Chapter 5: Interactions – between multiple activities and between activities and environment

Contents

5.1 Introduction

Understanding and addressing the implications of the interaction between a range of activities, and between that range of activities taken together and sustainability considerations, is integral to marine planning. It is therefore essential to not only collate relevant information and present this on a sector by sector basis, as in Chapter 4, or a topic by topic basis, as in Chapter 6, but also to develop and apply analyses to multiple activities. The following chapter explores this from two perspectives.

The first considers the interaction between activities and the marine environment. While the potential effects on different elements of the environment are assessed in detail in Chapter 6, the interaction between activities, both individually within one sector and collectively across sectors, and the environment needs to be assessed. This is a key topic for marine planning to assess and address, given expectations set out in various government documents[1]. This is explored through a consideration of pressures generated by activities, the sensitivity of seabed habitats to those pressures and the potential resulting effect.

The analysis could identify locations in the East plan areas where habitats might be more or less sensitive to a given activity or where the potential effect on seabed habitats needs to be assessed further. However, both the approach in general and the analytical methods used are still evolving in the way that they are applied to marine management. Together with limitations and questions, these are outlined and illustrated by way of two examples.

While the interaction between activities is partly covered in the individual activity sections of Chapter 4, it is also essential to look across all sectors. The second perspective therefore considers interactions between multiple activities in the East plan areas. Such assessment will highlight key issues that do not emerge from only considering each activity in isolation. Chapter 4 described the current and, in some cases, potential future spatial extent of activities in the East plan areas. Here, in Chapter 5, the analyses first considers current patterns of activity, teasing out existing examples of successful co-location and where potential conflicts may be occurring. Secondly, taking the outputs on potential future estimated projections towards the end of Chapter 4, examples are given that highlight the implications of combining different projections for wind energy, oil and gas production and aggregate extraction. These combinations are guided by some ongoing futures analysis[2] which seeks to derive possible future scenarios for different activities.

Note this work is very much in progress and its use here is to highlight the approach, illustrate potential key issues arising, and stimulate discussion. The outputs should not be taken as final in any way. Some comments received through this consultation have not been directly referenced in this revised report as

[1] For example, Marine Policy Statement (MPS) (2.3.1.6, 2.4.3) on the need to consider potential cumulative effects.
[2] 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

they are more relevant to the future stages of planning. Discussions will continue with stakeholders, partners and experts to develop evidence that will inform the marine planning process going forward.

5.2 Assessing pressures and environmental sensitivity – an integrated view

Introduction

To understand the interaction between activities and the receiving environment, and the potential impacts that may result, it is necessary to consider, among other things, the **pressures**[3] that those activities generate and the **sensitivity**[4] of receiving features to those pressures. Further, it is anticipated that marine planning will help to assess and address[5] potential **cumulative** effects from the range of activities occurring in a marine area. Our understanding of pressures and sensitivity is variable and developing but recent progress in assessing **seabed habitats**, enables at least a consideration of the issue and possible approach for undertaking assessment (although this is still at a formative stage, especially when considering cumulative pressures). The following is therefore intended to raise awareness of the issue and methodology, illustrated by way of two examples only, and prompt comment on the appropriateness of the method, the data that lies behind the analysis and the utility of the approach, including if and how it might be extended and applied in marine planning for the East plan areas. The analysis and examples are based on current activity but can also be applied to projections and scenarios for potential future patterns of activity.

How the analysis will inform planning

The outputs from this sensitivity analysis form an insight at plan area scale, into the spatial distribution of pressure, where overlap of common pressures occur and where pressures occur over sensitive habitats. This analysis will be used in marine planning, where appropriate, to inform assessment of the location of future activities in a way that helps to takes account of (at least some) environmental receptors in general, rather than simply areas of importance. It will be further analysed alongside additional evidence on the environment (much of which is addressed in Chapter 6 of this report) as well as evidence on social and economic activity displayed throughout chapters 4 and 5.

The confidence in sensitivity information and understanding of how habitats respond to cumulative pressures and the underlying location of habitats are all relatively low. This fact will be taken into account when feeding this information into wider planning analysis with sensitivity playing a small part in defining policies in a marine plan. These limitations are considered further in this chapter. It must recognised, however, that the principles and expectations of marine planning set out in the Marine Policy

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[3] The mechanism through which an activity has an effect on any part of the ecosystem. The nature of the pressure is determined by activity type, intensity and distribution. Robinson et al. (2008)

[4] A measure of tolerance (or intolerance) of a habitat or ecosystem to changes in environmental conditions. Zacharias & Gregr 2005). In this analysis we are considering sensitivity to anthropogenic pressures

[5] MPS (2.3.1.6, 2.4.3) and an element of the ecosystem approach set out in the MPS (2.3.1). Various initiatives also require such a consideration, such as Marine Strategy Framework Directive.

Statement (MPS) and other documents, as well as other initiatives such as the Marine Strategy Framework Directive (MSFD), require this kind of analysis to be developed and applied. While the developmental nature of the approach and limitations in the underlying information may constrain the contribution such analysis will make to the first East Inshore and Offshore plans, it is essential that such work progresses to support planning in general and the next plans in particular.

Habitat sensitivity is considered here to EUNIS level 3[6] which describes broadscale habitats designed to be mapped at a regional scale. This work will not replace the need for project specific environmental impact assessment as this detailed survey work will yield more accurate results. Pressure sensitivity is also assessed for some additional non-mobile species and habitats of conservation interest (including OSPAR threatened and/or declining habitats and species and UK BAP species). This allows a more detailed sensitivity analysis to be completed but does not have complete coverage across the plan area.

Method

The input studies that feed into this phase of analysis are explained in Chapter 2 section 2.3. The use of these studies and the processing steps are outlined below in Figure 5.1[7].

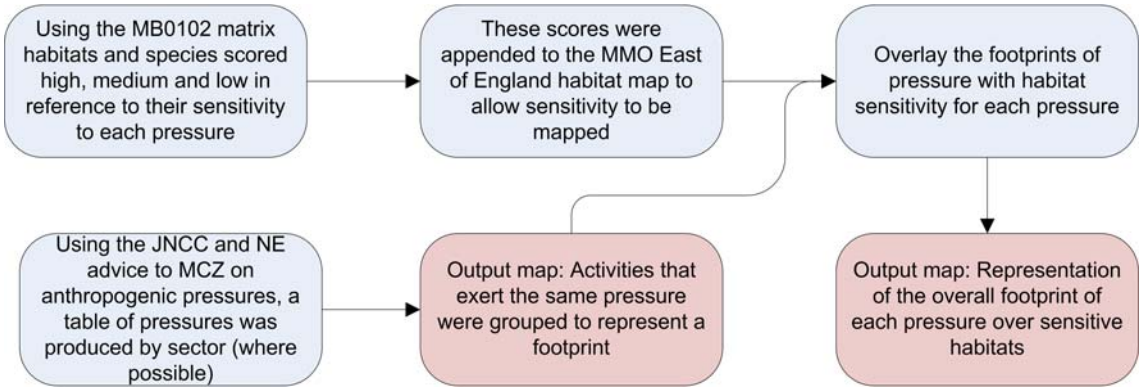

Figure 5.1: Methodology describing the process of producing sensitivity analysis

Habitat sensitivities were mapped for all 40 pressures listed in the matrix in Annex 3. A description of how this was done is included in Chapter 2 section 2.3.

Pressure maps were created by using the table of pressures caused by activities (see Annex 4) and datasets that define their footprint (listed in Annex 1). The footprints of activities were scored **3** and the rest of the plan area was scored **0**. In

[6] Developed by the European Environment Agency (EEA), the EUNIS system (European Nature Information System) defines species, site and habitat information. It classifies terrestrial, freshwater and marine habitats. It contains 5 hierarchical levels for marine habitats. This classification extends to level 5 with the breakdown of habitats more specific in higher levels. Sensitivity analysis has been completed to level 3. http://eunis.eea.europa.eu/index.jsp

[7] Link to UKSeaMap 2010 referred to in table: http://jncc.defra.gov.uk/page-2117

cases where several activities cause the same pressure, layers were added together in ArcGIS to form areas of potential cumulative pressure.

Habitat sensitivity maps and potential cumulative pressure maps were then combined for each pressure type in order to identify areas of potential high vulnerability (that is where high levels of pressure might occur in the same location as habitats that are highly sensitive to that pressure). This was done by standardising both inputs to between 0 and 1 to allow us to assess the variables equally. These standardised layers were then added together.

Limitations of method

There are a number of limitations in the pressure and sensitivity analysis listed below. These may change during the planning process as new information is developed by partners

- The sensitivity scores are sometimes defined as ranges of sensitivity due to habitat type in EUNIS level 3 classifications being defined by a number of habitats and species with differing sensitivities to a given pressure. In this marine planning analysis, the higher value in the range has been taken. This means that potentially large areas of habitat could be classified as having higher sensitivity which is being driven by a small amount of specific habitats or species present within the wider EUNIS level 3 classified habitat. Please note that when analysing the additional species and habitats of conservation interest, these are more specific and do not contain a sensitivity range. These have been displayed as point data overlaid onto the broadscale habitat sensitivity maps.
- The pressures that have been used in both the sensitivity analysis and for futures analysis only represent a potential for the pressure to occur. No measure of intensity of activity has been assessed. The sensitivity scores defined in the Development of a Sensitivity Matrix[8] report were assessed against a benchmark level of pressure[9]. Due to limitations in data, existence of these benchmarks in the mapped layers showing potential pressure was not assessed i.e. the intensity of the potential pressure was not assessed. This will mean that potential for pressure to occur may be overestimated.
- The lists of pressures used in the assessment were those used in the report Development of a Sensitivity Matrix. This list provided a mix of pressures from the OSPAR classification, Charting Progress 2 and MSFD[10].
- The accuracy and resolution of habitats are not necessarily comparable with the resolution of the pressures being considered.

Limitations specific to sensitivity analysis completed

- The footprints that have been included in this analysis only show **the potential** for a pressure to occur. For example, rock armour and placement of concrete mattresses placed on pipelines and cables to prevent scour contribute to the

[8] Department for Environment, Food and Rural Affairs (Defra), 2010, MB0102 Report No 22 Task 3 Development of a Sensitivity Matrix (pressures-MCZ/MPA features)
[9] Defra, 2010, MB0102 Report No 22 Task 3 Development of a Sensitivity Matrix (pressures-MCZ/MPA features), p5
[10] Defra, 2010, MB0102 Report No 22 Task 3 Development of a Sensitivity Matrix (pressures-MCZ/MPA features), p19

physical change (to another seabed type) pressure. Due to limitations in knowledge of where armouring occurs along pipelines and cables, we can only show **the potential** for this pressure to occur.

- Some vulnerability maps (combined habitat sensitivity and potential pressure footprints) have not been mapped either through lack of data to compile potential pressure footprints or sensitivity information being of very low confidence, not assessed or not exposed.
- The results of the analysis and associated maps should not be viewed as absolute assessments and comparisons should not be drawn across different pressure assessments. This is due to the pressure footprints and sensitivity scores being standardised between 0 and 1 to allow them to be combined. The result is a picture of relative potential for pressure over sensitive habitats rather than a standardised scale that can be compared across pressure types.
- Additionally the method used in this example means that the significance of any single activity is reduced as more activities are added. This could mean for example, that the relative significance of intensive trawling may by downgraded by the presence of a single localised piece of infrastructure in an area.
- The significance of a pressure beyond the limits of potential activity are not considered due to the low confidence in the sources of pressure.

