Offshore Wind Leasing Round 4:

Regions Refinement Report

38255-TCE-REP-026

The Crown Estate has undertaken its regions refinement process based on the *Resource and Constraints Assessment for Offshore Wind: Methodology Report*, *Summary Stakeholder Feedback Report* and the *Characterisation Area Documents*.

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Annex A: Characterisation documents for excluded regions

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1.1	Draft	November 2018
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1 Introduction

To support the Offshore Wind Leasing Round 4 process, we have undertaken a significant amount of spatial analysis and engagement on offshore wind resource and constraints at a strategic level across English, Welsh and Northern Irish waters.

This work has been undertaken using a regional approach[1]. The purpose of this work has been to develop a common evidence base to help inform potential applicants to the Round 4 process and to support the spatial design elements of the leasing round. We have engaged with statutory and non-statutory stakeholders, regulatory authorities and planning authorities to validate and build on the detailed spatial analysis to identify and characterise most favourable areas of seabed for offshore wind development with relatively lower levels of constraint.

The original 18 seabed regions were identified in early summer 2018. Engagement has been structured in two phases with market and statutory stakeholder meetings held in July 2018 and a second phase in November 2018 which included engagement with wider stakeholders. Work has been ongoing during this period, now concluded, is provided to applicants in the Offshore Wind Leasing Round 4 process, to help inform site selection on a non-reliance basis. The evidence base and a summary of feedback received are available online through our website[2].

We have used this evidence base to refine the number and spatial extent of regions that will be made available through the leasing process. By refining the number and spatial extent of regions that come forward, and sharing our detailed data and analysis of constraints affecting the characterisation areas inside each of these regions, we aim to support and inform the market's identification of sites, helping to reduce consenting risk, and ensure the most viable projects come forward. This process is undertaken with the aim of focussing interest in areas of seabed that offer the best potential for development at the present time across English, Welsh and Northern Irish waters, based on the strategic analysis that we have undertaken.

Refinement of seabed regions has been carried out in a two stage process. Stage One which followed the engagement with statutory stakeholders was presented in November 2018 and focused on visual, navigation and Ministry of Defence constraints. This process resulted in nine regions being excluded from the Round 4 process. The remaining nine regions were also extended out to the 60 metre depth contour, in light of market feedback. Of these nine remaining regions, five regions were confirmed for inclusion in Round 4; and the other four regions were to be considered in more detail in a second stage of refinement due to the complexity of constraints present in the area.

This document presents the final outcome of the regions refinement process and presents the spatial boundaries of the regions which will be converted into Bidding Areas. Bidding Areas will represent the areas of seabed that applicants will be permitted to propose projects within Leasing Round 4. In summary, the regions refinement process has identified:

- Ten regions that will not be taken forward in Round 4;
- Four regions of seabed that remain unchanged since November 2018 and will be used to form relevant bidding areas in Round 4; and
- Four regions of seabed that have been modified since November 2018 based on specific constraints and stakeholder feedback, with the modified boundaries used to form relevant Bidding Areas in Round 4 in refined form.

The exclusion of the ten regions at this stage does not preclude their consideration in any future leasing rounds. We will continue to work closely with stakeholders and communities where there is appetite to identify future opportunity.

1 As set out in "*38255-TCE-REP-024 Resource and Constraints Assessment for Offshore Wind: Methodology Report*"

2 *www.thecrownestate.co.uk/round4*

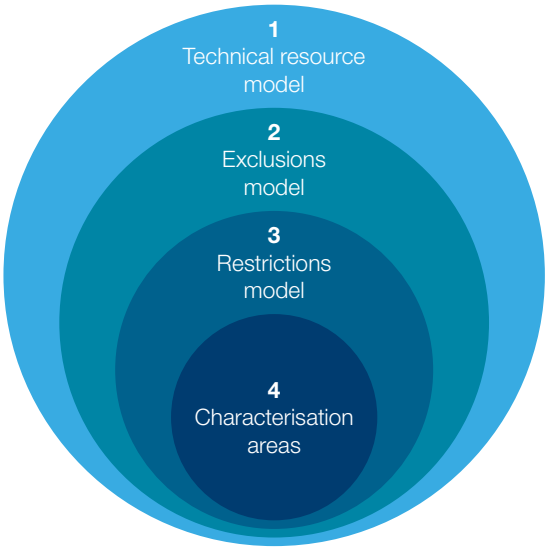
2 Regional Refinement

2.1. Characterisation areas and regions

Characterisation areas are the product of the resource and constraints analysis undertaken by The Crown Estate and represent our view of the most favourable areas for offshore wind development within regions. These areas were defined using spatial technical and constraints models and have been subject to more detailed, qualitative assessment which is documented in the relevant Characterisation Area Reports.

The analysis follows four key steps, each of which progressively refines the available seabed to identify the more technically attractive and relatively less constrained areas of seabed. These steps are described in **Figure 1** and spatial boundaries are shown on **Figure 3** (in section 8 with all other map figures).

Figure 1: High level stages of resource and constraints assessment showing decreasing footprint at each stage



The list below summarises each stage of the process that was followed.

- **Technical resource model:** this is the starting point of the analysis and defines the area of seabed that is most favourable for offshore wind development (defined by waters between 5m and 50m depth and accessibility due to wave climate being below 2.5m for 80 per cent of the time).
- **Exclusions model:** this forms part of the constraints analysis and removes activities and receptors that will preclude the development of offshore wind infrastructure such as existing seabed infrastructure and rights, and areas where health and safety or policy reasons mean development is unfeasible. The activities and receptors (input criteria) in this model are termed 'hard constraints' and are described by spatial data layers.
- **Restrictions model:** this model includes all other criteria (described by spatial data layers) which are structured and weighted in terms of the constraint each presents to development of offshore wind but does not necessarily preclude development. The input criteria in this model are termed 'soft constraints'.
- **Characterisation areas:** these are defined from the result of combining the first three stages in the list and taking the least constrained 50 per cent of these, by feature. The model was then split into 18 areas following marine planning boundaries but also adding in sub-divisions by grouping together areas with similar types of constraints. Detailed consideration and analysis has subsequently been undertaken on these areas and are available to prospective applicants through the relevant Characterisation Area Reports. The aspects that are introduced in this stage of work are termed 'review layers'.

A full description of the process followed and data used is available in the *Resource and Constraints Assessment for Offshore Wind: Methodology Report*[3].

The original regions were defined using the favourable classification in the technical resource model (i.e. the starting point for the resource and constraints analysis) with the boundaries of the 18 regions defined along similar boundaries to the characterisation areas; grouping together areas of seabed with similar types of constraints as shown in **Figure 4**. This has resulted in each characterisation area being sited within a single wider region.

3 *https://www.thecrownestate.co.uk*

2.2. Leasing concept

The spatial element of the leasing concept for the Round 4 Leasing process is to enable developer-led site identification whilst ensuring that we support appropriate development through provision of data and analysis. Developers will be able to propose project sites within Bidding Areas that are available, with Bidding Area boundaries being based on the final regions emerging from the regions refinement process.

This approach allows flexibility for developers to utilise high resolution data through sources such as the Marine Data Exchange[4] and local knowledge to propose sites outside of the characterisation areas. The resource and constraints assessment has not included this high resolution local data, instead focusing on datasets with consistent coverage across English, Welsh and Northern Irish waters. This is with the purpose of ensuring consistent and robust analysis of opportunity across the seabed that we have responsibility for.

2.3. Region refinement methodology and classification

Through the refinement process we have identified regions which we believe offer the most favourable conditions for offshore wind development, for the Round 4 leasing process for England, Wales and Northern Ireland. This has involved classifying the regions as follows:

Table 1: Region classification

1. Regions excluded from Round 4 leasing
Regions not taken forward as part of Round 4. Following a detailed assessment of spatial constraints, and extensive engagement with statutory stakeholders, we have taken the decision to exclude ten regions of seabed from our offer to market, as part of the proposed new offshore wind leasing round to be known as Round 4.[5]
2. Region will be included in the Bidding Areas in Round 4 leasing
Four regions will be offered in the tender process as part of Round 4 without significant amendment, as part of four Bidding Areas. We believe that these regions, though not unconstrained, offer good opportunities for new offshore wind leasing, on the basis that they are technically feasible, include sufficiently large areas of available seabed for offshore wind development, and have relatively lower levels of consenting constraint.
3. Regions to be partly included in the bidding areas in Round 4 leasing
Four regions of seabed have been modified based on specific development constraints, where the less constrained parts will be included in the relevant Bidding Areas in Round 4 in refined form.

4 *http://www.marinedataexchange.co.uk*

5 The exclusion of the ten regions at this stage does not preclude their consideration in any future leasing rounds

3 Stage One regions refinement

Three types of constraint were used in Stage One of Regions Refinement to determine the classification of regions. These criteria have been drawn from the evidence base underpinning each characterisation area; where these constraints will be challenging to mitigate for any development across the whole of the characterisation area. The constraints which underpin the Stage One refinement process are:

- Ministry of Defence (MoD) Practice and EXercise Areas (PEXA) that were identified as material issues through the characterisation work;
- Visual interactions identifying regions where development potential (i.e. the characterisation area) would predominately or entirely be within 13km of the coast;
- Where development potential in a region is significantly overlapped by shipping routes that contain traffic of over 1,000 ships per year.

The Ministry of Defence PEXA areas that have been highlighted as of significant constraint through engagement with the Defence Infrastructure Organisation have been removed from the regions map. This prompted some regions to reduce in size significantly.

Assessment of visual sensitivity was completed using percentage overlaps with the underlying characterisation area. Regions have been excluded where over 70 per cent of the characterisation area is within 13km from the coast.

The consideration of navigation drew on calculating the percentage of the characterisation area that overlaps with routes accommodating over 1,000 ships per year[6], but also considering the number of different routes that transect the characterisation area, and their alignment and proximity to hard constraints such as traffic separation schemes and other obstructions.

3.1. Excluded regions

The regions that have been excluded are listed below with reasoning, as well as the addition of further detail on a selection of the other constraining factors that were identified in the characterisation documents.

The exclusion of these regions does not preclude their consideration in any future leasing rounds.

3.1.1. Durham Coast

The Durham Coast characterisation area sits very close to shore with 93 per cent of the characterisation area within 13km of the coastline. A map of this constraint with the region displayed is available in **Figure 4**.

The characterisation document also highlights significant and potentially insurmountable issues with the Ministry of Defence air defence and threat radars at Brizlee Wood and Brunton Airfield respectively.

In addition, potential issues were highlighted with a number of environmental designations for birds and habitats. Potash and polyhalite mines extend under the seabed from the North Yorkshire coastline and present a significant constraint. The characterisation area was also modelled to be visible from numerous landscape designations, including Heritage Coasts, the North York Moors National Park, Hadrian's Wall World Heritage Site and North Northumberland Area of Outstanding Natural Beauty (AONB).

> For a full list of the constraints that have been defined and characterised, please refer to the relevant characterisation report in **Annex A**.

6 HM Government (2017). Vessel Density Grid 2015.
Available online under open government license: *https://data.gov.uk/dataset/b7ae1346-7885-4e2d-aedf-c08a37d829ee/vessel-density-grid-2015*

3.1.2. Thames Approaches

The Thames Approaches characterisation area intersects with significant navigation routes that host over 1,000 ships per year. This equates to 73 per cent of the characterisation area overlapping with this significant amount of navigation activity. This traffic is transiting through the area between major traffic management schemes and into major ports such as Port of London, Felixstowe and Harwich. A map of this constraint with the region displayed is available in **Figure 5**.

The Characterisation Area Report also highlights the significant amount of offshore wind development across the Thames Estuary area already with two additional offshore wind project extensions adding to this deployed capacity in the Thames Approaches region.

The documents also highlight environmental sensitivities related to the Southern North Sea Special Area of Conservation (SAC). Cumulative pressures on commercial fishing were highlighted as a potential issue as well as impacts on Lesser Black Backed Gull.

> For a full list of the constraints that have been defined and characterised, please refer to the relevant characterisation report in **Annex A**.

3.1.3. Kent Coast

The Kent Coast characterisation area intersects with significant navigation routes that host over 1,000 ships per year. This equates to 67 per cent of the characterisation area overlapping with this significant amount of navigation activity. This traffic is transiting through the area between major navigational traffic management schemes and into major ports such as Port of London, Felixstowe and Harwich. A map of this constraint with the region displayed is available in **Figure 5**.

The characterisation document also highlights the significant amount of offshore wind development across the Thames Estuary area already with the Thanet offshore wind farm project extension adding to this deployed capacity in the Kent Coast region.

The documents also highlight environmental sensitivities related to the Southern North Sea SAC. The area also hosts the Goodwin Sands which is sensitive from an environmental and cultural heritage perspective. There are also potential issues identified relating to Lesser Black Backed Gulls as well as potential visibility constraints.

> For a full list of the constraints that have been defined and characterised, please refer to the relevant characterisation report in **Annex A**.

3.1.4. West of Isle of Wight

A considerable portion (55 per cent) of the West of Isle of Wight characterisation area sits within 13km of the coast. The relatively close proximity of this characterisation area, coupled with MoD sensitivities around the Portland Bill compass testing facility, that would preclude development around Lyme Bay and to the south and east of Portland Bill, means that this area is very spatially constrained. A map of this constraint with the region displayed is available in **Figure 6**.

Significant commercial shipping and recreational sailing routes also characterise this area as being constrained.

In addition, the area was also highlighted as being important for commercial fishing activity and was modelled to be visible from numerous landscape designations; Heritage Coasts, AONBs, the New Forest National Park and the Dorset and East Devon World Heritage site.

> For a full list of the constraints that have been defined and characterised, please refer to the relevant characterisation report in **Annex A**.

