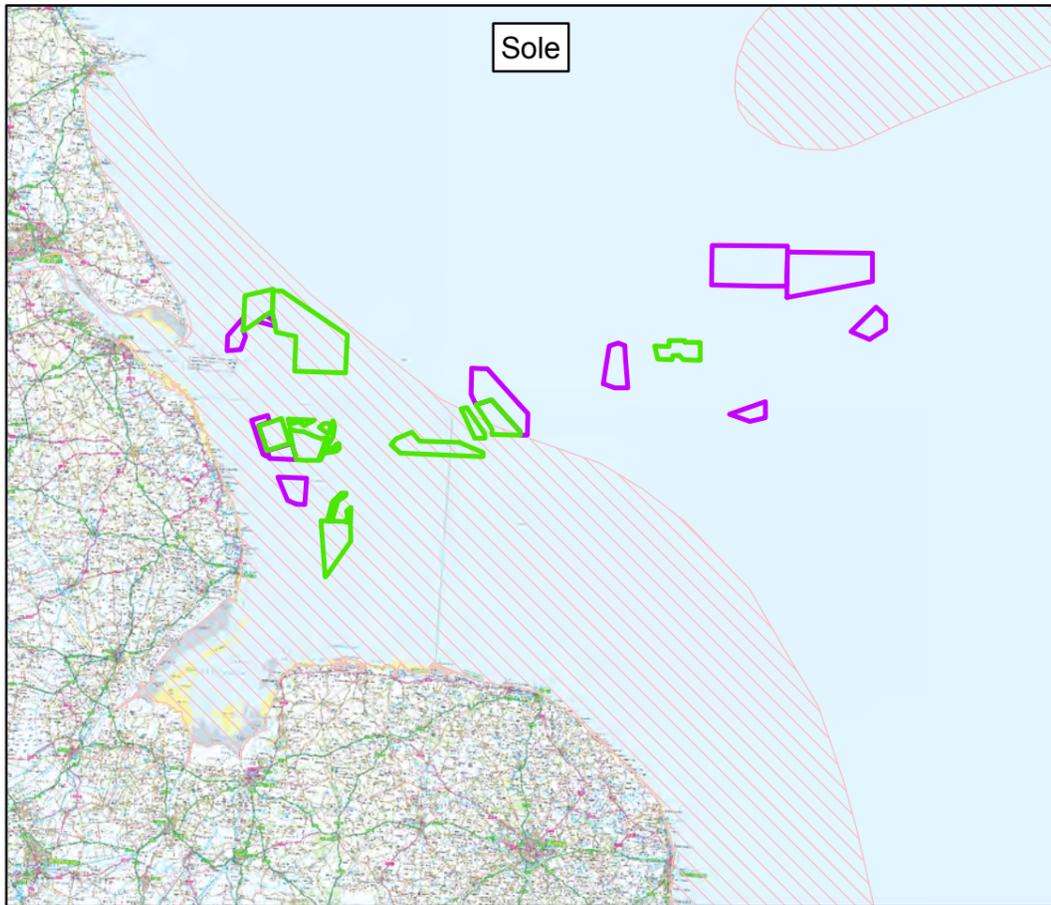
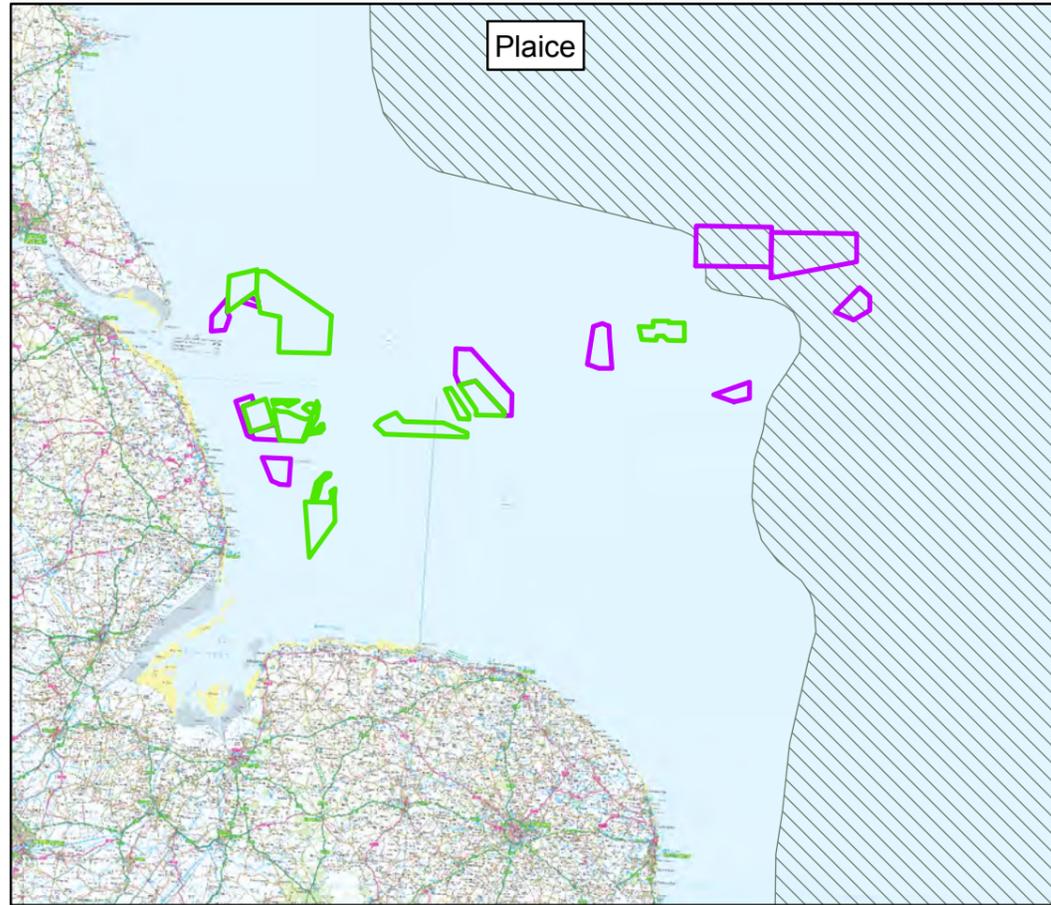
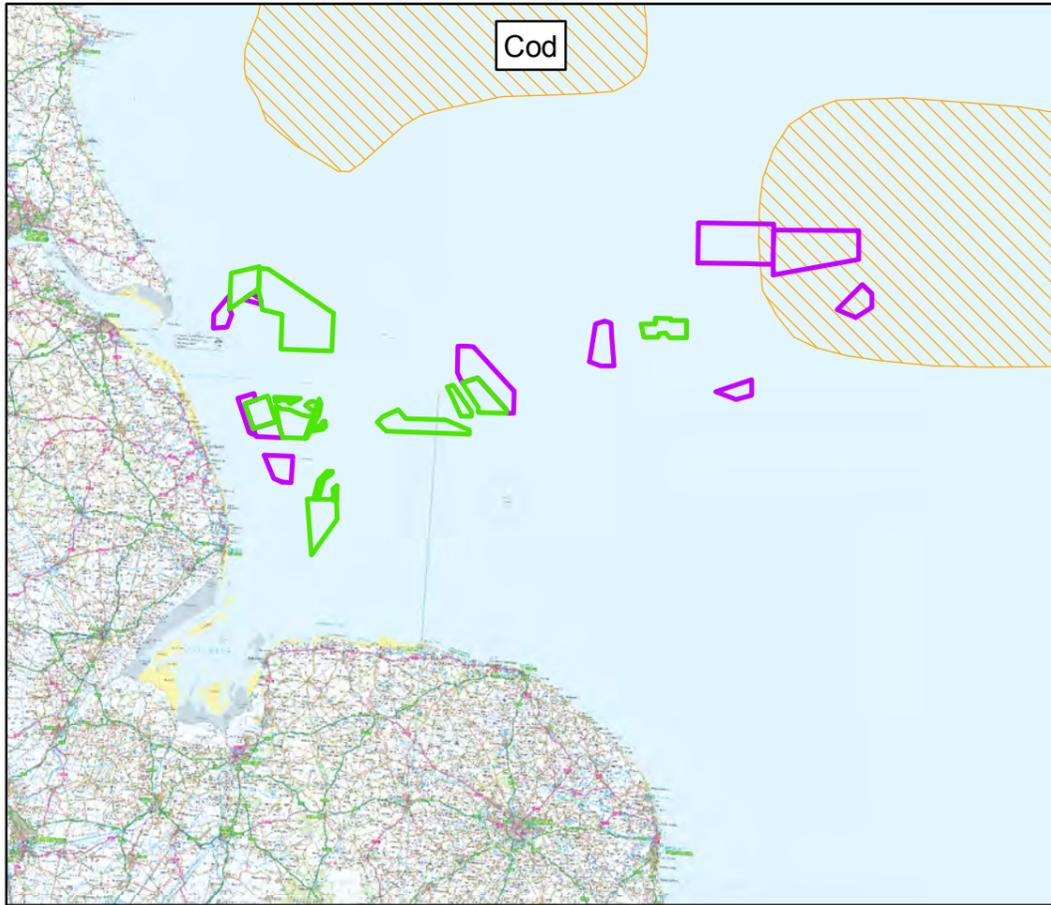
Potential Impacts of Aggregate Extraction

Potential impacts of aggregate extraction on fish resources include:

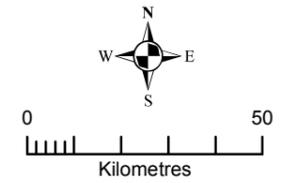
- Disturbances to spawning grounds and nursery grounds leading to a potential impact on recruitment.
- Loss of feeding habitat or prey upon which fish depend with resultant impacts on population size or health.
- Effects on behaviour of migratory species due to displacement by noise or elevated turbidity.

A specific comment was made by a consultee with regard to possible impacts of aggregate extraction on bass spawning grounds, a population which are important to commercial fisheries as well as localised cetacean populations, particularly harbour porpoise.

The potential for in combination impacts to marine communities due to offshore development, climate change and fishing pressure must also be considered.



- KEY:
- Licence Area
 - Application Area
 - Cod Spawning Area
 - Plaice Spawning area
 - Sole Spawning Area
 - Herring Spawning Area



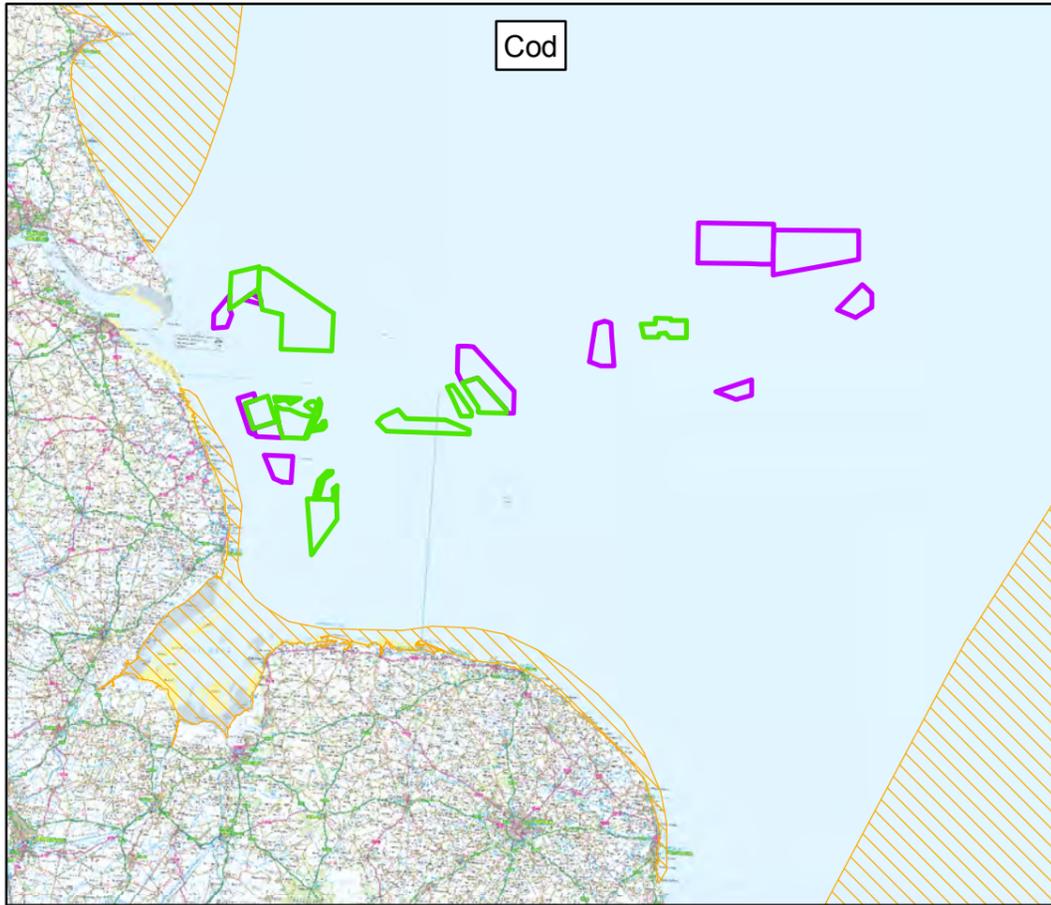
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Figure 4.7
Spawning Areas

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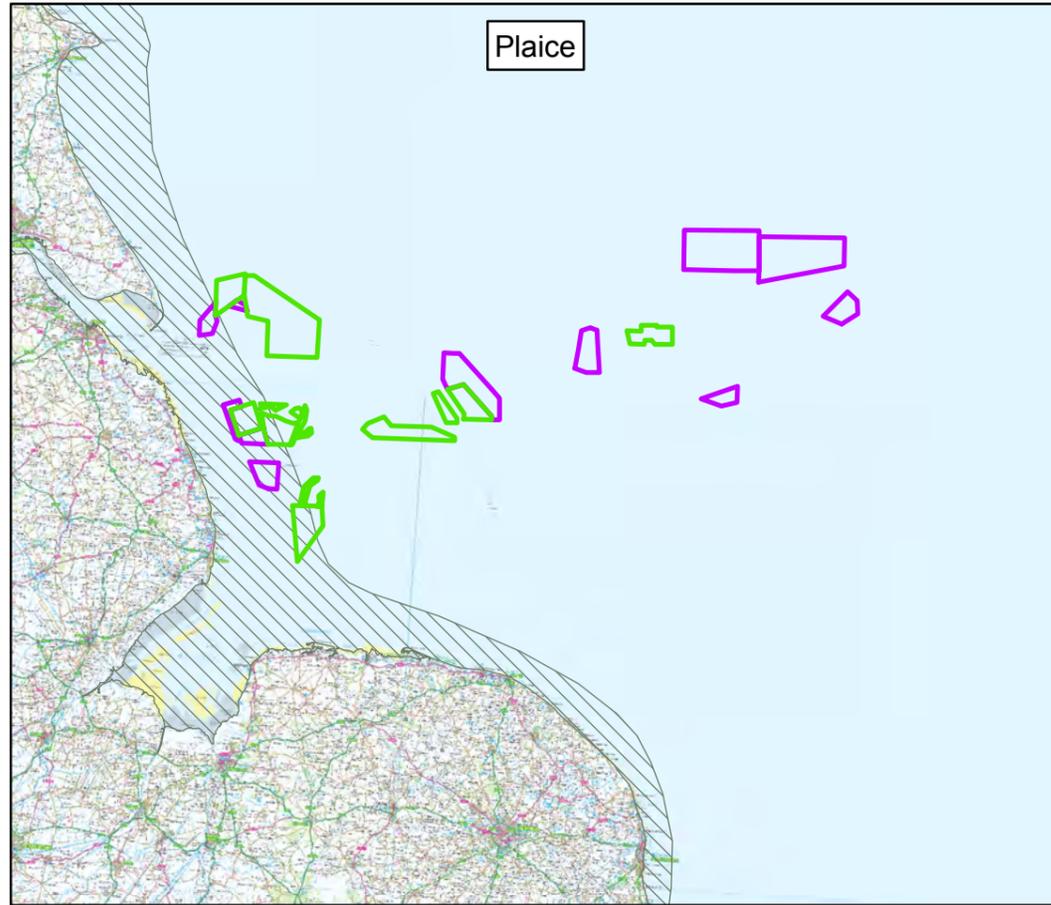
ERM
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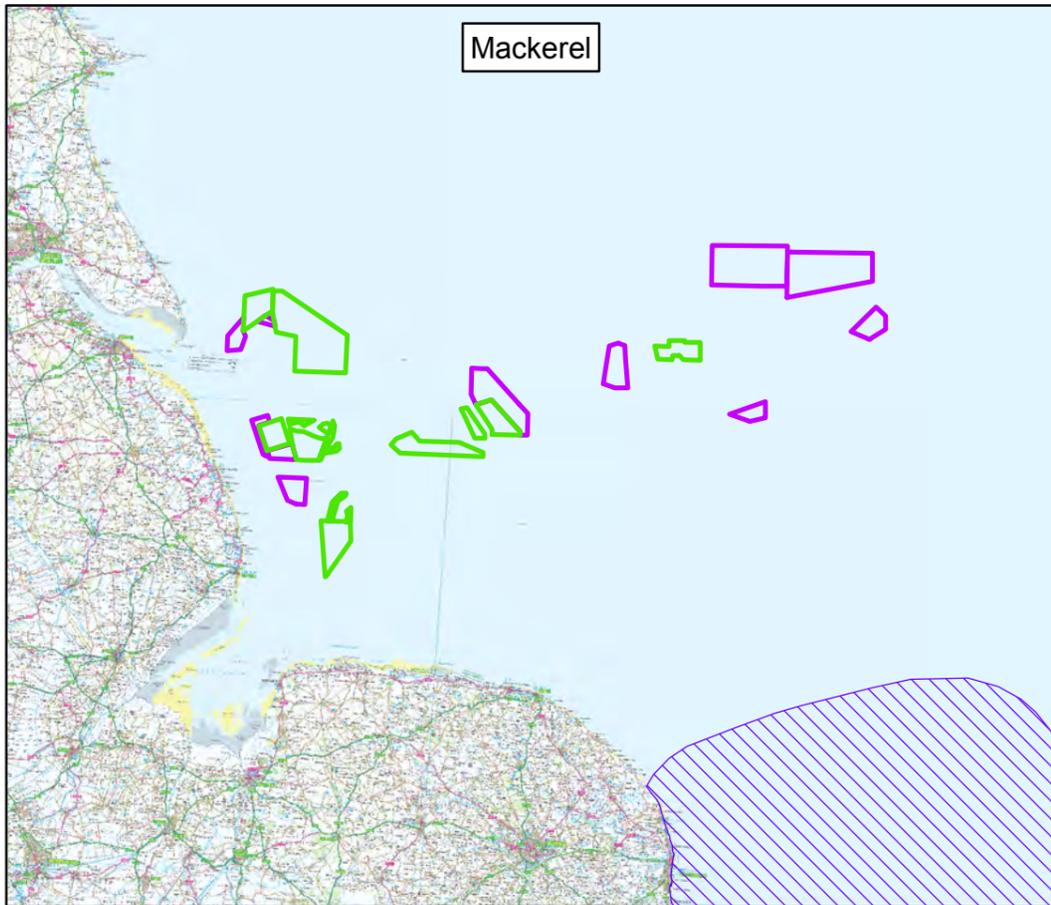
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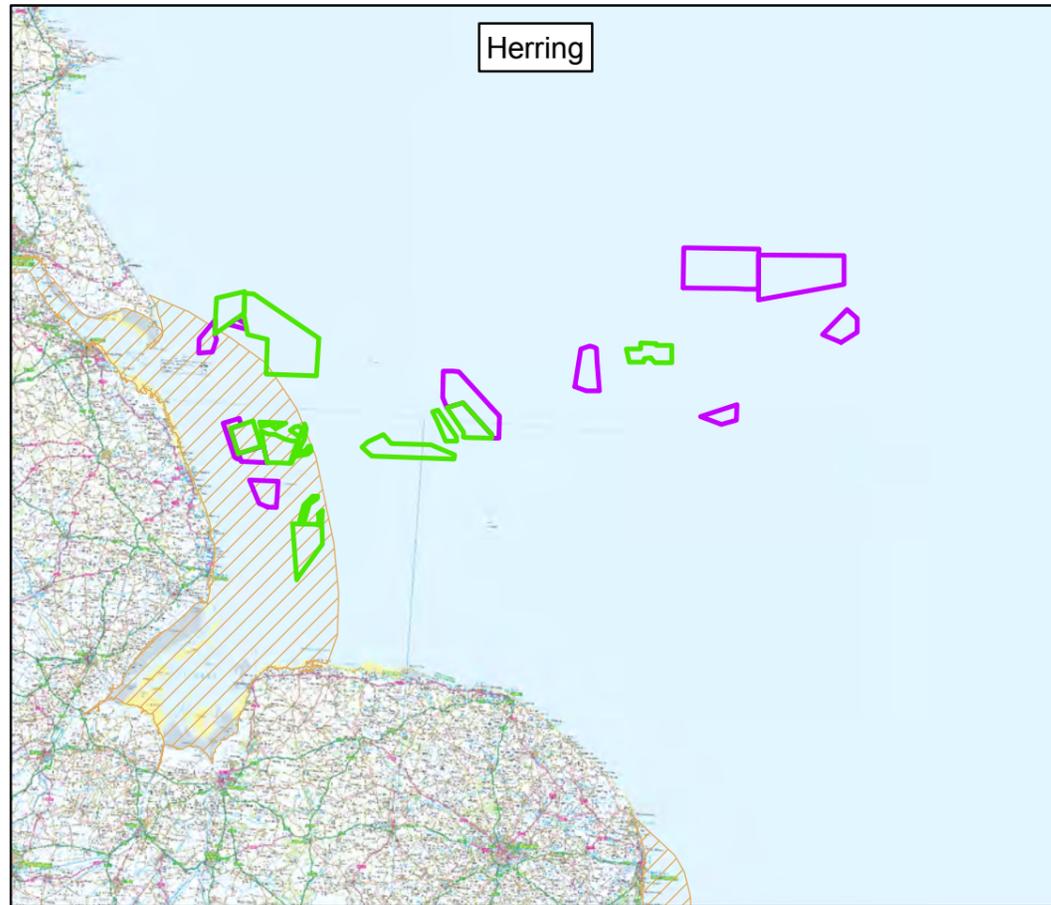
Cod



