Annex F4 Regional summary (Net Gain)

Contents

F4.1 This annex provides a regional description of the marine environment and human activities in recommended Marine Conservation Zones (rMCZs) in the Net Gain Project Area in the absence of Marine Conservation Zones (MCZs) (the baseline). It also provides a regional description of the anticipated impact upon the marine environment and human activities in rMCZs in the Net Gain Project Area caused by the designation of rMCZs. A description is provided only for those sectors that are anticipated to be impacted upon by MCZs over the Impact Assessment's (IA) 20-year period of analysis. Sectors for which only a national-level assessment was carried out[1] and sectors that are not expected to be impacted upon by rMCZs in the Net Gain Project Area are not described here.

1 Environment

1.1 Regional baseline summary

F4.2 The Net Gain Project Area spans the southern portion of the Northern North Sea (Scottish border to Flamborough Head) and the northern portion of the Southern North Sea (Flamborough Head to Bawdsey) (UK Marine Monitoring and Assessment Strategy (UKMMAS), 2010). Water depths in the Net Gain Project Area range from up to 200 metres in the north to less than 50 metres in the south. Most of the water in region is well mixed by tides and wind throughout the year, and sea surface temperatures vary seasonally, from 4 °C in winter to 19 °C in summer. The coastline in the north is predominantly rocky, interspersed with intertidal sediments in bays and inlets. In the south, the coastline is varied with large expanses of intertidal sands and muds and soft cliffs. The offshore benthic environment comprises expanses of sands, finer and coarser sediments.

F4.3 There is a significant inflow of high salinity Atlantic water into the north of the region. The Southern North Sea has seen a small decrease in salinity. This may be related to an increase in freshwater runoff from the major rivers entering the region, although confidence in this explanation is low (UKMMAS), 2010).

Net Gain rMCZs

F4.4 A total of 23 broad-scale habitats, 15 species of conservation importance and 14 habitats of conservation importance is found within the Net Gain Project Area (see Annex B for a summary of the interest features protected and the area covered/number of occurrences). The recommended sites incorporate a broad range of offshore and inshore habitats, which together can support a high diversity of both benthic and pelagic species. Individual sites vary dramatically. Offshore sites tend to be larger, covering expanses of subtidal sand and coarse and mixed sediments. Inshore sites are smaller on average, and include diverse flora and fauna associated with both hard and soft sediment types. The intertidal sites are often composed of a range of broad-scale habitats, whereas the conditions in estuarine sites, such as low wave energy, strong tidal effects, freshwater inflow and mobile sediments, mean that communities found in these habitats can be diverse and unique (Net Gain Final Recommendations, 2011).

[1] National-level assessments have been carried out where it has not been possible to establish impacts by rMCZ or by region. This does not mean that impacts will not occur as a result of rMCZs in the Net Gain Project Area.

F4.5 The wide variety of habitats present within the rMCZs, support diverse communities which include numerous algal species, characteristic epifaunal species (animals that live on the surface of the sediment) such as hydroids, bryozoans, sponges, sea squirts, sea mats, sea firs, mussels and barnacles, and burrowing animals such as brittle stars, bristleworms, amphipods, polychaetes and bivalves, which are themselves important for supporting larger predators higher up the food chain, such as shellfish, sea birds and cetaceans. Biogenic reefs of Ross worm are also present along with rare examples of honeycomb worm (Net Gain Final Recommendations, 2011).

F4.6 Highlights include a number of sites recommended on the north Norfolk coast, which containrepresentative examples of saltmarsh, saline lagoons, seagrass and reedbeds, some of which support specialist flora and fauna and provide natural coastal defences and a haven for wading birds and wildfowl. The lagoons (rMCZ Reference Area 2a&2b) are important for migratory waders and the saltmarsh (rMCZ Rereference Area 4) is important for breeding red shank and overwintering brent geese and other water fowl. The peat and clay exposures here lie adjacent to the Seahenge archaeological sites (Holme I and Holme II), and include branch structures, tree stumps, blue mussel beds and evidence of burrowing activity. This coastline also covers rMCZ NG 2, which encompasses some of the best examples of subtidal chalk within the English southern North Sea and forms part of the longest chalk reef in Europe (Net Gain Final Recommendations, 2011).

F4.7 The waters in and around rMCZ NG 14 have high pelagic importance and support diverse marine life communities. With burrowing animals proliferating, a variety of worms, sea snails and bivalves is present. Sea pens are also present in the deep mud, and they are particularly vulnerable to the type of trawls used over the coinciding *Nephrops* fishing ground. Also of pelagic importance is the Flamborough Head frontal system, which represents the boundary where the warmer waters of the Southern North Sea mix with the cooler waters of the Northern North Sea. The upwelling allows nutrients to be transported to the surface from deeper colder waters, which creates increased primary productivity and encourages foraging aggregations of larger predators. Another productivity and biodiversity hot spot is captured in rMCZ NG 10. The cliffs between Cayton Bay and Filey Brigg and spanning Bempton Cliffs and the Flamborough headland support important breeding sea bird colonies. The area is sheltered and rich in zooplankton, molluscs and crustaceans, which provide support for eider during winter months (Net Gain Final Recommendations, 2011).

F4.8 Recommended Marine Conservation Zone NG 15 contains the only example of low energy circalittoral rock within the Net Gain Project Area. This habitat is extremely rare around the UK; the low energy associated with this rocky habitat and the depth at which it occurs enable a unique animal community to persist. With areas too deep for algae to obtain the light they need to grow, animal communities of sea squirts, dead man's fingers and plumose anemones are able to proliferate, as well as peacock worms, bristleworms, squat lobsters, hermit crabs and a number of species of urchin (Net Gain Final Recommendations, 2011).

F4.9 The rMCZs include areas of additional ecological importance that have been identified as beneficial to some highly mobile species that are not featured in the statutory Ecological Network Guidance (Natural England, 2010). It is anticipated that these species would benefit from benthic

protection. For example, many of the rMCZs include habitats that are used as nursery and spawning grounds for fish and shellfish, including species that are of commercial importance such as cod, herring, sole, plaice, sprat, whiting and lobster. Estuaries, such as those in rMCZ NG 13a and rMCZ NG 1c, are particularly important for juvenile migratory species including plaice, flounder, brown trout and Atlantic salmon (Net Gain Final Recommendations, 2011).

F4.10 The majority of rMCZs are located close to or include locations used by resident, migratory and overwintering sea birds, waders and waterfowl of national and international significance, such as terns, gulls, kittiwake, guillemots, fulmar, puffin, oystercatcher, dunlin and brent geese. The rMCZs will provide a range of opportunities for feeding, roosting, loafing, nesting and breeding for birds utilising these terrestrial or coastal sites, which will further enhance the protection of a number of species. A number of rMCZs are important for birds in their own right. For example, rMCZ NG 13 includes Coquet Island Royal Society for the Protection of Birds (RSPB) reserve; the site contains 90% of the UK population of roseate terns. During the winter, the intertidal area off Filey Brigg (rMCZ NG 10) supports nationally significant numbers of purple sandpiper; 50% of the English population are found in this area (Net Gain Final Recommendations, 2011).

F4.11 Sightings of whales and dolphins are recorded from a number of rMCZs; the most common are the harbour porpoise, white-beaked dolphin and minke whale, although less frequent sightings of other species are made, including humpback whale, orca and common dolphin. Sightings of grey and common seals are also recorded within many sites. Some rMCZs contain or are in close proximity to important seal haul-out and breeding sites. For example, rMCZ NG 13, rMCZ NG 14 and rMCZ NG 15 are close to the Berwickshire and North Northumberland Coast European Marine Site (EMS), which includes seal colonies at the Farne Islands, and it is thought that these sites provide important feeding and foraging grounds. In addition, rMCZ NG 5 borders the Donna Nook National Nature Reserve, which is used by grey seals throughout the year as a haul-out and breeding site, with approximately 4,000 grey seals present and more than 1,300 seal pups born every year. Blakeney Point is used in winter by grey seals and in summer by common seals. Seals from the spit are known to overspill into the bay where rMCZ Reference Area 5 is located (Net Gain Final Recommendations, 2011).

F4.12 The sites include a number of important geological and geomorphological features. Examples include the Silver Pit glacial tunnel valley, in which the sloping sides and valley floor support diverse and abundant benthic communities. In addition, rMCZ NG 14 contains a small part of the glacial feature: Farne Deeps, a trench that contains the deepest sea water in the region. The geology of the Holderness coast, The Binks and Spurn Head are all within rMCZ NG 8 and are important features that contribute to the sediment load and protection of the Humber Estuary. Sections of the shingle ridges that form the Orford Ness geological feature are within rMCZ NG 1c and the feature itself provides the natural barrier between the rMCZ and the North Sea. Orford Ness is thought to be one of the largest and most important shingle structures on the British coast (Net Gain Final Recommendations, 2011).