3.1.5. South West

The majority (96.97 per cent) of the South West characterisation area lies within 13km of the Cornish coast. There is also a significant amount of MoD activity in and around the area including several ranges, danger and exercise areas which have reduced the potential area for development even further. A map of this constraint with the region displayed is available in **Figure 7**.

Significant concerns have also been raised in relation to statutory safeguarding and air defence radar related to MoD activity.

Other concerns in the characterisation document relate to impacts on Marine Conservation Zones (MCZs) in the area and interactions with commercial fishing activity. The characterisation area was also modelled to be visible from numerous Heritage Coasts, AONBs and the Devon and Cornwall mining landscape World Heritage site.

> For a full list of the constraints that have been defined and characterised, please refer to the relevant characterisation report in **Annex A**.

3.1.6. Bristol Channel (English)

The Bristol Channel (English) characterisation area sits with a considerable portion (76 per cent) of the area inside 13km of the coast. The relatively close proximity of this characterisation area to shore has formed the basis of removal of this region from the offer to market at Round 4. A map of this constraint with the region displayed is available in **Figure 8**.

Other issues that were highlighted in the characterisation area include aggregate extraction areas and significant navigation traffic navigating into the Bristol Channel.

The characterisation area was also modelled to be visible from numerous landscape designations; Heritage Coasts, AONBs and the Exmoor National Park.

> For a full list of the constraints that have been defined and characterised, please refer to the relevant characterisation report in **Annex A**.

3.1.7. Bristol Channel (Welsh)

The Bristol Channel (Welsh) characterisation area sits with a considerable portion (74 per cent) of the area within 13km of the coast. The relatively close proximity of this characterisation area to shore has formed the basis of the exclusion of this region from Round 4. In addition, Castlemartin (D113B) and Manorbier (D115B) danger areas on the south Pembrokeshire Coast have been removed as hard constraints. A map of this constraint with the region displayed is available in **Figure 8**.

Other issues that were highlighted in the characterisation area include aggregate extraction areas, significant navigation traffic navigating into the Bristol Channel.

The characterisation area was also modelled to be visible from a number of landscape designations; Heritage Coasts, AONBs and the Exmoor National Park.

> For a full list of the constraints that have been defined and characterised, please refer to the relevant characterisation report in **Annex A**.

3.1.8. Cardigan Bay

The majority (81 per cent) of the Cardigan Bay characterisation area is covered by the MoD Aberporth Range which is used as a test area for Unmanned Air Vehicles. 91 per cent of the remaining area after this constraint has been removed is within 13km of coast posing significant constraint from a visual perspective. A map of these constraints with the region displayed is available in **Figure 9**.

Other issues that were highlighted in the characterisation document for this area include: navigational activity and intersection with the Harbour Authority Area at Fishguard Harbour; significant intersection with SACs protecting habitats and species; and SPAs protecting species such as Red Billed Chough, Manx Shearwater and Red Throated Diver.

Potentially very significant constraints were highlighted around visibility from Pembrokeshire Coast and Snowdonia National Parks as well as several Heritage Coasts.

> For a full list of the constraints that have been defined and characterised, please refer to the relevant characterisation report in **Annex A**.

3.1.9. Northern Ireland

99 per cent of the Northern Ireland characterisation area is within 13km of the coast and is therefore constrained by risk and uncertainty associated with visual sensitivity from shore. A map of this constraint with the region displayed is available in **Figure 10**.

The characterisation document for this area also highlights constraints related to shipping activity and the jurisdictions of Belfast Harbour and Donaghadee Harbour Authorities.

Potentially significant constraints were highlighted across a range of European designations for bird species and habitats, recreational sailing activity and visibility from a range of AONBs.

> For a full list of the constraints that have been defined and characterised, please refer to the relevant characterisation report in **Annex A**.

3.2. Extending regions to 60 metre water depth

Engagement with market stakeholders during summer 2018 highlighted that technological and operational advancements in construction techniques, foundation design and other factors mean that for Round 4 projects, development of fixed foundation turbines is likely to be possible and economically viable in water depths deeper than 50 metres and in locations with more extreme wave climates.

In response to this, we extended each of the remaining regions to the 60m depth contour. **Figure 11** details the extent of this change for regions that were classed as 'propose to include' and 'under consideration' in November 2018.

The spatial extent of the characterisation areas remains unchanged, as it is still our view that the most economic resources are sites in water depths of less than 50m and with good accessibility due to wave climate.

3.3. Included regions

The characterisation analysis has highlighted strong opportunity across the Dogger Bank, Southern North Sea, East Anglia, North Wales and Irish Sea regions. There are still significant development constraints present across these areas which are detailed in the relevant characterisation area reports for each region.

During stage two region refinement further amendments have been made to the East Anglia region, which is described in more detail in section 4.

4 Stage Two regions refinement

4.1.1. Yorkshire Coast

The *Yorkshire Coast Characterisation Report* highlights oil and gas and navigation constraints as potentially needing significant mitigation. In addition, there are interactions with MoD Air Defence Radars at Staxton Wold and Trimingham which could cause a significant issue across the characterisation area.

However, the primary constraint that prompted this region to be considered in more detail related to the distribution and potential consenting issues around mobile species, in particular birds from the Flamborough and Filey Coast Special Protection Area (SPA). This is in the context of the cumulative impact of a significant number of developments in the Southern North Sea impacting on population integrity of the Flamborough and Filey Coast SPA.

In order to understand this risk further, we commissioned a review of current evidence and previous Environmental Impact Assessments (EIAs) from developments around the regions to pull out major risk relevant to this region. The recommendation of this review was to not offer the Yorkshire Coast region due to a number of factors including:

- Potential displacement impacts on Red Throated Diver in the Greater Wash SPA with evidence suggesting impacts are often noted up to 10km from turbines; and
- Potential in-combination impacts on Kittiwake, Guillemot, Razorbill and Gannet from the Flamborough and Filey Coast SPA, with risks reducing with greater distance from the colony.

As a result of this evidence review and stakeholder feedback (see the *Stakeholder Summary Report*), the entirety of this region will be excluded from Round 4. **Figure 12** shows the Yorkshire Coast region with the outputs of the Future of the Atlantic Marine Environment (FAME) and Seabird Tracking and Research (STAR) data for Kittiwake from Flamborough and Filey Coast SPA.

> For a full list of the constraints that have been defined and characterised, please refer to the relevant characterisation report in **Annex A**.

4.1.2. The Wash

The ***Wash Characterisation Area Report*** highlights oil and gas and navigation constraints as potentially needing very significant mitigation. In addition there are interactions with MoD Air Defence Radars at Staxton Wold and Trimingham which could cause a significant issue across the characterisation area. There are also numerous environmental sensitivities such as the Cromer Shoals MCZ highlighted, in addition to a well-established inshore fishing industry in the area.

A significant constraint that was considered in more detail was the potential ornithological issues with species from the Flamborough and Filey Coast, North Norfolk Coast and Alde Ore Estuary SPAs. In order to understand these issues further, we commissioned a review of current evidence and previous EIAs from developments around the regions to pull out major risk relevant to this region. The recommendations of this review were to refine the region to manage significant environmental consenting risks. These refinements include:

- Refine the region along a buffer of 40km from the Scolt Head and Blakeney Point areas of the North Norfolk Coast SPA to manage impacts on Sandwich Terns;
- Refine the region along a 10km buffer of the Greater Wash SPA to reduce potential displacement impacts on Red Throated Diver;
- Consider the in-combination impacts of the little gull species which congregate in the Greater Wash SPA, especially in autumn. This should be mitigated with the refinements mentioned above however;
- Consider Lesser Black Backed Gulls towards the south of the region which are under pressure at the Alde-Ore Estuary SPA; and
- Potential in-combination impacts on Kittiwake, Guillemot, Razorbill and Gannet from the Flamborough and Filey Coast SPA are also a consideration in this region especially to the North of the region. Impacts tend to reduce with greater distance from the colony however.

As a result of this evidence, the 2017 Offshore Wind Extensions plan-level Habitats Regulations Assessment[8] (HRA), and stakeholder feedback (see the *Summary Stakeholder Feedback Report*), the boundaries of this region have been refined. The boundary of the Greater Wash SPA with an additional 10km buffer will be removed from the region along with a buffer of 40km from the Scolt Head and Blakeney Point areas. The Inner Dowsing, Race Bank and North Ridge SAC has also been removed. **Figure 13** shows the Wash region overlaid with these constraints.

8 The Crown Estate (2019), Record of the Habitats Regulations Assessment 2017 Offshore Wind Extensions Plan Available online: *http://marinedataexchange.co.uk/search?q=#fq=fq%3DDeveloperName%253A(%2522Habitats%2520Regulations%2520Assessment%2520(HRA)%2522)*

It has been concluded that the boundary of the region will not be refined based on density datasets for Kittiwake and Lesser Black Backed Gull species due to confidence issues in defining an explicit boundary based on modelled data. Stakeholders have identified a number of sources that characterise behaviour and hotspot areas outside of SPAs for key species in the Wash region[9]. Potential applicants are advised to review these sources of information when considering potential sites.

For a full list of the constraints that have been defined and characterised, please refer to ***Characterisation Area Report: 4 – The Wash***.[10]

4.1.3. South East

Two of the major constraints that have been identified in the South East region are navigation activity and visibility. The area is intersected on its southern boundary by the traffic separation scheme managing traffic into the southern North Sea. There is also significant cross channel traffic and other vessel movements from ports such as Dover, Newhaven and Portsmouth.

On consideration of the data, evidence and stakeholder feedback, we have concluded that impacts on navigation traffic in this region are better considered through the project level Navigational Risk Assessment that developers are required to produce to support a consent application. Potential applicants should be aware of South Marine Spatial plan policies S-PS2 and S-PS3[11] in particular. **Figure 14** shows the region overlaid with navigation traffic over 1000 tracks per year.

The region has been refined to remove an area of significant MoD constraint, primarily MoD Danger Areas where offshore wind farm development could potentially affect the ability of Navy aircraft to operate down to sea level and constrain their movement. The region has also been refined to remove South Wight Maritime SAC and Basurelle Sandbank SAC due to their current conservation status and relative spatial extent, the degree of impact from offshore wind development within either SAC would be a significant consenting risk.

Potential applicants in this region should also be aware of visibility issues from various AONBs and Heritage Coasts, as well as the South Downs National Park.

For a full list of the constraints that have been defined and characterised, please refer to ***Characterisation Area Report: 9 – South East***.[12]

9 Cleasby et al (2018). Combining habitat modelling and hotspot analysis to reveal the location of high density seabird areas across the UK: Technical Report. RSPB Research Report no. 63. RSPB Centre for Conservation Science, RSPB, The Lodge, Sandy, Bedfordshire, SG19 2DL. Available online: *https://rspb.maps.arcgis.com/apps/Cascade/index.html?appid=d6c3aa1ec7184a2895a01cebf451c7b3&utm_source=rspb.org.ukseabirdtracking&utm_medium=shorturl*;

Sansom et al (2018). Comparing marine distributions maps for seabirds during the breeding season derived from different survey and analysis methods. PLOS ONE. Available online: *https://doi.org/10.1371/journal.pone.0201797*;

Bradbury et al (2014). Mapping Seabird Sensitivity to Offshore Wind Farms. PLoS ONE. Available online: *https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0106366*;

Marine Ecosystem Research P (NERC and Defra), Seabird and cetacean distributions - a step change. Available online: *http://www.marine-ecosystems.org.uk/Research_outcomes/Top_predators*; *and*

Wakefield et al (2013). Space partitioning without territoriality in gannets. Scienceexpress. Available online: *http://www.sciencemag.org/content/early/recent / 6 June 2013 / Page 1/ 10.1126/science.1236077*

10 Available at *www.thecrownestate.co.uk/round4*

11 *HM Government. South Marine Plan, Available online:* http://mis.marinemanagement.org.uk/south/ports-and-shipping

12 Available at *www.thecrownestate.co.uk/round4*

4.1.4. Anglesey

Significant constraints and uncertainties relating to navigation, MoD activity and visibility mean that the southern and central sections of the Anglesey characterisation area would be very difficult to undertake development in at this point in time. Consideration of evidence[13] and stakeholder feedback has confirmed that these sections of the Anglesey region should be excluded. **Figure 15** shows the Anglesey region with the visibility from landscape designations model output for turbine tip heights at 250m above sea level.

The North-Westerly section of the region is largely free of these constraints but is close to the Irish Sea Front SPA which is designated for the Manx Shearwater.

The management measures for this site could potentially provide a significant constraint to development, however this should be considered at project level by developers and hence this section of the region will be retained to form the boundary of Bidding Areas.

> For a full list of the constraints that have been defined and characterised, please refer to ***Characterisation Area Report: 15 – Anglesey***.[14]

4.1.5. East Anglia

The *East Anglia Characterisation Report* highlights a number of constraints including navigation, ornithology, MoD activity. These constraints should be considered during a developers' site identification process.

Stakeholder feedback has highlighted significant concerns in relation to seascape and visual impact in the East Anglia region. In light of these concerns, and notwithstanding that this region was proposed for inclusion at the end of region refinement stage one, a further review of this region was undertaken.

Figure 16 shows the East Anglia region with the visibility from landscape designations model output for turbines tip heights at 250m above sea level. Consideration of stakeholder feedback has led to the nearest 13km from shore being excluded from this region.

> For a full list of the constraints that have been defined and characterised, please refer to ***Characterisation Area Report: 6 – East Anglia***.[15]

13 *NRW (2013). National Landscape Character Areas. Available online: https://naturalresources.wales/evidence-and-data/maps/nlca/?lang=en*

14 Available at *www.thecrownestate.co.uk/round4*

15 Available at *www.thecrownestate.co.uk/round4*

5 Region refinement outcomes

5.1. Summary by Region

The table below details the classification of regions that has been completed following the two stages of region refinement. **Figure 17** shows the spatial extent of these regions prior to the removal of hard constraints.