Plaice

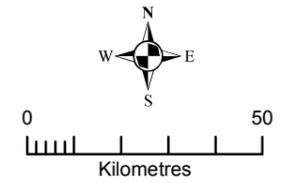


Mackerel



Herring

- KEY:
- Licence Area
 - Application Area
 - Cod Nursery Area
 - Plaice Nursery Area
 - Mackerel Nursery Area
 - Herring Nursery Area



TITLE:
Figure 4.8
Nursery Areas

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DRAWING: SR0310_NurseryAreas.mxd		REV: 0

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PROJECTION: WGS 1984 UTM Zone 31N

Information Sources

- Summaries of the ecology of commercial species from Cefas, ICES and FishBase.
- Information on the distribution of rare and protected species from JNCC and FishBase.
- Locations of spawning grounds and nursery areas from Cefas' interactive Spatial Explorer and Administrator (iSEA) database.
- ICES survey reports.
- Natural England Research Reports.
- Environmental Statements for aggregate licence applications and wind farm developments in the region.
- A range of reports carried out by Precision Marine Surveys Limited.
- Additional published reports and papers.

In addition it is understood that 2 m beam trawl data have been collected as part of the ALSF-funded Regional Environmental Characterisation (REC) survey that took place in June 2009. However this survey was aimed at describing epifaunal communities and will not provide extensive information on demersal or pelagic fish populations. Nonetheless, the details of the collected survey data will be reviewed to help inform the scope of the fish ecology component for the full MAREA.

4.3.5 Marine Mammals

Regional Baseline Overview and Key Issues – Pinnipeds

Two species of seal breed in the UK and are commonly found in UK coastal waters; the common seal and the grey seal.

Figure 4.9 Common Seal (left) and Grey Seal (right)



The common seal (*Phoca vitulina*) is the smaller of the two UK seal species. They occur along all coasts of the UK, preferring sheltered sandy beaches to haul out on. An internationally important colony of common seals is found within the Southern North Sea Marine Natural Area on and around The Wash and the sandbanks of the north Norfolk Coast, and also at Donna Nook on the Lincolnshire coast. Females haul out onto the intertidal sand and mudflats to give birth and suckle cubs between June and July. Their diet consists of a range of species including herring, sprat, whitefish and flatfish. The UK supports approximately 33,800 common seals which accounts for 40% of the world population (Jones *et.al*, 2004).

Grey seals (*Halichoerus grypus*) also occur around the coast of the UK although their distribution is centred around the northwest of Scotland and around Orkney and Shetland; they are less numerous than common seals within the southern North Sea Marine Natural Area. Grey seals generally prefer more rocky coastlines however they will use sandy beaches for hauling out and pupping if the sites are suitable. The main breeding site in the Humber MAREA scoping study area is at Donna Nook in Lincolnshire, although pups are born elsewhere, generally along the Norfolk coast including Blakeney Point, and they are frequently observed within the Flamborough Head SAC

Regional Baseline Overview and Key Issues - Cetaceans

The cetacean fauna (whales, dolphins and porpoises) of the southern North Sea is relatively poor, both in numbers and diversity of species. According to Natural England and the Sea Watch Foundation, there are between four and nine species of cetaceans which have been sighted with any regularity in the southern North Sea. Only two of these species are considered by the Sea Watch Foundation to be present off the east coast of England throughout the year or to be present annually as seasonal visitors; the harbour porpoise and white-beaked dolphin (Sea Watch Foundation, 2009)

The harbour porpoise (*Phocoena phocoena*) is the most numerous cetacean found in the north-western continental shelf waters, commonly occurring in the shallow coastal seas around the UK. They are small cetaceans up to 1.9 m in length that are usually found in small groups of between one and three individuals. Harbour porpoises feed on a wide variety of small fish species including herring, sprat, mackerel, sandeel, whiting and hake as well as cephalopods such as squid. Calving is most common during the late spring however calves have also been observed during January and February.

The white-beaked dolphin (*Lagenorhynchus albirostris*) is a large and very robust dolphin, measuring 2.5 - 3m when fully grown. It is the most common cetacean species in the northern and central North Sea; however it is only occasionally sighted south of the Humber Estuary. Peak numbers occur between June and October. White-beaked dolphins eat a variety of prey including cod, whiting, hake, haddock, mackerel, herring, cephalopods and some crustaceans.

The only common species of baleen whale that is recorded in the vicinity of the MAREA area is the minke whale (*Balaenoptera acutorostrata*), which has been sighted particularly offshore of Flamborough Head in the late summer/early autumn. They are filter feeders which prey on schooling fish such as herring, cod, whiting and sandeels as well as free swimming crustaceans and gastropods, and can reach up to 7-8.5 m in length.

Figure 4.10 *Harbour Porpoise (left), White-beaked Dolphin (right) and Minke Whale (bottom)*



Potential Impacts of Aggregate Extraction

Potential impacts of aggregate extraction on marine mammals include:

- Disturbance from increased noise, increased turbidity and visual disturbance.
- An increased risk of collisions.
- A reduction in prey availability.
- Impacts to coastal habitats where pinnipeds are known to haul out.

Particular concerns were raised during the public consultation about the effects of aggregate extraction on the availability of prey to marine mammals, and it was suggested that these impacts could have long term or permanent effects on the ecosystem.

Information Sources

- JNCC Atlas of Cetacean Distribution in northwest European waters.

- Small Cetaceans in the European Atlantic and North Sea (SCANS and SCANS II surveys).
- Seal distributions from the NBN Gateway, which for the Humber MAREA region is likely to comprise information from the following sources:
 - Biological Records Centre;
 - JNCC;
 - Marine Biological Association; and
 - Marine Conservation Society
- Natural England's information on The Southern North Sea Marine Natural Area.
- Information from the Sea Watch Foundation.
- Information from the Sea Mammal Research Unit.
- Records of mammals standings' from the Natural History Museum - www.nhm.ac.uk/research-curation/research/projects/strandings/
- JNCC Marine Mammal Observer data if made available.

4.3.6

Marine and Coastal Birds

Regional Baseline Overview and Key Issues

The coastal seas along the eastern English coast provide an important habitat for a range of seabirds and waders and wildfowl. Distribution is largely dictated by suitable nesting sites and prey availability (Jones et al, 2004) for seabirds, both of which are provided for a number of species within the Humber and Greater Wash MAREA study area, and feeding areas for waders and wildfowl. This review will therefore focus on known breeding sites and foraging areas for seabirds and feeding areas for waders and wildfowl within the study area.

There are a number of sites along the coast of the study area which have been designated as they support important populations of seabirds or waders and wildfowl. These sites, along with their designated bird interest features, are shown in *Table 4.1* below.

Table 4.1 Designated Site with Seabird Interest Features

<i>Site Name</i>	<i>Designation</i>	<i>Bird Interest Features</i>
Flamborough Head and Bempton Cliffs	SPA and SSSI	Breeding kittiwake and a breeding assemblage of puffin, razorbill, guillemot herring gull and gannet.
Humber Estuary	SPA, Ramsar Site and SSSI	Breeding little tern and marsh harrier, wintering bar-tailed godwit, bittern, golden plover, hen harrier, dunlin, knot, redshank, shelduck and passage redshank and sanderling and a wintering assemblage of over 20,000 birds.
Spurn Head	NNR	Breeding little tern.
Gibraltar Point	SPA, Ramsar Site, SSSI and NNR	Breeding little tern and wintering bar-tailed godwit, grey plover and knot.
The Wash	SPA, Ramsar Site and SSSI	Breeding common tern, little tern and marsh harrier, wintering avocet, bar-tailed godwit, golden plover, whooper swan, black-tailed godwit, curlew, dark-bellied Brent goose, dunlin, grey plover, knot, oystercatcher, pink-footed goose, pintail, redshank, shelduck, turnstone, and ringed plover and sanderling and a wintering assemblage of over 20,000 birds.
North Norfolk Coast	SPA Ramsar Site and SSSI	Breeding common tern, little tern, sandwich tern, roseate tern, avocet, bittern, marsh harrier and Mediterranean gull, redshank, ringed plover wintering avocet, bar-tailed godwit, bittern, golden plover, hen harrier, ruff, dark bellied Brent goose, knot, pink-footed goose, pintail, redshank, wigeon and an assemblage containing common scoter, velvet scoter and cormorant.
Hunstanton Cliffs	SSSI	Breeding fulmar.
Holmes Dunes	NNR	Breeding little tern, avocet and wintering.
Skolt Head Island	NNR	Breeding sandwich tern, common tern, roseate tern and little tern.
Blakeney	NNR	Breeding sandwich tern, common tern and little tern.
Donna Nook	NNR	Wintering Brent goose, shelduck, dunlin and knot
Holkham	NNR	Breeding little plover, oystercatchers, little terns, wintering brent goose, shelduck and redshank.
Saltfleetby - Theedlethorpe	NNR and SSSI	Breeding little tern, wintering Brent goose, dunlin, shelduck

(Source: JNCC Website 2009, Natural England Website 2009, Yorkshire Wildlife Trust 2009)

Bempton Cliffs lies in the north of the study area, approximately 54 km from the closest licence area, however it is the largest seabird colony on the east coast of England and is important for birds both during the breeding season and over winter. Key species include breeding gannet and fulmar.

Hunstanton Cliffs SSSI also supports a nationally important colony of fulmar. The Humber Estuary, Spurn Head, Gibraltar Point, and The Wash all support breeding colonies of terns. The Wash also supports a nationally important

population of lesser black-backed gull.

The North Norfolk Coast, which also encompasses Holmes Dunes, Skolt Head Island and Blakeney NNRs supports a wide range of breeding terns as well as an important breeding population of Mediterranean gull. The sandwich tern colony complex supported by the North Norfolk coast SPA accounts for around 30% of the total Great Britain breeding population. Wintering populations of seaduck, especially common and velvet scoter are also found in this area.

The Wash, Humber Estuary and North Norfolk Coast SPAs are especially important for supporting wintering concentrations of waders and wildfowl which feed on intertidal areas. The Wash is recognised as being the most important site in the UK in terms of the number of waders and waterfowl that it supports.

Jones *et al* (2004) list 33 species of seabird which used the southern North Sea marine coastal area which includes the Humber MAREA scoping study area. Aerial Surveys of waterbirds in the strategic wind farm areas undertaken from 2004 to 2006 (DTI, 2006) and (DBERR, 2007) have provided seasonal data on the distribution of seabirds across the study area.

During the winter, these surveys revealed low distributions of divers and seaduck within the survey area, mostly located around the Wash and adjacent coastlines. Gull species were recorded wintering over the whole survey area at moderate densities, with certain concentrations along the north Norfolk coast and in the Wash.

Concentrations of wintering auk species were recorded offshore during the early winter, moving further inshore and north towards breeding sites at Bempton Cliffs at the end of the winter. During the early part of the winter, some auk species moult, losing their flight feathers and becoming flightless. At this time they are particularly sensitive to disturbance.

Wintering kittiwakes were recorded at low densities across much of the survey area and a concentration of little gull was recorded in coastal waters beyond the Wash. Little gull are known to pass through the area in internationally important numbers during the autumn migration.

In summer, low numbers of gulls and auks were recorded across the survey area with increases towards the end of the summer when birds disperse from breeding sites. High numbers of terns were recorded north of the north Norfolk coast, foraging from breeding colonies and later dispersing further offshore (DTI, 2006) and (DBERR, 2007).

Many of the species found throughout the study area will forage widely in search of prey. However certain areas and habitats are known to be important for some species. Breeding terns are known to preferentially forage in areas close to their colonies in order to maintain an adequate supply of food to their

chicks. Favoured foraging areas include shallow coastal areas, as well as shallow sand banks further offshore. Wintering divers and seaduck also tend to be found in association with shallower water where prey species are more abundant.

Diving birds hunt by sight and are therefore sensitive to increased turbidity and changes in benthic communities, both of which could affect their ability to forage for food. The groups that are most sensitive to such changes are breeding terns, wintering auks and sea duck.

Potential Impacts of Aggregate Extraction

Potential impacts relating to birds have been identified as follows.

- Potential additional disturbance to birds at ports and disturbance during dredging operations.
- Potential impacts on bird foraging from increased suspended sediments as a result of dredging activities.
- Potential impacts on predator/prey relationships as a result of impacts to benthic habitats and fish populations, eg, reduction of food sources for bird species.
- In combination impacts to bird species as a result of other offshore and coastal developments and climate change.

Information Sources

- Southern North Sea Marine Natural Area Profile.
- DTI/DBERR Aerial Surveys of Waterbirds in Strategic Windfarm Areas 2004/05 and 2005/06.
- European Seabirds at Sea (ESAS) database.
- JNCC surveys, published reports and general website information.
- Consultation with JNCC, NE and RSPB.
- JNCC Seabird Colony Register.
- BTO Wetland Bird Survey (WeBS) counts.

4.3.7

Designated Sites

Regional Baseline Overview and Key Issues

There are a number of existing and proposed protected areas close to and within the Humber MAREA scoping study area. These include Special

Protection Areas (SPAs) and Ramsar sites which are particularly important for waterfowl and seabirds, Special Areas of Conservation (SACs) designated for their habitats, and Sites of Special Scientific Interest (SSSIs).

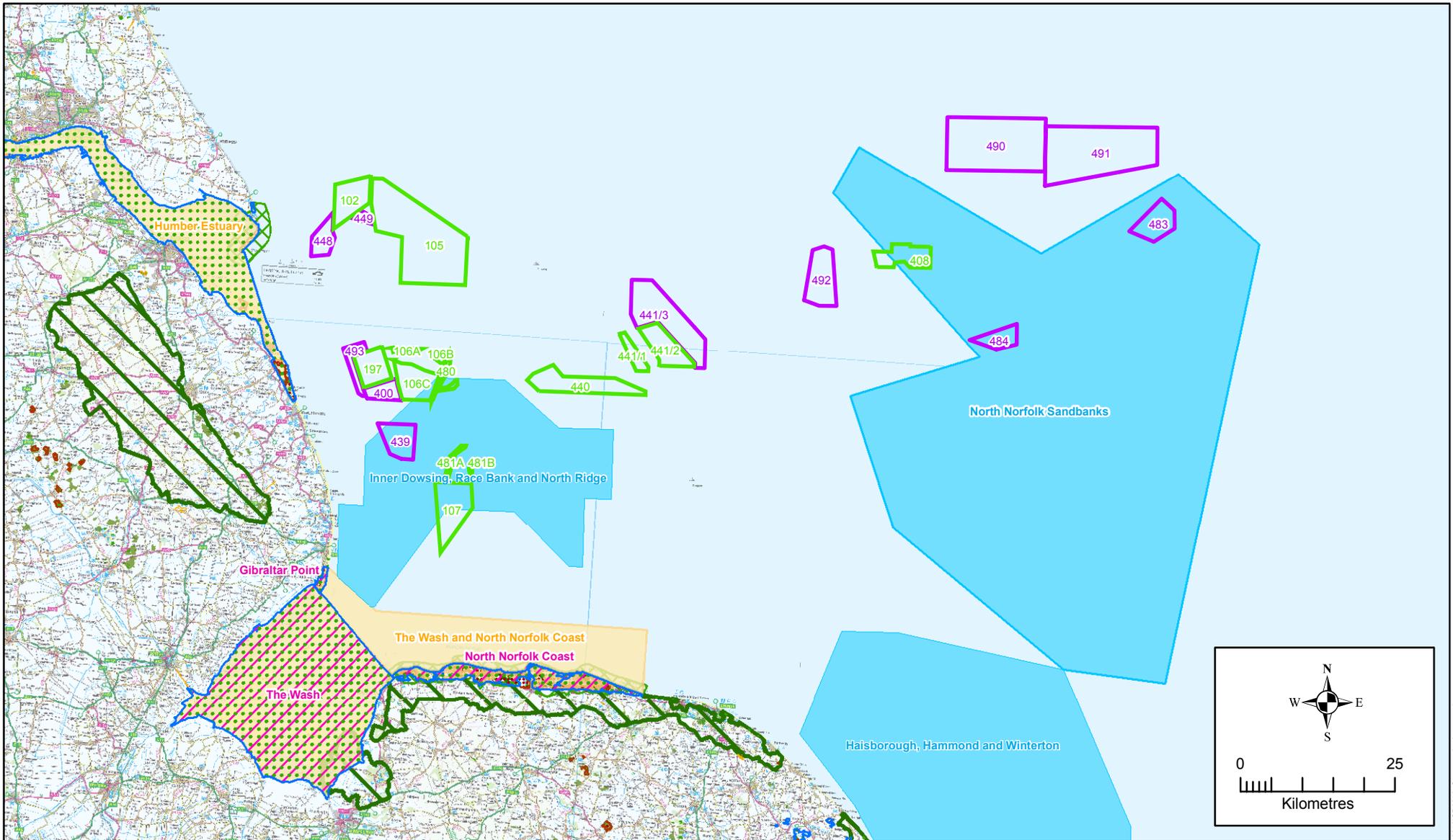
Two offshore habitats that are included in Annex I of the Habitats Directive are known to occur in the Humber MAREA scoping study area: Sandbanks which are slightly covered by sea water all the time and Reefs. *Figure 4.11* shows the locations of existing and proposed protected areas within the Humber and Greater Wash region. Species of conservation concern within the MAREA scoping study area are described in *Sections 4.3.2 to 4.3.6* of this scoping report.