F4.13 The ecological condition of habitats and features varies from rMCZ to rMCZ, depending on the localised conditions and the habitats and features' exposure to different types of human and environmental pressures. Additional habitats and species are already protected by other

designations, including Special Areas for Conservation (SACs), Special Protection Areas, Sites of Special Scientific Interest (SSSIs) and Ramsar sites (Natural England, 2011).

F4.14 The current likely conditions of broad-scale habitats and Features of Conservation Importance (FOCI) in the Net Gain Project Area have been determined via a vulnerability assessment exercise, as advised by the Statutory Nature Conservation Bodies (Natural England and the Joint Nature Conservation Committee (JNCC), 2011). The assessment has been conducted in the absence of information on the condition of features and habitats. It is difficult to predict the changes in the condition of these features over the 20-year period of analysis. A recent assessment of the safety and biological diversity of our seas (UKMMAS, 2010) indicated that intertidal habitats are deteriorating in both the Northern and Southern North Sea areas. This deterioration was linked to coastal habitat squeeze arising from observed and predicted sea level rise and human activities, including land reclamation, beach litter, shellfish harvesting and the presence of coastal structures. Specifically, in the Southern North Sea, there are locations where long-term 'hold the line' erosion and flood management measures in response to rising sea levels may potentially add to the existing pressure on intertidal sediment habitats (UKMMAS), 2010).

F4.15 Subtidal habitats are generally stable or improving in condition. Subtidal rocky habitats are generally only subject to local pressures, such as construction of marine infrastructure and certain fishing practices. Subtidal sediments, however, are subject to widespread pressures from aggregate extraction, benthic fishing, pollution and renewable energy infrastructure. The status of estuarine fish was assessed to be improving in the Northern North Sea, but deteriorating in the Southern North Sea, linked to improved water quality and reduced eel recruitment, respectively. Cetacean, grey seal and sea bird populations are either stable or increasing in the North Sea. Conversely, harbour seals are decreasing in response to various pressures such as disease, competition, predation, unregulated shooting and declines in prey species. There has been little deterioration in cleanliness and safety indicators in the Net Gain Project Area. These indicators assess the level of hazardous substances, radioactivity, eutrophication, oil and chemical spills, litter, underwater noise, the safety of seafood to consumers and the safety of bathing waters to swimmers (UKMMAS), 2010).

F4.16 It may be assumed that if climatic conditions and human activities remain as per the status quo, the condition of broad-scale habitats and FOCI will remain unchanged over the next 20 years. However, if the exposure of features to certain pressures increases as a result of increased intensity, duration, footprint or frequency of human activities, then the condition of features may be expected to deteriorate over time.

Climate change

F4.17 The effects of climate change have been observed in the Net Gain Project Area. Sea level rise is of particular concern in the Southern North Sea region; it is associated with increased risk of coastal erosion, flooding and loss of intertidal habitats. Rising sea temperature has been linked to changes in plankton production and the plankton community, such as an increase in the length of the phytoplankton growing season. The distribution of some species of plankton and fish has also shifted northward, which may be affecting the marine food web (UKMMAS, 2010).

Commercial fish stocks

F4.18 The Net Gain Project Area supports some of the most valuable demersal and Nephrops fisheries in the UK. In addition, herring, mackerel and other shellfish fisheries are important. Demersal fish communities appear to be improving in terms of abundance, biomass and species richness, apart from stocks of haddock and saithe. However, smaller and opportunistic fish are dominant (UKMMAS, 2010). Fishing activity, particularly bottom trawling, is considered to be a major pressure on the marine benthic environment.

Non-commercial species

F4.19 Both the Northern and Southern North Sea areas support a diversity of marine species, including dolphins, whales and porpoises. Populations of these species are now considered to be in good condition. In the Southern North Sea, harbour seal populations are continuing to decrease following earlier disease outbreaks. The cause of the decrease remains unknown (Natural England, pers. comm., 2012).

F4.20 For sea birds, the more recent overall trend is downwards, with a 9% decline in the last decade that represents a not insubstantial loss of more than 600,000 breeding sea birds. Some species have suffered significant declines: 14% for Arctic skua, 33% for European shag, 40% for black-legged kittiwake and 69% for herring gull. Only northern gannets and great skua have shown a sustained recovery since the historic lows of the 1960s. Further sea bird declines are anticipated (RSPB, pers. comm., 2012). There is no evidence of a link between commercial fishing and these declines in the Net Gain Project Area, although climate change is affecting some sea bird species through changes in plankton communities and resultant impacts of prey fish species (Natural England, pers. comm., 2012). Developments such as offshore wind and aggregates, pollution, rise of sea level and resulting coastal squeeze, and populations becoming increasingly concentrated are also threats to sea birds (RSPB, pers. comm., 2012).

1.2 Regional summary of impacts

F4.21 The final recommended network configuration in the Net Gain Project Area consists of 18 rMCZs and 13 rMCZ Reference Areas. These sites cover a total area of 12,715 km^2, which is approximately 11% of the Net Gain Project Area. When combined with other types of Marine Protected Areas, the coverage increases to approximately 34%. A range of estuarine, inshore and offshore rMCZs captures the full range of benthic habitats in the Net Gain Project Area (Net Gain Final Recommendations, 2011).

F4.22 Some 35 MCZ features (different species and habitats) are evidenced to occur across 31 rMCZs in the Net Gain Project Area and 136 conservation objectives are proposed. These comprise:

- 52 ‘reference’ conservation objectives across 26 MCZ features;
- 14 ‘recover’ conservation objectives across 8 MCZ features;
- 70 ‘maintain’ conservation objectives across 27 MCZ features.

There are a further 9 conservation objectives proposed across 6 geological features within sites in the Net Gain Project Area: 5 'maintain' and 4 'reference' conservation objectives.

F4.23 It is assumed that rMCZs with MCZ features with 'maintain' conservation objectives are likely to prevent deterioration in ecosystem services, whereas rMCZs with MCZ features with 'recover' conservation objectives are likely to increase the level of ecosystem services. The ecosystem services that are supported by MCZ features in the rMCZs in the Net Gain Project Area that are likely to be maintained are environmental resilience, leisure and recreation, natural hazard protection, provision of fish and shellfish for human consumption and regulation of pollution. In other sites, where features are likely to have 'recover' conservation objectives, these same ecosystem services are likely to increase. The features protected by all rMCZs, and particularly rMCZ Reference Areas, could potentially be used to inform research and education and have non-use value, irrespective of the conservation objective.

F4.24 Designation of the rMCZs will promote an ecologically coherent network of sites promoting conservation of marine biodiversity in the North Sea. This will contribute to the protection of living, non-living, cultural and/or historic marine resources. It will provide protection for threatened and declining species and habitats as identified by the Oslo and Paris Convention (OSPAR). Together, all the features captured within the rMCZs play an important role in ecosystem functioning. Each distinct habitat is replicated in other protected areas. Such replication enables adjacent populations to interact and be mutually sustaining. The size of the MCZs promotes the longevity of species, habitats and ecological processes and services. The creation of a network of MCZs will help to safeguard the rich biodiversity, natural beauty, fisheries and heritage of the Net Gain Project Area.

2 Marine aggregate extraction

2.1 Regional baseline summary

F4.25 In the Net Gain Project Area, there are 4 production licence areas within 1km of an rMCZ (rMCZs NG 4 Wash Approach and NG 16 Silver Pit) (identified using data from The Crown Estate's website; for further details see Annex H2). No licence applications are currently being considered for areas within 1km of an rMCZ and there are no option areas[2] that do not have existing licences. In the project area, 4 rMCZs overlap with or are in close proximity to a strategic resource area (The Crown Estate, feedback on draft IA material, 2011). These are areas that are not currently licensed where evidence of geological features and deposition processes suggests there is potential for sand and gravel deposits to be found (The Crown Estate, feedback on draft IA material, 2011).

2.2 Regional summary of impacts

F4.26 Two management scenarios are employed in the IA, which provide low and high cost estimates that illustrate the potential range of impacts of rMCZs upon the marine aggregate extraction sector. The low cost scenario assumes that future licence applications for aggregate

[2] The Crown Estate issues an operator with an option following its acceptance of the operator's tender to extract aggregates from an area. The operator applies for licences to extract aggregates within the option area, usually for smaller areas than the area that it initially tendered for (The Crown Estate, pers. comm., 2012).

extraction (for production and application) within 1km of an rMCZ will need to assess the potential impact of the activity upon the MCZ features' conservation objectives. It is estimated that the additional cost will be incurred for a total of 5 applications for 4 licensed areas over the 20 years covered by the IA. It is assumed that the additional one-off average cost of £0.027m per licence application (based on information provided by BMAPA, pers. comm., 2011). BMAPA will also incur a total cost of £0.010m/yr to provide information that all operators can use for these assessments. This cost arises from the entire suite of suites.