Limitations of using the sensitivity analysis to analyse potential futures

- The impacts and underlying accuracy of combining several sensitivity layers together, as has been done in the Future analysis, is beyond what the sensitivity assessments were originally designed for. At this stage, it is uncertain how valid the results are but ongoing development and appraisal, taking account of comments from partners and stakeholders, will help to clarify.
- A further limitation of the methodology is that it is not able to assess effectively different types of pressure at a single location (such as the combined synergistic and antagonistic effects of siltation, abrasion, synthetic and non-synthetic substance contamination and underwater noise). The map will only highlight where numerous sensitivities overlap which can then be developed in more detail if necessary.
- Currently, sensitivity scores are added together to form the combined sensitivity. This is a very simplistic way of addressing the issue of cumulative pressure. It may be more appropriate to take the highest sensitivity score when combining sensitivities to reflect that if habitat is highly sensitive to one particular pressure, that this score should not be diluted by lower sensitivity scores to other pressures. The MMO has begun a programme of work to better understand cumulative effects but this will take time and resource. As results of this study become available they can be incorporated into decision making.
- In addition consideration must be given of how lower sensitivity scores to single pressures may combine to result in a higher overall sensitivity to multiple pressures. This would reduce the emphasis on a single activity influencing the outputs when assessing multiple activities.

Note: more information about general limitations of input information is included in Chapter 2.

Example outputs of sensitivity analysis

Below is a description and interpretation of two key pressure assessments, these are extensive pressures that are important to the East plan areas and that marine planning can potentially play a role in managing.

Physical change (to another seabed type)

Physical change (to another seabed type) is defined[11] as "The permanent change of one marine habitat type to another marine habitat type, through change in substratum, including artificial (such as concrete)." This therefore involves the permanent loss of one marine habitat type which is replaced by another habitat which may not be the same shape, size or ecological value.

Activities that cause physical change include the installation of infrastructure (such as oil and gas platforms, wind turbine foundations, pipelines and cables) and the placement of scour protection where soft sediment habitats are replaced by hard or coarse substrate habitats and aggregate extraction.

Habitat sensitivities in the East plan area range from medium to high (see Figure 5.2). The only high sensitivity habitat in the East plan area is sublittoral sand[12] although this covers approximately 64 per cent of the plan area.

Figure 5.3 shows that the highest risk of physical change occurs around oil and gas infrastructure with numerous platforms, pipes and other subsea infrastructure contributing to this pressure type. Note cumulative physical change cannot occur, however this figure demonstrates increased potential sources of this pressure.

Figure 5.4 demonstrates that oil and gas infrastructure and other potential sources of physical change pressure generally occur in highly sensitive habitats. Many of the areas highlighted also cover areas of search for Round 3 wind farms. This extra activity has the potential to greatly increase the amount of physical change pressure in the East plan areas with a large number of turbine foundations and potential areas of cable protection contributing to physical change. Figure 5.5 includes the potential pressure that could be caused by Round 3 wind farm areas of search.

[11] OSPAR, March 2011, Intercessional Correspondence Group on Cumulative Effects – Pressure list and descriptors

[12] JNCC, http://jncc.defra.gov.uk/marine/biotopes/biotope.aspx?biotope=JNCCMNCR00001557 Accessed November 2012

Figure 5.2: Habitats and species sensitive to physical change (to another seabed type)

marine management organisation

Please note: this map should only be viewed in conjunction with the explanatory text in chapter 5.2 describing the methods used and their limitations

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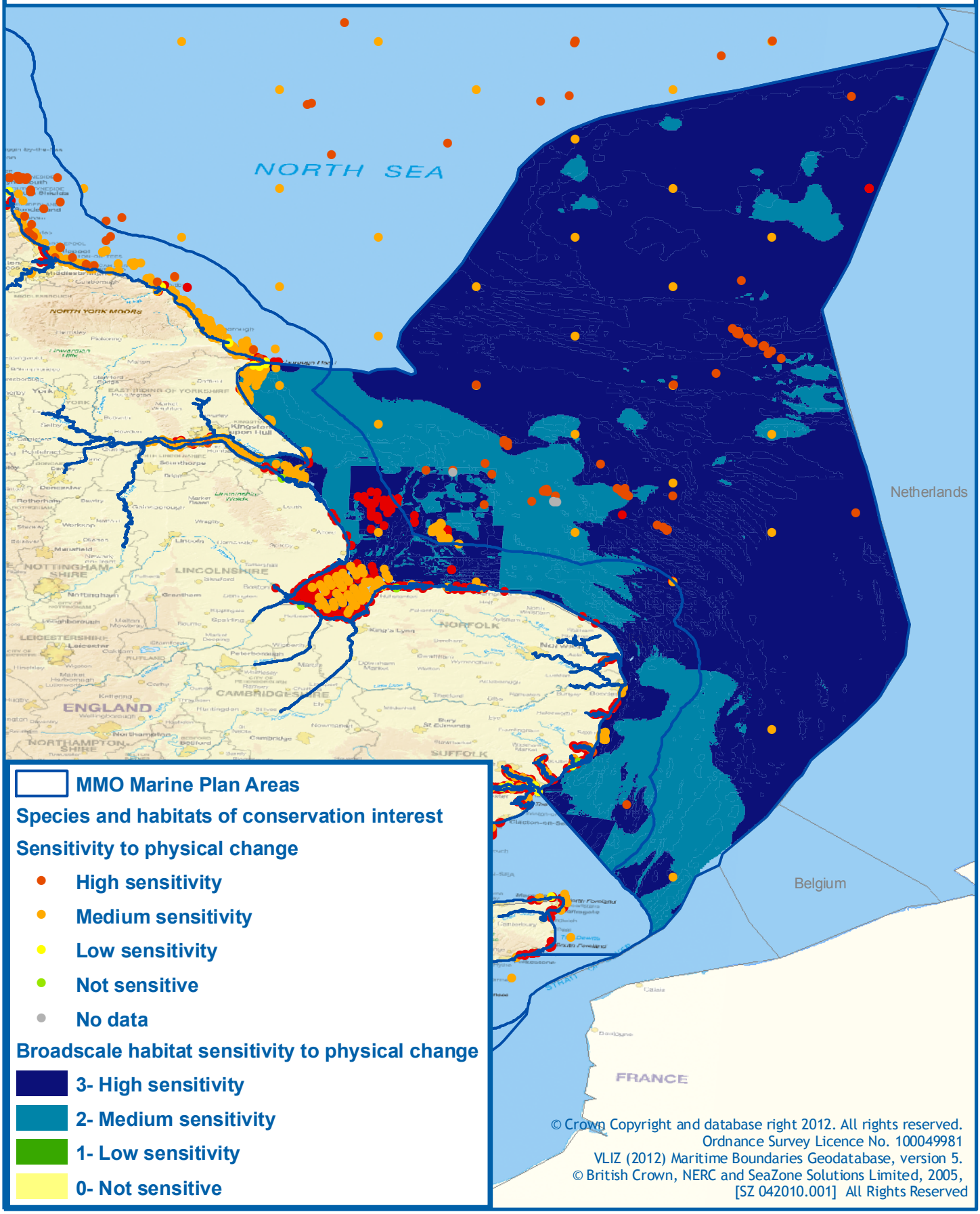

Figure 5.3: Potential sources of cumulative physical change (to another seabed type) pressure

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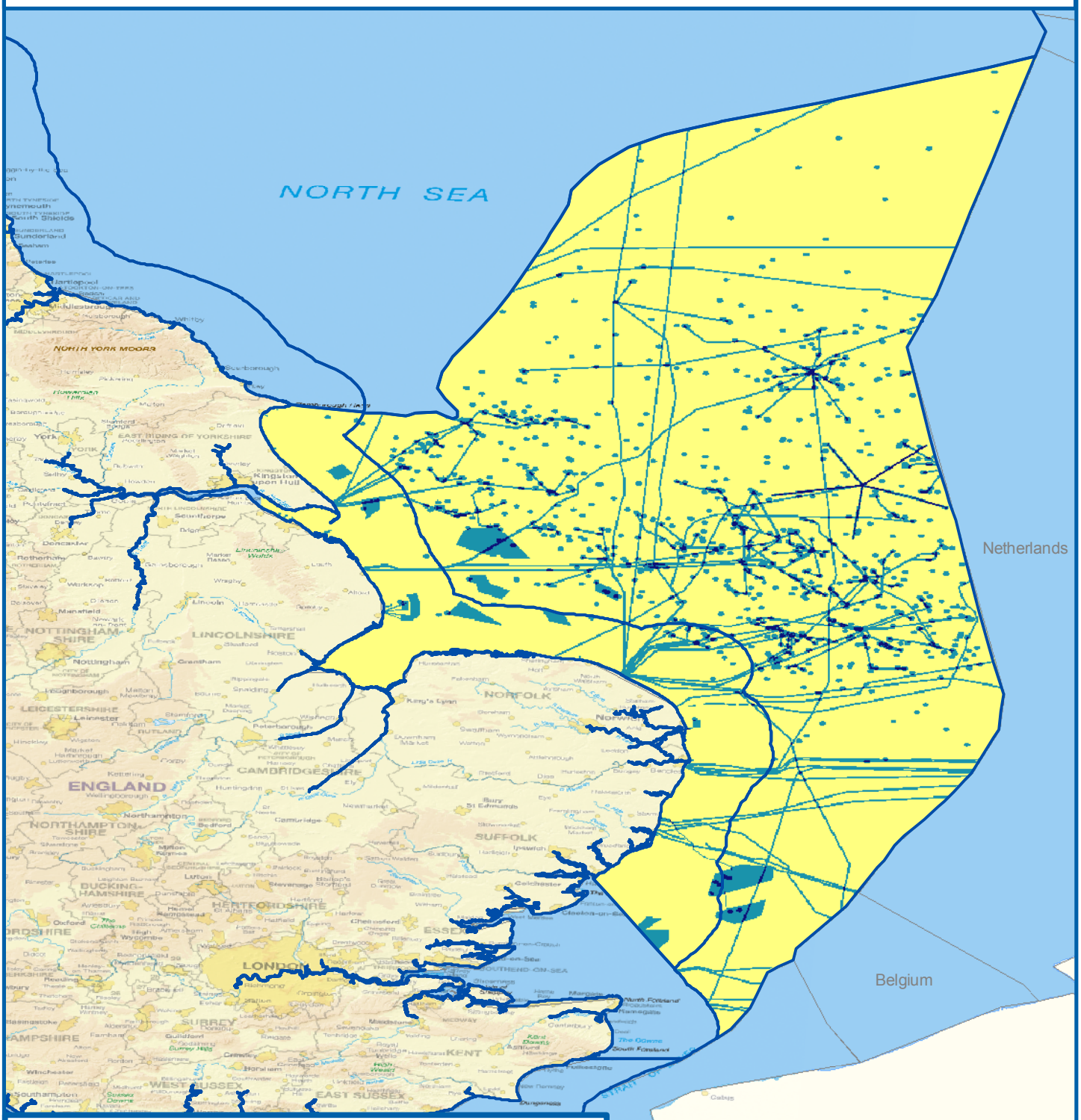