Table 2: Final region classification

1. Regions excluded from Round 4 leasing	1 - Durham Coast
	3 - Yorkshire Coast
	7 - Thames Approaches
	8 - Kent Coast
	10 - West of Isle of Wight
	11 - South West
	12 - Bristol Channel (English)
	13 - Bristol Channel (Welsh)
	14 - Cardigan Bay
	18 - Northern Ireland
2. Region boundary will be used to form Bidding Areas in Round 4 leasing	2 - Dogger Bank
	4 - The Wash (with refinement of the boundary)
	5 - Southern North Sea
	6 - East Anglia (with refinement of the boundary)
	9 - South East (with refinement of the boundary)
	15 - Anglesey (with refinement of the boundary)
	16 - North Wales
	17 - Irish Sea

5.2. Hard constraints

Hard constraints within open Bidding Areas will be excluded from the areas available for potential sites. Hard constraints signify areas which no part of a proposal should overlap. This is due to commercial, policy or health and safety reasons.

The hard constraints for Round 4 are listed below (hard constraints data will be reviewed on a monthly basis and updated on The Crown Estate Open Data portal[16]). **Figure 18** shows the remaining regions with these hard constraints removed.

Table 3: Hard constraints

Hard Constraint	Data Set
Offshore Wind Agreement for Lease / Lease area / Zone Development Agreement (ZDA) / Preferred Bidder Letter	The Crown Estate
Aggregates Production Agreement / Exploration and Option Agreement / Preferred Bidder Letter	The Crown Estate
Capital and Navigation Dredging Licensed area	The Crown Estate
Natural Gas Storage Agreement for Lease / Lease Area	The Crown Estate
Coastal Outfall Lease area (500 metres buffer)	The Crown Estate
IMO Traffic Separation Schemes	UK Hydrographic Office

5.3. Bidding Areas

The eight refined regions being taken forward as part of Round 4 (as detailed in **Table 3**) have been grouped into defined Bidding Areas.

The four available Seabed Bidding Areas are:

- **Bidding Area 1** - Dogger Bank (comprising the Dogger Bank region)
- **Bidding Area 2** - Eastern regions (comprising the Southern North Sea region, The Wash region (refined) and the East Anglia region (refined))
- **Bidding Area 3** - South East (comprising the South East region (refined))
- **Bidding Area 4** - Northern Wales & Irish Sea (comprising the North Wales region, Irish Sea region, and the Anglesey region (refined))

The Bidding Areas were defined through the following process:

1. The final open regions, as described in Table 3, were grouped to form four spatially distinct Bidding Areas.
2. Where region boundaries were in close proximity to the UK Continental Shelf, Isle of Man Territorial Sea border, and Scotland Adjacent Waters Limit the Bidding Areas were aligned to these boundaries.
3. Water depth contours at 5m and 60m created from the EMODnet 2018 Bathymetry dataset[17] were used as a guide to further refine and smooth the Bidding Area boundaries. Small areas with water depths deeper than 60m were included on a case by case basis where these were surrounded by areas of shallower resource.
4. Boundaries were further smoothed by removing peripheral areas of seabed which ended up isolated from the rest of the Bidding Area once hard constraints are taken into account, and which would not accommodate an acceptable project capable of passing the Round 4 tender parameters.

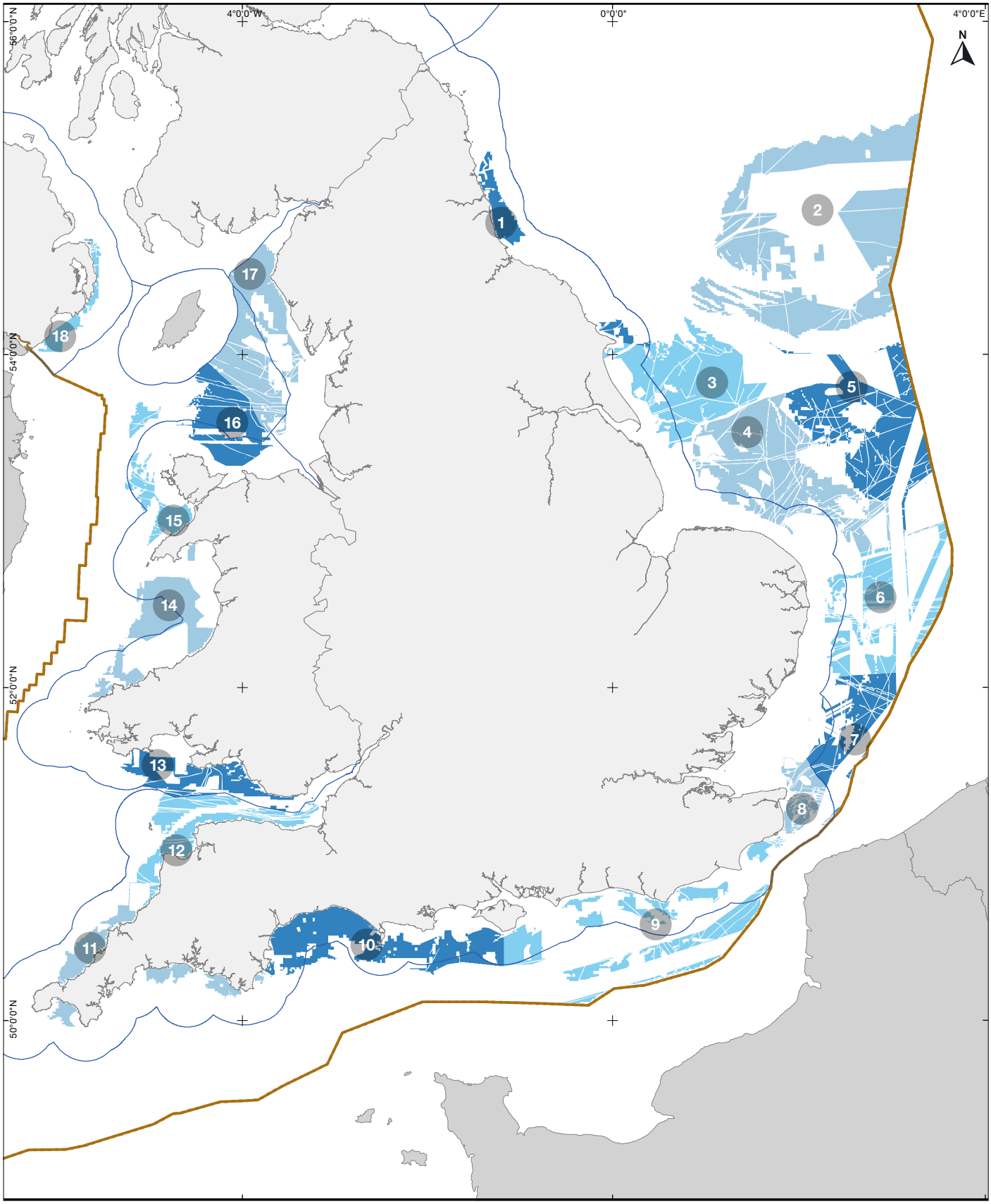
The final Bidding Areas are shown in **Figure 19** and **Figure 20** (with hard constraints shown).

16 *https://opendata-thecrownestate.opendata.arcgis.com/*

17 *https://www.emodnet-bathymetry.eu/*

6 Map figures

Figure 2: Map of the 18 originally modelled Characterisation Areas (November 2018)



Base Map				
Territorial Waters Limit	1 - Durham Coast	6 - East Anglia	11 - South West	16 - North Wales
Renewable Energy Zone Limit	2 - Dogger Bank	7 - Thames Approaches	12 - Bristol Channel (English)	17 - Irish Sea
UK Continental Shelf	3 - Yorkshire Coast	8 - Kent Coast	13 - Bristol Channel (Welsh)	18 - Northern Ireland
United Kingdom	4 - The Wash	9 - South East	14 - Cardigan Bay	
Europe	5 - Southern North Sea	10 - West of Isle of Wight	15 - Anglesey	

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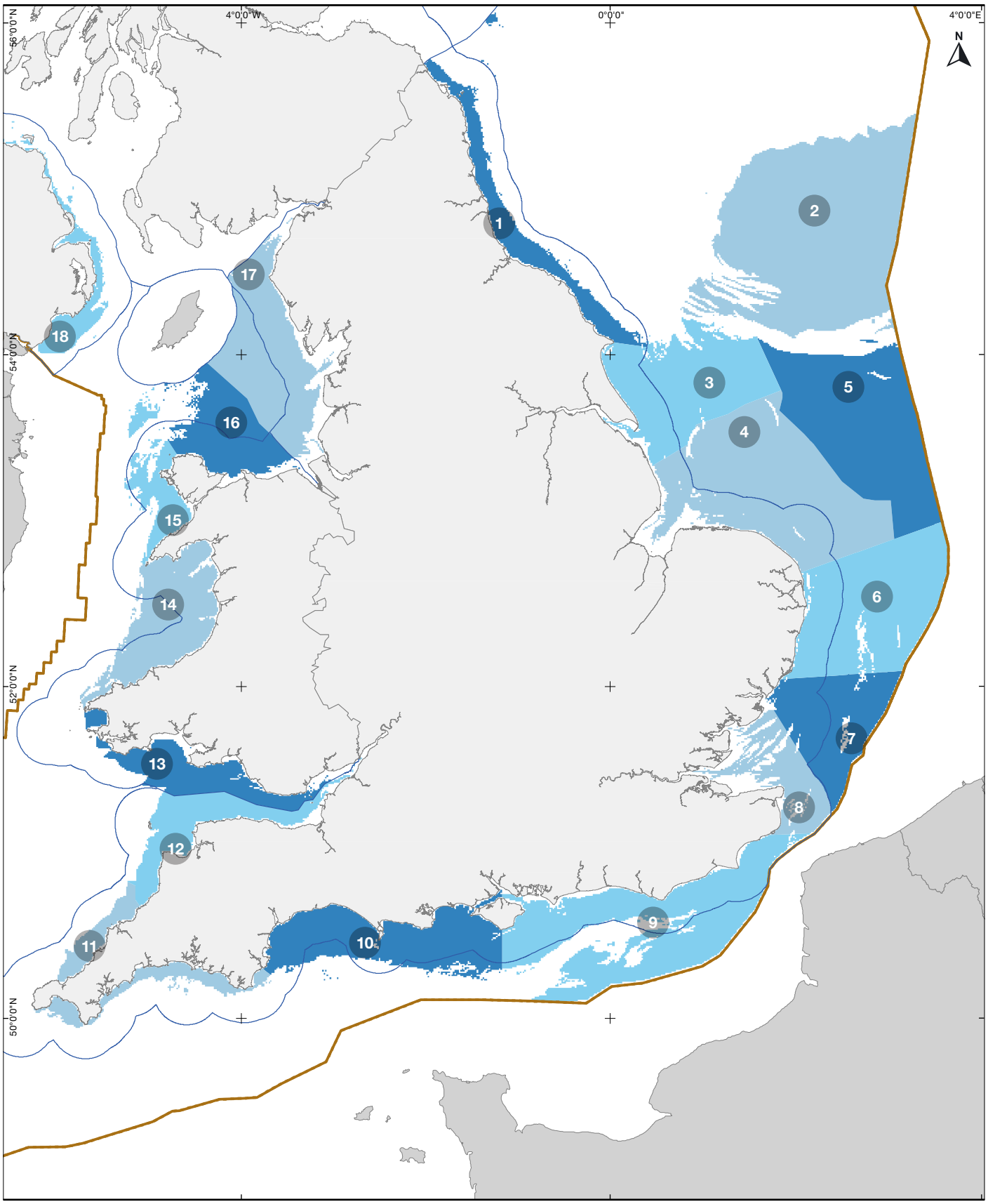
0 30 60 90 120
Kilometres

Figure 3: Map of the original 18 regions (November 2018)



Base Map				
Territorial Waters Limit	1 - Durham Coast	6 - East Anglia	11 - South West	16 - North Wales
Renewable Energy Zone Limit	2 - Dogger Bank	7 - Thames Approaches	12 - Bristol Channel (English)	17 - Irish Sea
UK Continental Shelf	3 - Yorkshire Coast	8 - Kent Coast	13 - Bristol Channel (Welsh)	18 - Northern Ireland
United Kingdom	4 - The Wash	9 - South East	14 - Cardigan Bay	
Europe	5 - Southern North Sea	10 - West of Isle of Wight	15 - Anglesey	