F4.27 It is not known whether licence applications for prospecting or production in strategic resource areas will be submitted during the 20-year period of the IA, where they will be located and what activities will be proposed. Therefore, it is not possible for the IA to identify whether additional mitigation of impacts on MCZs will be required and therefore whether operators will incur additional costs as a result.

Aquaculture

F4.28 No impacts of rMCZs upon aquaculture in the Net Gain Project Area are anticipated. As such no further description of the sector is provided here.

4 Archaeology

4.1 Regional baseline summary

F4.29 Archaeology is recorded as being present in 15 rMCZs, 5 of which are rMCZ Reference Areas. Records range in scale and significance, from individual finds to groups of structures. Archaeological activities known to take place are surveys (intrusive, including sediment sampling, and non-intrusive), surface recovery of artefacts and full site excavations.

F4.30 The earliest known archaeological finds from within rMCZs date to the Mesolithic period (5,000 to 10,000 BC). Recorded archaeology then spans all periods to modern history.

F4.31 By far the most abundant records are of shipwrecks, with a total of nearly 1,400 records. It is likely that some of these records will be duplicates of the same wreck. The condition of wrecks is largely unrecorded. Sites with large concentrations of wrecks tend to be those in inshore waters along the entire coastline of the North Sea. Five rMCZs contain more than 100 records of wrecks and these account for 81% of all wrecks within rMCZs. The evidence of wrecks ranges from fragments of unknown vessels to well-documented and named vessels. The identified vessels range in date from early medieval vessels to modern-day lost craft.

F4.32 Alongside evidence of many military and non-military vessels sunk during conflicts, national defence archaeology is present in 7 rMCZs and 3 rMCZ Reference Areas within the Net Gain Project Area. The vast majority of records are in coastal sites and are associated with WWII. Structures include pillboxes, anti-tank cubes, weapon pits and a coastal battery, and they are apparent along the entire length of the coastline of the Net Gain Project Area. Aircraft losses from WWII are also present in 2 rMCZs, and 3 rMCZs contain 3 identified sunken submarines, British and German, from both World Wars.

F4.33 It is understood that local archaeology groups are active in at least 3 rMCZs along the Yorkshire coastline.

4.2 Regional impact summary

Source of costs

F4.34 The costs to archaeology of the rMCZs in the Net Gain Project Area arise due to additional future licence application costs and additional mitigation. This additional mitigation is required in rMCZ Reference Areas only. Only one scenario is considered.

Scenario 1

F4.35 There is likely to be an increase in costs of assessing environmental impacts for licence applications in all rMCZs in the region of £500 to £1,000 for a small site, £5,000 for a medium site and £10,000 for a large site (English Heritage, pers. comm., 2011). This is assumed to apply only to rMCZs that currently have evidence of archaeology within them. However, such costs are likely to be an overestimate because these figures represent the cost to hire professionally accredited surveyors to survey protected species, which in part is likely to be incurred anyway in the absence of MCZ designation.

F4.36 It is anticipated that archaeological excavations, surface recovery and intrusive surveys will be prohibited within rMCZ Reference Areas (diver trails, visitors and non-intrusive surveys will be allowed). This applies to 5 rMCZs in the Net Gain Project Area: rMCZ Reference Areas 2a and 2b, rMCZ Reference Area 6, rMCZ Reference Area 7, rMCZ Reference Area 9 and rMCZ Reference Area 11. If archaeologists respond to the prohibition of excavation by undertaking an alternative archaeological excavation in another locality, this could result in additional costs to the archaeologists. As it is not possible to predict when or how often this could occur, this cost is not accounted for in the IA. The prohibition of excavation and therefore interpretation of archaeological evidence from the site will also decrease acquisition of historical knowledge of past human communities from the site, resulting in a cost to society.

F4.37 English Heritage has advised that rMCZ Reference Areas 2a and 2b, rMCZ Reference Area 6, rMCZ Reference Area 7, rMCZ Reference Area 9 and rMCZ Reference Area 11 may be relevant to their National Heritage Protection Plan (themes 3A1.2) and therefore may be of increased archaeological interest for excavation in the future.

5 Cables

5.1 Regional baseline summary

F4.38 There are numerous telecommunication and power cables that pass through rMCZs in the Net Gain Project Area. Most are operational but some are proposed and are yet to be consented.

5.2 Regional summary of impacts

F4.39 It is not anticipated that any existing or operational cables will be impacted upon by rMCZs in the Net Gain Project Area. The IA assumes that only licence applications for future cable proposals could incur an additional cost as a result of rMCZs.

F4.40 It is not yet known where future cables will be proposed. However, the IA estimates that between 2 and 6 cables will be proposed in the Net Gain Project Area over the 20-year period of the IA (lowest and highest estimate, respectively). The best estimate is that 4 cables will be proposed in the Net Gain Project Area over this timeframe. It is not anticipated that any future cable proposals will seek to pass through rMCZ Reference Areas in the Net Gain Project Area (UK Cables Protection Committee, pers. comm., 2012).

F4.41 It is assumed that each licence application will be required to consider its impact upon MCZ features and its conservation objectives. The additional cost per licence application to fulfil this requirement is estimated to be £0.001m. The best estimate of the present cost to the sector of rMCZs in the Net Gain Project Area is £0.027m over the 20-year period of the IA. The low and high cost estimate of the present cost to the sector is £0.013m and £0.040m respectively, over the 20-year period of the IA..

6 Coastal developments (excluding ports and harbours)

F4.42 No impacts of rMCZs upon coastal developments in the Net Gain Project Area are anticipated. As such no further description of the sector is provided here.

7 Commercial fisheries

7.1 Regional baseline summary

F4.43 This section summarises the baseline and impacts of the regional suite of rMCZs on UK and non-UK fishing activity. The section explains the management scenarios, followed by discussion for UK vessels (by gear type) and non-UK vessels.

F4.44 There are 489 UK home port vessels operating in the Net Gain Project Area, working from 58 ports of varying sizes and with differing levels of activity. The following home ports have more than 20 vessels operating from them and therefore have the highest levels of activity: Bridlington, Boston, Blyth, Amble, Scarborough, Kings Lynn, Hartlepool and Whitby. Collectively, these 8 ports accommodate an estimated 43% of all known UK commercial fishing vessels operating in the Net Gain Project Area (FisherMap, Net Gain, 2011).[3]

F4.45 It is estimated that 68% of the UK vessels operating in the Net Gain Project Area use static gears, 26% use mobile gears and the rest use a combination of the two.[4] The ports with the highest totals of vessels using static gears include Bridlington, Amble, Scarborough, Redcar, Seahouses, Whitby and Cromer. The ports with the highest total number of vessels using mobile gears include Boston, Kings Lynn, Blyth, North Shields, Amble and Hartlepool.

[3] Data were collected by Net Gain liaison officers between February 2010 and October 2011 and were later validated by fleet representatives. It is possible that not all Scottish vessels operating within the Net Gain Project Area have been captured in this analysis.

[4] The MCZ Fisheries Model does not distinguish whether vessels using hooks and lines and nets are using mobile or static gear. Therefore, in this analysis, both mobile and static gear classes include some vessels using hooks and lines and nets. It is possible that not all Scottish vessels operating within the Net Gain Project Area have been captured in this analysis.

F4.46 Commercial fishing vessels operate in all but 5 of the 31 rMCZs in the Net Gain Project Area. Some 55% of the 489 vessels operating in the Net Gain Project Area are known to operate within rMCZs. These are summarised below, along with the estimated total value of landings.

F4.47 The total combined estimated value of landings from rMCZs (from vessels both under and over 15 metres) is £7.671m/yr.

Table 1: UK vessel fishing activity in rMCZs in the Net Gain Project Area

Gear type	Estimated value of landings (£m/yr)	Estimated Gross Value Added (GVA) (£m/yr)
Dredges	0.175	0.073
Bottom trawls	1.834	0.685
Mid-water trawls	0.551	0.308
Pots and traps	4.747	2.299
Nets	0.242	0.107
Hooks and lines	0.121	0.071
Collection by hand	0.000	0.000
Total	7.671	3.543

Note: These figures have been adjusted to account for overlaps between rMCZs.
Source: MCZ Fisheries Model.

Source of costs

F4.48 Management scenarios for individual rMCZs vary depending on the nature of the features being protected and their exposure to commercial fishing activity. In addition, there is insufficient scientific evidence that demersal trawls, dredges, lines, nets, and pots and traps will impact on certain benthic features. As a result, there is uncertainty about whether additional management of fisheries will be needed.