MMO Marine Plan Areas

Count of potential sources of pressure that overlap

- **0**
- **1**
- **2**
- **3**

Figure 5.4: Areas of habitat 'vulnerable' to potential sources of Physical Change (to another seabed type) pressure

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Please note: this map should only be viewed in conjunction with the explanatory text in chapter 5.2 describing the methods used and their limitations

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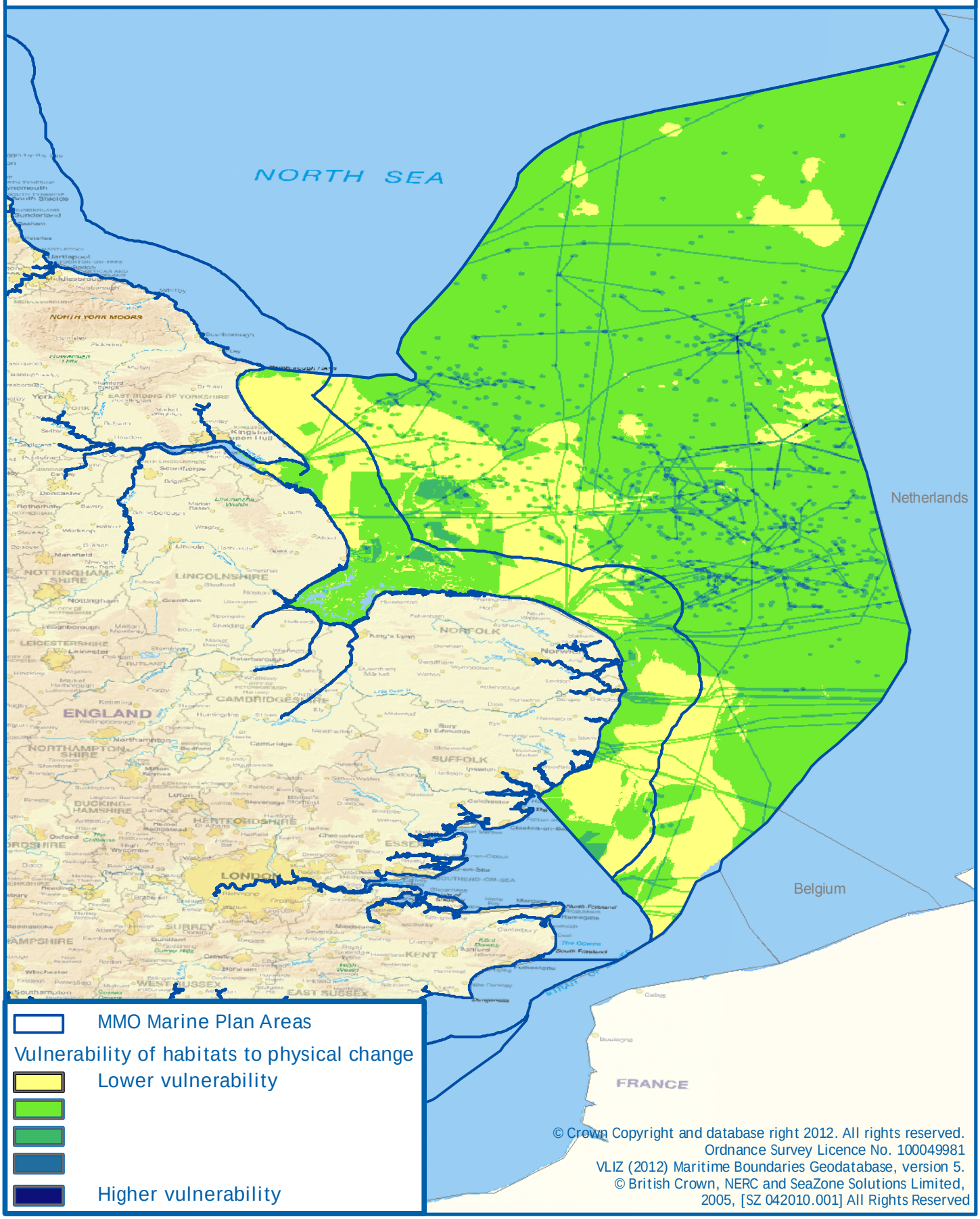

Figure 5.5: Areas of habitat 'vulnerable' to potential sources of Physical Change (to another seabed type) pressure including potential pressures caused by round 3 wind farms areas of search

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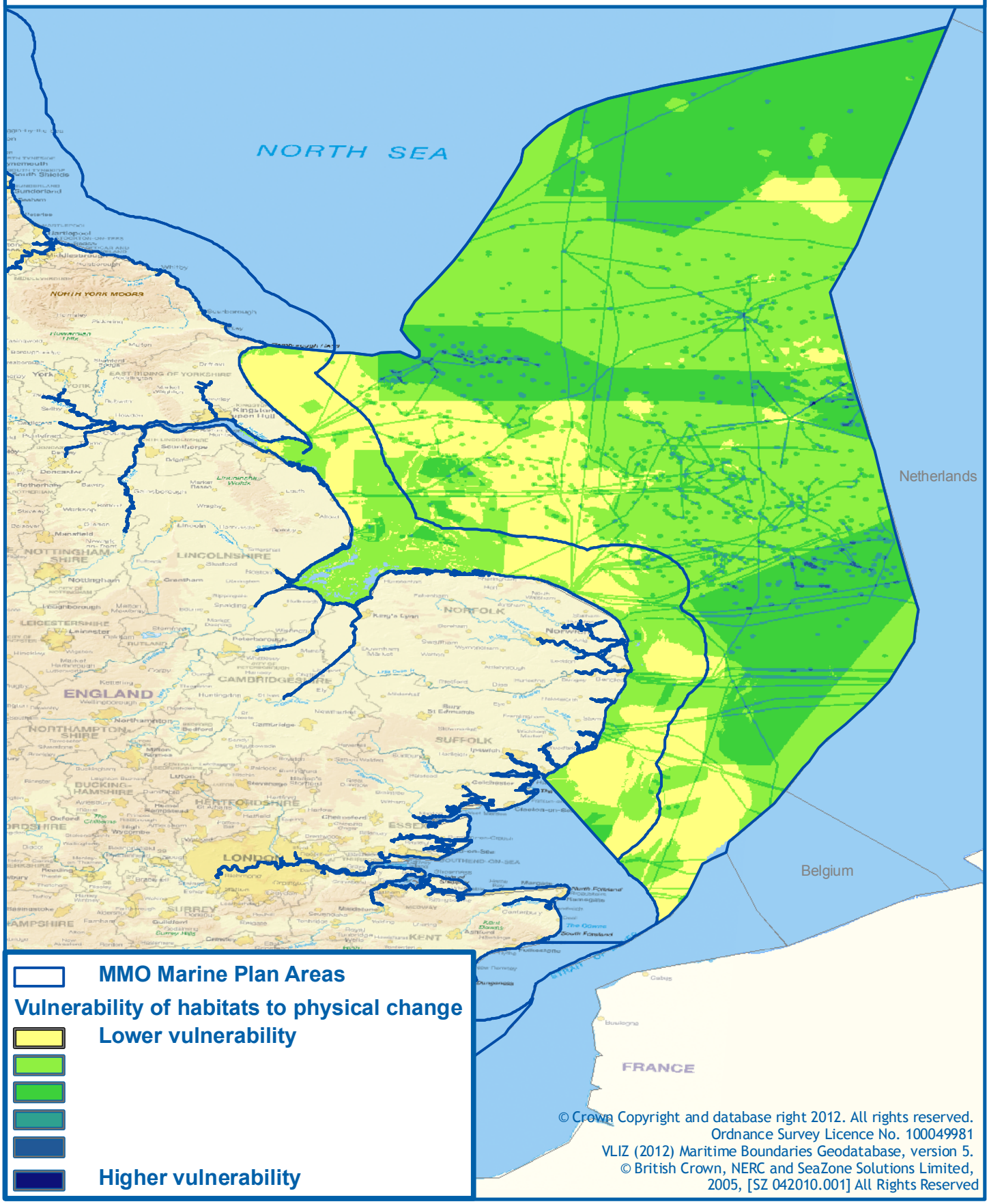

Shallow abrasion

Shallow abrasion is defined as the action of penetration of the seabed by more than 25 mm or scoring of rocks. Many of the same activities that cause surface abrasion also cause shallow abrasion and penetration with the footprints and habitat sensitivities very similar for each pressure type. This pressure type can be caused by a number of activities including certain fishing activities, such as scallop dredging, and beam trawling, as well as construction activities and cable laying.

Habitats in the East plan areas mainly have a medium sensitivity to shallow abrasion. Sublittoral mixed sediments are classed as highly sensitive. These features are located mainly around The Humber Estuary, The Wash and south east Anglian coast as displayed in Figure 5.6

Figure 5.7, demonstrates that in numerous locations, potential for activities to overlap could cause cumulative pressure. These areas are situated near to the coast and where different types of fishing activity might overlap with one another or where fishing may occur near to infrastructure installations such as pipes and cables.Temporal variability should be considered in an accurate cumulative impact assessment as many of the activities that cause shallow abrasion varied in frequency and intensity.

Figure 5.8 demonstrates that cumulative shallow abrasion pressures potentially occur over some habitats sensitive to that pressure in the East plan area (that is high levels of both pressure and sensitivity occuring together). This can be seen to the north of the Humber Estuary and to the south west of of the plan area.

Figure 5.9 shows increased risk of shallow abraison pressure due to construction and operation of Round 3 wind farms. This has potential to significantly increase the amount of shallow abrasion pressure in the East plan areas.

There is scope to manage some shallow abrasion both spatially and temporally through planning of construction activities.

Figure 5.6: Habitats and species sensitive to shallow abrasion

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Please note: this map should only be viewed in conjunction with the explanatory text in chapter 5.2 describing the methods used and their limitations