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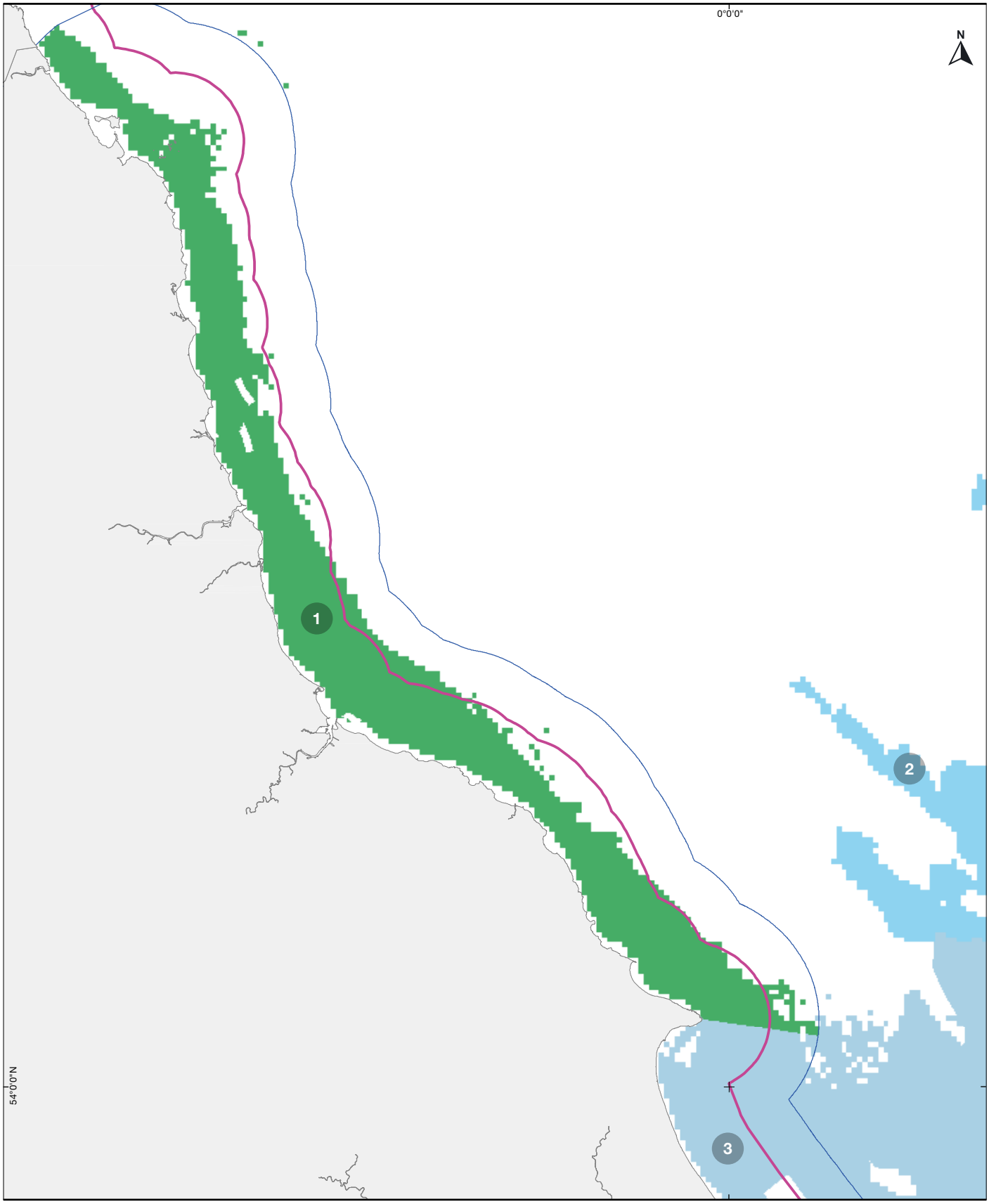
0 30 60 90 120
Kilometres

Figure 4: Map of 13km distance from shore and the overlap with the Durham Coast Region (November 2018)



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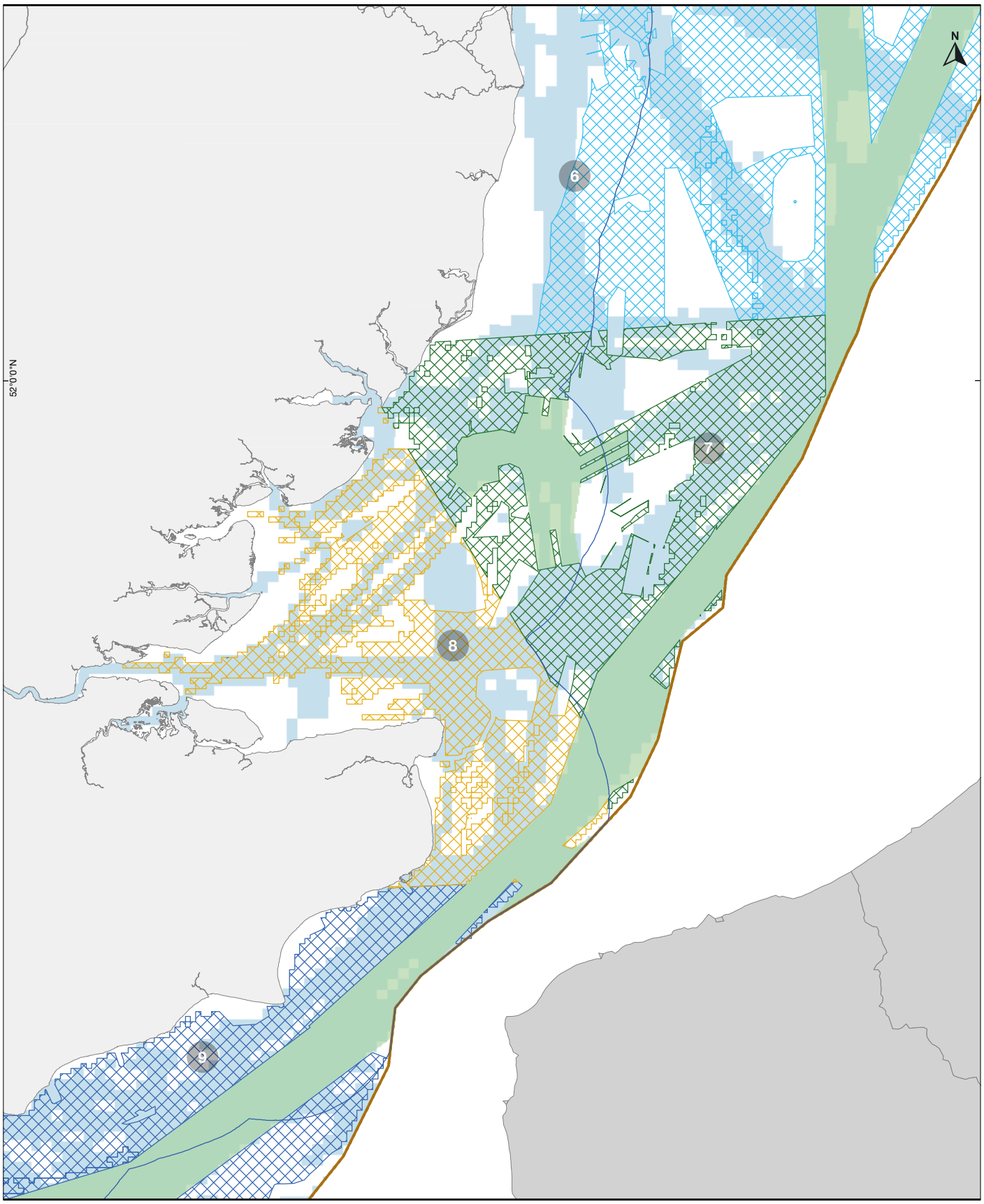
0 10 20 30
Kilometres

Figure 5: Map of shipping density greater than 1,000 ships per year and the overlap with the Thames Approaches and Kent Coast regions (November 2018)



Traffic Separation Schemes & Deep Water Channels

Vessel Density - Annual Average > 1000

Base Map

Territorial Waters Limit

Renewable Energy Zone Limit

UK Continental Shelf

United Kingdom

Europe

Regions Excluded

7 - Thames Approaches

8 - Kent Coast

Regions Remaining

6 - East Anglia

9 - South East

0 10 20 30

Kilometres

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Figure 6: Map of 13km distance from shore and the overlap with the West of Isle of Wight Region (November 2018)

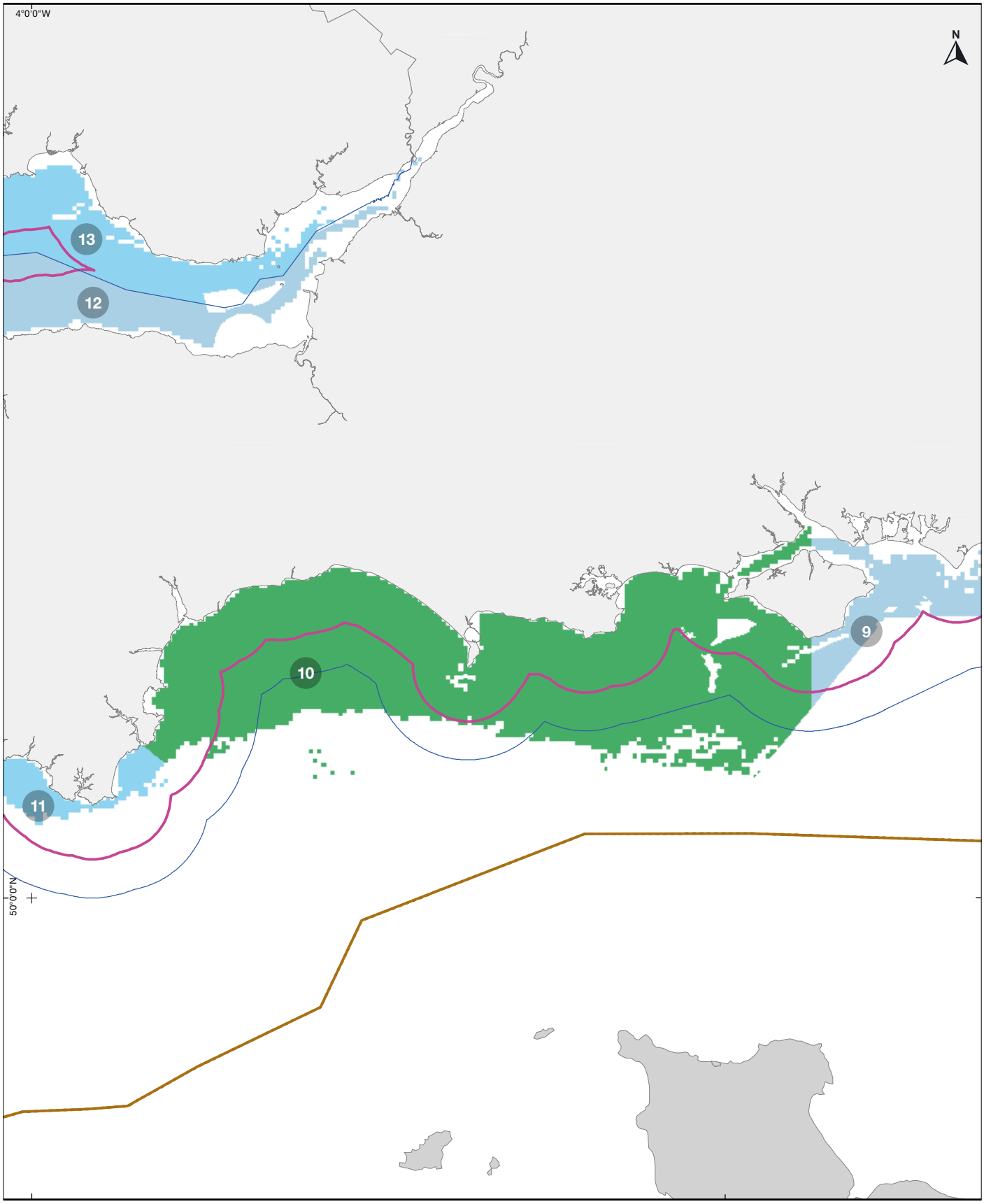

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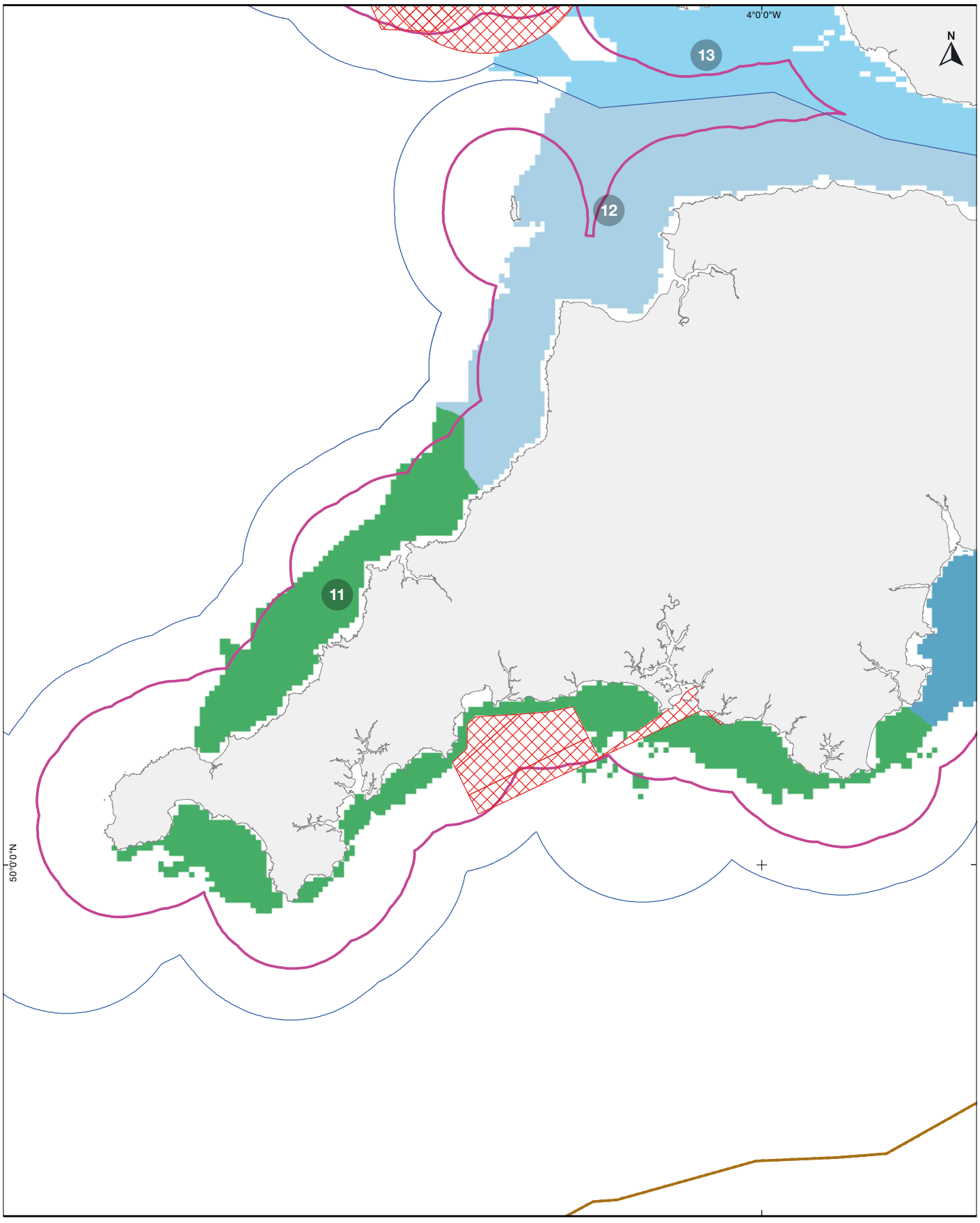
Figure 7: Map of 13km distance from shore and the overlap with the South West region (November 2018)



