# Annex I1 Impacts of individual recommended Marine Conservation Zones (Balanced Seas) Part 1

## Contents

# 1 Introduction

1.1.1 This annex sets out the direct impacts of each of the Balanced Seas recommended Marine Conservation Zones (rMCZs) and rMCZ Reference Areas. The rMCZs and rMCZ Reference Areas are presented in geographical order, split over the three separate documents. The reference list for all three documents can be found at the end of document three.

1.1.2 Four sets of tables are provided for each rMCZ as follows:

- Table 1 – sets out an ecological description of the site, and specifies what ecological features are to be protected by the rMCZ and their conservation objectives;
- Table 2 – sets out the cost impacts of the rMCZ by sector.
- Table 3 – lists the sectors that have activities currently occurring within or near to the rMCZ but for which no mitigation is required and therefore no cost impacts are anticipated.
- Table 4 – sets out the beneficial impacts to ecosystem services of the rMCZ

# 2 Impact Assessment

2.1.1 The remainder of this document sets out the individual rMCZ and rMCZ Reference Area assessments.

## rMCZ 2, Stour and Orwell Estuaries

## Site area (km$^2$): 86.90

**Table 1. Conservation impacts** **rMCZ 2, Stour and Orwell Estuaries**

**1a. Ecological description**

This recommended Marine Conservation Zone (rMCZ) would protect a large proportion of the low energy intertidal rock found in the Balanced Seas Project Area and a very high diversity of habitats and species compared with other UK estuaries (with over 250 taxa recorded). This richness is thought to be a result of the stable saline conditions in the estuaries. The rMCZ contains several examples of estuarine rocky habitats including an example of Harwich Stone Band (Cementstone/London Ashfall Clay Band) habitat, which is known only from the Stour, Orwell and Deben estuaries and which supports interesting algal communities. The rMCZ also has wild and unharvested native oyster beds, extensive blue mussel beds, sheltered muddy gravels, peat and clay exposures, populations of the tentacled lagoon worm and starlet sea anemone, and subtidal sands and gravels. It is one of only two sites in the Balanced Seas project area where honeycomb worm reef and Ross worm reef have been recorded together. The area is considered an important fish nursery throughout the year for several species, and the almost permanent presence of juvenile bass here is considered to be unprecedented among British estuaries.
Source: Balanced Seas Final Recommendations (2011).

**1b. Baseline condition of MCZ features and impact of the MCZ**

| Feature | Area of feature (km2) | No. of occurrences | Baseline | Impact of the MCZ |
|---|---|---|---|---|
| **Broad-scale Habitats** | | | | |
| A1.3 low energy intertidal rock | 0.61 | - | Favourable condition | Maintain at favourable condition |
| A2.4 intertidal mixed sediments | 0.11 | - | Favourable condition | Maintain at favourable condition |
| A5.1 subtidal coarse sediment | 31.11 | - | Favourable condition | Maintain at favourable condition |
| **Habitats of Conservation Importance** | | | | |
| Blue mussel beds | 0.58 | - | Favourable condition | Maintain at favourable condition |
| Estuarine rocky habitats | 0.19 | | Favourable condition | Maintain at favourable condition |
| Honeycomb worm (*Sabellaria alveolata*) reef | 0.02 | | Unfavourable condition | Recover to favourable condition |
| Oyster beds | 0.59 | | Unfavourable condition | Recover to favourable condition |
| Peat and clay exposures | 0.01 | | Favourable condition | Maintain at favourable condition |
| Ross worm (*Sabellaria spinulosa*) reef | 0.45 | | Unfavourable condition | Recover to favourable condition |
| Sheltered muddy gravels | | 28 records | Unfavourable condition | Recover to favourable condition |
| Subtidal sands and gravels | 1.05 | | Favourable condition | Maintain at favourable condition |

## Site-specific costs arising from the effect of the rMCZ on human activities (over 2013 to 2032 inclusive)

| **Table 2a. Archaeological heritage** | **rMCZ 2, Stour and Orwell Estuaries** |
|---|---|
| ***Source of costs of the recommended Marine Conservation Zone (rMCZ)***<br><br>Increase in costs of assessing environmental impacts for future licence applications (it is not anticipated that any additional mitigation of impacts on features protected by the rMCZ will be needed relative to the mitigation provided in the baseline). Archaeological excavations, surface recovery, intrusive and non-intrusive surveys, diver trails and visitors will be allowed.<br>However, restrictions could be placed on:<br>• anchoring in areas of vulnerable MCZ features in the site, including Ross worm *Sabellaria spinulosa* reef;<br>• archaeological excavation in areas of peat and clay exposures in the site. | |
| **Baseline description of activity** | **Costs of impact of rMCZ on the sector** |
| Vessel wrecks of British, Dutch, German and French origin are recorded within the site. Two German aircraft are recorded within the site. There is evidence of iron-age or Roman salt workings, as well as artefacts of Roman, Mesolithic, Anglo Saxon, Medieval, Post Medieval, Viking, Palaeolithic and Iron Age date. Bronze-age dwellings have been recorded within the site, as well as cup and ring marks, earthworks, ditches and caves (English Heritage, 2012).<br><br>English Heritage has indicated that this site is likely to be of interest for archaeological excavation in the future as it is relevant to its National Heritage Protection Plan (theme 3A1.2). | An extra cost would be incurred in the assessment of environmental impact made in support of any future licence applications for archaeological activities in the site. The likelihood of a future licence application being submitted is not known so no overall cost to the sector of this rMCZ has been estimated. However, the additional cost in one licence application could be in the region of £500 to £10,000, depending on the size of the MCZ (English Heritage, pers. comm., 2011). No further impacts on activities related to archaeology are anticipated.<br><br>If archaeologists respond to restrictions on excavation in areas of peat and clay exposures and restrictions on anchoring over areas of sea grass or Ross worm *Sabellaria spinulosa* reef by undertaking alternative archaeological excavations 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, it is not costed in the Impact Assessment. If archaeological excavations do not take place as a result of these restrictions, this will prevent interpretation of archaeological evidence from the site which will decrease acquisition of historical knowledge of past human communities from the site, resulting in a cost |

| **Table 2a. Archaeological heritage** | **rMCZ 2, Stour and Orwell Estuaries** |
|---|---|
| | to society. |

| **Table 2b. Commercial fisheries** | **rMCZ 2, Stour and Orwell Estuaries** |
|---|---|

***Source of costs of the recommended Marine Conservation Zone (rMCZ)***

The Joint Nature Conservation Committee and Natural England have advised that there is considerable uncertainty about whether additional management of commercial fishing gears will be required for certain features protected by this rMCZ. Two scenarios have been identified for the Impact Assessment which reflect this uncertainty. Should the site be designated, the management that will be required will fall somewhere within this range.