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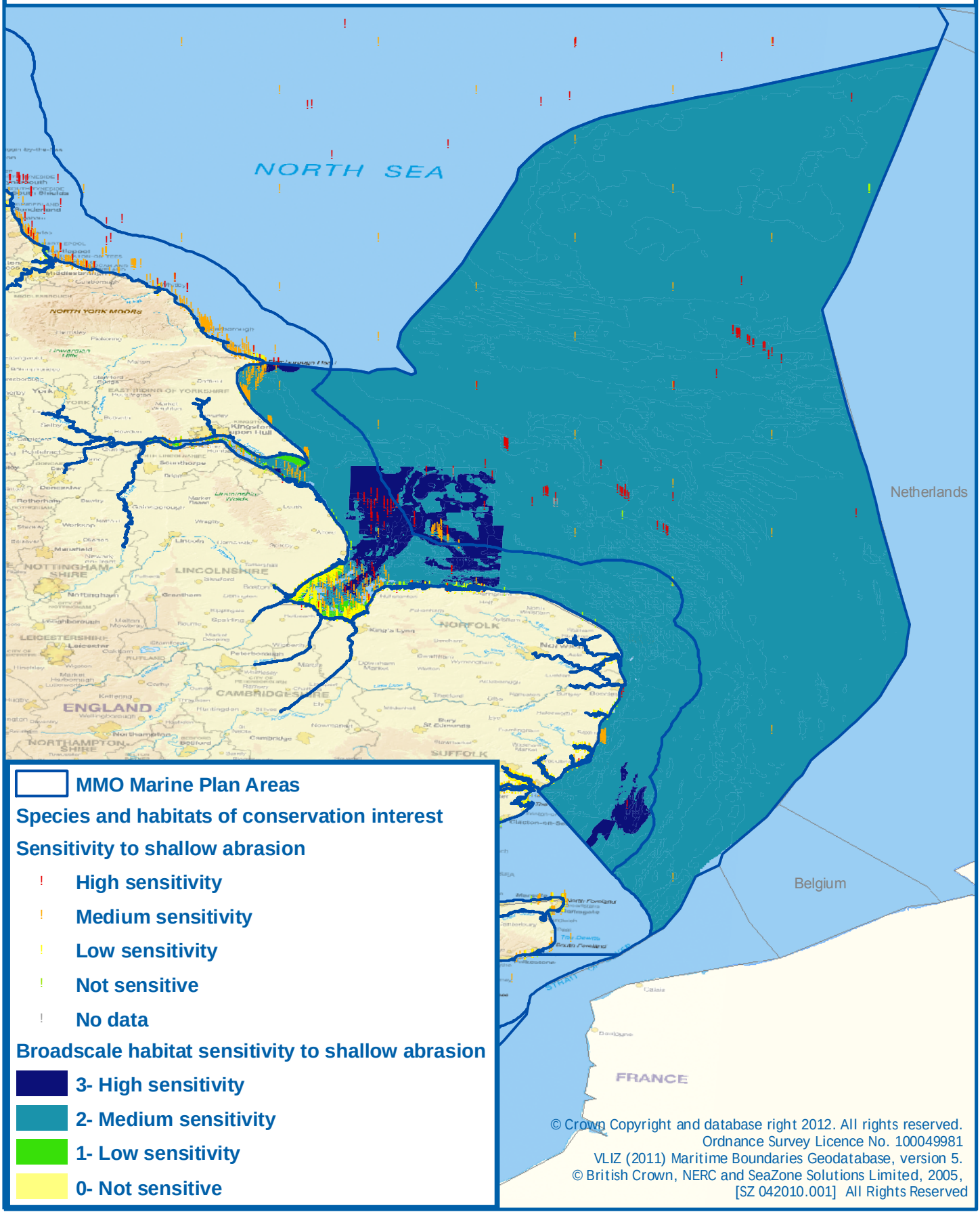

Figure 5.7: Potential sources of cumulative shallow abrasion pressure

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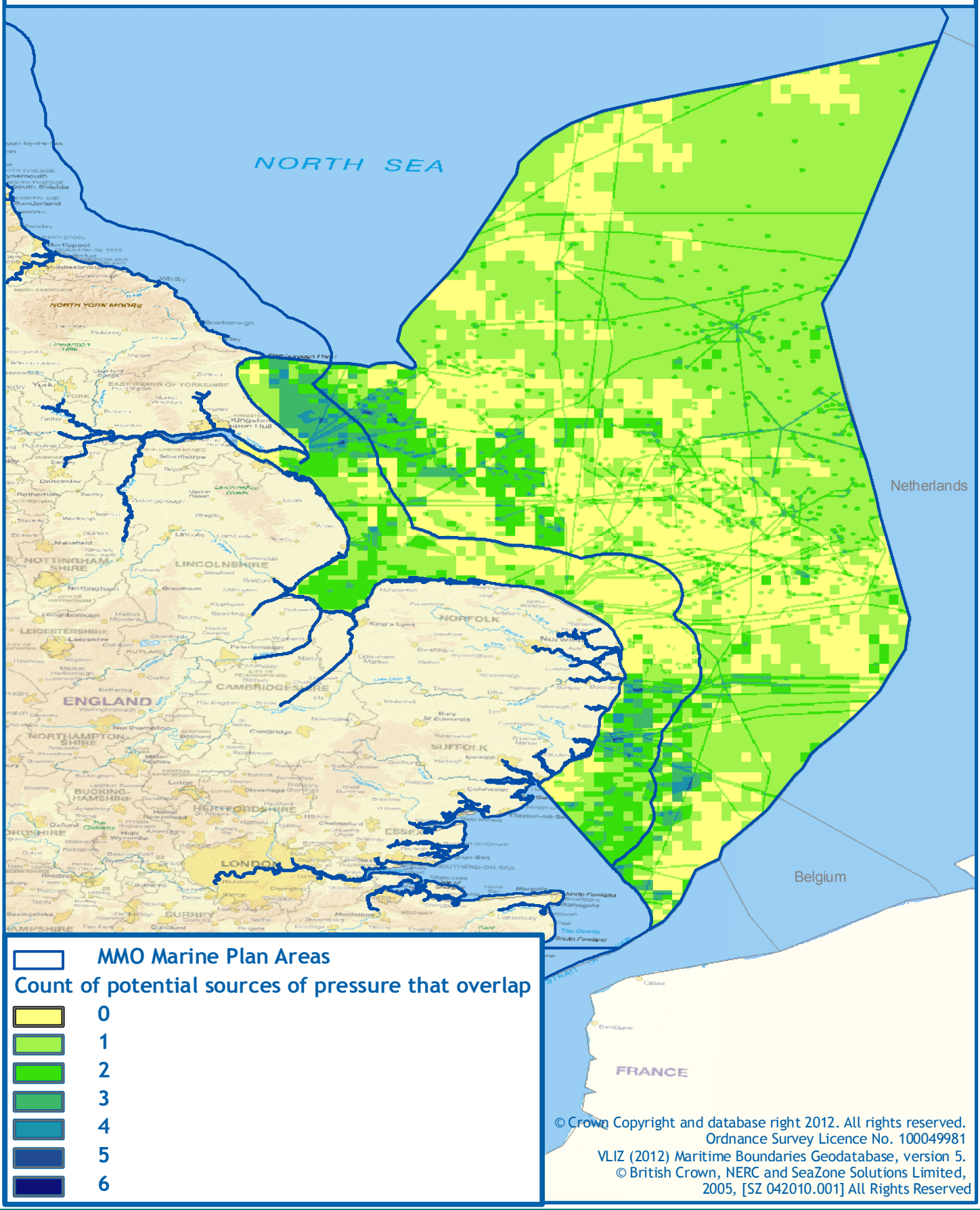

Figure 5.8: Areas of habitat 'vulnerable' to potential sources of shallow abrasion pressure

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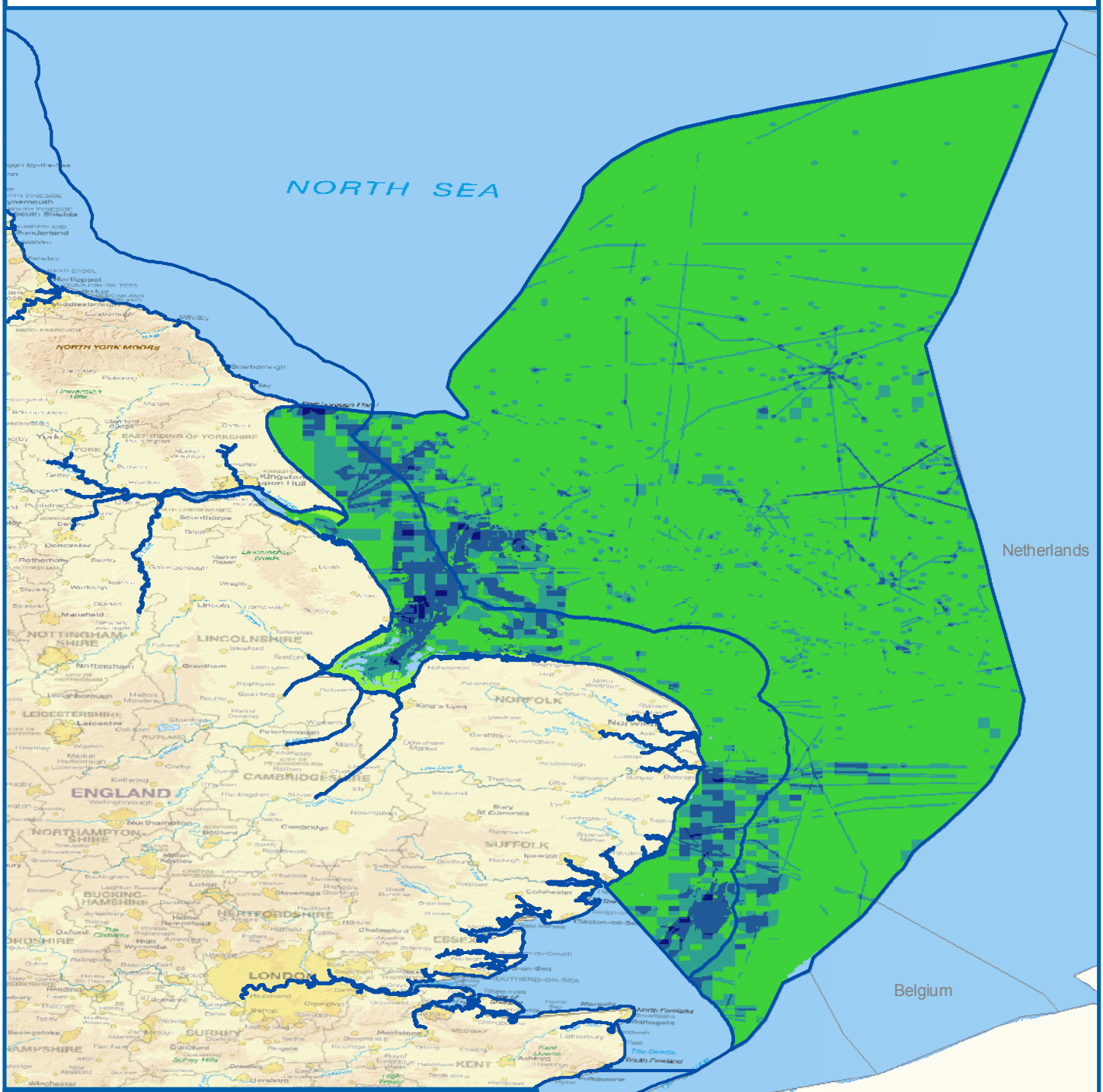

MMO Marine Plan Areas

Vulnerability of habitats to shallow abrasion

Lower vulnerability

Higher vulnerability

Figure 5.9: Areas of habitat 'vulnerable' to potential sources of shallow abrasion pressure including potential pressures caused by round 3 wind farms area of search