F4.49 If additional management of fisheries is needed, there is uncertainty about whether an experimental closure might be required initially (in order to determine the responses of features to the removal of pressures), the number of replicates that would be required and the area of the features to which the closure would apply. If it is identified that additional management will be needed (without an experimental closure or following the closure), there is uncertainty about the area of the features to which the management would apply. In light of this, different management scenarios have been identified for different rMCZs, with some rMCZs having up to four different management scenarios. These include ‘recommended’ or ‘preferred’ management scenarios that were identified by the regional MCZ project stakeholder group for some rMCZs.

F4.50 The summary of impacts of the regional suite of rMCZs provided here focuses on the following by gear type, in order to present the range of potential costs to the sector:

- lowest cost management scenario: this is the management scenario in each rMCZ that results in the lowest cost to the commercial fishing sector (it includes scenarios that suggest no additional management);
- highest cost management scenario: this is the management scenario used in the IA for each rMCZ that results in the highest cost to the commercial fishing sector;
- best estimate of cost: In the absence of better informaiton, the best estimate has been calculated using the following assumptions:
  - mid-point (50%) values between the lowest and highest cost scenarios for gear types that were the primary reason for setting the conservation objectives of the features to ‘recover’;

- quartile (25%) values between the lowest and highest cost scenarios for gear types that were not the primary reason for setting the conservation objectives of the features to 'recover'.

F4.51 The extent to which the rMCZs will result in the displacement of affected fishers from the rMCZs, and the extent to which they will result in a reduction in fishing effort and landings, is generally unclear.

F4.52 Under the lowest cost management scenario, the value of landings affected is relatively low, although some significant impacts are anticipated for individual rMCZs. It is estimated that rMCZs will affect 0.007% of total UK vessel GVA.[5] Over the 20-year timeframe of the IA, the estimated value of UK vessel landings and GVA affected have present values of £0.605m and £0.285m, respectively. Under the highest cost management scenario, rMCZs in the Net Gain Project Area will affect approximately 0.55% of total UK vessel GVA.[6] Over the 20-year timeframe of the IA, the estimated value of landings and GVA affected have present values of £53.859m and £24.799m, respectively.

F4.53 Under the best estimate of cost, rMCZs will affect approximately 0.17% of total UK vessel GVA.[7] Over the 20-year timeframe of the IA, the estimated value of landings and GVA affected have a present value of £17.314m and £7.727m, respectively.

F4.54 In interviews carried out with fishers and fisheries representatives, it was noted that the most likely impact of the rMCZs would be displacement. However, the majority of interviewees found it difficult to specify exactly how the rMCZ would affect their future fishing decisions and value of landings. As such, there is insufficient information to enable any analysis of displacement at the regional level. In the absence of a better understanding of the effect of rMCZs on fishing decisions, it is assumed that the cost impact to the sector is equivalent to the value of landings attributed to the area of rMCZs. This is likely to be an overestimate of the true value of landings affected. This is because effort currently expended within rMCZs is likely to be redistributed to areas outside rMCZs as fishers seek to offset the impacts of rMCZ-related fisheries management.

F4.55 For further details on the rMCZ-specific lowest and highest cost management scenarios considered in this annex, please refer to the assessments of site-specific impacts provided in Annex I4, the description of the potential impacts of the management scenarios provided in Annex J3d and the management scenarios tables and maps provided in Annex H7.

[5] UK GVA data are provided in Annex D.
[6] UK GVA data are provided in Annex D.
[7] UK GVA data are provided in Annex D.

7.2 Baseline summary of gears and regional summary of impacts

Table 2: Estimated value of landings and GVA affected from the impacts on UK vessels of the lowest, highest and best estimate cost

	Lowest cost management scenario			**Highest cost management scenario**			**Best estimate of costs**		
Gear type	**No. of rMCZs affecting £0.001m/yr or more of**	**Total estimated value of landings affected**	**UK GVA affected (£m/yr)**	**No. of rMCZs affecting £0.001m/yr or more of**	**Total estimated value of landings affected**	**UK GVA affected (£m/yr)**	**No. of rMCZs affecting £0.001m/yr or more of**	**Best estimate value of landings affected**	**UK GVA affected (£m/yr)**

management scenarios

	landings	**(£m/yr)**		**landings**	**(£m/yr)**		**landings**	**(£m/yr)**	
Dredges	0	0.000	0.000	2	0.146	0.061	2	0.073	0.030
Bottom trawls	3	0.005	0.002	9	0.770	0.287	9	0.387	0.145
Mid-water trawls	0	0.000	0.000	2	0.017	0.010	2	0.009	0.005
Pots and traps	4	0.044	0.021	8	2.802	1.357	8	0.733	0.355
Nets	0	0.000	0.000	2	0.019	0.009	1	0.005	0.002
Hooks and lines	0	0.000	0.000	3	0.043	0.025	3	0.011	0.006
Hand collection	0	0.000	0.000	0	0.000	0.000	0	0.000	0.000
Total	6	0.050	0.023	13	3.797	1.748	13	1.218	0.544

Note: These figures have been adjusted to account for overlaps between rMCZs.
Source: MCZ Fisheries Model, 2011.

7.3 Baseline and impact summary of gears

UK bottom trawls

F4.56 **Baseline:** Vessels using bottom trawls operate in all rMCZs where commercial fishing occurs, with the levels of activity largely dependent on the size of the rMCZ. Some 68% of the total estimated value of landings from vessels using bottom trawls within rMCZs can be attributed to over 15 metre vessels, and 52% is from rMCZs beyond 12 nautical miles (nm). Target species for vessels using bottom trawls include cod, haddock, lemon sole, plaice, shrimp and whiting. Various other species are caught from within rMCZs, but at much lower levels.

F4.57 **Impacts:** Under the lowest cost scenario, 3 rMCZs, all of which are rMCZ Reference Areas, will have a combined total of £0.005m/yr of landings. Of these, rMCZ Reference Area 10 has the largest value of landings impacted at £0.003m/yr. Under the highest cost scenario, 9 rMCZs and rMCZ Reference Areas have a combined total of £0.770m/yr of landings. Three sites, rMCZ NG 6, rMCZ NG 7 and rMCZ NG 9, have the largest impacts at £0.160m/yr, £0.405m/yr and £0.090m/yr, respectively. The bottom trawl fleets will experience the greatest number and area of rMCZs closed to fishing, and the second largest estimated value of landings affected in the highest cost management scenario. Of particular importance to the Grimsby fleet is rMCZ NG 7. In addition, rMCZ NG 6 Silver Pit would result in a significant loss of value of landings affecting the Amble, Brancaster Staithe, Bridlington, Leigh-on-Sea, Grimsby, Kings Lynn and Whitby fleets. The best estimate for bottom trawls is that £0.387m/yr of UK vessel landings and £0.145m/yr of UK vessel GVA will be affected by the suite of sites, with present values of £5.504m and £2.055m respectively over 20 years.

UK dredges

F4.58 **Baseline:** The estimated total value of landings for dredges within rMCZs can be equally attributed to vessels both under and over 15 metres. Some 83% of the estimated value of landings from within rMCZs by vessels using dredges is from rMCZs between 6nm and extending partly beyond 12nm. Vessels using dredges operating within rMCZs are particularly concentrated between North Norfolk and Flamborough Head, including the Wash. Within rMCZs in the Net Gain Project Area, the main target species for UK vessels using dredges is mussels, but cockles and scallops are also targeted.

F4.59 **Impacts: No value of landings in rMCZs will have an impact greater than £0.001m/yr under the lowest cost scenario.** Under the highest cost scenario, 2 rMCZs have a combined total of £0.146m/yr of landings. These are rMCZ NG 9 at £0.106m/yr and rMCZ NG 14 at 0.040m/yr. The best estimate for dredges is that £0.073m/yr of UK vessel landings and £0.030m/yr of UK vessel GVA will be affected by the suite of sites, with present values of £1.035m and £0.432m respectively over 20 years.

UK mid-water trawls

F4.60 **Baseline:** Few UK vessels use mid-water trawl gear in the Net Gain Project Area. Some 71% of the estimated value of landings from within rMCZs by vessels over 15 metres using mid-water trawls is from rMCZs beyond 12nm. The MCZ Fisheries Model records no value of landings within rMCZs within 6nm by vessels over 15 metres using mid-water trawls. The model also does

not provide value of landings for mid-water trawls by vessels under 15 metres. However, the model does record some mid-water trawling activity taking place in rMCZs in the Southern North Sea within 12nm, between the Humber Estuary and north Norfolk coast, but the value of this is unknown. Vessels using mid-water trawls in rMCZs target species including bass, herring and spurdog.

F4.61 **Impacts: No values of landings in rMCZs will have an impact greater than £0.001m/yr in the lowest cost scenario.** Under the highest cost scenario, 2 rMCZ Reference Areas have a combined total of £0.017m/yr of landings. At £0.016m/yr, the greatest impact site will be in rMCZ Reference Area 13. The best estimate for mid-water trawls is that £0.009m/yr of UK vessel landings and £0.005m/yr of UK vessel GVA will be affected by the suite of sites, with present values of £0.122m and £0.068m respectively over 20 years.