Natural England and the JNCC are responsible for identifying draft SACs and potential SPAs in inshore waters (0- 12 nautical miles), and offshore waters (12-200 nautical miles and the UK Continental Shelf) respectively. In addition to the existing SACs described above, there are three sites within the Humber MAREA scoping study area that have been identified as possible SACs (pSAC)- sites that have had Cabinet Committee approval to go to consultation. There are:

- North Norfolk Sandbanks and Saturn Reef pSAC;
- Inner Dowsing, Race Bank and North Ridge pSAC; and
- Hainsborough, Hammond and Winterton pSAC.

A site remains a pSAC until it is submitted to the European Commission. The North Norfolk Sandbanks and Saturn Reef pSAC was subject to public consultation from December 2007 to March 2008. This site will be submitted to the European Commission as soon as issues that were raised during consultation are resolved by JNCC and Defra. The other two pSACs listed above were subject to consultation from November 2009- February 2010. Following an analysis of the consultation responses, JNCC will issue a report on the status of these pSACs.

North Norfolk Sandbanks and Saturn Reef possible SAC (pSAC) This large offshore pSAC consists of 10 main sandbanks and a number of smaller banks, which collectively form the most extensive example of offshore linear ridge sandbanks in UK waters. The pSAC site area is approximately 3,600 km². The sandbanks are home to invertebrate communities typical of sandy sediments, such as polychaetes, crabs and brittlestars. One particular polychaete, the ross worm *Sabellaria spinulosa*, is capable of creating biogenic reef structures through consolidating thousands of fragile sand-tubes to create a solid structure that rises from the seabed. The Saturn Reef, which was recorded within the pSAC area was such a structure. North Norfolk Sandbanks and Saturn Reef pSAC was subject to public consultation from December 2007 to March 2008 and is awaiting submission to the European Commission.



KEY:	
	Licence Area
	Application Area
	RAMSAR
	Sites of Special Scientific Interest
	Special Protection Area
	Special Area of Conservation
	Possible Special Area of Conservation
	National Nature Reserve
	Local Nature Reserve
	Area of Outstanding Natural Beauty
	Ancient Woodland
	Heritage Coast

CLIENT: **Humber Aggregate Dredging Association**

SIZE: **A4**

ERM
Eaton House
Wallbrook Court
North Hinksey Lane
Oxford, OX2 0QS
Tel: 01865 384800
Fax: 01865 204982

SOURCE: Reproduced from Ordnance Survey digital map data. © Crown copyright. All rights reserved. 2009 License number 0100031673; © English Nature, 100017954 2009
PROJECTION: WGS 1984 UTM Zone 31N

TITLE: Figure 4.11 Marine Nature Conservation Areas		
DATE: 19/04/2010	CHECKED: HV	PROJECT: 0098617
DRAWN: IG	APPROVED:	SCALE: As Scale Bar
DRAWING: SR0310_ConservationAreas.mxd		REV: 0

The Inner Dowsing, Race Bank and North Ridge possible SAC (pSAC) falls within the MAREA scoping study area off the south Lincolnshire coast in the vicinity of Skegness. A wide range of sandbank types are found in the area including banks bordering channels, linear relict banks, sinusoidal banks with distinctive subsidiary banks, associated channels and biogenic reef of *Sabellaria spinulosa*. The site has been selected as a possible SAC for its Annex I habitats Sandbanks which are slightly covered by seawater all the time and *Sabellaria spinulosa* biogenic reef.

The Haisborough, Hammond and Winterton pSAC site lies off the north east coast of Norfolk, in close proximity to the MAREA scoping study area. The pSAC contains a series of sandbanks which meet the Annex I habitat description, 'Sandbanks slightly covered by sea water all the time'. The infaunal and epifaunal communities found on the crests of the sandbanks within the site are relatively species-poor as a result of this highly dynamic sediment environment and the associated impacts of disturbance, smothering and scour.

The Wash and North Norfolk Coast SAC is the second-largest area of intertidal flats in the UK. Sandy intertidal flats predominate, with some soft mudflats in the areas sheltered by barrier beaches and islands along the north Norfolk coast. The biota include polychaetes, bivalves and crustaceans. On this site sandy sediments occupy most of the subtidal area, resulting in one of the largest expanses of sublittoral sandbanks in the UK. The site is also important for reefs, *Salicornia* and other annuals that colonise mud and sand, Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*), and as a habitat for the Common seal and Otter.

The Wash and North Norfolk Coast SAC overlaps geographically with the **North Norfolk Coast SPA** and **The Wash SPA**. The Wash and North Norfolk Coast SPA adjoin. Breeding terns, particularly sandwich tern (*Sterna sandvicensis*) and wintering sea-ducks regularly feed outside the North Norfolk Coast SPA, in the adjacent coastal waters of The Wash and North Norfolk Coast SAC. The North Norfolk SPA has some of the best examples of saltmarshes in Europe.

The Wash SPA is of outstanding importance for a large number of geese, ducks and waders, both in spring and autumn migration periods, as well as through the winter.

The **Gibraltar Point SPA** lies to the north of The Wash and consists of an actively accreting sand-dune system, saltmarsh and extensive intertidal flats. The site accommodates large numbers of overwintering birds and significant colonies of breeding terns. The site is also important for waders during the spring and autumn passage period.

The Humber Estuary SAC is the second-largest coastal plain estuary in the UK, and the largest coastal plain estuary on the east coast of Britain. Habitats within the Humber Estuary include Atlantic salt meadows and a range of

sand dune types in the outer estuary, together with subtidal sandbanks, extensive intertidal mudflats, glasswort beds, and coastal lagoons. The estuary is also an important habitat for Sea lamprey, River lamprey and Grey seals. Within the Humber SAC the **Humber Estuary SSSI** is designated. This site consists of seven biological and geological SSSIs which were previously designated separately. Components of this SSSI are similar to the Humber SAC components and include saline lagoons, sand dunes, invertebrate assemblage, wintering and passage waterfowl species, breeding bird assemblage, breeding colony of grey seals, river and sea lamprey plus the geomorphology of Spurn and the cliff and foreshore at South Ferriby.

The Humber Flats, Marshes and Coast (Ramsar site and SPA) are designated for vegetation interests including extensive reedbeds, areas of saltmarsh and brackish pools. They support internationally important numbers of various species of breeding and wintering water birds as well as many passage birds, notably internationally important populations of ringed plover *Charadrius hiaticula*, and sanderling *Caldris alba*. Donna Nook supports Britain's most southeastern breeding colony of grey seal *Halichoerus grypus*.

Potential Impacts of Aggregate Extraction

Aggregate extraction has the potential to cause adverse effects to sites or species designated under nature conservation legislation through one or more of the following mechanisms:

- Direct impacts- eg loss of, or damage to, designated habitats or species themselves.
- Indirect/secondary impacts- eg change in seabed topography and substrate type or alteration of sediment transport processes and pathways which affects site integrity over time.
- In-combination effects of aggregate extraction with other activities which together cause an adverse effect on a habitat or species.

The following potential impacts on nature conservation features were specifically noted during consultation:

- Impacts from aggregate extraction on coastal and offshore designated sites.
- Impacts on Annex I habitats and Annex II species.
- Impacts on marine species and habitats that are outside of the Natura 2000 Network but that are considered to be of nature conservation value.
- Impacts of beach recharge on coastal receptors, including designated sites and habitats.

The RAG guidance includes recommendations to take account of EU birds and Habitats Directive sites and Biodiversity habitats and species Action Plans (UKBAP) but also any habitats and species proposed as Nationally Important Marine Features (NIMFs) and OSPAR MPAs.

Information Sources

- Seazone Hydrospatial will be used as the primary baseline database.
- MAGIC interactive web-based mapping tool www.magic.gov.uk.
- The Joint Nature Conservation Committee (JNCC) website www.jncc.gov.uk and reports.
- The Centre for Environment, Fisheries and Aquaculture Science (Cefas) www.cefas.co.uk/ and reports.
- Natural England's information on The Southern North Sea Marine Natural Area.
- The Marine Life Information Network for Britain and Ireland (MarLIN) www.marlin.ac.uk.
- Site Selection Assessment for current and proposed SAC's and SPA's.
- Consultation with JNCC about Natural England to identify any forthcoming proposals for additional protected areas.
- Information from Areas of Outstanding Natural Beauty (AONB) website, www.aonb.org.uk.

4.4 HUMAN ENVIRONMENT

4.4.1 Commercial and Recreational Fisheries

Regional Baseline Overview and Key Issues

The range of fishing activities within the Humber MAREA scoping study area is diverse, particularly in the inshore waters to the south of the area. Given the lack of natural harbours throughout the region, many of the smaller vessels fishing inshore operate from the beach. In the north of the MAREA scoping study area and along the Holderness coast, the inshore fishery is dominated by static gears, predominantly shellfish potting for brown crab (*Cancer pagurus*), velvet crab (*Necora puber*) and lobster (*Homarus gammarus*). The shellfish fisheries in this region are nationally significant and landings of lobster are the highest in the UK.

North Eastern Sea Fisheries Committee (NESFC) sea bass (*Dicentrarchus labrax*) has been certified as sustainable by the Marine Stewardship Council

(MSC) since December 2007. It is fished along the Holderness coast between Flamborough Head and Spurn Point, using intertidal fixed gill-nets which run straight out from the shore up to a maximum distance of 180 m. The nets are shot from a series of permanent marked, fixed positions along the coast. They are examined and cleared of fish twice a day and because they are intertidal, they spend between 6 and 12 hours a day partially dry and therefore not fishing.

Southern North Sea nephrops (*Nephrops norvegicus*) is also fished in the region and is currently undergoing assessment to attain certification as an MSC fishery. The NESFC Lobster (*Homarus gammarus*) fishery was also submitted for MSC certification, but was denied on the basis of data standards in 2007. The fishery was given three years to conduct an ecologically focussed fisheries study and to resubmit the data by 2010 for re-assessment.

Inshore fin fisheries along the Holderness coast tend to be dominated by gill nets targeting gadoids (cod and whiting), Dover sole (*Solea solea*) and sea bass (*Dicentrarchus labrax*). There had previously been an increase in long-lining in this area, but feedback during consultation stated that there are currently only two over 10 m vessels that use long-lining and that effort is currently negligible due to lack of quota. There are a few under 10m vessels that still fish for quota and non-quota species using long-lines, but most have already run out of quota and in respect of non-quota species, there are more successful methods of catching the species such as gill or trammel nets.

Fisheries activity in The Wash area and along the Lincolnshire and North Norfolk coast is similar to that of the Holderness coast, with shellfish, cod, rays and sea bass being particularly important. There are also a limited number of boats that beam-trawl for fin fish on a seasonal basis, particularly for flat fish species, and also for brown shrimp (*Crangon crangon*). There is an important molluscan shell-fishery in the region which targets cockles (*Cerastoderma edule*) and mussels (*Mytilus edulis*) and is predominantly targeted by larger (over 10 m) vessels.

Regional Baseline Overview and Key Issues – Offshore Fisheries

For the purpose of the MAREA, 'offshore fisheries' have been classified as waters outside the 12 nautical mile limit. A range of European member states fish offshore with the majority of effort being concentrated in the northeast of the Humber MAREA scoping study area. Offshore fishing effort in the southeast is also high, although there are no production licences, application or prospecting areas in this part of the MAREA study area. Vessels from Denmark and the Netherlands dominate the over-flight recordings data in the offshore region, and vessels from the UK, Belgium and France are also prevalent.

Over-flight data indicate that the principal mobile fishing activity taking place offshore in the MAREA area is beam trawling for cod, plaice and sole, with some limited otter and pair trawling for demersal species being carried

out by Danish and French vessels.

Regional Baseline Overview and Key Issues – Recreational Fishing

Angling is regarded as being one of the largest participation sports in the UK. The Holderness coast supports the two largest shore angling matches in Europe. Shore anglers target a wide range of species including cod and whiting during the winter, and bass, rays, smoothhound and flatfish during the summer and autumn. Boat anglers will also target these species in addition to ling, haddock, pollack and tope. Boat anglers, both charter and private owners, tend to fish features such as wrecks and reefs, however there are some sand banks and gravel beds that are key boat angling spots.

Potential Impacts of Aggregate Extraction

The potential impacts on commercial and recreational fisheries arising from marine aggregate extraction include:

- Direct and secondary effects on commercially important fish or shellfish species that have knock-on effects for fisheries that target them. This includes potential damage to fish and shellfish from dredging operations, changes in behaviour, impacts to spawning or nursery grounds, impacts to prey populations or changes in the distribution of fish or shellfish arising from dredging operations (see *Section 4.3.3*).
- Loss of fishable area within licensed dredging areas.
- Increased risk of collision between dredging vessels and fishing vessels.
- Potential changes to sea-bed topography which can affect fishing activities (such as trawling).
- The possibility of damage to fishing gears (eg direct damage to nets/pot/long lines from dredgers).
- Potential 'squeeze effect' on adjacent areas (increased fishing pressures) as a result of displacement of effort from aggregate dredging areas.
- Possible economic effects in the commercial and recreational fishing sectors.

Consultee responses confirmed the importance of the Greater Wash and Humber area to local and regional fisheries. Numerous concerns regarding the impact on fisheries from aggregate extraction were raised, with potential impacts to spawning grounds, crab populations and loss of fishing grounds due to new licence areas being particularly highlighted. It was also noted that the dredging activities used at different points in the tidal cycle has a large influence on the impact on fisheries. For example, if screening takes place outside of slack water the impact will affect a much greater area than if it

occurs during slack water. In addition there are concerns that occasional emergency load dumping is impacting important crabbing and lobster grounds.

Finally, potential impacts to fisheries from beach nourishment and beach recharge were highlighted as a concern by consultees, particularly with regards to impacts to potentially important nursery grounds (eg of juvenile shrimp). Assessment of impacts arising from the use of aggregates is outside the scope of the MAREA, but reference will be made to other studies that investigate these impacts (eg the five-yearly reviews of the Lincshire beach nourishment programme that is undertaken by the Environment Agency to provide sea defence between Mablethorpe and Skegness on the Lincolnshire coast).

Information Sources

- Cefas Fisheries Research Technical Reports.
- Marine Management Organisation landings data by ICES rectangle.
- North Eastern Sea Fisheries Committee Reports.
- Eastern Sea Fisheries Joint Committee Research Reports.
- Environmental Statements for aggregate licence applications and wind farm developments in the region.
- A range of reports carried out by Precision Marine Surveys Limited.
- Additional published reports and papers.
- Up-to-date overflight and VMS (Vessel Monitoring System Data).

The commercial inshore fisheries of the Holderness coast and Greater Wash, are reasonably well described; however, much of the information available is derived from anecdotal sources.

4.4.2 *Archaeology and Cultural Heritage*

Regional Baseline Overview and Key Issues – Prehistoric Archaeology

Information regarding Prehistoric Archaeology is separated into three main periods:

- Devensian (c.110,000 to 13,500 Before Present (BP)), the last ice age in Britain;
- Pre-Devensian (c.700,000 to 110,000 BP); and
- Post-Devensian (c.13,500 to 6,000 BP).

The known submerged prehistoric archaeology of the MAREA study area is sparse, with the exception of a relatively small number of sites and finds.

The effects of sea level fluctuations and the numerous glacial and marine transgressions and regressions have at times caused the floor of the North Sea to be dry and outside the limits of the ice. During these periods, an inhabitable environment may have been exposed in the MAREA scoping study area which was suitable for human exploitation.

Three major glaciations are known to have taken place since the date of the earliest record of human activity in Britain (c.700,000 BP); the Anglian glacial (478,000 to 423,000 BP), the Wolstonian glacial (380,000 to 130,000 BP) and the Devensian glacial (110,000 to 13,500 BP), and it is assumed that the study area was covered by ice during each of these glacial episodes. It has long been suggested that any archaeological deposit which was subsequently covered by an ice sheet would be completely destroyed and scattered (Flemming, 2002). Consequently there is a limited potential for Pre-Devensian and Devensian archaeological sites and artefacts to remain *in situ* within the MAREA scoping study area, although the potential remains for the presence of derived artefacts which were transported by the Devensian ice sheet.

Following the retreat of the Devensian ice sheet (c.13,500 BP), the climate began to ameliorate. Before its inundation in the Late Mesolithic (c.7,000 BP) the study area would have provided a temperate environment in which human activity may have occurred. There is thus the potential for both *in situ* and derived Post-Devensian archaeological material to be present within the MAREA scoping study area.

Regional Baseline Overview and Key Issues – Maritime Archaeology

The known maritime resource (ie sites that have been located on the seabed) within the MAREA scoping study area is predominantly derived from United Kingdom Hydrographic Office (UKHO) records, although the National Monuments Record (NMR) and the relevant Historic Environment Records (HERs) may also hold some records of known sites. Known wreck data recorded within the Seazone Hydrospatial database are plotted in *Figure 4.12*. However, in these records there will be a bias towards vessels dating from the 19th century onwards due largely to the higher potential for structures of ferrous material to be identified on the seabed through geophysical survey. Consequently, the potential for maritime sites within the Humber MAREA study area cannot be reliably quantified based on the *known* maritime resource alone. Similarly, the *potential* maritime resource is partly based on reported shipping casualties and is compiled within the database held by the NMR. However, prior to the advent of the Lloyds list of shipping casualties in 1741, there was no official record of ship losses, causing the record of shipping casualties to be biased towards wrecking incidents which occurred from the mid-18th century onwards.

There is the potential for the remains of watercraft dating from the

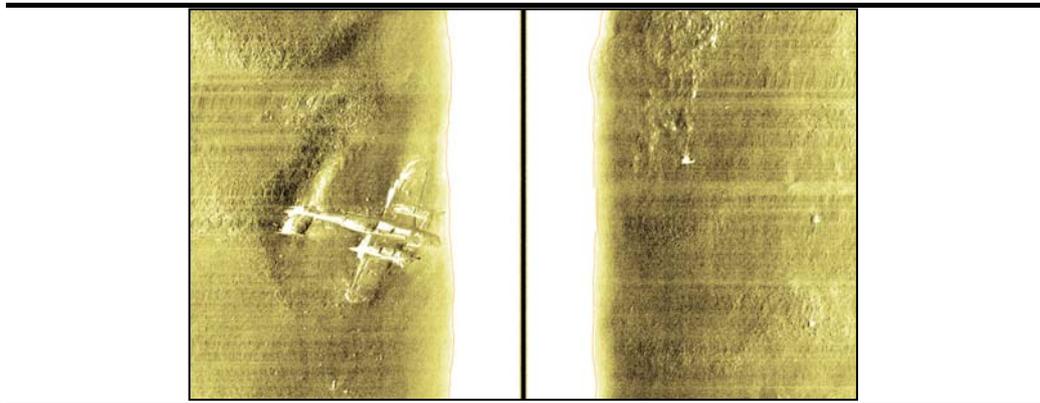
Mesolithic period onwards within the MAREA scoping study area.

The nearest protected wreck to the study area is the *Bonamie Ricard*, which lies to the north of the study area.