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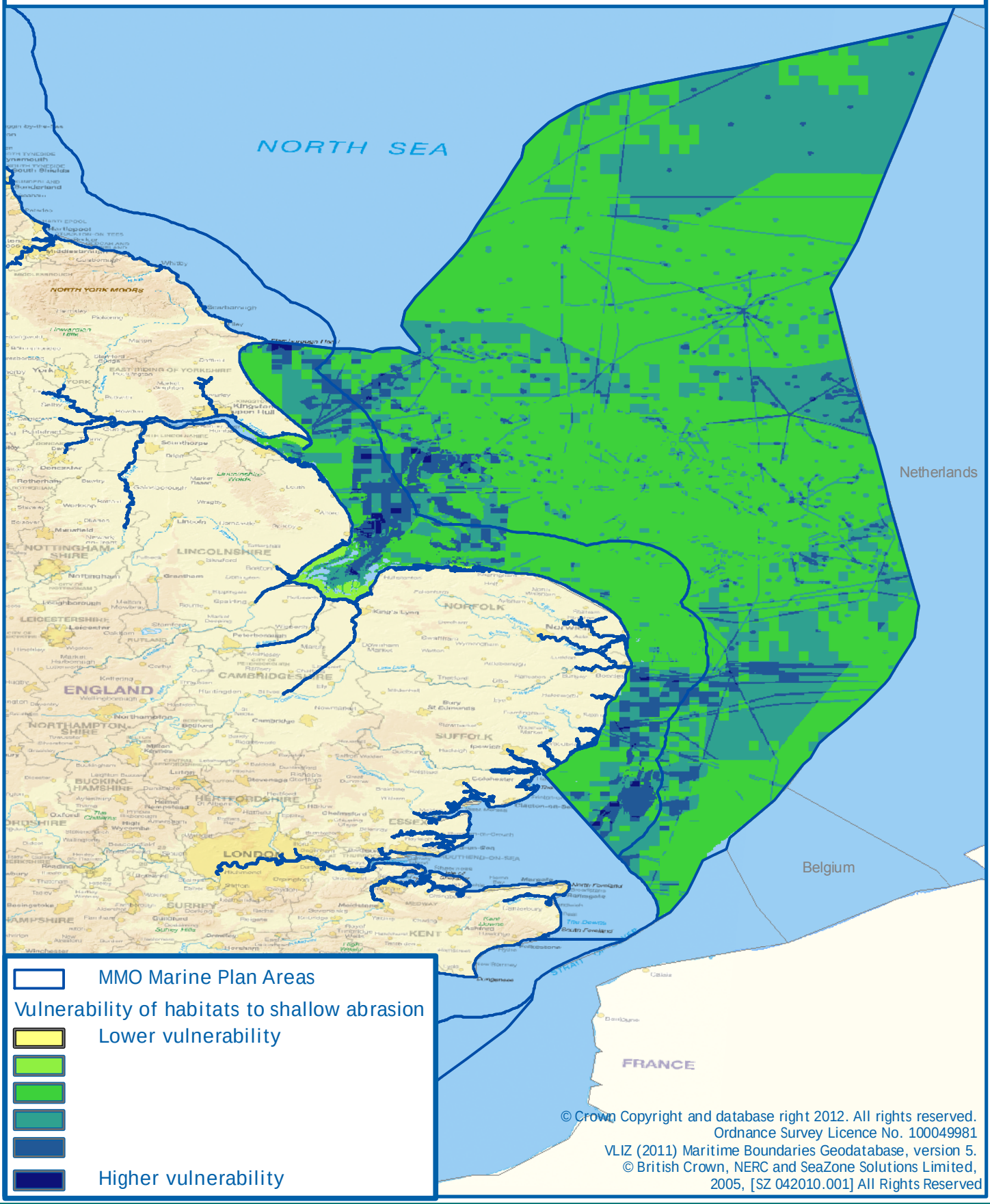

5.3 Application of pressure/sensitivity assessment to derive and visualise potential future scenarios

Introduction and rationale

Another application of sensitivity assessment that could inform marine planning is to consider and present pressures from the perspective of one activity – that is to indicate the full pressure footprint of an activity by combining the different pressures it generates in some way. Again, the results would be particularly applicable to assessing the potential effects of future increase in the activity. If the approach is deemed appropriate and useful, any outputs should be regarded as a soft constraint that require an agreed assessment of the degree of restriction posed rather than a hard constraint – that is incompatible.

The following examples are provided for comment on the conceptual approach as a whole as well as the methods in particular. These outputs have been incorporated to the definition of a potential future footprint in Chapter 4.

Please note that for the purposes of this analysis JNCC's UKSeaMap 2010 was used as its UK wide coverage allowed for a wider sensitivity assessment than that possible with the new updated habitat sensitivity map for the East plan areas only.

Method

For each of the three key activities assessed in Chapter 4, sections 4.12- 4.15 (renewable wind energy, aggregates and oil and gas) their potential environmental pressures were assessed and taken from the table in annex 4. For each activity in turn, a habitat sensitivity map was created for every individual pressure. ArcGIS was then used to combine together the individual sensitivity maps for every pressure associated with the activity in question. Sensitivity data was normalised between 0 and 1 to ensure each pressure was weighted equally, and minimised to allow for further analysis.

Example outputs of sensitivity that feeds into futures analysis

Offshore renewable wind

Figure 5.10 illustrates variation in habitat sensitivity across the whole of English waters for the cumulative pressures associated with wind energy production (see Annex 4 for list of pressures used). This map highlights areas where wind energy could potentially be positioned in order to locate activities over habitats with lower cumulative sensitivity. This assessment has been completed for the whole of English waters and demonstrates the relative cumulative sensitivity to the pressures caused by offshore wind.

The offshore area shows a mixture of high to medium sensitivity to cumulative pressures, with the North West and East plan areas having more habitats of medium and low sensitivity to the combined pressures caused by wind. The inshore area has mixed opportunity with some highly sensitive habitats.

Figure 5.10: Habitat sensitivity to potential cumulative pressures caused by fixed foundation offshore wind

marine management organisation

November 2011

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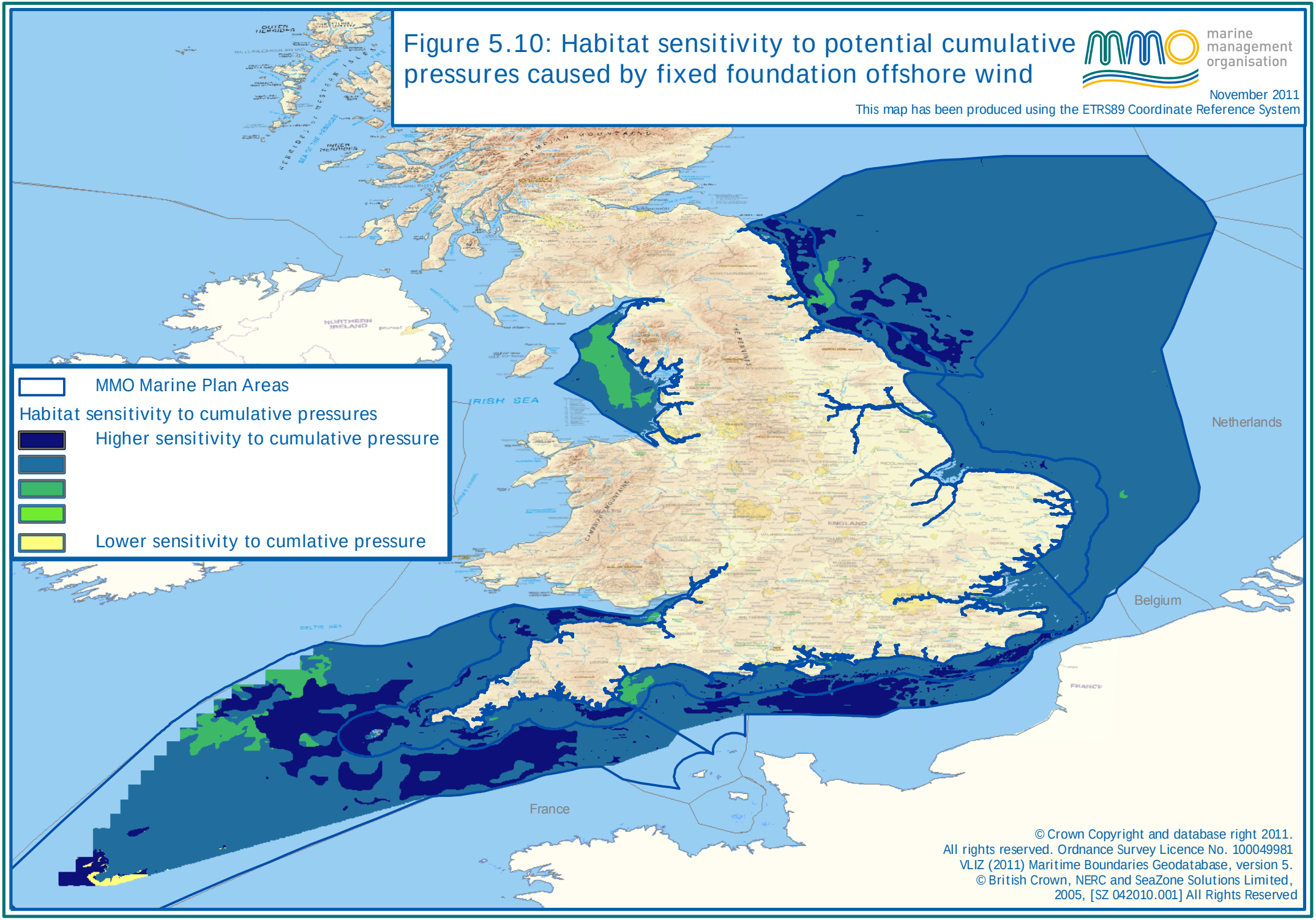

Aggregate extraction

The relative sensitivity map to the pressures caused by aggregate dredging is figure 5.11 below. The map indicates that the East Inshore and East Offshore areas are generally less sensitive to aggregate extraction than the other plan areas and may therefore be more suitable for aggregate extraction from a habitat sensitivity perspective alone (although this must be considered in the context of the data limitations set out in section 5.2). The darker areas are those with lower cumulative habitat sensitivity and the lighter areas are those with higher cumulative sensitivity. There is still some variability within the plan area showing areas that may be more preferential than others from a habitat sensitivity perspective.

Figure 5.11: Habitat sensitivity to the potential cumulative pressures caused by aggregate extraction