***Management scenario 1:*** Zoned closure of Stour and Orwell Estuaries and inner part of Hamford Water to bottom trawls and dredges to protect areas of Ross worm *Sabellaria spinulosa* reef (Statutory Nature Conservation Bodies (SNCB) informed scenario).

***Management scenario 2:*** Closure of entire rMCZ to bottom trawls, dredges, lines, nets, pots and traps (SNCB informed scenario).

***Summary of all fisheries:*** The rMCZ is wholly within 6nm (nautical miles) and is fished only by UK vessels. The commercial fishing fleet using this rMCZ operates out of Felixstowe Ferry, Shotley, Walton and Harwich. Most of these vessels are small, under 10 metre boats which tend to fish on 'day trips'. A variety of static and mobile gears are used within the area, allowing flexible and versatile fishing effort. Vessels trawl for sole during the summer and autumn, with plaice and ray forming an additional catch. Some effort then switches to cod and whiting until the end of the year, when several boats opt to use nets and lines rather than trawls. The majority of smaller boats join the lobster and crab potting fishery at the beginning of summer. There is a seasonal whelk fishery, and seasonal set and drift net fisheries for sole, bass and cod. Winter herring and sprat are targeted by trawl or drift nets if quota is available. Long lines are set for cod, ray and bass. Kent and Essex Inshore Fisheries and Conservation Authority (IFCA) and and Eastern IFCA byelaws have closed the estuaries to oyster dredging for about 2 years. Other IFCA commercial fishing restrictions also exist and are summarised in Annex E1. More detail on the approach used for the fisheries method is provided in Annexes H7 and N4.

Estimated annual value of landings from the rMCZ: £0.045m/yr.

| **Baseline description of UK commercial fisheries** | **Costs of impact of rMCZ on UK commercial fisheries** |
|---|---|

<table>
<tr><th>Table 2b. Commercial fisheries</th><th>rMCZ 2, Stour and Orwell Estuaries</th></tr>
<tr><td>Bottom trawls: Vessel numbers unknown.<br><br>Estimated total value of landings from the rMCZ: £0.008m/yr (MCZ Fisheries Model).</td><td>The estimated annual value of UK bottom trawl landings affected is expected to fall within the following range of scenarios:<br><table><tr><td>£m/yr</td><td>Scenario 1</td><td>Scenario 2</td></tr><tr><td>Value of landings affected</td><td>0.002</td><td>0.008</td></tr></table></td></tr>
<tr><td>Hooks and lines: Vessel numbers unknown.<br>Estimated total value of landings from the rMCZ: £0.001m/yr (MCZ Fisheries Model).</td><td>The estimated annual value of UK hook and line landings affected is expected to fall within the following range of scenarios:<br><table><tr><td>£m/yr</td><td>Scenario 1</td><td>Scenario 2</td></tr><tr><td>Value of landings affected</td><td>0.000</td><td>0.001</td></tr></table>In establishing the draft conservation objectives, the site's features may have been assessed as having low vulnerability to fishing with hooks and lines at current levels and, where this is the case, this activity was not the primary reason for assigning the 'recover' conservation objectives. As such, it is anticipated that if additional management is required it may be towards the lower end of the range, and is likely to be less restrictive than that required for other gears.</td></tr>
<tr><td>Nets: Vessel numbers unknown.<br>Estimated total value of landings from the rMCZ: £0.027m/yr (MCZ Fisheries Model).</td><td>The estimated annual value of UK net landings affected is expected to fall within the following range of scenarios:<br><table><tr><td>£m/yr</td><td>Scenario 1</td><td>Scenario 2</td></tr><tr><td>Value of landings affected</td><td>0.000</td><td>0.027</td></tr></table>In establishing the draft conservation objectives, the site's features may have been assessed as having low vulnerability to fishing with nets at current levels and, where this is the case, this activity was not the primary reason for assigning the 'recover' conservation objectives. As such, it is anticipated that if additional management is required it may be towards the lower end of the range, and is likely to be less restrictive than that required for other gears.</td></tr>
<tr><td>Total direct impact on UK commercial fisheries</td><td></td></tr>
</table>

**Table 2b. Commercial fisheries** — **rMCZ 2, Stour and Orwell Estuaries**

The estimated annual value of UK landings and gross value added (GVA) affected are expected to fall within the following range of scenarios:

| *£m/yr* | Scenario 1 | Scenario 2 |
|---|---|---|
| Value of landings affected | 0.002 | 0.036 |
| GVA affected | 0.001 | 0.016 |

| **Baseline description of non-UK fisheries** | **Costs of impact of rMCZ on non-UK commercial fisheries** |
|---|---|
| | None. |

**Table 2c. Ports, harbours, shipping and disposal sites** — **rMCZ 2, Stour and Orwell Estuaries**

***Source of costs of the recommended Marine Conservation Zone (rMCZ)***

***Management scenario 1:*** Increase in costs of assessing environmental impacts for future licence applications. This applies to future licence applications for disposal of dredged material, navigational dredging and known specific plans or proposals for port and harbour developments within 1km of the rMCZ It is anticipated that additional mitigation of impacts on features protected by the rMCZ will be needed for port developments or port-related activities relative to the mitigation provided in the baseline.