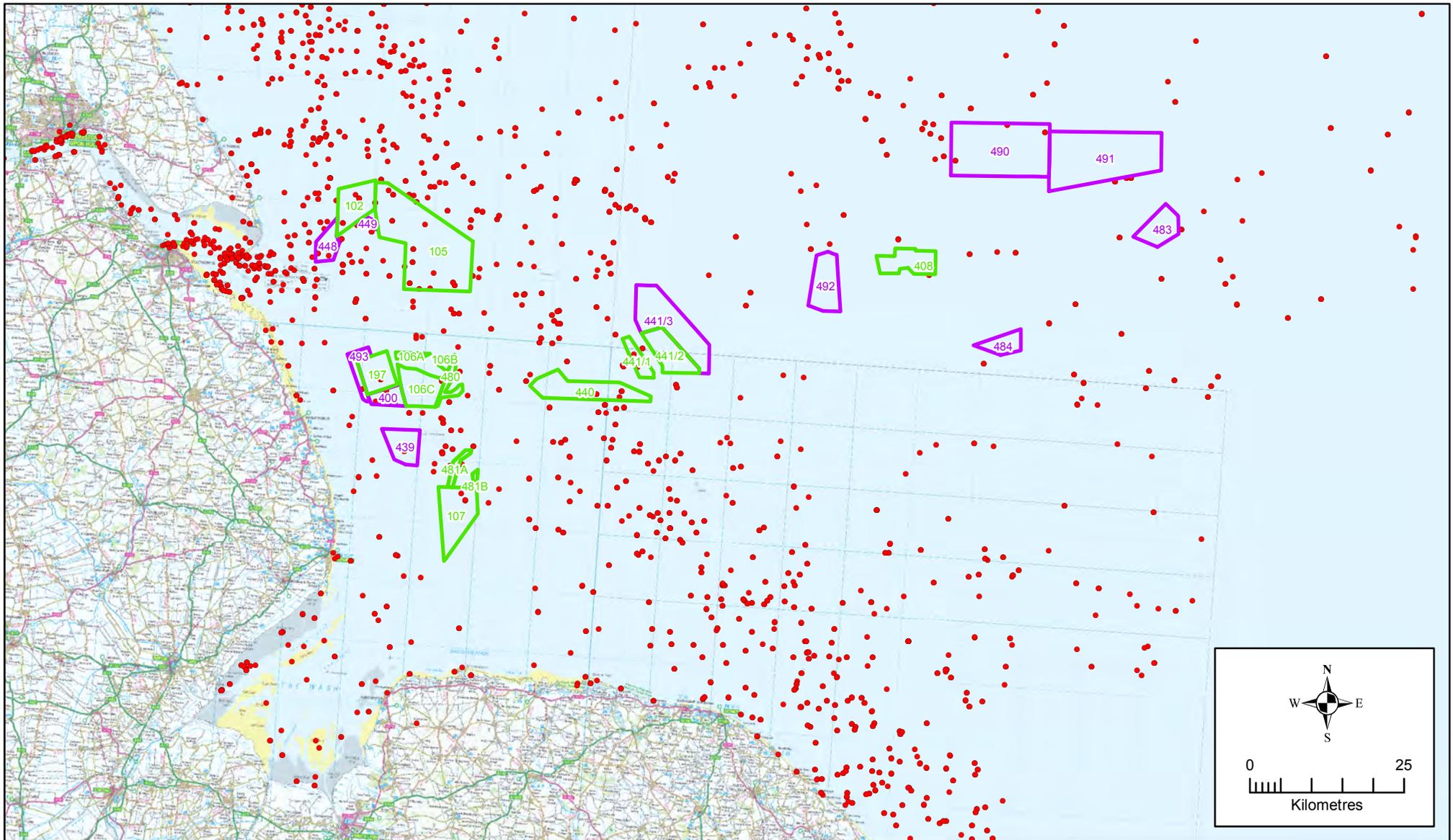
Regional Baseline Overview and Key Issues – Aviation Archaeology

Since the advent of powered human flight in the early 20th century, thousands of military and civilian aircraft have been lost around the UK. Although records of aircraft losses at sea are extensive, data regarding the physical location of their remains is limited. Records of known aircraft crash sites are predominantly held by the UKHO. There is no single definitive list of aircraft losses in UK territorial waters. The NMR lists records relating to aircraft crash sites as Named Locations, comprising aircraft that are known to have crashed at sea, but for which there are currently no known remains on the seabed.

The physical remains of any aircraft which crashed while in military service are automatically protected by the Protection of Military Remains Act (1986).



Source: Wessex Archaeology



KEY:	
	Licence Area
	Application Area
	Wrecks

CLIENT:	Humber Aggregate Dredging Association	SIZE:	A4
ERM Eaton House Wallbrook Court North Hinksey Lane Oxford, OX2 0QS Tel: 01865 384800 Fax: 01865 204982			
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TITLE:			Figure 4.12 Known Ship Wrecks
DATE: 29/03/2010	CHECKED: HV	PROJECT: 0098617	
DRAWN: FS	APPROVED:	SCALE: As Scale Bar	
DRAWING:			SR0310_ShipWreck.mxd
			REV: 0

Potential Impacts of Aggregate Extraction

Archaeological resources can be adversely affected by various aspects of dredging operations. The following potential impacts of aggregate extraction on the historic environment are identified by Marine and Aggregate Dredging and the Historic Environment Guidance Note (2003):

- Aggregate extraction may result in the direct loss of known and unknown archaeological resources such as wrecks, artefacts and *in-situ* features that are found within and beneath sands and gravels of the extraction areas. This would arise when such objects/ artefacts are removed from their current position and location within the sediment and lost within the volume of dredged material during the physical operation of aggregate extraction.
- Dredging may have an impact on artefacts, wrecks, prehistoric sites and deposits of interest outside dredging areas, depending on regional patterns of erosion, deposition and sediment transport. Increases in suspended sediments from dredge plumes may also be deposited beyond the dredging area. An increase in turbulence has the potential to impact such features of interest.
- Aggregate extraction has the potential to impact upon the wider environment through physical, biological and chemical effects. These impacts can influence baseline conditions, (beyond those that would be expected through natural variations) resulting in the potential to affect archaeological and historical resources.

Consultee responses identified the key issues of concern to be increased turbulence around wreck sites and potential impacts to palaeo sites. Beach recharge was regarded as a potential concern to historical features however most of the archaeological features in this region are located further inshore. In addition, impacts associated with the eventual use of marine aggregates are outside the scope of the MAREA.

Information Sources

- Records of wrecks and obstructions listed by the UKHO.
- Maps of aircraft wrecks produced by English Heritage based on Ministry of Defence (MoD) records.
- Records of Named Losses and terrestrial sites held by the National Monuments Record (NMR).
- Records regarding archaeological sites held by the Lincolnshire Historic Environment Record (LHER), the North Lincolnshire Historic Environment Record (NLHER), the North East Lincolnshire Historic Environment Record (NELHER), the Norfolk Historic Environment

Record (NHER) and the Humber Archaeology Partnership (HAP).

- Details of droits (eg flotsam and jetsam) held by the Receiver of Wreck.
- Sites protected under the Protection of Military Remains Act (1986), provided by the Ministry of Defence.
- Secondary sources relating to the palaeo-environment and to the Palaeolithic and Mesolithic archaeology of Northern Europe, including the following ALSF projects: *Seascapes: Southwold to Clacton* (Oxford Archaeology 2007), *Seabed Prehistory* (Wessex Archaeology 2008b) and *Artefacts from the Sea* (Wessex Archaeology 2003b, 2004).
- Secondary sources relating to historic shipping patterns, as well as those sources relating to known and potential wreck sites and casualties, including the ALSF *England's Shipping* (Wessex Archaeology 2003) and *Navigational Hazards* projects (Bournemouth University 2007).
- ALSF *Air Crash Sites at Sea* (Wessex Archaeology 2008) and various secondary sources relating to historic aviation patterns.
- Modern admiralty charts and geological maps
- Results from the Regional Environmental Characterisation geophysical surveys will be incorporated when available.
- Results from research undertaken by Birmingham University on Mesolithic landscapes (eg Doggerland) could be valuable as landscapes of similar potential are thought to occur within the study area.

4.4.3 *Shipping and Navigation*

Regional Baseline Overview and Key Issues - Ports

There are a number of ports along the coasts of Norfolk, Lincolnshire and East Riding of Yorkshire varying in size from small fishing ports to busy commercial ports. The five key ports in the MAREA study area are the Ports of Immingham, Hull, Grimsby, Goole and King's Lynn. The extent of the areas governed by the relevant port authorities are shown in *Figure 4.13*.

Associated British Ports (ABP) operates all of these ports and as the Harbour and Pilotage Authority, manages the navigational safety of the Humber Estuary and the rivers Ouse, Trent and the Humber. The management of safety navigation in The Wash is the responsibility of the King's Lynn Conservancy Board Port and Pilotage Authority.

Immingham is the largest port in the area and Immingham and Grimsby and Killingholme, are the UK's largest port group by tonnage (65.3 Mt) (Department for Transport, 2009). Traffic on the River Humber totalled 91.1 million tonnes in 2008. The leading ports by tonnage are Grimsby &

Immingham (70 %), Hull (14 %) and wharves on the Rivers Hull and Humber (11 %) (Department for Transport, 2009).

At the present time there are plans and proposals in place for the expansion of several ports in the Humber MAREA area, namely:

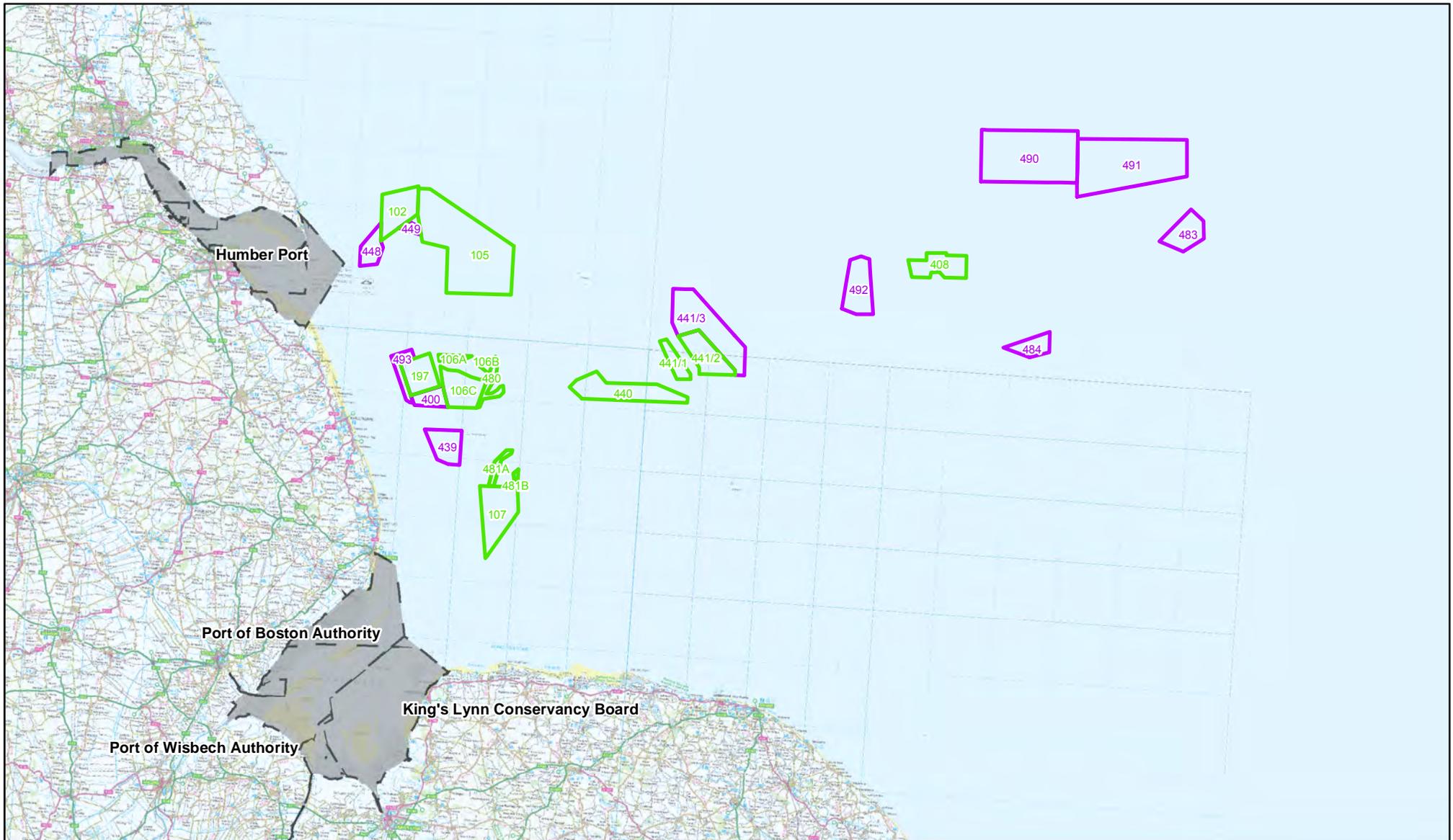
- Grimsby Riverside roll-on, roll-off (RoRo) Terminal, also known as 'Grimsby Outer Harbour' for larger car ferries and European traffic. The plan involves developing a five berth Ro-Ro terminal in a tidal harbour dredged into the foreshore at Immingham.
- Hull Riverside Container Terminal – Quay 2005. Approval was granted in 2005, although there is currently no confirmed start date for the works.
- Hull Riverside Bulk Cargo
- Humber Sea Terminal.

The River Humber is the busiest commercial estuary in the UK with approximately 40,000 vessel movements per year (Hull and Goole Port Health Authority, 2010). Vessels contributing to this total include regular movements by cargo vessels, ferries and tankers, as well as cruise ships, fishing vessels and dredgers.

Traffic in the region has increased by nearly 40 percent between 2005 and 2007 (Department for Transport, 2008). The density of yachting and pleasure craft activity fluctuates seasonally. Shipping traffic to and from the ports in the Humber Estuary and The Wash passes through the MAREA study area. Some of the world's busiest shipping lanes are found in this region with merchant vessels accounting for the majority of the vessels using the area, followed by tankers. In addition to the ports previously mentioned, traffic associated with east coast ports such as Tees and Forth also pass through the area.

Ferries connecting the east coast of England to the Netherlands and Belgium run directly through the of the Humber MAREA study area on a daily basis. Ferries running from Newcastle to Amsterdam pass along the eastern boundary of the study area.

There are also a number of vessel movements associated with oil and gas platforms and with current and future offshore wind farm construction.



KEY:

- Licence Area
- Application Area
- Port Authority Limit

0 20
Kilometres

CLIENT: **Humber Aggregate Dredging Association**

SIZE: **A4**

ERM
Eaton House
Wallbrook Court
North Hinksey Lane
Oxford, OX2 0QS
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Fax: 01865 204982

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PROJECTION: WGS 1984 UTM Zone 31N

TITLE: **Figure 4.13 Port Authority Limits**

DATE: 29/03/2010	CHECKED: HV	PROJECT: 0098617
DRAWN: FS	APPROVED:	SCALE: As Scale Bar
DRAWING: SR0310_PortLimits.mxd		REV: 0

Navigation issues are managed by Trinity House. They are often site-specific in nature and are addressed by conditions for individual aggregate licence areas. The MAREA will therefore focus on key navigational features and issues at the regional scale, which may be affected by the cumulative effects of dredging in multiple licence areas and the in-combination effects of dredging vessels together with vessels from other industry sectors.

The main navigational feature in the MAREA study area is the Humber Traffic Separation Scheme (TSS), which lies close to the mouth of the Humber. The TSS is an internationally recognised routing measure established by the International Maritime Organisation (IMO) in 2001, with the aim of separating opposing streams of shipping traffic and reducing the likelihood of ship-to-ship encounters and hence collisions.

The TSS has three sets of traffic lanes:

- Northeast approaches via New Sand Hole;
- Eastern approaches via Sea Reach; and
- Southeast approaches via Rosse Reach.

The three sets of lanes converge in a Precautionary Area centred 5 miles east-southeast of Spurn Head (where pilots normally board), and all traffic is then routed via a single TSS west and northwest into the River Humber. Pilotage is compulsory for vessels over 60 m in length and all vessels carrying dangerous substances in bulk. The New Sand Hole TSS is due to be extended from 1st July 2009. This will apply to both the inbound and outbound traffic. The inbound traffic will be extended from the Outer Brinks to the Humber, and the outbound traffic from the Mid New Sand to the North New Sand (Associated British Ports, 2009). The Humber Deep Water Anchorage will be realigned and extended (Associated British Ports, 2009).

The statutory harbour authorities for the ports (eg ABP) in the area are responsible for navigational safety to and from the ports. Maintenance dredging campaigns are periodically carried out to ensure water depths are sufficient to allow vessels to navigate and manoeuvre safely. Deepening of navigational channels may also be carried out in the area. At present there are plans in place for the following dredging activities in the Humber MAREA scoping area:

- Immingham Oil Terminal approach channel dredge; approval is being sought to improve access for tankers by dredging a deeper channel and for the disposal of associated waste through the Humber Estuary.
- Sunk dredge channel, maintenance dredging.
- Hawk Channel, maintenance dredging.

Spurn Bight is designated as a Marine Environmental High Risk Area (MEHRA). MEHRA's are defined as "comparatively limited areas of high sensitivity which are also at risk from shipping. There must be a realistic risk of pollution from merchant shipping." The purpose of designating areas as MEHRA's is to improve the safety of shipping in the area and increase protection of the environment, by reducing the potential for incidents and collisions.

There are numerous navigational hazards that exist within the Humber MAREA study area. These include ship wrecks on the seafloor, oil and gas infrastructure such as pipelines and associated wellheads.

Ship wrecks are found throughout the study area with densities increasing in areas of increased vessel traffic ie near the Humber TSS. Protocols for avoiding interactions with wrecks in and around licence areas are specified in the conditions that are set for individual licence areas.

Offshore installations associated with the oil and gas industry are plentiful in the Greater Wash area. Pipelines used for the transportation of oil, gas and chemicals are found throughout the study area (see also *Section 4.4.4*). Wellheads are in abundance in the region, particularly in the north and northeast of the scoping study area.

There are also a number of approved and planned offshore wind farms within the study area. This includes developments in close proximity to the Humber Estuary (Humber Gateway & Westernmost Rough) as well as those off the Lincolnshire coast (Lynn, Inner Dowsing & Lincs) and further offshore at Docking Shoal, Race Bank and Triton Knoll (see *Section 4.4.4* for further details).

In addition an RAF bombing range is in use at Donna Nook located on the Lincolnshire coast to the west of the study area. The study area is located within the area covered by the Air Defence Radars at Staxton Wold near Scarborough, north Yorkshire.

Navigation aids are found throughout the MAREA study area around potential hazardous features. These are to:

- Mark existing natural dangers to navigation, such as shoals and sandbanks (the location of which or even the continued need for marking could be affected by dredging activities).
- Provide waypoints for vessels transiting the area.
- Mark Traffic Separation Schemes established by international agreement.
- Mark man-made obstructions such as wrecks considered to be a danger to navigation.

Potential Impacts of Aggregate Extraction

The potential impacts to shipping and navigation that may result from aggregate extraction at the regional scale (which will be the focus of the MAREA) include:

- Physical interaction between aggregate extraction, port development dredging and disposal.
- Marine traffic issues associated with approaches to ports.
- Potential effects upon navigation routes and increased risk of vessel collision.

Some consultees highlighted the potential impacts of aggregate extraction on buoys and mooring systems, and other navigational aids within close proximity to aggregate areas, but also within approaches to ports and harbours where floating aids are provided for navigation.

Information Sources

- Admiralty charts and publications.
- Seazone Hydrosatial will be used as the primary baseline database.
- Associated British Ports (ABP) website <http://www.abports.co.uk/>.
- Passage plans obtained from Ship Operators.
- Consultation with local ports and pilots.
- AIS survey data for the region.
- Fisheries data (overflight and satellite data).
- Recreational activity data from RYA.
- Historical shipping accident data for region.
- MGN 371 Offshore Renewable Energy Installations (OREIs) - Guidance on UK Navigational Practice, Safety and Emergency Response Issues. Annex 1 provides good guidance on Traffic Surveys.

