Chapter 4: Key activities

Contents

Introduction

This section addresses the activities outlined in Chapter 3 of the Marine Policy Statement (MPS), which includes marine protected areas (see explanation in 4.1). It specifically focuses on the East Inshore and East Offshore plan areas – the first two plan areas for England. It provides background information and scene setting for each of the sectors, drawing together and summarising evidence and issues that have emerged based on data and information, national context and policy, relevant existing plans at a sub-national level, and discussions with stakeholders. See Chapter 2 of this report for detail on the approach to gathering this information.

Each section includes an overview of the current situation and, where known, potential future situation for the sector. It then summarises the evidence and draws out resulting implications for the sector itself, interaction with other sectors and sustainable development considerations (mainly elements of the environment). The draft and now revised text reflects comment from stakeholders on the evidence presented and discussion and confirmation of the implications and emerging issues. Together with the evidence, those issues that can be considered key, that is those that are substantial or significant and can be addressed by marine planning rather than other measures will inform the next steps in the planning process and provide context to the sustainability appraisal (SA). More specific consideration of environmental, economic and social issues arising is provided in Chapter 6. It is not intended to revise the whole of the following text again but the MMO will continue to consider evidence and views on issues through discussion in the next steps in the planning process.

The focus of this chapter is on drawing out evidence and identifying issues that are relevant to marine planning. Many of the issues to do with impacts of marine activities are already the subject of legislation and other regulation, whether this be controlling the toxicity of discharges, reducing nutrient inputs, avoiding vessel collisions in congested areas. While these can be signposted in marine plans, marine planning needs to focus on those issues where it can add value above and beyond other existing or developing measures.

National context and policy

The national context is largely drawn from the MPS, sector specific policy documents such as National Policy Statements (NPSs), other major strategic documents, such as Fisheries 2027, Renewable Energy Roadmap and the Strategic Scoping Report.

The current report is focussed on the evidence base and issues. However, in assessing the evidence, it was clear that relevant policy and plan documents contain explicit or implicit goals and objectives (beyond the 22 high level marine objectives listed in the MPS[1]) and statements that are likely to inform the drafting of planning policies. Therefore, **while identifying objectives and deriving planning policies are later steps in the planning process** (see 1.11)[2], it was considered helpful to draw attention to some relevant goals/objectives and policies to inform stakeholders and provide further context to commenting on key issues.

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[1] Defra (2011) Marine Policy Statement, p11

[2] For progress with next steps see www.marinemanagement.org.uk/marineplanning/index.htm

East marine plan areas – current situation

The approach to data and information is set out in Chapter 2. This section provides brief key facts and figures on the activity within the East plan areas including the relative importance of the areas in relation to England. It also summarises other relevant plan-level information such as the distribution of the activity and existing measures in place to regulate or manage the activity.

East marine plan areas – existing planning context

Chapter 2 describes the approach to assessing existing plans all of which are at a local or sub-national level. The text in most of the sectors is based on a summary of relevant evidence in statutory terrestrial plans (most commonly core strategies, part of local development frameworks (LDFs) supplemented by relevant points from the Area of Outstanding Natural Beauty (AONB) Plan. Other types of existing plan are either referred to under the relevant sector, such as European marine site management schemes in the marine protected areas section, or elsewhere in this report, such as shoreline management plans in Chapter 2.

The focus of the evidence is on the current situation, relevant planning policies, any indication of intentions or aspirations for the future including goals or objectives, and implications for marine planning. The main text provides a high level summary of the review of what is a large number of plans, but details from individual plans (mainly LDFs) organised by sector are included at Annex 6.

Potential future situation

In order to undertake planning it is necessary to assess the potential future changes in relevant sectors, both based on projecting current trends forward and assessing new demands for marine space taking account of objectives, policies and technical considerations. The degree to which future development or change can be described or quantified varies greatly between sectors. In the following, a brief outline is provided based on general or national requirements. More in-depth spatial projections are presented for a few selected sectors at the end of Chapter 4. The evidence presented, and implications highlighted, will continue to be subject to comment and discussion.

Summary of evidence and issues

This chapter summarises the evidence and draws out implications for issues based on the preceding text and taking account of relevant analyses and discussion so far with stakeholders. The section is structured around a summary of the evidence and its relevance to the East plan areas, issues for delivery of the sector under discussion (including current situation and potential future situation), issues arising for other sectors (including potential conflicts), and issues to do with sustainability (both potentially positive as well as negative impacts). The intention is to focus on substantial points and implications of most relevance to marine planning. However, some issues which are more appropriately addressed by other mechanisms, but may need to be noted in marine planning, are also included. We will continue to refine the understanding of issues most relevant to the first plans for the East plan areas during discussion on objectives and options.

4.1 Marine protected areas and other designated sites

Introduction

Marine protected areas (MPAs) are outlined in this chapter on human activities partly to follow the structure of the Marine Policy Statement (MPS) and partly because, as defined geographic areas, they have obvious spatial implications.

MPAs in the strict sense are those designated specifically for marine features of conservation interest[3]. However, other statutory[4] designated sites around the coast that overlap or are adjacent to the marine area are also directly relevant to marine planning, that is given the interdependence of subtidal, intertidal and coastal habitats, species and processes, and encompassed here. Such sites include statutory conservation sites without wholly marine features but also areas of outstanding natural beauty and national parks.

MPAs and designated sites are only one aspect of biodiversity, conservation and landscape protection. These topics are considered more generally, including statutorily protected species, mobile species such as birds, marine mammals, sharks, skates and rays, features of conservation interest (FOCI), and seascapes, in Chapter 6[5], together with 'issues for sustainability' in relevant activity sections in the rest of Chapter 4.

National context and policy[6]

The UK marine environment contains very rich and varied habitats which support a wide variety and abundance of living organisms. The Government recognises the economic, social and intrinsic value of a healthy marine environment and are committed to halting the loss of biodiversity and the degradation of ecosystem services, and restoring them so far as is feasible, while making a contribution to averting global biodiversity loss. However, many habitats and species are subject to pressure from human activities and some important sites are in decline. The Government is committed to allowing damaged ecosystems to recover in order to realise the benefits from the marine environment. This will be achieved through integrating conservation objectives set out in the MPS into marine planning and decision making and implementing the management requirements of specific designated sites.

The UK administrations are committed to substantially completing an ecologically coherent network of MPAs[7] as part of a broad based approach to nature conservation. The network is seen as a key tool (along with others) in contributing to achieving good environmental status as required by the Marine Strategy Framework

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[3] Spatial measures established for other reasons, such as e.g. for fisheries management, are excluded from this section on MPAs discussed elsewhere, such as in 4.8.
[4] This section focuses on statutory sites. There are a range of non-statutory sites that occur around the plan area, such as Heritage Coasts and RSPB reserves.
[5] Note also relevance of the Marine Strategy Framework Directive (see Chapter 1, 1.2)
[6] Based on Marine Policy Statement 3.1.1 – 3.1.2.

[7] Current known timetable would see the first marine conservation zones contributing to the network being designated in 2013.

Directive (MSFD) including requirements for biodiversity and seafloor ecosystems. The network will comprise existing MPAs as well as new sites. It will be made up of national marine conservation zones (MCZs), sites of special scientific interest (SSSIs), European[8] (special areas of conservation (SACs), special protection areas (SPAs)) and international (Ramsar sites) designations[9]. However, the level of protection that is afforded to each of these varies[10] and therefore it is essential that the provisions that apply to each are understood when viewing the distribution of designated sites. For example, for SACs designated under the Habitats Directive and SPAs classified under the Wild Birds Directive (and, as a matter of policy, possible SPAs before they are designated) , statutory protection is provided through legislation including the Conservation of Habitats and Species Regulations 2010 and the Offshore Marine Conservation (Natural Habitats, &c) Regulation 2007.

There are currently around 55 SPAs (42 of which are designated for a marine feature), 78 SACs (40 of which area designated for a marine feature) and 377 SSSIs (113 of which protect marine features) which are relevant to marine planning. We have defined relevance here as a site for which either part or all of it is contained within the east plan areas, of where a boundary of a designated site borders the plan areas (that is of the mean high water mark). These figures have been calculated by the MMO using ArcGIS analysis.

In addition to the site specific objectives that apply to all designated sites, the following relevant goals, objectives and policies[11] are highlighted by way of context, although note that identifying objectives and deriving planning policies are later steps in the planning process:

- The UK aims to ensure a halting and, if possible, a reversal of biodiversity loss with species and habitats operating as a part of healthy, functioning ecosystems.
- The UK aims to ensure the general acceptance of biodiversity's essential role in enhancing the quality of life, with its conservation becoming a natural consideration in all relevant public, private and nongovernmental decisions and policies.
- Establishing a well managed, ecologically coherent network of MPAs. By the end of 2016 this will contain in excess of 25 per cent of English waters[12], that is the marine area around England.
- European Union commitment to "halting the loss of biodiversity and the degradation of ecosystem services in the EU by 2020, and restoring them, so far as is feasible"[13]

[8] Note also European marine sites (collective term for special areas of conservation (SACs) and special protection areas (SPAs) that are covered by tidal water) – see www.naturalengland.org.uk/ourwork/marine/protectandmanage/mpa/europeansites.aspx

[9] See Marine Policy Statement 3.1.3-3.1.5 for a description of different types of designated site and the legislation underpinning them.

[10] For example, at present less than 0.1 per cent of UK waters exclude *a priori* all potentially damaging activities.

[11] Marine Policy Statement 2.6.1, 3.1.7, 3.1.8

[12] England Biodiversity Strategy www.defra.gov.uk/publications/files/pb13583-biodiversity-strategy-2020-110817.pdf

[13] http://ec.europa.eu/environment/nature/biodiversity/comm2006/2020.htm

- The MSFD includes several key objectives in relation to marine ecology and biodiversity, and requires the measures for achieving good environmental status to include spatial measures for biodiversity protection. MPAs are but one measure that will contribute to achievement of MSFD targets.
- Marine plan authorities and decision-makers should take account of the regime for MPAs and comply with obligations imposed in respect of them. This includes the obligation to ensure that the exercise of certain functions contribute to, or at least do not hinder, the achievement of the objectives of a MCZ. This would also include the obligations in relevant legislation relating to SSSIs and sites designated under the Wild Birds Directive and Habitats Directive.
- Marine plan authorities and decision makers should take account of how developments may impact on the aim to halt biodiversity[14] loss and the legal obligations relating to all MPAs, their conservation objectives, and their management arrangements.

MPAs have a role to play in sustaining and increasing ecosystem services. It is anticipated that MCZs specifically and marine plans more generally will "consider the components of marine habitats not only in terms of biodiversity and habitats, but also with regards to ecosystem functioning and the provision of ecosystem services and benefits"[15].

East marine plan areas – current situation

Figure 4.1 shows the distribution of different types of existing MPAs that are within (either wholly or in part[16]) the East marine plan areas. Figure 4.2 shows other designated sites which overlap with the marine area[17]. Note that there are a number of designations which are difficult to see at a local level on the maps, such as within Suffolk's estuaries – some are shown in 4.1 and 4.2 but see also the interactive mapping provided by JNCC[18]. The following information highlights the number, area and relative importance of designated sites, and particularly MPAs, in the plan areas:

- The East plan areas contain a significant area of sites designated as SPA and SAC around England, that is approximately 78 per cent of existing SAC (including the large candidate SAC on the Dogger Bank in the offshore plan area) and 42 per cent of existing SPA by area.
- There are around 15 SPAs in the East Inshore area, one of which extends into the East Offshore area (Outer Thames Estuary), covering a combined area of 3,032 square kilometres or 5 per cent of the East plan areas (30 per cent of the East Inshore plan area) and SACs occupy 19,794 square kilometres of the East plan areas (33 per cent).
- Over one third (39 per cent) of both plan areas are either SAC, SPA or both (as some SACs and SPAs overlap).

[14] Noting the duty to conserve and enhance biodiversity in the NERC Act 2006.
[15] UK National Ecosystem Assessment, (2011) The UK National Ecosystem Assessment Technical Report. UNEP-WCMC, Cambridge, p462
[16] It should be noted that there are also designated sites adjacent to the East plan area boundaries to the north and south.
[17] Note that SACs and SPAs well beyond those shown on the maps may need to be included for the purposes of Habitats Regulations assessment (HRA),
[18] http://jncc.defra.gov.uk/page-5201

- SSSIs (all within East Inshore): 51 sites, covering 1,002 square kilometres, representing just under 40 per cent by area of the SSSIs around the coast of England.
- There are a number of important Ramsar sites, including the Humber estuary and The Wash.

Please note: These figures were calculated by the MMO using GIS analysis of features contained within the boundary of the plan area.

Existing measures: all of the existing designated sites mentioned are subject to protection measures based on the legislation underpinning them, such as SACs, SPAs under the Conservation of Habitats and Species Regulations 2010 (and as a matter of policy, potential SPAs and candidate SACs should be treated as if already classified, and listed Ramsar sites receive the same protection)[19]. Further to this, most of the sites have some form of management measure, such as management schemes for many SACs designated for marine features under the Habitats Regulations, such as Humber, Wash & North Norfolk Coast, Flamborough Head, and 'management agreements' for many SSSIs. Most issues to do with the implementation of MPAs will be addressed and delivered through these site-based protection and management measures. An assessment of risks from ongoing anthropogenic activities in a selection of SACs and SPAs[20] is being used to inform licence decisions and review of some existing management measures. Marine plans will integrate conservation objectives set out in the MPS and provide a "whole environment" framework within which the management requirements of specific designated sites are implemented.

It should be noted that there will be habitats and species present within MPAs that are not 'designated' features and may therefore not be subject to the associated statutory protection. Such features would be considered through a combination of advice from JNCC and Natural England, licensing, and management measures, which would need to be considered in marine planning.

Designated sites adjacent to the marine plan area will also need to be considered for 'indirect effects' from within the plan area. Such sites include those on the adjoining coast and MPAs in regions bordering the East plan area.

East marine plan areas – existing planning context

The following focuses on relevant evidence and issues set out in LDFs and the one AONB management plan (North Norfolk). Management plans for specific MPAs and designated sites are referred to in the previous section. Issues arising from river basin management plans are outlined in Chapter 2. Other plans relevant to designated sites include the statutory, such as those for national parks and for national nature reserves, and non-statutory such as estuary management plans (EMPs), which also set out a number of policies related to biodiversity and conservation.

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[19] Marine Policy Statement 3.1.3

[20] Coyle, M.D. & Wiggins. S. M. 2010. European Marine Site Risk Review. Natural England Research Reports, Number 038

All of the local authorities have policies relating to biodiversity in general and designated sites in particular but only a few have policies specific to designated sites of marine interest, reflecting the uneven distribution of relevant sites. Most of the references to such sites reiterate legislative or existing requirements. The AONB recognises the potential for erosion, climate change and development pressures to damage habitats with a subsequent effect on marine species and bird feeding grounds.

- **Conditions or restrictions to ensure protection of national sites**, for example (aggregated and summarised from several LDFs – see Annex 6) proposals which would cause harm to sites of national importance for wildlife or geology will not be permitted unless they:
    - cannot be located on alternative sites that would cause less or no harm
    - the benefits of the development at the site clearly outweigh both the impacts that it is likely to have on the special interest of the site and any broader impact on the national network of such sites
    - prevention, mitigation and compensation measures are provided.

- **Conditions or restrictions to ensure protection of international sites**: equivalent wording to previous point but based on terms set out in regulations, such as no adverse effect to the SAC or SPA in question.

A few LDFs together with the North Norfolk AONB emphasise a proactive approach:

- **General**: Maintain a commitment to protect and enhance designated sites (such as Humber Estuary)
- **Specific measures**:
    - Adopt a pro-active approach to the resolution of conflicting interests (recognising the need to maintain the integrity of the Humber Estuary biodiversity sites).
    - Maintain and improve the condition of key land, intertidal and sea habitats, managing the consequences of coastal change (Norfolk Coast).
    - Improve resilience to change for key habitats and species through development of ecological networks that extend, link and buffer these habitats (Norfolk Coast).

Potential future situation

See Figure 4.1 for new proposals (at varying stages of progress) for different types of MPA, particularly MCZs. Known **candidate** SACs are mentioned above. Work is underway to assess the requirement for further SPA sites, including, feeding and non-breeding sites for water birds in an area of search between south of Flamborough Head and Norfolk[21], for terns, and for foraging areas for seabirds [22].

The main known change in coverage by MPAs will be the introduction of marine conservation zones (MCZs). Twelve MCZs[23] in the East plan areas have been

[21] http://jncc.defra.gov.uk/pdf/SPA_AOS_Maps%2020100304.pdf
[22] Kober et al, 2010) http://jncc.defra.gov.uk/page-5622

recommended by MCZ projects (nine from Net Gain and three from Balanced Seas) to Natural England and the Joint Nature Conservation Committee (JNCC) (see Figure 4.1[24]). These encompass eight reference areas (rMCZs, all in the Net Gain project area) although some of these are too small to see at the scale of Figure 4.1. Only two of the recommended sites overlap with existing MPAs. rMCZs take up 3,252 square kilometres of the plan areas (6 per cent of the total plan areas).

The final composition of designated MCZs is not known. The potential impact on various activities, including possible restrictions or conditions, will also depend on the conservation objectives and management measures that apply to each site and which have yet to be determined (although it is likely that the small number of reference areas will exclude most activities). Currently, Natural England and JNCC are analysing the recommendations and will submit their advice on them to Defra. Once the regional MCZ project site recommendations, impact assessment and Natural England and JNCC's advice has been received by the Department for Environment, Food and Rural Affairs (Defra), ministers will consider the supporting evidence and potential environmental, social and economic impacts. It is envisaged that all sites will go out to consultation around the end of 2012. Depending on responses to consultation, ministers will decide on which MCZs to designate in 2013. Once public consultation is underway, marine planning can formally consider MCZs. Until then, recommended MCZs can be informally noted in analysis to inform marine planning.

Ideally, for the purposes of planning, it would be useful to identify several hypothetical projections for the future pattern of MPAs, based on possible increase in SPAs and MCZs, perhaps based on a percentage of proposed sites that go forward to designation combined with assumptions about different management requirements. This is not possible given the need for further assessment and consultation to be undertaken first.

While it is not possible to define or quantify the number and area of sites that will be designated, it is clear that the likely increase in coverage by new MPAs could be significant, based on the number of sites put forward by the regional MCZ projects and the potential for further SPAs. Potentially this may raise key issues for other activities, using the same or adjacent areas of sea, depending on the location and the activity. The degree to which this is the case will depend on a number of factors such as the conservation objectives referred to above. It should also be remembered that the premise of the approach to MCZs is to work with stakeholders, for relevant features of conservation interest, to identify areas that collectively met the ecological network guidance, while impinging as little as possible on their interests. Therefore the potential impacts and benefits have started to be explored. This will be considered further through the impact assessments being undertaken by the MCZ projects which will consider both benefits and disbenefits (social, economic and environmental). Further, various activities are compatible with conservation interests depending on the habitat, species or interest. Generic advice to this effect, considering different activities, pressures and possible impacts, and mitigation has

[23] Offshore Foreland, Kentish Knock East, Stour and Orwell, Alde Ore Estuary, Orford Inshore, Cromer Shoal Chalk Beds, Wash Approach, Lincs Belt, Silver Pit, Holderness Inshore, Holderness Offshore, Markham's Triangle.
[24] And also www.mczmapping.org

been produced by JNCC and Natural England[25]. Further work over the next few months will prepare an Impact Assessment for the proposed MCZs that will enable those with an interest in the marine environment to understand and comment on how, and to what extent, the proposed MCZs may impact on them.

[25] General advice on assessing potential impacts of and mitigation for human activities on MCZ features using existing regulation and legislation (June 2011) www.naturalengland.org.uk/Images/activities-advice_tcm6-26819.pdf

Figure 4.1: Marine Protected Areas

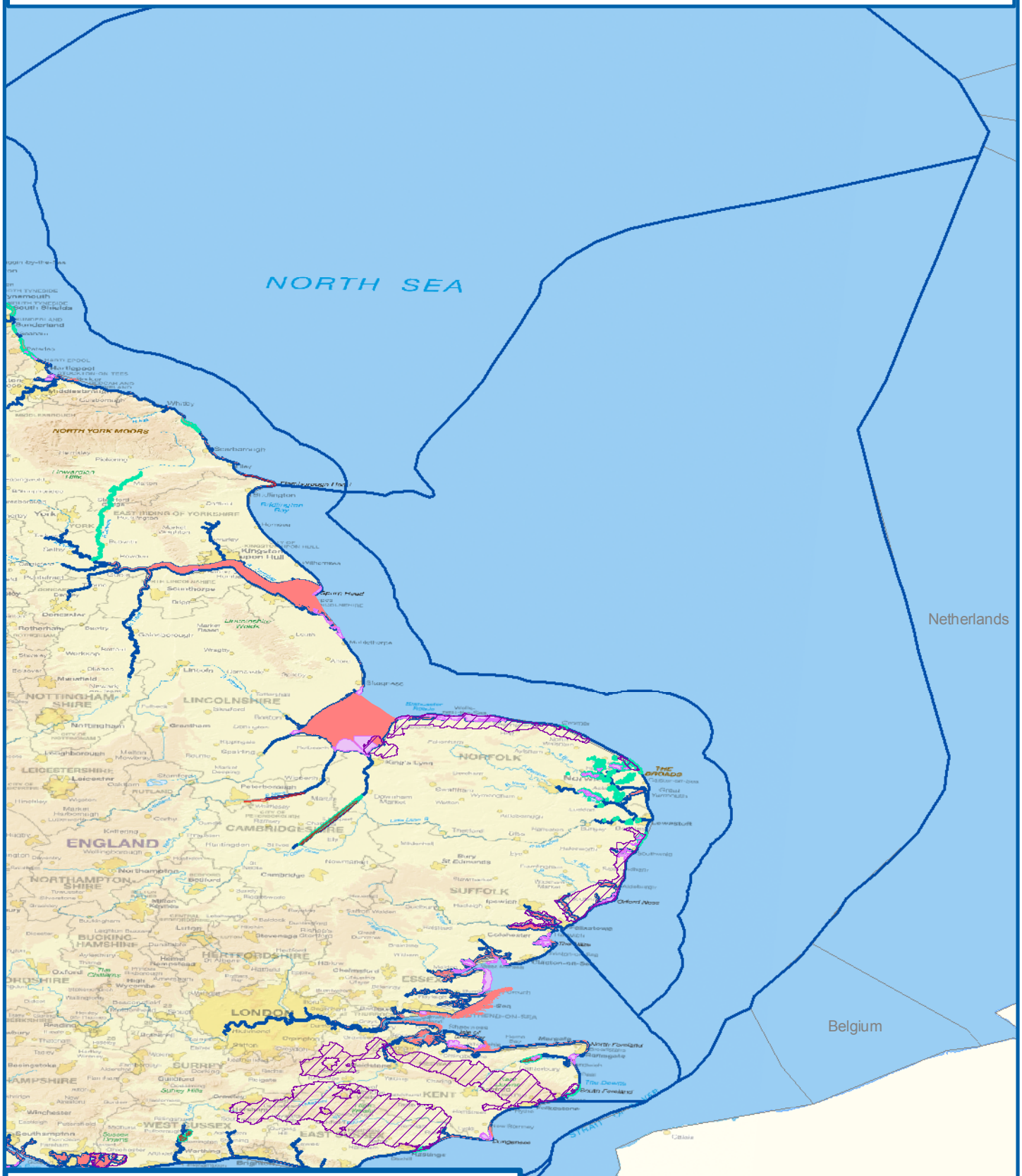
January 2012
This map has been produced using the ETRS89 Coordinate Reference System

marine management organisation

Figure 4.2: Other designated sites intersecting with the East plan areas

January 2012
This map has been produced using the ETRS89 Coordinate Reference System

marine management organisation



- MMO Marine Plan Areas
- Areas of Outstanding Natural Beauty
- National Nature Reserves
- Site of Special Scientific Interest
- SPAs- non marine intersecting with plan area
- SACs- non marine intersecting with plan area

Summary of evidence and issues

Relevance to East plan areas

The East plan areas include a wide range of habitats, species and other features of conservation importance. As a result, they include a significant proportion of the designated MPAs around England and will gain more in the near future.

- **Current:** significant proportion of the area of sites designated as SPA (approximately 42 per cent) and SAC (approximately 78 per cent) around England, together with a substantial coverage at the coast and of the intertidal by SSSIs (just under 40 per cent by area of those around the coast of England).
- Just over a third of the East plan area is either SAC or SPA or both.
- **Future:** further SPAs may be designated but the potential location and extent of these has yet to be determined.
- There will be a number of MCZs designated but how many and what proportion of the twelve rMCZs (6 per cent of the total plan areas) progress towards designation is unknown.

It should be noted that there are designated sites adjacent to the East plan area boundaries to the north and south.

Please note: These figures were calculated by the MMO using GIS analysis of features contained within the boundary of the plan area.

Issues for delivery of MPAs (and other designated sites)

- The management of existing sites is largely provided for by statutory protection requirements and management measures implemented by competent and relevant authorities. The main relevance for marine planning is to take account of existing sites and understand and assess the implications of new MPA (and other designated site) proposals. Marine planning should provide a framework or planning policy context for site-based measures. The need for, and nature of, this support needs to be determined and will be driven by advice from the statutory nature conservation bodies but could include:
    - integration of conservation objectives set out in the MPA to assist decision making and implementation of the management requirements of specific designated sites
    - ensuring that activities and decisions outside of sites take account of the delivery of individual MPAs and an ecologically coherent network, including cumulative and cross-boundary considerations
- Attention must be paid to the type of designated site under consideration as the legislation and protection applying to it will vary. Equally, different conservation features have very different protection requirements and therefore the range of management measures also varies. This type of information will be essential when considering co-location of activities within designated sites. An example is the degree to which wind energy development and SACs or SPAs can be co-located or not.[26]

- The need to help ensure that sites have appropriate protection prior to designation
- The designation of new conservation sites in conjunction with development of offshore wind alone is a major change in spatial usage, although the exact size of the change is currently unknown. This imminent extra competition for space and potential implications for human activities is likely to be a key issue for marine planning. Indeed, competition for space may mean there are limited or no alternatives for site selection.

Issues for other sectors

- Pending confirmation of MCZ designations and management measures, there is potential for some degree of effect for ongoing and new activities and development, although a stakeholder-led process with the MCZ project groups to identify recommended sites has sought to minimise this. The degree to which this is the case will depend on a number of factors including conservation objectives. This is being considered further through the impact assessment (IA) for MCZs.
- An initial, high level IA and consultation undertaken by the MCZ projects indicated that there might be few situations where developments or activities, such as shipping, are deemed to have a real impact on sites. However, this requires further assessment, such as it did not address cumulative effects, as part of refining the IAs to accompany advice from Natural England and JNCC. The IA is taking into account existing activities on the 127 rMCZs and reference areas, and whether or not these activities will be compatible with the features for which the sites are identified.
- In the meantime, stakeholders from several sectors have raised remaining concerns, or at least uncertainty, about possible effects including displacement and the prolonged period in which this uncertainty will remain. Clearly the final advice may have a potentially profound effect on the location and distribution of activities and, therefore, potentially issues for marine planning to address. While marine planning cannot give formal consideration to MCZs until they are out to public consultation, it would be prudent to take note of them informally in analysis to inform marine planning. The MMO and Defra, with Natural England and JNCC, will continue to work closely together in taking forward both processes.
- Whilst any resulting implications would be largely a matter for individual MCZ management and related licensing, there are likely to be issues that marine planning will play a part in addressing, such as the consequences of the increased area of protection and any knock on effect for areas and activities outside of the sites, measures outside of sites relevant to sites, including licensing and enforcement requirements. However, both the need for, and ability to, act will be founded in the legislation underpinning the particular designated site
- Concern has been raised by some stakeholders about any management measures applying equally to foreign fishing vessels as UK vessels. While as much an issue in general as for implementation of MPAs, Defra has previously stated that fishing restrictions will not be imposed unilaterally on UK vessels before they can be applied to EU vessels.

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[26] The Netherlands, for example, has taken the policy decision to avoid co-locating wind farms in SACs and SPAs. It is for the UK to determine what it considers the most appropriate approach.

Issues for sustainability

- Further work is needed to determine the relevance and potential basis of national MPAs for mobile species – Defra is commissioning such work. While this is an issue for Defra and Natural England or JNCC, any resulting advice or actions may have implications for marine planning.
- Cumulative and cross boundary impacts of developments need to be considered. Marine plans can help guide the licensing process to ensure that cumulative effects of developments do not impact on MPAs although there are substantial gaps in our understanding of such impacts.
- Designation of MCZs and subsequent management of those and other MPAs needs to consider the impact (positive or negative) on economic regeneration of coastal communities, such as Lowestoft through opportunities as a service centre for the offshore industry or continued operation and development of the port of Felixstowe. A recent socioeconomic study undertaken for the MMO[27] should contribute to such considerations.
- MPAs and designated sites can provide direct and indirect societal and economic benefits, such as through the ecosystem services provided by the features that they protect. One example is the importance of saltmarsh habitat for fish nurseries. These should be picked up through individual site impact assessment and management. However, it is anticipated that marine planning will also consider this more widely[28].
- Habitats and species present within MPAs that are not designated may need to be considered in marine planning, depending on advice from JNCC and Natural England, and addressed through a combination of licensing and management measures.

4.2 Defence and national security

National context and policy

The primary objective of the Ministry of Defence (MoD) is to provide military defence and, where appropriate, security for the people of the UK and overseas territories. UK waters are a crucial environment in which MoD (including HM Armed Forces and the Royal Fleet Auxiliary) must maintain and deploy the operational capability required to achieve this[29].

Defence activities that use the marine environment, directly or indirectly, in support of operational capability are diverse but include operational vessels and aircraft, HM naval bases, surface and sub-surface navigational interests, underwater acoustic ranges, maritime and amphibious exercises, coastal training ranges and coastal test and evaluation ranges[30].

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[27] Roger Tym and Partners / OSCI (2001) Maximising the socio-economic benefits of marine planning for English coastal communities [online] available at www.marinemanagement.org.uk/marineplanning/documents/se_national.pdf

[28] UK National Ecosystem Assessment (2011) The UK National Ecosystem Assessment Technical Report. UNEP-WCMC, Cambridge and references therein

[29] Defra (2011), Marine Policy Statement, p28

[30] Defra (2011), Marine Policy Statement, p28

The MoD has undertaken to minimise the impact of its activities on the environment and pays due regard to such impacts as part of its decision making process, in line with the Secretary of State for Defence's statement on Safety, Health Environmental Protection and Sustainable Development in the MoD[31].

Some onshore coastal defences such as aerodromes, transmitter sites and explosive stores have safeguarding zones extending over the marine area to regulate development that may otherwise affect their operation[32].

The following relevant goals/objectives and policies drawn from the MPS and Securing Britain in an Age of Uncertainty: The Strategic Defence and Security Review[33] (SDSR) are highlighted by way of context although note that identifying objectives and deriving planning policies are later steps in the planning process:

- Marine activities should not prejudice the interest of defence and national security. The participation of the MoD in the development of marine plans and their contribution to overall safety, security and resilience will ensure the effective use of marine resources while identifying mitigation measures, where possible, for incompatible activity or usage[34].
- Marine plan authorities and decision makers should take full account of the individual and cumulative effects of marine infrastructure on both marine and land based MoD interests[35].
- The socio-economic benefits from the defence sector should be recognised within marine policy and planning, particularly employment[36].
- The MoD has the power to regulate sea areas and restrict their use either temporarily or permanently, by making byelaws under the provisions of the Military Lands Acts 1892 and 1900 and the Land Powers Defence Act 1958.
- Some areas while not currently utilised for MoD activity have significant history and this may result in the inability to use non-operational areas due to live ordnance still being present.
- Use of the marine environment will recognise, and integrate with, defence priorities, including the strengthening of international peace and stability and the defence of the UK and its interests, such as protection of key sea-lanes, or conducting counter- piracy and narcotics operations[37].
- MoD Safeguarding manages the formal consultation process through which MoD is engaged on development proposals, including those for wind turbines. It ensures operational facilities such as aerodromes, explosive stores, radar facilities and range areas are not compromised by development either on or offshore.
- The MoD is also a consultee on the licensing of marine developments and the extraction of hydrocarbon resources within the UK continental shelf area, to ensure offshore developments and activities do not affect strategic defence

[31] Defra (2011) Marine Policy Statement, p28
[32] Defra (2011) Marine Policy Statement, p29
[33] MoD (2010) Securing Britain in an Age of Uncertainty: The Strategic Defence and Security Review
[34] Defra (2011) Marine Policy Statement, p28
[35] Defra (2011) Marine Policy Statement, p29
[36] Defra (2011) Marine Policy Statement, p29
[37] MoD (2010) Securing Britain in an Age of Uncertainty: The Strategic Defence and Security Review

interests or inhibit the use of designated danger and exercise areas supporting military training and weapon trials[38].

East marine plan areas – current situation

The MoD contributes to the marine sector by providing survey data and cross-government surveillance, monitoring and enforcement activities. It employs people throughout the UK in support of its operations in the marine environment, including through HM naval bases and MoD ranges and coastal estate.

The MoD continues to secure our borders by taking action overseas, in our territorial airspace or waters, at the UK's physical border or within the UK itself. To achieve this, the MoD will create a multi-agency National Maritime Information Centre (NMIC), which will, for the first time, provide the UK with a comprehensive picture of potential threats to UK maritime security, in UK national waters. It will then build links with international partners to allow the UK to develop a global maritime picture. Among other benefits, the NMIC will provide the Government with a single picture of maritime activity, bringing together intelligence and monitoring carried out by the UK Border Agency, Coastguard, Police, Royal Navy, Foreign and Commonwealth Office, Marine Management Organisation and other agencies.

The green areas shown in the East plan map are military practice areas used by a combination of Air Force, Navy and Army activities for practice in air-to-air combat manoeuvres and bombing, submarine exercise and firing danger areas. The UK has a military low flying system which supports training below 2000 feet throughout UK airspace except in controlled airspace dedicated to civil aviation traffic and over major built up areas. This can be seen on the map as the yellow shaded area covering the UK and part of the East Inshore area closest to land.

Also within the East Inshore area are two coastal air weapon ranges used for practise bombing. The brown cross hatch area highlighted on the map refers to potential radar interference from wind farms with a turbine height of 140 metres. This is located across much of the UK including a large section of the East plan areas. Additional information is being sought from MoD to support the production of further data layers illustrating potential radar interference across other turbine heights.

Naval exercises encompass the whole sea area, but activity is concentrated in several hotspots. There is a submarine exercise area off Flamborough Head, on the boundary between the North East and East areas. The South West and South areas contain an extensive complex of danger and exercise areas that are used for naval training involving shipping and aircraft engaged in firing activities where access is prohibited when firing or other activities are taking place. The majority of these sites are covered by MoD byelaws.

Change (such as in relation to sea training activities) is driven by home defence policies (such as surveillance and monitoring of UK waters) and military activities abroad. The SDSR outlines that by 2015 there will be 5,000 job losses in the Navy. The impact of the decommissioning is likely to be felt most in Portsmouth and

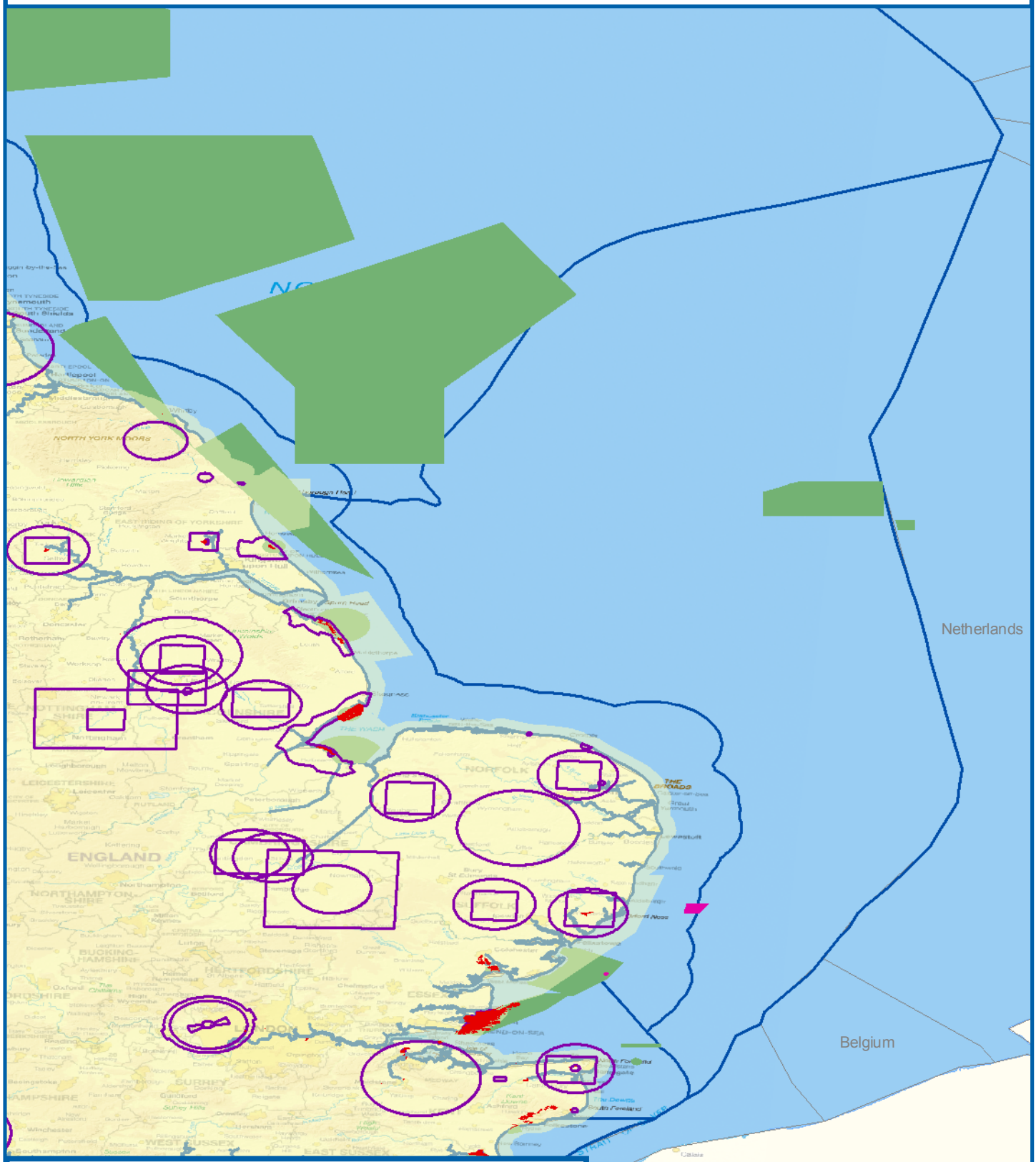
[38] MoD, www.MoD.uk/DefenceInternet/MicroSite/DIO/WhatWeDo/Operations/MoDSafeguarding.htm, October 11

Plymouth, the main naval bases in England. Future impacts of this marine activity will be driven by national policy. It is anticipated that the key decisions regarding defence will be taken at the MoD, and that the marine planning process will not be likely to have great influence over the prevalence or location of defence activities[39].

[39] MMO (2011), Maximising the socio-economic benefits of marine planning for English coastal communities – p40

Figure 4.3: Defence and national security activity

January 2012
This map has been produced using the ETRS89 Coordinate Reference System



- MMO Marine Plan Areas
- MoD Estates within 5km of Mean High Water
- Munitions Dumps
- Safeguarding Data within 5km of Mean High Water
- Military Low Flying Zones
- Military Practice Areas

East marine plan areas – existing planning context
No specific references in terrestrial or other sub-national plans.

Potential future situation
Future defence commitments and activities are difficult to predict. Many existing defence commitments are likely to continue for the foreseeable future including the need for exercise and practice areas and firing ranges. The scale of many existing activities is likely to alter as a result of the SDSR which will need to include provision for the return of ground forces to the UK from mainland Europe and the continuing need for protection for dependencies together with active theatres of operation such as Afghanistan. Terrorist threats to the UK and its citizens are still an active consideration and will require flexibility within the MoD and partners, to take account of any shifts in activity.

Summary of evidence and issues
The MoD provides military defence and, where appropriate, security for the people of the UK and Overseas Territories. Defence activities that utilise the marine environment, directly or indirectly, in support of operational capability are diverse including operational vessels and aircraft, HM naval bases, surface and sub-surface navigational interests, underwater acoustic ranges, maritime and amphibious exercises, coastal training ranges and coastal test and evaluation ranges.

The MoD contributes to the marine sector by providing survey data, employing people throughout the UK in support of its operations in the marine environment, including through HM Naval bases and MoD ranges and coastal estate. In some coastal locations the MoD is the major employer in the region.

Relevance to East plan areas
- **Current**: Almost half of the combined East plan areas space is indicated as being related to defence activity. Specifically, much of this space is dedicated to Air Force air to air training areas, the majority of which do not extend to sea level. There are also two coastal air weapon ranges used for practise bombing in the East plan areas and there is a submarine exercise area off Flamborough Head, on the boundary between the North East and East areas
- **Future**: A National Maritime Information Centre (NMIC) is being established that will provide a comprehensive picture of potential threats to UK maritime security in UK national waters. It will build links with international partners to allow the UK to develop a global maritime picture. The NMIC will provide the Government with a single picture of maritime activity, bringing together intelligence and monitoring carried out by the UK Border Agency, Coastguard, Police, Royal Navy, Foreign and Commonwealth Office, Marine Management Organisation and other agencies.
- **Future**: Future defence commitments and activities are difficult to predict. Many existing defence commitments are likely to continue for the foreseeable future including the need for exercise and practice areas and firing ranges. The scale of many existing activities is likely to alter as a result of the SDSR. Terrorist threats to the UK and its citizens are still an active consideration and will require flexibility within the MoD and partners, to take account of any shifts in activity or methodology deployed by those with terrorist intent.

Issues for delivery of defence and national security

Future impacts of this marine activity will be driven by national policy with changes (such as in relation to sea training activities) shaped by home defence policies (such as surveillance and monitoring of UK waters) and military activities abroad. It is anticipated that the key decisions regarding defence will be taken at the MoD, and that the marine planning process will reflect any changes in location of defence activities[40].

Issues for other sectors

- The MoD ensures facilities including radar facilities, exercise and range areas are not compromised by any form of development either on or offshore, managed through a formal consultation process with prospective developers in addition to involvement with the Marine Management Organisation (MMO) and the Department of Energy and Climate Change (DECC).
- The MPS requires marine plans to take full account of the individual and cumulative effects of marine infrastructure on MoD interests.
- Use of the marine environment will recognise, and integrate with, defence priorities, including the strengthening of international peace and stability and the defence of the UK and its interests including protection of key sea-lanes[41].
- Use by the MoD of coastal land for military activities precludes all other activities.

Issues for sustainability

- The MoD is committed to the protection of the natural and historic environment and therefore does not seek to be exempt from environmental legislation unless it restricts essential operational capability.
- Where they occur, the socio-economic benefits should be recognised when developing marine policy and planning[42].

4.3 Energy production and infrastructure development

Energy production and infrastructure development includes oil and gas, renewable energy, grid connection, carbon dioxide capture and storage (CCS) and nuclear.

4.3.1 Oil and gas

National context and policy

Though oil and gas have been known to be present in the North Sea basin since the 1800s, the UK development of oil and gas activity in the UK marine environment only started in earnest in the 1960s and 1970s when rocks under the North Sea (and on the UK continental shelf) were found to have significant, extractable, deposits of hydrocarbons, namely crude oil and natural gas. Extraction of oil and gas has developed to become one of the major activities in the North Sea. From a marine

[40] MMO (2011) Maximising the socio-economic benefits of marine planning for English coastal communities – p40
[41] MoD (2010) Securing Britain in an Age of Uncertainty: The Strategic Defence and Security Review
[42] MMO (2011) Maximising the socio-economic benefits of marine planning for English coastal communities – p40

planning perspective, it is present mainly in the East of England plan areas, with a significant presence in the North West plan area also.

Natural gas is, per kilowatt hour produced, less polluting, in terms of carbon dioxide (CO_2) emissions and sulphur oxides (SO_x), than other forms of fossil fuels, such as coal. As environmental concerns about global warming and acid rain grew, so the use of natural gas increased, both domestically and commercially to provide heating and electricity. It displaced other forms of production, such as coal and was responsible for significant reductions in CO_2 and SO_x levels emitted by the UK. However, the burning of hydrocarbons does still emit large amounts of CO_2, though oil and gas activities may also be able to help with carbon capture and storage (CCS), to enhance recovery of hydrocarbons and to provide potential storage sites for captured carbon.

Oil and gas is a significant contributor of tax revenue and an important economic driver and provider of employment. As a key means of achieving goals of energy security and independence and bringing wealth to the UK, oil and gas extraction is a key strand of energy policy and implementation activity at the UK level, reflecting its importance to the UK economy. Production from UK fields peaked in 1999 and is now in decline, due to decreasing levels of reserves[43]. As demand for gas increasingly needs to be met from sources beyond the UK, the transport of gas via tanker in a liquefied form has become of interest and may mean that infrastructure, such as gas terminals, is needed to help with this growing supply of gas to the UK. The environmental impacts of extraction and exploration activities associated with oil and gas, such as emissions to air through flaring and water environment issues (noise and discharges from platforms) are covered by a range of regulatory measures, or will be, as in the case of water environment issues, through the Marine Strategy Framework Directive (MSFD)[44].

The marine area is expected to make an increasingly major contribution to the provision of the UK's energy supply and distribution. This contribution includes the oil and gas sectors which supply the major part of our current energy needs (supplying around two thirds of primary energy demand in 2008), and a growing contribution from renewable energy and from other forms of low carbon energy supply in response to the challenges of tackling climate change and energy security. Oil and gas is currently the highest value marine activity in the waters around England[45].

Contributing to securing the UK's energy objectives, while protecting the environment, will be a priority for marine planning, bringing substantial socio-economic benefits such as employment and income opportunities, transferable technology and skills development.

The following relevant goals/objectives and policies drawn from the MPS, the National Policy Statements for Energy (NPS-EN 1)[46] and Gas Supply Infrastructure

[43] MMO (2011) Strategic Scoping Report
[44] http://archive.defra.gov.uk/environment/marine/documents/legislation/msfd-descriptors.pdf
[45] MMO (2011) Strategic Scoping Report
[46] http://www.official-documents.gov.uk/document/other/9780108510779/9780108510779.pdf

and Gas and Oil Pipelines (NPS-EN4)[47] and the DECC Offshore Energy Strategic Environmental Assessment[48] are highlighted by way of context although note that identifying objectives and deriving planning policies are later steps in the planning process.

- Maximising the economic recovery of UK oil and gas resource sustainably is a priority in the UK's energy supply and energy security strategies.
- Although the UK plans to reduce its reliance on fossil fuels, transition will take a significant time and gas will continue to play an important part in the UK fuel mix for years to come.
- The UK will remain heavily dependent on oil and gas and is expected to rely on imports to meet around half of its demand in 2020.
- Some parts of the UK marine area are well explored and understood. However, in all areas it is likely that there are new discoveries still to be made and these resources need to be accessed to achieve the objective of maximum economic recovery.
- When decision makers are examining and determining applications for energy infrastructure and marine plan authorities are developing marine plans they should take into account:
    1. that the physical resources and features that form oil and gas fields occur in relatively few locations and need first of all to be explored for and can then only be exploited where they are found
    2. there are no overriding environmental considerations to prevent the achievement of our draft plan or programme of licensing or leasing for seaward oil and gas rounds, hydrocarbon and carbon dioxide storage, provided appropriate measures are implemented that prevent, reduce and offset significant adverse impacts on the environment and other users of the sea.
- The UK must make the transition to a secure, safe, low-carbon, affordable energy system.
- The UK must meet a legally binding EU target for 15 per cent of energy consumption to come from renewable sources by 2020.
- The UK Government is committed to reaching its legally-binding target of an 80 per cent reduction in greenhouse gas emissions by 2050, compared to 1990 levels.
- When developing marine plans, marine plan authorities should identify how these will contribute to delivery of national targets and priorities, including legally binding commitments entered into under the Renewable Energy Directive (Directive 2009/28/EC) and our domestic binding target to reduce greenhouse gas emissions by 80 per cent by 2050.
- Consideration to national need for energy infrastructure as set out in the overarching National Policy Statement for England (EN-1) must be given in developing marine plans.
- It is for industry to propose new energy infrastructure projects within the strategic framework set by government. The Government does not consider it appropriate for planning policy to set targets for, or limits on, different technologies.