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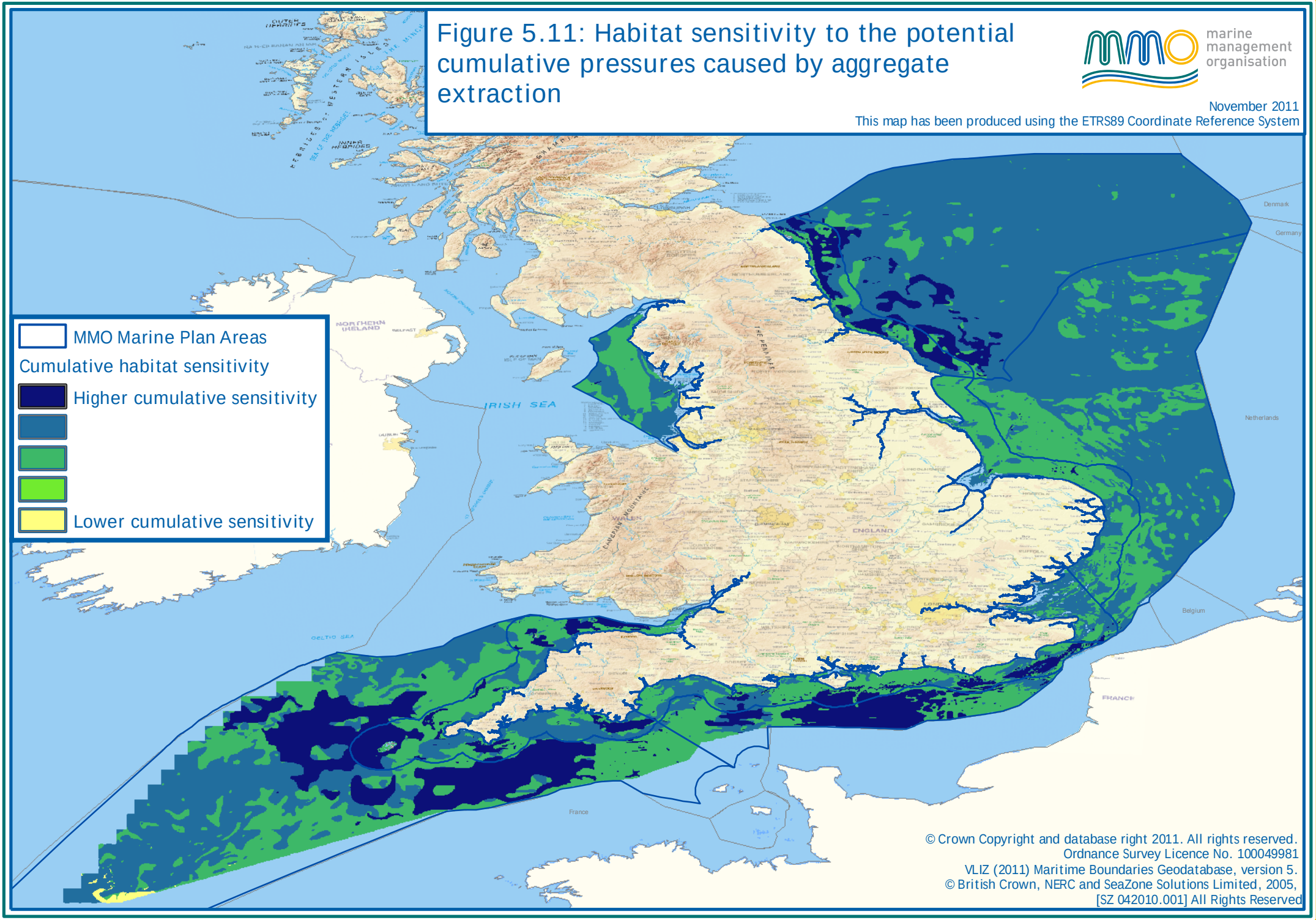

5.4 Interactions across multiple current activities and leased areas

The East plan areas support the activities of a wide range of sectors. A number of mapped examples are presented here showing areas that are particularly busy, where co-location is currently taking place and where activities may develop in the near future. They highlight varying demands for space across the plan areas and where future demands may raise concerns that require consideration through marine planning. Please note: The MMO is currently undertaking projects to evaluate the potential for co-locating activities within the East plan areas and on cumulative effects (the outputs of which are expected in April 2012 and should allow for further exploration as the plan progresses). Information gathered at the December 2011 workshops will be included in this work.

Estuaries and activities that appear to have the same spatial footprint, but actually use different parts of the water column, will be looked at in more detail through the options stages of the marine planning process.

Figure 5.12 displays an area off the East Anglia coast where a Round 3 wind farm area of search is located in an area of significant shipping activity including a designated IMO route. The western edge of the zone overlaps with a special protection area (SPA) and a special area of conservation (SAC). There is also significant oil and gas extraction activity through the northern edge of the zone.

Humber Estuary

The East Inshore plan area is extremely busy around the Humber Estuary (see Figure 5.13). The estuary is designated as a SPA, a SAC and recommended marine conservation zone (rMCZ) as well as supporting high density shipping and port activities. Aggregate extraction is concentrated in this area, as well as Round 2 wind farms and oil and gas licence blocks. This is one of the busiest regions within the East plan areas.

Shipping and aggregate extraction

All the maps demonstrate high levels of co-location throughout the East plan areas. Figure 5.14 highlights an example of aggregate extraction activity currently taking place in the same space as areas of high density shipping activity, particularly around the Humber, East Anglia and the southern tip of the East Offshore plan area (it is to be noted that a significant proportion of the shipping traffic recorded in the region may be related to marine aggregate operations transiting to/from production licences and ports)

Hornsea Round 3 zone

The development of Round 3 wind farm zones will overlap and need to consider numerous activities to allow renewable energy targets to be achieved. The Hornsea Round 3 provides a good example of some of the issues that will need to be considered. The zone is located over an area of high density oil and gas extraction. There is a recommended MCZ overlapping the north east corner of the zone and medium shipping density activity primarily in the western side of the zone. See Figure 5.15.

Figure 5.12: Interactions across current activities and leased areas off the East Anglian coast

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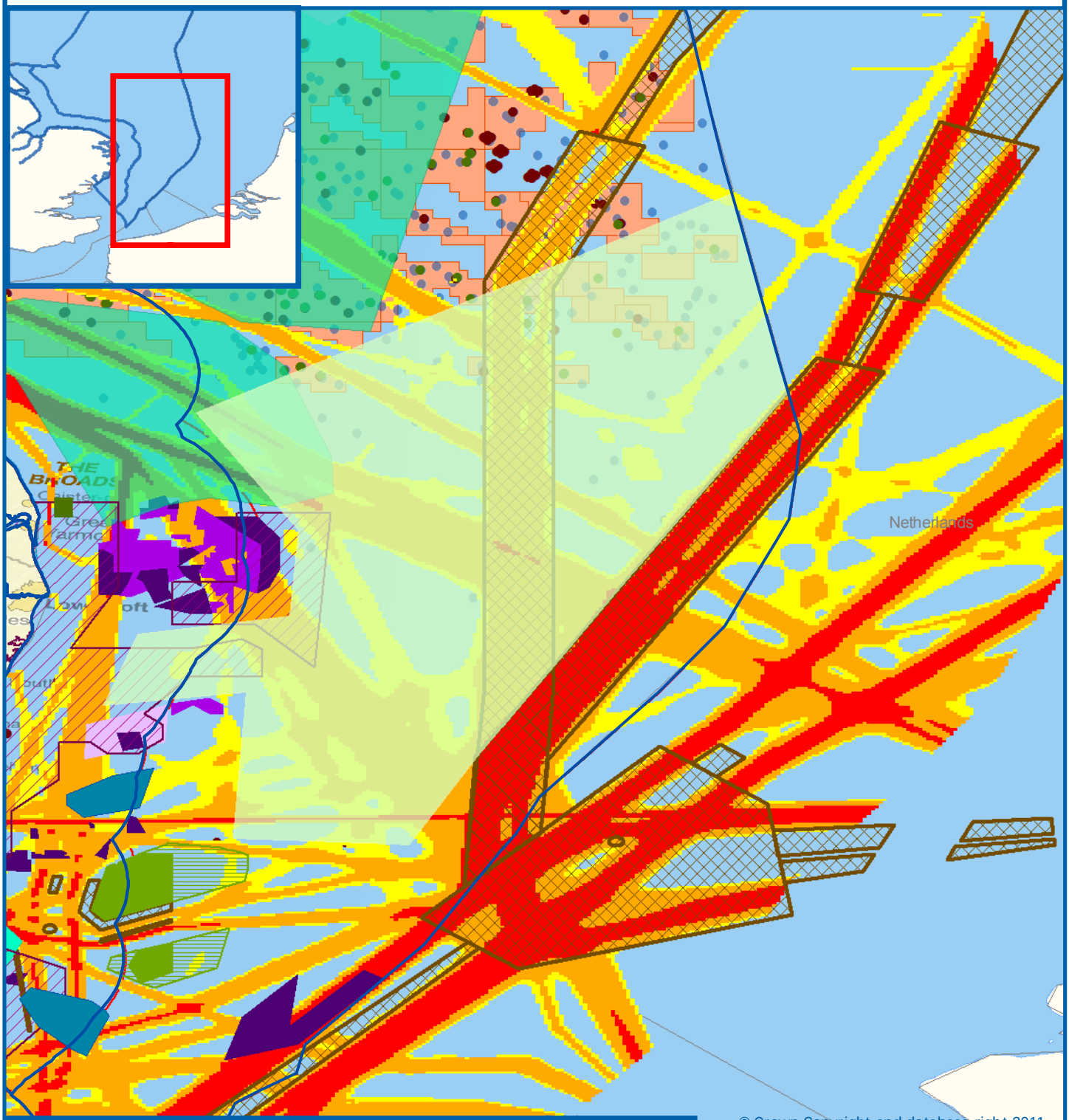

- MMO Marine Plan Areas
- Round 1 Wind Farms Lease
- Round 2 Wind Farms Lease
- Round 1-2 Wind Farm Ext
- Round 3 Wind Farms Zone
- MCZ Recommended Sites
- Inshore SPA
- Latest Offshore SAC Sites
- Inshore SAC
- Aggregates Applications
- Aggregates Licences
- Aggregates Prospecting or Options
- IMO Routing (polygon)
- Shipping > 1000 ships per year
- Shipping 200- 1000 ships per year
- Shipping 100- 200 ships year
- Subsurface infrastructure
- Surface infrastructure
- Wells
- Current oil and gas licence areas

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Figure 5.13: Interactions across current activities of the Humber estuary area

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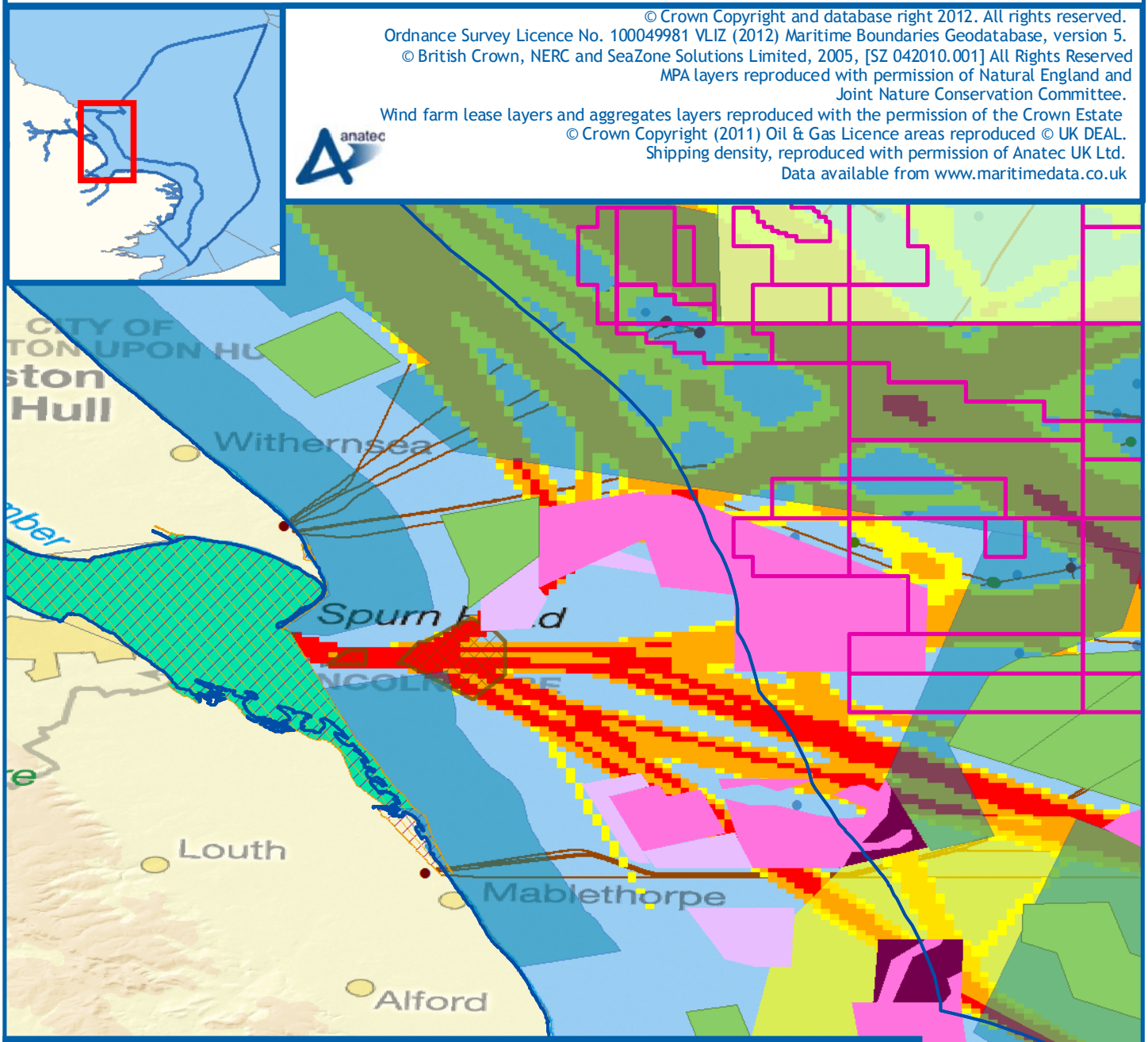