***Management scenario 2:*** Increase in costs of assessing environmental impacts for future licence applications. This applies to future licence applications for disposal of dredged material, navigational dredging and all port and harbour developments within 5 km of the rMCZ. Also, additional costs incurred in updating the existing Maintenance Dredging Protocol (MDP) in order to assess impacts of activities on MCZ features. It is anticipated that additional mitigation of impacts on features protected by the rMCZ will be needed for port developments or port-related activities relative to the mitigation provided in the baseline.

| **Baseline description of activity** | **Costs of impact of rMCZ on the sector** |
|---|---|
| ***Disposal sites:*** There are 23 disposal sites within 1km of the rMCZ which are licensed for disposal of channel dredge material and are likely to be used by the ports of Felixstowe, Harwich and Ipswich. The average number of licence applications received for all of these disposal sites is 3.4 per year (based on number of licence applications received between 2001 and 2010 (Cefas, pers. comm., 2011). For ten of these disposal sites, no licence applications were received between 2001 and 2010, but | *£m/yr* — Scenario 1: Cost to the operator 0.025; Scenario 2: 0.029*<br><br>* This estimate for additional cost in future licence applications for port developments arising as a result of this rMCZ is not used to estimate the total costs for the IA. It is based on different assumptions to those used to estimate costs at a regional level and for the entire suite of sites. Also, this figure |

| **Table 2c. Ports, harbours, shipping and disposal sites** | **rMCZ 2, Stour and Orwell Estuaries** |
|---|---|
| they are not closed to disposal in future (Cefas, pers. comm., 2011).<br><br>There are 23 disposal sites within 5km of the rMCZ which are licensed for disposal of channel dredge material and are likely to be used by the ports of Felixstowe, Harwich and Ipswich. The average number of licence applications received for all of these disposal sites is 3.4 per year (based on number of licence applications received between 2001 and 2010 (Cefas, pers. comm., 2011). For ten of these disposal sites, no licence applications were received between 2001 and 2010, but they are not closed to disposal in future (Cefas, pers. comm., 2011).<br><br>***Navigational dredge areas:*** There are several dredged channels within 1km of the rMCZ associated with the Harwich Haven ports. It is assumed that each dredge area's marine licence is renewed once every 3 years, and that an assessment of environmental impact upon MCZ features is undertaken for each licence renewal.<br><br>There are several dredged channels within 5km of the rMCZ associated with the Harwich Haven ports. It is assumed that each dredge area's marine licence is renewed once every 3 years, and that an assessment of environmental impact upon MCZ features is undertaken for each licence renewal. As these navigational dredge areas are covered by an existing MDP, it is assumed that the assessment of environmental impact is not changed over the 20 year period of the IA.<br><br>***Port development:*** Within 5km of the rMCZ there are 6 ports and harbours which may undergo development at some point in the future: Harwich Haven, Harwich International, Harwich Navyard, Felixstowe, Mistley and Ipswich (Ports & Harbours UK, 2012). This may not represent a full list of all ports and harbours that could be impacted on by the site.<br><br>The Haven Hub Master Plan aims to provide around 8 million twenty-foot | assumes that an assessment of environmental impact upon MCZ features is undertaken for each licence renewal (every 3 years). It does not include the cost of incorporating MCZ features in the existing MDP. It is likely to over-estimate the cost of Scenario 2 for rMCZs with ports within 5km that have MDPs because of the savings in future costs provided by an MDP. See Annex H for further information<br><br>***Scenario 1:*** Future licence applications for disposal of material, navigational dredging and known port or harbour development plans or proposals within 1km of this rMCZ will need to consider the potential effects of the activity on the features protected by the rMCZ. Additional costs will be incurred as a result (a breakdown of these by activity is provided in Annex N11).<br><br>Although 10 of the disposal sites in the rMCZ have not been used in the last ten years, they might be used during the 20 year period covered by the IA. Future licence applications for disposal of material in these disposal sites will need to consider the potential effects of the activity on the features protected by the rMCZ<br><br>Future mitigation of impacts on features protected by the rMCZ will be needed for proposed future port and harbour developments relative to the mitigation provided in the baseline. Unknown potentially significant costs of mitigation could arise.<br><br>***Scenario 2:*** Future licence applications for disposal of material, navigational dredging and known port development plans and proposals within 5km of this rMCZ will need to consider the potential effects of the activity on the features protected by the rMCZ. Additional costs will be incurred as a result (a breakdown of these by activity is provided in Annex N11).<br><br>An additional cost will arise to update the existing MDP as this will need to consider the potential effects of activities on the features protected by the rMCZ. |

| **Table 2c. Ports, harbours, shipping and disposal sites** | **rMCZ 2, Stour and Orwell Estuaries** |
|---|---|
| equivalent units (TEUs) of container-handling capacity within the Harwich Haven by 2030, including Berths 8 and 9 (Felixstowe South Phase 1), the planned deep-water capability of Phase 2 of the Felixstowe South development (due in 2018) and the subsequent development of the (fully consented) Harwich International Container Terminal at Bathside Bay (Port of Felixstowe, 2011). The Haven ports are integral to Britain's transport infrastructure and are close to major sea lanes, providing minimum deviation (Harwich Haven Authority, 2011). The Port of Felixstowe handles over 40% of all UK containerised traffic. It is the largest container port in Britain and is the only port in the UK that can handle the new large container ships (Port of Felixstowe, 2011). The main approach channel, already 14.5 metres deep, is the deepest in all UK container ports. In addition to its national significance, the port also has an important role in the economic development of East Anglia and Harwich, Felixstowe and Ipswich (HHA, pers. comm., 2011). The developments described in the Haven Hub Master Plan will significantly increase the value of exports that pass through the port (currently estimated at £60,000m/yr) (Hutchison Ports, 2011). | The anticipated additional cost in the MDP is estimated to be a one-off cost of £8438.<br><br>Sufficient information is not available to identify what additional mitigation of impacts on features protected by the MCZ will be needed for proposed future port and harbour developments relative to the mitigation provided in the baseline. Unknown potentially significant costs of mitigation could arise. |