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[47] www.official-documents.gov.uk/document/other/9780108510809/9780108510809.pdf
[48] www.offshore-sea.org.uk/site/index.php

East marine plan areas – current situation

The East of England plan areas account for 74.9 per cent of the oil and gas infrastructure situated in the seas around England, covering 6.9 per cent of the East Offshore plan area and 1.4 per cent of the East Inshore plan area[49]. In terms of UK gas production, the East of England plan areas were responsible for 28.6 per cent of gross production by volume in 2010[50]. There is one oil field in the East Offshore plan area, though this is classed as a discovery and is not producing at this time, but may in the future. According to work undertaken for Oil and Gas UK[51], the oil and gas industries and it's supply chain employ 340,000 people in the UK, of which 5 per cent (17,000 people) are employed in the Eastern area, approximately analogous to the areas inland from the East marine plan area. This highlights its role in the economy of the areas adjacent to the East plan area, and gives an idea of the size of the skills base that has developed in these areas.

Indigenous gas production is in decline, having peaked in 1999. DECC projections suggest that by 2020, 75 per cent of the UK demand for gas will come from imports[52]. As part of the move to increasing imports, increased storage facilities are likely to be needed, including offshore. Consequently, significant investment in new gas infrastructure will be required. Offshore storage of gas, offshore unloading of gas and provision of gas import facilities are activities which are of importance to our security of supply as indigenous gas supplies decline and this importance is only likely to increase. A range of offshore and coastal infrastructure is required to increase the UK's storage capacity including:

- new import infrastructure, including conventional import pipelines, gas reception facilities and liquefied natural gas (LNG) import facilities – these will be necessary to provide import capacity for the increasingly import dependent UK gas market
- new subsea gas unloading and storage facilities and pipelines to allow the offshore unloading of LNG and its subsequent storage
- there are limited areas where underground gas storage can happen and the suitable oil and gas fields in the UK tend to be concentrated in eastern England and the Weald basin in the south[53].
- the plan area also includes current underground gas storage in salt caverns, at Aldbrough in East Yorkshire and a site in development near Bacton in the Deborah gas field.

Oil and gas licence blocks[54], which are the administrative divisions for exploration and extraction of oil and gas from the marine area, cover 39.7 per cent of the East Offshore plan area and 8.4 per cent of the East Inshore plan area, though this does not mean that all of these blocks are currently in use, or where in use that all activity

[49] MMO (2011) Strategic Scoping Report
[50] DECC (2010) Gross gas production figures (https://www.og.decc.gov.uk/information/bb_updates/appendices/Appendix10.xls)
[51] Oil and Gas UK (2011) 2011 Economic Report
[52] DECC (2010) UKCS Oil and Gas Production Projections (https://www.og.decc.gov.uk/information/bb_updates/chapters/production_projections.pdf)
[53] DECC (2011) National Policy Statement for Gas Supply Infrastructure and Gas and Oil Pipelines. TSO, London
[54] MMO (2011) Strategic Scoping Report

is exclusively linked to oil and gas, for example, proven hydrocarbon fields only cover 4.2 per cent of the plan areas. There are also over 6,600 kilometres of pipelines in the plan areas, with transfer to shore via terminals at Easington (Humber), Theddlethorpe in Lincolnshire and Bacton in Norfolk. Pipelines run under the Humber Estuary, linking the North and South banks of the Humber.

Decommissioning and other legacy issues are highlighted as an area that needs significant attention and activity over the period of the plans. This represents a large technical and economic challenge for the industry as a whole, though decommissioning of several gas fields in the plan areas has been achieved[55]. Due to the type of drilling used, which is water based rather than oil based, it is understood that there are no issues with legacy drill cutting piles in the East plan areas[56]. As well as the challenges it presents, decommissioning also presents opportunities for businesses experienced in working offshore and in decommissioning of similar infrastructure, though this may have impacts in terms of use of facilities at ports by other sectors. Oil and gas infrastructure can also be re-used where appropriate, for example as part of future carbon capture and storage projects and the potential for this is likely to be a consideration in any decisions to decommission infrastructure.

When wells have been drilled but not put into use, they are either plugged and capped (putting them permanently out of use) or they are suspended, in order that they may be used in the future if beneficial to do so. Plugged and capped wells do not present an issue as long as their presence is known so other seabed users can factor this into their activities[57]. Suspended wells have a presence on the seabed surface, whereas plugged and capped wells do not. Suspended wells can present issues for users of the seabed such as trawlers, who may snag their nets upon them or damage the wellhead. There are significant numbers of suspended wells in the plan areas, though the position of these is known and actively managed by the industry, in conjunction with other users of the sea.

When pipelines are installed, great care is taken to ensure they are as safe as possible to other seabed users. However, due to an uneven seabed, tidal currents or scouring, some pipelines may develop free spans. A free span on a pipeline is where the seabed sediments have been eroded or scoured away and the pipeline is no longer supported on the seabed. When this occurs, the pipelines present a serious danger to fishing activity, especially trawl doors, clump weights or any towed gear, as they can become trapped under the pipeline and will be extremely difficult to recover[58]. There are pipelines within the plan area that exist in conditions that mean that they can develop free spans.

Oil and gas operators have a duty to maintain and inspect pipelines. While surveys of pipelines via remotely operated vehicles might not present much of an obstruction for other sectors wanting to use areas, where maintenance is needed this can be an issue. In shallow water (less than 30 metres depth) the barges that are used for this have wide anchorage spaces of up to 2 kilometres, which could have implications for

[55] www.oilandgasuk.co.uk/knowledgecentre/technical_perspective.cfm
[56] www.oilandgasuk.co.uk/knowledgecentre/cuttings.cfm
[57] www.oilandgasuk.co.uk/knowledgecentre/technical_perspective.cfm
[58] http://fishsafe.eu/en/offshore-structures/pipelines.aspx

other users of the sea, or indeed for the feasibility of maintenance work. Due to the hydrographical conditions of the southern North Sea, there are a number of pipelines that need maintenance to remedy free span issues with pipelines, making this an issue for the plan area.

The management measures of MPAs could have a significant impact on oil and gas operations, if not for current installations, for future activities, particularly if management measures meant that discharges (such as drilling muds and waste waters) from oil and gas infrastructure were not permitted. This could be an issue as retrofit of infrastructure is either prohibitively expensive or not technically feasible.

East marine plan areas existing planning context

Local development frameworks (LDFs) do not mention oil and gas specifically – they focus almost completely on renewable and low-carbon energy generation technologies, with the exception of East Riding of Yorkshire Council, whose Preferred Approach Core Strategy May 2010 contained a draft policy which refers to supporting any necessary infrastructure developments at Easington gas terminal. LDFs are interested in landscape (and seascape) issues, particularly in relation to new developments being in keeping with the character of an area. This could have implications for landfalls of pipelines and onward transmission of oil and gas on-land. A number of LDFs, such as those concerned with the Humber Estuary have permissive policies in place for appropriate ports developments, which could in theory include gas terminals, though none mention this specifically.

Potential future situation

This is addressed in more detail in the potential future projections section at the end of Chapter 4. Infrastructure considerations are dealt with in the Current situation section above

Summary of evidence and issues

Relevance to East plan areas

Oil and gas extraction is a key strand of energy policy and implementation activity at the UK level and is the most economically valuable activity in English waters. While production from UK fields is declining, indigenous production is expected to continue to satisfy about half of the UK's oil and gas demand in 2020. Maximising the economic recovery of UK oil and gas resource sustainably is a priority in the UK's energy supply and energy security strategies.

The East plan areas are significant for hydrocarbons (mainly gas) around England:

- Account for 75 per cent of gas production in England[59], with nearly 75 per cent of oil and gas infrastructure around England situated in East plan areas (mainly offshore) including 3,485 pieces of gas infrastructure and over 6,600 kilometres of pipelines[60].

[59] DECC (2010) Gross gas production figures (https://www.og.decc.gov.uk/information/bb_updates/appendices/Appendix10.xls)
[60] MMO (2010) Strategic Scoping Report

- Licensed blocks cover 39.7 per cent of the East Offshore plan area and 8.4 per cent of the East Inshore plan area but not all of these blocks, or the whole area within blocks, is currently in use, with proven hydrocarbon fields only covering 4.2 per cent by area.
- Limited information is available on long-term future exploration but 126 licence blocks are expected to be in use or to have been explored for gas by 2030, some of which may lead to production from new fields and new infrastructure (this may be partially dependent on capacity for sub-sea tie back to existing infrastructure).
- Underground gas storage in salt caverns occurs at Aldbrough in East Yorkshire and as the UK becomes more dependent on imported gas, storage infrastructure is likely to increase significantly, particularly in the East plan area[61].
- Decommissioning has already been completed for some fields in the plan areas and represents both a challenge and opportunity for the future.

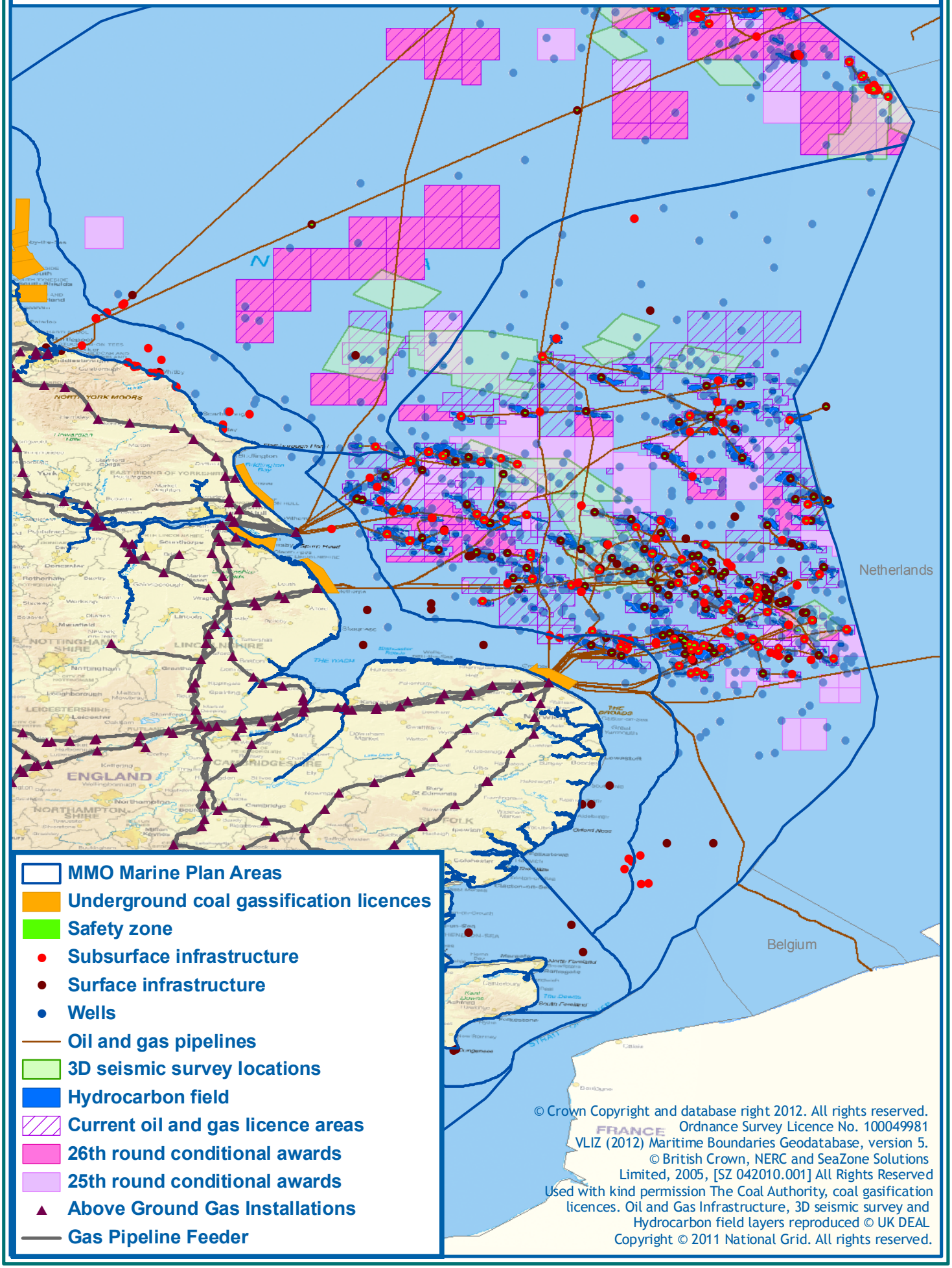
Figure 4.4 shows the current activity for oil and gas industry in the East Inshore and Offshore Marine Plan areas[62].

[61] Defra (2011) UK Marine Policy Statement. 3.3.15 refers to Salt Caverns in this context.
[62] The MMO are currently working with Oil and Gas UK to ensure we have a full understand of the infrastructure metadata. This may result in further data refinement as necessary.

Figure 4.4: Oil and gas

January 2012
This map has been produced using the ETRS89 Coordinate Reference System

marine management organisation



Issues for delivery of oil and gas

Current issues, including interaction with other sectors and the environment, tend to be dealt with through the licensing rounds, supporting strategic environmental assessment (SEA), and subsequently at an individual project level during assessment of permit applications.

However, due to the policy direction, and current presence of gas in the plan area, exploration for and production of gas will be one of the key issues for marine planning in East plan areas, both presently, and potentially into the future. Future importance could also be linked to CCS development. Future investment by the sector will determine the sustained productivity of the UK Continental Shelf (UKCS)[63]. There is a need to accommodate the requirements of oil and gas alongside other industries while taking account of environmental considerations including potential cumulative effects, such as noise.

Due to the increasing need for imports of gas and for storage (including indigenously produced gas), infrastructure, such as gas terminals, is likely to be needed to help with delivery of this aspect of gas supply.

When wells have been drilled but not put into use, they are either plugged and capped (putting them permanently out of use) or they are suspended, in order that they may be used in the future. Plugged and capped wells do not present an issue as long as their presence is known so other seabed users can factor this into their activities. Suspended wells have a presence on the seabed surface, whereas plugged and capped wells do not. Suspended wells can present issues for users of the seabed such as trawlers, who may snag their nets upon them or damage the wellhead. There are significant numbers of suspended wells in the plan areas, though the position of these is known and actively managed by the industry, in conjunction with other users of the sea.

Although of more relevance to the sector-specific regulation of oil and gas extraction than marine planning, there is significant learning for the sector from the Deepwater Horizon incident as detailed in the final report of the Oil Spill Prevention and Response Advisory Group (OSPRAG). Progress has already been made, including the unveiling of the OSPRAG capping device.[64]

Issues for other sectors

Oil and gas infrastructure, together with safety and exclusion zones, excludes other activities although the footprint of individual installations may be small.

- It is likely that more gas infrastructure will be needed to exploit new fields. Such an increase may conflict with the Round 3 zones and determine where wind development may be located (as not all of the area in the zones is required to deliver the target zone capacities for Round 3). An increase in infrastructure may also impact on other sectors.

[63] Oil and Gas UK (2011) 2011 Economic Report
[64] www.oilandgasuk.co.uk/knowledgecentre/OSPRAG_Capping_Device.cfm

- The Civil Aviation Authority CAP764, 'Policy and Guidelines on Wind Turbines' states that a 9 nautical mile consultation zone is needed around offshore helidecks. This allows for discussion on the safe operation of helicopters between those operating helidecks or proposed helidecks (in this case oil and gas developers) and other sectors wanting to use an area within the 9 nautical mile consultation zone
- It is anticipated that the amount of wave and tidal energy being generated will increase markedly up to and beyond 2020. It is important for marine planning to take account of appropriate locations for such developments alongside more established uses of marine space and to recognise the timescales and stages against which the sector is likely to progress, including the lead time for grid and infrastructure development.
- An increase in areas occupied by hydrocarbon infrastructure and safety zones combined with increase in the footprint of other sectors, particularly renewables, aggregates and potentially MPAs, may have implications for other sectors, particularly shipping and fishing.
- Potential growth in on-shore facilities, including ports to decommission structures, which may impact on the availability of facilities and supply chains for other sectors.
- The location of infrastructure such as suspended wells is fully communicated to other industries, in order to minimise hazards associated with them.
- There may be opportunities for oil and gas infrastructure to be used for carbon capture and storage, which can also enhance oil and gas recovery from functioning fields.

Issues for sustainability

- Pressures exerted by this activity typically include:
    - direct pressures on biodiversity (scour around legs)
    - noise and vibration (both during construction and operation – link to biodiversity)
    - visual impact (link to seascape)
    - potential for pollution where incidents occur (link to biodiversity, air quality and water quality)
    - emissions from flaring (links to air quality) – see Chapter 6.

The scale of impact of individual oil and gas installations is relatively small and in some cases time-limited (for example, solely during the installation, and operation phase), though the scale of a project will dictate the impact.

- Pressures are usually dealt with at an SEA and individual project level. The potential increase in pressures and impacts from any increase or change in gas exploration and production, including in combination with other activities, will need to be considered whether within the existing regulatory regime or marine planning.
- Decommissioning: There has been much debate in recent years about the impact of these operations on the environment, on the health and safety of workers, the costs involved and the technology required[65]. Decommissioning

and the timeframes for doing this are becoming more of an issue, as over the next thirty years, the number of redundant oil and gas installations is due to rise significantly as "around 500 [oil and gas] installations are expected to be decommissioned over the next three decades"[66]. There is however, considerable uncertainty in relation to the size and timing of decommissioning activities[67].

4.3.2 Renewable energy

National context and policy

Offshore wind is a crucial part of the UK's plans for a low carbon future, producing low carbon energy at scale and offering the potential for a new global offshore wind industry to be based in the UK, employing thousands of people, with the potential to supply nearly a quarter of the UK's current energy needs.

As a key means by which mitigation against further human-induced climate change occurs, as well as achieving goals of energy security and independence, renewable energy generation is a key strand of policy and implementation activity at all levels of government[68], from the UN, through the EU and UK and down to the local level. Targets derived at the international level are reflected at all subsequent policy levels, with those of the most relevance to marine planning being at the EU, UK and English levels.

In the Renewables Road Map[69], the Government stated that it expects offshore wind capacity to increase from the current level of 1.5 gigawatts (GW) to approximately 18 GW by 2020, with the majority of this likely to come from the East plan area. In order to utilise this resource, there is a need to ensure that the projects are developed in a sustainable way. The Government has clearly stated that the need for this infrastructure is pressing, within the National Policy Statements.

- At the EU level, the UK has signed up to the Renewable Energy Directive (RED)[70], which commits the UK to generating 15 per cent of all its energy requirements from renewable sources by 2020 (this includes heating and transport, which each account for roughly one third of total energy use, with electricity accounting for the other third). The Renewable Energy Strategy (2009) indentified a possible contribution from renewable energy of 30 per cent of total generation by 2020 with 12 per cent from heat and 10 per cent from transport.[71]
- The 2007 Energy White paper Meeting the Energy Challenge[72] strengthened the Government's position towards upgrading the electricity transmission system.
- Beyond 2020, the Government also has a commitment, at the national level, to cut greenhouse gas emissions by 80 per cent by 2050 from 1990 levels, which it aims to achieve through a series of five-yearly carbon budgets.

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[65] www.oilandgasuk.co.uk/knowledgecentre/decommissioning.cfm
[66] Defra (2011) UK Marine Policy Statement. TSO, London, p31.
[67] www.oilandgasuk.co.uk/knowledgecentre/technical_perspective.cfm
[68] DECC (2010) Renewable Energy National Policy Statement (EN-1)
[69] DECC (2010) Renewable Energy Roadmap
[70] Quoted from DECC (2010) Renewable Energy Roadmap
[71] http://www.official-documents.gov.uk/document/cm76/7686/7686.pdf
[72] www.decc.gov.uk/en/content/cms/legislation/white_papers/white_paper_07/white_paper_07.aspx

- Current national policy initiatives to help achieve these commitments relate to electricity generation, road transport and domestic and large scale heating, as well as innovation and research and development policy, economic development (skills and job creation) and sub-national development policy.
- The main demand policies are the Renewables Obligation (subsidy for renewable electricity generation) and a Road Transport Fuels Obligation (doesn't cover shipping or aviation currently).
- The main supply policies influence relate to skills and training provision and targeted investment in innovation infrastructure, through a series of technology and innovation centres[73].
- Expansion of the offshore wind supply is likely to require significant investment in new high-value manufacturing capability with potential to regenerate local and national economies and provide employment[74].
- The development of marine renewable energy will need to take into account any relevant targets, indicators or measures aimed at achieving good environmental status under the Marine Strategy Framework Directive (MSFD). Specifically this would cover impacts on biodiversity, the generation of noise, and impacts on hydrographical conditions.

The following relevant goals/objectives and policies drawn from the Marine Policy Statement (MPS), the DECC Renewable Energy Roadmap, the overarching Energy National Policy Statement (EN-1) and the Renewable Energy National Policy Statement (EN-3) are highlighted by way of context although note that identifying objectives and deriving planning policies are later steps in the planning process.

- The UK must make the transition to a secure, safe, low-carbon, affordable energy system.
- The current level of energy production from renewable energy in the UK is 3 per cent[75] .
- The UK must meet a legally binding EU target for 15 per cent of energy consumption to come from renewable sources by 2020.
- The UK Government is committed to reaching its legally-binding target of an 80 per cent reduction in greenhouse gas emissions by 2050, compared to 1990 levels.
- To meet our obligations the electricity generation, transport and heating sectors all need to contribute, with the greatest contribution likely to come from the electricity generation sector with potential for around 30 per cent of electricity to come from renewable sources if the UK is to comply with these requirements.
- The UK is the global leader in offshore wind energy deployment, with a capacity of approximately 1.3 gigawatts (GW)[76], producing over 3 TeraWatt hours (TWh) of electricity in 2010 or roughly the same amount of electricity generated in a year

[73] www.innovateuk.org/deliveringinnovation/technology-and-innovation-centres/offshore-renewable-energy.ashx
[74] Defra (2011) Marine Policy statement, p33
[75] Source National Grid Non Technical Summary September 2011 Offshore Development Information Statement
[76] DECC (2011) UK Renewable Energy Roadmap, p42

as one small coal-fired power station[77]. There is approximately 9 GW of future capacity currently under construction in the UK offshore (rounds 1 and 2).

- By 2020 between 14 and 24 per cent of English electricity production is expected to come from offshore wind, the largest single contributor to targets for renewable energy.
- Offshore wind energy production must rise significantly from current levels of output of 1.5 GW to circa 18 GW by 2020, and it is expected to provide the largest single renewable electricity contribution as we move towards 2020 and beyond.
- Indications from The Crown Estate's seabed licensing programme show potential offshore generation output could be as high as 32 GW with the majority of this provided from wind energy, as a result the footprint for renewable energy installations would increase significantly.
- When developing marine plans, marine plan authorities should identify how these will contribute to delivery of national targets and priorities, including legally binding commitments entered into under the Renewable Energy Directive (Directive 2009/28/EC) and our domestic binding target to reduce greenhouse gas emissions by 80 per cent by 2050.
- Consideration to national need for energy infrastructure as set out in the overarching National Policy Statement for England (EN-1) and the National Policy Statement for Renewable Energy (EN-3) must be given in developing marine plans.
- It is for industry to propose new energy infrastructure projects within the strategic framework set by Government. The Government does not consider it appropriate for planning policy to set targets for or limits on different technologies.
- It is anticipated that the amount of wave and tidal energy being generated will increase markedly up to and beyond 2020[78].
- It is important for marine planning to take account of appropriate locations for such developments alongside more established uses of marine space and to recognise the timescales and stages against which the sector is likely to progress, including the lead time for grid and infrastructure development as well as landfall considerations.

East marine plan areas – current situation

Offshore wind energy

- The East Inshore and East Offshore plan areas have been recipient of the deployment of renewable wind energy installations since 2004, with the development of the Scroby Sands site.
- The East of England plan areas include the sites of 23 per cent of the current offshore wind installations and, more pertinently has the majority (70 per cent of planned English Round 2 sites and over 88 per cent of planned English Round 3 sites – see next bullet) of all future areas where wind farm development will be licensed in UK waters[79].

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[77] DECC (2010) DUKES
[78] Defra (2011) Marine Policy Statement, p29
[79] MMO (2010) Strategic Scoping Report

- On 8 January 2010 The Crown Estate announced the nine successful applicants for Round 3 wind farm development. Three of these are located in the East Inshore and Offshore areas:
    - **Dogger Bank** – located in the North Sea with a potential of 9 GW
    - **Hornsea** – also located in the North Sea with a potential of 4 GW
    - **Norfolk Bank** – in the Southern North Sea with a potential of 7.2 GW.
- The East Inshore area also includes two areas of potential significance for tidal energy, namely the Humber estuary and the Wash. Wave energy, while in its infancy, may in the future be pertinent to the East of England plan area, though the majority of wave potential is situated off the south west coast.

More information on offshore wind energy can be found at Annex 7.

Marine renewables

In-water or marine renewable projects within the plan area are confined to Neptune Renewable Energy's Proteus demonstrator tidal stream power plant in the Humber Estuary at Hull, Tidal Harvester 2 which is under development in Lowestoft and Trident Energy's 80 tonne prototype wave energy device.

Project Neptune's Proteus device proposed for the Humber estuary is expected to be deployed before the end of the year with anticipated generating capacity of a minimum 1000 megawatt hours (MWh) of electricity a year.

This could be joined by the first commercial array of five advanced Proteus generators, also planned for deployment in the Humber. If successful the development has the potential to provide energy for 5,000 homes[80].

Tidal Harvester 2 produced by 4NRG is a seven-metre long, four-tonne device suitable for deployment in estuaries which has been undergoing trials on Lake Lothing near Lowestoft with construction and trial of a single fifth scale (8 metre-diameter) model expected soon.

Trident Energy's 80 tonne prototype is currently undergoing land based trials in/near Lowestoft following its unsuccessful deployment off the Suffolk coast in September 2009.

There is potential for further growth within the power generation sector for biomass fuelled generation, with many conventional coal fired plants co-firing with biomass and others exploring the possibility of doing so. Construction of new biomass fuelled generating plant may bring additional low carbon generating capacity on stream with additional demands on ports and associated logistics.

See figures 4.6 and 4.7 for more information.

Transmission and grid connectivity

Britain's electricity transmission network has evolved over the last 75 years to accommodate changes in the means of electricity generation techniques and now

[80] Manufacturer's data.

includes coal, gas, nuclear and renewable energy sources. As a result the national electricity transmission system has steadily expanded and been upgraded to accommodate new types of generation in new locations, and it continues to change in order to meet the national demand for electricity.

Peak demand for electricity (the largest amount of electricity used at peak time on a cold day) in Great Britain is currently over 60 GW. By 2016, 12 GW of coal-fired power stations will close as they cannot meet the requirements of European emissions legislation. At the same time, around 7.5 GW of nuclear capacity will come to the end of its life. This means a huge investment in new generating capacity is needed to replace them to meet existing and future electricity demand. Currently Britain has 4.5 GW of wind generation. There are plans for another 20 GW of wind generation onshore, while licences have been issued by The Crown Estate to develop a further 33 GW of offshore wind generation by 2020. The Government has identified eight potential sites for new nuclear power stations all of which are in coastal locations.

In England, National Grid is responsible for electricity transmission. To do this it uses a national network of overhead lines, some underground cables and sub-stations which operate at high voltages. The introduction of large amounts of new renewable generation over the next decade and beyond means this network will need to be reinforced and extended. Most wind generation will be in remote locations, including offshore, where wind speeds are favourable and sites for wind farms are available.

The construction of an offshore electricity transmission grid is seen as beneficial to support the deployment of up to 33 GW of offshore wind generating capacity and for the future deployment of wave and tidal stream devices[81]. Developing the electricity transmission network onshore and offshore is a complex and challenging task. Constraints exist within both marine and terrestrial environments with respect to routeing and siting electricity transmission infrastructure, such as land take and visual impact. Careful consideration of how this can be delivered to support of the Government's commitment to low carbon energy generation while minimising its impacts will have significant implications for marine planning.

There are a number of ways that an offshore electricity transmission network could be developed, but the two main options are a radial network or a co-ordinated network. A radial network would see each area of offshore generation directly linked to the shore by an individual export cable (rather like the spokes in a bicycle wheel). A co-ordinated network would see connectivity both between multiple generation blocks offshore, and integration between wind farms, with common export cables to the shore.

There are a number of benefits associated with developing a co-ordinated offshore grid such as reductions in sub-sea cables, the number of potential landfalls, and the amount of associated onshore infrastructure. A co-ordinated network offers the greatest opportunity for a transmission network that provides security of supply, is

[81] Renewables Roadmap 2011
www.decc.gov.uk/assets/decc/11/meeting-energy-demand/renewable-energy/2167-uk-renewable-energy-roadmap.pdf

cost-effective and allows flexibility for the integration of electricity cables to export and import electricity to and from other countries. Such flexibility is particularly important when designing an electricity network given the uncertainty surrounding the rate and scale of deployment of offshore renewable generation.

Therefore, a co-ordinated offshore electricity transmission network would provide a framework for the long-term development of offshore renewables as they are developed over time. A co-ordinated and planned approach would also help terrestrial planning to better accommodate the onshore infrastructure required for offshore electricity generation and transmission such as landfall sites, converter stations and substations. DECC and Ofgem are currently collaborating on the Offshore Transmission Coordination Project, (OTCP) and this is likely to be beneficial in understanding and managing these impacts[82]. In addition the National Policy Statement EN-1 highlights a need for new infrastructure where it may not already exist.[83] The Offshore Development Information Statement (ODIS) 2011, produced by National Grid aims to help the long-term development of national electricity transmission systems in the UK marine environment with potential options for connecting offshore wind sites to land[84]. Another consideration would be the Scottish National Renewable Infrastructure Plan which locates potential sites close to the East offshore boundary[85].

Marine and terrestrial planning will need to work together with electricity generators, electricity transmitters and users of the marine environment to provide a coordinated approach that facilitates necessary onshore infrastructure development, while taking into account environmental and other designations and uses, thereby supporting the move towards delivering a low carbon economy to meet the UK's obligations under the Climate Change Act 2008.

East marine plan areas – existing planning context

Marine relevant policies were identified in the LDFs of three local authorities:

- East Riding of Yorkshire: Promotes sustainable development by supporting economic clusters for renewable energy technology sector, encouraging renewable energy generation in appropriate locations.
- North East Lincolnshire: Identifies the Humber Employment Zone (552 hectares) stretching between and inclusive of the commercial port areas of Grimsby and Immingham ports, including nationally significant estuary land, as a key strategic site for development. Land closest to the estuary (explicitly land east of an existing railfreight line) will be safeguarded for uses that genuinely need to be located close to the estuary. Future allocations will need to preserve the integrity of the Humber Estuary Natura 2000 sites. This will necessitate the establishment and management of appropriate habitat areas within this zone.
- Waveney: Lowestoft will be a focus for regeneration with the development of a renewable energy cluster of businesses and growth of the knowledge economy.

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[82] http://www.ofgem.gov.uk/Networks/offtrans/pdc/pwg/OTCP/Pages/OTCP.aspx
[83] Section 3.7 para 3.7.1
[84] www.nationalgrid.com/uk/Electricity/OffshoreTransmission/ODIS/
[85] www.scottish-enterprise.com/~/media/SE/Resources/Documents/Sectors/Energy/energy-renewables-reports/National-renewables-infrastructure-plan.ashx

A renewable energy cluster and power park of around 8 hectares will be promoted in the Lake Lothing and harbour area of central Lowestoft, especially focused on expanding existing development in the Ness Point and outer harbour area.

In addition, land-based renewable energy has been picked up in the LDF policies of 15 local authorities: Boston; Broadland; East Cambridgeshire; East Lindsey; East Riding of Yorkshire; Fenland; Great Yarmouth; Kingston-upon-Hull; North East Lincolnshire; North Norfolk; Norwich; Selby; South Norfolk; Waveney; York.

Many of the policies in these documents relate to terrestrial decentralised renewable energy technologies that will be associated with new development. These have been included here as they may have some effects on marine issues, including, depending on the developments proximity to the coast: marine protected areas and conservation sites, seascape and coastal erosion.

All of the LDFs that incorporate renewable energy policies that may relate to the marine plan have a proactive approach to decentralised renewable energy and support the concept of sustainable development. This support is qualified by the requirement for developers to assess and minimise impact on environmental factors with a requirement not to significantly affect conserved or protected species or features (including proper recognition of designated sites, such as SSSI, Ramsar sites, SPAs, SACs and national nature reserves), residential amenity (including traffic levels, noise, odour and dust), heritage and seascape (including the character of an area with reference to visual disturbance, such as views of historical buildings). Policy responses related to development of renewable energy can be considered as follows:

- Development control in favour of renewable energy (specific targets and locations, as well as general local authority-wide approaches to development related to renewable energy).
- Exploring opportunities and promoting innovation (deploy and monitor to enable projects to run where knowledge of potential impacts is limited).
- Described approaches to enable development of renewable energy infrastructure and / or technology, in some cases offshore renewable specifically (in the case of offshore renewable examples, location is mainly down to the opportunities afforded by the Humber as a deep water estuary and existing port infrastructure in the case of Lowestoft).

Issues relating to landfall locations of cables and associated infrastructure from offshore renewable schemes are not specifically considered in any of the existing LDFs or local plans, which means that from a sub-national perspective such matters will need to be considered on a site by site basis. See also section 4.7, Telecommunications cabling

Through development of appropriate policies, local authorities recognise the possible various benefits of renewable energy and see it is part of considerations for development in the future, both directly, such as development of renewable infrastructure and indirectly, such as requiring developments to use energy derived from renewable sources. However converter and substations and other related

transmission infrastructure is often omitted. The following summarises the diversity of policies identified in-line with the policy response categories described above.

Potential future situation

Deployment of renewable energy devices (including wind, tidal and wave) offer opportunities to make a significant contribution to the UK's obligations for low carbon energy with the largest schemes in the UK under development through The Crown Estate's current licensing programme within the East Inshore and East Offshore plan areas. Such deployment offers other sectors opportunities to benefit from the development, such as aggregates through supply of construction materials, or ports through increased traffic and shoreside facilities.

Employment opportunities arise in the manufacturing, testing and deployment of renewable energy devices and their associated infrastructure with current examples seen at Lowestoft and elsewhere in research and development, manufacturing, deployment and maintenance activities. Further expansion of these activities is expected throughout the plan areas with growth in manufacturing and testing facilities and particularly in the development of Able UK's Marine Energy Park near Grimsby and the Siemens-led proposals for multi-million pound investment at Alexandra Dock, Hull. In employment terms post construction employment associated with sub stations and transmission related facilities are relatively low. Stakeholder concerns exist with regards to the deployment of renewable energy devices and particularly in relation to the visual impacts of turbines, overhead power lines, converter and sub stations, land take, navigation safety, displacement from established fishing grounds, marine biodiversity and noise impacts.

High ambitions exist for wind energy deployment with many North Sea countries contributing to the EU Memorandum of Understanding on the North Sea Grid. This document lays out a potential future approach to developing a consensus for a North Sea Grid[86].

International data sets are currently being sought to reflect the wind energy ambitions across the North Sea countries, It has not been possible to obtain these in time for this report's deadline, and will be pursued for consideration in development of marine plans.

Summary of evidence and issues

Relevance to East plan areas

The East of England plan areas include the sites of 23 per cent of the current offshore wind installations and have the majority (70 per cent of planned English Round 2 sites and over 88 per cent of planned English Round 3 sites) of all future areas where wind farm development will be licensed in UK waters.

Indications from The Crown Estate's Seabed Licensing Programme show potential offshore generation output could be as high as 32 GW with the majority of this

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86 http://ec.europa.eu/energy/renewables/grid/doc/north_sea_countries_offshore_grid_initiative_mou.pdf

provided from wind energy, as a result the footprint for renewable energy installations would increase significantly.

Offshore wind energy production must rise significantly from current levels of output of 1.5 GW to circa 18 GW by 2020, and it is expected that it will make up the majority of marine renewable energy up until 2020.

Due to the availability of wind resource and the technical feasibility in relation to water depth, wind speed and size of site, the vast majority of the offshore wind energy potential exists in the East Offshore area. In order to use this resource, there is a planning need to ensure the Round 3 wind energy leasing areas are developed in a sustainable way.

The Crown Estate has established three major wind energy development zones in the East Offshore area – Dogger Bank (north), Hornsea (middle), and East Anglia (south) – see Figure 4.5.

By 2020, the UK government expects offshore wind electricity generation to have increased by at least tenfold and possibly by as much as twenty times its current level[87]. As most of this is in the East plan areas, this represents a significant factor in marine planning for this area.

Opportunities exist and will continue to grow for job creation associated with the construction and maintenance of the offshore renewable industry, in particular those communities which are classified as more deprived. Areas around the Humber are beginning to come forward with proposal sites for large scale renewable construction with potential associated employment for local people. Similar possibilities are emerging at Lowestoft and Great Yarmouth as well as in other areas both within and outside of the plan areas. (Scunthorpe, TATA steel supply for offshore wind projects, and the National Renewable Energy Centre (Narec) renewables facility in Northumberland.)

The Humber Renewable Energy Super Cluster Enterprise Zone could also be a key part of achieving targets set out in the Renewable Energy Roadmap, benefiting from reduced business rates and less restrictive land planning requirements[88] [89].

Marine plan authorities will need to liaise, as appropriate, with terrestrial planning authorities to ensure the development of any necessary on-shore infrastructure. Focus for necessary agreements to be reached should include:

a) converter stations and sub-stations, to support offshore electricity generation and connection to the national grid
b) appropriately developed and placed ports and harbours to support construction and maintenance as well as other infrastructure such as roads.

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[87] DECC (2010) Renewable Energy Roadmap.
[88] www.hm-treasury.gov.uk/press_96_11.htm
[89] http://vanel.org.uk/regen/2011/08/humber-estuary-renewable-energy-super-cluster-enterprise-zone-approved/

Looking at the evidence, it is possible to say that there is the potential for offshore wind to become the dominant energy activity in the plan areas, based on:

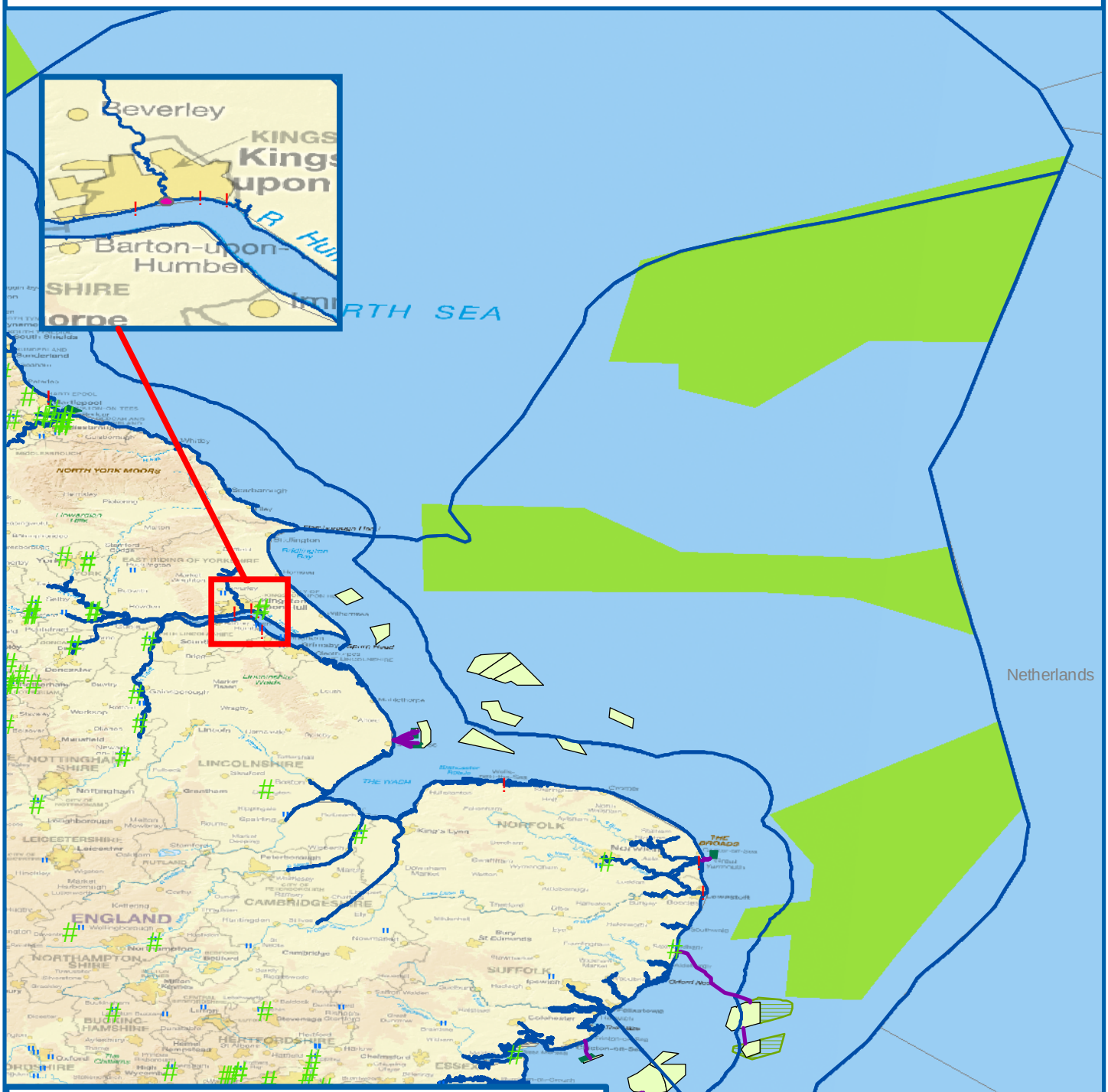
- geographical area covered (though this is turn dependent on a number of factors such as device type and size, spacing and opportunities for co-location)
- government policy and legal commitments.

This suggests that marine renewable energy will be one of the key policy issues for marine planning.

Figure 4.5: Renewable energy - activity areas

January 2012
This map has been produced using the ETRS89 Coordinate Reference System

marine management organisation



- MMO Marine Plan Areas
- Round 1 Wind Farms Lease
- Round 2 Wind Farms Lease
- Round 1-2 Wind Farm Extensions
- Round 3 Wind Farms Zone
- ! Ports supporting renewable energy development
- Wind Farm Cables
- Tidal Lease Areas
- # Electricity substations under 400KV
- " Electricity substations over 400KV

Figure 4.6: Potential tidal stream resource for energy production

January 2012
This map has been produced using the ETRS89 Coordinate Reference System

marine management organisation

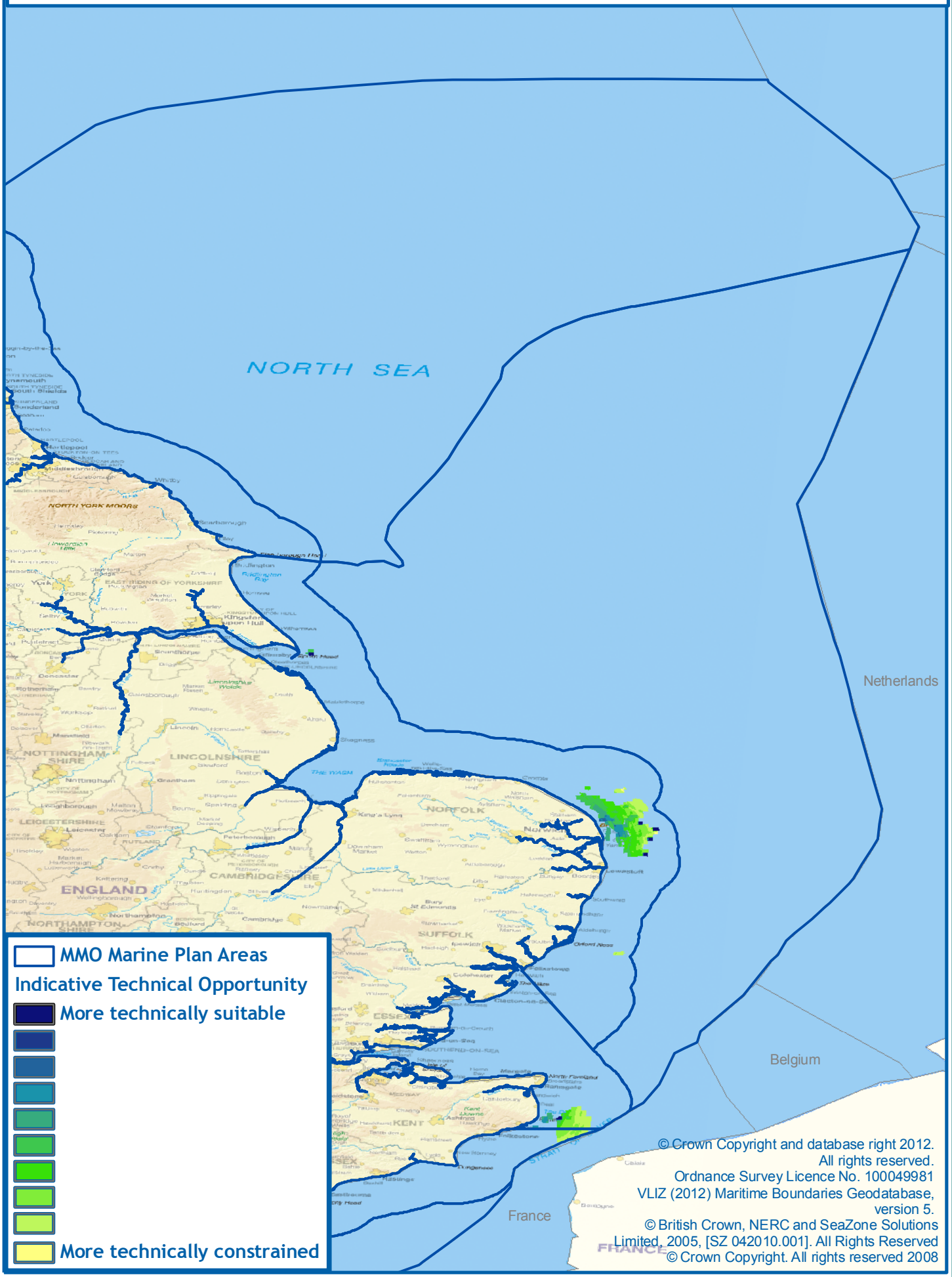
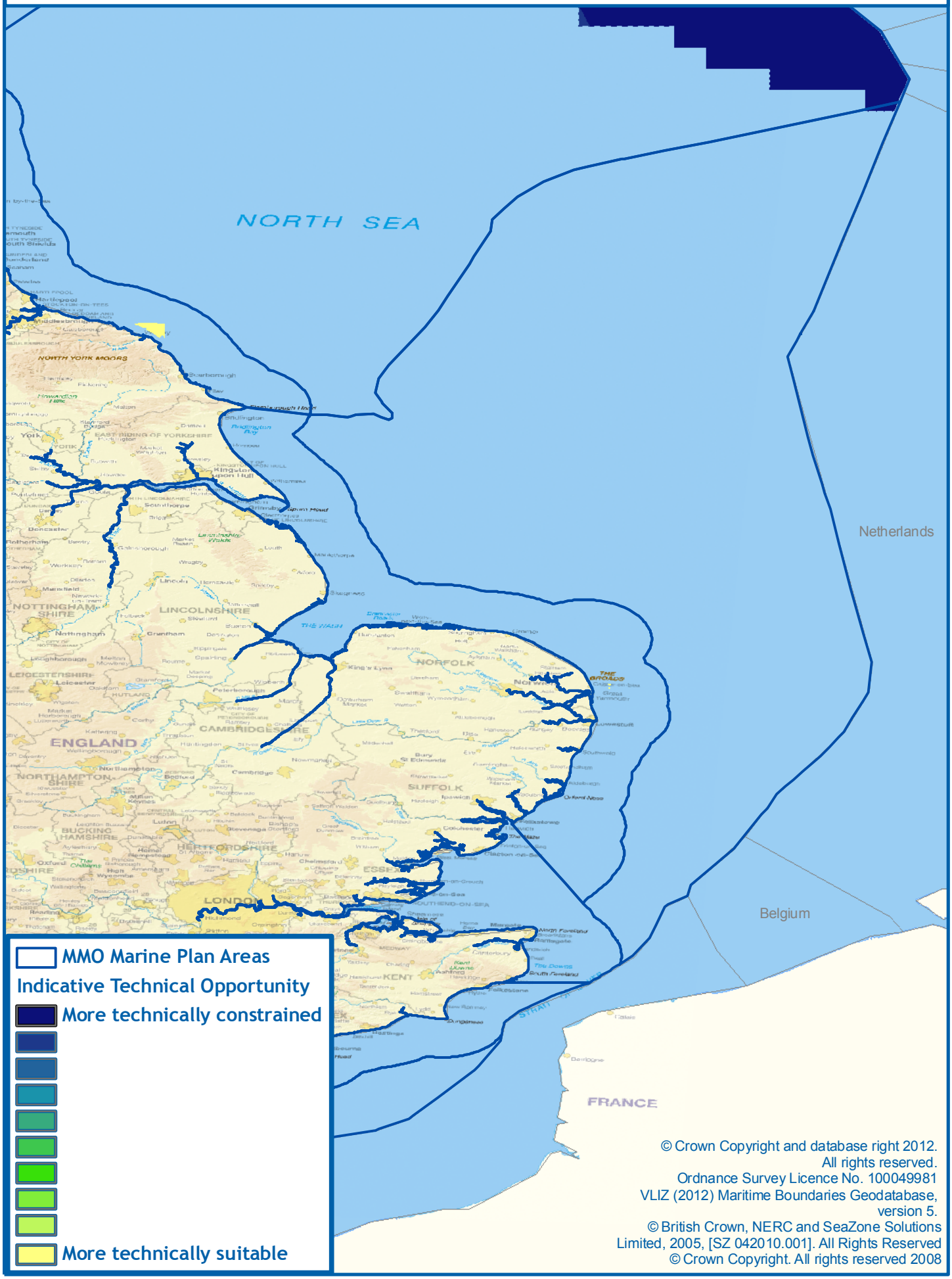


Figure 4.7: Potential wave resource for energy production

January 2012
This map has been produced using the ETRS89 Coordinate Reference System

marine management organisation



Issues for delivery of renewable energy

- Providing more certainty in terms of space and location for wind energy development is required so that investors and developers gain confidence and commit to financing and building wind farms.
- Timely development of the offshore electricity network and connection to the grid is vital to help ensure the continued development of offshore renewable energy.
- Round 3 wind zone developers need to work together, and with authorities, to determine the cumulative effects of development across the three zones in the East Offshore area as well as any cumulative effects associated with developments in bordering seas.
- Cable routes will need to be identified to enable connection of offshore wind farms to land based grid system and landfall opportunities. Cable corridors may be beneficial and could be considered as part of the routing to shore subject to operational constraints. See also section 4.7.
- Renewable energy sites will need to take account of existing and future designations. Management measures of future MPAs will need to be fully taken into account, which may have an impact on the extent, location and type of development within these areas including that of Round 3 wind farms.