- MMO Marine Plan Areas
- Subsurface infrastructure
- Surface infrastructure
- Wells
- Oil and gas pipelines
- Current oil and gas licence areas
- Round 1-2 Wind Farm Extensions
- Round 2 Wind Farms Lease
- Round 3 Wind Farms Zone
- MCZ Recommended Sites
- Latest Offshore SAC Sites
- Ramsar Sites, UK (JNCC)
- Inshore SAC with Marine Components
- Inshore SPA with Marine Components
- IMO Routing
- Shipping density > 1000 ships per year
- Shipping density 200- 1000 ships per year
- Shipping density 100- 200 ships per year
- Aggregates Applications
- Aggregates Licences
- Aggregates Prospecting or Options

Figure 5.14: Interactions across current activities for shipping and aggregate extraction

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This map has been produced using the ETRS89 Coordinate Reference System

marine management organisation

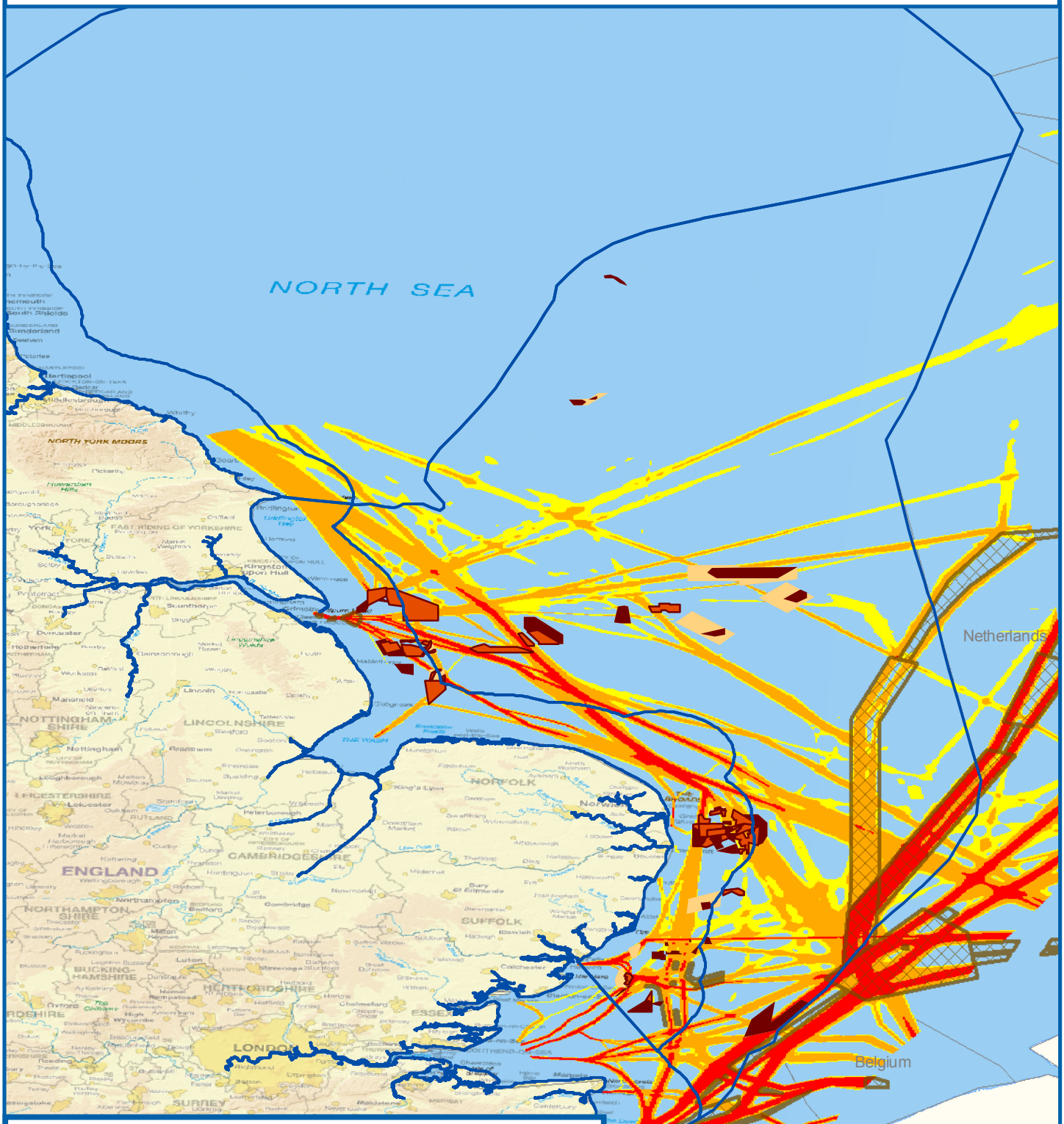

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Figure 5.15: Interactions across current activities of the Hornsea area

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January 2012

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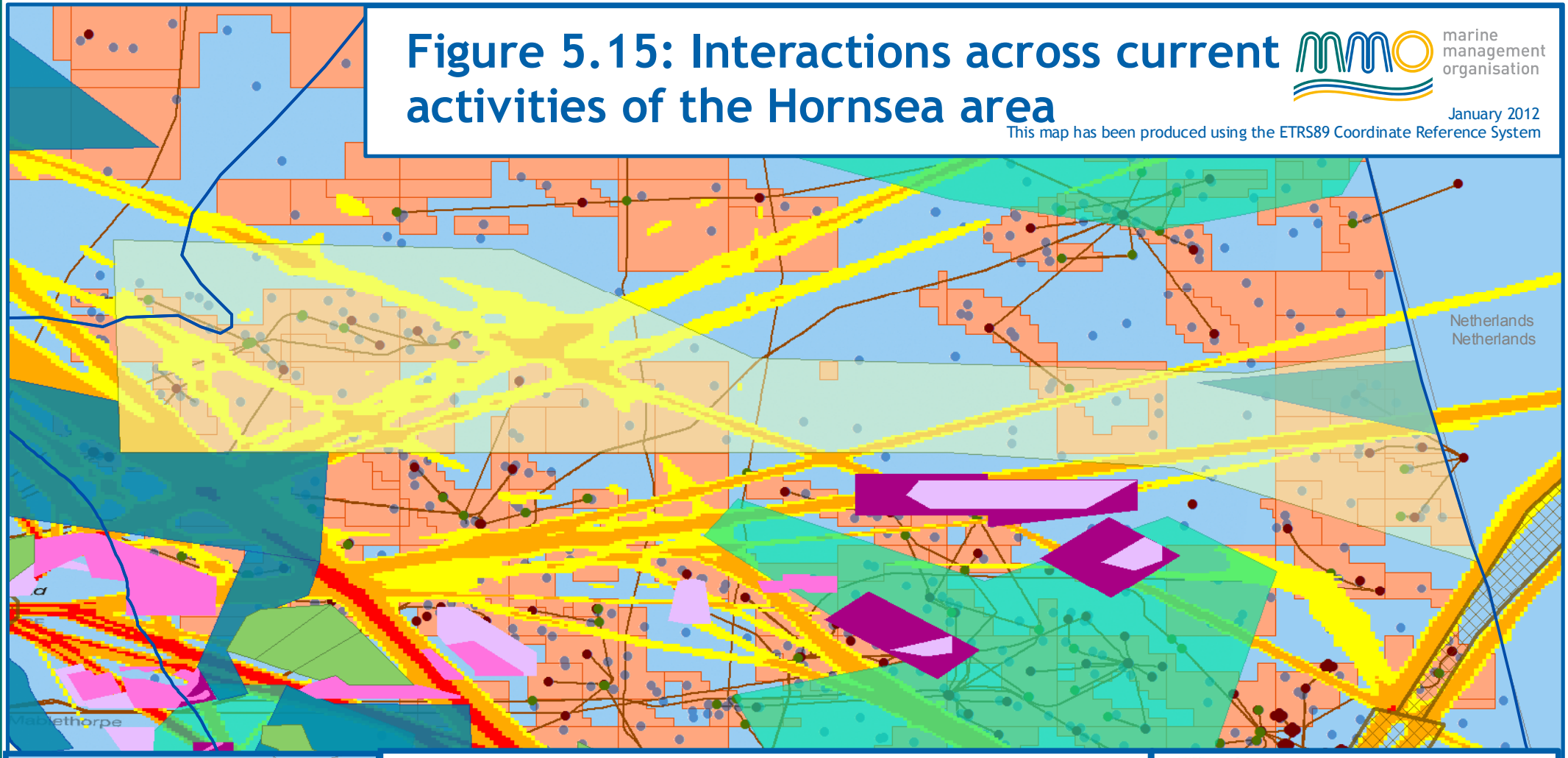

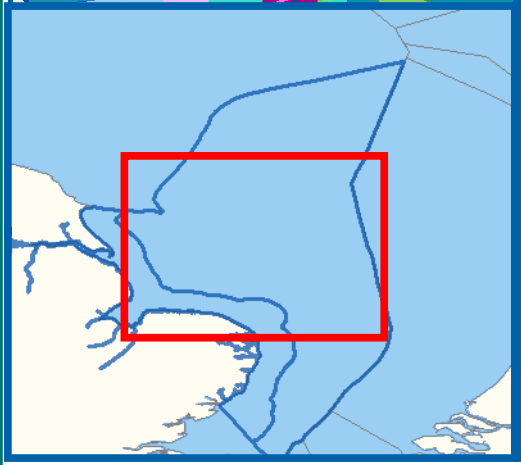

- MMO Marine Plan Areas
- Subsurface infrastructure
- Surface infrastructure
- Wells
- Oil and gas pipelines
- Current oil and gas licence areas
- Round 1 Wind Farms Lease
- Round 2 Wind Farms Lease
- Round 1-2 Wind Farm Extensions
- Round 3 Wind Farms Zone
- Aggregates Applications
- Aggregates Licences
- Aggregates Prospecting or Options
- MCZ Recommended Sites
- Latest Offshore SAC Sites
- Shipping 100- 200 ships per year
- Shipping 200- 1000 ships per year
- Shipping > 1000 ships per year
- IMO Routing

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5.5 Interactions – taking account of possible future projections

Chapter 4.12 defines an approach taken to assess possible future projections from three sectors (offshore wind energy, oil and gas production and aggregate extraction) to ascertain how their spatial requirements may change over the next 20 years. This resulted in a possible high, medium and low projection being estimated for each sector (see 4.12 for explanation and limitations).