UK pots and traps

F4.62 **Baseline:** Pots and traps is the most valuable fishery in the Net Gain Project Area, and 62% of all estimated value of landings from within rMCZs is attributed to it. This activity is concentrated within 12nm, and an estimated 97% of the total values of landings for pots and traps within rMCZs is from sites within 12nm. Some 57% of all estimated value of landings from pots and traps within rMCZs in the Net Gain Project Area can be attributed to 2 sites off the Holderness coastline, rMCZ NG 8 and rMCZ NG 9. The main target species for UK vessels using pots and traps within rMCZs are crabs and lobsters and, to a lesser degree, whelks.

F4.63 **Impacts:** Under the lowest cost scenario, 4 rMCZs will have a combined total of £0.044m/yr of landings. Some £0.018m/yr of this figure will be incurred only if the byelaw in rMCZ Reference Area 9 is not renewed. At £0.013m/yr rMCZ Reference Area 8 has the next greatest total, and the rest can be attributed to smaller values in rMCZ Reference Area 11 and rMCZ Reference Area 12. Under the highest cost scenario, 8 rMCZs and rMCZ Reference Areas have a combined total of £2.802m/yr of landings. At £2.586m/yr, the greatest impact on pots and traps in this scenario is in rMCZ NG 9. This is the greatest impact for any gear type in any site in the Net Gain Project Area and will significantly impact the Bridlington, Flamborough, Grimsby, Hornsea, Tunstall and Withernsea fleets. The best estimate for pots and traps is that £0.733m/yr of UK vessel landings and £0.355m/yr of UK vessel GVA will be affected by the suite of sites, with present values of £10.424m and £5.047m respectively over 20 years.

UK hooks and lines

F4.64 **Baseline:** Vessels using hooks and lines within rMCZs tend to do so within 6nm, with lower levels of activity recorded further offshore. The vast majority of vessels using hooks and lines within rMCZs are under 15 metres in length. Target species for vessels using hooks and lines include bass, cod, ling, pout, ray, skate, smoothhound, spurdog, tope and whiting.

F4.65 **Impacts: No values of landings in rMCZs will have an impact greater than £0.001m/yr in the lowest cost scenario.** Under the highest cost scenario, 3 rMCZs have a combined total of £0.043m/yr of landings. Impacts in rMCZ NG 1b account for most of this value at £0.032m/yr, with the rest attributed to smaller impacts in rMCZ NG 6 and rMCZ NG 9. The best estimate for hooks and lines is that £0.011m/yr of UK vessel landings and £0.006m/yr of UK vessel GVA will be

affected by the suite of sites, with present values of £0.156m and £0.091m respectively over 20 years.

UK nets

F4.66 **Baseline:** The majority of vessels using nets within rMCZs do so within 6nm. Some 91% of the estimated value of landings from within rMCZs by vessels using nets is from rMCZs within 6nm. No vessels use nets in rMCZs beyond 12nm. The vast majority of vessels using nets within rMCZs are under 15 metres in length. The main target species for vessels using nets within rMCZs include bass, cod, herring, pollock, skate, sole and turbot. Many other species are targeted at lower levels.

F4.67 **Impacts: No values of landings in rMCZs will have an impact greater than £0.001m/yr in the lowest cost scenario.** Under the highest cost scenario, 2 rMCZs have a combined total of £0.019m/yr of landings. This figure is derived from £0.017m/yr in rMCZ NG 9 and £0.002m/yr in rMCZ NG 1b. The best estimate for nets is that £0.005m/yr of UK vessel landings and £0.002m/yr of UK vessel GVA will be affected by the suite of sites, with present values of £0.073m and £0.032m respectively over 20 years.

Non-UK fleets operating within rMCZs

F4.68 The Net Gain Project Area is fished by Belgian, Danish, Dutch and French fleets. The Belgian fleet has indicated that it fishes in rMCZ NG 1b and the French fleet has indicated that it fishes in rMCZ NG 1b, rMCZ NG 6, rMCZ NG 7, rMCZ NG 9 and rMCZ NG 12. French vessels using mobile gears are known to be active in 5 rMCZs in the Net Gain Project Area. Estimated average value of landings for French vessels using mobile gears (active and seines) within rMCZs in Net Gain Project Area between 2008 and 2009 was £0.141m/yr (Direction des Pêches Maritimes et de l' Aquaculture, pers. comm., 2012,).

F4.69 The remaining fleets did not provide details of the rMCZs in which they currently operate, but highlighted Dogger Bank as a critical fishing ground. All non-UK vessels operating within the Net Gain Project Area are over 15 metres in length and the vast majority of vessels are bottom trawlers. Vessels operate beyond 12nm and in grounds between 6 and 12nm, in areas with historic fishing rights.

Likely fleet responses to highest cost management scenario

F4.70 Redistribution of fishing effort is likely to occur in response to the highest cost management scenarios, which could result in a number of impacts that are discussed below. Redistribution of effort to areas outside rMCZs could, but will not necessarily, reduce the value of landings affected.

F4.71 It is thought that any displacement would be into areas already fished by other fleets, increasing tensions among fleets from competing ports and conflict between international fleets. Gear conflict between mobile and static fishing gears may increase as a result of displacement of otter trawl fishing effort from rMCZs, thus further increasing social tensions within local fishing communities. In some instances, rMCZs are likely to increase the costs of fishing by increasing steaming distances for fishers (e.g. mobile and static gear users in rMCZ NG 1b) who respond by

fishing other grounds. If fishers decide to fish alternative grounds further from shore, then risks to the safety of fishers and their vessels may be increased (this could arise for the Blyth fleet, for example). Increases in fuel consumption as a result of increased steaming will result in increased greenhouse gas emissions by the commercial fishing sector.

F4.72 Fisheries stakeholders have indicated that adaption to different gears in response to the highest cost management scenario is not a realistic option for the majority of the vessels operating in the North Sea. This is because of the high cost and unsuitability of vessels for adaption, along with current EU licensing laws.

F4.73 Although it is thought that displacement is the most likely impact on the fleet of rMCZs, fisheries stakeholders interviewed by Net Gain also noted the lack of suitable alternative fishing grounds. This was raised as a particular concern around Flamborough and the north Norfolk Coast, where future wind farm developments, aggregate extraction sites and existing protected areas will severely limit fishing grounds. This lack of suitable fishing grounds could force vessels operating in this area to leave the North Sea fleet (Wells fleet, pers. comm., 2011). Fisheries stakeholders interviewed by Net Gain did not anticipate that a fall in the number of vessels operating in the North Sea would have a significant impact on the regions fish-processing facilities or wholesale and retail trades. A certain amount of fish is already imported from Icelandic water, so any domestic fall in supply would be met by increasing these imports (Jubilee Fishing, pers. comm., 2011). However, the highest cost management scenario could impact on employment in certain areas because rMCZs within 6nm are known to make a substantial contribution to year-round employment for port fleets, providing work over winter months and in adverse weather conditions (Blyth fleet, pers. comm., 2011).

F4.74 Similarly, the impacts of multiple site designations will increase the impacts on certain fleets in particular. The Holderness and North Yorkshire coast fleets will be affected by the proposed fisheries management in NG 6, NG 9 and NG 12.

F4.75 On an international scale, the French fleet believes that it would be unable to continue fishing in the North Sea following designation of the rMCZs. This is because there are no alternative fishing grounds outside of rMCZs that offer an equivalent fishing environment.

8 Flood and coastal erosion risk management

8.1 Regional baseline summary

F4.76 Coastal defence activity occurs in 8 coastal rMCZs that are not rMCZ Reference Areas and 7 coastal rMCZ Reference Areas. Natural England and the Environment Agency have identified 3 rMCZs where it is expected that the relevant Shoreline Management Plan (SMP) policy could potentially impact on some of the features. This is the case for rMCZ NG 10, rMCZ Reference Area 3 and rMCZ Reference Area 6.

F4.77 The SMP policy for the area that includes rMCZ NG 10 Castle Ground is regarded as being vital to maintain the economic value of Scarborough. The existing hard defences and removal and redistribution of sand protect commercial properties as well as roads. It is thought that rMCZ Reference Area 6 Dogs Head Sandbanks could be affected by the ‘Lincshore’ beach nourishment

scheme, as re-nourishment material may move into the vicinity of the rMCZ Reference Area and, as such, the relevant SMP policy could potentially impact on some of the features. This scheme protects around 30,000 houses and high-grade agriculture land. The SMP policy for the area covered by rMCZ Reference Area 3 Glaven Reedbed is 'hold the line'. The rMCZ Reference Area is also adjacent to an area of future planned managed realignment.