| **Table 2d. Recreational anchoring** | **rMCZ 2, Stour and Orwell Estuaries** |
|---|---|
| ***Source of costs of the recommended Marine Conservation Zone (rMCZ)***<br><br>Creation of no-anchoring zones for recreational vessels (except in emergency circumstances) over sensitive features (Ross worm *Sabellaria spinulosa* and honeycomb worm *Sabellaria alveolata*). | |
| **Baseline description of activity** | **Costs of impact of rMCZ on the sector** |
| The Stour and Orwell Estuaries are a popular destination for recreational boaters, and in the rMCZ there are 7 sailing clubs representing over 3,000 members, and 6 marinas maintaining over 1,600 berths and 110 swinging moorings (Visit my Harbour and RYA websites). The main approach channel for | As there is little or no anchoring over the current known extent of *Sabellaria*, Scenario 1 is not expected to impact recreational boat anchoring significantly and no significant costs are expected. |

| **Table 2d. Recreational anchoring** | **rMCZ 2, Stour and Orwell Estuaries** |
|---|---|
| recreational vessels into the estuaries is through the mid channel, and vessels waiting to enter the estuaries may drop anchor in this area (Essex Sites Meeting Report, July).<br><br>The shelf area that is used throughout the season for dinghy racing may overlap with areas of *Sabellaria*. Race marker buoys are laid for the racing. There is no equivalent area nearby for this activity (RYA Balanced Seas Impact Assessment (BS IA) Response, January 2012).<br><br>Project data (survey by the Environment Agency as part of a national contract; Unicomarine surveys via Harwich Haven Authority) show the habitat features of conservation importance Ross worm *Sabellaria spinulosa* and honeycomb worm *Sabellaria alveolata* occur within the mouth of the Stour and Orwell Estuaries from mid channel to just off the shore south of the Harwich Haven Jetty. There is a recreational anchorage in this location where vessels may anchor for an hour or two before entering the estuaries. Recreational water sports and sea anglers' representatives on the Regional Stakeholder Group (RSG) and Local Groups do not think the area where the features occur is used much for anchoring as it is highly exposed and not particularly visually attractive. StakMap indicated that only one club has an anchoring area overlapping the *Sabellaria*.<br><br>In addition there are 6 unlicensed moorings above the stone pier below Harwich Haven Jetty (these may not overlap with the S*abellaria* data point but this cannot be confirmed at this time), but fewer than 5 vessels moor there at any one time and mooring is sporadic depending on weather (Natural England Stakeholder Interview for rMCZ Reference Area 24 Harwich Haven, November 2011). | If it transpires that race marker buoys are currently set in the areas of *Sabellaria*, the location of the marker buoys would need to be altered so that they do not coincide with the *Sabellaria* (K. Cook, Natural England, pers. comm., 2012). If it is not possible to alter the course so that marker buoys do not impact on the *Sabellaria*, racing in the site would cease. This would significantly impact on people who race in the site as there are no alternative areas for racing nearby (RYA BS IA 3rd Tranche Feedback, February). It could also impact indirectly on local businesses through reduced expenditure by the dinghy racers.<br><br>The Suffolk/Essex/North Kent Local Group and RSG recommended that a survey be undertaken before designation as they had low confidence in the *Sabellaria* data. If *Sabellaria* is found to be more widespread within the rMCZ, a greater number of no anchoring zones would be needed, thus potentially impacting the anchoring of more recreational vessels and installation of eco-moorings might need to be considered if suitable sites are available. Survey costs have been included in monitoring costs in Annex N12. |

## Human activities in the site that are not negatively affected by the rMCZ (over 2013 to 2032 inclusive)

| **Table 3. Human activities in the site that are not negatively affected by the recommended Marine Conservation Zone (rMCZ) (existing activities at their current levels and future proposals known to the regional MCZ projects)** | **rMCZ 2, Stour and Orwell Estuaries** |
|---|---|
| Commercial fishing (pots and traps, mid-water trawls, collection by hand)<br>Flood and coastal erosion risk management (coastal defence)<br>Recreation (except the activities listed above in table 2)<br>Research and education<br>Shipping<br>Water abstraction, discharge and diffuse pollution*. | |

* The IA assumes that no additional mitigation of impacts of water abstraction, discharge or diffuse pollution will be required over and above that which will be provided to achieve the objectives of the Water Framework Directive through the River Basin Management Plan process (based on advice provided by Natural England, pers. comm., 2010).

## Anticipated benefits to ecosystem services

The habitats, species and other ecological features of the recommended Marine Conservation Zone (rMCZ) contribute to the delivery of a range of ecosystem services. Designation of the rMCZ and its subsequent management may improve the quantity and quality of the beneficial services provided, which may increase the value (contribution to economic welfare) of them. Impacts on the value of ecosystem services may occur as a result of the designation, management and/or achievement of the conservation objectives of the rMCZ. Further discussion on the potential benefits to ecosystem services can be found in Annex L and definitions can be found in Annex H.

| **Table 4a. Fish and shellfish for human consumption** | | **rMCZ 2, Stour and Orwell Estuaries** |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| Fletcher and others (2011) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) can contribute to the delivery of fish and shellfish for human consumption.<br><br>Intertidal rock habitats are important sources of larval plankton upon which commercially important fish species feed, including mussels and larval fish of plaice and mackerel (Fletcher and others, 2011).<br><br>The estuaries have extensive wild native oyster and blue mussel beds, and are also commercial fish nursery areas. They have an almost permanent | If the conservation objectives of the features are achieved, some features will be maintained in favourable condition and some recovered to favourable condition.<br><br>New management of fishing activities is expected (above the baseline situation), the costs of which are set out in Table 2b, which may reduce the impacts on fish and shellfish habitats and harvesting of stocks.<br><br>As most of the commercial species targeted by fishers in | Anticipated direction of change:<br>⇧<br>Confidence: Low |