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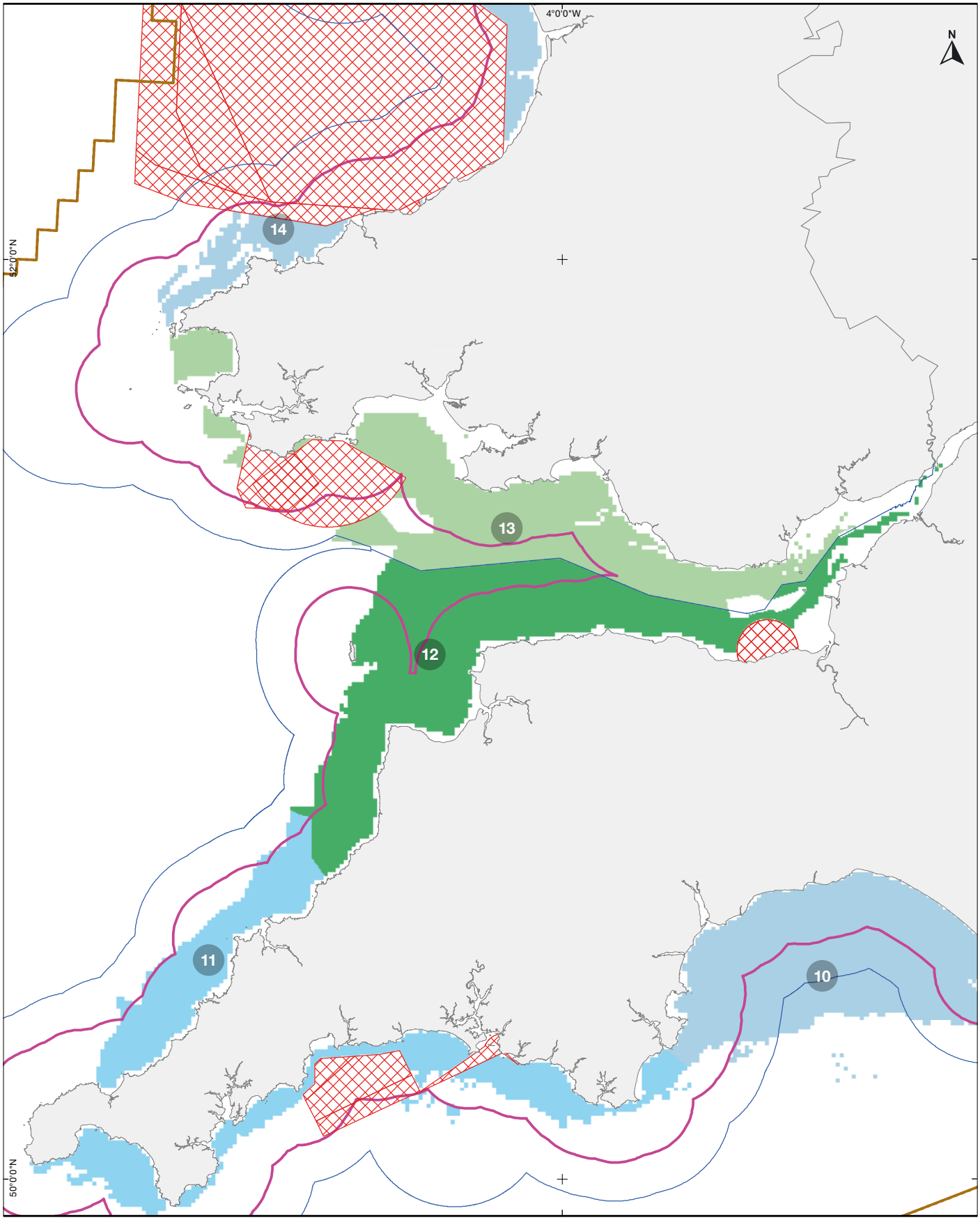
0 10 20 30
Kilometres

Figure 8: Map of 13km from shore and the overlap with the Bristol Channel (English) and (Welsh) regions (November 2018)



Distance from Shore - 13km
MOD Danger Areas

Base Map

Territorial Waters Limit
Renewable Energy Zone Limit
UK Continental Shelf
United Kingdom

10 - West of Isle of Wight
11 - South West
12 - Bristol Channel (English)
13 - Bristol Channel (Welsh)
14 - Cardigan Bay

0 10 20 30 40
Kilometres

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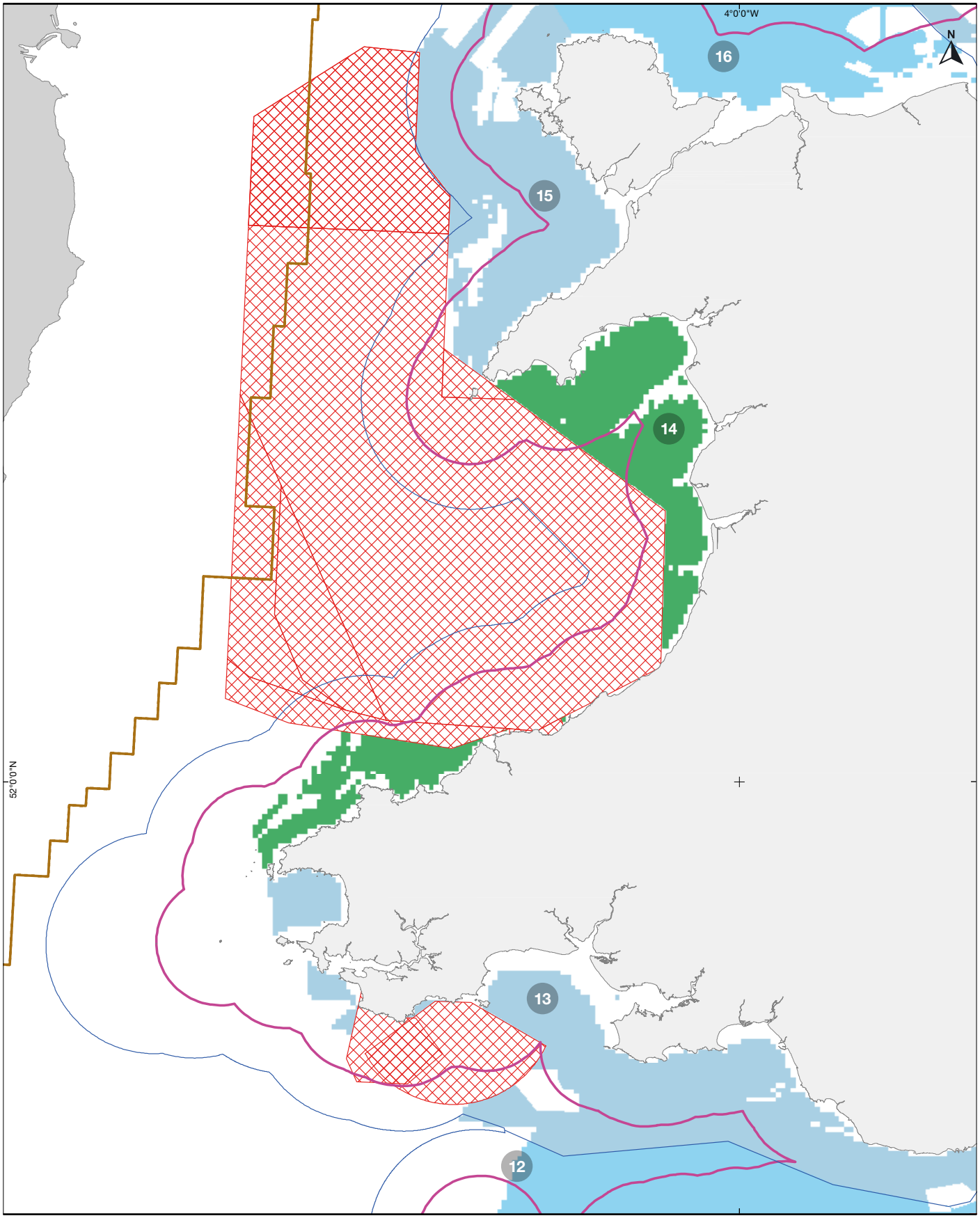
Figure 9: Map of MoD PEXA and 13km distance from shore and the overlap with the Cardigan Bay region (November 2018)



Distance from Shore - 13km
MOD Danger Areas

Base Map

Territorial Waters Limit
Renewable Energy Zone Limit
UK Continental Shelf
United Kingdom
Europe

12 - Bristol Channel (English)
13 - Bristol Channel (Welsh)
14 - Cardigan Bay
15 - Anglesey
16 - North Wales

0 10 20 30
Kilometres

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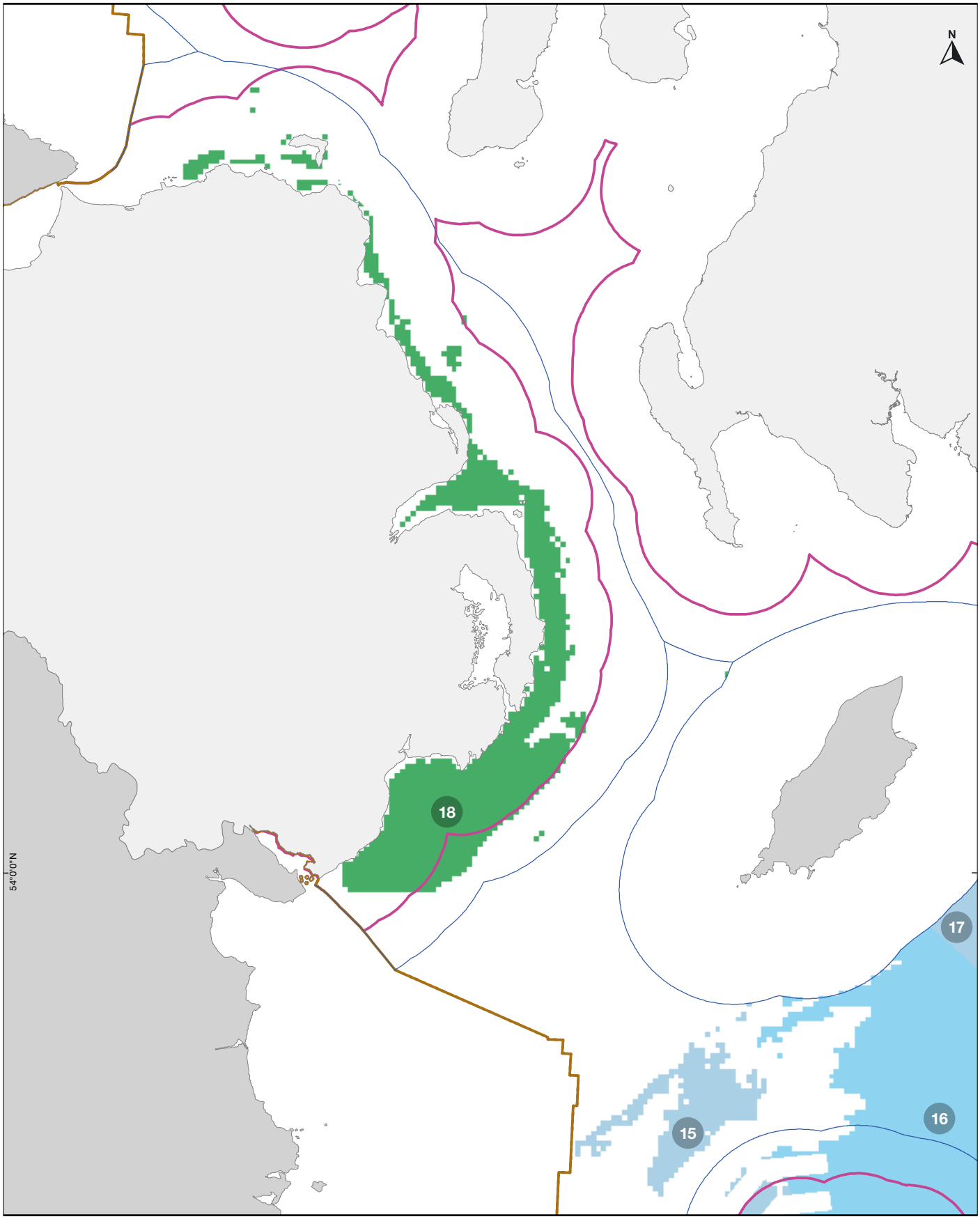
Figure 10: Map of the 13km distance from shore and the overlap with the Northern Ireland region (November 2018)



Distance from Shore - 13km

Base Map

- Territorial Waters Limit
- Renewable Energy Zone Limit
- UK Continental Shelf
- United Kingdom
- Europe