8.2 Regional summary of impacts

Source of costs

F4.78 It is anticipated that costs to flood and coastal erosion risk management (FCERM) will fall into two categories: (i) costs of additional environmental assessment requirements, and (ii) costs of additional mitigation requirements. However, it is not possible to provide costs of additional environmental assessment at a site-specific level or regional level. As such, this summary considers the impact of any necessary additional mitigation only, and there is no regional range of costs or a best estimate of cost for this sector.

F4.79 For rMCZs NG 10, rMCZ Reference Area 3 and rMCZ Reference Area 6, it is assumed that there is no possible way to protect the recommended features within the rMCZs and provide the necessary flood and coastal erosion risk management. In these cases, it is assumed that there will be no changes to the relevant SMPs. Instead, it is anticipated that the body that is undertaking maintenance of an existing or planned coastal protection/flood management scheme will provide an equivalent environmental benefit to compensate for the impact that the maintenance would have on features protected by the rMCZ. There would, therefore, be a cost to the operator of providing this equivalent environmental benefit. The costs of this have not been assessed because it is not yet known whether achievement of the conservation objective of features in the rMCZ will definitely be impacted on by maintenance of the scheme and, if so, the magnitude of that impact. (These will be established through Natural England's monitoring of the site.)

F4.80 Based on the advice of Natural England and Marine Management Organisation (MMO), the IA assumes that an assessment of environmental impact will need to be submitted in support of all future licence applications for FCERM activities proposed in rMCZs. It is not possible to identify accurately the number of licence applications because the detail of future FCERM requirements is not known at this time. Details and information on the assumptions about the assessment of environmental impact can be found in Annex H8.

F4.81 Where possible, the Environment Agency has provided estimated numbers of future licence applications for counties with rMCZs that might impact on FCERM activities (Environment Agency, pers. comm., 2012).

F4.82 By 2018/19, 5 FCERM schemes in the North-East Area could incur an additional cost in their future licence applications due to rMCZ NG 13 (Environment Agency, 2012). There are currently no planned projects that could impact upon features protected by rMCZ Reference Area 11 and NG 13a.

F4.83 By 2018/19, 17 FCERM schemes could incur an additional cost in their future licence application due to rMCZ NG 10. If preferred options are required to change as a result of the rMCZ

(e.g. flood wall instead of rock armour), then significant additional mitigation costs could be incurred. It has not been possible to estimate the likely additional cost (Environment Agency, pers. comm., 2012).

F4.84 By 2018/19, 3 FCERM schemes could incur an additional cost in their future licence application due to rMCZ NG 8. Each could also incur additional mitigation costs. It has not been possible to estimate the likely additional cost (Environment Agency, pers. comm., 2012).

F4.85 For rMCZ Reference Areas 2a and 2b in Norfolk, the SMP policy is currently 'managed realignment'. Realignment of the saline lagoons may be needed for FCERM purposes. If this is the case, it is estimated that 3 associated applications will be submitted over the 20-year period of the IA (Environment Agency, pers. comm.. 2012).

F4.86 For rMCZ Reference Area 3 in Norfolk, the SMP policy is currently 'hold the line'. No significant works are programmed by 2018/19, but it is likely that maintenance repair work will be required in the future. It is estimated that 5 associated applications will be submitted over the 20-year period of the IA (Environment Agency, pers. comm.. 2012).

F4.87 In total, 33 future licence applications (25 are anticipated to be submitted by 2018/19) are likely to incur an additional cost in the assessment of environmental impact due to rMCZs in the Net Gain Project Area. This does not include the proportion of 1,200 licences anticipated for the counties of Essex, Norfolk and Suffolk that may be impacted by rMCZs in the Net Gain Project Area. See below for more detail. These estimates look over the 20-year period but are not definitive and are based on the contents of the local MTP.

Essex, Norfolk and Suffolk

F4.88 For the southern part of the Net Gain Project Area (Norfolk and Suffolk) and the northern part of the Balanced Seas Project Area (Essex and a small part of Suffolk), it was not possible to estimate licence applications by county (Environment Agency, pers. comm.. 2012). For the combined area, the Environment Agency has estimated a total of 1,200 applications over 20 years or 300 over 5 years. This is a forward project of 40 applications that have been submitted between April and December 2011. These future licence applications could incur an additional cost in their future licence application due to:

- rMCZ NG 1c Alde-Ore Estuary;
- Stour and Orwell Estuaries (rMCZ 2 in the Balanced Seas Project Area);
- Blackwater Roach, Crouch and Colne Estuaries (rMCZ 3 in the Balanced Seas Project Area);
- the part of the Thames Estuary rMCZ 5 that lies within Essex (Balanced Seas Project Area).

F4.89 For the rMCZ Reference Areas in Suffolk and Essex, potential licence applications have been estimated by the Environment Agency using numbers of previous flood defence consents from 1990 to autumn 2011. Over this period, there have been consents in the following rMCZs in the Balanced Seas Project Area:

- 3 consented licence applications in rMCZ Reference Area 1 Colne Point;
- 3 consented licence applications in rMCZ Reference Area 23 Abbots Hall Farm;
- 13 consented licence applications in rMCZ Reference Area 3 Holehaven Creek.

F4.90 It is reasonable to expect that over the next 20 years the number of licence applications will double in these rMCZs, to 37 licence applications. These estimates look over the 20-year period but are not definitive and are based on the contents of the local MTP.

9 National defence

9.1 Regional baseline summary

F4.91 National defence activities are known to take place within 17 rMCZs in the Net Gain Project Area, of which 5 are rMCZ Reference Areas. The types of activity include firing range, bomb target practice, submarine exercise, aerial activity and ordinance demolition. A brief summary of the activities that take place in each rMCZ is provided in Annex I4. Detailed information is not available.

9.2 Regional summary of impacts

F4.92 The Ministry of Defence (MoD) (pers. comm., 2011) has stated that designation of rMCZs is unlikely to have any direct impact upon the current level and type of MoD activity in the Net Gain Project Area. However, should the future level of MoD activity increase, there is a possibility that some rMCZs could impact upon future military activity. It is assumed that the MoD will mitigate the impact of military activity upon rMCZ features through additional planning consideration during operations and training (MoD, pers. comm., 2011). The cost to the MoD is assessed for the suite of sites only (see Evidence Base) and cannot be broken down by region.

10 Oil and gas exploration and production, gas interconnectors and gas storage (including carbon capture storage)

10.1 Regional baseline summary

F4.93 The baseline describes only those aspects of oil and gas exploration and production, gas interconnectors and gas storage activities (hereon referred to as oil and gas activity) and carbon capture and storage (CCS) that could be impacted upon by MCZs. The IA assumes that only the costs of future oil and gas (including CCS) licence applications could be impacted upon by MCZ designation. Therefore, currently consented developments of oil and gas production are not described in the baseline.

F4.94 In the 26th Seaward Licensing Round, licensed blocks were offered to operators to extract oil and gas from the UK Continental Shelf in October 2010 and December 2011. Within the Net Gain Project Area, 116 of the 397 blocks that were offered in the 26th Seaward Licensing Round were later awarded to operators for commercial extraction.

F4.95 In the absence of more detailed information about future oil and gas licence applications, the IA assumes that during the 20-year period of analysis, one licence application is submitted for each of the 397 blocks offered in the 26th Seaward Licensing Round.

F4.96 There are currently no existing or planned oil and gas or CCS developments within any of the potential rMCZ Reference Areas. Nor do any of the rMCZ Reference Areas overlap with blocks in the 26th Seaward Licensing Round with 'significant discoveries' or 'fallow blocks with discoveries' (see Annex H11). However, 5 rMCZ Reference Areas overlap with blocks on offer in the 27th Seaward Licensing Round. None of these blocks have discoveries yet, and it is not known if any of these blocks will be of commercial interest. The Department of Energy and Climate Change (DECC) has stated that it is unlikely that any rMCZ Reference Areas will overlap with future oil and gas (including CCS) infrastructure (DECC, pers. comm., 2012).

F4.97 There is considerable uncertainty regarding the number of CCS applications that are likely to be submitted over the IA 20-year period of analysis and their likely location. This is because UK policy concerning the sector is yet to be defined, and demonstration projects and investment programmes are yet to be determined. For the purposes of the IA, it is assumed that 20 CCS applications will be submitted over the IA 20-year period (split between the Net Gain Project Area and the ISCZ Project Area) (Carbon Capture and Storage Association (CCSA), pers. comm., 2011). This is likely to be an overestimate because it is based on the CCS capacity that is estimated to be required to decarbonise the electricity sector by 2030 (DECC, pers. comm., 2011). As such, it may exceed the number of proposals that is likely to be viable.