Ongoing research[13] commissioned by the MMO is intended to provide some further insight on national and east of England future scenarios for 2031 looking at a range of plausible futures, based on different interactions of activities in the marine environment. Using some early results from this work and the high, medium and low projections set out at the end of Chapter 4, an initial attempt was made to see how these projections might interact with both one another, as well as the spatial footprint currently exhibited by the remaining activities for which future projections have not been calculated (such as marine protected areas, fishing and shipping).

This has been attempted for two possible future scenarios set out below. These scenarios are **hypothetical** to illustrate implications arising from different combinations of projections rather than representing an agreed desirable future situation.

The maps below are shown to give an indication of the types of issues marine planning will need to address in order to take account of the changing spatial demands from users of the East plan areas. **They are not to be viewed as a true indication of future spatial need. For sectors for which future spatial demand has not been assessed (and therefore current spatial use is viewed) it is not to be taken that there will be no change to their spatial need until 2030. Rather this is a reflection of both limitations in available knowledge and the ability of marine planning to add value.** The maps are presented to highlight where possible future growth scenarios may raise concerns that require consideration through marine planning.

Scenario 1

This scenario assumes that the UK has gone increasingly green. As a result, renewable energies experience a boom.

Figure 5.16 shows a possible future scenario where wind energy experiences a boom, and the possible impacts of this boom on other users of the east plan areas (for further information on how this projection has been created, see Chapter 4 section 4.13). Figure 5.16 highlights a possible overlap between current IMO shipping routes and the space required for wind energy as well as a possible overlap

[13] 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
Note that the work is on-going and will be subject to further discussion with partners with an interest or background in futures analysis.

with offshore special areas of conservation. Under this scenario oil and gas extraction is at a low level and aggregate extraction at a medium level.

Scenario 2

This scenario is played out against a backdrop of continued significant extraction of oil and gas from the UK Continental Shelf, with moderate growth in renewable energy.

Figure 5.17 shows the potential effect of the realisation of a possible high projection for oil and gas extraction combined with possible medium projection for wind energy production and aggregate extraction against a backdrop of existing activities. This appears to increase busyness and competition for space around the Dogger Bank area and off the East Anglian coast.

Figure 5.16: Interactions across current activities and possible future spatial requirements under Scenario 1

November 2011
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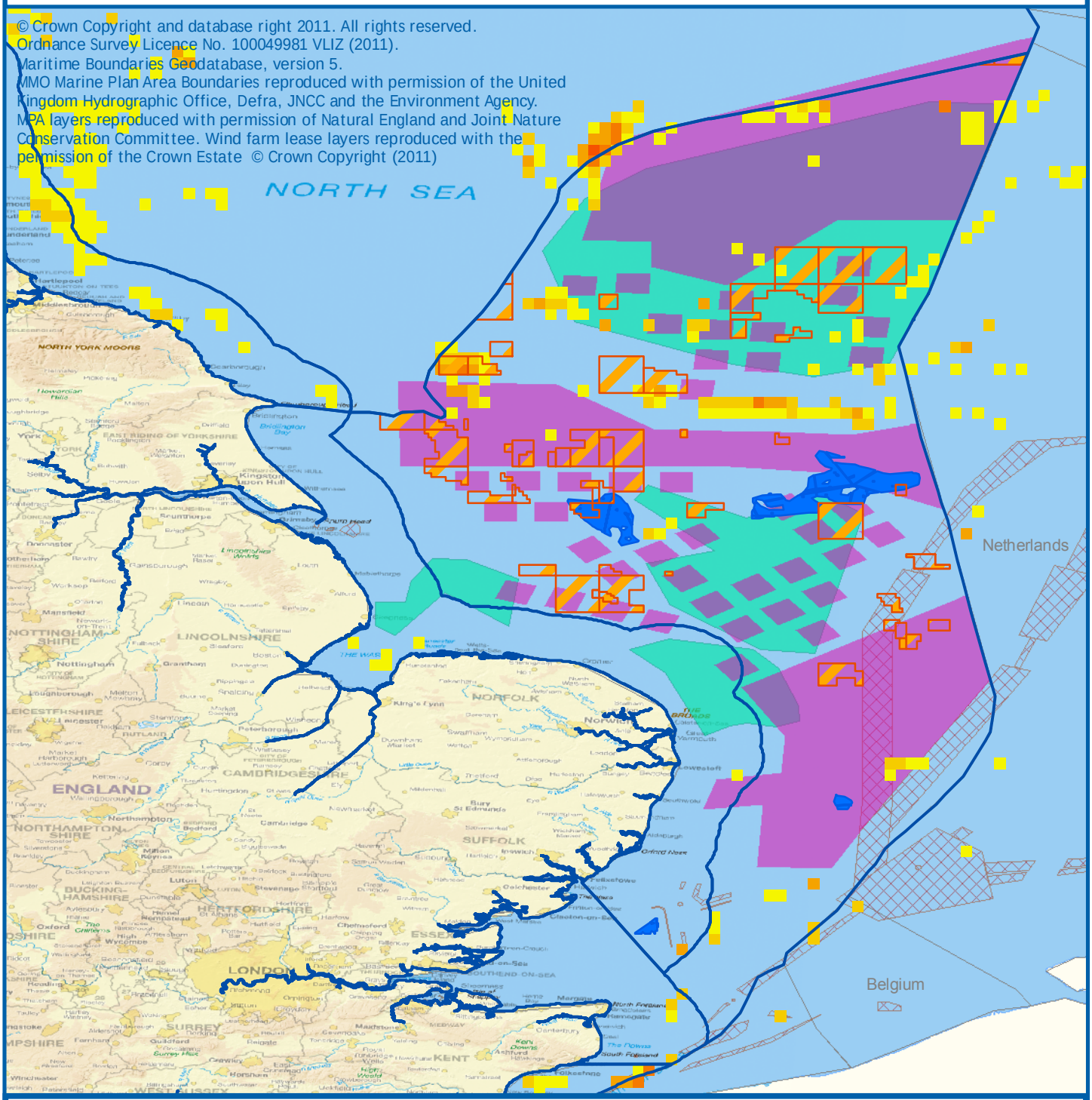


- MMO Marine Plan Areas
- Possible future low projection for oil and gas
- Possible future medium projection for aggregates
- Possible future high projection for wind energy
- IMO Routing (polygon)
- Latest Offshore SAC Sites

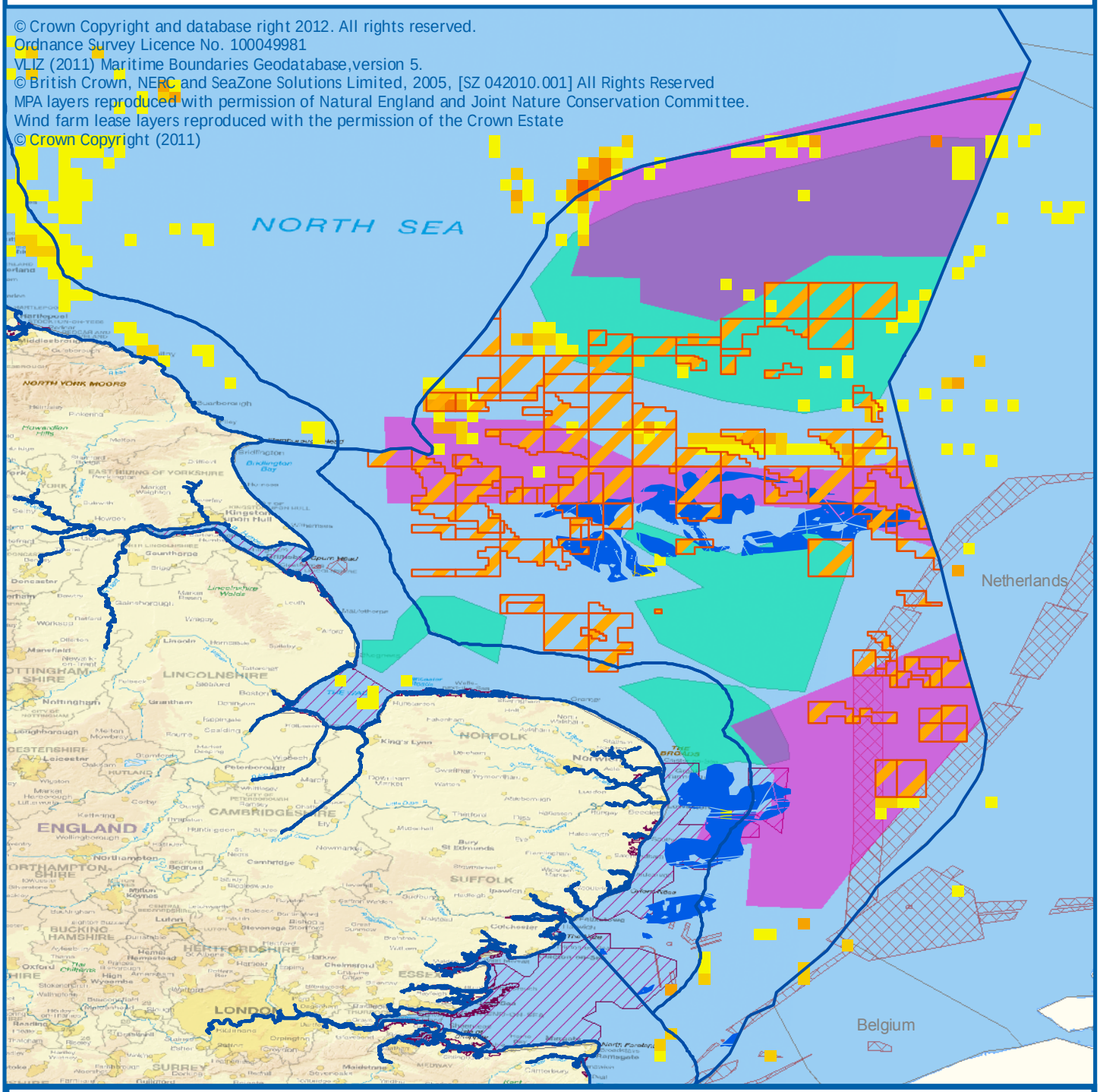
MMO fishing activity 2007-2010
(tonnes of live weight landed)

- 40 - 80
- 81 - 160
- 161 - 320
- 321 - 640
- 641 - 1280
- 1281 - 2560
- 2561 - 5120

Figure 5.17: Interactions across current activities and possible future spatial requirements under Scenario 2

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

marine management organisation



- MMO Marine Plan Areas
- Possible future high projection for oil and gas
- Possible aggregate projection (in 2034 - 2981km2)
- Possible future medium projection for wind energy
- IMO Routing (polygon)
- Inshore SPA
- Latest Offshore SAC Sites

MMO fishing activity 2007-2010

(tonnes of live weight landed)

- 40 - 80
- 81 - 160
- 161 - 320
- 321 - 640
- 641 - 1280
- 1281 - 2560
- 2561 - 5120