Issues for other sectors

- Potential for adverse effect on ability to develop oil and gas fields due to the requirement for relevant safety zones and overall footprint, that is in accordance with Civil Aviation Authority guidance on helicopter movements around offshore helicopter destinations, flight paths to existing (and future) sites would need to be considered[90].
- Ports and shipping may be adversely affected by any expansion in the deployment of renewable energy generation. Consultation between sectors will prove essential if trade with ports within and adjacent to the plan areas are not to suffer any adverse impacts on their commercial viability. Benefits may accrue from the expansion in deployment of renewable energy installations.
- Deployment of renewable energy devices must be planned sustainably to ensure any effects on fishing activity are minimised.
- The tourism and recreation industry may be affected by the location and siting of new substations associated with cabling coming onshore. Visual impacts of any new coastal substations and converter stations would need careful consideration to ensure both access to the coast and enjoyment of coastal areas and the overall socio economic benefits of these activities are not undermined by new offshore associated onshore developments. Anecdotal evidence exists of the deployment of renewable energy devices stimulating tourism related activities such as sightseeing, with boat trips being run from local ports out to renewable energy sites
- Opportunities for co-location with MPAs and other activities need full consideration in order to maximise the use of space. Further work on co-location opportunities is required to ensure best use is made of the marine area, including oil and gas, fisheries, aggregates and shipping. Co-location with MPAs may be possible; but may not be practical if operation and maintenance activities are severely constrained (see also 4.1 ‘Issues for other sectors’).

[90] www.caa.co.uk/docs/33/Cap764.pdf

Issues for sustainability

- Mitigating climate change depends on low carbon energy so the sustainable development of offshore wind farms is essential.
- Negative pressures exerted by this activity differ by renewable energy technology type and are usually dealt with at a project level, but typically include:
    - noise and vibration (both during construction and operation) – links to biodiversity
    - visual impact – links to seascape and through that to tourism
    - impacts on navigation – links to shipping
    - impacts on biodiversity (bird strike, scour around pilings) – links to biodiversity
    - exclusion of other activities – links to fishing, aggregates and shipping
    - resource use pressures (decrease in wave height and frequency) – links to coastal processes
    - damage or degradation to existing historic environment[91]
    - cabling and associated impacts (such as EMF) – links to biodiversity and aggregates.
- Opportunities for co-location with MPAs and other activities need full consideration in order to maximise the use of space. Further work on co-location opportunities is required to ensure best use is made of the marine area, including oil and gas, fisheries, aggregates and shipping. Co-location with MPAs may be possible; but may not be. The seascape of any marine area must be considered with the development of offshore wind turbines and associated land-fall cabling/sub-stations.
- The Infrastructure Planning Commission (IPC), working with local planning authorities (LPAs), will need to determine permit applications for land based infrastructure associated with marine renewable energy. The MMO's Marine Licensing Team will also need to work with LPAs when determining consent applications for non-nationally significant infrastructure projects (NSIP). In terms of impacts on designated features, there are a number of designations to be considered including protected species, SSSI, Ramsar sites, SPAs, SACs, national nature reserves (link to marine ecology and biodiversity), together with others such as the historic environment
- Land-based renewable energy clusters that are proposed to serve the major offshore wind farms in the East plan areas, such as Humber Renewable Energy Super Cluster, may bring about a large amount of extra shipping traffic, adding to the intensity and diversity of shipping in the East plan areas.
- Potential employment opportunities may make significant contributions to the economic wellbeing of many of the coastal communities in and adjacent to the plan areas, through manufacturing, installation and maintenance activities.
- The potential development of a co-ordinated offshore energy grid.
- The cumulative impact on **all sectors** of renewable energy installations and their associated structures[92].

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[91] www.offshorewindfarms.co.uk/Pages/Publications/Archive/Cultural_Heritage/

[92] http://ec.europa.eu/energy/renewables/grid/doc/north_sea_countries_offshore_grid_initiative_mou.pdf

- Interactions with other sectors and the environment, tending to be dealt with at an individual project level during assessment of licence applications

4.3.3 Carbon capture and storage (CCS)

National context and policy

CCS is defined in the MPS as "a three step process which includes: capturing carbon dioxide from power plants and other industrial sources, transporting it, usually via pipelines..., to storage points; and storing it safely in deep (at least 800m) offshore geological sites..."

An EU Directive[93] on the geological storage of carbon dioxide[94] (hereafter the CCS Directive) requires that "a person who intends to operate a geological site for the storage of carbon dioxide will require a permit issued in accordance with the requirements of the Directive"[95].

This permitting requirement has been transposed into UK law via the Storage of Carbon Dioxide (Licensing etc.) Regulations 2010[96]. The CCS Directive states that CCS should be used in addition to the reduction in reliance on fossil fuels and a commitment to developing other low carbon technologies. It also aims to ensure the permanent containment of carbon dioxide, minimising any wider negative effects or risks.

There are currently eight large-scale CCS projects in operation around the world, two of these projects use offshore storage facilities located in Norwegian waters[97].

CCS is highlighted in the Marine Policy Statement (MPS) as an expected growth area in the UK. This is due to the need to store carbon dioxide generated by human activities to meet carbon reduction commitments and the high potential of the UK marine area to support CCS. "The expectation is that storage in the UK will take place almost exclusively offshore, which in turn will require the necessary infrastructure (such as pipelines and offshore structures) to be installed to transport carbon dioxide from the mainland and inject it deep below the seabed[98]." Initially, attention is likely to focus on depleted oil and gas fields[99]. CCS is also considered important in "enabling fossil fuel energy generation to be part of the UK's low carbon, secure energy future[100]."

The regulatory framework for CCS is being developed in England by the Department of Energy and Climate Change (DECC) [101]. At the same time they are working to

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[93] The Directive 2009/31/EC of the European Parliamentary and of the Council of 23 April 2009
[94] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:140:0114:0135:EN:PDF
[95] UK Marine Policy Statement, HM Government, 3.3.32, 2011
[96] http://www.legislation.gov.uk/uksi/2010/2221/contents/made
[97] www.globalccsinstitute.com/publications/global-status-ccs-2011, Chapter 2, p11.
[98] UK Marine Policy Statement, HM Government, 3.3.31, 2011
[99] UK Marine Policy Statement, HM Government, 3.3.31, 2011
[100] UK Marine Policy Statement, HM Government, 3.3.34, 2011
[101] www.decc.gov.uk

produce a Roadmap[102] that will describe a shared understanding between the Government and key stakeholders of the potential role of CCS in reducing emissions from the power and industrial sectors. The Roadmap will also highlight issues that need to be addressed to enable commercial deployment of CCS and the organisations responsible for taking action. The Roadmap will be a living document with an action plan used to track progress and will provide a framework to identify and address new issues. The Government does not intend to be prescriptive about technology choices or set targets in the Roadmap, which will comprise two elements:

- a strategy style document setting out potential deployment projections and trajectories and the barriers and actions required to address them
- an action map showing a timeline of activity required to address barriers[103].

The licensing regime (via the CCS Directive) imposes conditions on operators in terms of site selection and characterisation to ensure that only those sites with the highest degree of certainty of permanent storage are chosen. In the highly unlikely event of a leakage event occurring, through the EU Emissions Trading System, the operator would have to surrender allowances equivalent to the amount of carbon dioxide lost to the environment as well as pay for the cost of any remedial action as required by environmental impact assessment (EIA) regulations.

The Energy Act 2011 included provisions that aim to remove the obstacles to the re-use of existing infrastructure for CCS. The provisions remove the possibility that the previous users of offshore structures and pipelines used for petroleum production could be made liable for their decommissioning once they have been used for the purpose of CCS demonstration. The provisions also enable the owner of an existing pipeline to compulsorily acquire rights from affected landowners to transport carbon dioxide through the pipeline rather than the substance they already have rights to use the pipeline for.

DECC do not have any specific targets or limitations for CCS deployment. The following relevant goals/objectives and policies are highlighted by way of context although note that identifying objectives and deriving planning policies are later steps in the planning process:

- The UK must make the transition to a secure, safe, low-carbon and affordable energy system.
- When developing marine plans, marine plan authorities should identify how these will contribute to delivery of national targets and priorities, including legally binding commitments entered into under the Renewable Energy Directive (Directive 2009/28/EC), our domestic binding target to reduce greenhouse gas emissions by 80 per cent by 2050 compared to 1990 levels and the carbon budgets set in the Climate Change Act 2008.
- The content on CCS set out in section 4.7 of EN-1 Overarching Energy National Policy Statement must be given consideration in developing marine plans.

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[102] www.decc.gov.uk/en/content/cms/emissions/ccs/policy/roadmap/roadmap.aspx
[103] Strategic Scoping Report for Marine Planning in England, Chapter 3.2, MMO 2011

- Marine plan authorities should take into account the UK's programme to support the development and deployment of CCS and in particular the need for suitable locations that provide for the permanent storage of carbon dioxide[104].
- It is for industry to propose new energy infrastructure projects within the strategic framework set by Government. The Government does not consider it appropriate for planning policy to set targets for or limits on different technologies.
- Marine plan authorities will need to liaise, as appropriate, with terrestrial planning authorities and the Infrastructure Planning Commission or successor to ensure a co-ordinated approach to assessing the development of any necessary onshore and offshore infrastructure.
- The MPS states that storage should be at least 800 metres below the seabed[105].

East marine plan areas – current situation

There are presently no commercial CCS sites operating in the UK. However, the East Inshore and East Offshore marine plan areas are likely to be two of the most important areas in English waters for CCS storage and infrastructure development. This is due to the high availability of potential storage sites, including the oil and gas fields of the Southern North Sea and the Bunter Sandstone rock formation that could be exploited for saline aquifer storage.

The Yorkshire and Humber region, adjacent to the East marine plan areas, represents the largest cluster of carbon dioxide industrial emitters in the UK[106]. Around 45 million tonnes per year of carbon dioxide is produced from energy generation and industrial emissions in this region[107]. Combined with the other Eastern coastal clusters of the Thames and Teesside, there are significant carbon dioxide sources in the land areas adjacent to the East marine plan areas. As these sources tend to be located in clusters, these areas provide excellent opportunities for the development of CCS network solutions to transport and storage. There are a number of proposed CCS projects within the East plan area, including those listed under ‘potential future situation’ below. More may come forward once the Government launches its new demonstration programme.

Theddlethorpe on the Lincolnshire coast is a hub of hydrocarbon pipelines coming ashore so could feature in the future CCS pipeline network.

East marine plan areas – existing planning context

No sub-national policy for CCS has been identified.

Potential future situation

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[104] The UK Government announced in December 2011 that its ‘CCS Programme’ still provides £1 billion to support capital investment in CCS. The outcome of this programme is intended to be cost competitive low carbon electricity from fossil fuel power stations in the 2020s. There is an open approach to the programme in terms of project types.
[105] UK Marine Policy Statement, HM Government, 3.3.31, 2011
[106] Yorkshire & Humber Carbon Capture, Transportation & Storage Strategic Options Appraisal Report, National Grid, p5
[107] Yorkshire & Humber Carbon Capture, Transportation & Storage Strategic Options Appraisal Report, National Grid, p5

The impact assessment of the CCS Directive estimated that 7 million tonnes of carbon dioxide could be stored by 2020 and up to 160 million tonnes by 2030 across the EU, providing that CCS proves to be an environmentally safe technology. This could account for 15 per cent of the reduction required across the EU[108]. The potential for storage within the East marine plan areas is of international significance and could result in the importation of carbon dioxide from other countries. However, there is currently an obstacle to this potential as the cross border transfer of carbon dioxide is not permitted (under article 6 of the London Protocol) [109].

There are six active applications from the UK Government for CCS projects to the European Investment Bank (EIB) for consideration in the next round of the EU's New Entrant Reserve (NER) scheme. This fund has set aside the value of 300 million EU carbon allowances, (whose monetary value varies according to carbon price), to support CCS and innovative renewable projects across the European Union. Up to three projects may be supported per member state. Of the six UK applications, four are from England:

- The oxyfuel new supercritical coal-fired power station on Drax site in North Yorkshire.
- The new integrated gasification combined cycle (IGCC) power station (pre-combustion with CCS on the coal-feed) in Killingholme, North Lincolnshire.
- The new IGCC power station in Stainforth, Yorkshire.
- The pre-combustion coal gasification project in Teesside, North East England.

The Overarching National Policy Statement for Energy EN-1 states that "all commercial scale (at or over 300 MW) combustion power stations (including gas, coal, oil or biomass) have to be constructed carbon capture ready" and that "new coal-fired power stations are required to demonstrate CCS on at least 300 MW of the proposed generating capacity". The MPS states that, "virtually all fossil fuel generation will eventually need to be fitted with technology that captures carbon dioxide and permanently stores it". The conclusion is that there will be "considerable volumes of carbon dioxide to be permanently stored" and that this will take place "almost exclusively offshore". There is the potential for the English marine area to be used to generate international income as it is considered "one of the most promising hub locations in Europe"[110].

The infrastructure that will be required to support CCS in the English marine area will be focussed on pipelines, well-heads and injection platforms, with opportunities for re-using existing infrastructure intended to be maximised. There will also be a need for the installation of any necessary infrastructure to allow the long-term monitoring of storage sites.

The CCS industry is keen to get appropriate onshore and offshore infrastructure in place for transport and storage at an early stage. This would allow the capacity to

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[108] Strategic Scoping Report for Marine Planning in England, Chapter 3.2, MMO 2011
[109] Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1996
[110] UK Marine Policy Statement, HM Government, 3.3.31, 2011

incorporate other carbon dioxide emitters in the area. This would bring down the costs of transport and storage as well as their impacts and could minimise the total footprint of a national CCS infrastructure network. Such over-sizing of the infrastructure for individual projects and thinking in terms of a broad network of infrastructure will require co-ordination across different developers.

Summary of evidence and issues

CCS is an important part of the UK's plans for low carbon energy, enabling fossil fuels to be utilised without emitting significant volumes of carbon dioxide. CCS is considered as the only practical future option for industrial emitters to capture and store their carbon dioxide emissions.

CCS is expected to take place almost exclusively offshore in the UK.

Relevance to East plan areas

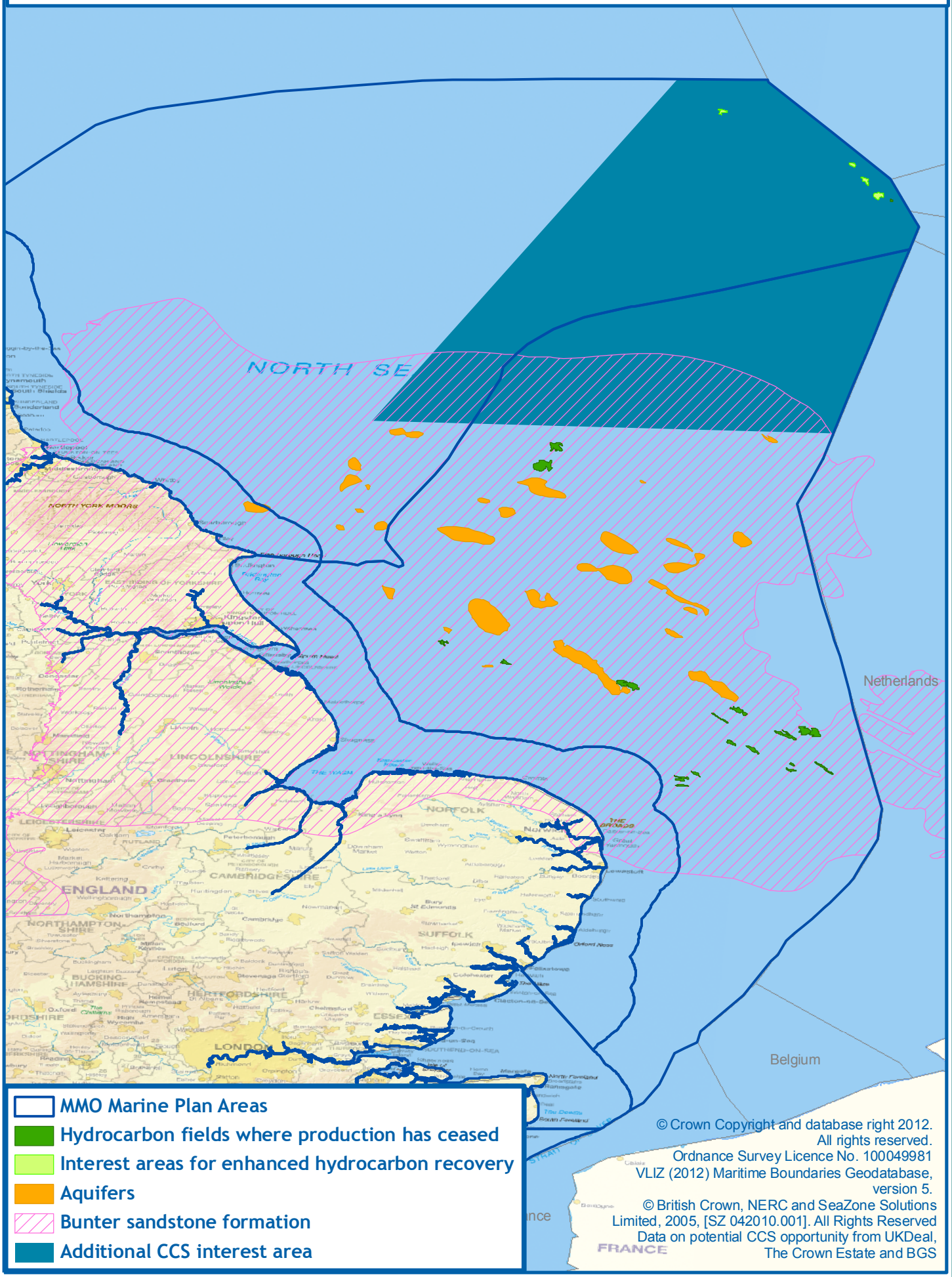
The East plan areas represent the greatest opportunity for CCS development in the English marine area. This is as a result of the concentration of the majority of the Bunter Sandstone formation aquifers and the existing oil and gas infrastructure in the East plan areas. These opportunities for storage are spatially restricted. The potential storage sites in the East plan and adjacent areas are shown on Figure 4.8. The figure includes data on aquifer structures and the Bunter sandstone formation reservoirs from a study by the British Geological Association[111]. Oil and gas data from UKDeal was used to identify hydrocarbon fields where production has ceased as well as interest areas for enhanced hydrocarbon recovery. An additional broad interest area has been highlighted as a number of developers have expressed interest through the EU's NER funding project in storage sites here..It should be noted that none of these sites are currently used for CCS and that their inclusion is intended to be indicative of potential areas where CCS may develop.

[111] Industrial carbon dioxide emissions and carbon dioxide storage potential in the UK, BGS, 2006,

Figure 4.8: Potential opportunity for carbon capture and storage

January 2012
This map has been produced using the ETRS89 Coordinate Reference System

marine management organisation



Storage is possible within some active oil and gas fields as part of enhanced hydrocarbon recovery. This would involve the introduction of carbon dioxide to an aquifer, displacing the hydrocarbons, allowing their recovery under pressure. This has the potential to increase hydrocarbon production and there are international examples of the successful operation of enhanced hydrocarbon recovery.

Issues for delivery of CCS

- An important issue for delivering CCS is the general access to finance and continued policy and developmental funding support from Government. As the CCS industry is at an early operational project stage in England, plans will need to be flexible enough to support the sector given that the characteristics of its future development are not yet known.
- A detailed assessment of the varying characteristics and suitability of different storage sites and there availability for future use in CCS would be beneficial to the development of the sector. Initial research has been carried into the most likely locations where the sector will develop. The MMO would be supportive of efforts to carry out further research. Inferences on the likely broad location of the transport infrastructure that will be required to link capture and storage sites could be made following such research, DECC's current CCS research programme being worth £125 million.
- The commercial sensitivity of information on the decommissioning programme of oil and gas fields could be limiting to the CCS sector in identifying suitable project sites.
- An assessment of the likely total carbon dioxide storage requirement to decarbonise energy generation and industrial processes, would be beneficial to the planning process and the achievement of policy goals on CCS by supporting future projections of spatial use. The MMO supports research to quantify the storage requirement and is aware of the UK Storage Appraisal Project (UKSAP) that was commissioned by the Energy Technology Institute in September 2009 to assess the UK’s offshore carbon dioxide storage capacity, publishing its findings during 2012.
- As described in more detail under the section Potential future situation, there is a need to develop a network of infrastructure for transport (onshore and offshore) and storage for carbon dioxide that would maximise the availability of CCS to carbon dioxide emitting sites. The current inflexibility and location of the majority of existing oil and gas infrastructure means new pipelines will need to be laid. Storage facilities in saline aquifers will also require new infrastructure.
- There is a challenge for the CCS industry in terms of timing and access to decommissioning programme information to ensure it is able to use appropriate oil and gas infrastructure in the UK before it is decommissioned. This infrastructure is unlikely to be able to remain dormant for long due to the costs of maintenance and the requirements for operators to decommission such sites. Dialogue between the oil and gas and CCS sectors will be required to achieve co-ordination. In addition, the suitability and safety of the existing infrastructure for this novel use would need to be assessed.

Issues for other sectors

- Where appropriate, the use of existing oil and gas infrastructure to develop CCS projects would be beneficial in terms of cost saving and minimising the disruption to the environment and communities surrounding the infrastructure. The

significant existing oil and gas infrastructure, such as pipelines and platforms, in the East marine plan areas represents an opportunity to achieve this re-use. It should be noted that the re-use of existing infrastructure is not without spatial implications on other activities, as the decommissioning of the infrastructure would liberate space for other activities.

- There is the possibility for CCS and oil and gas to co-locate via enhanced hydrocarbon recovery.
- Any new CCS platforms may need helicopter access and therefore, certain activities could be spatially restricted around the platforms in line with current guidance for the oil and gas industry issued by the Civil Aviation Authority (CAP764)
- There is potential, although thought to be limited, for competition for sites between natural gas storage and CCS as some sites would be suitable for both.
- There is potential for competition for space between new CCS pipelines and oil and gas pipelines, telecommunications or electricity cables for distribution networks or connecting renewable energy sites. Marine utility corridors could be developed to utilise the same infrastructure, or spatial corridor, potentially minimising the collective space used for such infrastructure, and impacts on the natural environment whilst maximising available space for other uses. Co-operation between developers would be essential to achieve such corridors.
- The transport of captured carbon dioxide is expected to be largely via pipelines, however it is possible that carbon dioxide may also be transported by ship to storage sites.

Issues for sustainability

- CCS projects will be subject to environmental impact assessment at the project level and are covered by the DECC Offshore Energy Strategic Environmental Assessment 2[112]. There are also environmental and financial requirements placed on CCS developers by the CCS Directive[113].
- The CCS Demonstration Programme allows the UK to demonstrate international leadership in mitigating greenhouse gas emissions[114].
- Removing carbon dioxide emissions from fossil fuel energy generation and industrial processes will reduce the potential for further acidification of the marine environment[115], and allows for the retention of fossil fuels in the UK energy mix, whilst significantly reducing the associated carbon emissions, thereby contributing positively to energy security,
- If expansion of CCS meets government policy targets then it could provide significant employment opportunities via construction and maintenance, and for the ports and shipping sectors. For the CCS sector, this has been estimated as 100,000 jobs[116].
- Leakage at the sea bed from a properly selected and managed storage site is thought to be extremely unlikely[117] [118]. If a leak were to occur, it is unlikely that

[112] www.offshore-sea.org.uk/site/scripts/consultation_download_info.php?downloadID=16
[113] At chapter 4
[114] UK Marine Policy Statement, HM Government, 3.3.34, 2011
[115] UK Marine Policy Statement, HM Government, 3.3.34, 2011
[116] Clean Coal: an industrial strategy for the development of carbon capture and storage across the UK, DECC, 2010
[117] UK Marine Policy Statement, HM Government, 3.3.35, 2011

any impacts would be either widespread or long-term, taking into account the dilution or buffering capacity of the marine environment[119]. It is possible for injected carbon dioxide to migrate underground, further research in the area of storage site monitoring and potential environmental impacts of carbon dioxide discharge into the marine environment is ongoing, and will further the understanding and assessment of risk in the future.

- Co-location of CCS and oil and gas via enhanced hydrocarbon recovery leads to permanent storage of the carbon dioxide, some benefits of this are the potential to increase energy security, raising revenues from oil taxation and the deferral of decommissioning costs and liabilities.
- Although most infrastructure will be offshore, sub-sea and therefore, having limited visual impact, there is some potential for impact where new pipelines need to be laid in the coastal zone[120].
- There is the risk of physical damage to seabed features, biota and features of archaeological interest during pipeline construction. These issues need to be considered on a case-by-case basis.
- Several of the environmental impacts of CCS will be similar to those for oil and gas extraction described in section 4.3.1. For example, there is the potential for CCS to have similar noise and vibration impacts to those of hydrocarbon operations that may place pressure on local biodiversity. These impacts are summarised as:
    - impulsive from seismic survey and piling during installation and decommissioning activities
    - semi-continuous or continuous from turbines, drilling rigs, production facilities or vessels[121]
- Where new infrastructure is required, the effects of drilling discharges will need to be mitigated in line with best practice from other sectors.
- During operation, there may be effects on electrically or magnetically sensitive species from subsea power cables due to the electromagnetic fields created[122].
- The British Geological Survey (BGS) reported that having storage sites offshore will reduce the risk of potential contamination of onshore drinking water aquifers from the stored carbon dioxide[123].
- The decommissioning liabilities placed on a CCS developer are set out in the CCS Directive and differ from those placed on oil and gas developers.

4.3.4 Nuclear power

National context and policy

Nuclear power has been used to generate electricity in the UK since the 1950s, with Calder Hall in Cumbria being the first functioning nuclear power station in the UK. Three types of nuclear reactor have been used in the UK, Magnox, Pressurised

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[118] Intergovernmental Panel on Climate Change, Special Report on Carbon Capture & Storage, 2005
[119] Blackford, J.C. et al Regional scale impacts of distinct CO2 additions in the North Sea, Marine Pollution Bulletin 56 (2008) 1461-1468
[120] DECC: UK Offshore Energy Strategic Environmental Assessment, 2011
[121] DECC: UK Offshore Energy Strategic Environmental Assessment, 2011
[122] DECC: UK Offshore Energy Strategic Environmental Assessment, 2011
[123] Industrial Carbon Dioxide Emissions and Carbon Dioxide Storage Potential in the UK, British Geological Survey report for Dept for Trade & Industry, 2006

Water Reactor (PWR) and Advanced Gas-Cooled Reactor (AGR). Of these, Magnox plants are the oldest and are now mostly decommissioned, with the exception of Wylfa, on the island of Anglesey, and Oldbury in Gloucestershire, which are both due to be decommissioned in 2012. The rest of the nuclear reactors working in the UK (10) are PWR (1) and AGR (7). Nuclear power provides approximately 16 per cent of the UK's electricity, and is a key part of the energy mix, as it provides a steady, predictable base load of electricity.

As all except one of the nuclear reactors in the UK are due for decommissioning in the next 10 years, the government decided to investigate opportunities for a new round of nuclear reactors, and have investigated sites for these reactors. It was announced that the sites for new reactors will be: Bradwell, Hartlepool, Heysham, Hinkley Point, Oldbury, Sizewell, Sellafield and Wylfa[124].

In some parts of the UK power stations may be sited in coastal locations and will have an important contribution to play in the UK's energy mix. The construction, operation or decommissioning of a coastal power station may have impacts on the local marine environment through for example the construction of the plants and associated development and marine off-loading facilities, such as jetties and marinas, for heavy plant items. There may also be impacts from abstraction and discharge of cooling water during operation. More detail on impacts and specific measures and actions to avoid or minimise adverse impacts including on marine ecology is contained in the National Policy Statement for Nuclear Power Generation (EN-6). Any discharges into water will be controlled in accordance with the permits issued by the relevant licensing authority.

The marine area is expected to make an increasingly major contribution to the provision of the UK's energy supply and distribution. Contributing to securing the UK's energy objectives, while protecting the environment, will be a priority for marine planning, bringing substantial socio-economic benefits such as employment and income opportunities, transferable technology and skills development.

The following relevant goals/objectives and policies drawn from the MPS and the national policy statements for Energy (EN 1) and Nuclear Power (EN6) are highlighted by way of context although note that identifying objectives and deriving planning policies are later steps in the planning process.

- The UK must make the transition to a secure, safe, low-carbon, affordable energy system.
- The UK must meet a legally binding EU target for 15 per cent of energy consumption to come from renewable sources by 2020.
- The UK Government is committed to reaching its legally-binding target of an 80 per cent reduction in greenhouse gas emissions by 2050, compared to 1990 levels.
- When developing marine plans, marine plan authorities should identify how these will contribute to delivery of national targets and priorities, including legally binding commitments entered into under the Renewable Energy Directive

[124] DECC (2011) National Policy Statement for Nuclear Power Generation (EN-6). TSO, London

(Directive 2009/28/EC) and our domestic binding target to reduce greenhouse gas emissions by 80 per cent by 2050.

- Consideration to national need for energy infrastructure as set out in the overarching National Policy Statement for England (EN-1) must be given in developing marine plans.
- For the UK to meet its energy and climate change objectives, the Government believes that there is an urgent need for new electricity generation plant, including new nuclear power. Nuclear power generation is a low carbon, proven technology, which is anticipated to play an increasingly important role as we move to diversify and decarbonise our sources of electricity.
- It is government policy that new nuclear power should be able to contribute as much as possible to the UK's need for new capacity. Although it is not possible to predict whether or not there will be a reactor or more than one reactor at each of the eight sites included in EN-6, a single reactor at each of the eight sites would result in 10 to 14 GW of nuclear capacity, depending on the reactor technology chosen.

East marine plan areas – current situation

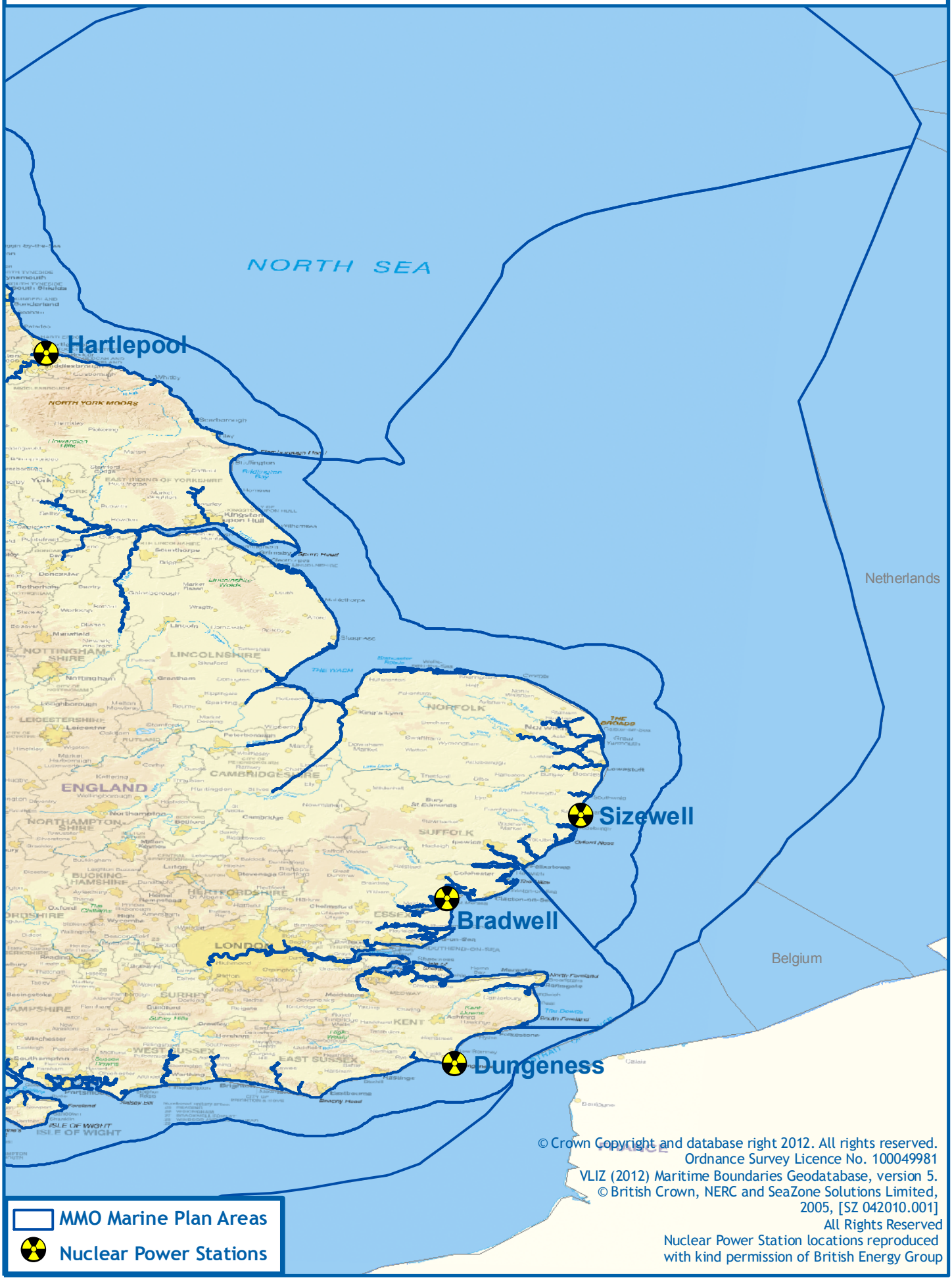
The East Inshore plan area has one nuclear power station along its coastline, Sizewell B in Suffolk, with Sizewell A on the same site being in the process of being decommissioned. There is also a plant at Bradwell in Essex, just to the south of the plan area which is in the process of being decommissioned. Sizewell B is forecast to be in use until 2035 and its rated output is approximately 1.2 GW[125]. Sizewell C, at the same site as Sizewell B, has been announced as part of the Government's commitment to nuclear new build with estimated start and finish dates of 2015 and 2026 respectively[126]. Currently, the Sizewell C project has been announced and is at the pre-application stage with the Infrastructure Planning Commission[127]. Nuclear energy brings economic benefits for commerce within the plan area, with businesses throughout the plan area currently working for the nuclear industry[128]. For more detail on location of sites please see Figure 4.9 below.

[125] www.decc.gov.uk/assets/decc/11/meeting-energy-demand/nuclear/2027-past-and-present-uk-nuclear-reactors.pdf
[126] CSkills. Nuclear New Build Employment Scenarios www.cskills.org/uploads/Nuclear_New_Build_Employment_Scenarios_Report_Web_tcm17-27989.pdf
[127] http://infrastructure.independent.gov.uk/projects/eastern/sizewell-c-new-nuclear-power-station/
[128] www.niauk.org/images/stories/pdfs/jobs_map_2011_final.pdf

Figure 4.9: Nuclear power stations

January 2012
This map has been produced using the ETRS89 Coordinate Reference System

marine management organisation



East marine plan areas – existing planning context

Suffolk Coastal's local development framework does mention nuclear specifically, and highlights some local issues that need to be addressed in relation to coastal erosion and coast protection issues, and coastal access including the Heritage Coastal Walk. Other LDFs focus almost completely on renewable and low-carbon energy generation technologies. LDFs are interested in landscape (and seascape) issues, particularly in relation to new developments being in keeping with the character of an area. This could have implications for new nuclear plants, though the siting of Sizewell C on a site with existing nuclear power stations is likely to minimise any impacts on seascape or landscape. Any application for a new nuclear plant at Sizewell would be submitted to the Infrastructure Planning Commission (and its successor) for approval and this is currently at the pre-application stage, as mentioned earlier. Any associated works, such as temporary jetties, would be subject to licensing or planning applications and would possibly include applications to the MMO or local authorities for licences and planning permission as necessary.

Potential future situation

Nationally, there have been eight sites announced in the Nuclear power NPS (see list above), with all sites being identified as locations potentially suitable for new nuclear power stations by 2025. The first two sites announced by EDF Energy (Hinckley Point and Sizewell) , according to their website, propose two new reactors per site, capable of generating approximately 3.2G W per site[129]. Current nuclear capacity is approximately 11 GW[130], so it can be said that there is the potential for an increase in generating capacity from new build over current levels, though this is dependent on the type and number of reactors proposed at other sites with potential for new nuclear power generation. Any development at Bradwell and Hartlepool, despite being outside the plan area, have the potential to impact within the plan area. It has been suggested that Sizewell C and Bradwell could have a maximum employment impact during construction of around 6,000 construction jobs[131]. This may have additional positive impacts, such as increased occupancy rates on hotels and demands on local services and suppliers.

Summary of evidence and issues

Relevance to East plan areas

Nuclear power has been a significant contributor to the UK energy mix for the last 50 years and national policy sees this role continuing, especially given the low carbon emissions associated with nuclear power. One site is located in the East Inshore plan area:

- Sizewell B is forecast to be in use until 2035 and its rated output is 1.1GW.

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[129] www.edfenergy.com/energyfuture/edf-energys-approach-why-we-choose-new-nuclear/current-nuclear-sites

[130] www.decc.gov.uk/assets/decc/11/meeting-energy-demand/nuclear/2027-past-and-present-uk-nuclear-reactors.pdf

[131] CSkills. Nuclear New Build Employment Scenarios www.cskills.org/uploads/Nuclear_New_Build_Employment_Scenarios_Report_Web_tcm17-27989.pdf

- The role of nuclear power on the coastline bordering the East Inshore area is forecast to increase, given the anticipated completion of Sizewell C in the 2020s.

Given the decisions over siting have already been made and that regulation of operating plants is already in place, the locational implications of nuclear for marine planning are clear spatially. As a result, only a very few issues emerge of relevance to planning. The marine plan will need to draw attention to the location of such issues but they will be addressed through the project-level assessment and licensing. The marine plan will also note relevant planning policies and conditions that would apply to any development.

Issues for the sector

- Though locations of sites for new nuclear are known and use existing sites, the scale of impacts listed under Issues for sustainability is unknown and will need to be addressed as proposals develop.
- Any impacts from nuclear new build may need to be addressed with those from other sectors in a consideration of cumulative effects.
- Nuclear power is regulated by the Health and Safety Executive, Environment Agency and in terms of decommissioning, the Nuclear Decommissioning Authority. The HSE's role will be part of a new statutory body, the Office for Nuclear Regulation, as stated on their website "On 8th February 2011, a written ministerial statement by the Rt. Hon. Chris Grayling MP announced the Government's intention to bring forward legislation to create a new independent statutory body outside of the HSE to regulate the nuclear power industry. The new statutory corporation will be known as the Office for Nuclear Regulation (ONR) and will take on the relevant functions that were carried out by the Health and Safety Executive and the Department for Transport. The ONR will be a new independent regulator, formally responsible in law for delivering its regulatory functions. The creation of the ONR will consolidate civil nuclear and radioactive transport safety and security regulation in one place."[132]

Issues for other sectors

- Under normal operating conditions nuclear power stations will have little impact on other marine activities, though there may be issues for the receiving environment of any water discharges, regulated and controlled by the Environment Agency.
- During the construction phase, there may be implications for other activities, such as for aggregates, where new construction is likely to use local, possibly marine, sourced aggregate.
- Nuclear new build presents economic opportunities for potential supply chain businesses, including those proximate to plants.

Issues for sustainability

- The nuclear power NPS highlights a number of impacts from nuclear power:
    - flood risk

[132] www.hse.gov.uk/nuclear/background.htm

    - water quality and resources, including temperature changes to water and radionuclide emissions – see Chapter 6 Figure 6.43
    - coastal change and impacts upon this, including from temperature changes in water
    - biodiversity and geological conservation
    - landscape and visual impacts
    - socio-economic
    - human health and well being.
- Following the Fukushima nuclear power plant incident, the UK government commissioned the Health and Safety Executive (HSE) to review the safety of nuclear power plants in the UK, in order to minimise the chances of a similar incident. The HSE found that there were no changes needed to the National Policy Statement for Nuclear Power Generation.

4.4 Ports and shipping

National context and policy

Ports and shipping are critical to the effective movement of cargo and people, and an essential part of the UK and global economy[133].

Shipping makes a £6.1 billion value added contribution to UK GDP, 0.4 per cent of the value of the UK economic activity, with more than 59,000 UK nationals employed in the industry[134]. Industry development is dictated by world trade patterns resulting from a given economic climate. Globally, 2008-09[135] saw fewer new builds and a reduction in tonnes of cargo and containers being shipped, though it should be noted that the number of ship movements did not change.

The MPS recognises the important role that ports have on the activities taking place within the marine environment. They are an essential part of the UK economy as the major conduit for the country's imports and exports. Ports make a £6.9 billion value added contribution to UK GDP, 0.5 per cent of the value of the UK economic activity, with more than 112,000 people employed in the industry[136]. In 2010, ports in England and Wales handled about 95 per cent of the total volume of UK trade and 75 per cent of its value[137].

The National Policy Statement for Ports (NPSP) was released in October 2011[138] and seeks to encourage the essential need for ports to grow in line with government policy on sustainable development, based on commercial factors in a free market context while ensuring legal environmental and social objectives are met[139].

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[133] Defra (2011) Marine Policy Statement, p36
[134] Oxford Economics for Maritime UK (2011, based on 2009 data) The economic impact of the UK Shipping Industry
[135] United Nations (2011) Review of Maritime Transport 2010, p46
[136] Oxford Economics for Maritime UK (2011, based on 2009 data) The economic impact of the UK Ports Industry
[137] DfT (2011) National Policy Statement for Ports, p9
[138] DfT (2011) National Policy Statement for Ports
[139] DfT (2011) National Policy Statement for Ports, p11

Despite continuing advances in efficiency, ports remain substantial employers in their own right, generating and facilitating economic activity through trade. They are essential to supporting emerging industries and to mitigating the effects of climate change by facilitating the increased movement of freight by sea. There are limited alternatives to transporting bulk commodities therefore the provision of sea port capacity is important for ensuring a sustainable economy based on imports and exports. Other benefits provided by ports include enabling the commercial shipping sector in supporting the tourism and leisure industry through ferries, cruise liners and yachts.

Shipping is regulated by global agreements through a specialised UN agency with responsibility for vessel safety and the prevention of pollution from ships, the International Maritime Organization (IMO). The IMO's primary purpose is to develop and maintain a comprehensive international regulatory framework for shipping, its remit includes safety, environmental concerns, legal matters, technical co-operation, maritime security and the efficiency of shipping. IMO international conventions are wide ranging with concerns including: Safety of Life at Sea, Prevention of Pollution from Ships, Regulations for Preventing Collisions at Sea, Facilitation of International Maritime Traffic, Management of Ships' Ballast Water and Sediments and Safe and Environmentally Sound Recycling of Ships, and Salvage[140]. Ongoing work at the international level includes action taken on the International Convention for the Prevention of Pollution from Ships (MARPOL) Annex 6 to improve the environmental performance of shipping through reduction of pollution.

As part of an integrated approach to transport planning, Europe and the UK both wish to see growth in shipping and have put in place measures to stimulate this growth, particularly in short sea and coastal shipping[141].

The goals and objectives for ports centre on improving economic, social and environmental welfare through sustainable development[142]. The following goals, objectives or observations relevant to ports and shipping drawn from government departments and MMO documents provide further context.

- Marine plan authorities and decision makers should take into account and seek to minimise any negative impacts on shipping activity, freedom of navigation and navigational safety and ensure that their decisions are in compliance with international maritime law[143].
- Shipping is essential to support emerging industries such as renewable energy development and to mitigate the effects of climate change by facilitating the increased movement of freight by sea rather than road[144].
- The MMO will need to take account of the need to protect the efficiency and resilience of continuing port operations, as well as further port development.

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[140] International Maritime Organisation, http://www.imo.org/About/Conventions/ListOfConventions/Pages/Default.aspx, Accessed January 2012
[141] European Commission (2011) Roadmap to a Single European Transport Area
[142] DfT (2011) National Policy Statement for Ports, p11
[143] Defra (2011) Marine Policy Statement
[144] Defra (2011) Marine Policy Statement

- When the MMO is developing marine plans, they should take into account the contribution that the development would make to the national, regional or more local need for the infrastructure, against expected adverse effects including cumulative impacts.
- Planning decisions must ensure effective competition between ports and provide resilience in the national infrastructure. They must also take full account of both the potential contribution port developments might make to regional and local economies[145].
- Preserve, protect and where possible improve marine and terrestrial biodiversity, providing high standards of protection for the natural environment, minimise emissions of greenhouse gases from port related development, be functionally and environmentally well designed, be adapted to the impacts of climate change, ensure security of supply.
- Supporting sustainable transport by offering more efficient transport links with lower environmental disbenefits, providing a basis for trans-modal shifts from road transport to shipping and rail, providing additional capacity for the development of renewable energy.
- Ensure all proposed developments satisfy the relevant legal, environmental and social constraints and objectives, including those in the relevant European directives and corresponding national regulations.
- The development of the offshore energy sector will require robust port facilities for the manufacture of turbines if the wind energy sector is to be home grown. This could require extra port capacity and deeper berths which could in turn drive port expansion projects[146].
- The impact of a proposed port development on the tourism sector must be considered, including impact on landscape or seascape. However, there may be positive impacts of port development through increased demand for local services[147]. National parks, areas of outstanding natural beauty (AONBs) and The Broads are highlighted as areas whose landscape and scenic beauty must be given great weight when considering port development[148].
- The impact of new port development on the surrounding transport network must be considered, the most likely of which would be increased congestion on road infrastructure and the associated environmental impacts of increased road traffic[149]. Rail and coastal or inland shipping is to be encouraged above road transport.