10.2 Regional summary of impacts

F4.98 The estimated cost of MCZ management to oil and gas and CCS operators is comprised solely of the additional costs anticipated in the assessment of environmental impact, which is completed in support of a future licence application. In rMCZs that are not rMCZ Reference Areas, based on the advice of DECC, JNCC and Natural England, it is assumed that no additional costs will be incurred to operators to mitigate impacts upon MCZ features (compared with what is required now in the absence of MCZs). Although the IA assumes that construction of infrastructure and drilling would be prohibited in rMCZs that are rMCZ Reference Areas, DECC (pers. comm., 2012) has advised that it is unlikely that any future oil and gas (including CCS) activity would take place in any of the rMCZ Reference Areas based on where they are located in relation to existing oil and gas infrastructure.

F4.99 The present value of impact of MCZs on oil and gas and CCS operators is estimated to range from £2.311m (low cost estimate) to £5.409m (high cost estimate) over the 20-year period of the IA. This only includes costs anticipated to future licence applications in blocks offered or awarded in the 26th Seaward Licensing Round. Only the assessment of national impact in the Evidence Base is updated to reflect the recently announced 27th Seaward Licensing Round. The impacts are predominantly associated with the Net Gain Project Area in all rMCZs (except NG 11) and rMCZ Reference Areas 8, 10, 11, 12 and 13. This is considered to be the best estimate of impact because it is based on the advice of DECC, Natural England and JNCC. A breakdown of estimated costs by region is provided at Annex N10.

F4.100 Oil & Gas UK and CCSA are concerned that additional costs could be incurred to operators to mitigate the impact of their activities upon MCZ features. They suggest that additional costs could be incurred if:

- pipelines need to be re-routed around MCZs (only rMCZ Reference Areas for the oil and gas sector and all MCZs for the CCS sector);
- horizontal drilling to resources underneath MCZs that are rMCZ Reference Areas is not allowed;
- additional mitigation of spills and leakages is required;
- additional costs for ongoing monitoring of impact upon MCZ features as a licence condition is required.

F4.101 CCSA is concerned about the knock-on impacts that such mitigation, if it were required, could have on the economic viability of developments and on meeting the UK climate change targets. An industry assessment of the potential cost is provided in the Evidence Base.

11 Ports, harbours, shipping and disposal sites

11.1 Regional baseline summary

F4.102 There are 71 ports and harbours within the Net Gain Project Area (ports.org.uk, 2011), 20 of which are within 5km of rMCZs. These range from major international trading gateways, such as Grimsby and Immingham, to small harbours with limited fixed infrastructure, such as Wainfleet Haven. Major estuaries provide the hub for international trade, with ports along the Humber Estuary collectively transporting more cargo by weight than any other ports complex in the UK. The Humber ports are also the fifth largest ports complex by tonnage in Europe. The ports of Hull and Tyne are also nationally important hubs for the transportation of international sea passengers (Department for Transport, 2011). The largest fishing ports by vessel numbers within the Net Gain Project Area are Lowestoft, North Shields, Scarborough and Grimsby (MMO, 2011). The port of Bridlington is also the UK's largest shellfish port. The following port, harbour and shipping activities occur within 5km of rMCZs in the Net Gain Project Area (see Annex N11):

- 1 licensed navigational dredge area within NG 13 and 1 licensed navigational dredge area within 5km of NGs 5 and 8, 28 licensed disposal sites within 5km of rMCZs, 6 of which are within 1km of rMCZs;
- 2 existing Maintenance Dredge Protocols (MPDs) associated with the Humber Estuary and the Wash.

11.2 Regional summary of impacts

Source of costs

F4.103 Within the Net Gain Project Area, it is anticipated that costs to this sector will fall into two categories: (i) costs of additional environmental assessment requirements, and (ii) cost of implementing or updating MDPs. It is assumed that no additional mitigation will be required above that given in the baseline. Two scenarios are presented in the IA to estimate the most likely impact of rMCZs upon ports, harbours and shipping. Both are summarised here.

Lowest cost management scenario

F4.104 The costs in this scenario are assumed to arise only from increased costs for future licence applications for navigational dredging and disposal within 1km of an rMCZ. This applies to rMCZ's NG 11 and 13 and to rMCZ Reference Area 9. No additional costs, for example to mitigate any impact of port operations upon MCZ features, are anticipated.

F4.105 Under this scenario, the average annual cost to the sector is estimated to be £0.022m/yr, and the present value of costs over the 20-year timeframe of the IA is estimated to be £0.317m.

F4.106 Annex N11 provides a breakdown of all values for each region and for each rMCZ.

Highest cost management scenario

F4.107 The costs in this scenario are assumed to arise from increased costs for future licence applications for navigational dredging, disposal of dredge material and port development that takes place within 5km of an rMCZ. A total of 15 rMCZs in the Net Gain project area (rMCZ NG's 1c, 5, 8, 10, 11, 13, 13a and rMCZ Reference Area's 2a and 2b, 3, 4, 5, 6, 7, 9 and 11) are anticipated to be impact upon ports, harbours and shipping activities in this scenario.

F4.108 The following 21 ports in the Net Gain project area will also incur additional costs if they submit licence applications for port development during the 20-year period of the IA. These are Alnmouth, Amble, Berwick upon Tweed, Blakeney, Blyth, Brancaster Staithe, Bridlington, Burnham Overy Staithe, Burnmouth, Filey Cobble Landing, Flamborough Landing, Morston Quay, Orford, Scarborough, Seaton Sluice, Staithes, Thornham, Tyne (North Shields), Wainfleet Haven and Whitby. No additional costs, for example to mitigate any impact of port operations upon MCZ features, are anticipated over the 20-year period of the IA.

F4.109 Under, this scenario, the average annual cost to the sector is estimated to be between £0.069m/yr and £0.068m/yr. The present value of costs over the 20-year timeframe of the IA is estimated to be between £0.998m and £0.971m. For the Net Gain Project Area, the cost is lower under the high cost scenario than under the low cost scenario. This is because, based on assumptions used in the IA (See Annex H), it will cost more to update potential MDPs in the Net Gain Project Area to account for MCZs, than it would be if individual future licence applications incurred the cost in assessments of environmental impact.

Best estimate of cost

F4.110 For ports, harbours, shipping and disposal sites, the best estimate of cost is assumed to be the mid-point between the lowest and highest cost estimates in scenario 2 (see Annex H12 for further information). The best estimate for the present value of costs over the 20-year IA period in the Net Gain Project Area is £0.983m.

Industry assessment of costs

F4.111 Representatives of the ports, harbour and shipping sector are concerned that MCZs could incur greater costs to the sector than those represented by the scenarios. In order to reflect this uncertainty in the IA, the sector has made its own assumptions about how it could be impacted

upon by MCZs. The sector anticipates that further costs could be incurred as a result of future licence conditions, including the requirement to provide additional environmental surveys, additional monitoring of environmental impact and additional mitigation of impact requirements.

F4.112 The assessment is based on assumptions developed from information provided by 8 port operators. The assumptions inform a national assessment of impact and it is not possible to break this down by region or by rMCZ because of the varying and unknown nature of future port developments. More information is provided in the Evidence Base, Annex H12 and Annex N11.

12 Recreation

12.1 Regional baseline summary

F4.113 Within the Net Gain Project Area, it is anticipated that mitigation of impacts of recreation would be needed for 7 rMCZs. All of these rMCZs are rMCZ Reference Areas and 6 are within 6nm. The information below provides a regional baseline summary only of recreational activities that are thought to require additional mitigation for these sites.

F4.114 The most common recreational activity is sea angling, which occurs in the vicinity of 7 rMCZs. Activity includes shore-based angling, wreck angling, competition angling and charter boat angling. Some of this angling is known to be catch and release (Holt Angling Club). Angling clubs within the region are known to abide by certain guidelines, such as not leaving rubbish (Holt Angling Club, Skegness Pier Angling Club). Bait digging and hand collection, which occur in a number of coastal and estuarine rMCZ Reference Areas, may also be impacted.

F4.115 A few rMCZ Reference Areas (particularly rMCZ Reference Area 4 Wash Approach, rMCZ Reference Area 7 and rMCZ Reference Area 9 Flamborough Head No Take Zone) are believed to be popular locations for walking, including dog walking, and are easily accessible to the public. In the majority of the rMCZs within the region, a dog control order is already in existence.

F4.116 Wildfowling is known to take place in rMCZ Reference Area 3 Glaven Reedbed and rMCZ Reference Area 4 Blakeney Marsh, where it is a traditional sport. The proposed rMCZ Reference Areas do not cover the whole of the leased area available for wildfowling, but the geographic extent of the lease area is unknown. The clubs using the land have a number of licences, including consent from Natural England that is not time limited, to shoot on the land. This consent is based on an assessment that ensures that the wildfowling in the site is consistent with the conservation objectives of the existing designations of the area as an SSSI and an SAC. The area is also open to wildfowlers who do not belong to a club.