4.4.4 *Offshore Developments*

Regional Baseline Overview and Key Issues – Offshore Wind Farms

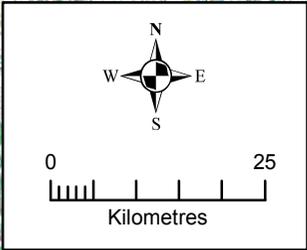
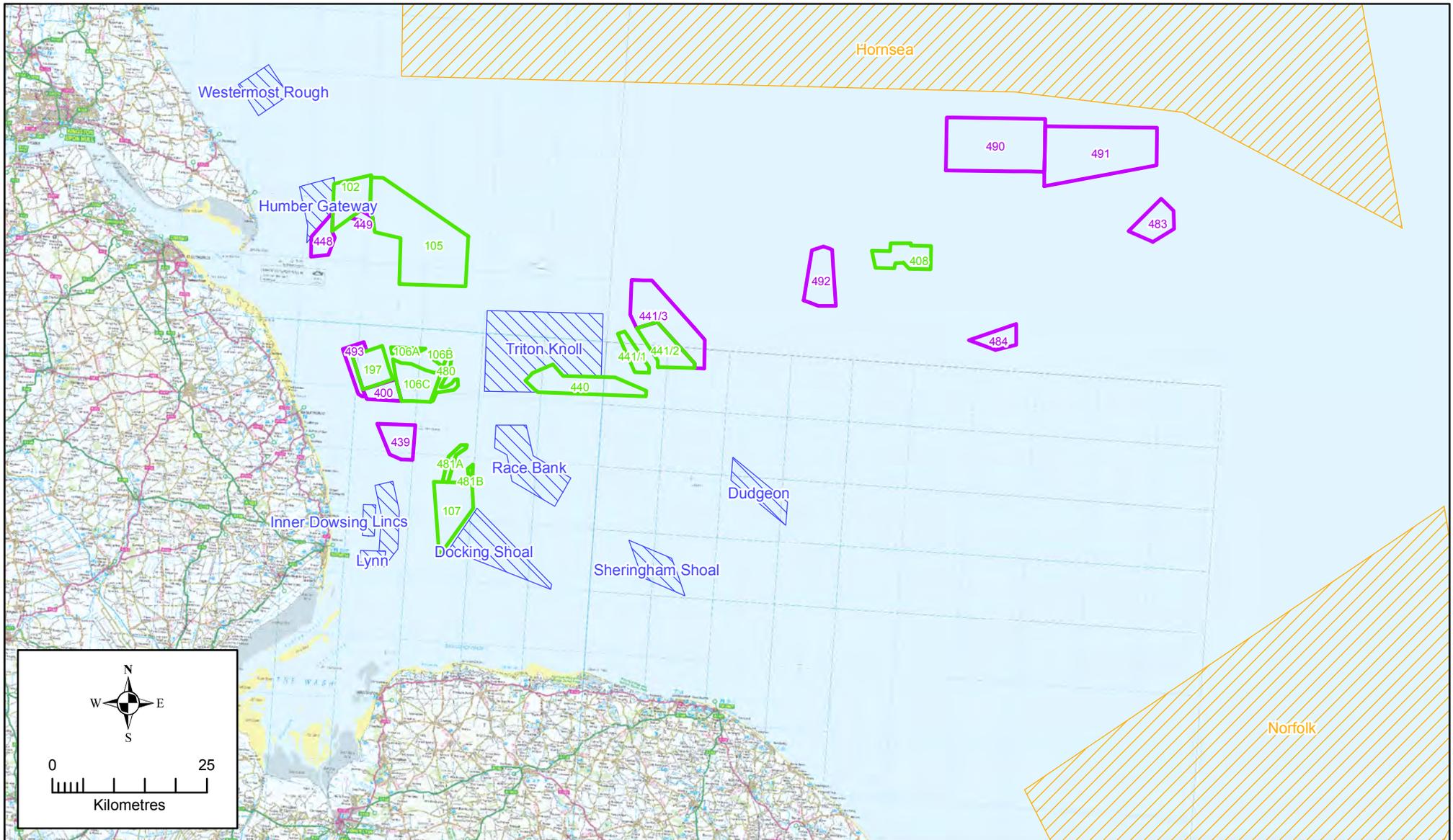
There are a number of proposed and existing offshore wind farms (OWFs) within the Humber MAREA study area, as shown *Figure 4.14*. Currently,

there are two operational OWFs in the area: the Lynn and the Inner Dowsing OWFs (total 57 turbines). These are adjacent to one another in the south west of the study area and first supplied power to the National Grid in May 2008. Approval for construction has also been granted to Cromer OWF although the application was subsequently withdrawn. A significant number of additional Round 1 and 2 offshore wind farms are proposed for or operational within The Wash area, and the status of each is shown in *Table 4.2*. These proposed wind farm sites are all located within the Humber MAREA study area, directly adjacent to dredging areas or up to distances of 25 km away.

Table 4.2 *Round 1 and 2 Offshore Wind Farms*

<i>Wind Farm</i>	<i>Round 1 or 2</i>	<i>Status</i>
Docking Shoal	Round 2	Application Submitted
Dudgeon	Round 2	Application Submitted
Humber Gateway	Round 2	Application Submitted
Inner Dowsing	Round 1	Operational
Lincs	Round 2	Approved
Lynn	Round 1	Operational
Race Bank	Round 2	Application Submitted
Sherringham Shoal	Round 2	Approved
Triton Knoll	Round 2	Pre-application
Westermost Rough	Round 2	Application Submitted

Three of the potential Round 3 zones identified by The Crown Estate are within, the southern north sea MAREA study area: Dogger, Hornsea and Norfolk. The Hornsea zone in particular lies relatively close to two of the offshore prospecting areas (areas 490 and 491). The exact positions of the eventual wind farm development zones are likely be refined during the lifetime of the MAREA as a result of consultation feedback on the UK Offshore Energy Strategic Environmental Assessment Report and additional studies by The Crown Estate and wind farm developers. The MAREA project team will need to stay up-to-date with these changes to ensure that potential in-combination impacts can be fully addressed in the MAREA.



KEY:	
	Licence Area
	Application Area
	Windfarms Round One and Two
	Windfarms Round Three

CLIENT:	Humber Aggregate Dredging Association	SIZE:	A4
ERM	Eaton House Wallbrook Court North Hinksey Lane Oxford, OX2 0QS Tel: 01865 384800 Fax: 01865 204982		
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TITLE:			Figure 4.14 Windfarms
DATE: 29/03/2010	CHECKED: HV	PROJECT: 0098617	
DRAWN: FS	APPROVED:	SCALE: As Scale Bar	
DRAWING:			SR0310_Windfarms.mxd
REV:			0

The Greater Wash area is a very important area in terms of gas exploration and exploitation. There are a number of gas and gas condensate pipelines passing through the MAREA study area. The main pipelines present are detailed in *Table 4.3* and shown in *Figure 4.15*. Many of these pipelines pass relatively close to the dredging extraction areas, and some lie within the boundaries of them eg Viking to Theddlethorpe passes through Area 484.

Table 4.3 *Key Existing Gas Pipelines*

<i>Name</i>	<i>Type</i>	<i>Operator</i>
Amethyst to Easington	Gas	British Petroleum
Langeded to Easington	Gas	Gassco
Cleeton to Easington	Gas condensate	British Petroleum
West Sole to Easington	Gas	British Petroleum
Rough to Easington	Gas	British Gas
Viking to Theddlethorpe	Gas	ConocoPhillips
Valiant to Theddlethorpe	Gas	ConocoPhillips
Murdoch to Theddlethorpe	Gas	ConocoPhillips
Loggs to Mablethorpe	Gas	ConocoPhillips
Lancelot to Bacton	Gas	Perenco
Clipper Point to Bacton	Gas	Shell UK E&P

There are also numerous wellheads, particularly in the north and northeast of the study area, within or in close proximity to several dredging areas.

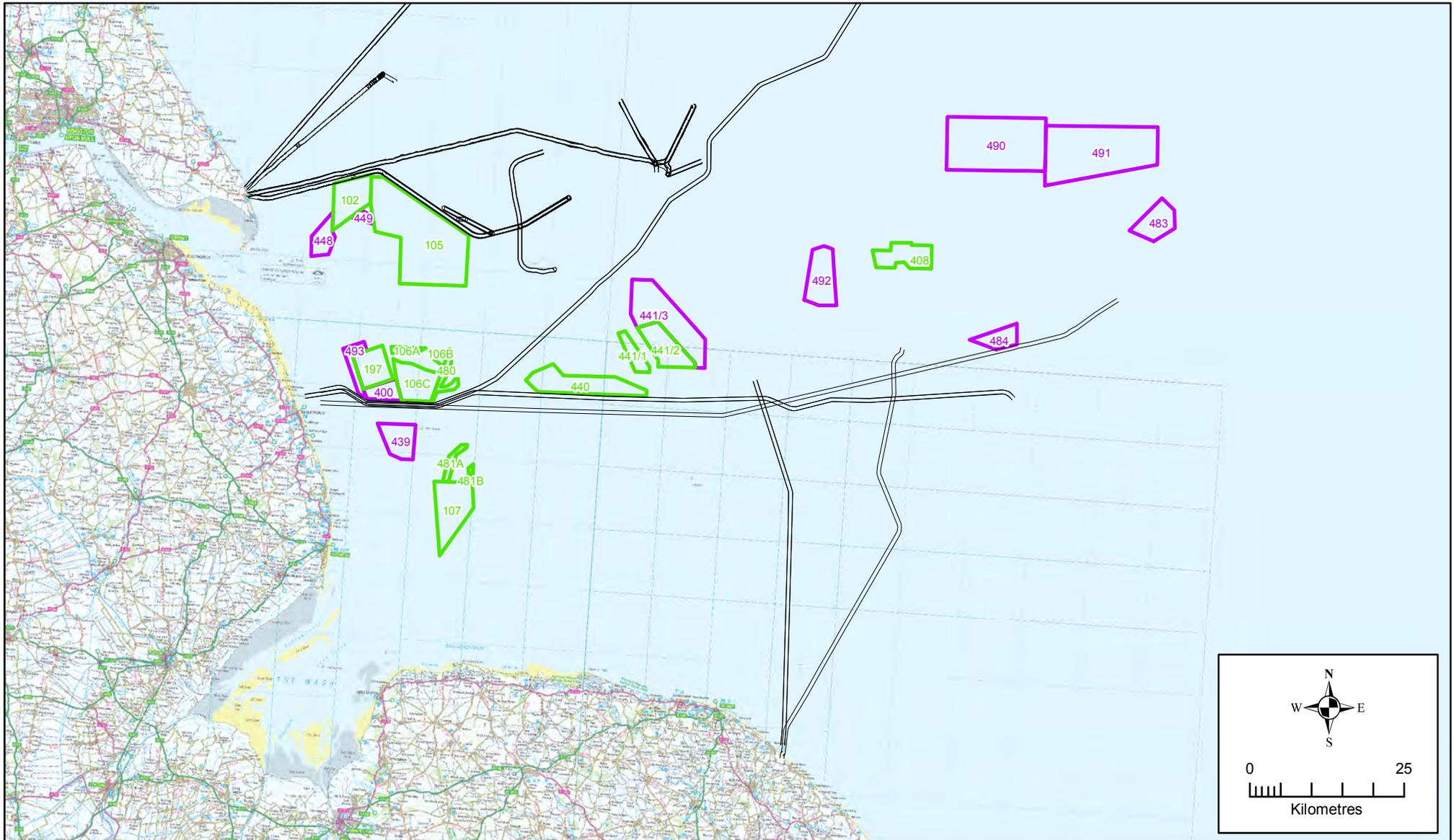
Submarine cables are known to exist in the MAREA study area. These are associated with the oil and gas and energy industry. The main sub-marine cable of note extends from Sheringham to the northeast of the dredging areas.

The study area is located within the area covered by the Air Defence Radars at Staxton Wold near Scarborough, north Yorkshire. An RAF bombing range is in use at Donna Nook located on the Lincolnshire coast to the west of the Humber MAREA scoping study area. This is used for target practise on weekdays and some winter evenings.

Potential Impacts of Aggregate Extraction

Potential impacts on offshore development from aggregate extraction include:

- Damage to subsea cables, pipelines and other infrastructure related to offshore developments.
- Effects upon current or proposed offshore wind farm sites.



KEY:	
	Licence Area
	Application Area
	Main Pipelines

CLIENT:	Humber Aggregate Dredging Association	SIZE:	A4
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TITLE:			Figure 4.15 Pipelines
DATE: 29/03/2010	CHECKED: HV	PROJECT: 0098617	
DRAWN: FS	APPROVED:	SCALE: As Scale Bar	
DRAWING:			REV:
SR0310_Pipelines.mxd			0

If live underwater cables or pipelines exist within a licence area, there is a potential for these to be damaged or broken as a result of aggregate extraction operations. However, buffer zones or “No Dredging Zones” are enforced around cables and pipelines to ensure that damage does not occur; for example in the case of cables there is a 250 m “No Dredging Zone” on either side of the cable, and a further 250 m “Dredging Notification Zone” where the cable operator would be notified before a dredging licence was granted (Allen, 2001). The Telegraph Act and Admiralty Notices provide for legal enforcement of these buffer zones.

In-combination impacts with regards to habitat loss from offshore wind farms, and gas pipelines and increased vessels will potentially occur from extraction of aggregates. The importance of early consultation with both the oil and gas industry and the offshore renewables sector was highlighted by consultees as being essential at an early stage of the MAREA.

Information Sources

- Environmental Impact Assessments for pipelines and Round 1 and 2 wind farms.
- The British Wind Energy Association.
- The Department of Energy and Climate Changes report: UK Offshore Energy Strategic Environmental Assessment, January 2009.
- Round 3 offshore wind proposed development zones.
- SEA reports 2 and 3 for North Sea Oil and Gas.
- Seazone Hydrosatial database and UK Deal database (www.ukdeal.co.uk).
- Members of the oil and gas industry with offshore infrastructure within the MAREA scoping study area and (with permission) survey companies who have worked in this sector.

4.4.5 *Marine Recreation and Coastal Tourism*

Regional Baseline Overview and Key Issues

A range of recreational activities take place in the MAREA scoping study area and have a significant input into the local economy. These activities include yachting and boating, coastal tourism, watersports, sea angling and scuba diving.

There is a moderate level of recreational yachting and boating within the Humber and Greater Wash region, particularly in inshore areas. There are considerable areas within the inshore Wash area and inshore along the

Lincolnshire, Norfolk and Holderness coasts that are described as 'general sailing areas' and racing areas by the Royal Yachting Association (RYA) as shown in *Figure 4.16*.

The North Norfolk coast is particularly popular with dinghy sailors and windsurfers and the region's coastal tourist resorts are notable on a national scale. However, the rough weather and lack of a weather and tide-safe port do limit recreational boating and yachting activity.

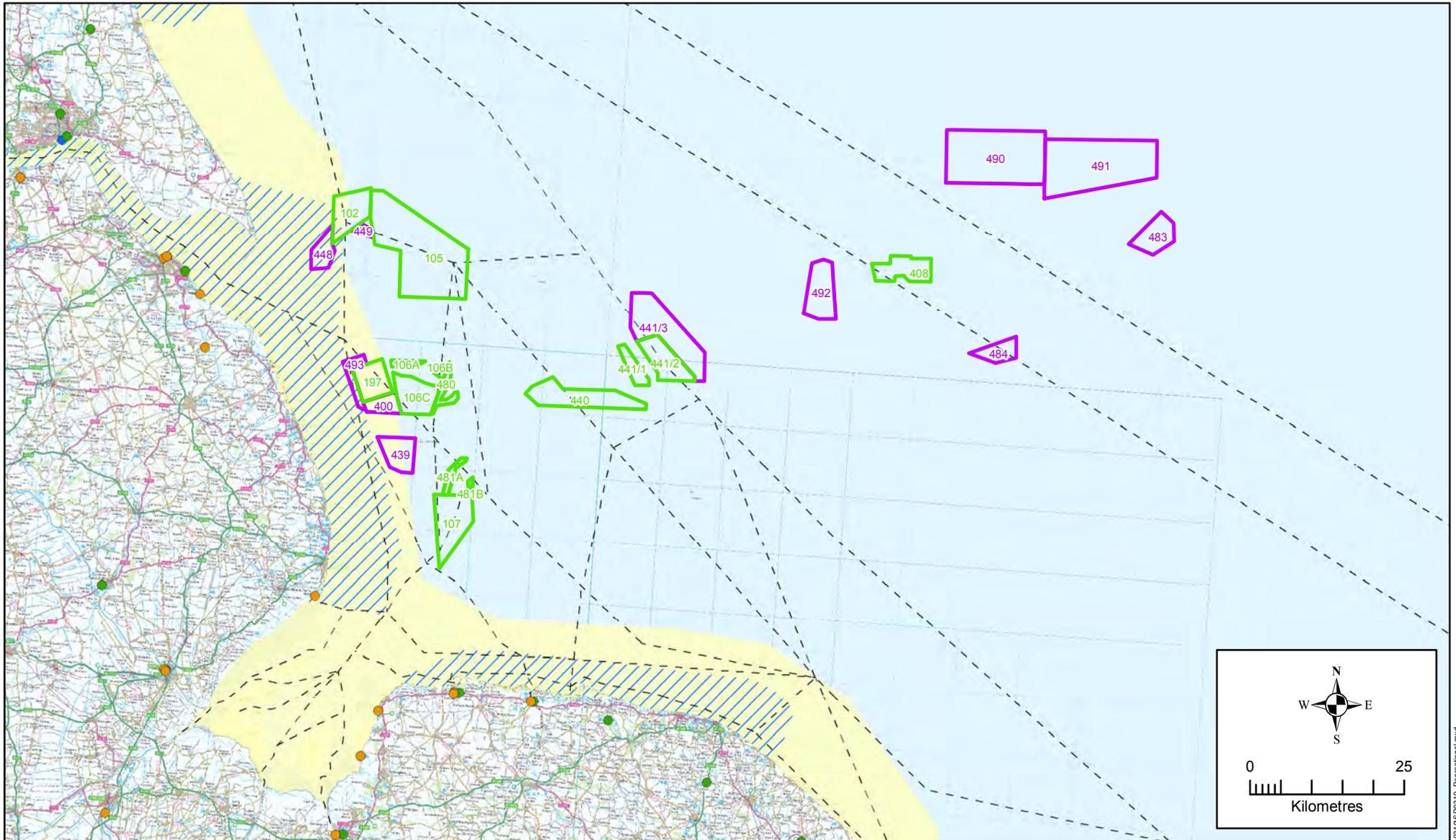
Over the last 30 years infrastructure developments have taken place along the coast to support the recreational sector, including marinas, yacht moorings, dinghy parks and launching slips. Tourism in Lincolnshire and Norfolk is mostly based around small towns and villages and the study area includes a number of seaside resorts such as Bridlington, Cleethorpes, Mablethorpe, Skegness, Hunstanton, Sheringham, Cromer and Great Yarmouth.

Hunstanton on the Norfolk coast at the mouth of the inner Wash is a nationally important venue for power-boating and waterskiing is also popular; the town hosted the International Water Ski Championships in 2005.



Hull Marina

Cromer Pier



KEY:

 Licence Area	 Marina
 Application Area	 Club
 Racing Area	 Training Centre
 Sailing Area	
 Cruising Route	

CLIENT: Humber Aggregate Dredging Association	SIZE: A4
ERM Eaton House Wallbrook Court North Hinksey Lane Oxford, OX2 0QS Tel: 01865 384800 Fax: 01865 204982	
SOURCE: Reproduced from Ordnance Survey digital map data. © Crown copyright. All rights reserved. 2009 License number 0100031673. RYA PROJECTION: WGS 1984 UTM Zone 31N	

TITLE: Figure 4.16 Recreational Sailing and Training Areas		
DATE: 29/03/2010	CHECKED: HV	PROJECT: 0098617
DRAWN: FS	APPROVED:	SCALE: As Scale Bar
DRAWING: SR0310_Recreational.mxd		REV: 0

Three beaches on the north Norfolk coast have been awarded Blue Flags: Cromer, Jubilee Beach and Mundesley (see *Figure 4.17*). The Blue Flag is a prestigious international award scheme for sites which have achieved the highest standard in terms of water quality, facilities, safety, environmental education and management.