East marine plan areas – current situation

Figure 4.10 shows current ports, anchorage areas and shipping densities within the East plan areas.

Ports and shipping make a significant contribution to the economy on the east coast and are expected to continue to do so. Expansion plans and growth in offshore industries are likely to further increase this contribution, although both import and export trade is vulnerable to economic sensitivities.

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[145] DfT (2011) National Policy Statement for Ports, p17
[146] Marine Management Organisation (2011) Strategic Scoping Report for Marine Planning in England
[147] DfT (2011) National Policy Statement for Ports, p21
[148] DfT (2011) National Policy Statement for Ports
[149] DfT (2011) National Policy Statement for Ports

The following identifies current key statistics for the East plan areas.

- The UK's busiest port in 2009 was Grimsby and Immingham in the East Inshore plan area[150] handling 12 per cent of the UK's traffic in 2009.
- The Port of Felixstowe, the UK's busiest container port sited just outside the East plan area, handled over 2 million teu[151] in 2010[152]. Consent granted in February 2006 would provide capacity for an estimated further 1.6 million teu at Bathside Bay and Felixstowe South[153].
- Ship to ship oil transfer (outside of estuaries, ports and harbours) occurs exclusively within the East Inshore area[154].
- IMO designations in the East plan area relate to ensuring safe navigation, a traffic separation scheme in the centre and bottom of the eastern boundary of the offshore area, and two separate schemes in the inshore area proximate to the Humber estuary and port of Felixstowe. Actual shipping activity is much more dispersed than just these IMO areas.
- Together with port-related and ferry traffic the East Inshore is one of the busiest areas for shipping. Ferries sail from Hull in the East Inshore area to Zeebrugge and Rotterdam and the inshore and offshore areas are crossed by several routes from other plan areas[155].
- 4 per cent of the East plan areas are covered by high density shipping movements (greater than 1,000 ships per year) requiring 2,485 square kilometres with 28 per cent covered by low density shipping movements (between 100 and 200 ships per year) requiring 16,551 square kilometres.

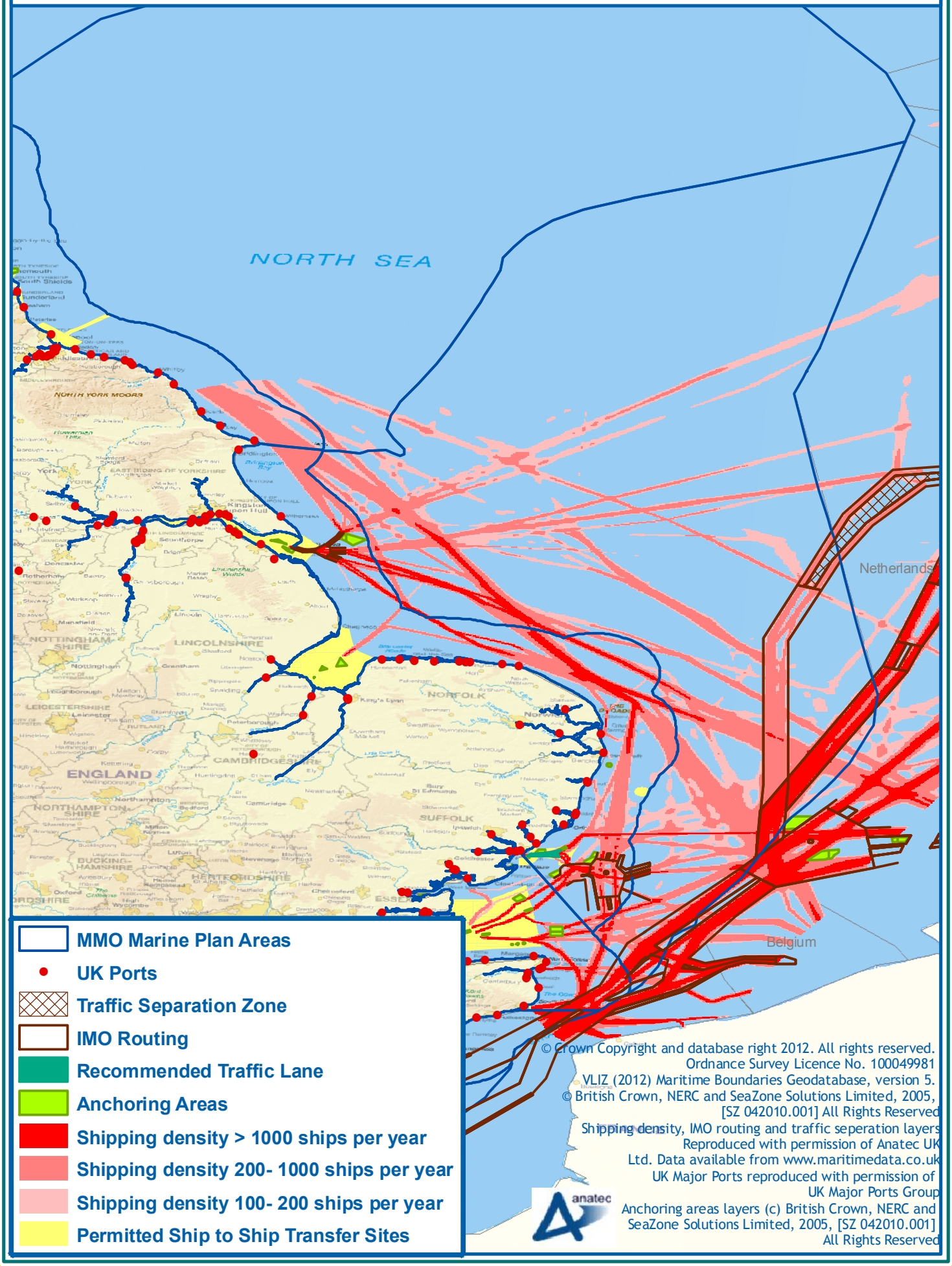
Existing measures: In respect of expansion or use changes, all proposed port-related development must satisfy the relevant legal, environmental and social constraints and objectives, including those in the relevant European directives and corresponding national regulations.

[150] Marine Management Organisation (2011) Strategic Scoping Report for Marine Planning in England
[151] Twenty-foot equivalent Units
[152] DfT (2010) Key port statistics, top 10 ports for selected traffic types, PORT0302
[153] DfT (2011) National Policy Statement for Ports, p14
[154] Marine Management Organisation (2011) Strategic Scoping Report for Marine Planning in England
[155] Marine Management Organisation (2011) Strategic Scoping Report for Marine Planning in England

Figure 4.10: Ports and shipping

Janauary 2012
This map has been produced using the ETRS89 Coordinate Reference System

marine management organisation



While figure 4.10 sets out a summary of spatial evidence necessary for marine planning, the MMO is aware of ongoing research projects that may offer additional information and data. This includes projects in The Crown Estate's offshore wind strategic workstreams examining the cumulative impact of offshore wind development on navigation. Evolving datasets such as those based on Automatic Identification System (AIS) that would allow a more detailed understanding of ports and shipping. The MMO is continuously updating its evidence base with relevant stakeholders wherever possible. Recreational boating activity is discussed in Chapter 4.11.

It is intended that all information used for the marine planning process including options and objectives development that can be described spatially will appear on the marine planning portal, hosted on the marine planning pages of the MMO website.

East marine plan areas – existing planning context

The following focuses on relevant evidence and issues set out in local development frameworks (LDFs).

Shipping occurs along the length of the coast of the East Inshore plan area with ten major ports and shipping routes penetrating the inshore and offshore plan areas. These ports are recognised in planning authority documents as nationally significant assets and a key part of local economies providing considerable direct and indirect local employment. The ports complex in Hull and Humber employs 47,000 people both directly and indirectly through port related activity[156], with plans for further expansion of port activities.

There is considerable diversity in the role of ports in the East plan area and immediately adjacent to it (particularly Felixstowe, Harwich and the wider Stour and Orwell estuaries), including freight, aggregates, fishing, the cruise industry, ferries, vessel repair and maintenance, as well as involvement with existing energy generation infrastructure and renewable energy development.

Marine relevant policies were identified in the LDFs of 12 local planning authorities (LPAs) providing good representation across the plan area.

- Conditions to protect or promote the use of sites – safeguarding use of wharves, rail connections to ports to allow access and policies to encourage growth through diversification of activity.
- Conditions to identify and protect new sites – setting aside land for port development in advantageous locations including improvements to nearby infrastructure.
- Conditions to support renewal and expansion – exploiting opportunities for the growth in renewables industry and modification to existing ports to improve efficiency, particularly for freight.

[156] Hull & East Yorkshire Bondholders, www.hull.co.uk/template01.asp?pageid=158, Accessed January 2012

Certain sites have been identified where intensification of activities may occur. These include:

- East Riding: Ports and wharves at Goole and Howdendyke.
- Suffolk Coastal: Retention, expansion and consolidation of Felixstowe Port in addition to the Felixstowe South re-configuration works that are currently underway, this includes provision of additional sites for necessary supporting port related uses.
- Kingston-upon-Hull: Establishing the Green Port (a concept aiming to develop the renewable industry across Hull with a primary focus on the ports including regeneration of Alexandra Dock for the manufacture and dispatch of offshore wind turbines).

Potential future situation

- With limited alternatives, the majority of an increase in goods and, to a lesser extent commodities trade will need to move through ports around the coast of the United Kingdom. The close relationship between ports and the development of the offshore energy sector also strengthens the notion that port capacity is expected to increase.
- In line with increased offshore marine energy development, the most noticeable diversification in shipping activity will be an increase in vessels associated with installation then servicing of wind farms.
- The growing renewable energy industry will have port requirements for activities including manufacture, installation and maintenance. While development of the renewable energy industry will be guided by business decisions, a number of Government initiatives have been established to encourage port-based investment for renewable energy. This includes identification of centres for offshore renewable engineering (COREs – in the East area including Humber and Great Yarmouth & Lowestoft ports)[157], and provision of funding through Grants for Business Investment (GBI)[158] and the Regional Growth Fund (RGF)[159].
- The Great Britain forecasts[160] suggested increases in port capacity by 2030 over a 2005 base as follows:
    - 182 per cent in containers, from 7 to 20 million teu (excluding transhipment)
    - 101 per cent in ro-ro traffic, from 85 to 170 million tonnes
    - 4 per cent in non-unitised traffic, from 411 to 429 million tonnes[161].
- Extra capacity and deeper berths to drive port expansions plans related to the manufacture of turbines with two such projects undergoing consideration on the Humber[162].

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[157] BIS & DECC (2011) Centres for Offshore Renewable Engineering
[158] BIS, www.bis.gov.uk/policies/economic-development/regional-investment, Accessed January 2012
[159] BIS, www.bis.gov.uk/RGF, Accessed January 2012
[160] MDS Transmodal (MDST) for DfT (2006 updated 2007) Forecasts of demand for port capacity in the period up to 2030
[161] DfT (2011) National Policy Statement for Ports, p13
[162] Marine Management Organisation (2011) Strategic Scoping Report for Marine Planning in England

- In the period up to 2020, 100 per cent increase in ro-ro traffic and 180 per cent per cent increase in containers (either via an increase in number of vessels or, as is already being seen in some cases, an increase in the size of vessels)[163].
- Development at Felixstowe to accommodate larger vessels[164].
- Increased competition for marine resources affecting the sea space available for the safe navigation of ships[165].
- Potential for installation of temporary dock facilities to enable construction of Sizewell C in Suffolk (initial proposals expected mid-2012).
- Possible increase in short-sea and coastal shipping as a modal shift from land-based transport to sea is encouraged.

Summary of evidence and issues

Relevance to East plan areas

The East plan areas currently include the UK's busiest port and the sector offers significant growth prospects, which gives an opportunity to increase employment rates in deprived coastal communities.

- **Current**: Around 22 per cent[166] of major UK ports are in the East plan areas, with 55 million tonnes handled by Grimsby and Immingham (12 per cent of national traffic).
- **Future**: It is likely that further port expansion, as implied by documents such as the DECC Renewables Prospectus[167] and/or development will occur to take into account growth in renewables industry and to accommodate growth described in national forecasts.

With 95 per cent of the UK's international trade arriving or leaving by sea, there is a clear need to recognise the strategic economic importance of ports and shipping activities in the plan. In the context of existing and future marine industries, while taking account of environmental considerations, it will be important for the East plan areas to facilitate current activity levels and proposed growth.

Issues for delivery of ports and shipping

The NPSP is a relevant consideration for the MMO[168] and the Infrastructure Planning Commission (IPC) is required to begin with a presumption in favour of development unless other conditions apply[169]. However, this presumption is set in the context of a development being consistent with relevant sustainability objectives. The Marine Policy Statement (MPS) refers to a presumption in favour of sustainable development[170].

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[163] Marine Management Organisation (2011) Strategic Scoping Report for Marine Planning in England
[164] Marine Management Organisation (2011) Strategic Scoping Report for Marine Planning in England
[165] Defra (2011) Marine Policy Statement
[166] Data from UK Major Ports Group based on membership
[167] DECC (2009_ Renewables Prospectus
[168] DfT (2011) National Policy Statement for Ports, p5
[169] DfT (2011) National Policy Statement for Ports, p17
[170] Defra (2011) marine Policy Statement, p15

The protection of navigation routes contributing to delivery of safe shipping, is of paramount concern and a major factor supporting port growth, particularly taking in to consideration the predicted increase in both vessel size and frequency of movements, and any growth of offshore renewables must consider this. Negative impacts to navigation may disrupt shipping patterns, increasing travel time and fuel use by shipping.

Marine planning needs to consider the interaction of shipping with other users of marine space and vice-versa. Where planning identifies the need to restrict surface navigation or make changes to IMO recognised routing measures, these would need to be agreed through established national and international channels[171].

A marine plan will need to be aware of action being taken to realise IMO convention such as protection of freedom of navigation under UNCLOS, integrating and supporting measures where appropriate. This is particularly true in the context of marine planning that takes into account a wide range of activities that individually and cumulatively may have significant impact on the use of space in the East plan areas.

The expected increases in traffic at the Port of Felixstowe[172], much of which is likely to route through the East Inshore and East Offshore plan areas, will require consideration in the marine plan. This should recognise that while the East Inshore and East Offshore plan will not apply directly to the Port of Felixstowe, shipping activity to and from the port will need to be accounted for in these plans.

Issues for other sectors

- Ports and shipping are both dynamic sectors, responding closely to market forces. For this reason, marine planning should seek to be as flexible as possible to allow appropriate responses as economic forces dictate, while taking account of other economic, social and environmental factors.
- An increase in extraction of marine won aggregates may necessitate suitable port facilities to allow landing and, where necessary, processing. This has the potential to contribute to maintaining or increasing port profitability and related employment, but may also present an opportunity cost related to other sector use of ports.
- Energy production and infrastructure development offer opportunities for expansion and diversification in ports through offshore industry growth and support for construction of onshore power plants. However, potential competition for space at sea that may arise from development of offshore energy installations, particularly large scale renewable deployment including Round 3, may adversely impact upon safe operation and competitiveness of shipping operation, such as a result of re-routing. To ensure proper consideration of safety of navigation, marine planning should be informed by relevant guidance covering interaction

[171] Approval sought from relevant UK government departments and agencies, including the Department for Transport (DfT), Maritime and Coastguard Agency (MCA) and Foreign and Commonwealth Office (FCO), before submitting proposals to IMO for agreement by all 169 member states.

[172] As previously mentioned, a port of national significance situated just outside the East marine plan area

between renewable and shipping activity such as that issued by the MCA (such as Marine Guidance Note 371[173]). Any negative impacts would, to a degree dependent upon the diversification of operations in the future, be felt by ports.

- The tourism and recreation sector is supported through berthing of cruise liners and passenger routes to mainland Europe. There is scope for this to increase but a balance needs to be maintained as port expansion may need to be considered alongside onshore tourism on waterfronts. Increases in both commercial shipping and recreational craft activity may increase the risk to safety of navigation as space is squeezed.
- Marine planning has, and will continue to, work closely with terrestrial planning authorities[174] to enable integration of growth in ports and shipping with necessary terrestrial infrastructure development including transport and energy (particularly in the context of the increasingly important role ports play in relation to marine renewable energy). Where relevant and practical, reference should be made to future development planned (see Annex 6) concerning sub-national policy).
- There is the potential for future MPAs to be co-located with areas of shipping activity.
- There is potential for the expansion of ports to impact upon designated areas; however there is opportunity for such impacts to be mitigated through terrestrial planning and marine licensing processes (such as meeting requirements of the Habitats Directive).
- Potential growth in sub-sea cabling and pipelining in the marine area could lead to an increased need to develop a mechanism to reduce possible impact from anchoring by vessels in emergencies, by identifying emergency anchorage areas.

Issues for sustainability

- Shipping is a very efficient means of transport, with low carbon dioxide (CO_2) emissions per tonne of cargo moved per kilometre compared with other modes[175] with further efficiencies expected[176].
- The scale of impact from shipping varies by type. The extent of noise and air pollution is dependent on shipping density.
- A number of air quality management areas (AQMAs) can be found around large ports in the Humber and Felixstowe as well as around Ipswich and the Wash[177]. Wider air quality issues for shipping are identified in Chapter 6 of this report, including details on the North Sea SO_x Emission Control Area (SECA).
- Pollution incidents and individual vessel accidents have the potential to have extensive impacts due to the volume of materials transported on modern vessels.

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[173] Maritime and Coastguard Agency (MCA) (2008) Offshore Renewable Energy Installations (OREIs) – Guidance on UK Navigational Practice, Safety and Emergency Response Issues

[174] As well as being set out as an issue for consideration in the Marine Policy Statement, this approach is consistent with the duty to cooperate applying to planning authorities as per clause 110 of the Localism Act (2011).

[175] Defra (2011) Guidelines to Defra / DECC's GHG Conversion Factors for Company Reporting: Methodology Paper for Emission Factors

[176] Further efficiencies will arise as a result of implementing legally binding obligations reduce CO_2 emissions from international shipping resulting from agreement at the IMO in 2011.

[177] Defra, http://aqma.defra.gov.uk/maps.php, Accessed November 2011

- Future port development related to offshore renewable energy has the potential to bring significant social benefits to communities via related employment (directly and via the supply chain), a consideration that must be viewed in the context of potential environmental changes that may be bought about through such development.
- Negative pressures exerted by this industry include:
    - airborne noise at ports and underwater noise at ports and during steaming[178]
    - accidental pollution unlawful operational discharge, such as oil, waste or sewage, physical damage caused by groundings or collisions
    - sulphur and nitrogen oxide emissions[179].

4.5 Marine aggregates

National context and policy

Marine sand and gravel makes a crucial contribution to meeting the nation's demand for construction aggregate materials, essential for the development of our built environment. They are particularly important in England, accounting for 38 per cent of the total regional demand for sand and gravel in the South East (80 per cent in London), 46 per cent in the North East and 22 per cent in the North West.

In addition there are often no practicable alternative sources to marine aggregate for the maintenance of coastal defences required for climate change adaptation. Marine aggregates contribute to energy security and economic development through provision of fill for major coastal infrastructure projects, for example ports, renewable energy and nuclear energy projects[180].

Furthermore, the Government is committed to working with mineral planning authorities to ensure that there is a steady and adequate supply of aggregates minerals to support economic growth, with an expectation that marine won supplies will increase by some 2 million tonnes a year, a rise of 14 per cent over the period 2005 to 2020[181]. Given that this corresponds with an 18 per cent drop in imported aggregates and a 7 per cent drop in land won aggregates over the same period helps to emphasise the increased dependence on marine won supplies. This is also supported by research commissioned by the Department for Communities and Local Government which estimates that reserves of land won sand and gravel have declined from a high of 907 million tonnes in 1995 to 650 million tonnes in 2004 and action is required if long term supply is to be maintained. There are also qualitative considerations which may affect decisions for future land won supplies including environmental designation and public opposition[182]. Marine-won aggregates can accrue other benefits including reduced traffic movements on road and negligible impacts on the landscape.

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[178] European Commission (2008) Marine Strategy Framework Directive
[179] Defra (2000) The Air Quality (England) Regulations 2000
[180] Defra (2010) Marine Policy Statement, p39
[181] Department for Communities and Local Government (2009) National and regional guidelines for aggregates provision in England 2005 – 2020, p5
[182] Capita Symonds (2008) Reasons for the decline in aggregate reserves in England, pp65, 78

Marine Aggregates Levy Sustainability Fund (MALSF) research[183] recognises the need to consider plausible future supply options and suggests that these are best considered regionally to build a national picture. There is a clear need for evidence on relative impacts to determine future supply from land or marine including cost benefit analysis which will need to be taken into account in any future aggregates policy. It should be noted that the MALSF programme has now ended.

Within the marine area around England, there are over 60 licensed areas for aggregate extraction.

In addition to the existing measures to obtain a licence for dredging activity, the following relevant goals/objectives and policies from the Marine Policy Statement (MPS) are highlighted by way of context although note that identifying objectives and deriving planning policies are later steps in the planning process:

- The Marine Management Organisation (MMO) should as a minimum make provision within marine plans for a level of supply of marine sand and gravel that ensures that marine aggregates (along with other sources of aggregates, including recyclates) contribute to the overarching Government objective of securing an adequate and continuing supply to the UK market for various uses.
- The MMO should consider the potential long-term requirement for marine won sand and gravel, taking into account trends in construction activity, likely climate change adaptation strategies and major project development[184].
- The MMO and decision makers should base decisions on sustainability criteria and should take into account the existing sea bed within the marine plan area that is currently being dredged, offshore movement of aggregates. The importance of meeting regional and national needs, beach replenishment and contract fill and the need to safeguard reserves for future extraction.

East marine plan areas – current situation

Figure 4.11 shows the current level of activity for aggregate extraction, with identification of licensed areas and shipping routes taken by individual dredging vessels. It should be noted that given dredging only occurs within a small part of the licensed areas (approximately 60 square kilometres per annum out of a licensed area of circa 790 square kilometres) the footprint of the activity is small. The East plan areas hold 61 per cent of national licensed areas for aggregate extraction, accounting for 44 per cent of permitted tonnage nationally. Furthermore, activity in the plan areas accounts for 55 per cent of all tonnage dredged. The plan areas hold a significant proportion of future search areas, therefore aggregate extraction is likely to remain an important activity here with opportunity for new prospecting and exploration areas. This is important as some existing sites are coming towards the end of their economic viability and will need to be replaced during the plan period.

Over half of the total production by weight comes from the East plan areas[185]. The following stresses the importance of marine won-aggregates in the plan areas based on levels of activity during 2010[186]:

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[183] Resource Decisions (2008) Marine and land sand and gravel, a comparative assessment, p4
[184] Defra (2010) Marine Policy Statement, p39

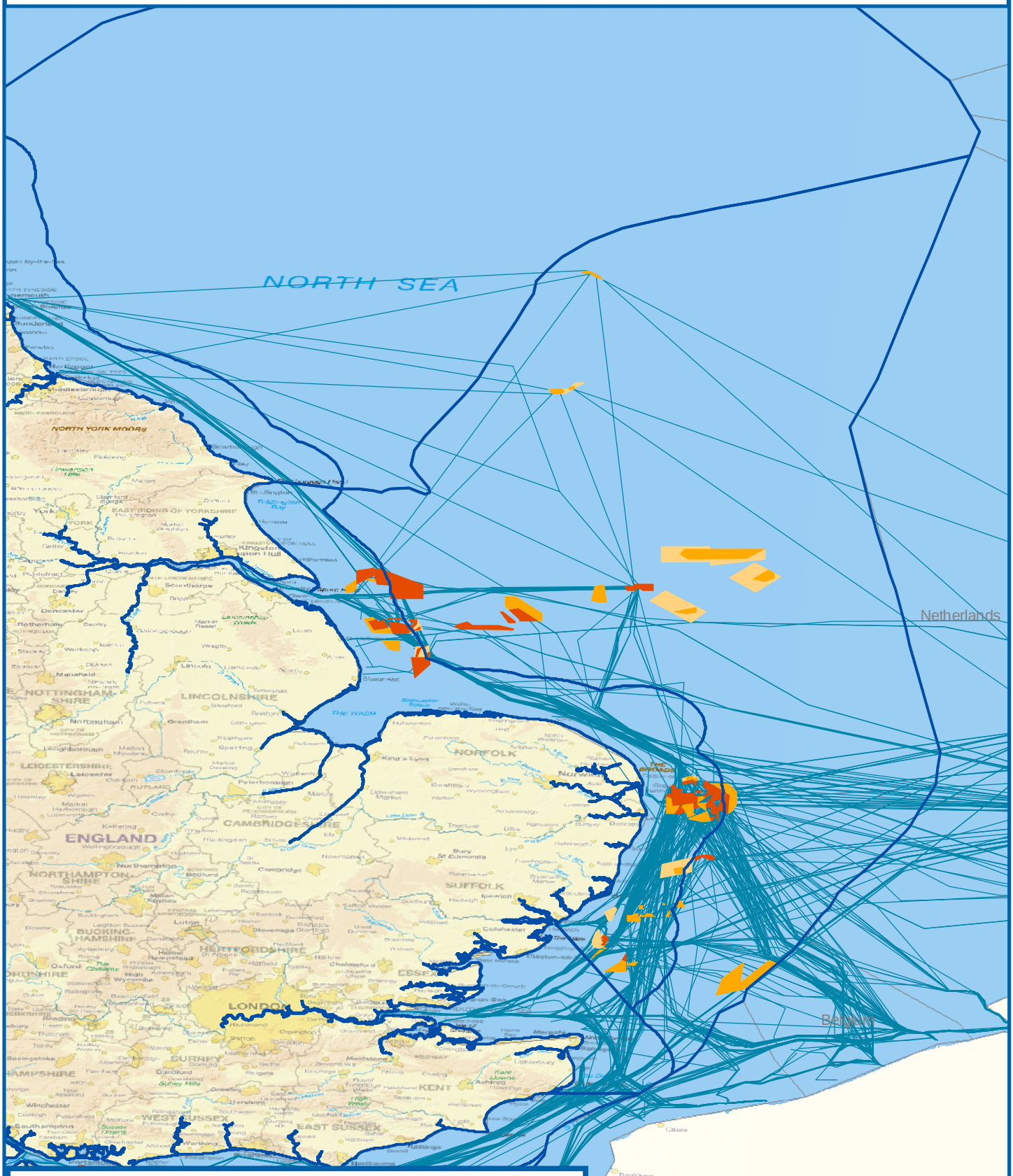
- there are approximately 790 square kilometres licensed for aggregate extraction in the plan areas
- the active dredge area is approximately 363 square kilometres with approximately 65 square kilometres dredged
- there are 28 production licences with 8.75 million tonnes of aggregate dredged including 0.55 million tonnes for a beach nourishment scheme and 0.19 million tonnes for contract fill, both of which were used to support projects in the East inshore plan area – the remaining 8.01 million tonnes were used for construction purposes
- 37 per cent of the overall dredged tonnage was delivered to the Thames Estuary
- 44 per cent of the overall dredged tonnage was delivered to mainland Europe
- 9 per cent of the overall dredged tonnage was delivered to the Humber region , incorporating ports on Tyneside and Teesside.

[185] Marine Management Organisation (2011), Strategic scoping report for marine planning in England, p55
[186] BMAPA/The Crown Estate (2011) The area involved – 13th annual report, p4

Figure 4.11: Aggregate extraction

January 2012
This map has been produced using the ETRS89 Coordinate Reference System

marine management organisation



- MMO Marine Plan Areas
- Aggregate Lease Applications to The Crown Estate
- MMO Aggregate Extraction Licence
- Aggregate Prospecting or Options
- Dredger Transit Routes

Existing measures

Before any dredging is undertaken The Crown Estate run a tender round for companies to express an interest in conducting aggregate extraction. Those companies that are successful in the tender stage must apply for a marine licence from the MMO before extraction can commence.

To obtain a marine licence, a baseline must be established through completion of sampling of biological and geological data. This assists in mitigating against potential environmental impacts of the activity, especially as an environmental impact assessment (EIA) and coastal impact study (CIS) have to be completed as part of the process. Dredging is expected to start no later than eighteen months from the date of the sample to ensure the survey data remains current. The operational stage for dredging is expected to last 15 years, with a further 2 years for post-dredge surveys to be completed. Consequently, a marine licence for aggregate extraction is expected to last up to 18 years. These licences are reviewed by regulators every five years through a substantive review process. Additionally, operators will seek to renew existing licences at the end of their term if sufficient reserves of commercially viable sand and gravel remain in line with policy requirements[187]. As a result, production licences frequently last in excess of thirty years and the marine plan will need to take this timespan into account.

Upon receipt of a marine licence, The Crown Estate will issue the applicant with a production licence to dredge for aggregates for which a royalty is paid for every tonne landed. This contributes to The Crown Estate's revenue, the surplus of which is paid to Treasury. Government has recognised that there is a need to balance socio-economic needs with environmental impacts arising from the winning of primary aggregates (including those from marine sources) and a levy has been imposed on the sale of all primary aggregates since 2002. Between 2002 and March 2011 (when the scheme came to an end), a proportion of the revenue generated from this levy has been used to provide a source of funding for research projects, some of which were focussed on marine extraction. These projects, coordinated and managed under the MALSF programme were aimed at improving the understanding of the environmental impact of aggregate extraction and identifying ways in which these can be monitored, minimised or mitigated against. Outcomes included better equipment to analyse sea bed resources, identification of how to reduce the carbon footprint of aggregate dredging vessels and development of a protocol for reporting of archaeological and historical material to assist in improving knowledge of the marine historic environment[188].

Many of the direct and indirect impacts associated with marine aggregate extraction directly relate to the area of seabed actually dredged (the dredged footprint) rather than the wider licensed area. The Government wishes to minimise the total area of the seabed authorised for minerals dredging[189] and the British Marine Aggregate Producers Association (BMAPA) work with the Crown Estate under a joint initiative to

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[187] Office of the Deputy Prime Minister (2002) : Marine Minerals Policy Note 1, paragraphs 14 and 26
[188] Marine Aggregates Levy Sustainability Fund (2010) – achievements and challenges for the future, p12
[189] Office of the Deputy Prime Minister (2002) : Marine Mineral Guidance 1 - Extraction by dredging from the English seabed, p9

formally report on the “area involved” for marine aggregate extraction activities. The intention is to minimise the area of seabed licensed, available to be dredged and actually dredged, through careful management and zoning. At national level, in 2010, dredging took place within 8.2 per cent of the licensed area, a reduction of almost 10 per cent on the previous year’s figure[190].

East marine plan areas – existing planning context

The following focuses on relevant evidence and issues set out in LDFs and joint minerals development plans (JMDPs). Management plans or measures specific to marine aggregate extraction sites are referred to in the previous section.

Marine-won aggregate extraction occurs throughout the East marine plan areas, with licensed extraction sites in both the East Inshore and East Offshore plan areas.

Marine relevant policies were identified in the JMDP of two LPAs: East Riding of Yorkshire and Kingston-upon-Hull, and one LDF: East Yorkshire, both of which are in the north of the plan area. The remaining LPAs in the plan area have not included specific marine aggregates policies within their LDF document. To an extent, this distribution reflects the nature of the industry to some degree, with the limited number of potential landing points that exist in the marine plan region which, in turn, reflect limited market demand here. It also corresponds with the majority of landings from the region taking place outside of the marine plan area. For example, the ports of Tyne and Tees in the bordering north east marine plan area receive over 600,000 tonnes despite having no marine licensed areas for aggregate extraction in the North East.

- Conditions or restrictions to ensure protection of wharves used for landing aggregates, for example redevelopment proposals which would prejudice the use as wharves for the importation and processing of marine aggregates and other imported minerals will not be permitted. In addition, facilities will be safeguarded particularly where they have access to key transportation links.
- Conditions or restrictions to ensure protection of international sites: for example, marine aggregates development associated with the landing, storing and transporting of marine won aggregates will be allowed if it will not adversely impact on the Humber Estuary SPA, SAC, Ramsar site and SSSI, and it will not adversely affect the local transport network, or the amenity or operation of existing land uses.
- Conditions or restrictions to safeguard natural assets, heritage and community life.

There are no obvious intentions in LDFs or other existing statutory sub-national plans to further consider the importance of marine aggregates in land use planning documents.

It should be noted that there are six non-statutory shoreline management plans (SMPs) within the East marine plan areas. Policies within SMPs consider coastal defence and associated beach nourishment. To contribute towards SMP objectives,

[190] BMAPA/The Crown Estate (2011) The area involved – 13th annual report, p3

the marine aggregates industry has provided for major beach replenishment schemes on the east coast between Mablethorpe and Skegness and between Happisburgh and Winterton. This is particularly pertinent given the economic benefits through tourism that attractive coastlines and beaches can bring to coastal communities. Given the need for statutory land use plans to have regard to the MPS this presents an opportunity for sectors to work together and contribute to the achievement of targets in both statutory and non statutory plans. Taking into account opportunities for construction aggregates to support both port development and renewable energy construction it is hoped that this will be considered in future statutory plans.

The limited policy context also reflects the vast majority of aggregates won within the marine plan area are being landed outside of the plan area. In particular, mainland Europe, London and north east ports on the rivers Tees and Tyne. Marine aggregate resources from the East marine plan areas have supported a number of prestigious developments in the south east such as Canary Wharf, the Channel Tunnel Rail Link and Heathrow Terminal 5. In addition, marine aggregates have played a pivotal role in the £3 billion worth of construction in support of the 2012 London Olympics and in the wider ongoing regeneration of the Thames Gateway stretching 40 miles to the east of the capital. The area is a national priority for regeneration and has been earmarked for 128,000 new homes and 232,000 additional jobs by 2016.

Wharves along the Thames support the supply of sand and gravel close to where it is required, with reduced road transport bringing significant environmental benefits. The importance of marine aggregates sourced from the East marine plan areas for use in London and the south east is further emphasised by a deficit of locally available construction aggregate resources, meaning a reliance on imports from outside of the South East.

This demonstrates the positive contribution that the industry can make to socio-economic factors outside of the immediate marine plan area. It is, therefore, important to recognise that decisions made in the marine plan areas will have a direct impact upon the supply of construction aggregate to London and the south east, where existing plans and policies are reliant upon aggregate resources from the marine plan area.

Potential future situation

A sustainable supply of aggregate for future years is a fundamental objective of both the UK Government and the UK aggregate extraction industry.

Maintaining the areas which are still commercially viable is essential and finding and securing new resources will be necessary to maintain all elements of domestic supply (construction, coast defence and contract fill) and to allow export into the future. The industry is actively investigating new areas for future production[191]. It should be recognised that a key constraint is that marine aggregate extraction can only occur where geological deposits are located – which by their nature tend to be relatively discrete and localised features.

[191] Marine Management Organisation (2011) Strategic scoping report for marine planning in England, p58

In the immediate future, marine aggregates will play a key role in supporting the delivery of infrastructure projects such as nuclear builds, port development and offshore wind farms. The most recent nuclear build at Sizewell B in the South East Plan area required 1.64 million tonnes of marine sand and gravel delivered by sea. It is expected that marine aggregate supplies sourced from English waters will continue to support delivery of large infrastructure projects across the UK and Europe thereby contributing to regeneration. This in addition to contributing to coastal defence works through beach recharge.

In addition, the British Geological Survey have published a report that gives due consideration to safeguarding options for marine minerals. In particular, this should ensure that the ability of future generations needs for minerals are not compromised by present day developments, nor does development render them sterile. Consideration of minerals safeguarding areas (MSAs) are important for the planning process as it will alert developers to consider the impact of their development on minerals and aligns with onshore safeguarding minerals policy including completion of minerals resource impact assessments, which could be incorporated into the EIA process. Current thinking[192] suggests that a tiered approach could be adopted with those areas of sea bed containing the most valuable resources having a proposed greater level of protection. It is important to recognise that material for major infrastructure projects will need large volumes of material which may not be able to be supplied from current licensed areas, so it may be necessary to safeguard materials for such projects. Future growth opportunities require the industry to be flexible and shift to changing demands. See end of Chapter 4 for consideration of potential aggregate extraction projects in the East plan areas.

Summary of evidence and issues

Relevance to East plan areas

The East plan areas currently include the busiest area in England for marine aggregate extraction in terms of tonnage dredged, licensed area and area dredged and a significant proportion of future search areas.

- **Current**: Just over 50 per cent of tonnage extracted comes from the East plan areas, from 28 licensed areas covering about 790 square kilometres (active dredge area approximately 363 square kilometres).
- **Current**: 44 per cent dredged tonnage is delivered to mainland Europe, 37 per cent to the Thames Estuary, 9 per cent to the Humber region and ports on the rivers Tyne and Tees.
- **Current**: Almost 28 per cent of aggregates extracted from the Humber region (Source BMAPA regional charts) are landed in the Humber, Tyne and Tees regions.
- **Current:** 99.8 per cent of aggregates extracted from the East coast region (Source BMAPA regional charts) are landed outside of the East coast.

[192] British Geological Survey (2011) Safeguarding options for marine mineral resources, p4

- **Current:** Aggregates also satisfy demand for coastal defence works and beach replenishment, with 0.55 million tonnes being supplied to the Lincolnshire Coast in 2010.
- **Future:** It is likely that demand for aggregates will grow for coastal defence purposes and beach nourishment along the Lincolnshire, Norfolk and Suffolk coastlines to meet aspirations identified in shoreline management plans.
- **Future**: It is likely that further licence areas for aggregates extraction will be required within areas of high resource potential, given the continuing importance placed on marine sources of aggregates, the relative importance of the plan areas for potential new prospecting and exploration areas and factoring the possibility of a reduction in land-won aggregate.
- **Future**: Some extraction, primarily for gravel is moving to sites off the south coast; however this is being offset in the East plan areas by an increased demand for coarse sand from licences off the East coast.

This indicates that marine aggregates will be one of the key policy issues for marine planning, both now and in the future as there is a need to consider the development of new licence areas in response to anticipated market demand across the lifetime of the marine plan and beyond. The need to accommodate the requirements of this sector, alongside existing marine industries, while taking account of environmental considerations, will be important planning issues for the East plan areas, due to the current volume of activity.

Issues for delivery of marine aggregates

- The current approach provides some strategic assessment (such as regional environmental assessment (REA)) and thence a robust licensing process defines extraction areas, their likely lifespan, and addresses implications for other sectors and the environment.
- National policy for minerals tends to focus on strategic statements, with little prescriptive guidance as to how to achieve outcomes including expected contribution from different regions. CLG anticipate a 14 per cent growth in marine won sand and gravel nationally[193]. Looking ahead, there are no discernible historic trends between the state of the economy and tonnage dredged. Therefore, it is difficult to predict the likely required size of future licence areas.
- Policies in SMPs for beach nourishment and coastal defence offer opportunities for the industry and marine plan development should recognise this.
- Ongoing work is identifying the distribution of potential resource for future extraction and possible MSAs which need to be considered pending confirmation of need.
- Marine plan development should take into account the likely remaining productive lifespan of existing licensed areas, including in assessing the effect of other issues/sectors, and future opportunities for aggregates extraction.

Issues for other sectors

Further work needs to consider impacts on other sectors, including:

[193] Department for Communities and Local Government (2009) National and regional guidelines for aggregates provision in England 2005 – 2020, p5

- fisheries: given existing pattern of activity (although tends to be addressed by existing mechanisms)
- renewables: assessment in support of Round 3 wind takes account of existing aggregates, may be an issue for further rounds of wind development and new aggregate extraction areas with potential expansion of activity conflicting with possible grid connection corridors for Round 3 wind farm developments – telecommunications cabling could also be affected given an anticipated increase in deployment of associated submarine cabling
- ports and shipping: the main issue is ensuring sufficiently sized facilities and infrastructure for landing aggregates and onward transportation – this is particularly important if demand for marine won aggregates increases
- oil and gas: the potential to impede exploration of and potential production from new sites.

Issues for sustainability

- Aggregate extraction can cause a number of pressures on the environment including:
    - physical disturbance and direct removal of seabed and indirect effects on sediment movement, and an increase in suspended sediment, with resulting affects on seabed biota, on species feeding on this, such as seabirds, fish, marine mammals, and on nursery grounds particularly for cod, herring and whiting
    - marine ecology and biodiversity: potential for sediment plumes to affect flora and fauna
    - potential increase in noise affecting sea mammals although this is considered in the scoping process which ultimately determines whether it is a significant issue that has to be considered at the site specific environmental impact assessment
    - disturbance or degradation of cultural heritage assets or archaeological remains.

The existing regulatory regime ensures such issues are taken account of and will continue to do so in the future. Marine planning needs to consider how to take account of such issues in planning for future aggregate areas, including potential cumulative effects between different aggregate areas (building on REAs) and with other sectors.

The work of the MALSF has greatly increased our understanding and management of these potential effects.

The dissemination of research on the effects of aggregate extraction and the management of this activity by the International Council for the Exploration of the Sea (ICES)[194] working group, on the effects of extraction of marine sediments on the marine ecosystem, has enhanced minimisation of these effects through more effective management.

[194] International Council for the Exploration of the Sea (2008), Report of the Working Group on Effects of Extraction of Marine Sediments on the Marine Ecosystem (WGEXT)

4.6 Marine dredging and disposal

National context and policy

The operation of our ports and marinas is enabled through the creation, maintenance and development of channels, berths and docks. This operation would not be possible without the dredging and disposal of marine sediment from such areas. Dredging is essential in the functioning of ports and marinas and supporting the social and economic benefits[195] to the UK economy in terms of imports, exports and tourism.

Harbour authorities typically have a statutory power enabled by specific legislation to dredge in connection with the maintenance and improvement of channels. There are two main types of dredging[196].

Maintenance dredging is done to maintain existing access to the port and discharges the responsibility to ensure that all vessels using the port may do so safely. It is undertaken on a routine basis to maintain the level of water at the depth indicated on navigational charts.

Capital dredging can take the form of deepening or widening an existing channel. Or it may take the form of enabling an entirely new channel to facilitate access to a new facility. Capital dredging involves improvement of access for example to allow bigger and deeper vessels, longer optimum tidal windows and the provision of passing places.

Where The Crown Estate or another party owns the bed of the harbour their permission for dredging operations is likely to be needed.

A harbour authority's statutory power to dredge is subject to consent to dispose of dredged materials in tidal waters. A licence to dispose of dredged spoil at sea must also be acquired from the MMO.

The amount of dredged material disposed of at sea each year from the UK has been relatively consistent since 1985. The variation in annual tonnage being most marked in the quantities of capital dredgings associated with port expansion and channel deepenings – the fluctuations in dredgings reflecting a combination of economics and weather[197].

Dredging and the disposal of the dredged marine sediment needs to be facilitated in line with the objective to prevent, reduce and eliminate where practicable pollution caused by dredging operations and the disposal of dredged sediments. Current safeguards have significantly improved the chemical status of the sediments around our coasts. This is due to reductions in the tonnage of contaminants which have been permitted to be disposed of at sea and within our river networks[198].

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[195] Defra (2010), Marine Policy Statement, pp37 and 40
[196] http://assets.dft.gov.uk/publications/topics/ports-4/goodpracticemarineoperations.pdf
[197] Defra (2010), Marine Policy Statement, p40
[198] Defra (2010), Marine Policy Statement, p40

The following relevant goals or objectives and policies drawn from the Marine Policy Statement (MPS), Marine Dredging and Habitats Regulations, Environment Agency research, marine licensing guidance and OSPAR are highlighted by way of context although note that identifying objectives and deriving planning policies are later steps in the planning process.

- The Government considers that the EC Habitats Directive (92/43/EC) requires maintenance dredging proposals, which could potentially affect European sites, to be assessed in accordance with Article 6(3) of the Directive.
- The development of a maintenance dredge protocol provide assistance to operators and regulators seeking or giving approval for maintenance dredging activities that could potentially affect European sites (also known as Natura 2000 or N2K sites) around the coast of England[199].
- The Environment Agency, in their role as the competent authority for the Water Framework Directive (WFD) will consider the effects of dredging and disposal activities on water status. The WFD applies to waters out to one nautical mile from the baseline from which territorial waters are drawn[200].
- Under the Food and Environment Protection Act 1985 (FEPA), a licence was required for the disposal of dredged material at sea, but not for the dredging activity itself. FEPA was replaced by a new streamlined licensing regime in April 2011. Under the Marine and Coastal Access Act 2009 all dredging activities will require a marine licence unless Section 75 of the act applies.
- The London Convention 1972 – The Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter 1972 (London Convention) – is an agreement to control pollution of the sea by dumping. It covers the deliberate disposal at sea of wastes or other matter from vessels, aircraft and platforms[201].
- The OSPAR Convention 2004 – The Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR Convention) – regulates international cooperation on environmental protection in the North-East Atlantic. It updates the 1972 Oslo Convention on dumping waste at sea and the 1974 Paris Convention on land-based sources of marine pollution[202].
- Requirements of the OSPAR Convention 1992 – contracting parties must take all possible steps to prevent and eliminate pollution and take the necessary measures to protect the marine area against the adverse effects of human activities so as to safeguard human health and to conserve marine ecosystems[203].

Beneficial use of dredged material

Dredged material has been shown to successfully protect eroding and/or create new saltmarshes which, in time, are capable of functioning like natural systems. In a similar way, mudflats can be created or, more usually, biologically impoverished mudflats can be enhanced, resulting in much more productive systems than before. Advantages of beneficial use schemes are listed below[204].

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[199] Defra (1994) Maintenance Dredging and the Habitats Regulations 1994, p4
[200] Environment Agency (2000) www.environment-agency.gov.uk/research/planning/33362.aspx
[201] MMO – Marine Licensing Guidance 3, p18
[202] OSPAR Commission, http://www.ospar.org, October 2011
[203] MMO – Marine Licensing Guidance 3, p18

There can be significant beneficial improvements from the use of clean maintenance dredgings to enhance mudflat and saltmarsh habitats, and to mitigate losses of intertidal land through sea level rise and capital dredging operation[205].

Although intertidal recharge schemes can provide long-term benefits of environmental enhancement and protection, the act of placing material over existing intertidal habitats can cause short-term impacts such as suspended sediments and smothering. However, despite the short-term problems, intertidal recharge is often the only practical means of attempting to combat erosion of intertidal habitats caused by coastal squeeze and rising sea levels[206].

Potential impacts of dredging and disposal[207]

The potential (negative) impacts of (conventional) dredging activities on species and their habitats can be described as:

- Substrate removal and thus habitat and species removal (recolonisation or recovery of disturbed areas may be possible).
- Alteration of bottom topography and hydrography, and thus destroying of local habitats and the risk of direct physical/mechanical stress to the species present.
- Alteration of sediment composition, that is of substrate characteristics in the surrounding of the dredging site, resulting in a change of the nature and diversity of benthic communities, such as decline of individual density, species abundances or biomass.
- Local re-suspension of sediments and increase of turbidity – these are finer sediments than the coarser sand, gravel and rock associated with capital dredging.
- **Contaminated sediments** – although generally not heavily contaminated, much dredged material is subject to some contamination and a variety of harmful substances, including heavy metals, oil, tributylin (TBT), polychlorinated biphenyls (PCBs) and pesticides, can be effectively locked into the seabed sediments in ports and harbours. These contaminants can often be of historic origin and from distant sources. The dredging and disposal processes can release these contaminants into the water column, making them available to be taken up by animals and plants, with the potential to cause contamination and/or poisoning. The likelihood of this occurring depends upon the type and degree of sediment contamination. The highest levels of contaminants generally occur in silts dredged from industrialised estuaries. If low level contaminants are released into the water column during disposal, they may accumulate in marine animals and plants and transfer up the food chain to fish and sea mammals.