F4.117 Research and education take place within rMCZ Reference Area 9 Flamborough Head No Take Zone and rMCZ Reference Area 7 Seahenge Peat and Clay. Reading University uses rMCZ Reference Area 7 for archaeological field trips, and councils run day trips in rMCZ Reference Area 9. It is likely that during these trips material is removed from the rMCZ Reference Areas (MMO, pers. comm., 2011).

F4.118 Recreational boating and water sports also occur within or adjacent to 2 rMCZs (rMCZ Reference Area 6 Dogs Head Sandbanks and rMCZ Reference Area 9 Flamborough Head No

Take Zone). Generally there is a low level of these activities within the sites and the activities tend to be limited to the summer months. There are not believed to be any designated anchoring points within any rMCZ Reference Areas, but ad-hoc anchoring may occur.

F4.119 Common rights are in existence for rMCZ Reference Areas along the North Norfolk coast for activities such as bait digging, samphire collection and cockle picking.

12.2 Regional summary of impacts

Source of costs

F4.120 Only one scenario is considered for each of the separate recreational activities. Details of these are available in Annex I4. A best estimate of costs has not been provided for the impacts on the recreation sector because quantified costs are not available as most of the impacts are unquantified and relate to the quality of the recreation.

F4.121 For the vast majority of recreational activities that need additional mitigation, the impacts of the rMCZs on the recreational sector are believed to be negligible. This is because the activities could continue to take place at the same level just outside of the rMCZ Reference Areas without an impact on the quality of the participants' experience. The management scenario for walking and dog walking in rMCZ Reference Area 9 assumes that these activities could continue (based on the current level of activity) but visitors would be advised to stick to marked paths in order to mitigate impacts on sensitive features protected by the rMCZ.

F4.122 It is anticipated, therefore, that as a result of the management scenarios there will not be a fall in the number of people taking part in most activities, a change in the quality of their experience nor any discernible impact on the local economy.

F4.123 The exception to the above is education and research, which may be impacted on by the codes of conduct required for rMCZ Reference Areas 7 Seahenge Peat and Clay and rMCZ Reference Area 9 Flamborough Head No Take Zone, but the scale of the impacts is not known. If those organisations that currently use rMCZ Reference Area 9 and rMCZ Reference Area 7 for research and education respond to the scenario by moving to an alternative more distant site, additional travel and time costs would be incurred (which cannot be estimated). Again, this could result in increased environmental costs from increased greenhouse gas emissions.

F4.124 Conversely, there are some positive impacts to recreation and tourism that may be expected as a result of rMCZs. The RSPB noted that any rMCZs protecting environments important to sea birds could lead to an increase in the number of sea birds in the area. This could, in turn, lead to increased visits from bird watchers and increased tourism, thus benefiting the local economy (RSPB, pers. comm., 2011).

F4.125 North Norfolk District Council noted that MCZ status could possibly add to the attraction of Holme Nature Reserve. Again, this could potentially bring more tourists into the area, which could benefit local businesses. Indeed, North Norfolk has a highly lucrative tourism and leisure industry, much of which is provided by its coastline (Local Government Association, Coastal Interest Group, pers. comm., 2011).

F4.126 The Northumberland and Berwickshire Coast EMS officer attributed an increase in diving activity within its well-established Marine Voluntary Reserve to the recovery of features within the reserve(Northumberland and Berwickshire Coast EMS, pers. comm., 2011). As such, it is possible that recreational divers may benefit from improvements in the quality of their diving experience following rMCZ designation. Potentially this could lead to an increase in tourism, with knock-on benefits for local firms.

13 Renewable energy

13.1 Regional baseline summary

F4.127 There are currently existing or planned wind farms in 3 of the rMCZs in the Net Gain Project Area (rMCZs NG 4 Wash Approach, NG 7 Markham's Triangle and NG 13 Coquet to St Mary's). Recommended Marine Conservation Zone NG 4 overlaps with the Sheringham Shoal wind farm (scheduled to be operational by mid 2012), the Race Bank wind farm (licence application submitted) and the Dudgeon wind farm (licence application submitted). Recommended MCZ NG 7 overlaps with the Hornsea Zone 4 search area (which is in the pre-planning stage).

F4.128 Existing or planned routes for wind farm power cable routes fall within 12 rMCZs (NG 1b, NG 1c, NG 2, NG 4, NG 5, NG 6, NG 7, NG 8, NG 9, NG 10, NG 11 and NG 13). These are linked to the following 11 existing or planned wind farms: Humber Gateway, Sheringham Shoal, Westernmost Rough, Greater Gabbard, Triton Knoll, Dudgeon, Hornsea, East Anglia, Dogger Bank, Galloper Extension and the Blyth Offshore Wind Demonstration Site. It is not known whether existing and proposed cable arrays overlap with rMCZs, as this information is not available.

F4.129 The National Grid Offshore Development Information Statement 2011 indicates that offshore DC cables will be required in the vicinity of rMCZs NG 1b, NG 2, NG 4, NG 5, NG 6, NG 8, NG 9, NG 14, NG 15, rMCZ Reference Areas 2a and 2b, 3, 4, 5, 8, 12 and 13. These will connect the offshore wind farms to the National Electricity Transmission System. It is anticipated that these will be installed in the 20-year period of the IA analysis, but no further information is available.

13.2 Regional summary of impacts

Source of costs

F4.130 Within the Net Gain Project Area, it is anticipated that costs to this sector will fall into two categories: (i) costs of additional environmental assessment requirements, and (ii) cost of additional mitigation. The summary of impacts of the regional suite of rMCZs provided here focuses on the highest and lowest cost scenarios in order to present the range of potential costs to the sector and then provide a best estimate of cost.

Lowest cost scenario impacts

F4.131 This scenario is based on advice provided by Natural England, JNCC, MMO and DECC (Natural England and JNCC, pers. comm., 2011a). It assumes that costs to the renewable sector of the rMCZs in the Net Gain Project Area arise due to additional environmental assessment

requirements of wind farm developments only. It is not anticipated that any additional mitigation will be required.

F4.132 It is assumed that future licence applications for wind farm developments within an rMCZ will need to consider the potential effects of the activity on achieving the conservation objectives of the rMCZ's features. This will increase the costs to operators of carrying out the environmental assessments for licence applications.[8] These are one-off costs incurred each time a licence application is made. The present value of costs over the 20-year timeframe of the IA is estimated to be £0.143m.

Highest cost scenario impacts

F4.133 This scenario is based on advice provided by Natural England, JNCC, MMO, DECC and wind farm developers. It assumes that costs to the renewable sector of the rMCZs in the Net Gain Project Area arise due to additional environmental assessment requirements of wind farm developments and additional mitigation. It is assumed that yet-to-be-consented export cables will be required to re-route around rMCZ Reference Areas and that, although yet-to-be-consented (export and inter-array cables) will be able to pass through rMCZs that are not rMCZ Reference Areas, there will be additional installation costs associated with this. It is assumed that all costs are one-off for each export cable[9]. The present value of costs over the 20-year timeframe of the IA is estimated to be £284.417m.

F4.134 There is a low likelihood of significant additional costs for inter-array cabling in the Round 3 Hornsea wind farm, which overlaps with rMCZ NG 7 which are not quantified in the high cost scenario. This could be a significant unknown cost. However, JNCC and Natural England (pers. comm., 2012) have stated that there is a low likelihood of this cost occurring.

F4.135 An industry scenario has also been developed in collaboration with renewable energy developers in the Net Gain Project Area. Representatives of the renewable energy sector are concerned that MCZs could incur greater costs to the sector than those represented by the scenarios. To reflect this uncertainty in the IA, the sector has made its own assumptions about how it could be impacted upon by MCZs.

F4.136 The sector anticipates that further costs could be incurred due to MCZs as a result of conditions placed on future licences. These, it anticipates, could include the requirement to undertake additional environmental surveys, additional monitoring of environmental impact and additional mitigation measures, and delays to project delivery. More detail is provided at Annex H14 and Annex N13

F4.137 This assessment estimates a present value of £58265.236m to £58548.503m over the 20-year period of the IA for the Net Gain project area.

[8] Further details of the additional assessment requirements can be found in Annex H14.
[9] Annexes H14, I4 and N13 provide further details.

F4.138 This cannot be broken down further due to the need to protect commercially sensitive information. These costs are associated with rMCZ NG's 1b 4, 5, 6, 7, 8, 9, 10 and 13. This industry assessment of cost was not informed by all windfarm developers in the North Sea.

Best estimate of cost

F4.139 Based on the very low likelihood of costs in Scenario 2 being incurred (Natural England and JNCC, pers. comm., 2012), the best estimate of impact is assumed to be 15% of Scenario 2. Annex H14 provides further explanation. For wind farms, the best estimate of costs at present value over the 20-year IA period in the Net Gain Project Area is £42.663m.

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