- 15 - Anglesey
- 16 - North Wales
- 17 - Irish Sea
- 18 - Northern Ireland

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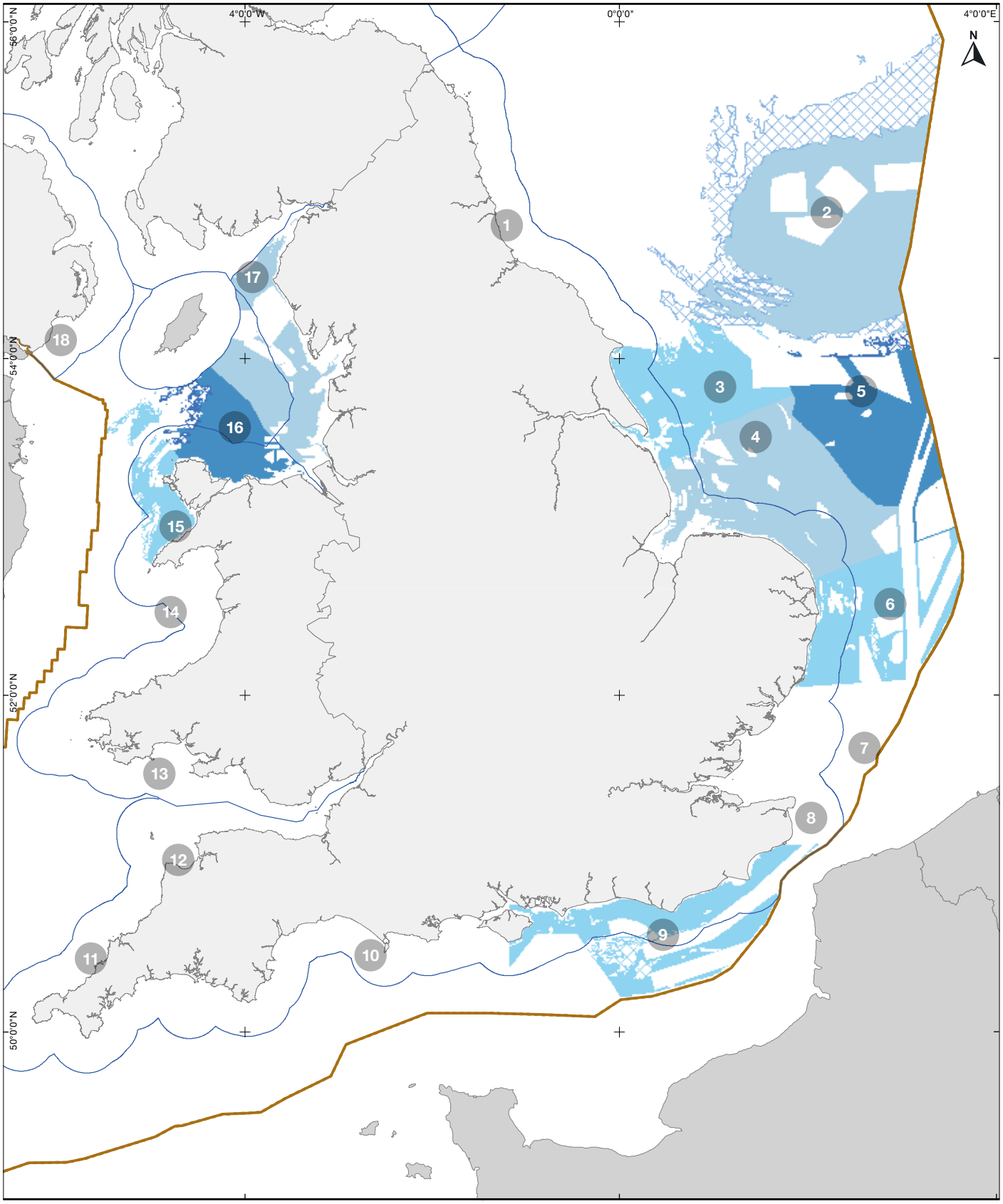
0 10 20 30
Kilometres

Figure 11: Regions remaining after Stage 1 refinement with water depths out to 60m displayed (November 2018)



Base Map	Propose to include	Under further construction	Excluded	
Water depths out to 60m	2 - Dogger Bank	3 - Yorkshire Coast	1 - Durham Coast	12 - Bristol Channel (English)
Territorial Waters Limit	5 - Southern North Sea	4 - The Wash	7 - Thames Approaches	13 - Bristol Channel (Welsh)
Renewable Energy Zone Limit	6 - East Anglia	9 - South East	8 - Kent Coast	14 - Cardigan Bay
UK Continental Shelf	16 - North Wales	15 - Anglesey	10 - West of Isle of Wight	18 - Northern Ireland
United Kingdom	17 - Irish Sea		11 - South West	
Europe				

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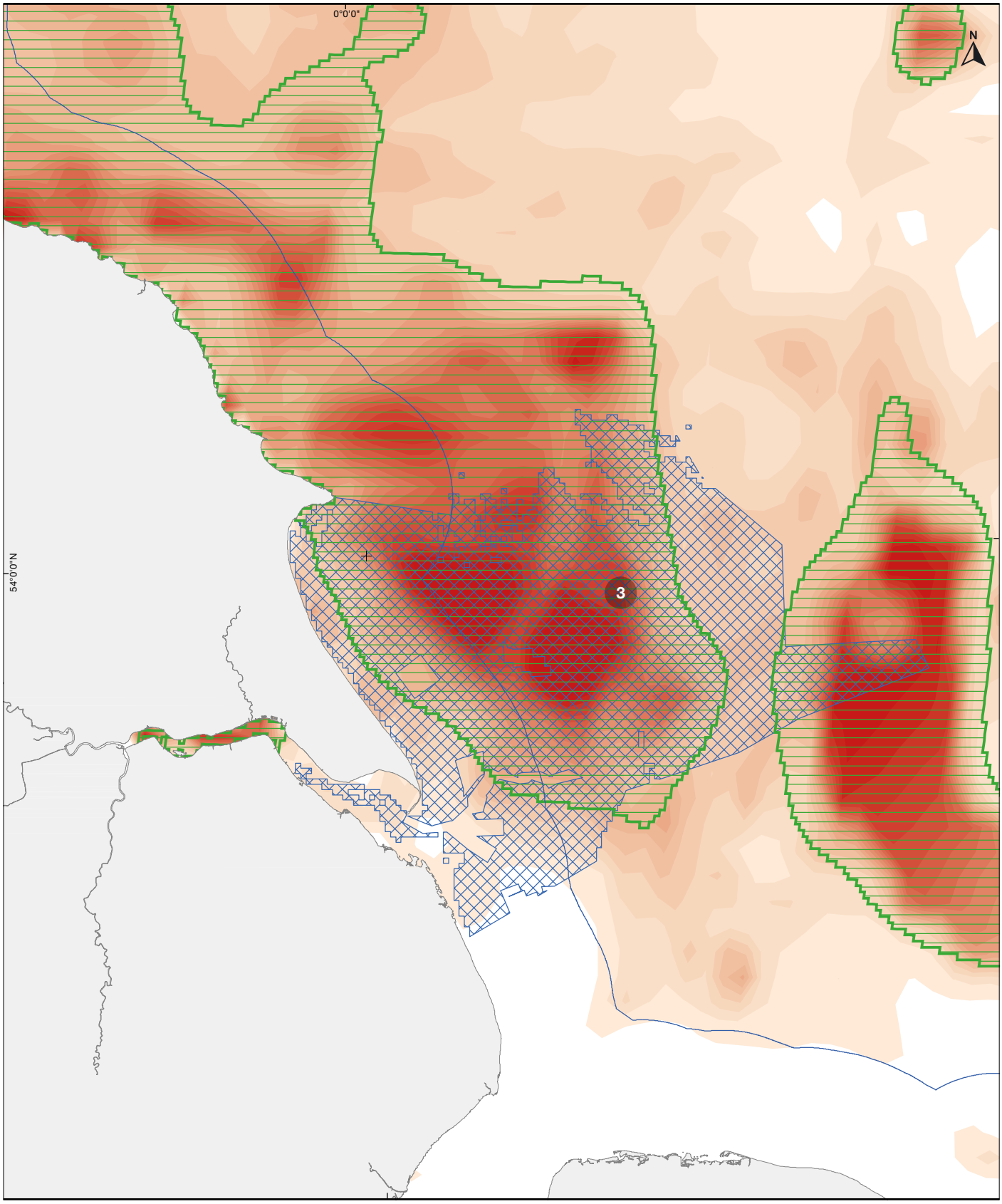
0 30 60 90 120
Kilometres

Figure 12: Map of the Yorkshire Coast region with FAME and STAR kittiwake distribution data overlaid



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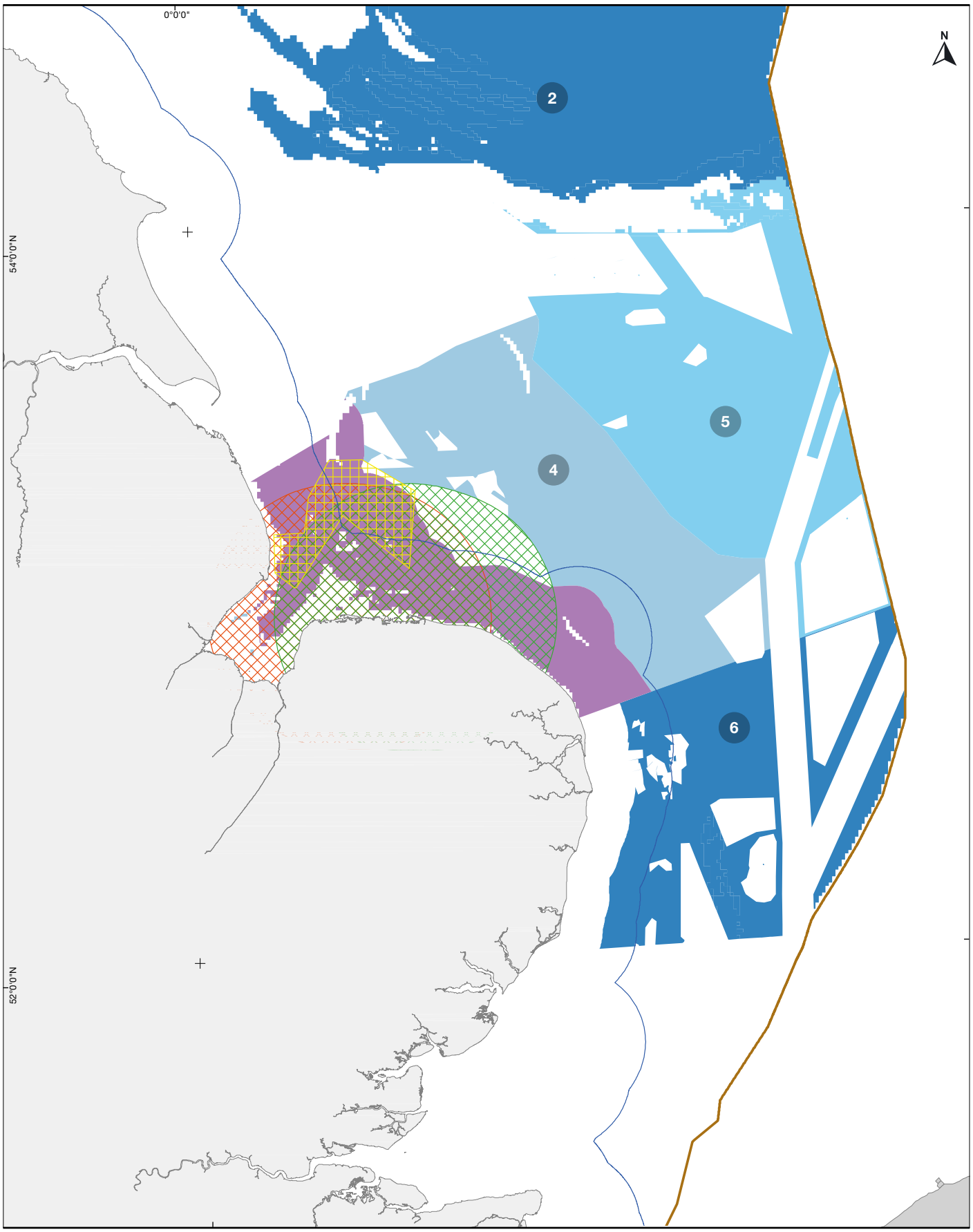
0 10 20 30
Kilometres

Figure 13: Map of the Greater Wash SPA buffered by 10km, Scolt Head buffered by 40km, Blakeney Point buffered by 40km and Inner Dowsing, Race Bank and North Ridge SAC overlaid with the refined Wash region



Inner Dowsing, Race Bank and North Ridge SAC
Blakeney Point - 40km Buffer
Scolt Head - 40km Buffer
Greater Wash SPA - 10km Buffer