The potential risks identified above, are considered to be effectively controlled through regulation of dredging and disposal activities. This ensures that activities are undertaken in a way which protects the environment.

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[204] Cefas, www.cefas.defra.gov.uk/our-science/assessing-human-impacts/dredged-material-emplacement.aspx, November 2011
[205] OSPAR Commission, www.ospar.org/Environmentalimpactsmarinespecies.pdf, November 2011
[206] OSPAR Commission, www.ospar.org/Environmentalimpactsmarinespecies.pdf, November 2011
[207] OSPAR Commission, www.ospar.org/Environmentalimpactsmarinespecies.pdf, November 2011

East marine plan areas – current situation

Figure 4.12 shows the distribution of marine dredged areas and disposal sites for dredging and disposal activities in the East Inshore and East Offshore plan areas.

The map indicates that dredging for navigational purposes is limited in the East Inshore area. The port of Felixstowe has the largest levels of marine dredging due to reconfiguration of the southern part of the Port.

When fully developed (Phase 1, 2011) Felixstowe will be able to provide a total of over four kilometres of deep-water container facilities, and total capacity at the Port will increase by nearly 50 per cent. Features of the project include: 1,285 metres of quay dredged to 16 metres below Chart Datum, able to accommodate the latest generation of very large container vessels and an approach channel of 14.5 metres below Chart Datum[208].

The map below shows dredging and disposal sites in the East coast plan areas. Many disposal sites are relatively small, some existing in the mouth of the Humber and just off the Suffolk coast. An area exists within the wash supporting the enhancement of mudflat and saltmarsh habitats.

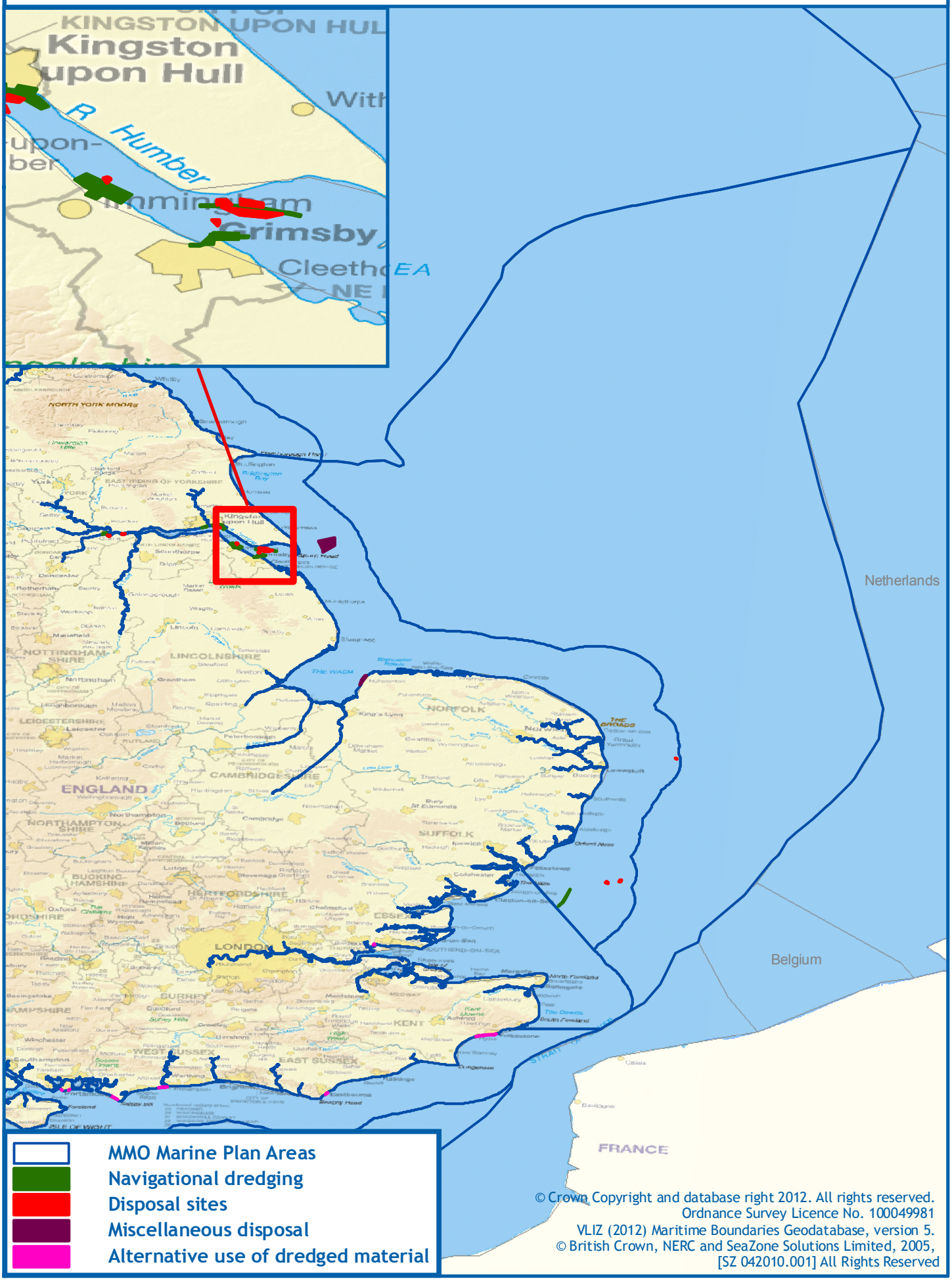
Navigational dredging areas represent both capital dredging (which creates new channels or deeper or wider channels than has been dredged within the last 10 years) and maintenance dredging (which is the routine dredging of existing channels). These can be seen predominantly in the mouth of the Humber and, although not shown in detail on the map, in other ports such as Felixstowe and Lowestoft.

[208] Port of Felixstowe, www.portoffelixstowe.co.uk, October 2011

Figure 4.12: Dredging and disposal areas
(MMO Licensed areas January 2012)

January 2012
This map has been produced using the ETRS89 Coordinate Reference System

marine management organisation



East marine plan areas – existing planning context

The following has been identified through analysis of local authority core strategy documentation and AONB management plans. Marine relevant policies were identified within the plan of Norfolk Broads Authority.

The Norfolk Broads are a series of rivers and broads (lakes), most of which are navigable. The area of the Norfolk Broads totals 303 square kilometres, most of this is in the County of Norfolk, with just over 200 square kilometres of them navigable, covering seven rivers and 63 Broads. Depth of these waterways is generally less than 4 metres deep, with thirteen of the broads completely navigable while three others have channels open to navigation running through them[209].

The objectives below are as identified in Norfolk Broads Core Strategy.

- Adequate water depths will be maintained for safe navigation, and the disposal of dredged and cut material will be carried out in ways that mitigate unavoidable adverse impacts on the environment.
- Beneficial use of dredging will be encouraged.
- Opportunities for the disposal of dredged materials to enable the management of the navigation will be sought and promoted in line with the Sediment Management Strategy.
- Control of sediment input from surrounding land, highways and river banks will be considered in developing proposals.

Potential future situation

Overall any trends in this regard are hard to determine. Marina expansion could require additional capital works, however this may be offset in some areas by a reduction in deepwater channels associated with commercial deepwater traffic and access to ports and harbours where a move to more recreation based activities takes place. Global shipping trends are for larger and larger vessels in order to benefit from efficiencies in scale. This in turn places additional demands on ports to respond by potentially increasing dredging to ensure continued safe access and commercial viability and competitiveness.

Modal shifts from road to waterborne transport could require more capital or maintenance dredging "with regional ports establishing themselves as the entry point for international supply chains' flows, potentially reducing the domestic land-based transport requirement and perhaps reducing coastal shipping feeder flows, particularly of containers. This may encourage further port concentration rather than de-concentration. The future pattern of maritime transport is unclear, as are the impacts on the road and rail markets since port choice influences land-based flow distances and volumes, key determinants of mode choice[210].

Summary of evidence and issues

Dredging is an enabling activity which is essential to the functioning of ports and marinas, positive factors include:

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[209] Norfolk Broards, www.norfolkbroads.com, November 2011
[210] DfT - Freight Modal Choice Study: Addressable Markets, executive summary, p5

- safe access and egress to ports and harbours for all users
- supporting future port development
- facilitating the construction of pipelines, outfalls and tunnels
- underpinning defence activities including those of the fleet of the Royal Navy and Royal Fleet Auxiliary
- maintaining sedimentary systems (beach nourishment and salt marsh restoration, soft sea defences).

Relevance to East plan areas

The port of Felixstowe has the largest levels of marine dredging in or immediately adjacent to the East plan areas due to reconfiguration of the southern part of the port, enabling it to provide over four kilometres of deep-water container facilities, increasing capacity by nearly 50 per cent. Maintenance dredging around the south east bank of the Humber estuary is also a feature of the East Inshore area.

The number of identified disposal areas is higher than the number of dredged areas and they also occupy a larger spatial extent. In the East Inshore area disposal areas are concentrated in The Wash, Norfolk Broads and at the mouth of the Humber. A single disposal ground in the East Offshore area is situated north east of the Strait of Dover.

Going forward the main consideration for marine planning will be the linkages with the development of ports, the specific dredging implications for a specific port development and the conservation of the marine environment.

Issues for delivery of marine dredging and disposal

The requirement to maintain navigable ports through the creation, maintenance and development of channels, berths and docks to benefit social and economic factors while taking account of environmental concerns is an important consideration for the MMO. Potential environmental impacts such as substrate removal, alterations of bottom topography and contaminated sediments can be balanced with the environmental benefits such as saltmarsh, mudflat and beach replenishment creation and replenishment. The MMO though marine planning and its licensing system will aim to balance such impacts to ensure a sustainable future for ports and the marine environment.

Issues for other sectors

Directly, dredging creates no identified issues for other sectors though it is the case that sectors enabled by this activity, predominantly ports and shipping, may create issues.

Issues for sustainability

While maintenance dredging and disposal is undertaken by many ports, berth operators and marinas, to maintain safe, navigable channels, it can generate pressures including:

- potential risk to marine life and ecology through changes in water quality (relating to changes in chemistry and turbidity), noise and physical disturbance

- the release of contaminants (legacy of industrial pollution)
- impacts on designated nature conservation areas (potential destruction or destabilisation)
- degradation of heritage assets through direct or indirect physical activity
- effects on a coastal landscape and or seascape (for example, maintenance through beach nourishment or disturbance of subsea features at spoil grounds)
- changes to natural sedimentary systems via physical changes to contributing structures e.g. alteration of channel depths.

4.7 Telecommunications cabling

National context and policy

This section includes some commentary on power cabling. Also see the Renewables section (4.3.2)

Submarine cables are part of the backbone of the world's power, information and international telecommunications infrastructure, and are socially and economically crucial to the UK. Submarine telecommunication cables carry over 95 per cent of the world's international traffic including telephone, internet and data, as well as many services for the UK's local communities, major utilities and industries. The transatlantic cables landing in the UK carry more than 70 per cent of Europe's transatlantic internet traffic[211].

Within the marine plan areas around England, as at November 2011 there are currently 18,295 kilometres of submarine cable, with a total footprint of 0.21 square kilometres of the continental shelf[212].

The following relevant goals/objectives and policies drawn from the MPS and the 2011 Budget Statement are highlighted by way of context although note that identifying objectives and deriving planning policies are later steps in the planning process.

- The importance of telecommunication and power cabling as vital infrastructure for the domestic and global economy and, as such, should be reflected in marine plans[213].
- Timely development of the telecommunications network in all parts of the UK is vital to help ensure the government's commitment to the minimum broadband speed promise[214]. Submarine telecommunications cable connectivity is a vital part of delivering a high-quality superfast broadband experience to users.
- Government support for superfast broadband and its roll out in enterprise zones will be achieved through guaranteeing the most supportive planning environment

[211] Defra (2010) Marine Policy Statement, p41
[212] Marine Management Organisation (2011) Strategic Scoping Report for marine planning in England, p61
[213] Defra (2010) Marine Policy Statement, p41
[214] Department for Culture, Media and Sport www.culture.gov.uk/images/publications/10-1320-britains-superfast-broadband-future.pdf, Accessed October 2011

and, if necessary, public funding[215]. This has the potential to particularly benefit offshore island communities and other remote locations.

- Studies have concluded that there are no over-riding environmental reasons to prevent achievement of sub-sea grid development up to 2020.[216]
- When decision makers are examining and determining applications for communications energy infrastructure and marine plan authorities are developing marine plans they should take into account the positive wider societal and economic benefits of improved telecommunications, that telecommunications cables should be developed where appropriate, necessary and economically feasible, and the potential impact of inward investment in telecommunications cabling related manufacturing and deployment activity.
- Marine plan authorities will need to liaise, as appropriate, with terrestrial planning authorities to ensure the development of any necessary on-shore infrastructure.

East marine plan areas – current situation

Figure 4.13 shows the distribution of existing submarine cables in the East marine plan areas with a particular concentration of telecommunication cables towards the southern part of the plan area into East Anglia. The East plan areas contain 18.7 per cent of the telecommunications cables in the English marine plan areas, second only to the South West areas with 57.8 per cent[217], the next largest plan area for cables is the north east with 8.6 per cent, which is also a key site for landfall for connections for both data and power into Europe. Consequently, the importance of cabling in the East plan area is not to be under-estimated, particularly when considering the value of traffic carried over these cables.

A generally held view by the industry is that the scale of impact of cables is generally modest, considered benign and is often time limited in some cases, (for example, solely during the laying of cable), though the scale of a project will dictate the impact. Also the habitat and seabed type will define some of the impacts.

Current issues that exist with cabling activity are:

- disturbance to habitat during laying of cable, maintenance of cables and assessment of impact of cable recovery prior to execution
- due to the risk of impact upon fishing, aggregate extraction and shipping, exclusion of activities or mitigation measures for these activities need to be considered to ensure achievement of an appropriate risk appetite – these measures are usually dealt with at a project level
- technology improvements for fibre optic cables allow capacity per cable increases which could allow the industry to keep pace with demand without an exponential increase in the number of cables required
- the effect of cables on the environment through scour, snagging and EMF[218] output.

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[215] HM Treasury 2011 Budget Statement http://cdn.hm-treasury.gov.uk/2011budget_complete.pdf, Accessed October 2011

[216] Defra (2010) Marine Policy Statement, pp32-33 para 3.3.17

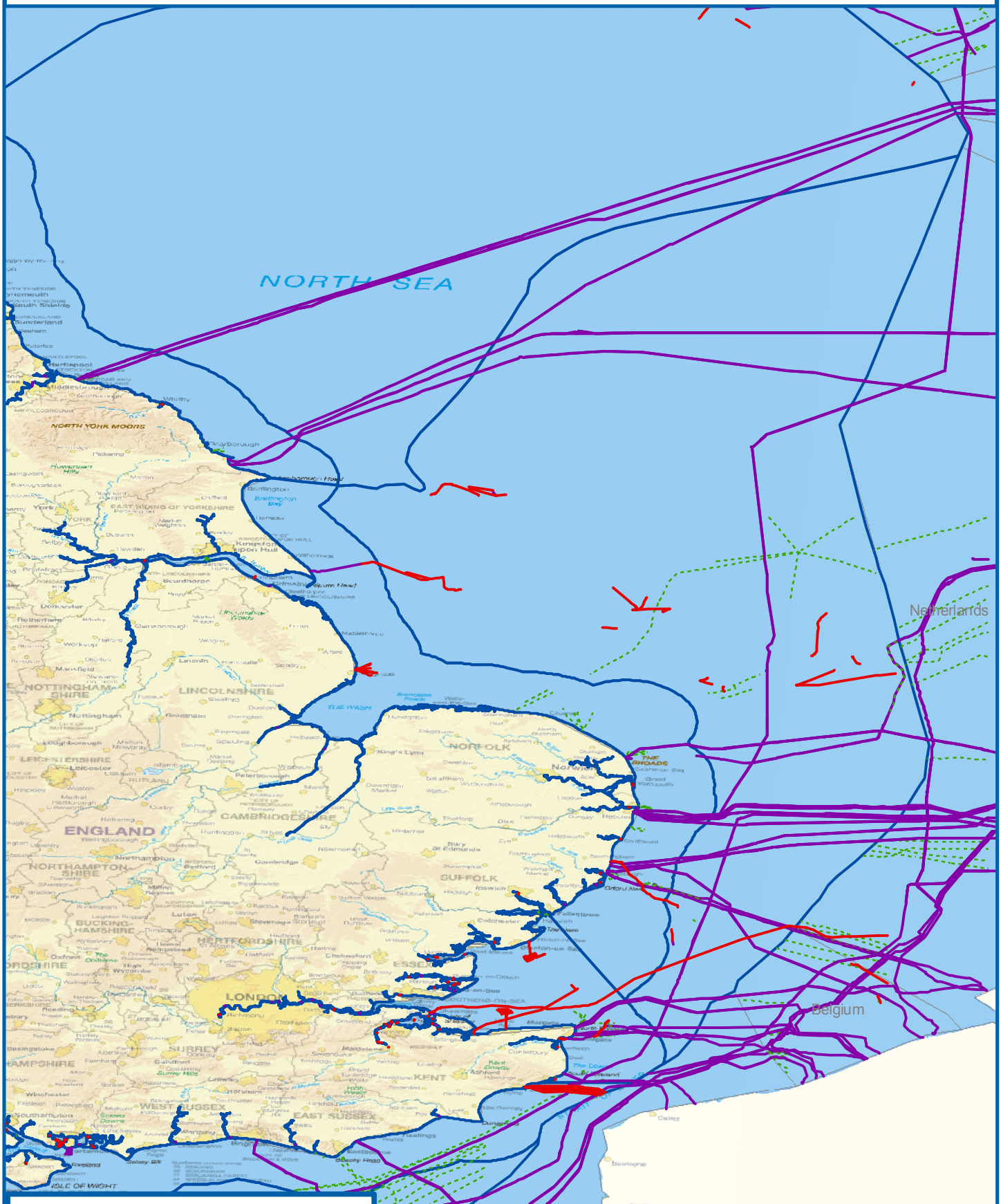
[217] Marine Management Organisation (2011), Strategic Scoping Report for marine planning in England, p61

[218] www.emfs.info/NR/rdonlyres/3DB6CCA2-854A-436B-B609-D89A09A978DF/0/EMF_The_Facts_120117.pdf, p7

Figure 4.13: Submarine cables

January 2012
This map has been produced using the ETRS89 Coordinate Reference System

marine management organisation



East marine plan areas – existing planning context

Other than the information covered in the national context section, there is no existing planning context for the East plan areas.

Potential future situation

It is anticipated that the amount of submarine cables being laid will increase up to and beyond 2020. It is important for marine planning to take account of appropriate locations for such developments alongside other uses of marine space[219].

This will be dependent on many factors but will include the technology available, the demand for data transmission, population growth areas and the economic situation.

Summary of evidence and issues

Relevance to East plan areas

The East plan areas are significant for telecommunication cables, in particular:

- nearly 20 per cent of the submarine cables in the English marine plan areas (second only to the South West areas in volume) and with a high traffic value
- a significant number of cables to various landfall sites along the East Inshore area and a considerable number of cables from outside the plan area which pass through the East Offshore area
- an anticipated growth in cables to and beyond 2020 given the existing networks and substation infrastructure
- government policies which highlight the vital role envisaged for telecommunications to support the economy directly and indirectly (such as financial services and education sectors), and population density.

Current issues, including interaction with other sectors and the environment, tend to be dealt with at an individual project level during assessment of licence applications.

This suggests that telecommunications cabling will be one of the issues for marine planning, both now and in the future as demand increases for data speed and quantity, taking account of requirements such as spatial distribution to allow execution of cable maintenance, potential cable recovery and increase in cables being laid alongside existing and future marine industries and environmental considerations.

Issues for delivery of telecommunications cabling

- It is important for marine planning to take account of appropriate locations for such developments alongside other uses of marine space[220].
- However, while there is anticipated growth in the plan areas, it is difficult to quantify the amount and location of increase in cables. It may therefore be

[219] Department for Business, Innovation and Skills BIS Professional and Business Services – a vision for growth www.bis.gov.uk/assets/biscore/business-sectors/docs/10-798-professional-business-services-2020-vision-for-growth.pdf, Accessed October 2011

[220] Department for Business, Innovation and Skills BIS Professional and Business Services – a vision for growth www.bis.gov.uk/assets/biscore/business-sectors/docs/10-798-professional-business-services-2020-vision-for-growth.pdf, Accessed October 2011

challenging to take account of potential future sites in planning. Subsea cables UK (formerly UKCPC) are developing guidance on an approach to cable laying and separation distances in collaboration with The Crown Estate which is expected in spring 2012. Instead, cables are likely to be considered on a case by case basis through assessment of licence applications. Implementation of cable corridors is an option that could accommodate future growth. An approach to this possible solution could include other countries and other sectors such as renewables and oil and gas.

- The United Nations Convention on Law of the Sea (UNCLOS) articles[221], especially 56, 58, 77, 78 and 79, allow for cables to be laid at sea with limited reasonable constraints suggested by the sovereign state outside the 12 nautical mile limit in the Exclusive Economic Zone. Laying of cables beyond the 12 nautical mile limit cannot be refused if the cable is international in nature, that is those that are passing through waters but not landing on the sovereign state. Marine planning will need to consider implications of any examples for the plan areas, and potential benefits of integration with other sectors[222]. The Ofgem report on Offshore Transmission Coordination supports the financial benefits of having a joined up approach[223].

Issues for other sectors

While potential issues, including interaction with fishing, aggregates and shipping in relation to damage to cables and their installations (risk of anchor strike, dredging up of cables) are addressed through conditions in licensing, the potential future growth of cables raises issues that might be addressed through planning, noting policy set out by government.

- Other sectors that may be particularly affected by cables, in respect of constraining development and with possible resulting exclusion or displacement, are the following, although collaborative working with these sectors should help to mitigate effects:
    - shipping (anchor strike) and identified emergency anchorages
    - fishing (possible displacement and possible un-viability for certain elements pursuing inshore grounds in smaller vessels through exclusion zones around cabling and cable protection measures such as rock armouring)
    - aggregate extraction
    - renewables, especially cables from and within wind farms
    - oil and gas pipelines
    - certain categories of marine protected areas (MPAs)
    - MoD related subsea cables and infrastructure.
- Cables on the UK Continental Shelf and surrounding waters can be subject to risk of damage. Although this can be through natural causes, human activity is the main cause of submarine cable faults due to damage caused by fishing

[221] www.un.org/depts/los/convention_agreements/texts/unclos/UNCLOS-TOC.htm
[222] Marine planning are liasing with National Grid for a useful dataset relating to landfall sites as well as working with Subsea cables UK for the most up to date on cable locations.
[223] www.ofgem.gov.uk/Networks/offtrans/pdc/pwg/OTCP/reports/Documents1/TNEI-7098-03-Asset%20Delivery%20Workstream-Release-15-12-2011.pdf, Section 2.8.3

trawlers and anchors. Given the increased activity in the UK marine area there is a risk that the number of incidents may increase[224].

- There needs to be a better understanding among relevant industries and the communication of guidelines to ensure both the safety of these cable installations and safe access to them for maintenance purposes[225].
- In doing so, consideration needs to be given to the economic benefits of telecommunications and the disbenefits of limiting installation of new cables or risking damage to installed infrastructure[226].
- Another consideration is the European SuperGrid (defined as "a pan-European transmission network facilitating the integration of large-scale renewable energy and the balancing and transportation of electricity, with the aim of improving the European market"[227]). This consideration is supported to some extent in the Marine Policy Statement[228].

Issues for sustainability

- Pressures exerted by this activity, principally disturbance to habitat during laying of cables and maintenance of cables, are usually dealt with at a project level. The habitat and seabed type will largely define the nature of any impacts which, in any case, tend to affect relatively small in area and are transient in nature. Environmental impact of recovery and removal of cables should also be a consideration.
- The potential effect of any predicted increase in cables in combination with other sectors, such as renewables cables or oil and gas pipelines, that cause the same pressure, that is the cumulative impact, will need to be considered in marine planning although the footprint of the activity may be relatively small the overall impacts may vary depending on the location.
- More information on the environmental aspects is available in Chapter 6 of the report.

4.8 Commercial fishing

Note that this section includes some descriptions and maps of features and areas of ecological value, such as spawning areas, which are therefore also relevant to Chapter 6 (and Section 4.1 where they are specifically incorporated within MPAs).

National context and policy

The UK fisheries administrations are committed to ensuring the future for a sustainable fishing industry[229]. Sustainable fish stocks have the potential to maintain a prosperous and efficient fishing industry and provide social, cultural and economic benefits to often fragile coastal communities. The dependence of jobs on fishing can be as high as 20 per cent or more in some communities. In 2010 the UK fishing industry had 6,477 registered fishing vessels, 16 per cent less than in 2001[230].

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[224] Defra (2010) UK Marine Policy Statement, p41
[225] Defra (2010) UK Marine Policy Statement, Pp41
[226] Defra (2010) UK Marine Policy Statement
[227] www.friendsofthesupergrid.eu/
[228] Defra (2010) Marine Policy Statement, p35, paragraph 3.3.28
[229] Defra (201) UK Marine Policy Statement, p42

These vessels landed 580,000 tonnes of fish and shellfish in 2009, worth £674 million, with 50 per cent of UK catches (by value) exported[231]. The industry supports about 12,000 direct jobs (2,300 less than in 2001). The number of days spent at sea by vessels over 10 metres in length has fallen by 37 per cent[232].

The marine fisheries sector comprises all socio-economic activities related to the capture of wild marine organisms (fish and shellfish), and the subsequent handling and processing of catches. Shellfish and demersal fish species currently contribute around 40 per cent each to the total catch value, with the remaining 20 per cent comprising pelagic species such as mackerel and herring.

The proportion of the 18 assessed fish stocks being harvested sustainably has increased from around 10 per cent in the 1990s to between 25 and 45 per cent (2000 to 2007) and to 61 per cent in 2008. In contrast, the proportion with full reproductive capacity has increased from 35 per cent in 1999 to 61 per cent in 2008. The 18 stocks represent a wide range of different stocks and fisheries including demersal roundfish (cod, haddock, saithe, hake), flatfish (sole, plaice), pelagic (mackerel, herring) and widely dispersed (blue whiting).

Fishing activity is sensitive to changes in other sea uses. Marine developments have the potential to prevent, displace or encourage fishing activities. There are potential social, economic and environmental impacts of displacement of fishing activity caused by other sea uses, particularly if from well established fishing grounds. The UK has a long history of fishing both inshore and offshore waters, and the UK administrations are committed to securing a future for a sustainable fishing industry.

The World Summit on Sustainable Development in 2002 set out specific targets for fisheries management, including restoring fish stocks to maximum sustainable yield by 2015, which must be implemented by all fishery managing authorities.

Fishing in the waters around the UK and other European Union countries is managed under the Common Fisheries Policy[233] (CFP), which aims to achieve a thriving and sustainable European fishing industry and is currently under review[234]. A reformed CFP should contribute to the delivery of the effective management of our seas and be integrated into wider marine policy including marine nature conservation. This will be key in delivering good environmental status under the MSFD. The draft regulation is now subject to detailed discussions and negotiations between members, the European Commission and the European Parliament during the next 18 months. The final regulation is due to be agreed by both the Council of Fisheries Ministers and the European Parliament in time to come into force on 1 January 2013.

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[230] MMO (2010) The UK Fishing Industry in 2010 - Structure and Activity, p1
[231] Defra, www.defra.gov.uk/food-farm/fisheries/marine/, Accessed November 2011
[232] The UK Fishing Industry in 2010, Structure and Activity, www.marinemanagement.org.uk/fisheries/statistics/annual.htm
[233] http://ec.europa.eu/fisheries/cfp/index_en.htm
[234] European Commission (2009) Green Paper on the Reform of the Common Fisheries policy http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2009:0163:FIN:EN:PDF

In addition Defra consulted on reform of the fisheries management arrangements in England, running earlier this year seeking views on proposals to change the way that English under 10 metre and non-sector vessels are managed to secure a more profitable and sustainable future for the fishing industry. The proposals included establishing a network of community quota groups, allocating individual fisheries access rights (fixed quota allocations across the fleet), and some re-distribution of quota within the English fleet. The consultation also included initial proposals for the future management of some of the more commercial shellfish stocks.

In terms of a sectoral vision for the future, the Defra publication 'Fisheries 2027 – a long-term vision for sustainable fisheries' gives possibly the clearest view as to where the sector would like to be in the future. It makes clear that "a sustainable fisheries sector is essential for delivering the Government's vision of clean, healthy, safe, productive and biologically diverse oceans and seas". The document, produced with considerable input from those within the industry, acknowledged that "fisheries are not managed in isolation, but as one of many uses of the marine environment within a system of marine planning". The document outlined a series of vision statements to be considered for the achievement of a sustainable fishery by 2027:

- Economic returns are optimised.
- There are rights of access to fisheries coupled with clear responsibilities.
- Fishing activity contributes to coastal communities.
- The environmental impact of producing and consuming fish products is acceptable.
- A CFP is delivering sustainable fisheries.
- Management is integrated and devolved to the most appropriate national, regional or local level.
- Management is responsive and based on agreed criteria for assessing impacts on stocks and the environment more widely.
- Fish are a readily available and valued source of protein.

In respect of the task of delivering these objectives it states "To deliver them, all stakeholders will need to work together. We will only be able to enjoy the benefits of sustainable fisheries if everyone signs up to the key roles and responsibilities summarised below. To succeed, we all need to play our part."

East marine plan areas – current situation

Over half of the plan area (56 per cent) is defined as high intensity spawning areas for plaice with over a third high intensity spawning areas for sandeels and whiting with over 11 per cent a high intensity nursery ground for cod.

It is pertinent to note that 58 per cent of the plan area is covered by defence-related practice areas with three munitions dumps and these can have a significant effect on fishing activity.

Fishermap inshore fishing data (Annex 11)

The MMO has received feedback from a number of stakeholders with regard to the limitations of the inshore fishing data displayed in the draft report, as a number of stakeholders have been unable to identify their specific fishing activity on these maps. In response to this, the MMO has acquired the Fishermap survey data

collected by the marine conservation zones project during 2010 with the aim of displaying further information on fishing activity in the inshore area.

The objective of the Fishermap project was to collect information on the activities of commercial fishermen using craft less than 15 metres in length between the years 2003 to 2010. In total the research collected data on 260 vessels using bottom gear, 161 dredgers, 22 pelagic trawlers and seiners, 253 hook and lines fishermen, 509 netters and 559 fishermen using pots and traps. In the east coast region no vessels with pelagic mobile gear were recorded. This data has been amalgamated and summed onto a sampling grid with each grid cell having the dimensions of 1/160 degree latitude by 1/80 degree longitude.

The marine conservation zone project sampled approximately 50 per cent of the total fleet within this region, however a significant number of skippers requested that their data not be shared with third parties. When this occurred their results have not been displayed unless the total number of vessels within a sampling unit exceeds 4. In the East coast region, the omission of these records does not cause the relative distribution of fishing effort to be altered; however, it does reduce the total extent of fishing activity that is being represented.

These maps are available to view in Annex 11 of this report.

Please note – These maps have only recently been received by the MMO and are to be subject to a full quality assessment by both Natural England and the MMO during spring 2012.

Vessel sighting data

Vessel sighting information (recording of positions and activities of fishing vessels) as displayed on these maps should be viewed in light of the collection method for this data[235].

Static gear sightings

Static gear activity is focused within the 12 mile territorial limit with some on the western boundaries of the East Offshore area.

Little static gear activity is highlighted within the Wash itself although one particular hot spot exists to the north east of the wash equidistant to Skegness and Hunstanton.

Mobile gear sightings

Current inshore mobile fishing activity from vessel sighting data appears concentrated around the Wash with a number of significant areas with high levels of activity, that to the south eastern part of the plan area straddling the 12 mile territorial waters limit.

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[235] All sightings data provided by the sea fisheries committees (SFCs) and MMO were integrated in a single spreadsheet. This added up to a total of 90,733 sightings around the English and Welsh coastline, of which 55,743 related to the time period used for the analysis presented in this report (2007 to 2009).

Activity is most intense in areas covered off the coast of the East Riding of Yorkshire with much of the vessel activity being directed from ports north of the Humber. A substantial amount of activity also taking place off the Suffolk coast.

The same caveats apply as above with regards to sighting derived information.

A spreadsheet giving landing tonnages and species for the major ports within the East Inshore and East Offshore plan areas is included as Annex 8.

Mobile gears, landings by weight

In terms of landings by weight from mobile gear from the inshore grounds two distinct areas are identified, namely the inshore areas from the Wash to Flamborough Head and from the southern inshore plan area boundary to Lowestoft.

In terms of the offshore grounds, catches between 4 and 23 tonnes are made throughout the offshore plan areas, with significant levels of catch made due east of Suffolk and to the north eastern part of the plan area, with the greatest number of high yield areas in the northern part of the plan area.

Static gears, landing by weight

In terms of the static gear fishery there are a number of broad similarities with the mobile fishery with the notable exception that the best yielding grounds are straddling the 12 mile territorial limit to the north of the plan area.

Nursery areas

High intensity nursery areas[236] for herring and cod are both found within the inshore plan area with sole nursery grounds located to the south west, and a considerable area within the inshore and offshore plan areas hosting the whiting nursery.

Spawning areas

The greatest area of spawning grounds within the plan areas are for plaice, of which the majority are located in the offshore areas, with a significant area within the inshore grounds to the north west of the plan area. There is a considerable overlap between this area and that prosecuted for sandeels to the north of the plan area. A considerable area to the south east of the plan areas covering both inshore and offshore areas is sole nursery grounds overlapping with the plaice nursery grounds.

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[236] Heupel et al. (2007) went on to suggest that nursery grounds could be identified based on three criteria, (1) the density of juveniles was greater than in other areas, (2) there would be greater site fidelity, and (3) the nursery area was used repeatedly over the years. When field data from annual surveys are the main data source for the identification of nursery grounds, then a more robust identification of nursery grounds may be inferred from high catch rates of juveniles and also the proportion of years in which juveniles have been observed at the site. Where appropriate broad scale data are available, data layers generated include the presence of "juveniles" (derived from a length split), the maximum catch rates of juveniles and, for fixed station surveys, and sites where juveniles have been caught regularly (such as in 50 or 70 per cent of the tows).

Figure 4.14: Inshore fishing activity- static gears with confidence values (inset)

Janyary 2012
This map has been produced using the ETRS89 Coordinate Reference System

marine management organisation

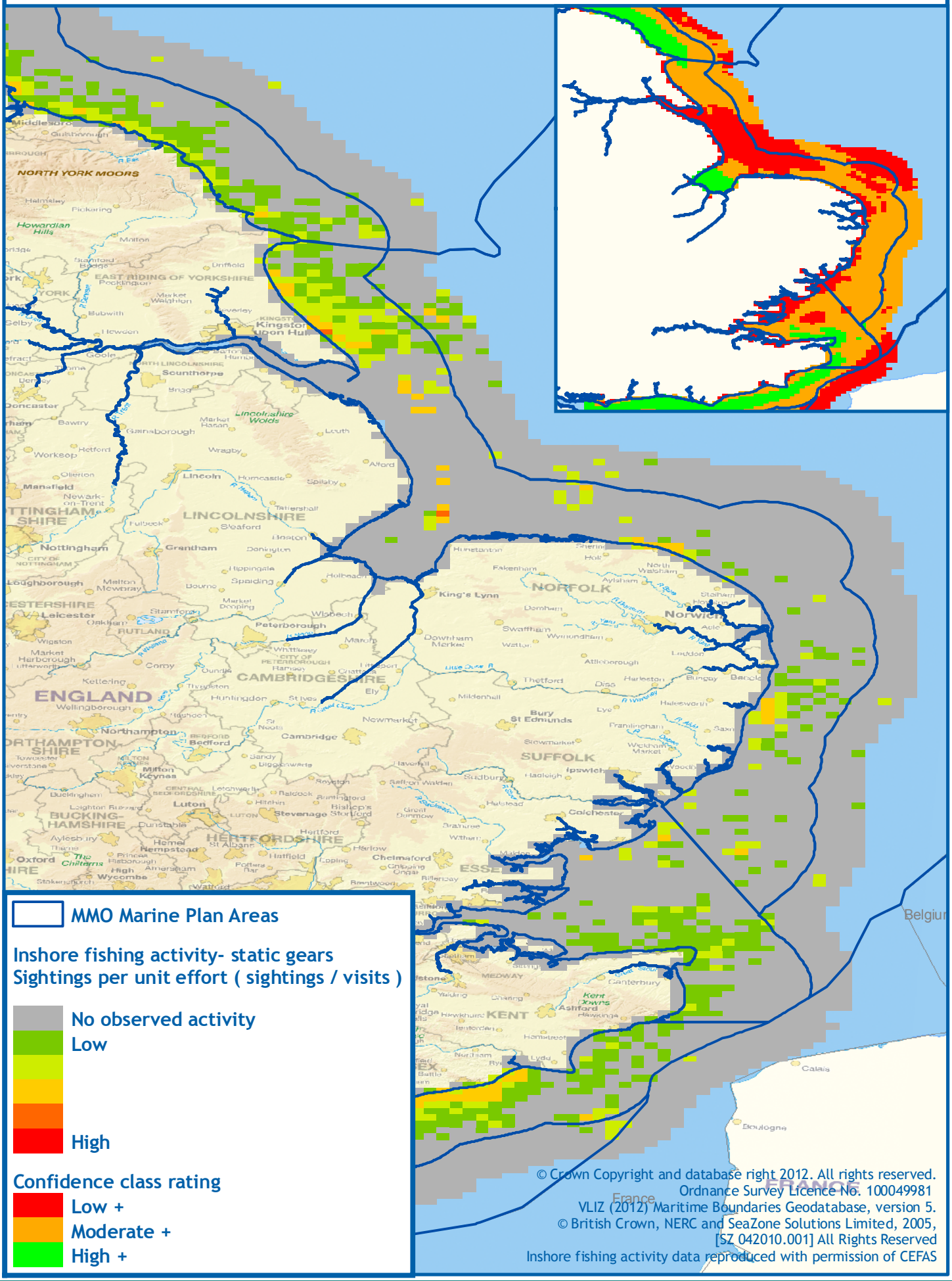


Figure 4.15: Inshore fishing activity- mobile gears with confidence values (inset)

January 2012
This map has been produced using the ETRS89 Coordinate Reference System

marine management organisation

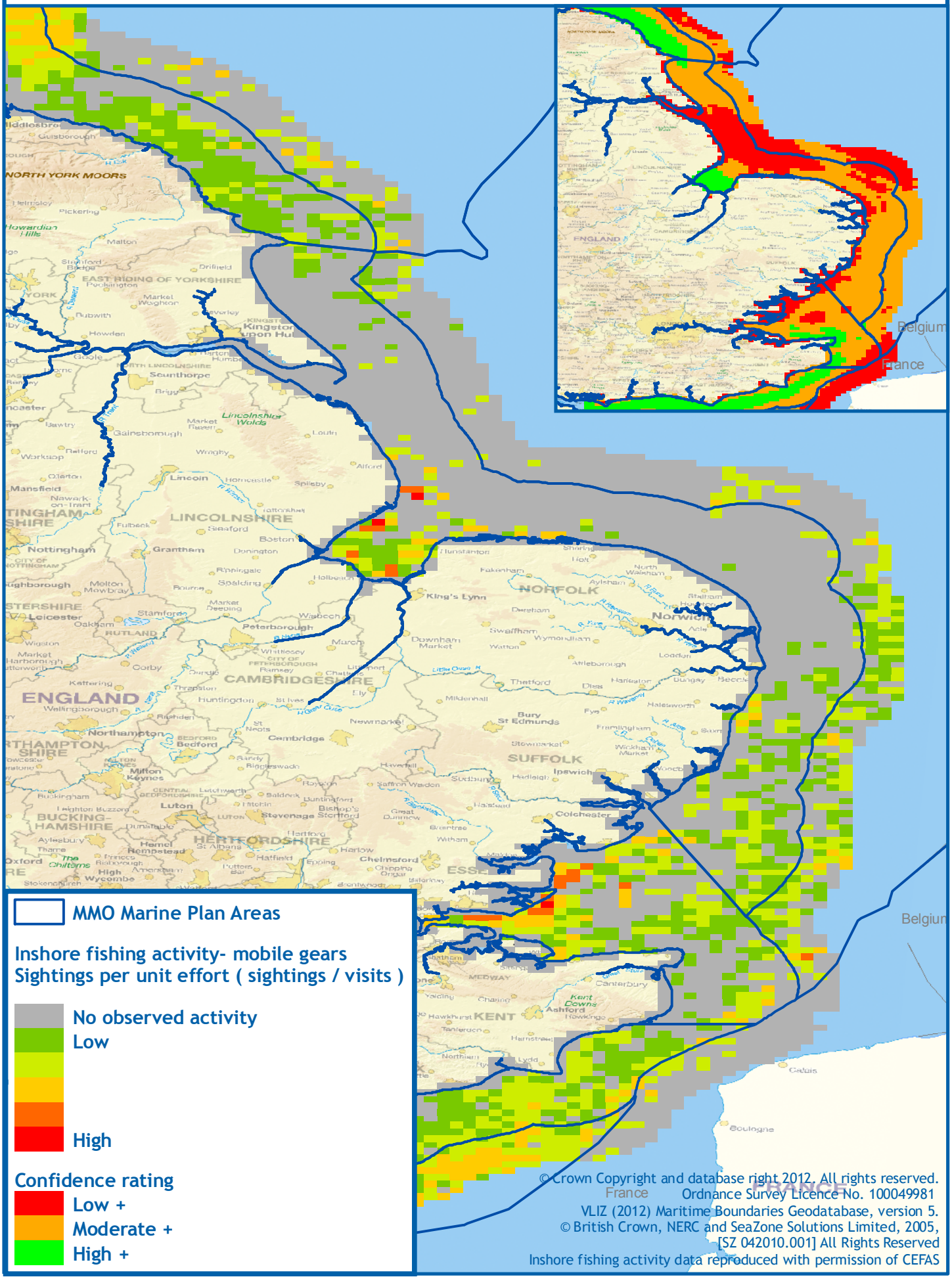
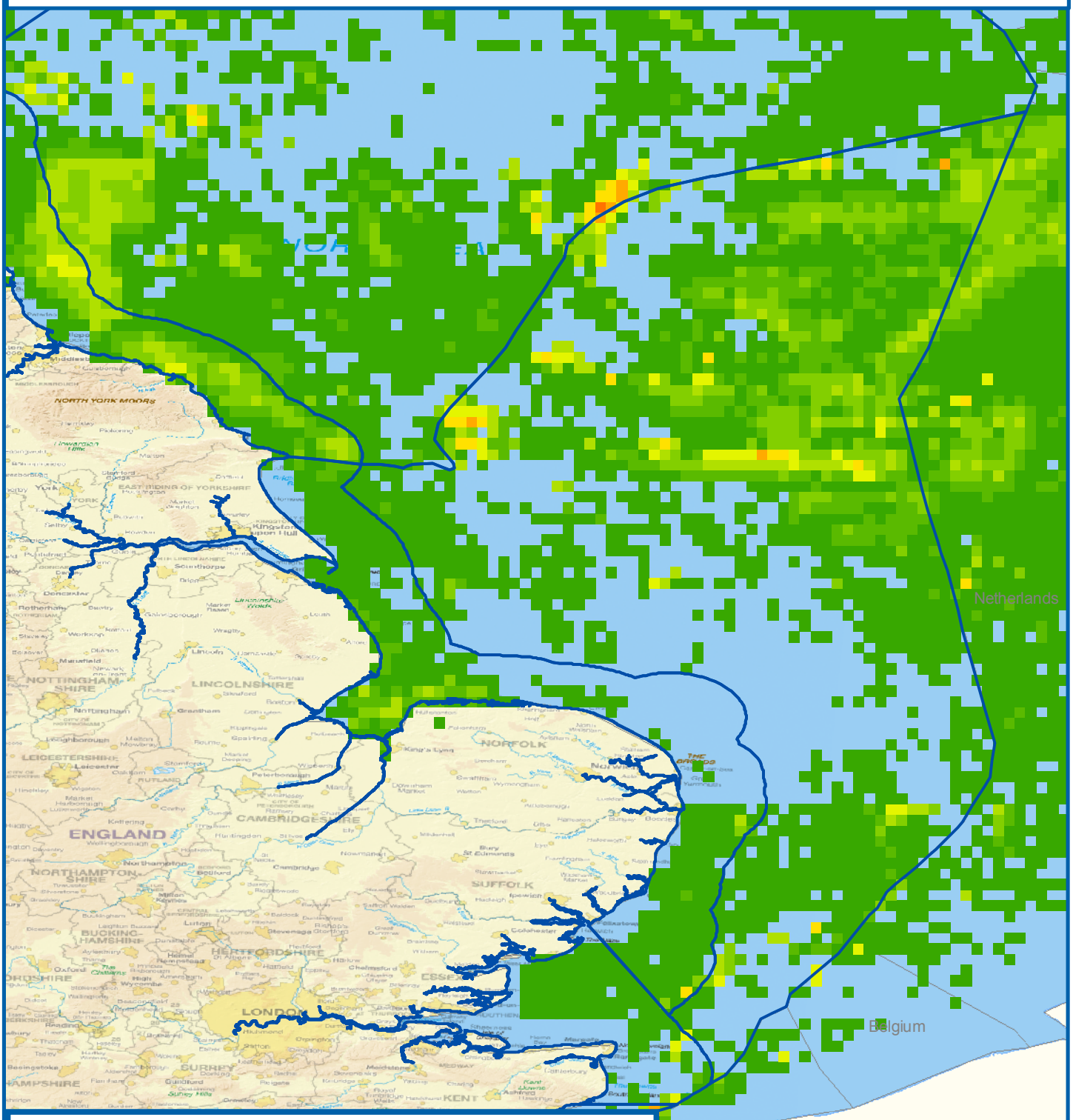


Figure 4.16: MMO UK fishing activity- mobile gears (tonnes of live weight landed from 2007-2010)

marine management organisation

Please note: this map should only be viewed in conjunction with the explantory paragraph of text describing the limitations of the MMO fishing activity data

January 2012. This map has been produced using the ETRS89 Coordinate Reference System



MMO Marine Plan Areas

MMO UK fishing activity 2007-2010
(tonnes of live weight landed- mobile gears)

- 0 - 10
- 11 - 20
- 21 - 40
- 41 - 80
- 81 - 160
- 161 - 320
- 321 - 640
- 641 - 1280
- 1281 - 2560
- 2561 - 5120

Figure 4.17: MMO UK fishing activity- static gears (tonnes of live weight landed from 2007-2010)

marine management organisation

Please note: this map should only be viewed in conjunction with the explantory paragraph of text describing the limitations of the MMO fishing activity data

January 2012. This map has been produced using the ETRS89 Coordinate Reference System