The coastline is also important for the wildlife tourism industry. Boat trips are available for tourists from Bridlington to Flamborough Head and Bempton RSPB Nature Reserve, and many visitors take trips to see the birds and seals at Blakeney Point and Scolt Head Island.

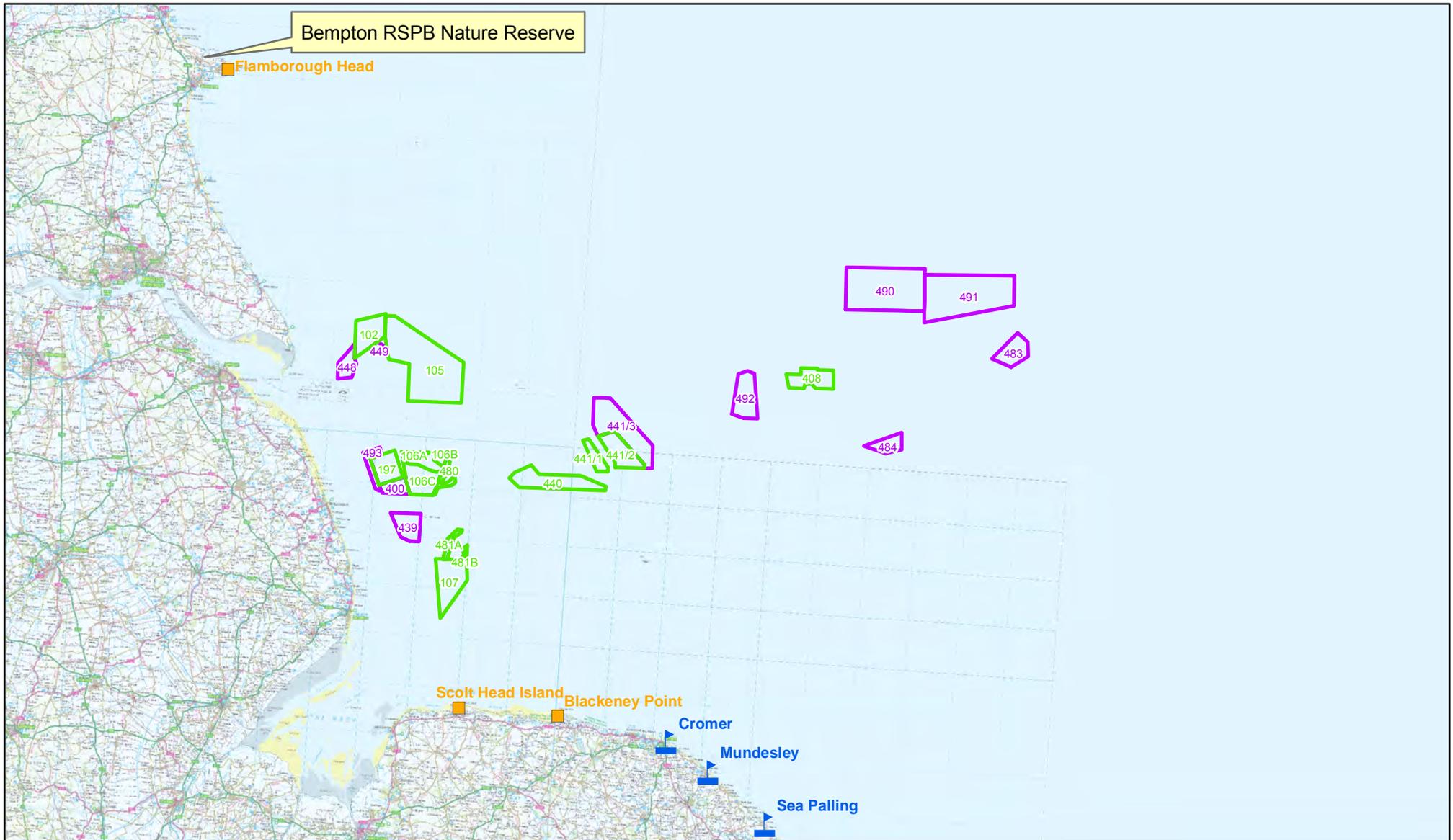
A number of other marine recreational activities are known to occur in the MAREA scoping study region, including scuba diving and sea angling. Scuba diving is popular at wreck sites, particularly several in the north of the area, while sea angling takes place from the shoreline and by boat from the Yorkshire, Lincolnshire and Norfolk coasts. Bridlington in particular is important for boat-based sea angling, and there are two boat compounds at Bridlington south shore containing over 70 privately owned boats, which are used primarily for recreational sea angling.

Potential Impacts of Aggregate Extraction

There is an increased risk of collision with recreational craft as a result of the presence of vessels used during aggregate extraction. However, the dredging areas within the MAREA scoping area are relatively far offshore and most marine recreation and coastal tourism activities take place within the nearshore, so interactions are expected to be infrequent. No feedback on marine recreation was received during the scoping study.

Information Sources

- JNCC Coastal Directories Project: Coasts and Seas of the United Kingdom.
- East of England Tourist Board.
- ENCAMS Seaside Awards.
- Blue Flag Campaign.
- Defra Digest of Environmental Statistics – Coastal and Marine Waters.
- Environment Agency.
- Marina-Info.com.
- Mortimer, D. 2002. Wash and North Norfolk Coast European Marine Site Management Scheme. English Nature, Peterborough.
- RYA and Cruising Association report 'Sharing the Wind: Recreational Boating in the Offshore Wind Farm Strategic Areas'.
- Royal Yachting Association (RYA) GIS Atlas



KEY:

- Licence Area
- Application Area
- ▶ Blue Flag Beach
- Places

0 30

Kilometres

CLIENT: Humber Aggregate Dredging Association

SIZE: A4

ERM
 Eaton House
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 North Hinksey Lane
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PROJECTION: WGS 1984 UTM Zone 31N

Figure 4.17 Coastal Tourism Sites		
DATE: 29/03/2010	CHECKED: HV	PROJECT: 0098617
DRAWN: FS	APPROVED:	SCALE: As Scale Bar
DRAWING: SR0310_Tourism.mxd		REV: 0

5.1 MAREA GUIDANCE

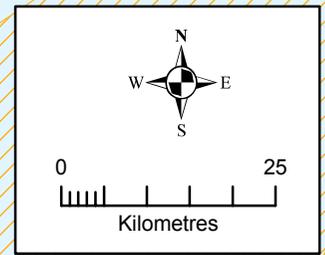
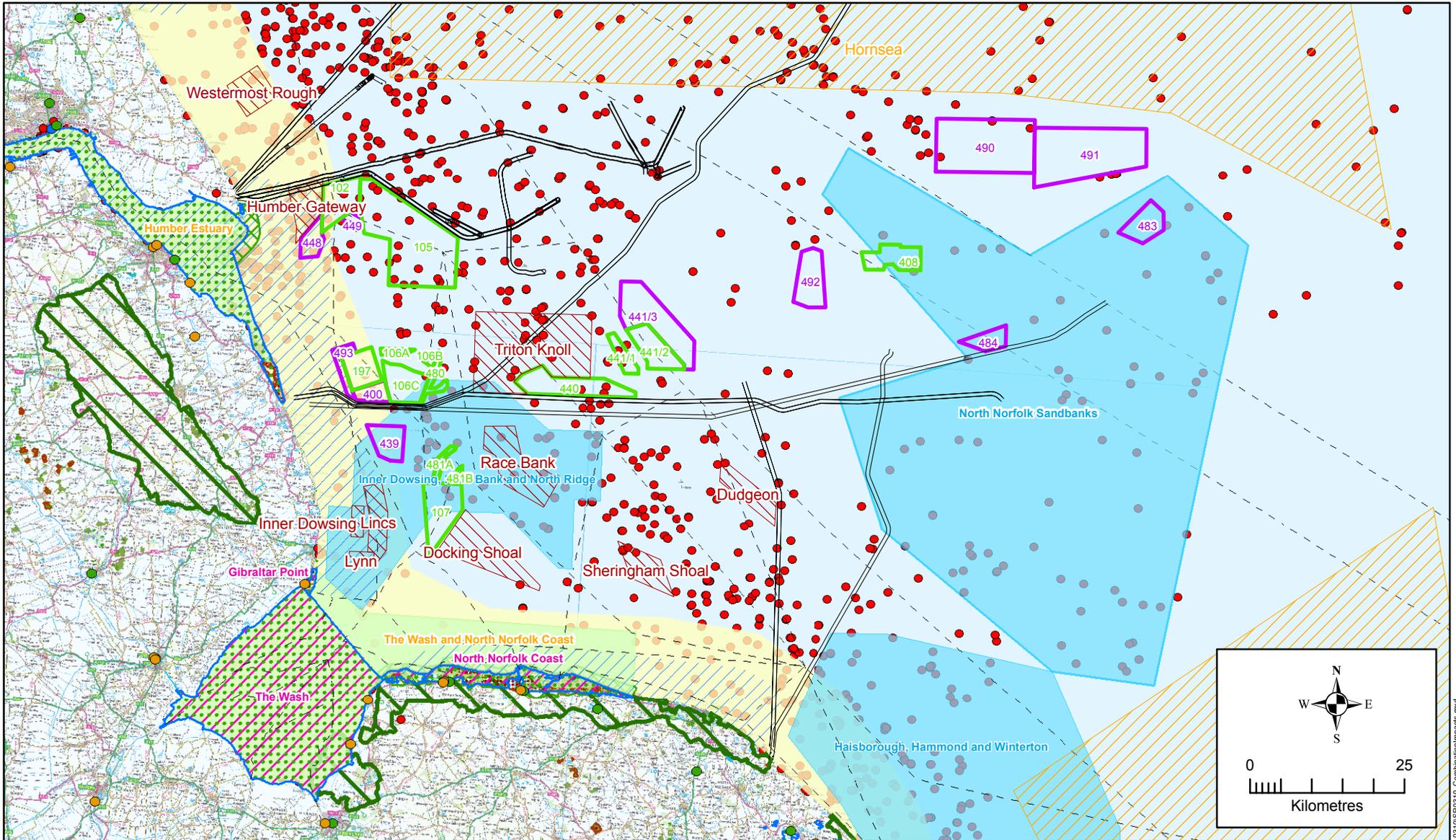
The MAREA will be conducted in accordance with the aims, objectives and guidance provided by the Regulatory Advisor's Group (RAG) in the following documents:

- RAG, 2008: Regional Environmental Assessment: A Framework for the Marine Minerals Sector. March 2008.
- RAG, 2007: Regional Environmental Assessments for the Marine Aggregate Industry – Developing Guidance. Workshop Reports and Recommendations: Phase 1 – July 2007, Phase 2 – September 2007.

As specified by the RAG guidance documents, the MAREA process will provide information on the wider environmental context of the Thames Estuary, which can be used to inform the site-specific EIA baseline sections. The MAREA will also identify areas of potential environmental sensitivity and/or interaction with other marine users. Information on the locations and distribution of sensitive receptors in the region will enable the site-specific EIAs to focus on the key sensitivities in their area, and scope out those issues that are of low potential significance at the regional scale.

Impacts on sensitive receptors from proposed activities at a regional level will be assessed cumulatively and in combination with impacts from other offshore activities and developments. The results of the MAREA will provide a guide to areas where a greater level of assessment is necessary in the later licence-specific EIAs required for marine aggregate dredging applications for approval.

As described in *Section 4*, the Humber region is complex and highly dynamic, with numerous developments and offshore activities taking place within similar timeframes. *Figure 5.1* shows the extent of these within the MAREA scoping study area.



KEY:					
	Windfarms Round One and Two		Special Protection Area		Club
	Windfarms Round Three		Special Area of Conservation		Training Centre
	Licence Area		National Nature Reserve		Marina
	Application Area		Local Nature Reserve		Cruising Route
	Possible Special Area of Conservation		Area of Outstanding Natural Beauty		Racing Area
	RAMSAR		Ancient Woodland		Sailing Area
	Sites of Special Scientific Interest		Heritage Coast		Wrecks
					Main Pipelines

CLIENT:	Humber Aggregate Dredging Association	SIZE:	A4
<small>ERM Eaton House Wallbrook Court North Hinksey Lane Oxford, OX2 0QS Tel: 01865 384800 Fax: 01865 204982</small>			
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TITLE:			
Figure 5.1 In-Combination Impacts			
DATE: 20/04/2010	CHECKED: HV	PROJECT: 0098617	
DRAWN: IG	APPROVED:	SCALE: As Scale Bar	
DRAWING:			REV:
SR0310_CombinationImpacts.mxd			0

5.2 SCOPE OF THE HUMBER AND GREATER WASH MAREA

5.2.1 MAREA Study Area

Prior to the finalisation of this scoping study a regional wave study was carried out by HR Wallingford in February 2010 to determine the potential influence on physical processes of dredging in licence and application areas located far offshore (HR Wallingford, 2010). These 'far offshore' licence and application areas include areas: 408, 483, 484, 506 (formerly area 490 and 491), and 492. The study was commissioned to determine if these areas could have a significant impact on the Holderness or Lincolnshire coasts or a significant 'cumulative' effect on waves at the more inshore licence and application areas. It was considered that should the cumulative impacts of the dredging areas offshore and inshore on physical processes be deemed not significant, the study area originally defined for the scoping study would be reduced to exclude the far offshore areas from the full MAREA.

200-year scenarios were modelled by HR and showed that the differences in wave conditions due to dredging are generally localised close to the dredged areas. In addition, the differences in mean wave direction and mean wave period were also shown to be local.

The study revealed that potentially significant impacts on 200-year extreme waves due to dredging are only found within 8 km of the "far offshore" dredged areas. The nearest inshore area is at a distance of about 17 km. The study concluded that the far offshore dredging areas considered will not have any significant impact on the coast or a significant 'cumulative' effect on waves at the inshore dredging areas.

Hence it is considered that local effects of these dredging areas can be considered individually in licence specific EIAs, and it is not necessary to include the far offshore licence areas in full scale modelling studies intended to be carried out for the full MAREA. Therefore the study area for the Humber and Greater Wash MAREA will not include the offshore dredging areas 408, 483, 484, 506 (formerly areas 490 and 491) and 492, and will be limited to the aggregates dredging areas and third party infrastructure inshore of these. The study area is shown within the red line boundary in *Figure 5.2*.

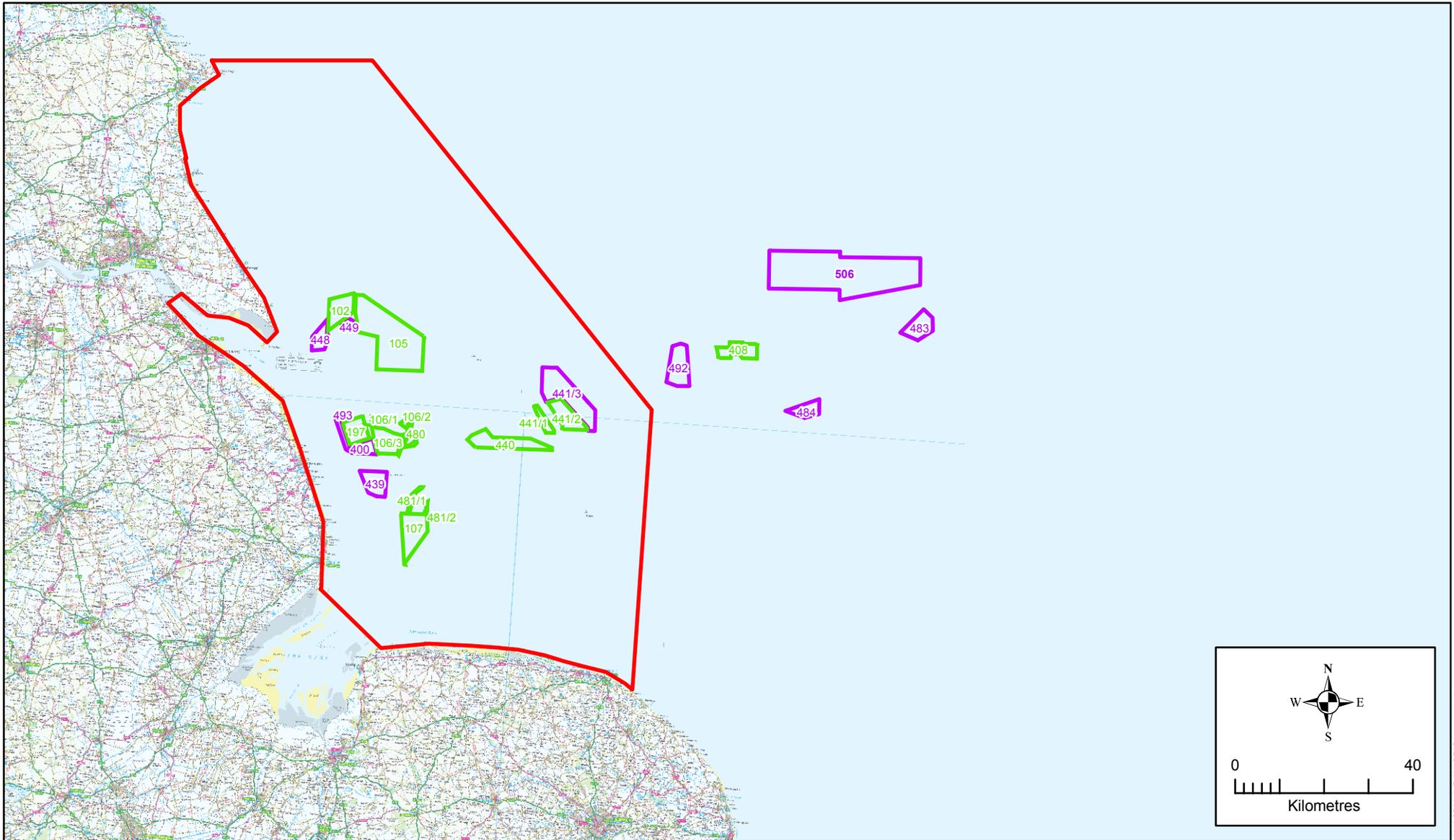
5.2.2 Topics to be Addressed in Full MAREA

Scoping Matrix

Figure 5.3 shows the environmental and socioeconomic resources and receptors that have been identified by this scoping study as key issues that will be addressed within the Humber and Greater Wash MAREA. The figure also shows the primary and/or secondary aspects of dredging operations that have been identified as being of concern for each receptor.

It should be noted, however, that it is not feasible or beneficial to direct an equal level of resources to each aspect. Similarly the methods that are

appropriate for data collection and assessment will vary between topics; some will require dedicated field survey work whereas for others secondary data sources will provide the necessary information. The proposed approach for each topic area is outlined in the sections below. It should be noted, however, that the approach to many topics will continue to develop during the course of the MAREA, as a result of ongoing consultation, further baseline research and other studies. This means that the approach outlined within this document should be viewed as a starting point.



KEY:	 Proposed Study Area
	 Licence Area
	 Application Area

CLIENT:	Humber Aggregate Dredging Association	SIZE:	A4
ERM Eaton House Wallbrook Court North Hinksey Lane Oxford, OX2 0QS Tel: 01865 384800 Fax: 01865 204982			
<small>SOURCE: Reproduced from Ordnance Survey digital map data. © Crown copyright. All rights reserved. 2010 License number 0100031673 PROJECTION: WGS 1984 UTM Zone 31N</small>			

TITLE:			Figure 5.2 Proposed Study Area for Full MAREA
DATE: 19/04/2010	CHECKED: IE	PROJECT: 0098617	
DRAWN: IG	APPROVED:	SCALE: As Scale Bar	
DRAWING:			SR0310_FullMAREASudyArea.mxd
REV:			0

Bathymetry and Hydrodynamics

No significant data gaps have been identified as the MAREA study area has good data coverage of both recorded and modelled hydrodynamic data.