| **Table 4a. Fish and shellfish for human consumption** | | **rMCZ 2, Stour and Orwell Estuaries** |
|---|---|---|
| presence of juvenile bass all year round (Balanced Seas Final Recommendations Report, 2011). As such the rMCZ is likely to help to support potential on-site and off-site fisheries.<br><br>The baseline quantity and quality of the ecosystem service provided is assumed to be commensurate with that provided by the features of the site when some are in in favourable condition and some are in unfavourable condition (see Table 1 for details).<br><br>There is a low level of commercial fishing in the estuaries. The small fleets at Harwich and Felixstowe Ferry operate in the estuaries' sheltered waters when poor weather limits their ability to work offshore. They trawl and net in the lower reaches of the estuaries for species such as Dover sole, brown shrimp and bass. A description of on-site fishing activity and the value derived from it is set out in Table 2b.<br><br>It has not been possible to estimate the value of the off-site benefits that derive from the spawning and nursery area. | this area are mobile flatfish, it is unclear whether the scale of habitat recovered and the magnitude of reduced (on-site) harvesting will be enough to have any significant positive impact on commercial stocks.<br><br>Potential benefits may arise on-site, for fishers permitted to fish within the rMCZ, and off-site from spill-over benefits.<br><br>Designating the rMCZ will protect its features and the ecosystem services that they provide against the risk of future degradation from pressures caused by human activities. | |

| **Table 4b. Recreation** | | **rMCZ 2, Stour and Orwell Estuaries** |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| ***Angling:*** Fletcher and others (2011) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) can contribute to the delivery of fish and shellfish for human consumption and recreation services.<br><br>Intertidal rock habitats are important sources of larval plankton upon which important fish species feed, including mussels and larval fish of plaice and mackerel (Fletcher and others, 2011).<br><br>Both estuaries are important nursery areas for fish caught recreationally, including bass (Balanced Seas Final Recommendations Report, 2011). | If the conservation objectives of the features are achieved, some of the features will be recovered to favourable condition. Others will be maintained in favourable condition.<br><br>Maintenance of the broad scale habitats in favourable condition may ensure their functioning as a nursery area, potentially benefiting fisheries exploited within and outside the rMCZ.<br><br>As no additional management of angling is expected, fishers will be able to benefit from any on-site and off-site beneficial | Anticipated direction of change:<br>⇧<br><br>Confidence: Low |

| **Table 4b. Recreation** | | **rMCZ 2, Stour and Orwell Estuaries** |
|---|---|---|
| Both boat and shore angling for mullet and bass takes place throughout the rMCZ. Shore angling is particularly popular with local anglers off the stone pier at Harwich. The nursery grounds in the estuaries, as well as juvenile and adult fish from the estuaries, may contribute to the good fish populations found in the system of sand banks and channels just outside the site in the Outer Thames Estuary, which is popular with private and charter boat anglers fishing for numerous species including mackerel, dogfish and ray (Stakmap, 2010). The generally high biodiversity due to the intertidal habitats within the site may also support on-site and off-site fisheries.<br><br>The baseline quantity and quality of the ecosystem service provided is assumed to be commensurate with that provided by the features of the site when some are in in favourable condition and some are in unfavourable condition (see Table 1 for details).<br><br>It has not been possible to estimate the value derived from angling on-site or the proportion of the value derived from angling off-site that results from the potential spawning and nursery area. | effects. If the rMCZ results in an increase in the size and diversity of species caught then this is expected to increase the value derived by anglers.<br><br>Designating the rMCZ will protect its features and the ecosystem services that they provide against the risk of future degradation from pressures caused by human activities.<br><br>The designation may lead to an increase in angling visits to the site, which may benefit the local economy. This increase may represent an overall increase in UK angling and/or a redistribution of location preferences. | |
| ***Diving:*** Diving is not known to take place in the rMCZ. | N/A | N/A |
| ***Wildlife watching:*** Fletcher and others (2011) identify that the features to be protected by the rMCZ can contribute to the delivery of recreation and tourism services.<br><br>Macroinvertebrates are an essential link between high trophic levels (e.g. fish and birds) and low trophic levels (e.g. algae) on intertidal rock habitat (Fletcher and others, 2011). Rock pools are particularly important habitats of intertidal rock that attract visitors to the marine environment (Fletcher and others, 2011).<br><br>The baseline quantity and quality of the ecosystem service provided is | If the conservation objectives of the features are achieved, some of the features will be recovered to favourable condition. Others will be maintained in favourable condition.<br><br>The recovery of the broad scale habitats to favourable condition may improve their functioning as support for fish, bird and marine mammal populations. Any associated increase in abundance and diversity of species that are visible to wildlife watchers may improve the quality of wildlife watching at the site and therefore the value of the ecosystem service. | Anticipated direction of change:<br>⇧<br><br>Confidence: Low |

| **Table 4b. Recreation** | | **rMCZ 2, Stour and Orwell Estuaries** |
|---|---|---|
| assumed to be commensurate with that provided by the features of the site when some are in in favourable condition and some are in unfavourable condition (see Table 1 for details).<br><br>The banks of the Orwell and the north side of the Stour have particularly high biodiversity, and abundant fish populations which support a number of internationally important foraging birds. Birdwatching is very popular and the RSPB manages a reserve along the Stour Estuary designed for this activity.<br><br>It has not been possible to estimate the value derived from wildlife watching in the rMCZ. | The designation may lead to an increase in wildlife watching visits to the site, which may benefit the local economy. This increase may represent a redistribution of location preferences rather than an overall increase in wildlife watching trips at the national scale.<br><br>Designating the rMCZ will protect its features and the ecosystem services that they provide against the risk of future degradation from pressures caused by human activities. | |
| ***Other recreation:*** Fletcher and others (2011) identify that the features to be protected by the rMCZ can contribute to the delivery of recreation and tourism services.<br><br>The banks of the Orwell and the north side of the Stour lie within the Suffolk Coast and Heaths Area of Outstanding Natural Beauty. The estuaries and their surroundings attract visitors from nearby Colchester, Ipswich and Felixstowe and much further afield. Marinas and jetties are found along the banks, providing access to and from the tidal waters for recreational and tourist activities. The Harwich Area Sailing Association has a large membership and the clubs organise regattas and a series of races that attract visitors (Stour & Orwell Estuaries Management Strategy, 2010). Coastal walking is popular within the rMCZ with 42 miles of promoted long distance paths including the Stour and Orwell Path and the Essex Way (Long Distance Walkers Association website and Stour & Orwell Estuaries Management Strategy, 2010).<br><br>It has not been possible to estimate the value derived from other recreation in the rMCZ. | If the conservation objectives of the features are achieved, some of the features will recover to favourable condition. Others will be maintained in favourable condition.<br><br>If the rMCZ is designated this will provide an additional positive aspect about the location that could be promoted by the tourism and leisure industry and that would be expected to increase visitation rates.<br><br>Designating the rMCZ will protect its features and the ecosystem services that they provide against the risk of future degradation from pressures caused by human activities. | Anticipated direction of change:<br><br>⇧<br><br>Confidence: Low |