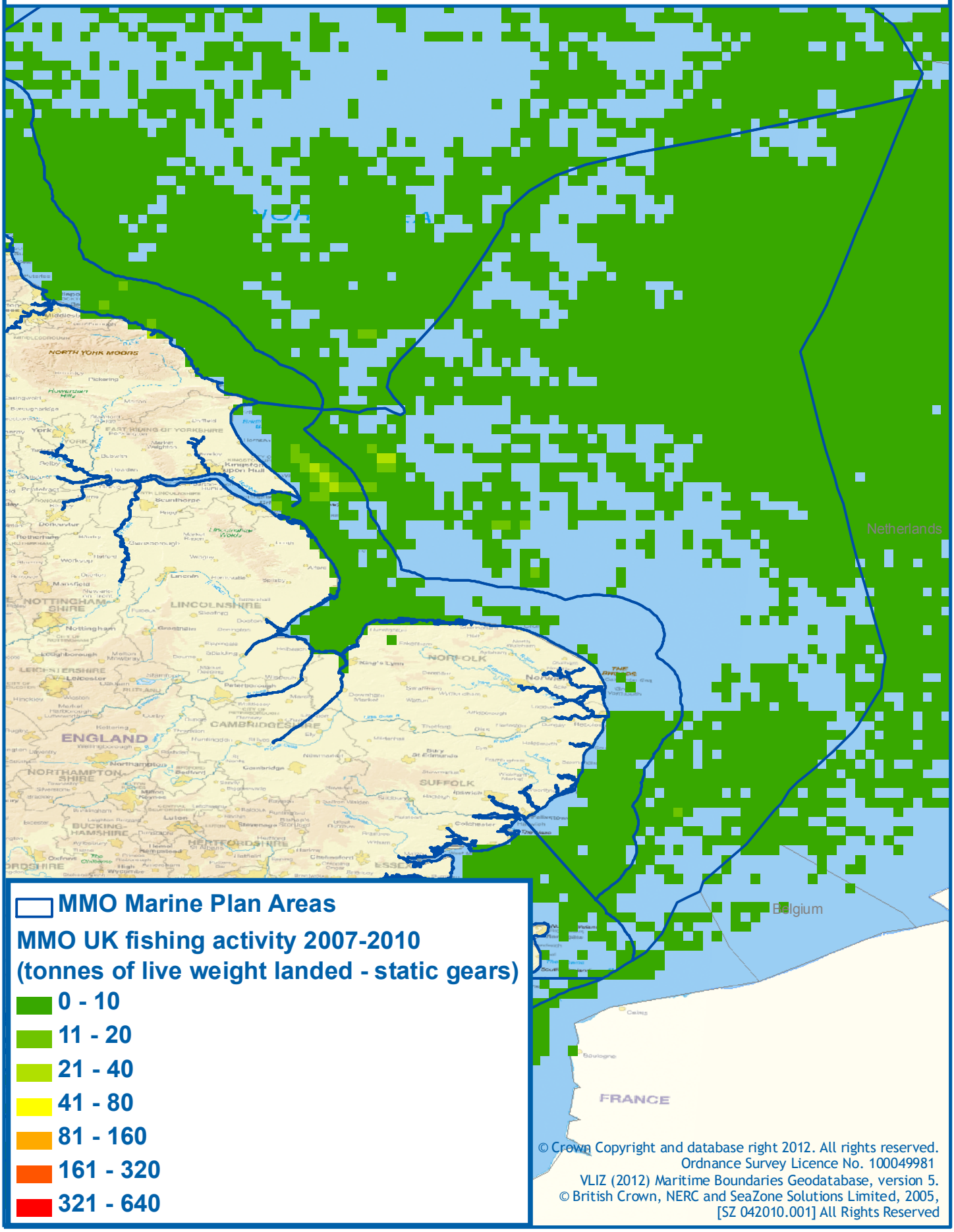


Figure 4.18: High intensity nursery areas

November 2011
This map has been produced using the ETRS89 Coordinate Reference System

marine management organisation

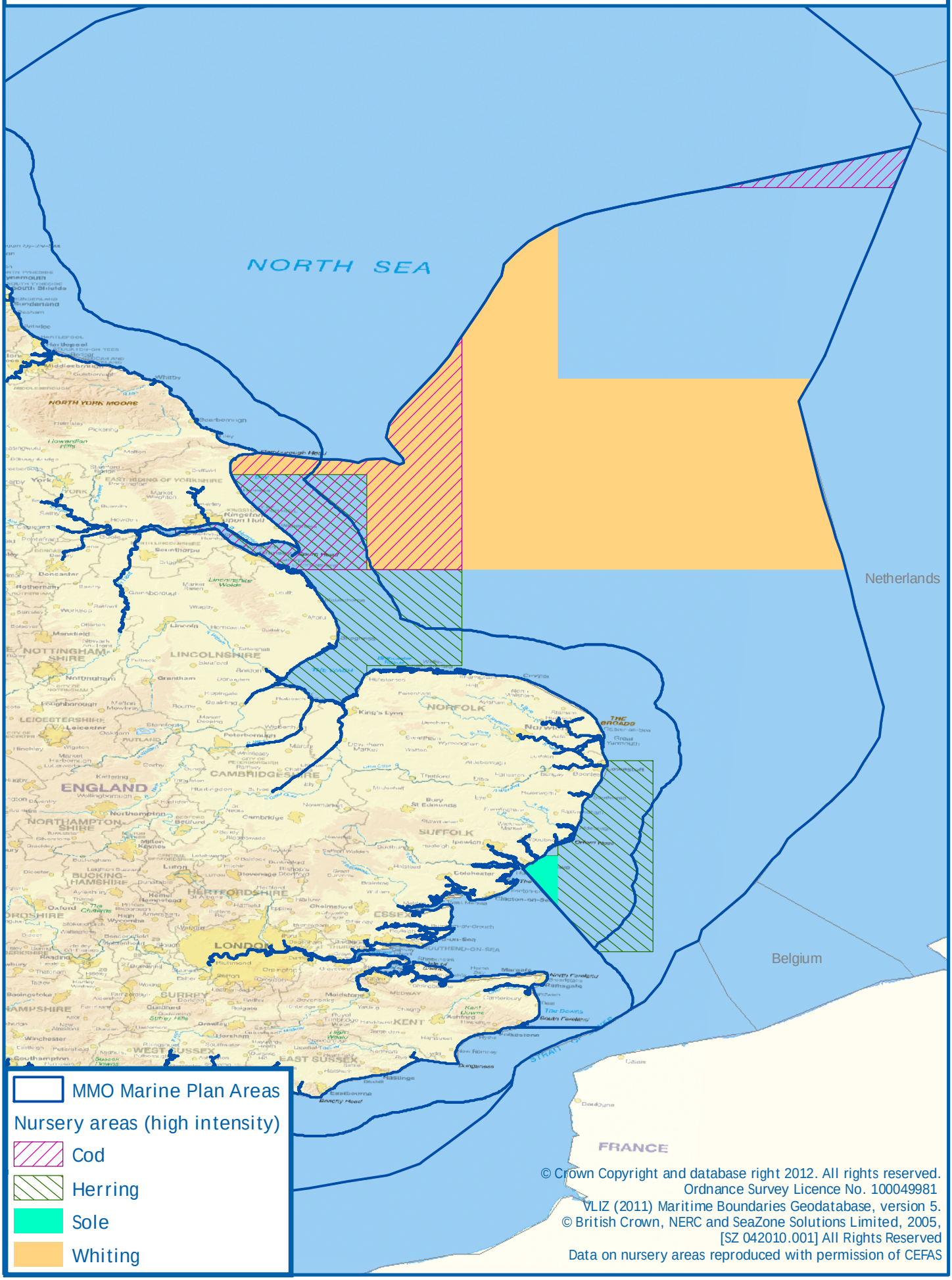


Figure 4.19: High intensity spawning areas

November 2011
This map has been produced using the ETRS89 Coordinate Reference System

marine management organisation

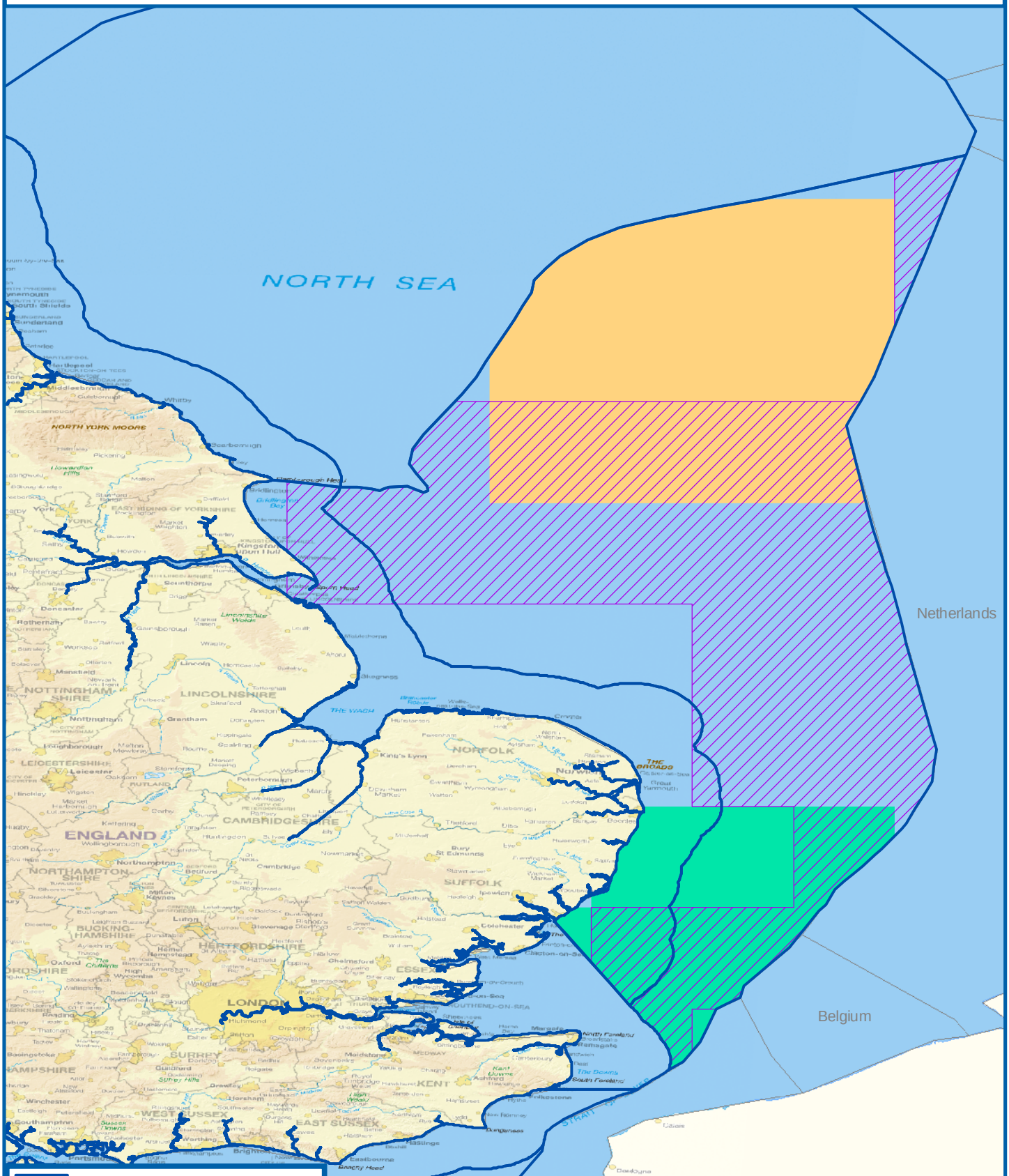


Figure 4.20: MMO fishing activity by E.U. vessels (ex. UK) (time spent in minutes 2007-2010 - mobile gears)

marine management organisation

Please note: this map should only be viewed in conjunction with the explantory paragraph of text describing the limitations of the MMO fishing activity data

January 2012. This map has been produced using the ETRS89 Coordinate Reference System

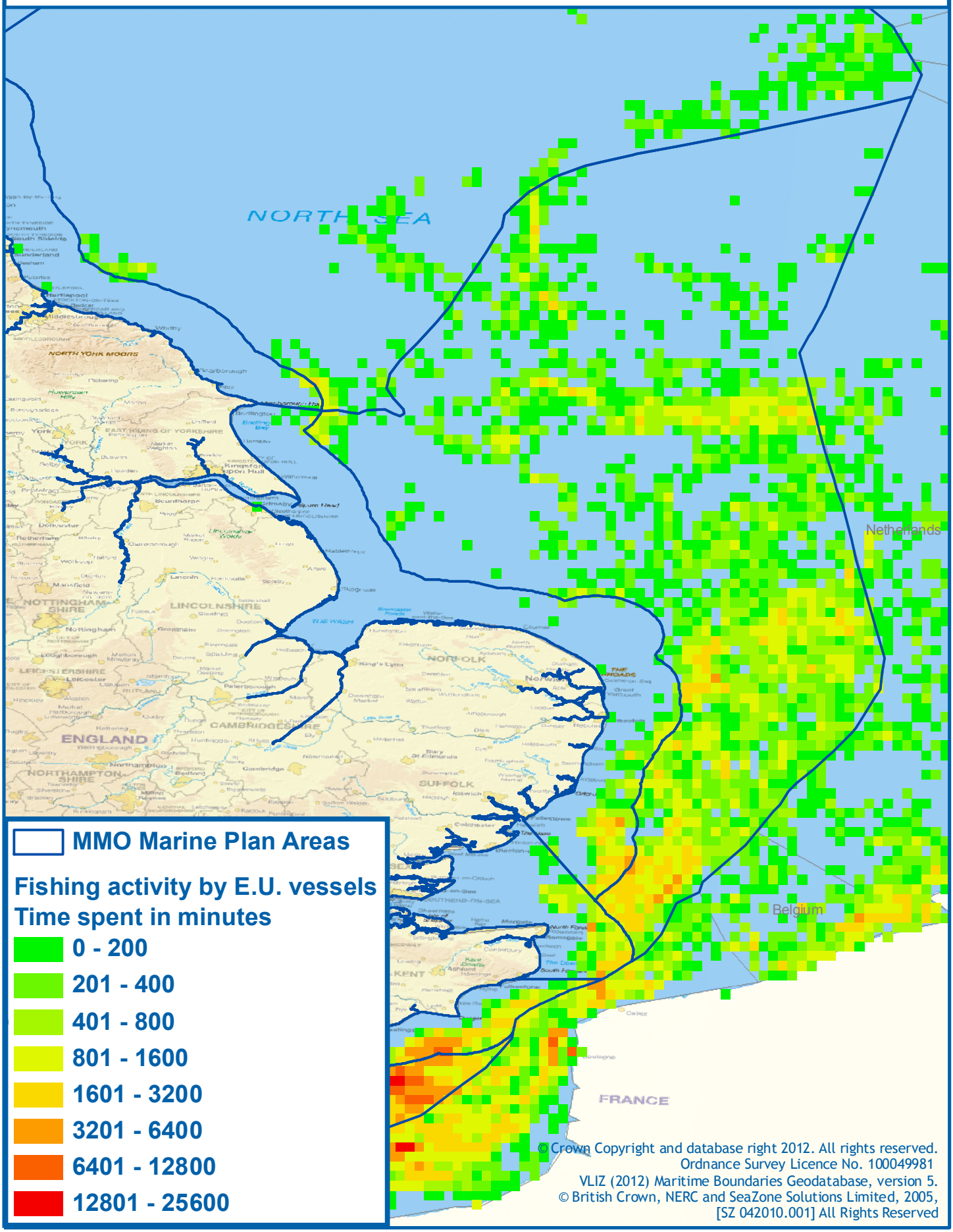
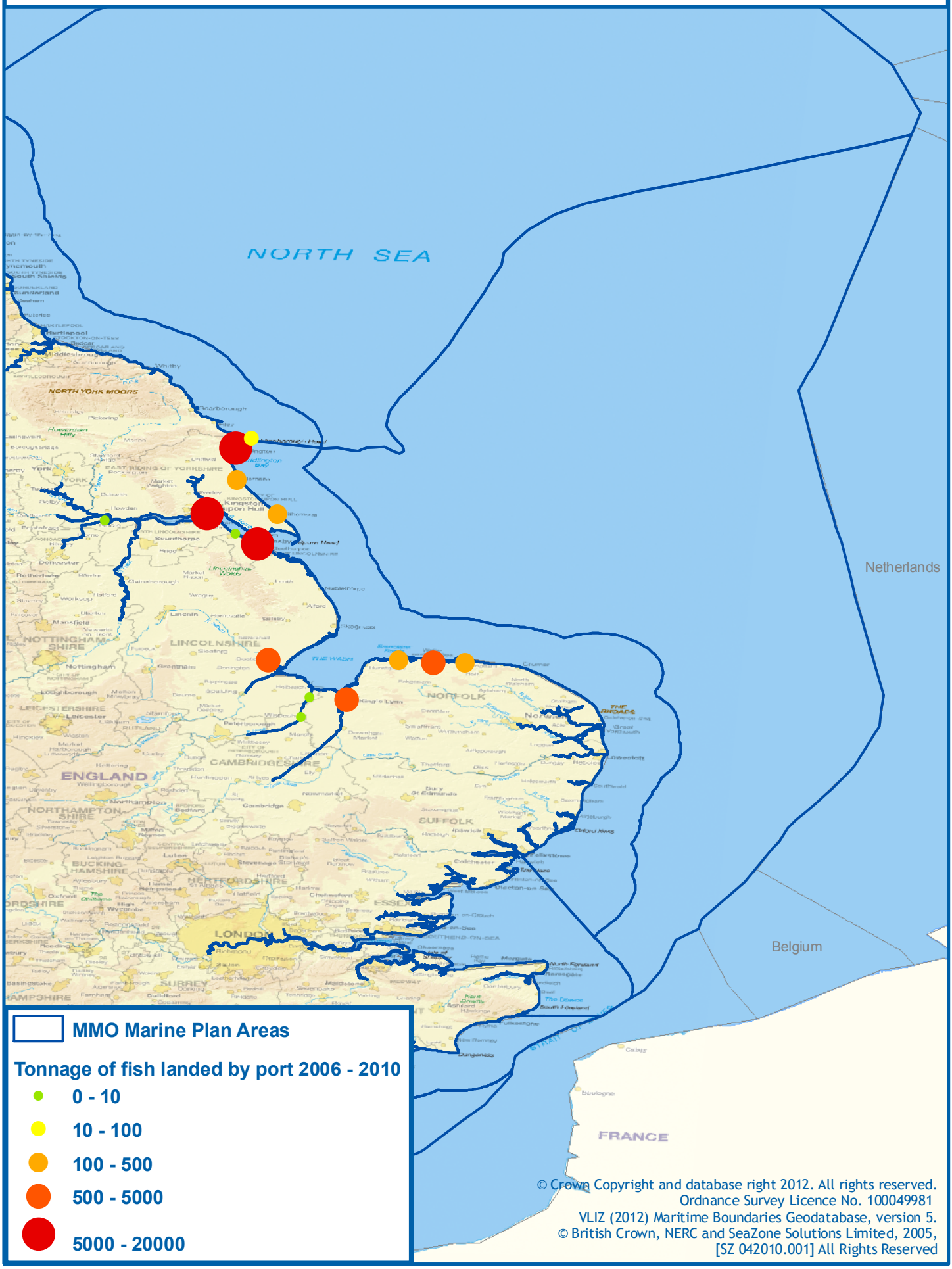


Figure 4.21: Tonnage of fish landed by port 2006 - 2010

January 2012. This map has been produced using the ETRS89 Coordinate Reference System

marine management organisation



Explanation of data limitations

Limitations of MMO fishing activity data

MMO fishing activity data shows fishing effort for over 15 metre vessels, which are deemed to be fishing from 2007 to 2010 with positional data extracted from vessel monitoring system (VMS) data. Data displayed shows quantity (tonnes) of live weight fish landed with gear type grouped into mobile and static gears for UK vessels. Data on international fishing effort is displayed for E.U. countries only (Belgium, Denmark, Netherlands, France, Germany, Ireland, Spain and Sweden). This is displayed as time spent fishing in minutes for mobile gears and as number of vessels for static gears.

For the purposes of the data displayed, mobile gears include:

- beam trawls
- beach seines
- Danish seines
- pair seines
- Scottish seines
- seine nets
- boat dredges
- hand dredges
- mechanized dredges
- pumps
- otter trawls
- otter trawls – bottom
- otter trawls – midwater
- otter twin trawls
- pair trawling
- pair trawls – bottom
- pair trawls – midwater
- bottom trawls nets
- nephrops trawls
- shrimp trawls – bottom
- midwater trawls
- shrimp trawls – midwater
- other trawls not specified
- purse lines
- purse seine – one boat
- purse seine – two boats
- miscellaneous gear,

For the purposes of the data displayed, passive gears include:

- gillnets and entangling nets
- encircling gillnets
- driftnets
- set gillnets (anchored)
- gill-trammel nets combined
- handlines and pole-lines (mechanized)

- handlines and pole-lines (hand-operated)
- longlines
- drift longlines
- set longlines
- trolling longlines
- hooks and lines
- hand fishing
- shell fishing by hand
- traps
- pots
- fyke nets
- trammel nets.

The following assumptions were made which will limit the usefulness of this dataset.

The work only covers activity by over 15 metre vessels – this can mean (particularly for ICES rectangles nearer the UK coast) that there are significant elements of fishing activity by UK vessels that are not covered.

The match between satellite position reports and reported activity is not exact affecting the accuracy of the data on quantity of fish landed. For example, only approximately 50 per cent of those satellite position reports estimated as representing time when a vessel was fishing can be matched to dates where fishing activity was reported within that particular International Council for the Exploration of the Sea (ICES) rectangle. This indicates that for data on the quantity of fish landed (linked to positional satellite data) the following estimates of the coverage of activity can be derived, in terms of the percentage of activity (the potential coverage is the proportion of activity covered by vessels over 15 metres that supply both activity and satellite data whereas the actual coverage is the proportion of total landings where an exact match has been made between the activity and satellite data).

Year	Potential coverage (per cent)	Actual coverage (per cent)
2007	84	61
2008	84	58
2009	86	66
2010	86	65
2007-2010	85	62

- These problems in matching satellite and activity data arise for a variety of reasons. There can be errors in the reporting of activity data (historically reported in paper logbooks), for satellite data, the speed limits used to determine whether a position report relates to fishing activity or not are generic and applied across all vessels and for all fishing gears in all areas, where in fact differences may occur.
- The VMS data was processed to cover fishing activity by extracting the data for vessels travelling between 1 and 6 knots. Using a speed range to infer whether or not a vessel is fishing produces a fairly valid picture of mobile gear fishing effort, but not of static gear. Since static gear fishers **by the very nature of their activity** are not considered to generally travel at this speed range (possible

steaming to grounds excepted), the MMO considered the data to be unhelpful in determining EU VMS static gear fishing activity. The MMO will endeavour to undertake further assessment of the static gear fishing activity of EU vessels using the east plan area throughout 2012.

- The representation of fishing effort as number of vessels per sub-rectangle per time period will not demonstrate the length of time that individual vessels have spent in each sub-rectangle over the period. Vessels that repeatedly visit the same areas will therefore be under-represented compared to vessels that frequently move.

Limitations of inshore fisheries sightings data

- Areas that are visited most frequently by patrol vessel and/or aircraft will provide a better indication of the fishing effort in the area. For this reason data on associated confidence must be viewed alongside the sighting data itself.
- Data on sightings of inshore fishing activity were used in preference of data taken from boardings, since boarding data was at risk of underestimating fishing effort for example, a spotter plane could spot 20 vessels in two trips whereas a vessel could board only two vessels in two trips for the same area.
- Although some night patrols are undertaken by sea fisheries committees (SFCs), the majority of patrols will be undertaken during daytime.
- Maps are only indicative of areas where fishing activities occur, as there is no continuous monitoring of activities. In some areas where no fishing activity has been observed, fishing activities may indeed have taken place
- The resulting maps are only intended to be used to compare relative intensities rather than to obtained absolute values of fishing effort.

Ongoing work continues to improve the fisheries evidence base

The MMO has identified the need to require a more in-depth understanding of the potential for marine planning to support both commercial and subsistence (or artisanal) fishing activities. There are acknowledged limitations in current fisheries datasets, yet having a more accurate and improved understanding of activities is vital in understanding how this sector could be impacted (positively or negatively) from marine planning policy objectives, and human developments in inshore and offshore waters. The MMO is working on delivering a project to collate the current available evidence on the nature, location, trends, and socio-economic value all fishing activities and resources in English waters. In addition the project will identify key knowledge gaps, current cost of fisheries management, and make recommendations on how the evidence base could be improved in the future.

Time spent fishing in specific areas

In terms of time fished in relation to mobile gear activity provided from VMS data (fishing activity – mobile gears (VMS) – time fished), the data shows that the greater number of high intensity areas within the East Inshore plan area are from the southern part of the inshore area to Lowestoft and around the Wash. The use of VMS data is in itself not fully representative of all fishing activity and does not include vessels under 15 metres in length. Within the offshore area significant levels of activity are found due east of Bridlington.

Ongoing management

Management of the inshore fisheries within the East Inshore plan area is the primary responsibility of the inshore fisheries conservation authorities (IFCA) of the Eastern IFCA and North Eastern IFCA, with the adjacent sea area to the south the responsibility of Kent and Essex IFCA. IFCA and their predecessor SFCs have the power to manage their fishery at local level, including the establishment of local bylaws together with responsibility for their enforcement. This includes restrictions on the size of vessel permitted to fish within prescribed areas within their respective districts and which activities may be carried out.

East marine plan areas – existing planning context

In planning terms on assessing the LPAs and AONB policies, no fisheries specific planning policies were evident.

There are no identified fishery related objectives at sub-national level emerging from the analysis of local development plans (LDPs) or local development frameworks (LDFs) produced by the LPAs. However it is pertinent to take note of the vision for IFCAs and their aim to "lead, champion and manage a sustainable marine environment and inshore fisheries, by successfully securing the right balance between social, environmental and economic benefits to ensure healthy seas, sustainable fisheries and a viable industry"[237].

A number of related policies that focus on environmental aspects or leisure and tourism elements were found but nothing specifically focused on fishing.

The most relevant to this was the Recreation and Tourism Policy EC9 of East Cambridgeshire which requires that in the case of marinas and moorings, development would not impede navigation or lead to hazardous boat movements, harm the quality of the fisheries, or conflict with traditional river uses such as fishing, sailing and rowing.

Social and cultural heritage

Building on local area social and cultural heritage with regards to fishing activity was found in Waveney Policy CS05 Lake Lothing and Outer Harbour Area Action Plan. This focuses on employment-led regeneration, with objectives of the plan to create "a diverse, vibrant and creative local culture that builds on the strong maritime heritage traditions".

Environment

East Riding of Yorkshire Policy HQE4 regarding enhancing biodiversity and geodiversity states that proposals will be encouraged to optimise opportunities to enhance biodiversity.

The policy states that "the natural environment will be conserved, protected, managed and enhanced in order to underpin the overall quality of life of the borough as a living environment and support wider social and economic sustainability objectives". This policy, while an important consideration for the management of land

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[237] Defra, www.defra.gov.uk/environment/marine/wwo/ifca/, Accessed November 2011

based development, is not directly applicable to the fishing sector as its activity is not regulated within the terrestrial planning regime. However, the sector should be mindful of the potential impacts on biodiversity that its activities may bring.

Norfolk Coast AONB Policy 3.5 relating to access and recreation has a requirement to ensure that harbours are used in a responsible manner with due regard to habitats and wildlife. While relevant to the fishing sector this is unlikely to be an issue.

Water quality

Norwich and South Norfolk Policy ENV 23 requires that, in the consideration of development proposals, regard needs to be taken of the availability of water resources and the effect on increased abstraction on environmental water need (that is those of rivers, wetlands and estuaries, including the need of navigation, fisheries, recreation and nature conservation) as advised by the Environment Agency.

Development which jeopardises water resources or has significant adverse impact on the water environment will not be permitted. There may be points to consider for the sector but these would very much relate to any proposed specific activity likely to fall within the area of fisheries management as opposed to the land-based planning regime.

Seascape

There are no specific fisheries related policies with regards to seascape. However, it is worthwhile noting that fisheries and their allied activities may contribute to the formation and changes of seascape in either a long term or temporal manner. For example through vessel transit along the coast and into and out of ports, supporting infrastructure such as ice plants, gear and catch stores and associated facilities.

Historic environment

Kingston upon Hull Policy CS6 seeks that local distinctiveness will be promoted with particular reference to historic buildings, wet and dry docks, wharves, and ancillary structures and features. This policy seeks to support the retention of marine related historic elements, some of which may come from fishing related activity.

Potential future situation

The fishing sector in England also operates in several key fisheries that are typically lower volume but higher priced, with the majority of the fisheries covering inshore areas.

This has resulted in the development of the English fleet with a greater proportion of smaller vessels that are economically viable while landing lesser quantities of fish that are of greater overall value. Shifts in the dynamic of fishing opportunities have, and are likely to continue to be, key drivers in the future development of the fleet[238].

[238] Marine Management Organisation (2010) The UK Fishing Industry in 2010 - Structure and Activity

Other MPS activities, identified as being secondary[239] to fishing policies, include tourism and recreation, energy production and infrastructure development, marine aggregates and marine dredging and disposal.

Fishing interacts with tourism and recreation in a number of ways. Tourists and visitors are drawn to many local areas due to the activity of fishing fleets no matter how small. Waterfronts attract visitors through links to maritime history as well as an appreciation of the inherent appeal of marine settings. Further research is proposed to better understand the greater value of fishing activity in this regard.

Operating ports are also fundamental to the fishing industry. It is notable that ports and harbours such as Grimsby that have been associated with traditional fishing practices, are undergoing regeneration to enable diversification of local economies. This may result in a reduction in terms of area and facilities available for fishing and fishing related activities in the future.

Summary of evidence and issues

Relevance to East plan areas

Activity is seen in three key areas:

- commercial fishing at sea and on the foreshore by licensed operators
- secondary activities including processing and retailing of catch and refined products
- support activities such as vessel construction and servicing and fishing gear manufacture and repair.

In terms of the distribution of fishing activity, potting activity targeting primarily crabs and lobster, occurs all along the coastline and offshore with some nomadic shellfish activity in the East Offshore area with specialist inshore fisheries for cockles and other bivalves occurring in the Wash. In the Southern North Sea the majority of UK fishing effort is by English vessels and flag vessels operating under UK quotas. The beam trawl fishery for sole in the East plan areas involves Anglo-Dutch vessels with the UK brown shrimp fishery taking place as a component of a larger international fishery.

Catch composition is changing with warm water species increasing in frequency of catch and their area of distribution.

Over half of the plan area (56 per cent) is defined as high intensity spawning areas for plaice with over a third high intensity spawning areas for sandeels and whiting with over 11 per cent a high intensity nursery ground for cod.

[239] In the process of identifying marine relevant policies, the most relevant MPS section was assigned to a terrestrial plan document policy identified. In many cases, policies related to more than one MPS section and where this was the case, all other MPS sections were recorded. These other MPS sections are referred to as being secondary.

Opportunities for co-location with MPAs and other activities need full consideration in order to maximise the most efficient and sustainable use of space. Further work on co-location opportunities is required to ensure best use is made of the marine area, including fisheries, aggregates and renewables.

Issues for delivery of commercial fishing

- LDFs in the East plan area offer no specific support through defined policy to the fishing sector. Marine plans must be produced in accordance with the MPS and its aim to support the continued existence of the UK's inshore and offshore fishing industry within the development of the marine plans[240].
- Stock levels, reform of the CFP and decentralisation of fisheries management, including the growth of regional fisheries management reflecting local conditions, will have a major influence in the future.
- Renewable energy deployment: The potential increase in the deployment of offshore wind energy should take account of current and future fishing activity.
- Some activities may be able to co-exist within the proposed wind development zones but a concerted effort will be required from both wind farm developers and fishing interests to deliver outcomes that are mutually beneficial to all.
- MPAs: Any potential management measures or reference areas may affect investment within the sector. Depending on measures applied fishing activity may be restricted, redirected in terms of methods used or displaced as a result (see also 4.1). Engagement with the fishing industry is a vital part of any MPA designation process.
- Ports and shipping growth of activities in non fishing sectors, such as renewable energy and/or diversification into the leisure sector and marina creation, may have adverse effects on the industry through reduction of in port facilities for fishing vessels and their related activities. Some positive outcomes for the fishing sector of non fishing sector port and harbour development do exist such as at Wells-next-the-Sea.
- Sub-sea cabling may have an impact on fishing activity and result in displacement and possible loss of viability for certain elements pursuing inshore grounds in smaller vessels through exclusion zones around construction sites and cable protection measures such as rock armouring.
- Aggregate extraction sites need to be selected with care, mindful of existing fishing activities with spawning and nursery grounds in particular.
- Socio economic impacts on the sector will need careful consideration. Some grounds are exploited by vessels with limited range and are of prime importance to smaller local communities, and may be particularly sensitive to spatial conflict.
- Water quality has potential to influence landing particularly in estuarine and intertidal areas.

Issues for other sectors

The list of issues for delivery of commercial fishing highlights that the sector potentially interacts with a large number of other sectors. It follows that fishing may pose issues for delivery of those sectors. Specific further issues to be noted include:

[240] Defra (2011) UK Marine Policy Statement, p41, Section 3.8.1.

- access to grounds and transit routes may have negative impacts for renewable energy developers
- shifts in fishing methodology from trawling to seine netting for example may require a different approach from renewable energy developers to support any such change within proposed development sites
- cable transit routes need careful consideration in order to minimise impacts to areas of prolific fishing activity.

Issues for sustainability

- CFP reform may potentially make the greatest contribution towards raising levels of sustainability within the industry and is eagerly awaited by the sector. Public interest in the delivery of locally supplied and sustainable food is also likely to play a part and this may favour some of the more artisan inshore fisheries.
- Displacement of activity and raised impacts on habitats on currently un fished grounds has been raised as an area of concern by a number of stakeholders.
- In the offshore grounds potential shifts in activity from beam trawling to seine netting may have benefits in terms of carbon reduction and catch quality and selectivity. If steaming time to grounds is significantly increased (as in the case for some of the inshore fleet and developing Round 1 and Round 2 offshore energy sites and their associated extensions) increased fuel consumption and therefore carbon footprint may result.
- Some habitats may be negatively impacted by fishing activity such as dredging and certain forms of beam trawling.
- Negative pressures exerted by this activity differ by methodology and can include:
    - abrasion and disturbance to the seabed
    - impacts on biodiversity and by-catch including over exploitation of stocks[241]
    - shifts within sectors (that is from trawling to potting) have potential to substantially increase pressures on shellfish stocks and particularly the inshore fishing fleet and affect coastal communities
    - over-exploitation of commercial fish stocks and threats to vulnerable or rare species
    - damage or destruction to habitats and the historic environment
    - marine pollution through loss of fishing gear and ghost fishing.

4.9 Aquaculture

National context and policy

The MPS defines aquaculture as "the process of farming or culturing aquatic organisms"[242]. This includes salmon, shellfish, marine worms, seaweeds and marine fish production.

[241] Defra (2011) UK Marine Policy Statement, p42
[242] UK Marine Policy Statement, HM Government, 3.9.1, 2011

There are 98 designated shellfish waters in England licensed for commercial production under the Shellfish Waters Directive[243]. This directive sets water quality standards and monitoring standards in areas where shellfish are present, such that they are fit for human consumption. Defra oversee the commitment to maintain a broad match between designated shellfish waters and shellfish harvesting areas in England.

The EC Regulation on Alien Species in Aquaculture (708/2007) requires member states to "establish a process by which the risk of introducing alien species for aquaculture is fully assessed before any introductions of such species are consented [244]". This assessment will form part of the assessment process for granting aquaculture licences in English waters.

Aquaculture is considered to be a key area for development by UK administrations due to its potential to contribute to the sustainability and security of the UK food supply. Defra are currently consulting on an aquaculture strategy to achieve sustainable growth in the sector in England. This has been developed by the English Aquaculture Plan Consultation Group. The group includes representatives from the aquaculture industry, retail, academia and civil society. This strategy is due to be in place in spring 2012.

Aquaculture is subject to the CFP reform process that has been described in the fisheries chapter previously. Two considerations for aquaculture specifically are:

- non-binding union strategic guidelines on common priorities and targets for the development of aquaculture activities shall be established by the Commission by 2013
- member states shall establish a multiannual national strategic plan for the development of aquaculture activities on their territory by 2014. The plan shall include the member state's objectives and the measures to achieve them.

"UK environmental policy will continue to improve the quality of shellfish harvesting areas (including those for wild shellfish) by seeking to adopt appropriate microbiological standards when implementing the WFD."[245]

The following relevant goals/objectives and policies are highlighted by way of context although note that identifying objectives and deriving planning policies are later steps in the planning process:

- Food security is an objective of the UK administrations and aquaculture could make an important and growing contribution to this[246].
- All administrations support and encourage the development of efficient, effective, competitive and sustainable aquaculture industries subject to suitable governance and safeguards[247].

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[243] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:376:0014:0020:EN:PDF
[244] UK Marine Policy Statement, HM Government, 3.9.8, 2011
[245] UK Marine Policy Statement, HM Government, 3.9.1, 2011
[246] UK Marine Policy Statement, HM Government, 3.9.1, 2011
[247] UK Marine Policy Statement, HM Government, 3.9.1, 2011

- Aquaculture contributes to improved consumer health as the products are nutritious and have associated health benefits[248].
- Aquaculture makes a contribution to socio-economic activity in coastal communities, often in remote communities via direct employment, product processing and distribution.

East marine plan areas – current situation

Shellfish production makes up nearly all aquaculture in England. In 2009 this was 4,690 tonnes, worth £7 million. This was twenty per cent of the total UK shellfish market. The majority of production is mussels, with smaller amounts of oysters, clams and cockles.

From the evidence available, the East inshore plan area currently has only shellfish aquaculture and no other forms. The East Offshore plan area has no aquaculture at present. Within the East Inshore area 164.2 square kilometres are classed as water bodies with shellfish production covering 1.62 per cent of the plan area. However, this is an overestimate of the area of actual production as these water bodies are only indicative of the broad areas which contain shellfish aquaculture (see figure 4.22). It does not indicate that the entire seabed area highlighted has shellfish aquaculture[249].

The East Inshore plan area was responsible for just 9.13 per cent of the spatial area of the above shellfish aquaculture water bodies in 2009. There are greater areas of such water bodies in the South West and South Inshore marine plan areas.

However, the East Inshore plan area was responsible for just under 65 per cent of total shellfish production via aquaculture in England, with 17 businesses in operation in the area in 2007. The majority of this production was from mussels (*Mytilus edulis*) in the Wash with this area producing 69 per cent of the total mussel production in England. Therefore, this activity is locally important in terms of economic value in the East Inshore plan area with four businesses operating within the Wash in 2007 and 3,024 tonnes of mussels being produced in that year. There were three further shellfish aquaculture areas within the East Inshore plan area in 2007. The Alde to Butley area in Suffolk was an area of production for the Pacific Oyster (*Crassostrea*), with two businesses operating and four tonnes of this species produced in 2007. The Brancaster area in Norfolk had 6 businesses and produced seventeen tonnes of Pacific oysters and 180 tonnes of mussels in 2007. Finally, the Blakeney area in Norfolk produced 42 tonnes of mussels via five businesses in 2007.

It should be noted that there are limitations as to the conclusions that can be drawn from the data used in Figure 4.22 as it represents a single year of harvest in what is an industry where annual harvests can fluctuate to a large degree. The MMO is working with other organisations to obtain multi-year harvest data and to define the

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[248] UK Marine Policy Statement, HM Government, 3.9.4, 2011

[249] These water bodies have been taken from a dataset created by ABPmer under contract to DEFRA (Contract reference MB102) http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&Completed=0&ProjectID=16368

spatial extent of shellfish aquaculture to a more accurate level than the broad shellfish water bodies used here.

Further description of the characteristics of aquaculture activity within the East plan area is restricted by the data that is currently available. This data gives an indication of the presence or absence of commercially exploited shellfish species in a broad water body, the production value of each species and the number of business operating per water body in 2007. However, the data does not clearly distinguish between sites of aquaculture and wild stocks harvesting. Therefore, Figure 4.22 should be considered as an indication only as to the areas of commercial shellfish species presence in shellfish water bodies. This is not a direct mapping of aquaculture as these species may be naturally exploited outside of aquaculture facilities.

There is a link between offshore and inshore mussel beds in terms of aquaculture production. Some juvenile or 'seed' mussel is collected at offshore beds and redistributed in coastal areas to be harvested when mature. There is a market in exporting seed mussel to Germany from the Wash area.

No data has been found by the MMO or been provided to date in respect of marine worm (for use as fishing bait) or algae aquaculture facilities. The MMO would welcome information on these areas.

East marine plan areas – existing planning context

No sub-national policy for aquaculture has been identified.

Potential future situation

Aquaculture is a growing industry and predictions are for this to increase in response to the growing demand for protein and desire to source local food[250]. The Defra vision for aquaculture is that "environmentally acceptable aquaculture is a significant supplier of fish"[251].

Aquaculture production in the UK had been projected in 2007 to increase by 116 per cent in the next decade, but this has not been realised so far[252]. Expectations that finfish culture would expand rapidly and emerge in England have not been funded and there does not seem to be commercial interest in the sector yet[253]. However, future development of inshore or deepwater finfish production could lead to large scale offshore production[254].

The aquaculture strategy described in the national policy and context section previously will aim to facilitate the sustainable growth of the sector in England and specific actions will emerge from its publication to achieve this goal.

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[250] Strategic Scoping Report for Marine Planning in England, Chapter 2.13, MMO 2011
[251] Fisheries 2027 a long-term vision for sustainable fisheries, Defra 2007
[252] Charting Progress 2 feeder Report: Productive Seas, Defra
[253] Strategic Scoping Report for Marine Planning in England, Chapter 2.13.1, MMO 2011
[254] UK Marine Policy Statement, HM Government, 3.9.3, 2011

While there is recognition in government policy of the potential for aquaculture to grow in English waters, no specific data exists on the best areas for expansion. The MMO will support, where practical, efforts to address the gap in data on where such future development would be best placed.

Summary of evidence and issues

Relevance to East plan areas

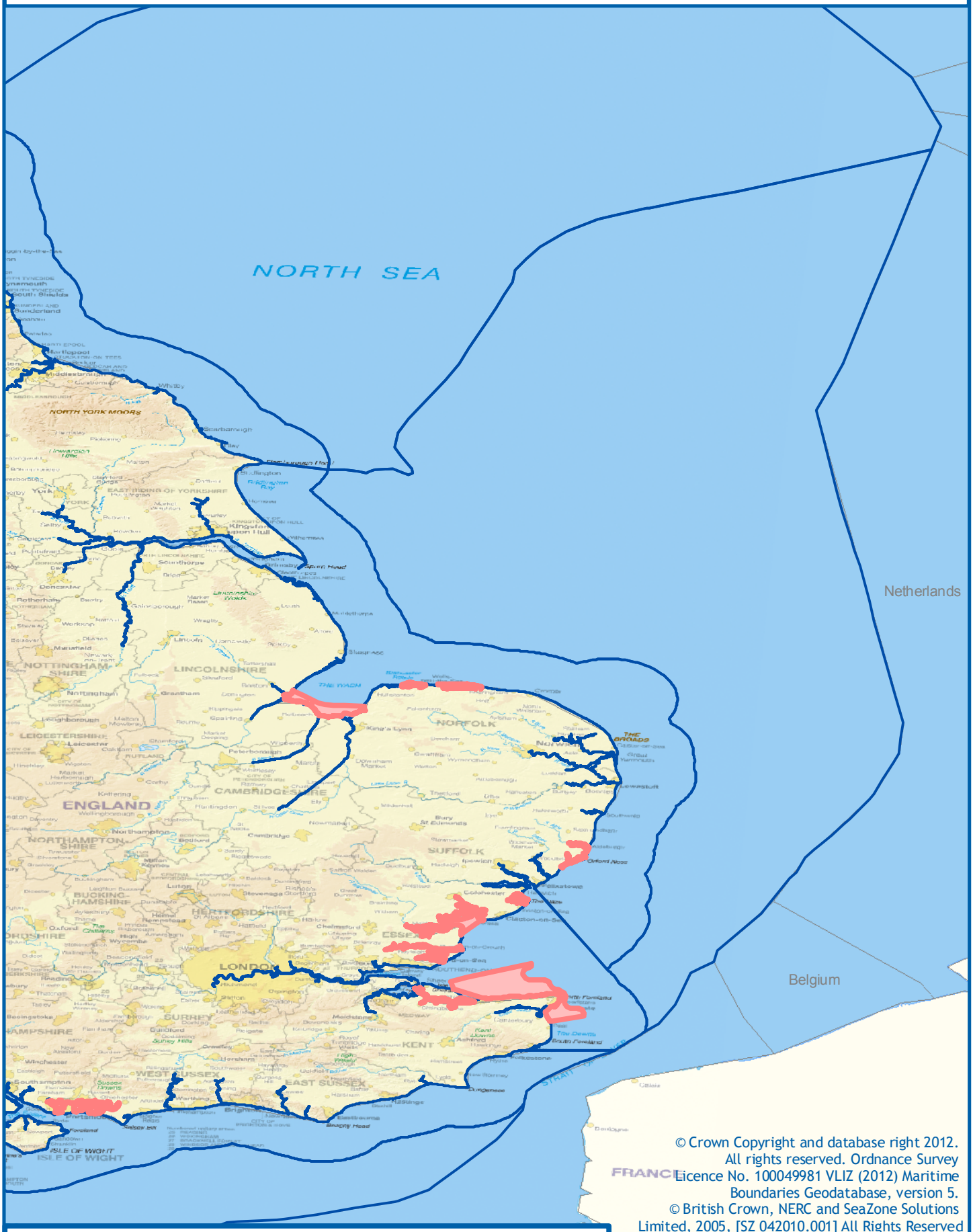
- **Current:** Based on the data from 2007, the East Inshore plan area is the most productive area nationally for aquaculture[255]. It was responsible for just under 65 per cent of total shellfish production via aquaculture in England, with 17 businesses in operation in the area in 2007.
- **Future**: Aquaculture is a growing industry and is predicted to grow further in response to the growing demand for protein and locally sourced food. The East plan areas could be important to the development of aquaculture in the English marine area given the large estuaries and sheltered sites and the development of energy infrastructure that could be co-located with aquaculture. However, the development potential within the plan areas needs to be clarified by addressing gaps in data and knowledge regarding the most suitable future sites. There is therefore a need for a study that maps the potential future spatial opportunity for aquaculture sites based on the full range of characteristics that the activity requires. These include good water quality, access for maintenance, shelter from storms and low environmental and technical constraints.

[255] See reference 8

Figure 4.22: Water bodies with some shellfish aquaculture production

January 2012
This map has been produced using the ETRS89 Coordinate Reference System

marine management organisation



MMO Marine Plan Areas

Water bodies with some shellfish aquaculture production

Issues for delivery of aquaculture

- Trends in the industry are closely tied in with changes in wild fisheries, the availability of investment and site availability[256].
- More intensive types of aquaculture can use space and resources more efficiently if they are carefully planned and managed[257]. The limiting factors on this development include site availability and environmental carrying capacity.
- It is difficult to secure investment finance for projects as little data on performance and profitability leads to low investor confidence and a high risk rating. There is a perceived lack of tenure security for these projects as the site manager is not the seabed owner.
- There are technological challenges relating to disease treatment, animal welfare (for finfish), ensuring continued product safety for consumers, technology transfer within the industry, research funding and expertise to carry out research.
- Environmental quality issues may be a limiting factor to project development where poor water quality in inshore areas occurs.
- There is no strategic plan highlighting the important role and potential for aquaculture in England, although this is due to be addressed by the draft aquaculture strategy.
- There are concerns from the industry that the consenting regime is too complex and is discouraging to proposals, particularly small schemes.

Issues for other sectors

There are considered to be broad opportunities for aquaculture to co-locate with other marine activities[258]. For example, it is possible to co-locate shellfish aquaculture and the fixed structures within wind farm developments. There may be difficulties however, linked to ownership and access. As the maintenance regimes required for offshore wind infrastructure become better understood, this will also influence the extent of co-location possible. Research on the potential for co-location between marine activities, including aquaculture, is ongoing via an MMO-funded project [259].

- Sites where shellfish aquaculture is most likely to develop may also be sites that are popular for other inshore activities, producing spatial conflicts. For example, a sheltered bay may have shipping activity or be a popular area for recreational activities such as sailing.
- Future finfish aquaculture sites could be positioned adjacent to shellfish aquaculture to provide increased nutrients that act as feed to the latter[14].This could reduce the organic enrichment to the broader marine environment from finfish aquaculture.
- The control of pollution within shellfish waters is important to allow the continuing existence and future expansion of inshore aquaculture facilities. Pollution affecting aquaculture is most likely to originate from surface or waste water discharges from land sources, so improvements in discharge quality would have benefits to aquaculture.

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[256] UK Marine Policy Statement, HM Government, 3.9.3, 2011
[257] UK Marine Policy Statement, HM Government, 3.9.3, 2011
[258] UK Marine Policy Statement, HM Government, 3.9.6, 2011
[259] (MMO1010) 'Evaluation of the potential for co-location of activities and interests in Marine Plan areas' due to be delivered in March 2012

- If aquaculture continues to expand, it is possible that it will take some market share from wild capture fisheries.