Characterisation of the physical environment is a key component of the MAREA process. A comprehensive review of available data and consultation will inform the nature and scope of specialist studies (modelling etc) that will be required during the MAREA. Specialist studies are likely to include wave modelling to inform future Coastal Impact Studies and an assessment of the potential for changes to bathymetry to alter tidal flows.

Coastal Processes

A number of consultees have raised concerns about the potential effects of dredging on the Holderness coast. In order to quantify the extent of any such effects, a detailed analysis of temporal change along the Holderness coast based on historic Ordnance Survey maps, aerial photographs and beach profile data where available will be included in the Humber MAREA. Consultation with the Environment Agency will be undertaken to ensure there is comprehensive understanding of coastal defence structures within the study area.

Although some licence areas are relatively close to the coast compared to others, this does not necessarily mean that they interact or interfere with nearshore coastal processes, particularly if they are situated in deep water. The study area is subject to highly complex hydrodynamic and sediment processes and the MAREA will address potential linkages between the offshore zone and the coast.

To establish any identified impacts that dredging may be having on the coastline, existing coastal process studies and historical dredging activity data will be collated and reviewed and additional studies will be undertaken where necessary.

Offshore Sediments and Sediment Transport

The scoping review did not identify any significant data gaps with respect to sediment data although coverage is more detailed in areas where offshore developments have been proposed. Sediment transport pathways are well described throughout the nearshore part of the study area but less so further offshore.

Regional geophysical information is available from the Outer Humber REC survey that was completed in early 2009. This survey achieved low resolution coverage across the majority of the MAREA study area. The data and reports from the REC survey, together with the existing regional data, will provide a broadscale characterisation of offshore sediments and bedforms across the Humber and Greater Wash region.

A comprehensive desk-based review and consultation will inform the scope of specialist studies that will be required during the MAREA. Specialist studies could include regional mapping of the distribution of sediments and bedforms, and modelling studies into sediment plume dispersion and changes to particle size. In particular, the potential impacts upon the current sediment transportation processes around the mouth of the Humber and along the Lincolnshire coast should be investigated.

Benthic and Epibenthic Communities

Whilst there is good coverage of data for areas that have been targeted for commercial licensing for mineral extraction, exploration and developments (eg wind farms), there are data-gaps for the areas of non-targeted seabed in and around the MAREA area which will need further description. The REC survey will help to address these data gaps and the need for an additional regional benthic survey should be reviewed at the outset of the MAREA. Cefas, JNCC, Natural England and the relevant SAC project officers will be consulted to discuss the distributions and ecology of key benthic species within the MAREA area.

The regional benthic baseline will be described through traditional ecological metrics, regional habitat maps and detailed discussion of the distribution of rare, sensitive and keystone species. Research will be undertaken into the sensitivity and recovery potential of the habitats and species to inform the MAREA impact assessments.

Fish and Shellfish

A desk-based assessment will be undertaken to review the existing data in the region and to produce a regional series of maps that show spatial and temporal patterns for species of interest. These will include spawning and nursery grounds plus key feeding area and migration routes where appropriate. Species that have a particular association with the substrates within marine aggregate areas will be a key focus of the MAREA.

Cefas, JNCC and Natural England will be consulted to discuss key species of commercial or conservation importance. Fishermen of region will be contacted via the NESFC, ESFJC and fisheries associations to invite them to share their local knowledge of the ecology of the species in the MAREA study area. In addition, information on the sensitivity and recovery potential of each species will be obtained to inform the MAREA impact assessments.

Marine Mammals

A desk-based assessment will be undertaken to review all the existing sightings data in the region and to produce a series of maps that show spatial distributions of the species of interest, and the relative importance of the region in context of the wider North Sea. A number of organisations have been identified during the scoping study that will be consulted to discuss the distribution and ecology of marine mammal species in the region.

During the full REA, consideration will be given to the disturbance offence under Regulation 39 of The Conservation (Natural Habitats) Regulations 1994 (as amended 2007) and The Offshore Conservation (Natural Habitats) Regulations 2007 (as amended 2009) to determine the risk of dredging activities disturbing marine mammals within the region.

Marine and Coastal Birds

A large amount of information on the baseline distribution of birds in the Humber MAREA scoping study area is known to exist. The DTI/BERR survey data will be a primary resource that will need to be fully analysed to inform the MAREA. Data gaps which exist as a result of survey coverage will be identified and highlighted in the MAREA. Good data on number of birds nesting around the area are available from JNCC's Seabird Colony Register and the NBN Gateway. Good data on wader distribution and numbers in the Humber Estuary are also available from the British Trust for Ornithology's Wetland Bird Survey (WeBS) counts.

A significant amount of research into offshore and coastal bird populations in the study area is being undertaken, particularly by the offshore wind farm industry, at present. The results of these recent studies to inform the ornithological baseline will be integrated into the MAREA. JNCC, Natural England and RSPB will be consulted during the MAREA to identify and address any outstanding data gaps. Information on the sensitivity and recovery potential of each species will then be obtained to inform the MAREA impact assessments.

Designated Sites

The key species of conservation importance in the MAREA study area will be identified and maps will be produced illustrating the locations important to these species. This and information on the distribution of Annex I habitats within the protected areas will be assessed and analysed.

The site selection assessment reports for each SAC and pSAC will be reviewed and the conservation objectives for each will be requested from JNCC and Natural England. Any new draft SACs and SPAs that are identified within the study area will be included within the scope of the full MAREA.

The potential for dredging activities to interact with the conservation objectives of any of these sites will be assessed as part of the MAREA. In addition, an assessment to show whether the condition of conservation features are predicted to change within the MAREA scoping study area as a result of ongoing and proposed dredging activities will be carried out.

Commercial and Recreational Fisheries

To understand the offshore sector of the fishery a thorough review of the available data related to commercial fishing activity in the region is required using the data sources listed, and with a particular emphasis on the analysis of

up-to-date MFA over-flight survey and VMS data.

At least 5 years (up to 2008) of overflight and satellite tracking (VMS) data for the MAREA survey area will be analysed; the data are available for all vessels over 10 m (overflight data) and over 15 m (VMS). Full analysis of the data (including seasonal trends and nationalities) will be undertaken during the MAREA using a standardised methodology recommended by Cefas. The use of GIS will provide a visual means of examining the fisheries data and can be used to determine spatial and temporal patterns in fishing for all vessels, those of a specific nationality and those using specific gears.

An economic analysis of key fisheries and ports is also required, including a consideration of seasonality. This will provide information on both the offshore and inshore fishing sectors.

In order to fully understand commercial fisheries in the Humber MAREA area, and particularly the inshore sector for which less data are available, it is imperative that the fishermen are consulted and requested to validate the collected data. Cefas, NESFC, ESFJC and fisheries associations will be consulted during the MAREA on the relevant fisheries issues in the region and the species that are targeted.

Together these studies and consultation will seek address the concerns of the local fishing industry and make reference to the guidelines set out by DEFRA in the guidance on offshore wind farms.

Archaeology and Cultural Heritage

A desk-based assessment will be undertaken to review all the existing archaeological and cultural heritage records and documents available for the MAREA study Area. Secondary data sources of prehistoric, maritime and aviation archaeology relevant to the MAREA study area and the wider Humber and Greater Wash Region will be reviewed to supplement known data.

With the exception of a relatively small number of sites and finds, the known submerged prehistoric archaeology of the MAREA study area is sparse. Terrestrial records will therefore be used to describe the potential for prehistoric archaeology within the adjacent offshore extent of the study area.

Potential sites of both maritime and aviation archaeology are also sparse. The potential for maritime sites within the Humber MAREA study area will be estimated from records of known wreck sites, recorded losses and knowledge of historic shipping patterns. Maps will be provided illustrating any locations of known archaeological interest within the MAREA study area.

The aircraft losses listed by the NMR will be reviewed against the records of WWII Air/Sea Rescue operations in the vicinity of the Humber MAREA study area during the full MAREA to provide an assessment of the potential for

aircraft crash sites within the region. This will be further supplemented by a review of secondary sources relating to aviation activity within the MAREA study area.

Finally it should be noted that during the MAREA scoping consultation, the importance of community archaeology was highlighted and the MAREA was identified as an opportunity to feedback information to the local community.

Shipping and Navigation

A desk based review of the existing activities relating to shipping and navigation will be undertaken using the data sources discussed above. The existing risk levels for the region will be established with an assessment of the future risks associated with the proposed dredging activities in the area. The overall impact on navigation in the region will then be quantified and where necessary precautionary measures will be developed to minimise the potential accident risk.

Offshore Developments

A desk-based assessment of proposed and existing developments in the MAREA study area such as offshore wind farms, cables, pipelines other oil or gas related infrastructure and military operations will be carried out. Spatial distributions of these operations or facilities will be illustrated in respect of their proximity to the MAREA dredging areas and potential in-combination impacts will be indentified as part of the MAREA.

Marine Recreation and Coastal Tourism

A desk-based assessment of the recreational activity in the region will be undertaken using the data sources listed. Spatial distributions of recreational facilities and their use will be mapped and where possible seasonality for each activity will be identified.

The Royal Yachting Association will be consulted with regard to recreational boating and sailing activity in the region and it is hoped that the Cruising Association and the Royal Ocean Racing Club may be able to provide additional information that will inform the MAREA. The British Sub-Aqua Club will be invited to provide information on the extent to which the area is used by scuba divers.

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Annex A

RAG Guidance

Regional Environmental Assessment: A Framework for the Marine Minerals Sector



Supported by:



March 2008

Regional Environmental Assessment: A Framework for the Marine Minerals Sector

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1. Introduction

This purpose of this document is to provide guidance / recommendations on a framework for Regional Environmental Assessment's (REA) for the Marine Minerals sector from nature conservation and marine and historic environment perspectives. This guidance recognises the industry led and non-statutory nature of the REA process, hence offering recommendations rather than binding requirements for REA.

This formulation of this guidance takes account of significant input from a Regulatory Advisors Group (RAG)¹, consisting of Cefas, Natural England, the Joint Nature Conservation Committee and English Heritage, in addition to input from the marine aggregate industry and their consultants engaged in undertaking REA's and targeted stakeholder engagement.

¹ Members of RAG are routinely tasked with providing scientific / technical advice on industry applications to extract Marine Minerals to Government regulators.

2. Aims and Objectives of REA for Marine Minerals

Specifically relating to Marine Minerals, the key questions an REA should address is:

“should existing dredging continue and new areas be dredged within the REA areas? (i.e. are the current levels of dredging activity environmentally acceptable and if so can they be increased without causing significant environmental impact?)”

To address this, the broad aims of the REA process should be:

1. to provide objective, evidence-based assessments of the distribution and importance of regional resources (living and non-living) and the potential impacts from the proposed activities on these resources, at a regional level;
2. to provide a context for site-specific Environmental Impact Assessments (EIA's) within the relevant REA area² and to identify site-specific issues that individual EIA's may need to focus on more specifically;
3. to provide an assessment of the impacts of different development scenarios of the aggregate extraction industry, based on industry projections, and in relation to those due to other human activities and natural variability;
4. to provide a robust assessment of cumulative and in-combination impacts at the regional level using consistent definitions and interpretations of such impacts, and thus contribute towards assessments of the magnitude and scale of such impacts in individual EIA's;
5. to make recommendations for monitoring to be addressed at the REA or individual EIA level and for R&D to address gaps in knowledge, understanding or assessment tools.

Key to the REA process is the ability to address cumulative and in-combination impacts in a regional context (Aim 3). Whilst there is a lack of consensus within the wider scientific and regulatory community as to how to address these issues, it is essential the REA adopt consistent definitions and interpretations of such terms.

To address the aims of REA, the key objectives should be:

- i. to assess key issues of risk to the marine environment;
- ii. to make best use of resources, specifically data collection, evaluation and assessment both now and into the future in the context of existing and future Government policy (for example Marine Spatial Planning / Ecosystem Approach);
- iii. to provide an objective, evidence-based assessment of potential impacts deriving from particular dredging scenarios. These scenarios should be realistic and cover the full range (max and min) of dredging options within licence areas and summed across the REA region;
- iv. to act as a reference source on the distribution and importance of regional resources (living and non-living) and the potential impacts from the proposed activities on these resources, at a regional level. These will be based on desk-

² REAs cannot substitute for site-specific EIAs. While some information in the REA outputs may be used directly in project-specific EIAs, other information may have a limited lifespan or need to be determined at a higher resolution than in the REA outputs.

based assessments using all relevant existing information with important gaps filled by targeted cross-disciplinary desk studies and fieldwork as necessary. The outputs of the REA reports will provide a basis (where appropriate) for site specific EIAs within the relevant REA area;

- v. to have a geographic and temporal scale which reflect the scale of the key issues involved as outlined by a preliminary scoping study;
- vi. to aim to provide a robust assessment of cumulative and in-combination impacts at the regional level based on consistent definitions and interpretations, and thus will be able to contribute towards assessments of the magnitude and scale of such impacts at specific licence areas;
- vii. to provide updated assessments as part of the ongoing REA process where new evidence or approaches are developed with the potential to offer an improved assessment;
- viii. to identify where data collected during the REA for the purpose of understanding potential regional impacts from site renewals and new applications needs to be supplemented by targeted data collection programmes specific to individual EIA's;
- ix. to provide consistency and a standardised approach to assessments of resources, activities, and impacts to ensure that outcomes are directly comparable within and across regions. Standardised approaches need to be developed for every aspect of the assessment process from survey design (including co-ordination of survey missions) and data collection to data analysis, presentation, and interpretation. Non-standard or ad-hoc approaches may dramatically reduce the effectiveness of the REAs and have knock-on consequences to the efficiency of the advisory process;
- x. to provide a legacy of data for industry and regulators but placed within the public domain.

3. The REA Process

Whilst the REA process is something, which industry and their consultants control in the light of specific regional issues, it is logical that the REA process should have two main parts:

1. Initially the REA will provide an objective characterisation of a region based on a desk-based assessment using all relevant existing information (to be determined by a detailed scoping study) with gaps filled by targeted cross-discipline data mining and fieldwork as necessary. This work would be presented as a separate section of the initial document delivered as part of the REA process and have no element of 'assessment' associated with it. This will serve the purpose of providing a clear objective baseline of information relevant to the REA.
2. The second stage of the process will be to perform analyses on the data collected during the first stage to determine levels of environmental impact, which can be assessed on a regional basis, but also to identify site-specific issues which individual EIA's may need to focus on more specifically. At this stage, the consideration of future regional monitoring programmes may be pertinent.

Each part of the REA process carries equal weight and is essential to meet the aims and objectives of REA and provide a context into which site specific EIA's can be placed.

4. Specific Guidance to address Nature Conservation, the Marine and Historic Environments

The following sections of this document provide a framework to address the aims and objectives of REA from the perspective of Nature Conservation, the Marine and Historic Environments. This information is based on contemporary levels of scientific / technical understanding. The areas covered are:

- Nature Conservation
- Marine Environment
 - Fish and Fisheries resources
 - Benthic Ecology
 - Coastal / Physical processes and sediment transport
- Historic Environment

4.1 Nature Conservation

The key issue to address is an initial identification of the extent (or lack of) and distributions of Habitats and Species of Conservation Importance within the REA area taking particular account of those likely to be impacted by marine mineral extraction. The information provided below highlights the key and generic nature conservation topics but it should be noted that depending on the particular REA area other nature conservation issues may arise.

Useful generic reference sources for Nature Conservation include:

<http://www.naturalengland.org.uk/>

<http://www.jncc.gov.uk/>

<http://www.magic.gov.uk/website/magic/>

Birds including the EU Birds Directive

The REA should provide a description or baseline report of birds using the REA areas. Recommended references include European Seabirds at Sea (ESAS) database, Seabird Nesting Counts information, Seabird Monitoring Programme, nearby designated areas including Special Protection Area (SPA), Ramsar sites, Sites of Special Scientific Interest and any areas that may have potential for designation in the future along with any other available information sources. Information on Important Bird sites can be found here: <http://www.jncc.gov.uk/page-2141> and information on seabirds here: <http://www.jncc.gov.uk/page-2143>.

Any data used in describing bird populations or distribution should be critically assessed in terms of age of the data and coverage / quality – a gap analysis. The REA should aim to fill any significant gaps by fieldwork as necessary. This is of particular importance in areas, which may be suitable for designation as SPAs.

An assessment should be made of what activities birds are using an area for. For instance, is the area used for feeding or breeding, an area used by moulting seabirds or a migration route? The information on feeding should be crossed links with the benthos and fisheries section and others if appropriate. The use of the area will need to be further considered during the impact assessment stage of the REA.

EU Birds Directive – It is important that the REA considers areas which are either already designated or may be designated in the future as SPAs. Information on marine SPAs can be found here: <http://www.jncc.gov.uk/page-1414>. Various types of marine SPAs are being considered for UK territorial and offshore waters:

- Seaward extensions to existing seabird breeding colony SPAs. Current work aims to identify those areas of the sea adjacent to breeding colonies that are important to seabirds for essential activities. Spatial analysis of at-sea survey data allows formulation of guidance on appropriate boundary extensions that may be applied generically for certain species. To date, extensions into the sea

- of 1 km for those SPAs at which common guillemot, razorbill and Atlantic puffin breed, and 2 km for breeding gannet SPAs, have been recommended;
- Inshore aggregations of non-breeding waterbirds. An initial trawl through various survey data has resulted in a list of inshore sites for seaduck, divers and grebes that might be considered for SPA status. Spatial analyses of aerial survey data from such sites allow assessment of whether a site qualifies as an SPA (using existing criteria formulated by JNCC for application to the terrestrial environment) and if so, where the seaward boundaries of the site might be defined.
 - Offshore aggregations of seabirds. The European Seabirds at Sea database hosts year-round data on the at-sea distributions of all birds that occur in the waters of the north-west European continental shelf. These data will be analysed in order to identify possible hotspots for seabirds with a view to possible SPA classification;
 - Other types of SPA. Some important aggregations of seabirds may not be captured by the above categories and are being considered individually. For example, diurnal concentrations of Manx shearwaters during the breeding season, which occur at varying distances and locations from the breeding colonies, are being studied using radio-tracking. Similarly, the feeding locations of red-throated divers are being investigated using the same technology. Feeding concentrations of terns in the breeding season are also the focus of specific study.

EU Habitats Directive

Under the terms of the EU Habitats Directive, the United Kingdom is required to put in place a network of marine Special Areas of Conservation (SACs). Together, the set of SACs and SPAs are intended to form a coherent ecological network of protected sites across Europe, referred to as the Natura 2000 network. SACs may be selected for Habitats of Conservation Importance (listed in Annex I of the Habitats Directive) or for Species of Conservation Importance (listed in Annex II of the Habitats Directive) which in UK waters include:

Marine Habitats listed on Annex I of the EU Habitats Directive

- Estuaries
- Lagoons
- Large shallow inlets and bays
- Submerged or partly submerged sea caves
- Sandbanks which are slightly covered by sea water all the time
 - Sublittoral sandbanks permanently submerged.
 - Non-vegetated sandbanks or sandbanks with vegetation belonging to the *Zostera marinae* (seagrass) and *Cymodoceion nodosae* (benthic algae).'
- Mudflats and sandflats not covered by sea water at low tide
- Reefs
 - Bedrock Reef – pinnacles / offshore banks
 - Stony reefs – cobble and boulder reefs, iceberg plough marks
 - Biogenic reefs – for example made by cold water coral (*Lophelia pertusa*) and Ross Worm (*Sabellaria spinulosa*)
- Submarine structures made by leaking gases

Marine Species listed on Annex II of the EU Habitats Directive

- Grey seal - *Halichoerus grypus*
- Common (or harbour) seal - *Phoca vitulina*
- Harbour porpoise – *Phocoena phocoena*
- Bottlenose dolphin - *Tursiops truncatus*
- Otter - *Lutra lutra*
- Loggerhead turtle – *Caretta caretta*
- Sea Lamprey – *Petromyzon marinus*
- River Lamprey – *Lampetra fluviatilis*
- Sturgeon – *Acipenser sturio*
- Shad – *Alosa* spp.