| **Table 4c. Research and education** | **rMCZ 2, Stour and Orwell Estuaries** | |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| ***Research:*** Fletcher and others (2011) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) can contribute to the delivery of research services.<br><br>Suffolk and Essex Wildlife Trusts conduct research within the rMCZ and are part of the Stour and Orwell Estuary Management Group (SOEMG), a multi-sectoral group with a number of research programmes under way oriented to improving the management of the estuaries, and exploring opportunities to improve visitor experience. Harwich Haven and the Eastern Inshore Fisheries and Conservation Authority (EIFCA) both conduct regular research as part of their statutory duties. The results of any research are shared and utilised by SOEMG (Stour & Orwell Management Strategy, 2009). | Monitoring of the rMCZ will help inform understanding of how the marine environment is changing and is impacted on by anthropogenic pressures and management interventions. Other research benefits are unknown. | Anticipated direction of change: ⇧<br><br>Confidence:<br><br>High |
| ***Education:*** Fletcher and others (2011) identify that the features to be protected by the rMCZ can contribute to the delivery of education services.<br><br>Guided walks and educational activities are organised in the Orwell Country Park adjacent to the rMCZ by Ipswich Borough Council. SOEMG is working with young people to increase understanding of the estuaries. Essex and Suffolk Wildlife Trusts both have small reserves along the banks of the estuary which are open to visitors (Essex and Suffolk Wildlife Trusts' websites). | MCZ designation may provide an opportunity to expand the focus of education events into the marine environment.<br><br>Designation may aid additional local (to the rMCZ) provision of education activities (e.g. events, interpretation boards), from which visitors would derive benefit.<br><br>Non-visitors may benefit if the rMCZ contributes to wider provision of education (e.g. television programmes, articles in magazines and newspapers, and educational resources developed for use in schools). | Anticipated direction of change: ⇧<br><br>Confidence: Moderate |

| **Table 4d. Regulating services** | **rMCZ 2, Stour and Orwell Estuaries** | |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| ***Regulation of pollution:*** the features of the site contribute to the bioremediation of waste (Blue Mussel beds), water purification | If the conservation objectives of the features are achieved, some features will be maintained in favourable condition and some | Anticipated direction of ⇧ |

| **Table 4d. Regulating services** | | **rMCZ 2, Stour and Orwell Estuaries** |
|---|---|---|
| (*Sabellaria*, Blue Mussel beds and native oyster) and sequestration of carbon (native oyster, sheltered muddy gravels, subtidal coarse sediment) (Fletcher and others, 2011).<br><br>***Environmental resilience:*** The features of the site, in particular intertidal rock, native oyster and *Sabellaria*, contribute to the resilience and continued regeneration of marine ecosystems (Fletcher and others, 2011).<br><br>***Natural hazard protection:*** The features of the site (native oyster, blue mussel beds and *Sabellaria*) contribute to local flood and storm protection (Fletcher and others, 2011).<br><br>It has not been possible to estimate the value derived from regulating services associated with the rMCZ. | (*Sabellaria* reefs, Native oyster beds and sheltered muddy gravels) recovered to favourable condition.<br><br>Recovery of *Sabellaria* reefs, Native oyster beds and sheltered muddy gravels and a potential reduction in the use of bottom towed fishing gear may increase the site's benthic biodiversity and biomass, improving the regulating capacity its habitats.<br><br>Designating the rMCZ will protect its features and the ecosystem services that they provide against the risk of future degradation from pressures caused by human activities. | change:<br><br>Confidence: Low |

| **Table 4e. Non-use and option values** | | **rMCZ 2, Stour and Orwell Estuaries** |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| Some people gain satisfaction from the existence of marine habitats, species and other features. They also gain from having the option to benefit in the future from the habitats and species in the rMCZ and the ecosystem services provided, even if they do not currently benefit from them.<br><br>It has not been possible to estimate the value derived from non-use and option value services associated with the rMCZ. | The rMCZ will benefit the proportion of the UK population that values conservation of the rMCZ features and its contribution to an ecologically coherent network of MPAs. Some people will gain satisfaction from knowing that the habitats and species are being conserved (existence value) and/or that they are being conserved for use by others in the current generation (altruistic value) or future generations (bequest value). The rMCZ will protect both the features and the option to benefit from the services in the future from the risk of future degradation. | Anticipated direction of change: ⇧<br><br>Confidence: Moderate |

## rMCZ 2, Reference Area 22 North Mistley Site area (km$^2$): 1.44

| **Table 1. Conservation impacts** | | | | **rMCZ 2, Reference Area 22 North Mistley** |
|---|---|---|---|---|
| **1a. Ecological description** | | | | |
| This recommended Marine Conservation Zone Reference Area encompasses a small intertidal bay on the northern shore of the Stour Estuary in Suffolk, opposite Mistley on the southern bank. It is recommended specifically for the population of the nationally scarce brackish water species, the starlet sea anemone *Nematostella vectensis* which is found here, as well as intertidal mud which is found throughout the site. It has also been recommended for blue mussel beds, although there is some doubt about the validity of the record for this feature. This site lies within the Stour Estuary Site of Special Scientific Interest, Stour and Orwell Estuaries Special Protection Area, and Stour and Orwell Estuaries Ramsar site.<br>Source: Balanced Seas Final Recommendations (2011). | | | | |
| **1b. Baseline condition of MCZ features and impact of the MCZ** | | | | |
| **Feature** | **Area of feature (km2)** | **No. of occurrences** | **Baseline** | **Impact of the MCZ** |
| **Broad-scale Habitats** | | | | |
| A2.3 Intertidal mud | 1.09 km$^2$ | | Unfavourable condition | Recover to reference condition |
| **Habitats of Conservation Importance** | | | | |
| Blue mussel beds | 0.07 | | Unfavourable condition | Recover to reference condition |
| **Species of Conservation Importance** | | | | |
| Starlet Sea Anemone (*N.vectensis*) | - | 1 record | Unfavourable condition | Recover to reference condition |