Issues for sustainability

Aquaculture can make a positive contribution to sustainable development via the following characteristics.

- Finfish convert protein from feedstuff at a more efficient rate than land-based livestock and shellfish do not need to be fed[260] [261].
- The production of shellfish and algae produces relatively small amounts of greenhouse gas emissions.
- Marine produced products do not compete for limited space for food production on land.
- A low input of freshwater is required in the production and preparation of aquaculture products.
- Aquaculture can reduce the pressure on wild stocks from capture fishing.
- Aquaculture provides healthy consumer products and contributes positively to national food security.
- Aquaculture provides locally important, often rural, employment.

Finfish aquaculture has the following potentially negative environmental effects.

- Organic enrichment from waste products and associated de-oxygenation of the surrounding water and sediments, reducing benthic invertebrate diversity.
- Inorganic enrichment that may cause eutrophication and changes in the plankton community.
- Concerns have been raised over the protein sources in finfish feeds and the sustainability of this supply as it generally contains fishmeal from wild caught marine fish species. The use of alternative protein sources in feeds, such as vegetable proteins or by-products from fish or meat processing could improve the sustainability of the supply. Opportunities could arise for deriving feed from fish landed as part of the discard reduction programme.
- Escaped fish can genetically alter local populations by inter-breeding.
- Diseases and parasites can be passed to native fish, with negative impacts on their populations.
- Should products be used to treat parasites and diseases, then contamination to the marine environment from such products may occur.
- Facilities may have a seascape impact as they tend to be located close to the shore.

Advances are being made to limit the potential for negative environmental effects from finfish aquaculture. These include:

- certification to sustainable standards of the fisheries to source fishmeal for feed and more efficient feeding regimes

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[260] www.aquamaxip.eu/content/view/108/177/

[261] Hall, S.J., A. Delaporte, M. J. Phillips, M. Beveridge and M. O'Keefe. 2011. Blue Frontiers: Managing the Environmental Costs of Aquaculture. The WorldFish Center, Penang, Malaysia, p71

- closed sided floating tanks where effluent can be controlled
- certification to sustainable standards of the fisheries to source fishmeal for feed
- sterile female stocks to minimise the risk of interbreeding with wild fish
- vaccination against diseases which could be passed between farmed and wild fish
- the use of well boats for veterinary medicine treatment with discharge of the water on land.

Shellfish aquaculture is considered to have a relatively low environmental impact.

However, a localised impact may be habitat loss or alteration associated with aquaculture structures such as cages for oysters.

Any form of aquaculture involving non-native species has the potential to alter local ecosystems and biodiversity if individuals escape and establish populations that compete with native species.

4.10 Surface water management and waste water treatment and disposal

National context and policy

About 80 per cent of marine pollution comes from a variety of land-based activities (Defra, 2002)[262], mostly delivered to the marine environment through effluent discharge or river outflow and from shipping and port activity. Effluent discharge is a bi-product of the infrastructure required for socio-economic development but national policy has been implemented to protect the environment by maintaining and developing high quality management and treatment of these discharges (MPS Page 44). The Urban Waste Water Treatment Directive was introduced to protect the environment from the adverse effects of urban waste water discharges and discharges from certain industrial sectors.

Other directives have also been introduced to address the protection of the marine environment for industry. Surface and waste water discharge (consented by the Environment Agency) can interact with the marine environment, reducing the ecological and chemical quality of the water, which in turn can impact industries such as shell fisheries and tourism and recreation. The Bathing Waters Directive and Shellfish Waters Directive (to be subsumed within the Water Framework Directive (WFD) in 2013) both aim to protect waters for their respective industries.

The WFD is designed to improve and integrate the way water bodies are managed throughout Europe. The WFD aims to take a holistic approach to water management, preventing deterioration of aquatic ecosystems, from a range of impacts such as eutrophication and restoring surface waters to good status in terms of ecological and chemical objectives. WFD will be delivered through river basin

[262] Defra (2002), Safeguarding our seas: A strategy for the Conservation and Sustainable Development of our Marine Environment.

management plans (RBMPs) which aim to enhance and improve the water environment and set out the current status of all water bodies, the pressures it faces and what we all need to do to reduce the pressures.

Initiatives such as Catchment Sensitive Farming support land managers in managing agricultural runoff to reduce eutrophication in water bodies. The WFD and Habitats Directive (1992) monitor and report on the impact of point-source discharges in protected and non-protected areas.

The Flood and Water Management Act 2010 makes provisions for the creation of a National Flood and Coastal Erosion Risk Management (FCERM) Strategy. In addition to this, planning policy (such as Planning Policy Statement (PPS) 20 and PPS25) and related guidance outlines how developers and authorities should manage development at the coast. This includes considering, among other things, impacts that may arise from a development (such as whether it may enhance flood risk elsewhere), whether the development is itself flood resilient, whether it may be more appropriately located elsewhere, and whether it is sustainable in the long-term (such as in the face of rising sea-levels).

Surface Water Management Plans (SWMP) will also help meet the requirements of the Flood and Water Management Act 2010. County councils and unitary authorities have a leadership role in flood risk management, including authority over writing and implementing SWMPs, coordinating other authorities as necessary. The marine planning team will continue to work closely with local authorities and the Environment Agency to understand those requirements of flood-related plans that are of particular relevance and scale to the marine plan. The MMO as a whole will continue to work with local authorities to examine plans relevant to any licence applications received.

The following relevant goals/objectives and policies from the Marine Policy Statement (MPS) are highlighted by way of context although note that identifying objectives and deriving planning policies are later steps in the planning process.

- The UK will contribute to sustainable development including health and wellbeing of the community and the protection of the environment by maintaining and developing a policy and regulatory system which provides modern, high quality management and treatment of surface and waste water must make the transition to a secure, safe, low-carbon, affordable energy system.
- An important aim is ensuring that infrastructure is in place and maintained for necessary disposal activity to be carried out in compliance with EU legislative requirements.
- The marine plan authority should satisfy itself where relevant that any development will not cause deterioration in status of any water to which the WFD applies.
- Marine plan authorities will also need to take into account, once developed, any relevant targets, indicators or measures aimed at achieving good environmental status under the MSFD. Marine plan authorities should consider the physical aspect of discharging to sea in the form of the location and physical impact of major sea outfalls in the development of marine plans. The impact of coastal and estuarine change, and the risk of flooding in such areas, should be taken into

East marine plan areas – current situation

Inshore, coastal and particularly estuarine areas are more at risk of being exposed to enhanced pollution levels. In recent decades, the chemical and ecological quality of waters has improved, due to increased treatment of point source sewage discharges and better regulation of potentially polluting dockside (SSR, Page 17), and will be further enhanced by the implementation of RBMPs, associated with the WFD, which will therefore make a significant contribution to the condition of marine waters.

Figure 4.23 shows the waste water discharge sites to saline estuaries, freshwater estuaries and along the coast and there are 159 discharge sites in the East plan area. There are also a small number of unconsented, domestic discharges which are not considered to have a significant impact on the environment. Data is not available to be able to map these domestic discharges. The map also shows most of the combined sewer overflows (CSOs) in the East plan area, but not all. The majority of discharge points are to the north (Humber Estuary) and south (The Broads and Felixstowe) of the plan area, where there is increased industrial activity and thus associated discharge sites, with fewer around The Wash and North Norfolk.

Controlled waters are those within 3 nautical miles of the coast.

Figure 4.23: Consented discharges to controlled waters

January 2012
This map has been produced using the ETRS89 Coordinate Reference System

marine management organisation

MMO Marine Plan Areas

Waste water discharge areas (freshwater estuary)

Waste water discharge areas (controlled sea)

Waste water discharge areas (saline estuary)

Combined sewer overflows

East marine plan areas – existing planning context

The following focuses on relevant evidence and issues set out in LDFs and RBMPs. Surface water management and waste water treatment and disposal policies were identified in five of the 34 local authorities, national park and AONB LDFs in the East plan area. North Norfolk has the highest number of policies (3) regarding this subject matter and specifically name areas where development must take account of surface water run-off and the need for capacity in sewage treatment works.

LDF policies seek to ensure new development does not increase the risk of flooding from surface water and where development does increase surface water run-off, appropriate mitigation measures, that is sustainable urban drainage systems, are in place to manage the increases in surface water.

Where areas are designated as a principal settlement and thus recognised as an area for development, the development must address storm water run-off and not impact on local river catchments or designated areas.

The two RBMPs in the East plan area focus on the production of a dredging and disposal framework for all those undertaking navigational dredging and disposal to assist in achieving WFD objectives, amongst other issues not related to this sector.

Potential future situation

There are no specific or quantified descriptions of the potential change in this activity beyond existing goals/objectives and policies and associated regulation. The need for future growth of sewerage services and the associated infrastructure is linked to the need for development (such as increased housing). There is also a requirement to appropriately manage surface water linked to developments as not to increase flood risk in coastal areas. This growth is bound by the requirements of the various Directives to ensure minimal impact and sustainable co-existence with other existing marine activities (MPS, Page 45).

Summary of evidence and issues

This section does not consider targets for the environment and water quality in relation to this sector. This will be done in the environmental, social and economic issues chapter under the Water section.

Inshore, coastal and estuarine waters are particularly at risk of marine pollution from effluent discharge and outfalls. The implementation of national policy to address both the discharge directly through the Urban Waste Water Treatment Directive and indirectly through the Bathing Waters Directive and Shellfish Waters Directive has and continues to reduce marine pollution from these sources.

Relevance to East plan areas

There are 159 discharge sites in the East plan area. The majority of discharge points are to the north (Humber estuary) and south (The Broads and Felixstowe) of the plan area, where there is increased industrial activity and thus associated discharge sites, with fewer around The Wash and North Norfolk.

Marine planning will need to have regard to existing surface water and waste water infrastructure and any future plans for new infrastructure. Marine plans should also

have regard to the associated directives and plans that govern this sector and ensure the East Inshore plan does not contravene the Directives and plans attempting to achieve, for example, good environment status for water bodies under WFD through the delivery of RBMPs

Issues for the delivery of surface water management and waste water treatment and disposal

- Sewerage infrastructure and drainage is essential in supporting economic and social development, and for reducing the risk of flooding in rural and urban areas.
- Marine plan authorities should consider the physical aspect of discharging to sea in the form of the location and physical impact of major sea outfalls in the development of marine plans. The impact of coastal and estuarine change, and the risk of flooding in such areas, should be taken into account to avoid inappropriate development in vulnerable areas and be in line with the considerations relating to the ecological and chemical water quality and resources, seascapes and historic environment.

Issues for other sectors

- Interactions between this sector and sectors such as fisheries will be dealt with on an individual basis through the application process. There are a number of issues other sectors need to be aware of and could be addressed through the plan such as marine protected areas and tourism and recreation.
- The impact of development and associated waste infrastructure must not be at the expense of the marine environment.
- Tourism and recreation rely heavily on clean and healthy coastlines to attract visitors so ensuring surface and waste water is properly managed so as not to impact upon the quality of coastlines is important. There are many processes in place to manage the water quality of outfalls including an appropriate assessment and relevant investigations required under licences from the Environment Agency and MMO.

Issues for sustainability

- The discharge of waste water and increased run-off may have a negative interaction with the natural environment so the location of these outfalls needs to be carefully considered. The physical appearance of an outfall also needs to be considered and this would be considered through assessment of any specific application.
- The location of outfalls for surface water and waste water must be considered in relation to the ecology and water quality of the area, particularly in relation to meeting WFD targets.
- Allocation of sufficient space to facilitate future growth of current sewerage services is essential to meet the needs of development in key locations and this may result in increased pressure.

4.11 Tourism and recreation

National context and policy

Tourism and recreation covers a wide variety of leisure activities not only providing direct benefits to coastal communities, but also indirect benefits through associated businesses (that is hotels, restaurants, boat-builders and maintenance, local employment) that support the industry.

Tourism and recreation is frequently the largest source of revenue in coastal communities, attracting tourists to the area together with their financial spend[263] and providing employment opportunities many of which are taken by local residents. The sector also benefits society through the leisure opportunities and the quality of life provided by living by the coast. The tourism and recreation sector can also benefit the natural environment by protecting and enhancing environmental assets for the future. The Government's Rural Economy Growth Review recognises this with £25 million being directed towards supporting rural tourism and particularly in improving tourism within areas of outstanding natural beauty[264].

The UK administrations' aim for tourism is to take steps to improve the competitiveness of the tourism industry, recognising the important part that it plays in the national economy and to encourage growth within environmental limits[265]. Tourism is already one of our six biggest industries and our third-largest export earner[266] and the estimated income for tourism in coastal towns in the UK is £4.8 billion[267]. Seaside tourism makes an important contribution. It supports some 21,000 jobs and contributes £3.6 billion to the economy[268].

Although the numbers of people opting to holiday in England in preference to travelling abroad (so called "staycations") are lower than other European countries[269], opportunities to promote destinations in England remain important and may even increase.

A similar picture exists for recreation where, for example, the estimated economic contribution of recreational boating to the UK economy was £1.042 billion in 2009-10 and employed nearly 35,000 in this sector[270] with marinas having the potential to serve as visitor attractions in their own right[271].

Other forms of tourism and recreation include (but are not limited to) swimming, snorkelling and diving, surfing, kite-surfing and wind surfing, fishing, wildlife watching, boat trips, cycling, walking and rambling, visiting local reserves and sites of cultural or heritage interest.

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[263] The Local Value of Seabirds, Estimating Spending by Visitors to RSPB Coastal Reserves and associated Local Economic Impact attributable to Seabirds, 2010, p1
[264] www.defra.gov.uk/rural/economy/
[265] UK Marine Policy Statement
[266] Government Tourism Policy
[267] Strategic scoping report for marine planning in England
[268] UK Marine Policy Statement
[269] Government Tourism Policy
[270] UK Marine Policy Statement
[271] Economic benefits of Coastal Marinas in the UK and Channel Islands 2007, British Marine Federation

Tourism is a particularly effective vehicle for regenerating run-down neighbourhoods, using relatively small amounts of new investment to revitalise existing assets. In rural areas this means our beautiful coast and countryside[272]

There are 70 blue flag beaches across England which demonstrates compliance with the criteria covering the following: environmental management, water quality, environmental education and information, and safety and services.

The following relevant goals/objectives and policies from the MPS and Marine and Coastal Access Act are highlighted by way of context although note that identifying objectives and deriving planning policies are later steps in the planning process.

- The coast provides inspiration for a range of artistic and cultural activities and food-based tourism.
- Outdoor recreation and enjoyment of the coast can provide benefits to physical and mental wellbeing.
- Continuous coastal path around the whole of England making the coast accessible to the public for the purposes of its enjoyment, which includes recreational uses (lead by Natural England).
- The government sets a priority to ensure that we all value our coastal and marine environment by raising awareness of the effect certain activities have on the marine environment, improving information about the value of our coasts and seas and by encouraging recreational activities in the marine environment[273].

East marine plan areas – current situation

The East plan area contains approximately 2,200 kilometres[274] of coastline which includes many beaches, coves, headlands and areas for recreation and leisure. There are also many attractive tourist locations.

16 beaches have been awarded blue flag status[275], demonstrating their work toward sustainable development, but especially their high water quality and management[276] (not all local authorities apply for blue flag status and this alone may not necessarily indicate the best beaches. Some authorities apply for alternative awards such as the Marine Conservation Society's Good Beach Guide).

Many people visit an area simply to be by the sea. 27 per cent of visitors to Suffolk in 2010 said the waterways and coast was an important factor in deciding to visit the area[277] and similarly 69 per cent in Waveney intended to visit the local beaches[278].

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[272] Government Tourism Policy
[273] Cleaner Coasts healthier seas working for a better marine environment strategy' 2005-2011
[274] This includes inland estuarine waterways up to the tidal limit.
[275] www.blueflag.org/Menu/Awarded+sites/2011/Northern+Hemisphere/England/EastOfEngland
[276] www.blueflag.org/Menu/Criteria/Beaches/Beach+Criteria+and+Expl+notes+2012
[277] www.choosesuffolk.com/tourismpartnership/pageDownloads/65566654Suffolk%20Visitor%20Survey%20Report%20Draft.pdf
[278] www.waveney.gov.uk/site/scripts/news_article.php?newsID=214

Leisure boating is the most popular and economically valuable part of the marine water sports industry. In the East plan area there are 101 Royal Yachting Association (RYA) training areas, 33 RYA marinas, 37 recreational craft marinas and 6 RYA racing areas (see Figure 4.18 for locations). While there is some demand for surfing in the East plan area, it is a low quality area for the surfing community with low consistency and medium levels of interest[279].

Wildlife also attracts many visitors to the East Plan area with coastal nature reserves such as Bempton Cliffs, a RSPB reserve near Bridlington, received 65,000 visitors in 2009/10, providing people with the opportunity to engage with and learn more about the natural environment and delivering benefits for health and wellbeing, education and the economy[280].

There are 1278 scheduled ancient monuments and battlefields in the plan area which attract visitors to the coastal areas for their rich heritage value.

Please note: The availability of data on recreation is limited. However, the MMO is commissioning work to draw together existing data on recreation, to identify data gaps and where appropriate commission further research. This data will be presented on the marine planning portal when the study is complete and taken into account in the future stages of marine planning.

The tourism and recreation-activity locations map displays data derived from the points of interest database developed by Ordnance Survey and Landmark Information Group, and includes data collected by Visit Britain. It displays the many tourism activities including camping and caravanning sites, water sport activities and some additional visitor attractions, highlighting the quantity and variety of tourism related activity on the East plan area coast. Please note this map does not represent all tourism and recreation attractions in the plan area; it simply illustrates the variety of opportunities for visitors.

[279] Surfers Against Sewage The Waves Are Resource (WAR) Report.
[280] RSPB Reserves and Local Economies 2011

Figure 4.24: Tourism and recreation

January 2012
This map has been produced using the ETRS89 Coordinate Reference System

marine management organisation

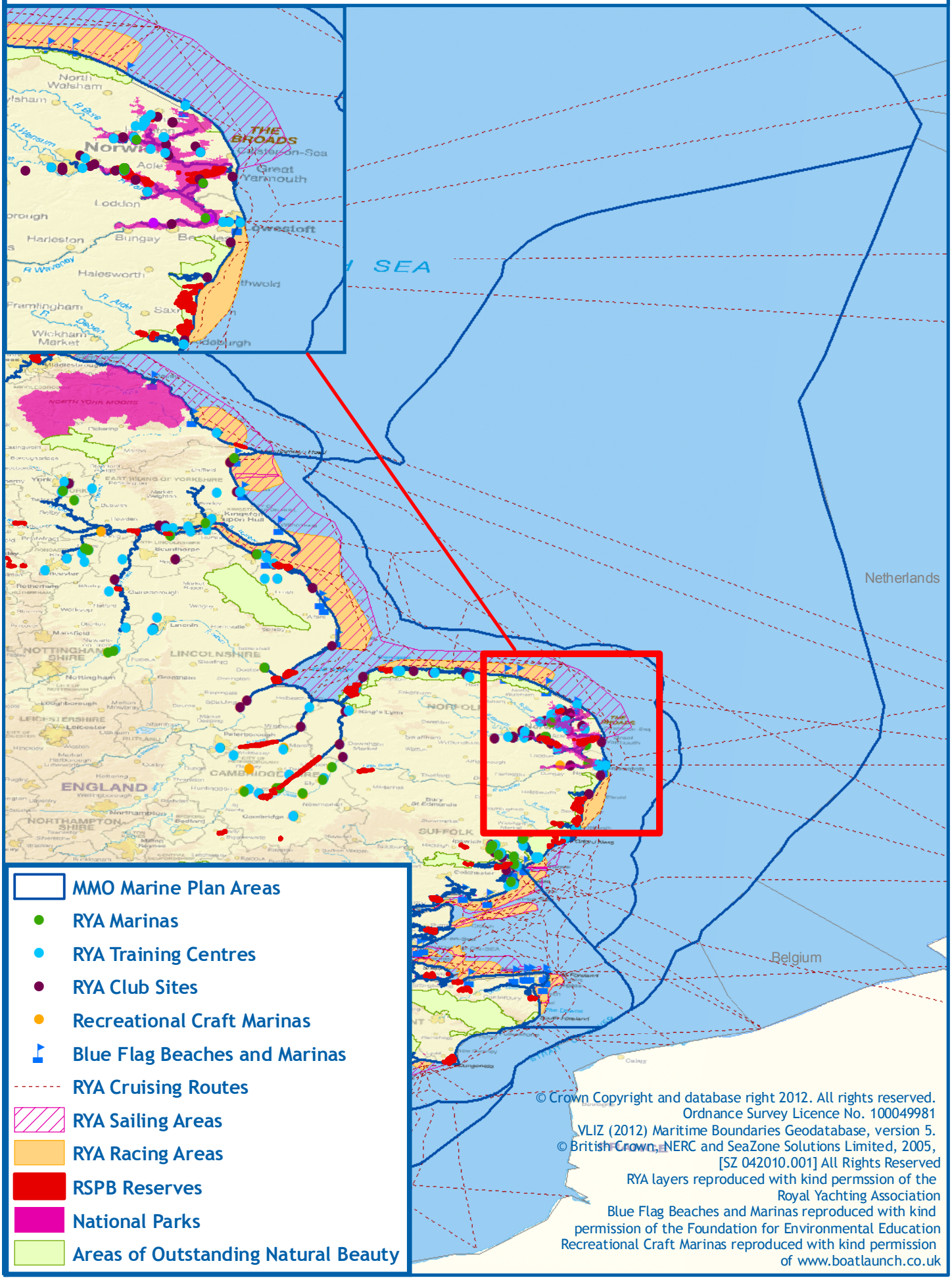
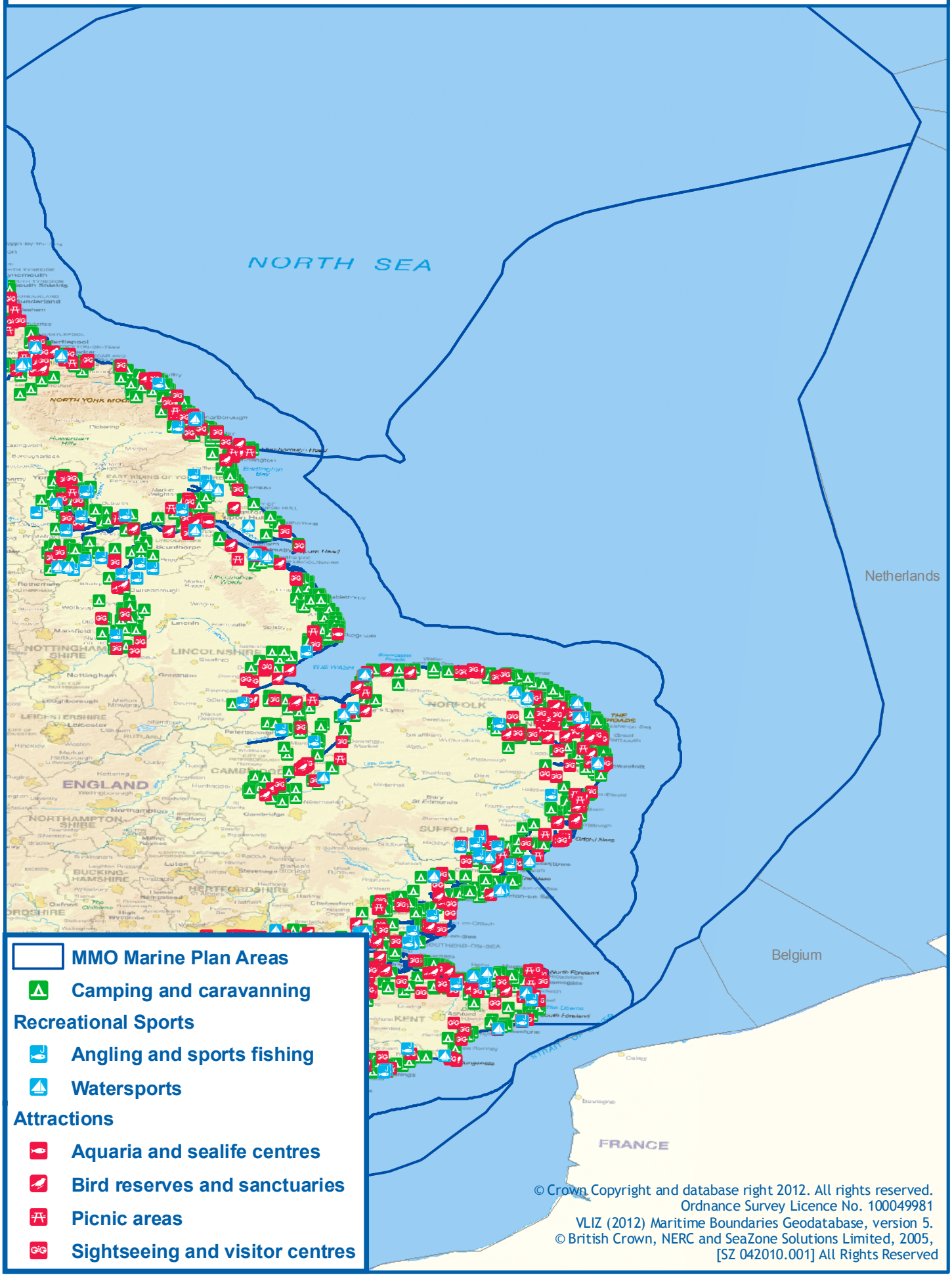


Figure 4.25: Tourism and recreation-activity locations

January 2012
This map has been produced using the ETRS89 Coordinate Reference System

marine management organisation



East marine plan areas – existing planning context

The following section focuses on relevant evidence and issues set out in LDFs and AONB management plans.

Marine relevant policies were identified in the plans of 13 local authorities. The majority of tourism and recreation policies identified relate to coastal local authorities in the south of the plan area.

Local authority policies identified cover a mix of recreation and tourism with the majority relating to the latter. There are direct linkages between many of the policies on tourism and economic growth and job creation. Certain policies on tourism are linked with environmental and heritage assets with most seeking to protect the natural environment, existing culture and heritage value.

Policy approaches can be summarised as:

- diversification and/or strengthening of the tourism and recreation offer
- protection and promotion of existing tourism and recreation offers
- addressing transport or access as part of tourism and recreation development.

The above policy approaches are not to be at the detriment of the environment.

Summary of evidence and issues

Relevance to East plan areas

The East plan area contains over 2,000 kilometres of coastline which makes it an attractive area for both tourism and recreational activities.

- **Current**: Leisure boating is the most popular and economically viable part of the marine water sports industry with many RYA training areas, marinas and racing areas in the East Inshore plan area. These areas are clustered around the Broads in Norfolk, Suffolk coastlines and estuaries and to a lesser extent the estuaries in the Wash and Humber. Records are not kept on numbers of members at individual clubs, their activities, or moorings and anchorages.
- **Current**: There are 16 beaches with blue flag status. which can be attributed to high water quality and good management[281].
- **Current**: Visitors across the East plan area support the tourism and recreation economy. 250,000 people viewed wildlife during visits to East Yorkshire in 2010, with 45,000 of these visitors coming specifically for the wildlife, generating over £1million per annum for the local economy[282].
- Wildlife watching is a popular activity within the East plan area, with visitors keen to learn more about the natural environment and its attributes such as marine mammals.
- The publics awareness of the environment and conservation issues positions wildlife watching as a potential growth sector[283].

[281] Blue Flag beach status awarded for May to September 2011.
[282] The Economic Potential of Nature Tourism in Eastern Yorkshire, 2010.
[283] Tourism benefit and Impact analysis of Norfolkf Coast Area or Outstanding Natural Beauty, 2006.

- **Future**: It is difficult to predict future trends and demands for tourism and recreation. The current economic situation may lead to an increase in domestic tourism due to the variety of opportunities available, which in turn may lead to an increase of visitors to local coastal and seaside areas.

Please note: The availability of data on tourism and recreation is limited. However, the MMO is commissioning work to draw together existing data on recreation to identify data gaps, and where appropriate commission further research to fill them.

Issues for delivery of tourism and recreation

- LDFs in the East cover the growth and enhancement of the tourism and recreation industries, placing criteria on delivery of new development so that it does not negatively impact on the environment – notably conservation designations, water quality and seascapes. Marine planning, in general, will seek to support this approach in the development of the marine plan
- Tourism and recreational activities will predominantly occur along the coast and in the inshore plan area. Few activities occur in the offshore area therefore this sector is spatially constrained to the coastline and inshore area.
- This sector is also impacted by the activities that occur on land and thus the need for terrestrial and marine planning to co-ordinate will be important for this sector.
- There are many interactions between activities within the tourism and recreation sector as well as with other sectors. In delivering marine planning, a thorough understanding of the range of tourism and recreation activities available in the East plan area is necessary. The MMO has commissioned a recreation study to gather information on this and identify gaps in data[284].
- Tourism and recreation in coastal areas is frequently supported by an attractive and healthy beach which is often the focal point for many coastal communities. Increased coastal erosion and flooding along the East coast could impact on the tourism and recreation opportunities and associated economic benefits for local communities. Analysis of the six shoreline management plans in the East plan area has been undertaken to ensure marine planning understands the management policies implemented to reduce the impact of erosion and flooding and support the coastal communities. This will need to be ongoing throughout the planning process.

Issues for other sectors

- Designations, identified specifically for environmental or conservation characteristics (see section 4.1 for different types) or cultural heritage , are important for tourism and recreation. Visitors are attracted to these areas for a variety of reasons including conservation and wildlife watching, for recreation activities such as diving or walking and to appreciate the uniqueness of the site at the coast, including the Humber and Wash estuaries as well as the Norfolk and Suffolk coasts. These have been identified for specific appropriate management within local authority planning policies.

[284] Compilation of spatial data on marine recreation activities, due for completion in March 2012.

- Ports and harbours may play a role in the diversification of tourism and recreational activities, such as wildlife excursions, fishing trips or visiting offshore wind turbines. The latter occurring at Scroby Sands in Norfolk.
- They are also important for ferries, yachting and cruising.
- Decisions about fisheries may have implications for the tourism industry as fishing boats and associated activity form a key part of the tourism offer in areas such as Aldeburgh in Suffolk and Cromer in Norfolk. Although it is difficult to quantify this, links between fishing, ports, harbours and marinas and tourism and recreation should be considered carefully. The MMO is exploring research opportunities to further illustrate the economic linkages between commercial fishing and tourism.
- The visual impact of offshore wind turbines and associated land-fall cabling/sub-stations may have an impact on the seascape of an area, and could impact on the tourism offer. In some areas wind farms are attracting tourists interested to learn more and see them in their surroundings. The associated land-based transmission infrastructure requires careful consideration and all regulatory authorities working closely together to ensure the minimisation of visual impacts and detriment to public amenity.
- Beaches in the East of England attract many visitors and have inherent coastal defence benefits. Many beaches have suffered from coastal erosion with beach replenishment schemes introduced to the Lincolnshire and North Norfolk Coast and East Anglia[285] to address erosion and maintain the tourism offer. The marine aggregate industry provides the majority of material for these schemes and this relationship needs to be recognised.
- Cumulative effects and potential squeeze of other sectors on the navigational needs of tourism and recreation interests should be considered. A reduction in available space for commercial shipping may have a knock-on effect on recreational boating. This can force recreational craft into the same space as commercial shipping thus creating a potential navigation hazard.
- It is difficult to predict the future pattern of the economy so tourism and recreational resorts need to focus on developing a strong, multi-user, multi-industry offer to attract visitors, such as efforts in North Norfolk to diversify the accommodation and attraction offer while retaining existing tourism infrastructure.
- Impacts from many sector activities such as waste water, litter, noise and light pollution can have adverse effects on the tourism and recreation sector.

Issues for sustainability

Tourism and recreation can provide environmental benefits by helping to enhance understanding and appreciation of the marine environment through activities such as eco-tourism and nature watching. Increased visitors numbers and improved access can also offer socio-economic benefits to coastal communities.

In many communities, tourism and recreation is a key employer with many other businesses, such as construction, retail, arts and crafts, directly benefiting from this sector[286]. The need to protect, maintain and develop and diversify current tourism

[285] www.bmapa.org/downloads/BMAPA_download.pdf
[286] www.norfolkcoastaonb.org.uk/mediaps/pdfuploads/pd000295.pdf

and recreation opportunities is very important for the local communities that rely on this sector and its contributions to the local economy.

However, tourism and recreational activities can also have a negative impact on the marine environment through the:

- removal of marine flora or fauna
- physical or visual disturbance to wildlife
- increased levels of waste water discharge litter or noise pollution
- pressures from increased visitor numbers in environmentally sensitive areas[287]
- introduction of non-native species into an area on recreational boats and crafts.

These impacts highlight the importance of protecting the environment to ensure the tourism offer is maintained and thus the economy continues to benefit from this sector. While it is important to continue offering visitors strong tourism and recreation opportunities (which support the economy through revenue and employment), these activities need to be carried out in a sympathetic manner to preserve the natural environment for future generations.

The potential effects of tourism and recreation activities on the marine environment will need to be considered in marine planning. Similarly, where they occur, the socio-economic benefits of tourism and recreation should therefore be recognised when developing marine planning policy.

4.12 Future change in activities and resulting footprint – examples of more detailed analysis to illustrate potential approaches

Introduction

In order to undertake planning it is necessary to assess the potential future changes in relevant sectors. This should be partly based on projecting current trends forward which can also help to provide a baseline of what would happen in the absence of marine planning. It will also include assessing new demands for marine space, taking account of objectives, policies and technical considerations, which may identify potential key issues in the future, such as conflicts or competition for space, cumulative effects, which marine planning needs to address[288]. It is recommended that plans take a twenty-year view (and can look beyond this period as appropriate)[289] although it is also helpful to consider the short-term, such as six years.

Ideally, different predictions or estimates of high, medium, or low amounts of change or growth, and the resulting spatial footprints, would be produced for each key activity. This would then enable an analysis of the interaction between that activity,

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[287] Defra (2010) UK Marine Policy Statement, p46, Section 3.11.4
[288] Defra (2011) A description of the marine planning system in England, p53 www.defra.gov.uk/corporate/consult/marine-planning/index.htm
[289] Defra (2011) A description of the marine planning system in England, p43 www.defra.gov.uk/corporate/consult/marine-planning/index.htm

under those three predictions, and the current situation for other activities, the estimated future for other activities, and various receptors such as environmental features (both individually and in combination with other activities). Practically, doing this for all sectors is difficult for two reasons.

Firstly, the degree to which future development or change can be described or quantified varies greatly between activities[290]. Some sectors which are very market dependant, such as telecommunications, are unable or limited in the predictions that they can make for future demand. Ongoing research[291] commissioned by the MMO is intended to provide some further insight and context for discussions with stakeholders.

For other sectors, it is known that there is likely to change or growth it is not only difficult to describe what that would look like in magnitude but also very difficult to describe **where** it would occur, such as shipping, some fisheries. At present that also applies to MPAs and particularly marine conservation zones. Recommendations are currently being assessed and proposed sites will then be subject to formal consultation such that it would be inappropriate to attempt to derive different estimates for the final make up of a designated network of MPAs (see Chapter 4 MPAs section).

Secondly, to ensure the analysis is manageable and the outputs clearly understood, there is need to limit the number of permutations to be considered, that is even if a high, medium and low estimate could be produced for each key activity included in the MPS (and several of these can be sub-divided) it would be not be sensible to generate all the permutations possible. Instead, it is necessary to focus on those activities that may lead to key issues, including impact on other activities, of most relevance to marine planning. Such activities would seem to be those that will undergo a substantial amount of change resulting in a significant change or demand in spatial footprint which will potentially affect other users of space and/or the environment.

Taking the above, the following focuses on examples of three relevant activities, that is those whose delivery and/or impacts on others is particularly amenable to being addressed by marine planning AND which can be described in a meaningful way based on the evidence available. **Providing predictions of future change or growth for only some activities either here or in revised analysis in no way indicates that are other activities are less important, it is simply a reflection of available knowledge and the issues where marine planning can add value.**

The analysis of future spatial requirements by 2030 looks at wind energy, aggregate extraction and oil and gas production, all cases where there is **relatively** good information and likely significant implications for use of space. **These are examples, provided partly to seek comment on the approach and methods used and their applicability to other activities. We anticipate continuing to explore the**

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[290] Comments welcome on the variation between sectors and how best to address this.
[291] Project being undertaken by Cranfield Institute to derive plausible national projections for the English marine area, and East marine plan areas, at 6 and 20 years? www.marinemanagement.org.uk/marineplanning/evidence.htm

approach, assumptions, methods and data for futures analysis and its application to marine plans. We will continue to highlight the need for such analysis with stakeholders, some of whom see the need and support work to address it. Indeed, the aggregates example has been revised compared to the draft report based on a detailed response from the industry. We are aware that UK Oil and Gas are considering alternative projections to those that are presented here; we have retained the provisional example for oil and gas to help illustrate the methodology but will update this in an addendum as appropriate.

The brief analysis describes the steps involved and underlying information and assumptions. In outline, the steps include:

- distribution of the relevant resource
- technical opportunity map taking account of other factors that determine where the activity could technically occur
- taking account of other, current activities (what might be termed hard constraints) that clearly preclude the activity being assessed as they are not compatible
- other activities may pose a degree of restriction (what might be termed soft constraints), rather than exclusion, depending the situation, importance, stakeholder views – examples of these are listed in the three cases below by cross-reference to sector descriptions in Chapter 4
- other factors may act as soft constraints, one of which may be sensitivity of environmental features to different pressures. This is referred to below with a possible approach, important limitations and caveats, and examples described at in Chapter 5.

The high, medium and low estimates for demand can then be applied to the outputs of any of these steps to give an indication of the relative difference in the resulting spatial footprint. While the estimates may define the **proportion** of the predicted available area, even for the examples selected it is not possible to say which locations within that area will eventually be identified. However, to highlight the different implications of the three estimates, spatial footprints for each are included **simply to visualise the differences and should not be taken as indicative of areas of preference**.

Projections and component parts of analysis that are described in this chapter should not be compared as if 'like for like' across sectors. For example, the technical opportunity or aggregate extraction and 'technical opportunity' for wind energy are not based on the same scale and do not represent comparable levels of opportunity. The maps show a relative assessment within the sector considered to assess competing demands for space.

4.13 Offshore renewable wind – an example of considering interaction with various constraints and estimating projections for future need

Introduction

The following section sets out an example utilising detailed considerations, including technical data and analysis, to ensure interested stakeholders are aware of some of the methods used to define potential future activities for use in the options phases of planning. At this stage only technical opportunity (criteria explaining where an activity can occur, such as water depth), hard constraints (factors that govern where activities cannot take place, such as around hard infrastructure) and some examples of other considerations are explored. Some soft constraints have not been considered such as other activities and socio-cultural information. These considerations will be brought forward in later stages of planning process.

This example outlines potential projections and opportunity maps for fixed foundation wind turbines. Floating turbines have not been considered due to uncertainty of adoption of the technology within the 20 year horizon of the marine plan.

Ongoing research[292] and discussion is seeking to establish some reasonable alternative growth projections for the rollout of offshore renewable power generation in the future. Initial suggestions are included here in order to visualise such projections – **these are included to highlight the issue and outline a possible approach only.**

Projections have been interpreted into a high, medium and low estimated roll out of renewable energy projects for the purposes of this report which are described below:

- High estimate
    - In 2030 all renewables account for around 70GW of UK energy production
    - High voltage grid installed all across the continental shelf
    - Wave and tidal renewables also contribute significantly to power generation
- Medium estimate
    - In 2030 in excess of 40 GW of electricity is produced by renewable sources
    - UK on track to meet its 2050 carbon reduction target set out in the Climate Change Act 2008
    - In 2020 15 per cent share of consumption is met by renewables
- Low estimate
    - Renewable electricity production in 2030 is at 25 GW
    - EU 2020 targets not met until 2025
    - Overall rollout not met expectation
    - Wave and tidal not commercially viable

[292] Project being undertaken by Cranfield Institute to derive plausible national projections for the English marine area, and East marine plan areas, at 6 and 20 years? www.marinemanagement.org.uk/marineplanning/evidence.htm

The estimations defined above cover the whole of the UK and supply an estimate for all types of offshore renewable energy projects, up to 2030.

Potential opportunity for wind development in English waters and East plan areas

Figure 4.26 details technical opportunity for fixed foundation wind developments in English waters. This data layer was developed in partnership with The Crown Estate using their MaRS system to model technical parameters of fixed offshore wind turbines in the UK. The areas shown are those most likely to support future development activity because they are technically suitable. This data is primarily based on seabed elevation (water depth greater than 5 metres and less than 60 metres), distance from shore and wind resource data.

Figure 4.26 demonstrates the importance of the East plan areas in developing fixed foundation wind farms with large continuous areas of the plan area technically suitable for development. As described in the introduction of section 4.12, to refine areas of search, hard constraints (immovable infrastructure), soft constraints (other non fixed activities) and other considerations need to be mapped.

Figure 4.27 details technical opportunity with hard constraints extracted (see Annex 9 for table of hard constraints). This significantly reduced the availability of developable space with IMO shipping routes and aggregate areas removing large areas of technical opportunity.

Figure 4.28 further refines the area of search by removing some soft constraints. Round 3 areas have been removed as leases have been agreed between developers and The Crown Estate, with target zone capacities defined. Another consideration that has been considered in defining the area of search is recommendation 4 from DECC's SEA[293] which states that most wind farm development should occur outside 12 nautical miles from the coast. This reflects the relative sensitivity of multiple receptors in coastal waters and the large amount consultation needed to develop in this area.

A range of soft constraints, activities that will be affected and may affect the siting of wind farm developments, should be considered when defining an area of search, The spatial coverage of these activities is described by sector in chapter 4 but are not brought into the analysis and mapping at present.

Another type of soft constraint is habitat sensitivity to the pressures caused by the construction and operation of offshore wind installations. This has been considered in Chapter 5, Section 5.5 and has been incorporated into Figure 4.28

[293] DECC, 2009, Post Public Consultation Report, p93

Figure 4.26: Technical opportunity for the development of offshore fixed foundation wind turbines

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This map has been produced using the ETRS89 Coordinate Reference System

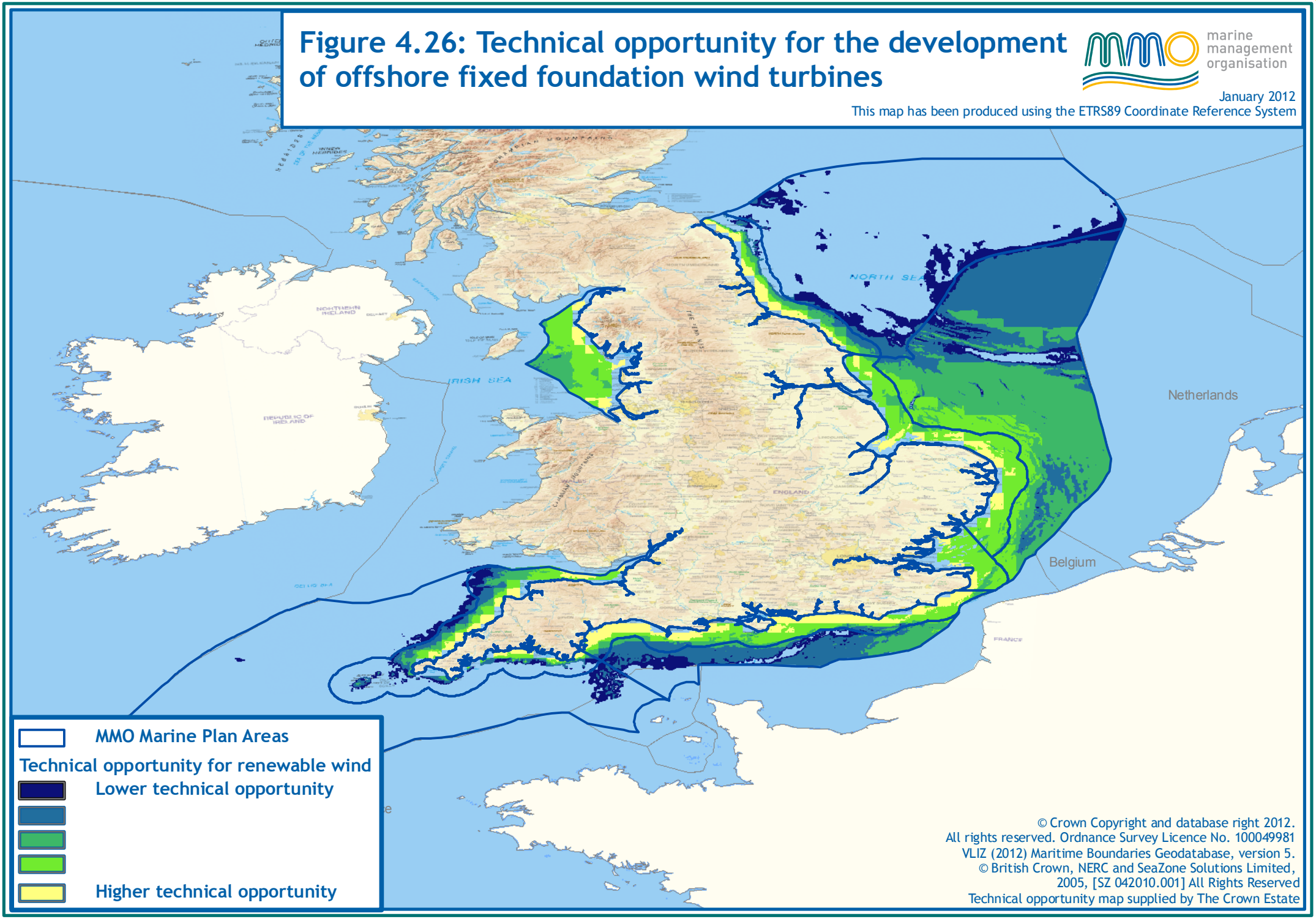

Figure 4.27: Technical opportunity for fixed foundation wind farms with hard constraints applied

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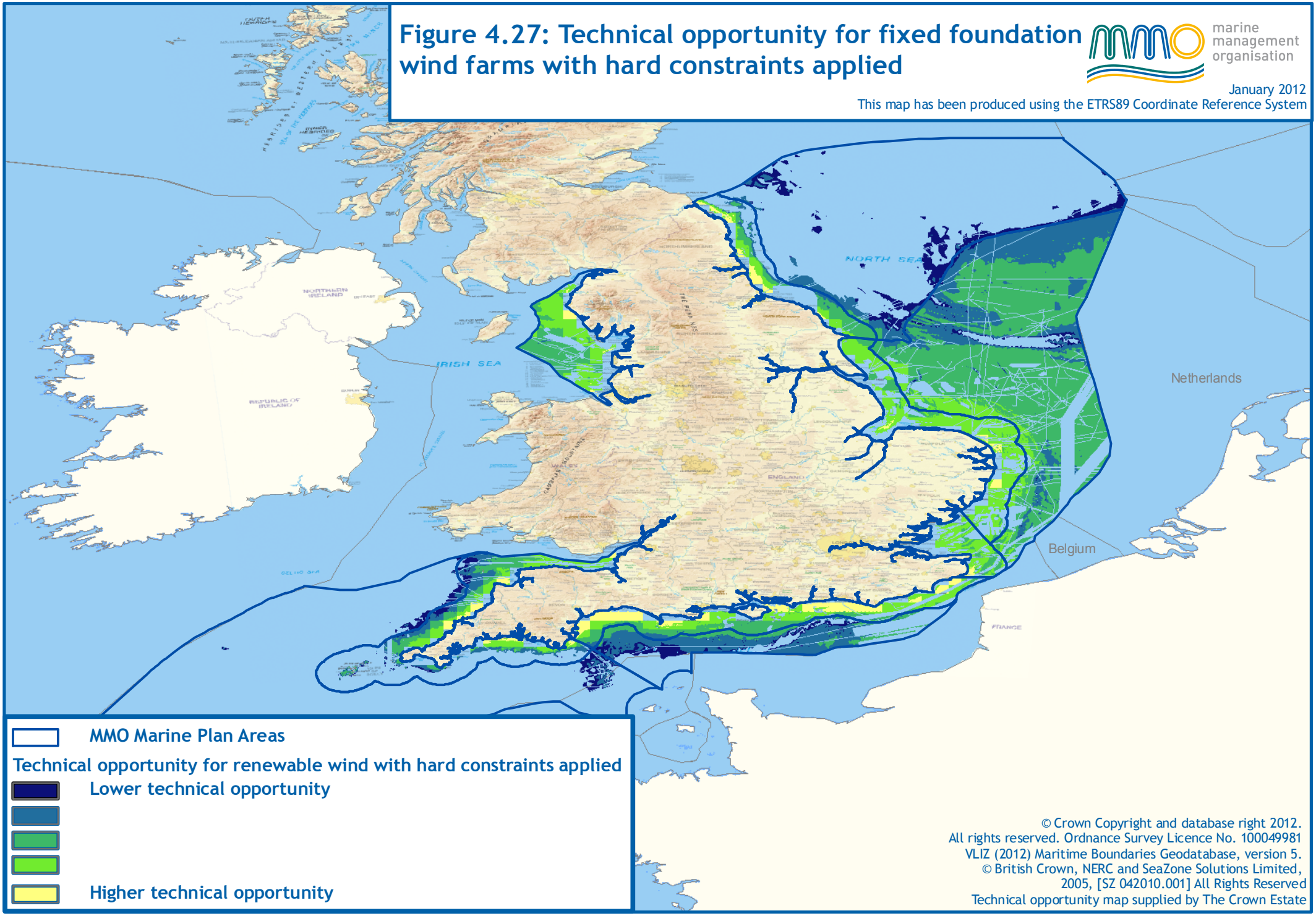

MMO Marine Plan Areas

Technical opportunity for renewable wind with hard constraints applied

Lower technical opportunity

Higher technical opportunity

Figure 4.28: Technical opportunity for fixed foundation wind farms with hard constraints, round 3 areas of search and 12nm coastal buffer applied

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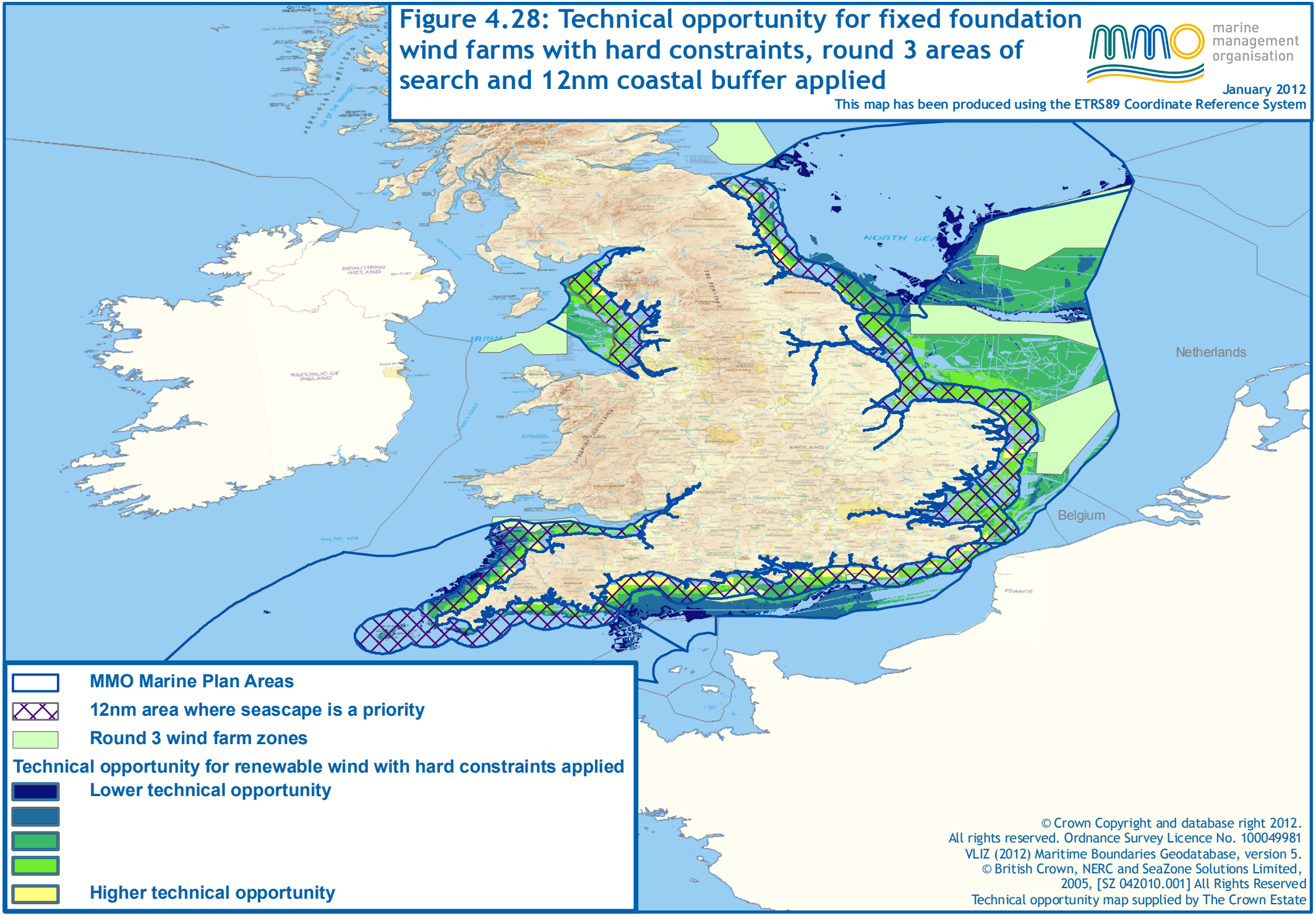

Technical opportunity map supplied by The Crown Estate

Defining the three growth estimates for offshore wind energy

These projections can be interpreted into a spatial footprint which will either describe a percentage of the Round 3 zones target capacity or, in the case of the high estimate, identify potential areas of development outside Round 3 areas.