To satisfy the terms of the EU Habitats Directive site specific survey evidence may be required for individual applications to assess the presence or absence of Annex I Habitat and Annex II Species. The REA should therefore aim to provide an overview of the habitats and species within the REA area and direct further EIA studies. JNCC and NE are currently working on the designation of marine SACs but it is unlikely that within the timings of the initial REAs, the Natura 2000 Network will be in place. Therefore, until such a time that the Natura 2000 Network is agreed and all sites designated, any identified Annex I Habitats may be considered as worthy of submission as a qualifying feature and afforded the level of protection as if they were designated.

It is not expected that the whole of the REA area will be surveyed at a resolution suitable to determine where Annex I features are located but features of conservation interest should be described in the context of a regional area.

For information on the distribution of seabed habitats and landscapes, reference should be made to:

MESH (<http://www.searchmesh.net/>)

UKSeaMap (<http://www.jncc.gov.uk/page-2117>)

Marine Mammals

The Habitats Directive also provides protection to European Protected Species (EPS) (listed in Annex IVa of the Directive) and their breeding sites and resting places whether or not they are within a Natura 2000 site. Marine EPS include all species of cetaceans, all species of marine turtles, the sturgeon (*Acipenser sturio*) and the otter (*Lutra lutra*). Amendments to the Habitat Regulations for England and Wales and the new Offshore Marine Conservation (Natural Habitats, &c.) Regulations 2007 revised the definition of disturbance of EPS. It is now an offence to deliberately disturb wild animals of an EPS in such a way as to be likely significantly to affect: a) the ability of any significant group of animals of that species to survive, breed, or rear or nurture their young; or b) the local distribution or abundance of that species.

There is also a potential for the designation of SACs for Marine Mammals listed on Annex II of the EU Habitats Directive as discussed above in Section 5.2.3.

The REA should provide a description / baseline report of marine mammals using the REA and surrounding areas. This may be taken from the Atlas of Cetacean distribution in north-west European waters (2003) (see: <http://www.jncc.gov.uk/page-2713>) and any other sources available (e.g. Sea Watch Foundation, Whale and Dolphin Conservation

Society (WDCS), Sea Mammal Research Unit (SMRU), SCANS I & II, SEA data – www.offshore-sea.org.uk). An assessment should be provided of any evidence that marine mammals use the area for a particular activity (feeding, breeding). As with birds, any data used in describing marine mammal populations or distribution should be critically assessed in terms of age of the data and coverage / quality – a gap analysis. The REA should aim to fill any significant gaps by fieldwork if possible.

The REA should also consider what the potential impacts of dredging activities are for marine mammals including noise generation, impact to food sources and general disturbance at a regional scale with particular consideration of the disturbance offence. For information on the disturbance offence and guidance how to assess the likelihood of disturbing marine EPS please refer to <http://www.jncc.gov.uk/page-4227> (and potential amendments).

Nationally Important Marine Features

Nationally Important Marine Features are intended to be marine species and habitats that are outside of the Natura 2000 Network but that are considered to be of Nature Conservation value. This conservation initiative is being driven by the UK BAP Habitats and Species Review with plans to link in with the proposed Marine Bill. Habitats may include features associated with the seabed such as interesting or unusual conservation features (e.g. Brittlestar Beds). NE and JNCC will endeavour to ensure the aggregate industry and those undertaking REAs are kept updated with progress of identifying Nationally Important Marine Features.

OSPAR Marine Protected Areas (MPA)

Part of OSPAR's (The Convention for the Protection of the Marine Environment of the North-East Atlantic) biodiversity strategy is to establish a system of marine protected areas known as the OSPAR MPA Programme. To achieve this, OSPAR undertook an initial review of existing marine protected areas (MPAs) in the OSPAR maritime area. Guidelines for the selection and management of MPAs were then developed and adopted in 2003 before developing the scope and aims for a network of marine protected areas. These are intended to contribute both to protection of threatened species and habitats and to the conservation of areas which best represent the range of species, habitats and ecological processes in the OSPAR area. The OSPAR commission agreed in 2003 that a network of MPAs, according to the criteria and guidelines it adopted should be developed by 2010 and has written recommendations for how to go about this. Contracting parties are currently in the process of identifying and submitting initial sets of sites to the Commission.

For further information on OSPAR please refer to <http://www.jncc.gov.uk/page-3370>. The Initial OSPAR List of Threatened and/or Declining Species and Habitats may be found here - http://www.ospar.org/documents/dbase/decrecs/agreements/04-06E_List%20of%20threatened-declining%20species-habitats.doc

Biodiversity, Habitat and Species Action Plans

In 1993, the UK government consulted organisations throughout the UK to discuss the key issues raised at the Convention of Biological Diversity. The product of this was the launch of Biodiversity: the UK Action Plan in 1994 which outlined the UK Biodiversity Action Plan for dealing with biodiversity conservation in response to the Rio Convention.

Within the REA the individual or group Biodiversity Action Plans for priority habitats and species should be reviewed and any listed actions from Local Biodiversity Action Plans addressed within the REA.

Actions Plan include but are not limited to: *Atrina fragilis*, *Cetorhinus maximus*, Inshore sublittoral sediment, *Lophopus crystallinus*, Maerl Beds, *Modiolus modiolus* beds, oceanic seas, offshore shelf sediment, *Sabellaria alvelota* reefs, *Sabellaria spinulosa* reefs, sublittoral sands and gravels and the grouped plan for toothed whales and baleen whales.

For a complete list of plans see: <http://www.ukbap.org.uk/>

4.2 Marine Environment

All aspects of the Marine Environment should be considered through REA in a multidisciplinary way. To aid clarity, the following section is broken down to cover the three key areas of the natural Marine Environment, which are likely to be impacted by Marine Mineral extraction.

Fish and Fisheries Resources

The key issues to consider are potential impact of marine mineral extraction on fish and fisheries resources (including spawning grounds and nursery grounds), adult distributions throughout the year and fishing operations (commercial and recreational).

In order to address these concerns, the following is recommended for inclusion in the REA process:

- Fish and fisheries resource issues should be defined after consultation with local and regional fisheries stakeholders.
- REA should contain a comprehensive review of fisheries resources in the region (spawning activity, nursery grounds, and adult distribution at other times of year), and a description of the fisheries that exploit them for commercial or recreational purposes. Such a review would be developed from two primary sources of information: consultation with local and regional fisheries stakeholders, and quantitative data describing the distribution of fisheries and biological resources.
- The consultation exercise needs to be thorough, based on a standardised and consistent methodology, and be capable of defining the overall scope and key issues to be addressed by the REA, whether site specific or regional.
- Available data from primary sources (e.g. Cefas, ICES, SFCs, MFA) should be acquired and used to complement the assessment of biological resources and fishing activity derived from the consultation exercise. These data will then be used to prioritise the issues that are reported in the REA, and will provide a scoping report for the future site-specific EIA's. Having gathered the available data and identified and prioritised the issues to address, the aggregate industry will be in a stronger position to develop targeted data collection programmes capable of filling gaps in knowledge at a regional and/or site specific level. If needs for licence-specific data to address site specific issues are identified, these should be addressed by applicants when preparing EIA's for licence applications or renewals and not within the framework of the REA.
- The REA should provide an assessment of how fish and fisheries might be affected as a result of increased or decreased activity throughout the Region resulting from licence renewals and new applications, compared to the status quo. Here the status quo for fish and fisheries, and for aggregate extraction activity, should cover a period of up to 5-years previous to the year in which the REA is being conducted. Covering a 5-year period allows for inter-annual variability and increases the chance of suitable data being available for the assessment. By comparing potential future

scenarios of impact by the aggregate industry with the status quo assumes that current level of environmental impact and conflict with other human uses are acceptable. As licences have been provided for all extraction activities, many supported by EIA's, this is not an unreasonable assumption.

- When available, longer time series extending back further than 5 years should be assembled for components of the fish community and for commercial and recreational fishing. For example, time series overviews might be developed for catches of selected young fish from the Cefas young fish survey, and from ICES coordinated fish larval surveys. These time series can be compared against time series for the same components in the wider geographic region (where practicable), and also against levels of fishing activity and aggregate dredging, in order to assess whether broad trends have occurred.
- Estimates of fisheries value need to be derived using standard methods agreed in advance by advisors and local/regional fisheries stakeholders.
- The industry should where possible make use of relevant assessments from other sectors, such as the recent assessment of interactions between Round 2 wind farms and fisheries, covering the outer Thames and the Wash.

Benthic Ecology

The key issues associated with the potential impact of marine mineral extraction on benthic ecology stem from the direct removal of sediment and the resident fauna, increased turbidity and redistribution of fine particulates and changes to the nature and stability of sediments.

In order to address these concerns, the following is recommended for inclusion in the REA process:

- A broad-scale description of the physical environment (e.g. sediment particle characteristics, tide and wave climate, sediment mobility, marine landscape etc).
- An assessment of the distribution of species/assemblages and habitats, particularly those of particular sensitivity or importance.
- Information on the temporal stability of the physical and biological environment, so as to aid understanding of the patterns/responses of benthic species. An understanding of natural variability will be important in order to differentiate between natural and anthropogenic disturbance.
- An assessment of the likely impact of activities to-date on the benthic environment (including cumulative and in-combination effects). In addition, an assessment of the likely impacts which may result from the proposed future activities.
- A consideration of the broad-scale patterns identified (spatially and temporally) in terms of any implications for survey designs at a more localised level. In addition, attention should also be given to the level of sampling effort required in order to detect change.
- The continued use of existing guidance, where appropriate, including the 'Guidelines for the conduct of benthic surveys at aggregate dredging sites' (<http://www.cefas.co.uk/publications/files/02dpl001.pdf>), for the collection of any new data.

Coastal / Physical Processes

The key issues associated with Coastal / Physical Processes are to be able to quantify the physical extent, magnitude and rate of extraction-induced change in changed bed types, to be able to distinguish such change from natural change (especially packets of mobile sand moving through a specific area) and to be able to assess the significance of such change, over time.

In order to address these issues, the following is recommended for inclusion in the REA process:

- A broad scale assessment of the physical environment including waves, currents, temperature, salinity, turbidity and geology from which a regional baseline can be created within which site specific EIA's can be placed.
- An assessment of how this baseline has changed though time, specifically how the texture, mineralogy and spatial gradients have changed. This assessment will need to cover an area, which at maximum would be defined by that area which could conceivably be influenced by or influence the licence areas over a 20-30 year period.
- Based on the preliminary assessment, a further assessment of the implications for wider ecosystem consequences, including climate change with regard to sediment mobility and composition of the seabed and the impacts of climate change on storm events and temperature.
- A consideration of the likely impacts to the coast based on the dredging scenarios outlined in the REA, which take account of local information including existing Coastal Impact Assessments and Shoreline Management Plans.

4.3 Historic Environment

The key aim of a REA associated with the Historic Environment is the provision of a comprehensive review of historic environment resources in the region inclusive of palaeo-environmental (e.g. prehistoric geomorphological features) and the record of wrecks, aircraft and other features.

In order to address these issues, the following is recommended for inclusion in the REA process:

- A comprehensive review of historic environment resources in the region inclusive of palaeo-environmental (e.g. prehistoric geomorphological features) and the record of wrecks, aircraft and other features taking account of:
 - consultation with national and local curatorial bodies including English Heritage and historic environment services within relevant local authorities;
 - data obtained from English Heritage’s National Monuments Record Centre and the Historic Environment Record maintained by local authorities; and
 - data describing the distribution and nature of the historic environment as revealed by geophysical and geotechnical survey.
- The use of a standardised methodology and defined overall scope and key issues derived from a desk-based assessment corroborated by marine survey where necessary. Specific attention should be given to applying in an REA the guidance as provided in the BMAPA and English Heritage “*Marine Aggregate Dredging and the Historic Environment Guidance Note*” (http://www.english-heritage.org.uk/upload/pdf/Marine_aggregate_dredging.pdf).
- Published reports generated by research supported by the Aggregates Levy Sustainability Fund (ALSF) are also to be directly referenced and appropriate methodologies adopted as and when appropriate (see following table). The REA should where possible make use of relevant assessments from other sectors, such as the recent assessment of Round 2 wind farms covering the outer Thames and the Wash and SEA reports produced by DTI.

ALSF projects

- England’s Shipping (digital Atlas)
- England’s Historic Seascapes
- Modelling Exclusion Zones for marine aggregate dredging
- On the Importance of Shipwrecks
- Enhancing our understanding: Shipwreck Importance
- Assessment of Archaeology with Marine Aggregate Environmental Assessments
- Re-assessment of the archaeological potential of continental shelves
- Submerged Palaeo-Arun River
- Artefacts from the seabed

ALSF projects

- Enhancing our understanding: Navigational Hazards
 - North Sea Palaeolandscapes
 - BMAPA-EH Protocol for the reporting of archaeological finds (Awareness programme)
 - Solent to Aggregates Outreach
 - Multibeam Sonar on Wrecks
 - Wrecks on the Seabed
 - Seabed in Prehistory
 - Innovative Approaches to Rapid Archaeological Site Surveying and Evaluation in the Marine Environment
 - High Resolution Sonar for the Archaeological Investigation of Marine Aggregate Deposits
 - Beach Replenishment and derived archaeological material
-
- Available data from primary sources (e.g. geophysical and geotechnical) will be acquired and used to complement the assessment of the historic environment record derived from the consultation exercise and desk based assessment (e.g. the National Monuments Record of English Heritage). These data will then be used to prioritise the issues that are reported in the REA, and will provide a scoping report for the future site-specific EIAs. Following the gathering of available data and the identification and prioritisation of the issues to be addressed, the REA should be able to propose targeted data collection programmes capable of filling gaps in knowledge at a regional and/or site specific level. The REA will also provide an assessment of how the historic environment might be affected as a result of increased or decreased activity throughout the Region resulting from licence renewals and new applications.

4.4 Other Issues to Consider

This guidance is written taking account of Nature Conservation, the Marine and Historic Environment interests and the framework above provides a suggested approach for each area in turn. However, REA clearly needs to take account of other sector interests principally the navigation and recreation sectors. As such, it is recommended that those seeking to undertake REA for the Marine Minerals sector engage with all relevant regulatory authorities and stakeholders, through a detailed consultation and scoping process, to ensure such interests are covered.

5. Further Information, Presentation and Data Management

Outputs from the significant number of projects funded through the Aggregate Levy Sustainability Fund (ALSF) and specifically its marine components (www.mepf-alsf.org.uk) should be considered when undertaking REA. In many cases, project data may be available to augment that gathered as part of REA for specific regions.

Relevant guidance documents already exist in a number of areas, and where relevant these are referenced. It should be emphasised that the most up to date and relevant guidance available from all sectors should be used to address specific components of REA in a consistent and comparable way. An example of existing guidance is available from (<http://www.cefas.co.uk/publications/files/windfarm-guidance.pdf>). Where necessary, those undertaking REA are encouraged to liaise directly with those relevant regulatory authorities.

Reporting of all aspects of the REA, and its general format should be undertaken in a consistent manner which allows for comparability, however this should be something those undertaking REA should choose. Consideration of a standardised reporting format for risk such as a “traffic light” or Red (High) / Amber (Medium) / Green (Low) reporting structure should be made.

Data generated by REA, together with REA outputs should routinely be available to industry and regulatory authorities for consideration in the Marine Minerals application process but also accessible within the public domain. Those undertaking REA should consider best available mechanisms for providing such access, such as availability through dedicated websites or data sharing initiatives.

Annex B

Proposed List of Consultees
for the Humber and Greater
Wash MAREA

PROPOSED LIST OF CONSULTEES FOR THE HUMBER AND GREATER WASH MAREA.

It is not envisaged that all stakeholders identified at the scoping stage and invited to the scoping meeting will be consulted again within the course of the Humber and Great Wash MAREA. The following list identifies proposed organisations or individuals to be consulted during the MAREA:

- ABP Humber;
- Angling Trust;
- Bass Anglers Sportsfishing Society (BASS);
- Bridlington & Flamborough Fishermen' Society (B&FFS);
- British Sub Aqua Club;
- British Wind Energy Association (BWEA);
- Centre for Environment, Fisheries and Aquaculture Science (Cefas);
- Chamber of Shipping;
- Coastal Action Zone (Lincolnshire);
- Cruising Association ;
- Department for Energy and Climate Change;
- Department for Transport;
- East Lindsey Council;
- Eastern Sea Fisheries Joint Committee;
- East Riding of Yorkshire Council;
- English Heritage;
- Environment Agency;
- Flamborough Head European Marine Site;
- Graham Stuart (MP for Holderness);
- Greater Wash Fishermen's Association;
- Greater Wash Fishing Industries Group;
- Holderness Fisheries;
- Hornsea Fishermen;
- Humber Archaeology Partnership, (Kingston upon Hull and East Riding councils);
- Humber Cruising Association;
- Hydrographic Office;
- International Dolphin Watch;
- JNCC;
- Lincolnshire County Council;
- Lincolnshire Wildlife Trust;
- Marine Conservation Society;
- Marine Management Organisation (formally Marine and Fisheries Agency);
- Marine Aggregate Levy Sustainability Fund (AFSF);
- Marine Biological Association;
- MARINET;
- Maritime and Coastguard Agency;

- Ministry of Defence;
- National Federation of Fishermen's Organisations (NFFO);
- National Trust;
- Natural England;
- Norfolk Coast AONB;
- Norfolk Wildlife Trust;
- North East Coastal Group;
- North East Lincolnshire Council;
- North Eastern Sea Fisheries Committee;
- North Lincolnshire Unitary Authority;
- North Sea Regional Advisory Council (RAC)
- North Norfolk District Council;
- Offshore wind developers (to be confirmed);
- Paul Huetson (Individual Holderness fisherman);
- Port of Kings Lynn;
- Royal Ocean Racing Club
- Royal Society for Protection of Birds (RSPB);
- Royal Yachting Association;
- Sea Anglers Matchmen's Federation;
- Sea Mammal Research Unit (SMRU);
- Sea Watch;
- The Chamber of Shipping;
- The Crown Estate;
- Trinity House;
- United Kingdom Offshore Operators Association (UKOOA);
- University of East Anglia;
- University of Hull;
- Wash Estuary Project;
- Wash North Norfolk European Marine Site;
- Wells & District Inshore Fishermen's Association;
- Whale and Dolphin Society;
- Wildfowl and Wetlands Trust; and
- Yorkshire Wildlife Trust.

This list will be updated and amended throughout the process of the Humber and Greater Wash MAREA.

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The following is a list of organisations that provided input into the MAREA through consultation (either during scoping or main MAREA phase). This list does not include the additional organisations that were invited to the scoping meeting but did not attend or provide feedback. Individual fishermen consulted are also not listed here.

- ABP Humber
- ABP King's Lynn
- Centre for Environment, Fisheries and Aquaculture Science (Cefas)
- Chamber of Shipping
- Cruising Association
- Department for Energy and Climate Change
- Eastern Inshore Fisheries and Conservation Authority
- East Lindsey District Council
- East Riding of Yorkshire Council
- English Heritage
- Environment Agency
- Greater Wash Fishermen's Association
- Holderness Coast Fishing Industry Group
- Hydrographic Office
- International Dolphin Watch
- Joint Nature Conservation Committee
- Lincolnshire County Council
- Lincolnshire Wildlife Trust
- Marine Management Organisation
- Maritime and Coastguard Agency
- Natural England
- Nene Port Authority
- Norfolk Coast AONB
- North East Lincolnshire Council
- North Eastern Inshore Fisheries and Conservation Authority
- North Eastern Sea Fisheries Committee
- North Lincolnshire Council
- North Norfolk District Council
- Port of Boston
- Regional Flood Defence Committee
- Residents of East Riding of Yorkshire
- Royal Society for Protection of Birds
- Royal Yachting Association
- RYE Consultants
- The Crown Estate
- Trinity House
- University of East Anglia
- University of Hull
- Yorkshire Wildlife Trust