## Site-specific costs arising from the effect of the rMCZ on human activities (over 2013 to 2032 inclusive)

| **Table 2a. Archaeological heritage** | **rMCZ 2, Reference Area 22 North Mistley** |
|---|---|
| ***Source of costs of the recommended Marine Conservation Zone (rMCZ)***<br><br>Increase in costs of assessing environmental impacts for future licence applications. Archaeological excavations, surface recovery and intrusive surveys will be prohibited from the entire site. Diver trails, visitors and non-intrusive surveys will be allowed. | |
| **Baseline description of activity** | **Costs of impact of rMCZ on the sector** |
| Neolithic and bronze-age tools have been found within the site | An extra cost would be incurred in the assessment of environmental impacts made in support of any future licence applications for archaeological activities in the site. |

| **Table 2a. Archaeological heritage** | **rMCZ 2, Reference Area 22 North Mistley** |
|---|---|
| (English Heritage, 2012).<br><br>English Heritage has indicated that this site is likely to be of interest for archaeological excavation in the future as it is relevant to its National Heritage Protection Plan (theme 3A1.2) (English Heritage, pers. comm., 2012). | The likelihood of a future licence application being submitted is not known so no overall cost to the sector of this rMCZ has been estimated. However, the additional cost in one licence application could be in the region of £500 to £10,000 depending on the size of the MCZ (English Heritage, pers. comm., 2012). 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, it is not costed in the Impact Assessment. The prohibition of excavation and therefore interpretation of archaeological evidence from the site will decrease acquisition of historical knowledge of past human communities from the site, resulting in a cost to society. |

**Table 2b. Commercial fisheries** — **rMCZ 2, Reference Area 22 North Mistley**

***Source of costs of the recommended Marine Conservation Zone (rMCZ)***

Closure of entire site to all gear types.

***Summary of all fisheries:*** The rMCZ Reference Area, lying in rMCZ 2 Stour and Orwell Estuaries, is primarily intertidal. Local Group discussions indicate that potting occurs in the rMCZ Reference Area, although this is not apparent from the MCZ Fisheries Model. It is not known how many vessels use this rMCZ Reference Area (MCZ Fisheries Model). More detail on the approach used for the fisheries method is provided in Annexes H7 and N4.

Estimated annual value of landings from the rMCZ Reference Area: £310/yr (MCZ Fisheries Model).

(Due to resolution issues of the MCZ Fisheries Model and the small size of many rMCZ Reference Areas in the Balanced Seas region, some fisheries landings values may be inaccurate. They have been included as a precautionary measure and to avoid underestimating the economic impact of a site.)

| **Baseline description of UK commercial fisheries** | **Costs of impact of rMCZ on UK commercial fisheries** |
|---|---|
| ***Bottom trawls:*** It is unknown how many vessels use bottom trawls in the rMCZ Reference Area but level of vessel use is very low if it occurs at all.<br><br>Estimated total value of landings from the rMCZ Reference Area: £40/yr | Estimated annual value of UK vessel landings affected:<br>*£m/yr* — Scenario 1<br>Value of landings affected — <0.001* |

<table>
<tr><th colspan="2">Table 2b. Commercial fisheries rMCZ 2, Reference Area 22 North Mistley</th></tr>
<tr><td>(MCZ Fisheries Model).</td><td>* £40/yr</td></tr>
<tr><td>Nets: It is unknown how many vessels use nets in the rMCZ Reference Area but level of vessel use for this site is low.<br><br>Estimated total value of landings from the rMCZ Reference Area: £270/yr (MCZ Fisheries Model).</td><td>Estimated annual value of UK vessel landings affected:<table><tr><td>£m/yr</td><td>Scenario 1</td></tr><tr><td>Value of landings affected</td><td><0.001*</td></tr></table>* £270/yr</td></tr>
<tr><td>Pots and traps: It is unknown how many vessels use pots and traps in the rMCZ Reference Area but information from stakeholders indicates that potting occurs.<br><br>Estimated total value of landings from the rMCZ Reference Area: £0.000m/yr (MCZ Fisheries Model).</td><td>Estimated annual value of UK vessel landings affected:<table><tr><td>£m/yr</td><td>Scenario 1</td></tr><tr><td>Value of landings affected</td><td>0.000</td></tr></table>This is likely to be an underestimate as it was indicated in Suffolk/Essex Local Group meetings that potting does occur within this rMCZ Reference Area.</td></tr>
<tr><th>Total direct impact on UK commercial fisheries</th><th></th></tr>
<tr><td></td><td>Estimated annual value of UK vessel landings and gross value added (GVA) affected:<table><tr><td>£m/yr</td><td>Scenario 1</td></tr><tr><td>Value of landings affected</td><td><0.001*</td></tr><tr><td>GVA affected</td><td>0.000</td></tr></table>* £310/yr</td></tr>
<tr><th>Baseline description of non-UK fisheries</th><th>Costs of impact of rMCZ on non-UK commercial fisheries</th></tr>
<tr><td></td><td>None.</td></tr>
</table>

| **Table 2c. Flood and coastal erosion risk management (coastal defence)** | **rMCZ 2, Reference Area 22 North Mistley** |
|---|---|
| ***Source of costs of the recommended Marine Conservation Zone (rMCZ)*** | |
| Increase in costs of assessing environmental impacts for future licence applications for maintenance work for the coastal defence scheme (it is not | |