Base Map

Territorial Waters Limit
UK Continental Shelf
United Kingdom
Europe

2 - Dogger Bank
4 - The Wash
5 - Southern North Sea
6 - East Anglia

0 10 20 30 40 50
Kilometres

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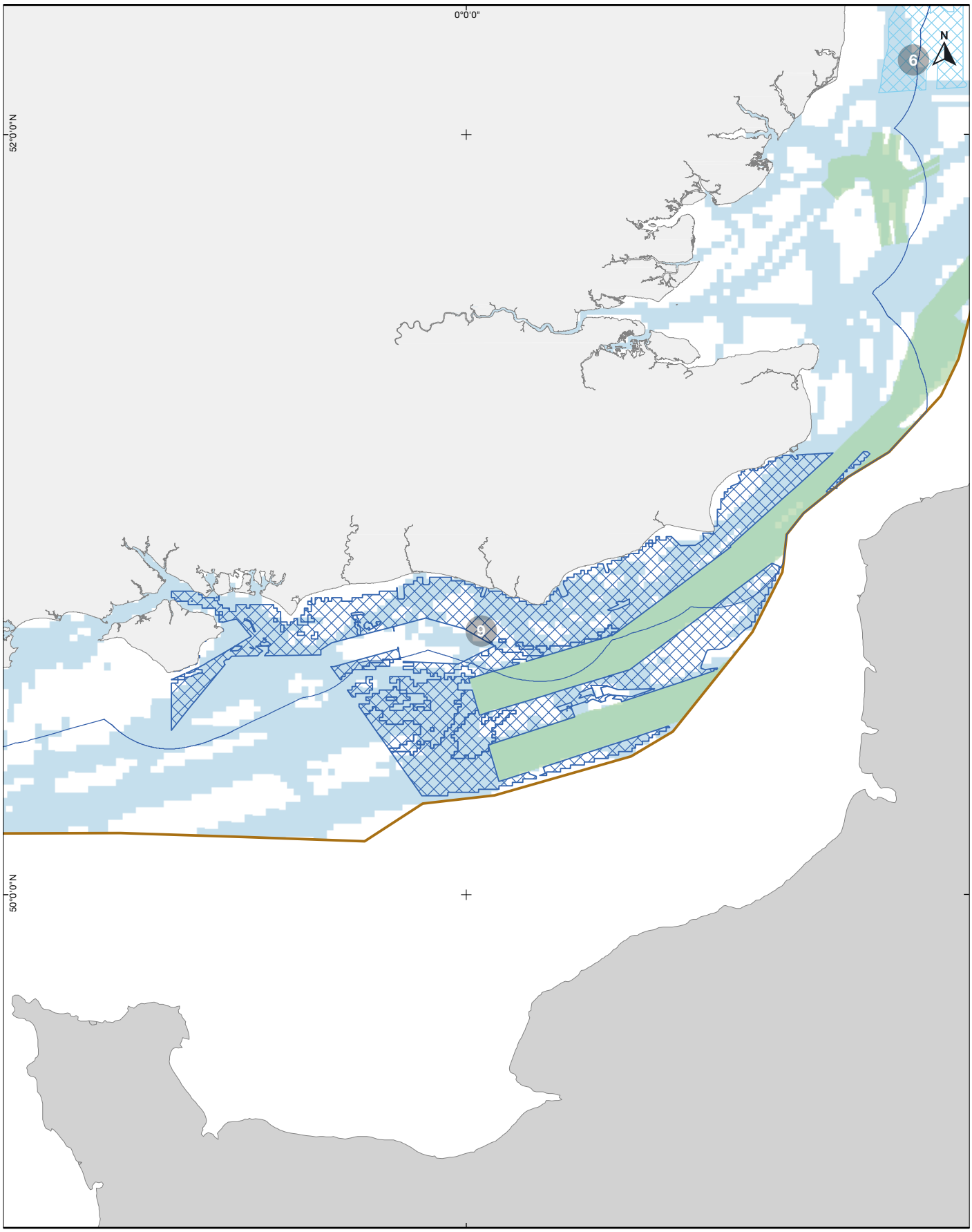
Figure 14: Map of the South East region with shipping intensity over 1000 ships per year and IMO traffic separation schemes overlaid



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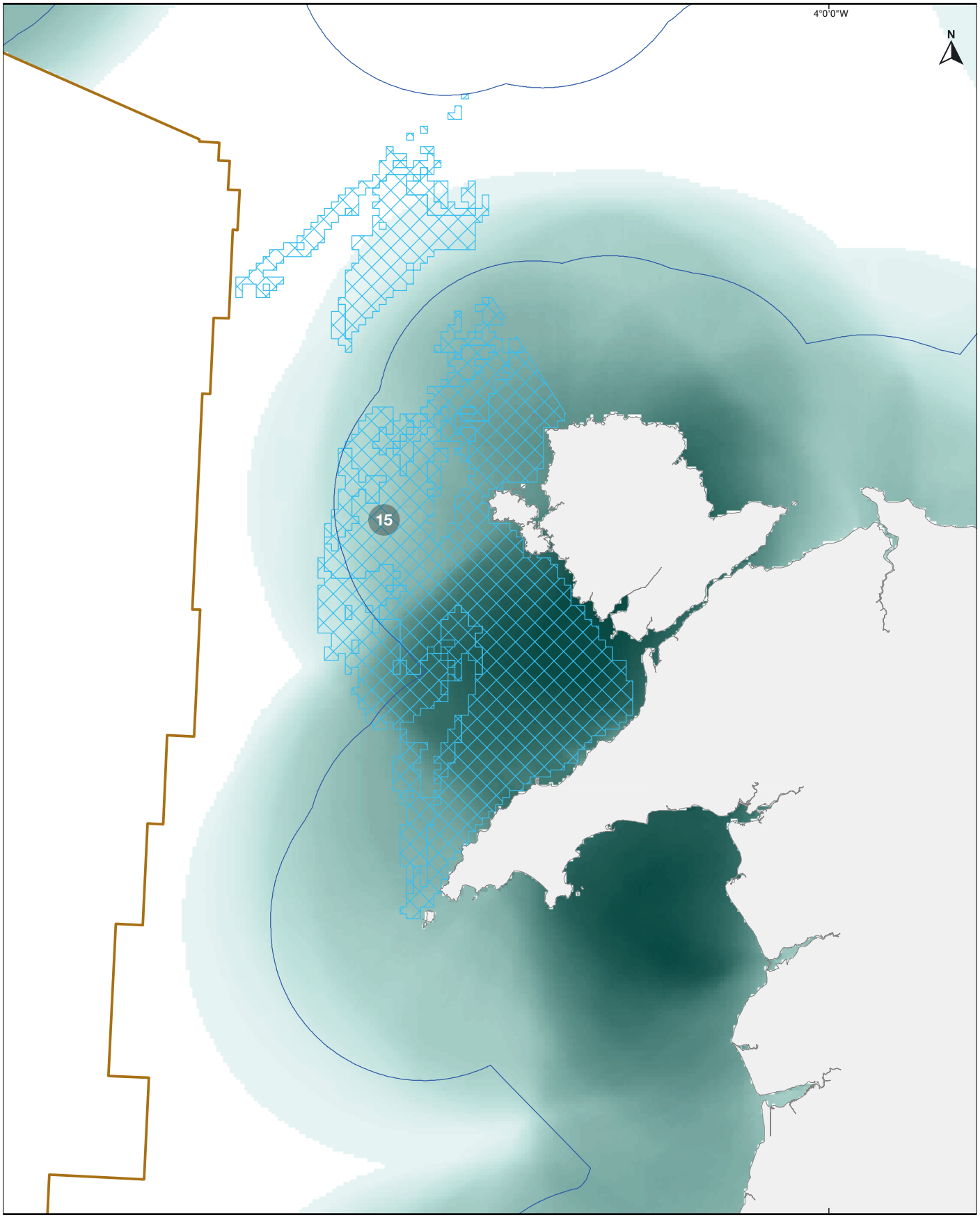
0 10 20 30 40 50
Kilometres

Figure 15: Map of the Anglesey region with the visibility from landscape designations model overlaid



Visibility from Landscape Designations

250m Turbine Tip Height

High

Low

Base Map

Territorial Waters Limit

UK Continental Shelf

United Kingdom

15 - Anglesey

0 5 10 15 20 25

Kilometres

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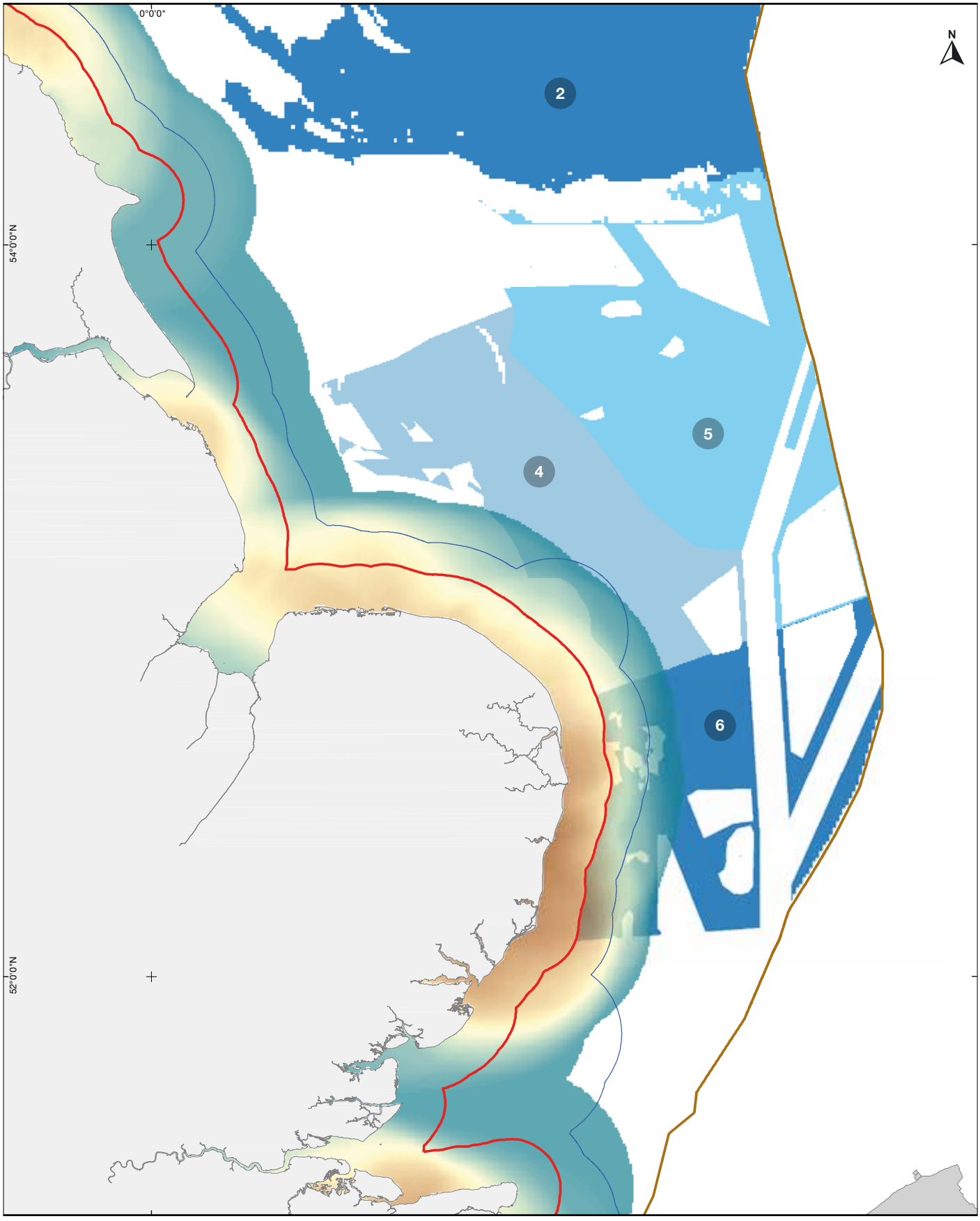
Figure 16: Map of the East Anglia region with the visibility from landscape designations model overlaid



Distance from Shore - 13km

Visibility from Landscape Designations

250m Turbine Tip Height

High

Low

Base Map

Territorial Waters Limit

UK Continental Shelf

United Kingdom

Europe

2 - Dogger Bank

4 - The Wash

5 - Southern North Sea

6 - East Anglia

0 10 20 30 40 50

Kilometres

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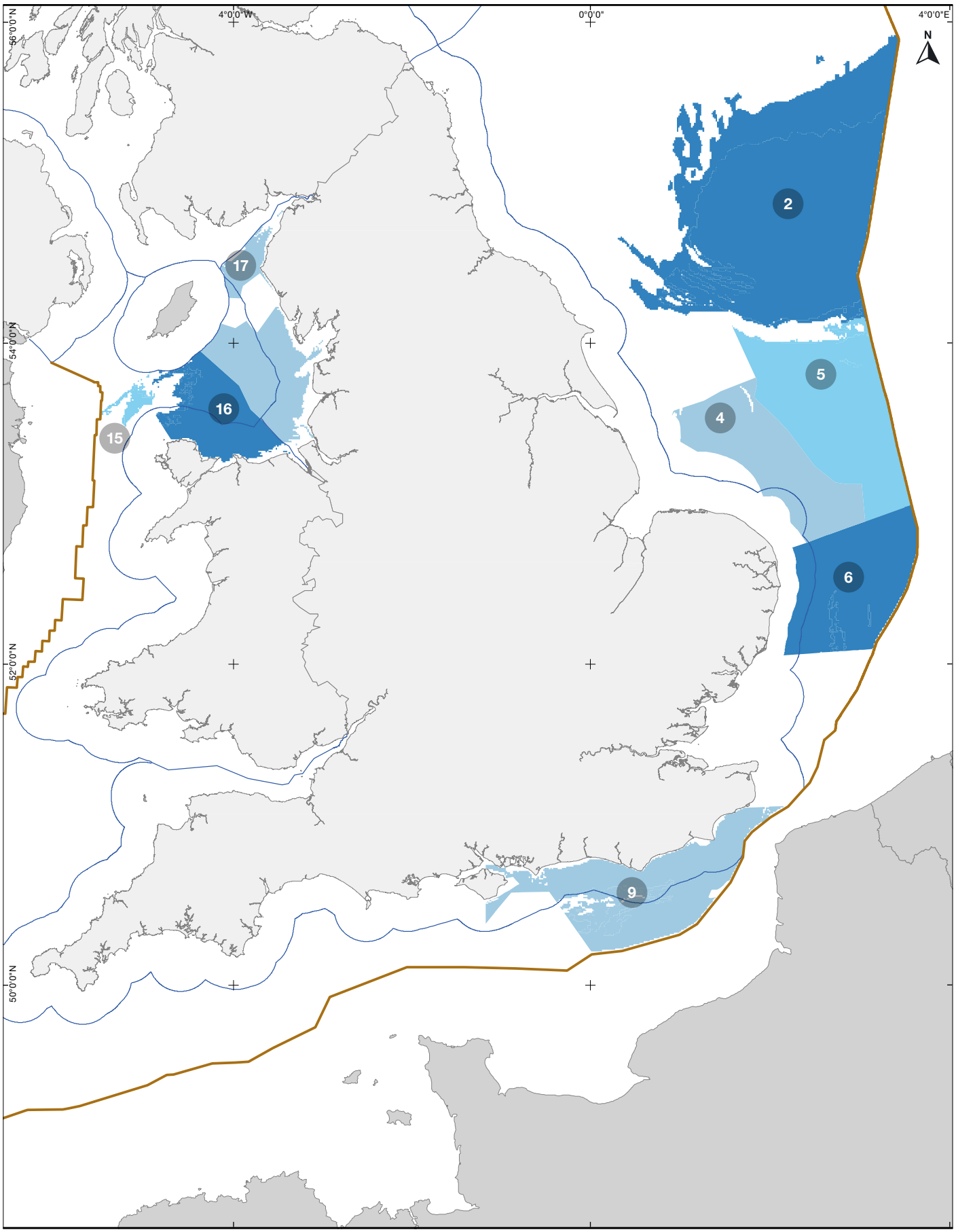
Figure 17: Final regions map following refinement