To complete this calculation, the power output per turbine and associated spatial density is required. Several rules have been defined defining spatial requirements for wind developments[294].

- Wind turbines should only be positioned in 500 megawatt (MW) blocks.
- Blocks should be 10 x 10 turbines which must be 1 kilometre apart equating to blocks of 10 kilometres x 10 kilometres.
- There should be a gap of 5 kilometres in all directions around the 500 MW block. This should give an overall density of 2.5 MW per square kilometre.

When calculating the spatial requirements needed to reach the estimates above, existing developments need to be taken account of. Figures for the proposed capacity of all Round 1 and Round 2 wind farm projects, 8 GW[295] were taken from the projection. Wave and tidal projections were taken from the Analysis of Renewables to 2020 report[296]. Estimates of the use of wave and tidal power generation up to 2030 were unavailable so 2020 projections are taken forward as indicative levels of power contribution from wave and tidal sources. The proposed target for three developments (33 GW[297]) was also subtracted from the projection.

Table 4.1 calculations to define footprint of future wind projects using the figures of 2.5 MW per square kilometre (these calculations using the values defined above)

Estimate	Low	Medium	High
Suggested projections for 2030	25 GW	40 GW	70 GW
Anticipated installed capacity from Round 1 and Round 2	8 GW	8 GW	8 GW
Proposed capacity from Round 3	33 GW	33 GW	33 GW
Projected tidal power generation in 2020	0.160 GW	0.385 GW	0.640 GW
Projected wave power generation in 2020	0.105 GW	0.205 GW	0.510 GW
Extra capacity needed to meet projection	0 GW	0 GW	27.85 GW
Percentage of Round 3 generation targets needed to fulfil projection	51	95	-
number of extra 500 MW blocks required	0	0	56

Please note the following assumptions and known limitations to this study

- The projections are based on all forms of renewable energy available in 2030 and exploitation of resource across all UK waters.
- Floating turbines were not considered in this analysis.

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[294] BWEA research paper, recommended by The Crown Estate. Note a number of different turbine sizes and spacing's will feed into this type of analysis at later stages in the planning process
[295] The Crown Estate, www.thecrownestate.co.uk/rounds-one-two, Accessed October 2011
[296] AEA/DECC, 2010, Analysis of Renewables Growth to 2020
[297]The Crown Estate, www.thecrownestate.co.uk/energy/offshore-wind-energy/our-portfolio/, Accessed October 2011

- Levels of precision vary between projections, in that the overall wind projection is to the nearest GW but the Analysis of Renewables report gives projections for tidal and wave to the nearest MW.
- Efficiencies and spatial requirements per MW of generation capacity may change as turbine technology develops. This has not been accounted for in these calculations.
- Estimates of the use of wave and tidal power generation up to 2030 were unavailable so 2020 projections are taken forward as indicative levels of power contribution from wave and tidal sources.
- Due to coverage of information it has been assumed that the all extra generation capacity to fulfil the projection will be met in English waters.
- There may be future advances in technology which may change either the energy generating capacity of turbines or their spatial limitations.

These limitations have been managed to show the highest density of structures in the East plan areas. This allows issues to be easily identified and taken forward in marine planning.

Also note that this is an example of analysis based only on technical constraints, hard constraints and some examples of other considerations. In future stages of the planning process for the East of England a complete analysis of socio-cultural factors, other activities that use the marine space, other environmental data such as bird, mammal and cetacean datasets and a variety of different options of spacing of turbines, turbine types, locations of arrays and connection issues will be considered.

Defining an East plan areas specific projection

To allow next stages of analysis, the combined opportunity map (Figure 4.28) was classified into six equal groups described in Table 2. This allowed geographic information system (GIS) analysis of areas of opportunity to be produced.

Table 4.2: Reclassification of values into groups – 6 means higher levels of technical opportunity overlaid with lower environmental sensitivity

Class	Technical constraint value
1	0.0 to 0.20
2	0.20 to 0.39
3	0.39 to 0.59
4	0.59 to 0.79
5	0.79 to 0.98
6	0.98 to 1.18

The overall availability of each class in English waters and in the East plan area was then calculated. The percentage of each class occurring in the East plan area in comparison to the rest of English waters was determined which allowed the relative importance of the plan area to be quantified.

Table 4.3: Percentage of best opportunity in the East plan area

Class	Class coverage across all UK waters with all considerations (square kilometres)	Class coverage across East plan area with hard constraints (square kilometres)	Percentage of class in East plan area
1	861.73	0.74	0.09
2	4059.91	355.71	8.76
3	6965.70	2049.74	29.43
4	10437.18	7358.69	70.50
5	14012.10	12286.68	87.69
6	2686.39	1926.18	71.70

Using these statistics, the footprint required to accommodate the estimated projections defined in Table 4.1 for offshore wind in the East plan area can be compiled.

Medium and low projections are covered by all existing and planned developments and therefore, an extra footprint is not required. Table 4.1 describes the calculation that determines this.

High projection

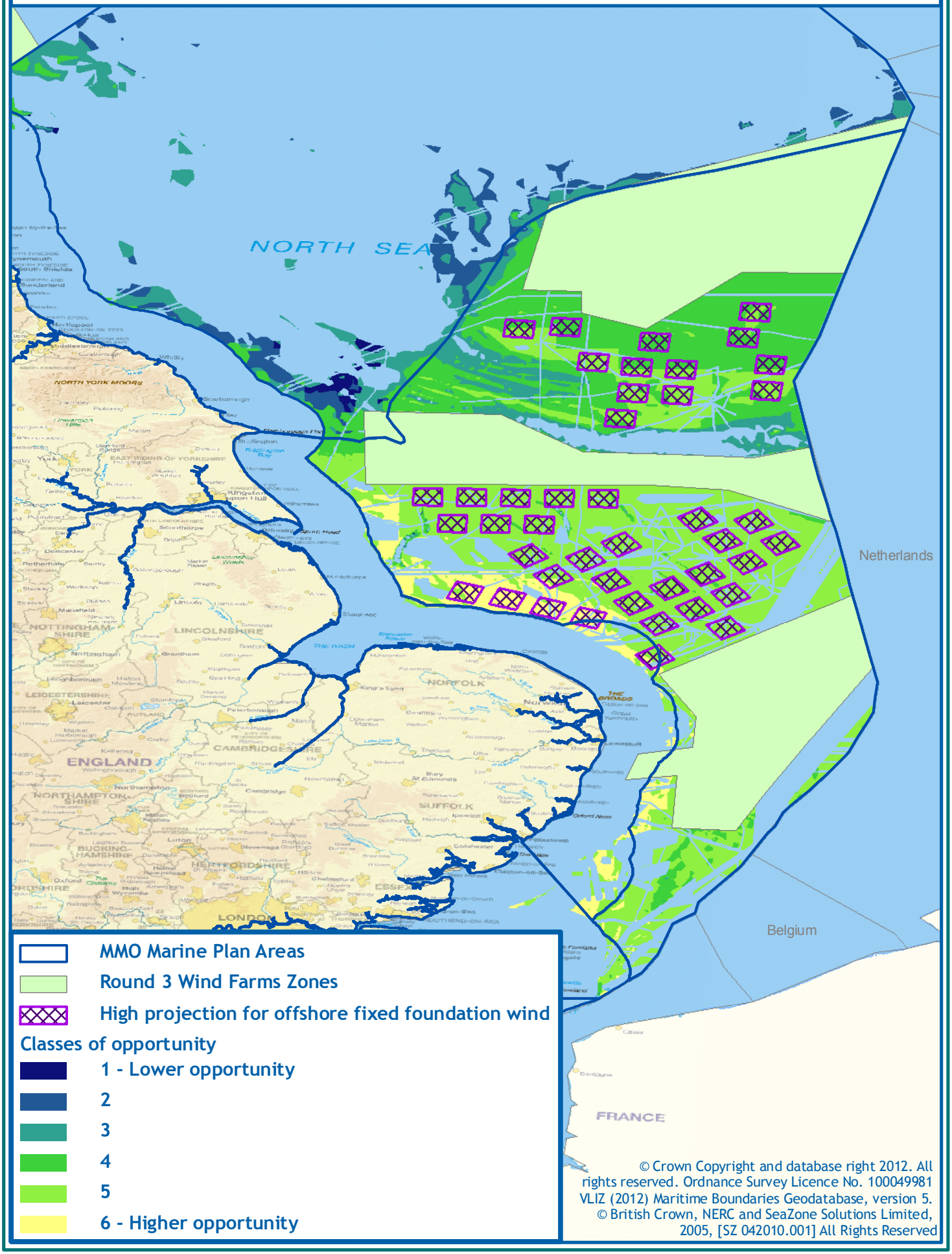
Overall footprint needed is 5,570 square kilometres or 56 10 square kilometre x 10 square kilometre blocks. An average of the percentages of each of the top three classes in Table 4.3 was taken to understand the percentage of best opportunity for wind in the East plan area. The resultant 77 per cent can then be applied to the overall number of blocks required in the East plan area giving a total of 43 10 square kilometre by 10 kilometre blocks.

Figure 4.29 demonstrates a visualisation of the footprint required in the East plan area for the high projection described above. This map demonstrates the size of projects required to achieve the high projection but also highlights the importance of the East plan area in any future increase in renewable targets.

Although an extreme example, it highlights several issues which may occur when developing offshore wind, even in medium and low projections. These issues include: methods of grid connection, the need to investigate co-location wherever possible and the need to coordinate and understand cumulative effects on other activities and environmental receptors. The MMO's current projects on both co-location and cumulative effects may assist in our understanding of these issues. This also highlights that turbines may need to be sited within the 12 nautical mile distance from shore which could require more significant consultation with stakeholders.

Figure 4.29: Visualisation of wind development required in the East plan areas to meet projection

January 2012
This map has been produced using the ETRS89 Coordinate Reference System



Conclusions of initial analysis

Wind energy: the East plan areas represent a large proportion of opportunity for fixed foundation wind turbines in English waters and are currently supporting numerous wind projects in planning and development. Government policies, targets and enabling documents form the basis for projected estimates. If renewable energy targets are increased, the East plan areas are likely to have to contribute significantly more in terms of space to accommodate new projects. The analysis to date implies this is possible but assessment of other activities spatial requirement and ability to operate around wind farms needs to be completed.

Please note: The MMO welcomes input or assistance from stakeholders on predicting the future activity of wind energy for input into marine planning either on the methods of analysis or the input data.

4.14 Oil and gas extraction – an example of considering interaction with various constraints and estimating projections for future need

We are aware that UK Oil and Gas are considering alternative projections to those that are presented here; in particular, the assumptions about demand for the plan area require to be reviewed. We have retained the provisional example for oil and gas to help illustrate the methodology but will update this in an addendum as appropriate. The MMO welcomes input or assistance from other stakeholders on predicting the future activity of oil and gas for input into marine planning either on the methods of analysis or the input data

Current situation or background

Oil and gas activity in the waters around England is administered through a licensing system, which divides sites for oil and gas prospecting and extraction into licence blocks, which are released in bidding rounds. There are currently oil and gas licence blocks operating throughout the East of England plan areas. This includes those awarded through the most recent rounds, 25 and 26, though the majority of these are not operational yet. This can be seen in Figure 4.30. The primary activity is almost exclusively gas extraction, though there is one oil field in the East Plan areas. The purpose of this exercise is to gain an understanding of the potential footprint for oil and gas activities in 2030.

Generating estimates of a potential future footprint

Technical opportunity

In order to gain an idea of the potential area of search for oil and gas activity in 2030, an initial assessment was achieved by consideration of those licence blocks with licence expirations after 2030 and the round 25 and 26 blocks. This gave a technical opportunity map (Figure 4.30), or initial area of search, for oil and gas (that is the theoretical maximum activity that could occur in 2030 if no further blocks were licensed). This map contained approximately 126 licence blocks.

Hard and soft constraints

Some hard constraints were considered that may limit space available for oil and gas extraction. These can be seen on the map below. However, a licence block would not be eliminated from consideration on the basis of presence or absence of existing infrastructure.

Habitat sensitivity was then considered as an example of a soft constraint. This also did not reduce the area of search further since the habitats within the licence blocks showed a relatively low level of sensitivity.

Once technical opportunities have been considered, a number of possible projections were then considered for 2030.

High projection

The total technical opportunity area was therefore considered as a possible future projection under high levels of growth. This projection assumes every licence block yields hydrocarbons at a level that makes them economic to extract. This also assumes that all relevant environmental impact assessment (EIA) and licensing criteria for individual projects can be met.

Medium projection

The medium projection was derived using the Department of Energy and Climate Change (DECC) energy mix calculator and ArcGIS and uses past extraction rates to predict a possible future Using these tools, it was possible to assume that UK Continental Shelf gas production will remain similar in 2030 despite changes to the rest of the energy mix, at 29.1 gigawatts (GW).

Using the DECC calculator, it was possible to ascertain that in 2007 the UK used 95.1 GW of gas. ArcGIS was used to determine the number of active licence blocks in the UK at that point, which was 950, of which 248 (26.1 per cent)[298] were in the East plan areas. From this it was possible to work out that average production per licence block was 0.100105 GW (95.1/950). If it can be assumed that this average production is accurate enough and will remain constant into the future, and that the proportion of production coming from blocks in the East plan areas will remain constant then it can be calculated that to achieve the 29.1 GW predicted supply in 2030, 291 licence blocks will be needed (29.1*0.100105).

Of these, if proportions of production stay constant, 26.1 per cent would need to come from the East plan areas, giving a final figure of 76 licence blocks, or 67.5 per cent of those licence blocks available.

An illustration of the high and medium projections can be seen in Figure 4.31.

Please note, the blocks for the medium projection have been chosen at random and do not infer any measure of appropriateness but rather are

[298] This figure was cross checked against production by volume from East of England plan areas fields in 2007, which was 28.7 per cent of the UK total, suggesting this proportion is broadly accurate.

included to visualise the difference in net footprint compared to the high projection.

Low projection

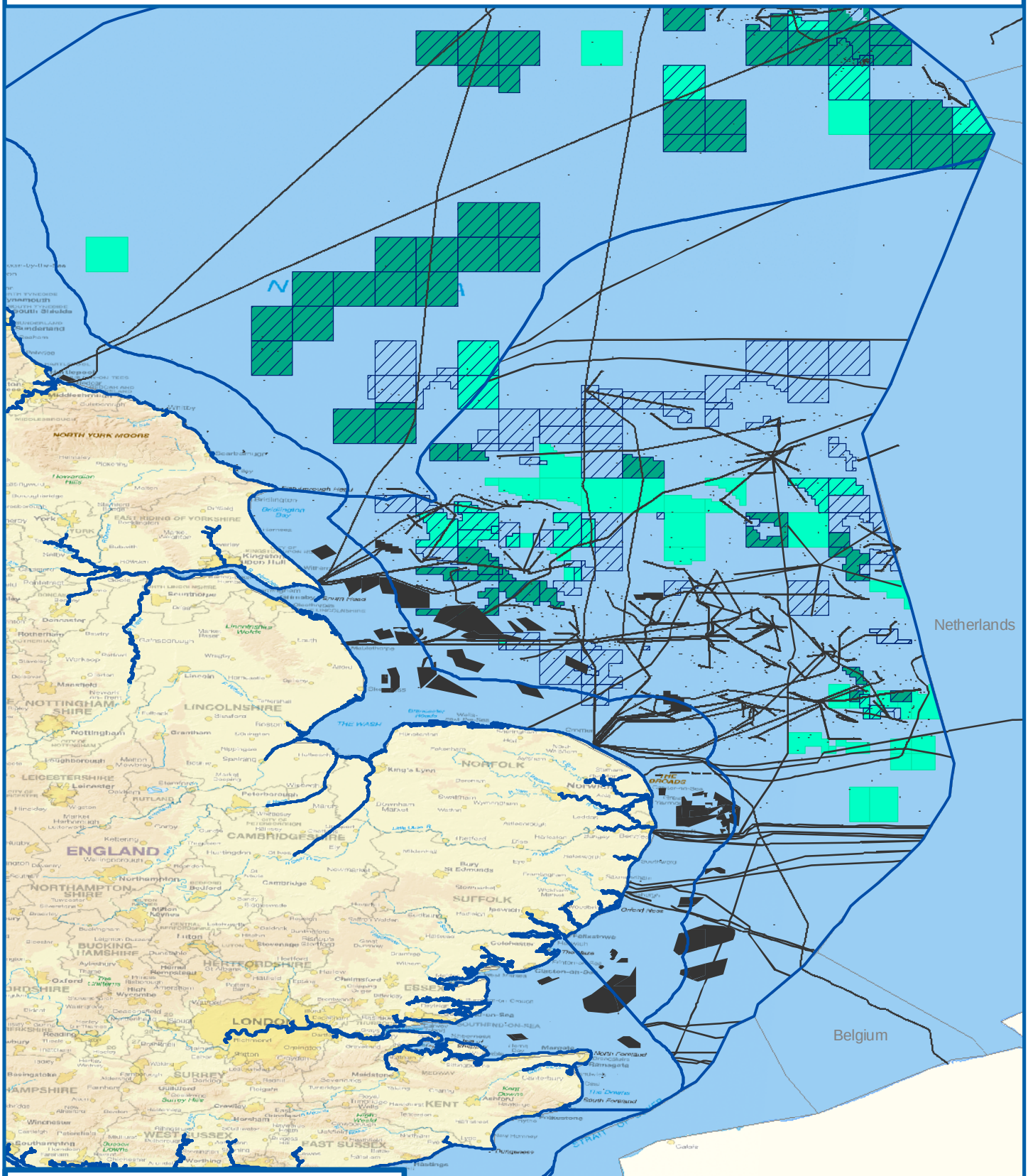
A low projection has been derived by assuming that a smaller number of blocks become productive or require new infrastructure and therefore there is less of a footprint for gas production with associated potential impact on other sectors or the environment. For the purposes of analysis a low projection was taken to be 80 per cent of the medium projection – this yielded a figure of 61 licence blocks. This is based on the gas projections in the 2011 Economic Report produced by Oil and Gas UK[299]. In the section of the report dealing with gas production forecasts, it states that historically 50 per cent of projects coming forward are successful and that this could lead to gas production levelling off at approximately 80 per cent of the current level of production. As a result we have assumed that this reduction could then be used for generating a low projection.

[299] Oil and Gas UK (2011) 2011 Economic Report

Figure 4.30: Technical opportunity for oil and gas extraction with hard constraints applied

November 2011
This map has been produced using the ETRS89 Coordinate Reference System

marine management organisation

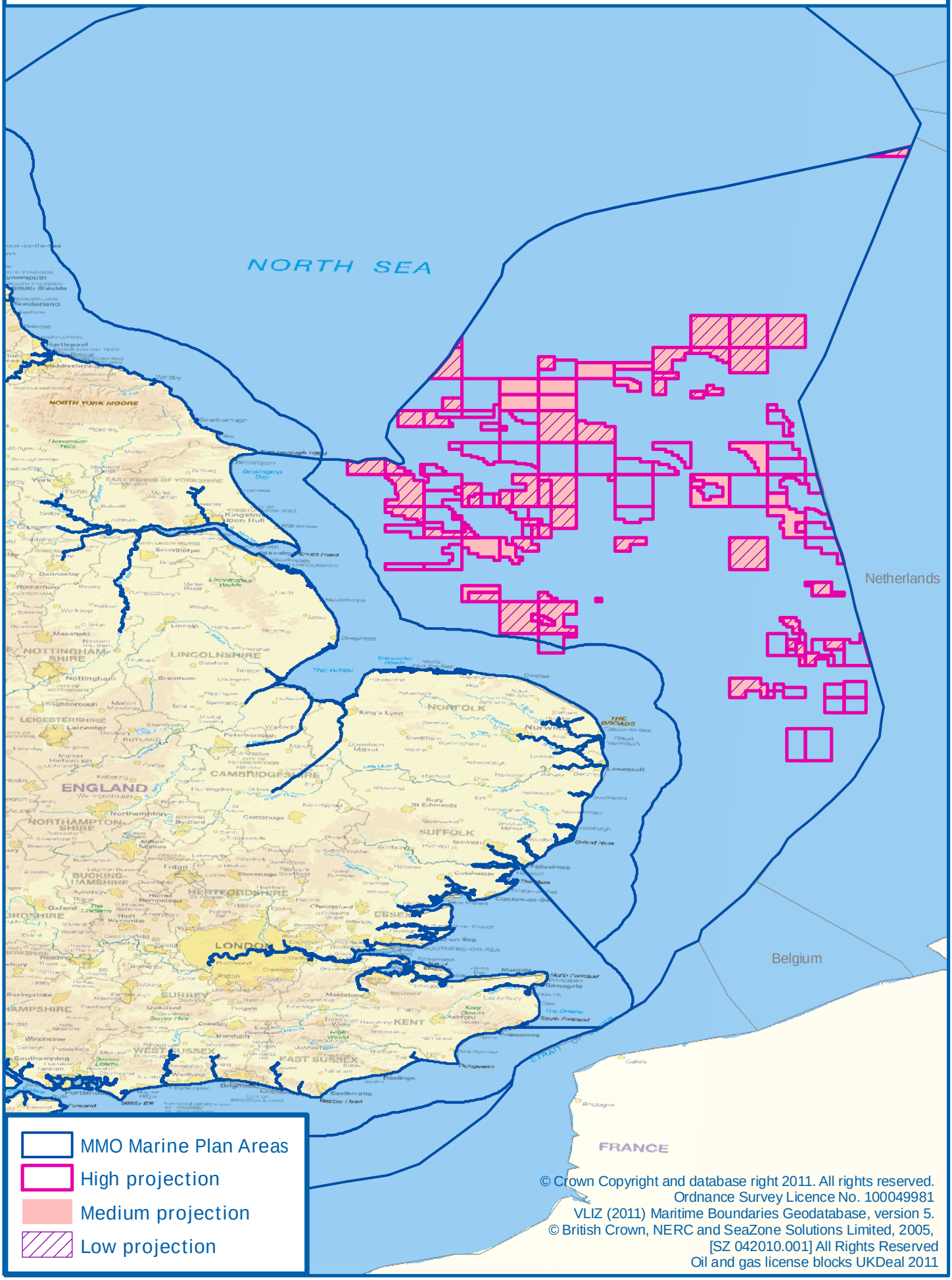


MMO Marine Plan Areas
Hard constraints
Current licence blocks
26th round conditional awards
25th round conditional awards

Figure 4.31: Potential oil and gas requirements for 2030 - high, medium and low projections

November 2011
This map has been produced using the ETRS89 Coordinate Reference System

marine management organisation



Conclusion of initial analysis

Oil and gas production: Gas production is the sole extraction activity in the East plan areas. Production of oil and gas on the UK Continental Shelf (UKCS) as a whole is in decline. Assuming that trend for the plan areas mirrors that of the UKCS, a range of potential spatial footprints for future production has been derived, accounting for sensitive habitats (although this has a limited effect) and hard constraints. This suggests that even under a high projected estimate, the total area occupied by infrastructure in 20 years' time the will be less than today, **although** this is dependent on many factors such as decommissioning of existing infrastructure.

4.15 Aggregate extraction – an example of considering interaction with various constraints and estimating projections for future need

Potential opportunity

Data from The British Geological Survey and The Crown Estate is displayed in the map below showing zones of high resource potential for future aggregate extraction. These are considered to be the regions within the East plan areas of the highest potential for this activity. These areas are not to be confused with an area of technical suitability as they will be subject to future survey which will narrow them down further into smaller, more technically suitable sites (such as areas closer to wharfs). Since this further prospecting work has not yet been done, the full resource areas were considered in their entirety and it is therefore important to note that these areas will be largely reduced in size once this process has taken place.

Applying hard constraints

Since further data on technical suitability was unavailable, some hard constraints (features currently occurring within the plan area which may prevent aggregate extraction occurring in the same space, such as existing oil and gas infrastructure) were then removed from within these potential resource areas. The hard constraints used were taken from work done by The Crown Estate (see Annex 9).

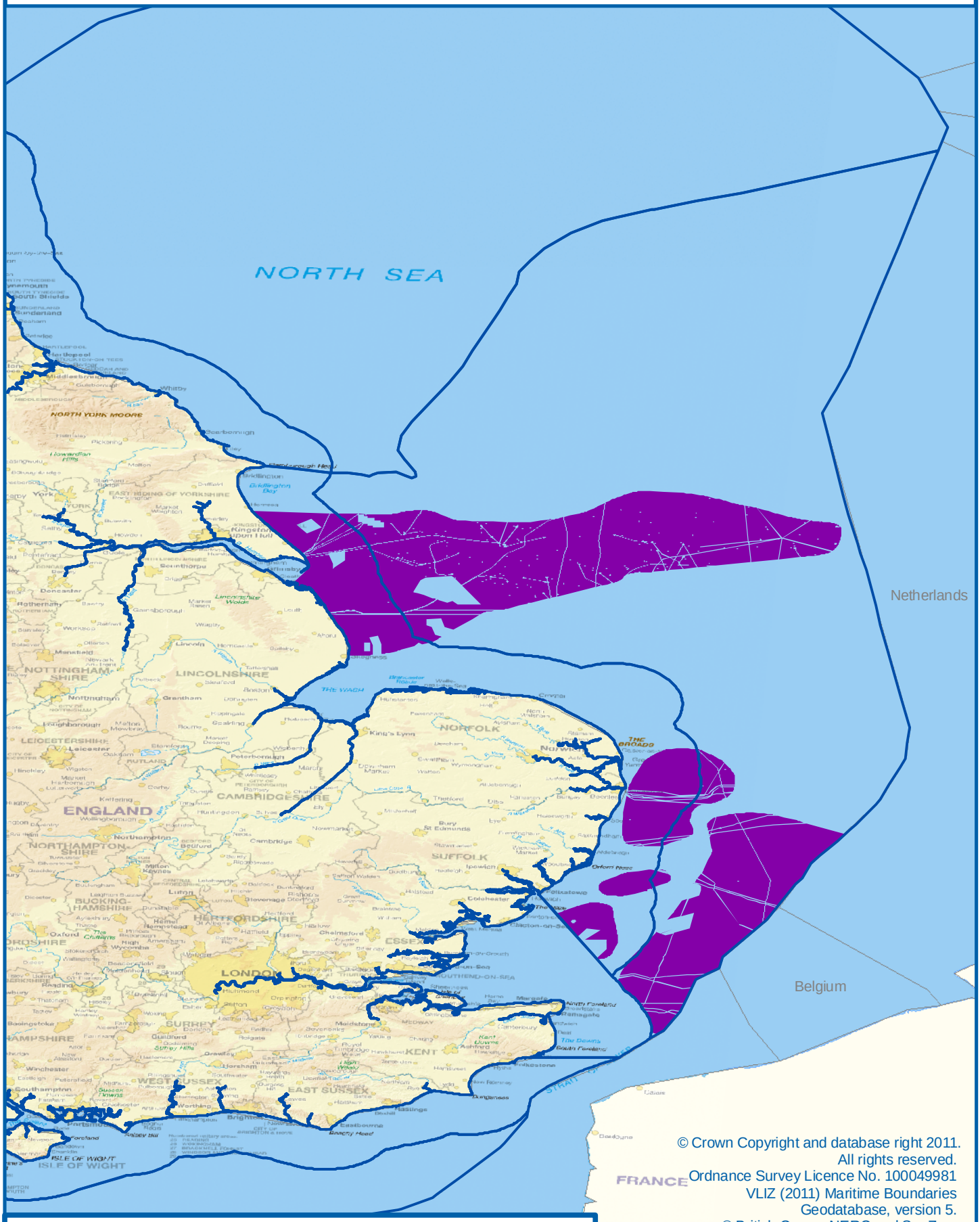
Applying soft constraints

There are a number of soft constraints that could be considered when looking at future spatial requirements for aggregate extraction (such as other activities demand for the same space, or factors that may be impacted by the activity). One example of a 'soft constraint' is the consideration of habitat sensitivity. This part of the analysis has been explained in Chapter 5, Section 5.5.

Figure 4.32: Potential resource area for aggregate extraction with hard constraints applied

November 2011
This map has been produced using the ETRS89 Coordinate Reference System

marine management organisation



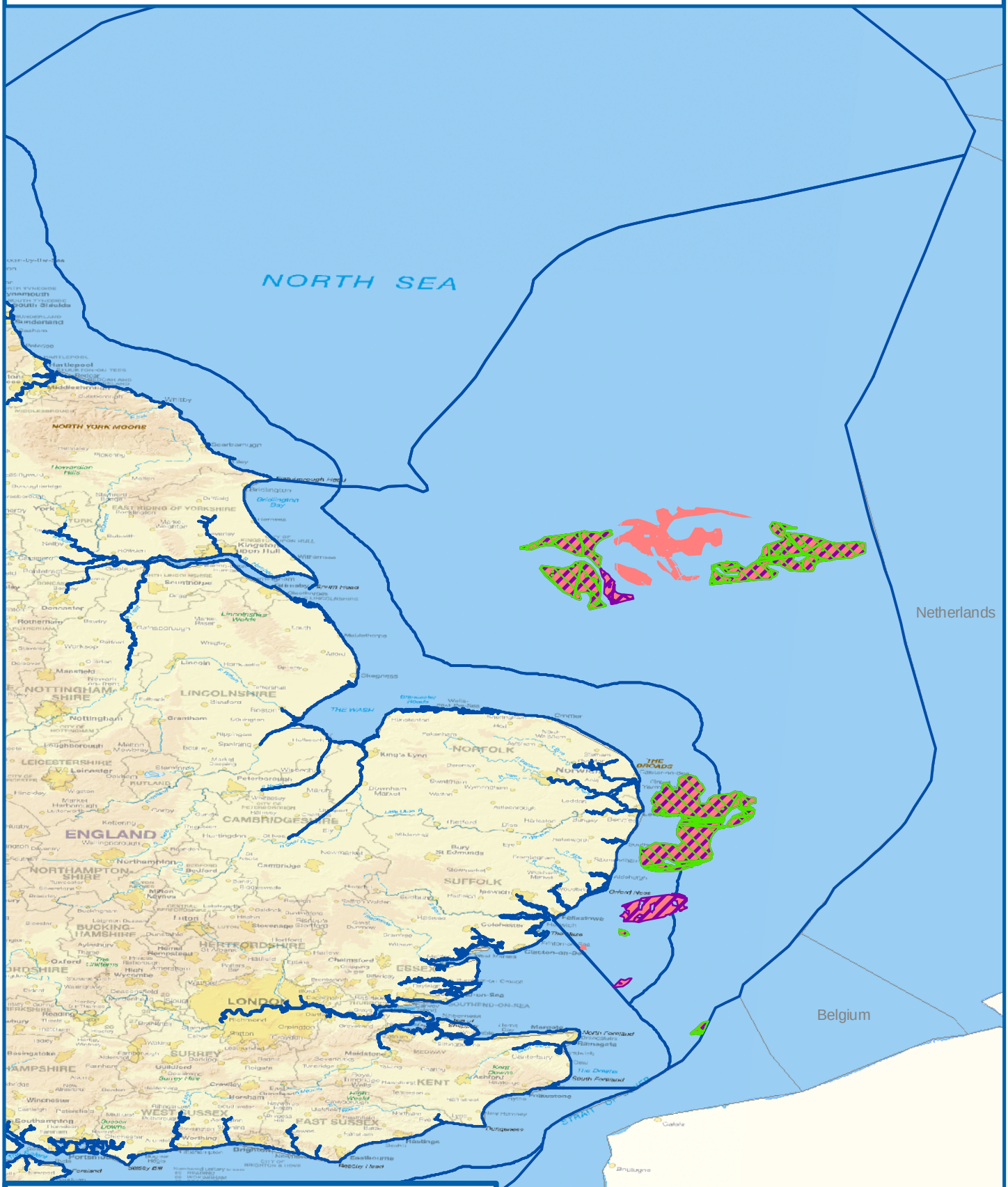
MMO Marine Plan Areas

Potential resource area with hard constraints applied

Figure 4.33: Possible future projections for aggregate extraction

January 2012
This map has been produced using the ETRS89 Coordinate Reference System

marine management organisation



Defining future growth projections for aggregate extraction

Ongoing research and discussion is seeking to establish some reasonable alternative growth projections for the extraction of aggregates in the future. Initial suggestions are included here in order to generate and visualise such projections. **These are included only to highlight the issue and outline one possible approach.**

In order to define some possible future growth projections for aggregate extraction, The Crown Estate has estimated the spatial footprint of marine aggregate dredging activity within the East plan regions over the next 20 years. The rationale has been developed using past practice and development of licence and option area trends, as a guide for determining the total area of seabed estimated to be used for marine aggregate dredging in the east plan areas to 2034 and beyond.

Possible approach for comment and discussion

In order to define the area needed for aggregate extraction in 2034, the spatial footprint of the activity is calculated in two parts:

- The **total use area**, which is an estimation of the area of seabed likely to be required to carry out the activity at any one point in time, and
- The **cumulative footprint**, being the area of seabed required to support the sector's development lifecycle over the plan period and therefore support the long term viability of marine aggregate supply from the region.

Both calculations are estimated using the total area including both the production agreement area[300] where extraction is permitted, and the exploration and option agreement areas[301] that precede this, for which exclusive use options are issued. The different types of area which describe the development lifecycle of marine aggregate extraction are highlighted below. This figure shows a real example of the stages involved in the development process and highlights that the footprint of the activity is not only related to the area that is licensed.

[300] Production Agreement is defined as 'a licence to dredge a defined area that has been exclusively granted by the landowner to an operator from which marine aggregate is being produced'.

[301] Exploration & Option Agreement area is the area pertaining to an Option Agreement which is defined as 'Following acceptance of a tender area, The Crown Estate, alongside the issuing of a exploration prospecting licence, will also issue an Option Agreement. The Crown Estate Option Agreement provides exclusive rights to develop a Production Agreement, following the successful completion of the application process under the relevant environmental consent process.

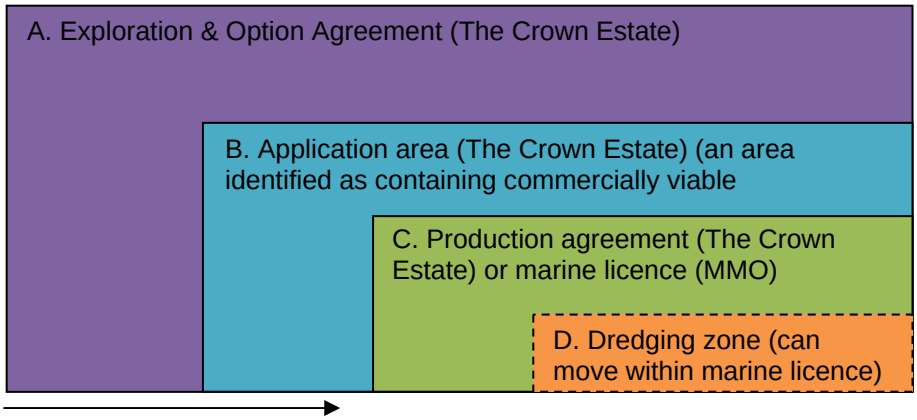


Figure 4.34: The area for which exclusive use is required will be refined over time through the development lifecycle

In addition to market demand, it is important to consider the resource potential of the two plan regions. There are a number of existing sub-regions where marine aggregate extraction operations are already well established, with licence areas that have been present for several decades. Over time these licence areas become exhausted, licences will be returned and new sites will have to be found. Against this background, additional operators may seek to obtain licences and/or new markets for marine aggregate minerals may emerge, requiring different geological deposits to be secured. There is therefore a process of change that occurs over time, whether this is in terms of operators, licences, resources and markets, or any combination of these.

The process of change requires areas of new resource (including different types of resources) to be identified and secured through the commercial and environmental licensing regimes that exist, and which have been described previously above.

For planning purposes, the assumption is to focus on those areas that are subject to option agreement and which are effectively considered for exclusive seabed use. Therefore both the licence area and the exploration/ option agreement areas that precede this should be used to calculate the footprint of the activity to be considered in the east inshore and offshore marine plans over the plan period.

Total use area

The current footprint of use for marine aggregates in the East Inshore and East Offshore marine plan regions is 1,980 square kilometres and this is shown in the table below.

It is estimated that at any point in time, the total use area (both option and production areas) will be similar or marginally higher in area to that of the current situation. The location of this area is unknown however, until after a tender has taken place by The Crown Estate and will change from tender to tender.

Table 4.4: Current licence area and option area

Area classification	Inshore (square kilometres)	Offshore (square kilometres)	Total (square kilometres)
Production licence	476	313	789
Option or application area	256	935	1,191
Total	**732**	**1,248**	**1,980**

Cumulative spatial footprint

As the plan period encompasses several cycles of change and evolution and the location of future marine aggregate extraction activity is unknown, it is also useful to consider the projected estimates of the cumulative spatial footprint throughout the 20 year plan period.

Over the course of the plan period, as new licence areas are secured, the option and application areas that originally related to them will reduce and be removed along with older exhausted production licences that are relinquished. As the development cycle begins again, new option areas are likely to be located in different locations. A working assumption for securing new licence areas is that just under one third of the Option/ Application area is delivered as a production licence (that is one-third of 1,191 square kilometres = 397 square kilometres).

Future requirement to 2017

Following a review of the marine aggregate casework programme, developed by The Crown Estate's managing agents using confidential information provided by individual operators, it was identified that marine licences for all of the current option/ application areas are expected to be determined by 2017 and this is therefore a useful timeframe to break this analysis down to.

The table below shows the anticipated total production licence area to 2017 by taking into account existing production licence area and the anticipated new licence area, which will be realised by the delivery of existing option areas (based on the working assumption for option/application area to production licence outlined above).

Table 4.5: Future production licence area – to 2017

Marine mineral regions	Current licence area (2012)	Anticipated new licence area (by 2017)* (square kilometres)	Total licence area (by 2017) (square kilometres)
Humber	470	100	570
East Coast	270	100	370
Outer Thames	50	150	200
Total	**790**	**350**	**1,140**

* Based on the delivery of existing option areas

In calculating the projected total licence area to 2017, the assumption that all current licence areas are maintained or renewed has been made, in addition to a short term prediction that a further 350 square kilometres of new licence area will be permitted in the east inshore and offshore regions.

In relation to the footprint of this activity being located within the inshore and offshore plan areas, the trend in marine aggregate dredging over the past 5 years in particular has been for the activity to move further offshore, that is licence areas within 12 nautical miles have decreased and those outside of 12 nautical miles have increased. This trend is set to continue with distribution of new licensed area between inshore/offshore as a percentage estimated to be approximately 30:70 in 2017.

Future requirement – to 2034

The period beyond 2017 to the end of the plan period (2034) incorporates a 40 year plus resource planning horizon for the marine aggregate sector. During this period operators look to secure additional resources that will extend for a further 30 year term (two 15 year licence terms) in order to replace existing licensed resources that are becoming exhausted.

Based on previous performance, it is anticipated that a further **1,000 square kilometres** of area will be required over the plan period to 2034, in addition to the current production licence area and option areas (1,980 square kilometres) – based on the assumption that every option area that comes forward through a tender will result in approximately one-third of its area being licensed.

This will initially be represented as an exploration area, within which exclusive options, applications and finally production licence areas are able to be delivered. Again, this total area (as calculated in the box below), is an estimate of the area required to successfully deliver against high level national policy and demand, therefore including both the areas of exploration as well as the areas required for licences.

Cumulative spatial footprint requirement out to 2034 (in square kilometres)

- A. Future exploration area 2014 to 2034: 1,000
- B. Current option area (to 2014): 1,191
  (of which approximately 350 square kilometres will become licence area)
- C. Current licence area (2012): 790
- D. Total area requirement: 2,981

Over time, the 1,000 square kilometres exploration area can be expected to realise additional production licence area of around 350 square kilometres (based on the current trend surrounding the conversion of option areas to licence areas, refer to B. above), which will come on line to either offset existing resources that are becoming exhausted or to service new or emerging markets. It is also estimated that some of this 1,000 square kilometres will be surrendered as these licence areas come forward.

With the trend continuing towards licence areas moving offshore, it is anticipated that the split of future exploration area is likely to increase to 15:85 between the inshore and offshore plan areas in the year 2034.

The production licence area in the region is anticipated to peak to around 1,140 square kilometres from 2017, but will then begin to reduce again as older licence areas are relinquished. The second phase of new licences resulting from the future exploration area can be expected to have a similar effect in the latter half of the marine planning period (2024-2034).

It is important to acknowledge that additional provision for marine minerals will need to be made to enable one-off local requirements for marine aggregate resources to service major infrastructure or coastal defence projects. The above calculation does not take into account these one-off requirements and therefore marine plans would need to incorporate sufficient flexibility to enable this resource to be sought from the region, should such events arise. These projects could require significant volumes of sand and gravel.

We can use these figures to try and infer possible high, medium and low spatial footprint projections for aggregate extraction over the life of the marine plan as identified below.

Table 4.6: Projection and area

Projection	Area (square kilometres)
High	2,981
Medium	2,331
Low	1,980

Therefore, a low spatial footprint scenario would see the area required as static, a medium case scenario taking into account the projected increase in licensed areas and a high spatial footprint would indicate that an additional 1,000 square kilometres of exploration area would be required for exploration purposes.

In addition, guidance from CLG[302], anticipates a rise of 14 per cent in marine won aggregates which strengthens the reasoning behind the ongoing exploration and both renewal and expansion of licence areas.

However, these areas must not be taken to infer any measure of appropriateness but rather are included to visualise the difference in net footprint between low and high projections.

This method represents just one of many ways that potential area needed for aggregate extraction in 2030 can be calculated. Other methods were attempted such as using the area dredged as a figure, although this was seen by many to be too small a value and one that did not take into account the additional space needed for prospecting and options. This demonstrates the different tiers of aggregate extraction area that could have been considered for this analysis (beginning with an area of search and then finally narrowing down to actual area dredged).

[302] Department for Communities and Local Government (2009), National and regional guidelines for aggregates provision in England 2005 – 2020, Annex A

Conclusion of initial analysis

The industry has been resilient to economic pressures and there are further opportunities for the industry to grow. Past data has been used to infer future requirements. Assuming sustained economic growth over the lifetime of the marine plan and allowing for the initial analysis herein of hard constraints and habitat sensitivity, suggests there is likely to be sufficient space for the activity to occur. However, this area will need to be modified to take account of other constraints (a range of activities) not currently factored in which may significantly reduce the space available or locations of future aggregate extraction.