Base Map		2 - Dogger Bank	6 - East Anglia	16 - North Wales
Territorial Waters Limit	United Kingdom	4 - The Wash	9 - South East	17 - Irish Sea
UK Continental Shelf	Europe	5 - Southern North Sea	15 - Anglesey	

0 20 40 60 80 100
Kilometres

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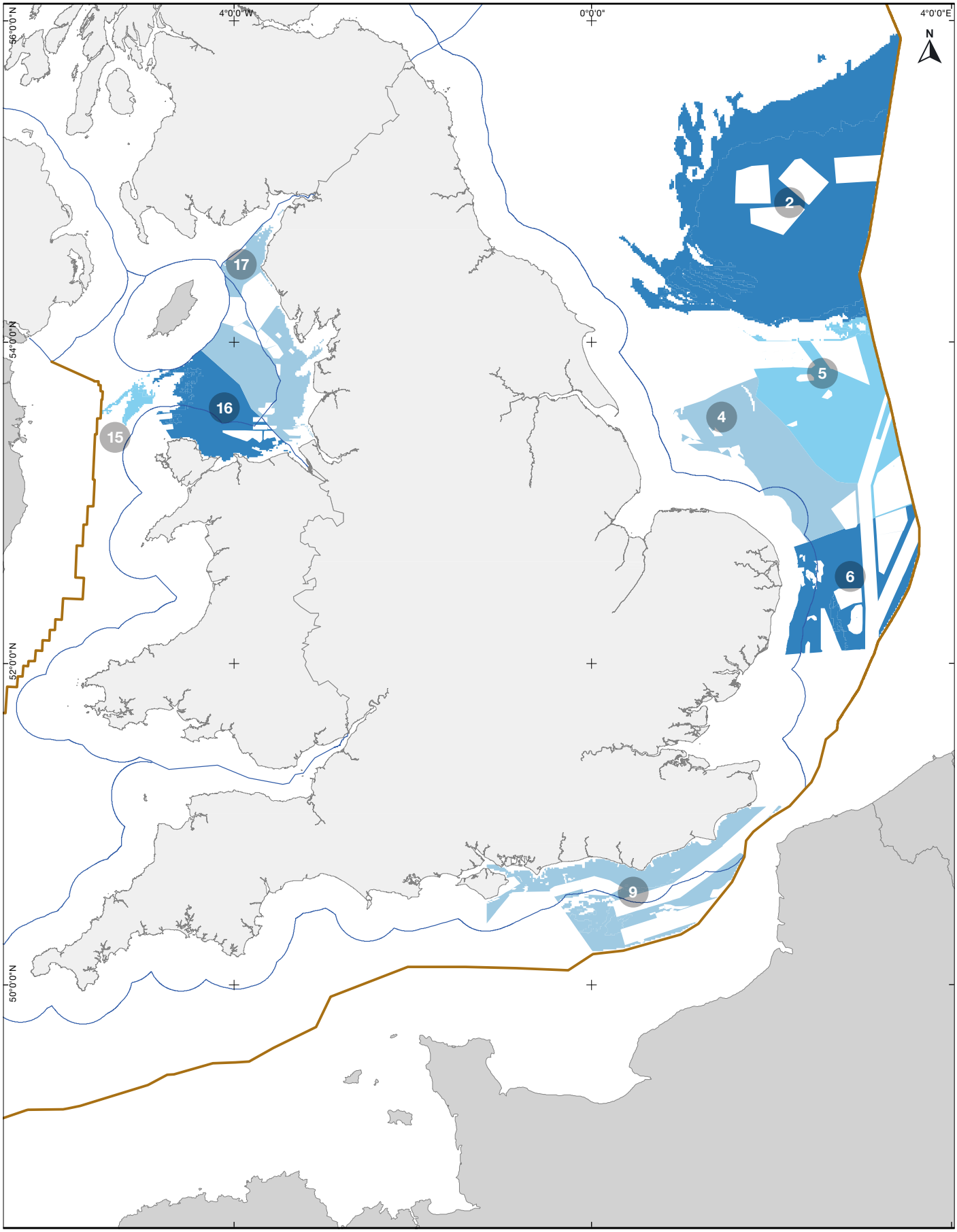
Figure 18: Final regions map following refinement with hard constraints removed



Base Map		2 - Dogger Bank	6 - East Anglia	16 - North Wales
Territorial Waters Limit	United Kingdom	4 - The Wash	9 - South East	17 - Irish Sea
UK Continental Shelf	Europe	5 - Southern North Sea	15 - Anglesey	

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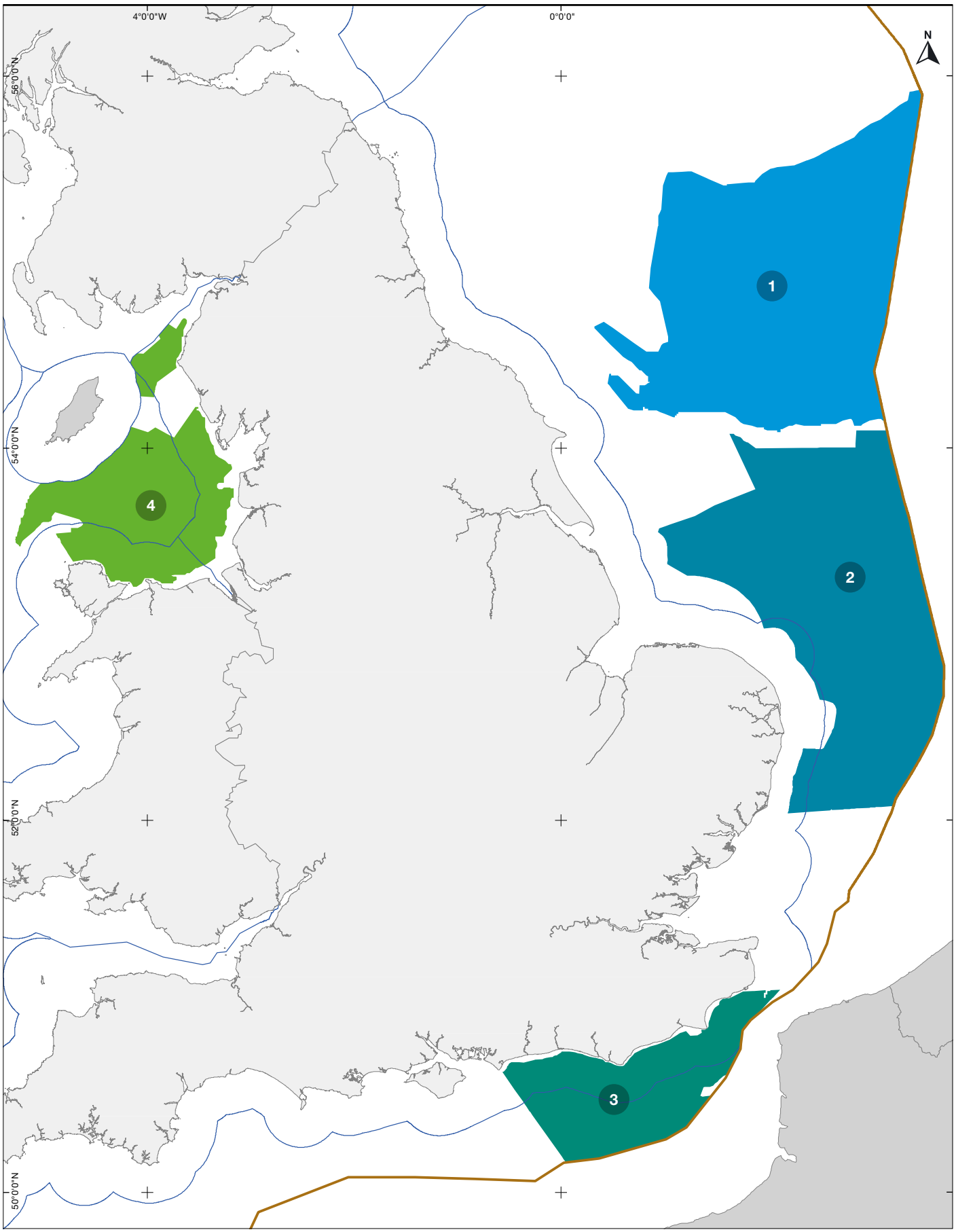
0 20 40 60 80 100
Kilometres

Figure 19: Bidding Areas to be made available to market



Base Map

- Territorial Waters Limit
- UK Continental Shelf
- United Kingdom
- Europe

- 1 - Dogger Bank
- 2 - Eastern regions
- 3 - South East
- 4 - Northern Wales & Irish Sea

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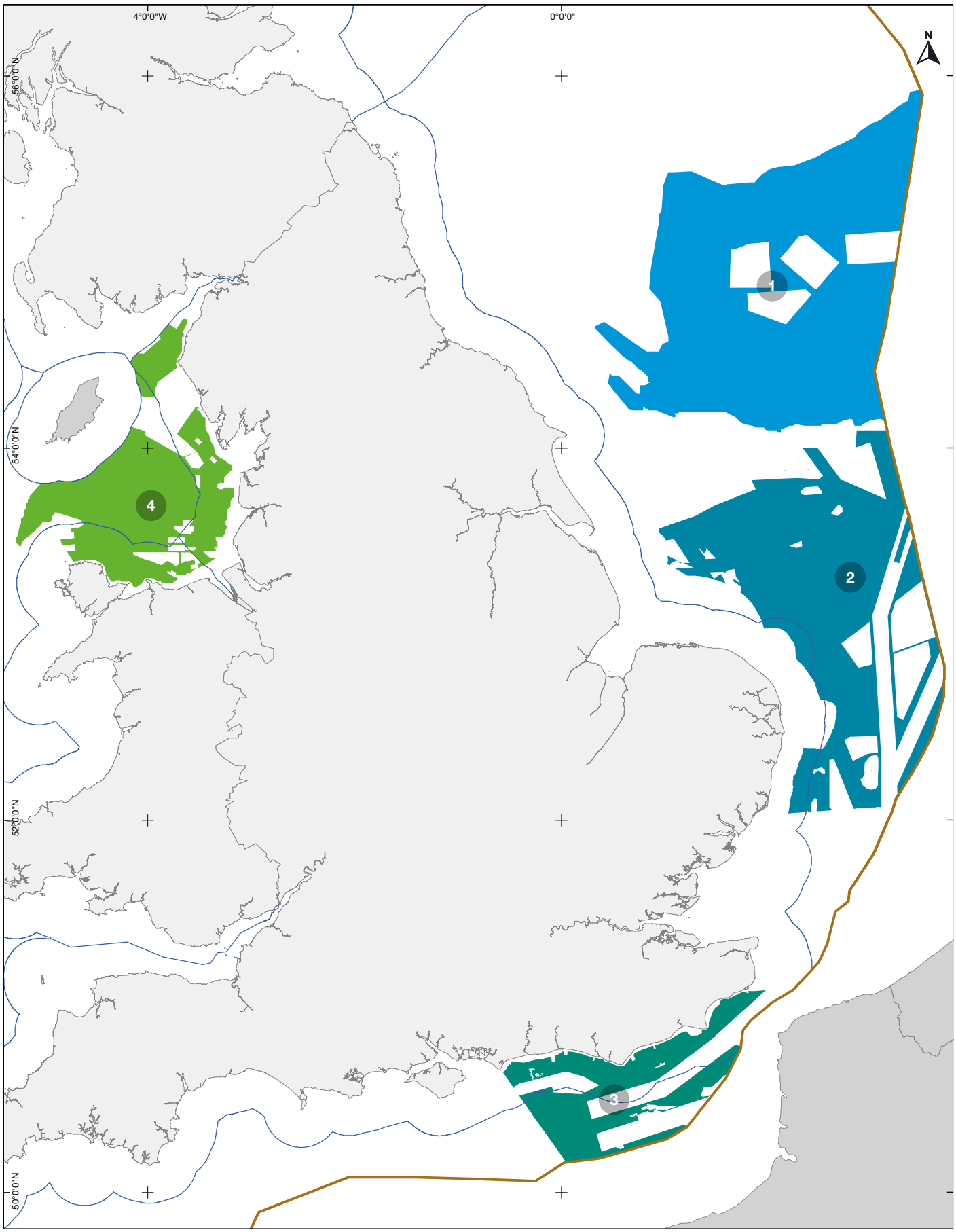
0 25 50 75 100
Kilometres

Figure 20: Bidding Areas to be made available to market with hard constraints removed



Base Map		1 - Dogger Bank	3 - South East
Territorial Waters Limit	United Kingdom	2 - Eastern regions	4 - Northern Wales & Irish Sea
UK Continental Shelf	Europe		

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0 25 50 75 100
Kilometres

Offshore Wind **Leasing Round 4**

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Correct as of September 2019, unless otherwise stated