| **Table 2c. Flood and coastal erosion risk management (coastal defence)** | **rMCZ 2, Reference Area 22 North Mistley** |
|---|---|
| anticipated that any additional mitigation of impacts on features protected by the rMCZ will be needed relative to the mitigation provided in the baseline). | |
| **Baseline description of activity** | **Costs of impact of rMCZ on the sector** |
| The shoreline management policies in the vicinity of the site include a combination of Advance The Line/Hold The Line/Managed Realignment/No Active Intervention. The Environment Agency is working with local community groups to trial the use of routinely dredged material from the estuary channel port and marinas as a soft coastal defence, thus keeping the material within the estuary system. The sediment would be placed in areas of eroding salt marsh to encourage re-growth. This work is in its early stages and the sites where sediment will be deposited are not yet known, but there is a possibility that they could overlap with the rMCZ Reference Area and impact areas of intertidal mud (Natural England and Environment Agency Flood and Coastal Erosion Risk Management Workshop for the Balanced Seas Project Area, 17 November 2011). An environmental assessment, permissions and licences will be required to carry out this work. | No additional costs for mitigation of impact are anticipated (Natural England and Environment Agency Flood and Coastal Erosion Risk Management Workshop for the Balanced Seas Project Area, 17 November 2011).<br><br>As a result of the rMCZ Reference Area, it is anticipated that additional costs will be incurred in assessing environmental impacts in support of future licence applications for Flood and Coastal Erosion Risk Management (FCERM) schemes. For each licence application these costs are expected to arise as a result of approximately 0.5–1 day of additional work, in most cases, although there may be cases where further additional consultant time is needed (Environment Agency, pers. comm., 2012). It has not been possible to obtain information on the likely number of licence applications that will be made over the 20 year period of the IA or estimates of the potential increase in costs. |

| **Table 2d. Ports, harbours, shipping and disposal sites** | **rMCZ 2, Reference Area 22 North Mistley** |
|---|---|
| ***Source of costs of the recommended Marine Conservation Zone (rMCZ)***<br><br>***Management scenario 1:*** Increase in costs of assessing environmental impacts for future licence applications. This applies to future licence applications for navigational dredging that takes place within 1km of the rMCZ. It is anticipated that the entire site will be closed to navigational and maintenance dredging. The Balanced Seas project is not aware of activities related to ports, harbours and shipping for which additional mitigation of impacts on features protected by the rMCZ Reference Area will be needed relative to the mitigation provided in the baseline<br><br>***Management scenario 2:*** Increase in costs of assessing environmental impacts for future licence applications. This applies to future licence applications for navigational dredging and all port and harbour developments within 5 km of the rMCZ. Also, additional costs to update the existing Maintenance Dredging Protocol (MDP). It is anticipated that the entire site will be closed to navigational and maintenance dredging, and additional mitigation of impacts on features protected by the rMCZ Reference Area will be needed for proposed future port and harbour developments relative to the mitigation provided in the baseline. | |
| **Baseline description of activity** | **Costs of impact of rMCZ on the sector** |

**Table 2d. Ports, harbours, shipping and disposal sites** **rMCZ 2, Reference Area 22 North Mistley**

***Navigational dredge areas:*** The south-east corner of this rMCZ Reference Area overlaps with maintenance dredging in the Mistley Channel. The channel is maintained by Harwich Haven Authority (HHA) and used by vessels and craft going to Mistley Marine and Leisure (slipway, work boats, yacht storage facility and mud berths), Mistley Quay (used by small coasters trading in agricultural products, stone, timber and other commodities) and the Stour Sailing Club (Harwich Haven Authority, 2011). The small port of Mistley handles a wide variety of cargoes within its 6 berths which include 2 deepwater berths. 0.03% of all foreign and domestic traffic in the UK and 0.06% of ship arrivals in the UK use Mistley Quay. Maximum size of vessels is 3,500 tonnes.The port employs approximately 300 people in the three wards around Mistley (Haven Gateway, 2010 berths; TWL Logistics Ltd, 2012),

The Mistley Channel is dredged 3–4 times a year by HHA, which moves about 1,000 metres$^3$ per session (Harwich Haven Authority, 2011).

The dredged material is used elsewhere in the Stour and Orwell Estuary in habitat projects and for maintenance of coastal defences and environmental processes (Harwich Haven Authority, 2011).

It is assumed that each dredge area's marine licence is renewed once every 3 years. As this navigational dredge area is covered by an existing MDP, it is assumed that the assessment of environmental impact is not changed over the 20 year period of the IA.

***Port development:*** Within 5km of the rMCZ there is only the Port of Mistley, which may undergo development at some point in the future (Ports & Harbours UK, 2012). This may not represent a full list of all ports and harbours that could be impacted on by the site. No port developments are known to be planned within the 20 year period of the Impact Assessment

| *£m/yr* | Scenario 1 | Scenario 2 |
|---|---|---|
| Cost to the operator | 0.003 | 0.003* |

* This estimate for additional cost in future licence applications for port developments arising as a result of this rMCZ is not used to estimate the total costs for the IA. It is based on different assumptions to those used to estimate costs at a regional level and for the entire suite of sites. Also, this figure assumes that an assessment of environmental impact upon MCZ features is undertaken for each licence renewal (every 3 years). It does not include the cost of incorporating MCZ features in the existing MDP. It is likely to over-estimate the cost of Scenario 2 for rMCZs with ports within 5km that have MDPs because of the savings in future costs provided by an MDP. See Annex H for further information

***Closure of site to maintenance and navigational dredging in Scenarios 1 and 2:*** It is anticipated that closure of the site to maintenance dredging of the main navigation channel to the Port of Mistley would lead ultimately to closure of the port (HHA, pers. comm., 10 February 2012). Because of the importance of the port, the IA assumes that the dredging would continue and the impacts on the MCZ features would not be mitigated.

The cost is assessed in the impact assessment (IA) in terms of the cost to the operator of providing environmental benefit that is equivalent to the impact that the navigational dredging causes to the rMCZ Reference Area. In the event that an activity impacts on achieving the conservation objectives of an MCZ's features, this would be required under Section 126(7) of the Marine and Coastal Access Act 2009. The cost of this has not been assessed because the following are not known: the magnitude of the damage that would be caused; and how equivalent environmental benefit would be provided and what it would cost.

The impacts have been assessed in this way because the assessment is of

| **Table 2d. Ports, harbours, shipping and disposal sites** | **rMCZ 2, Reference Area 22 North Mistley** |
|---|---|
| (IA). | the impacts of the regional MCZ projects' site recommendations that were submitted in September 2011. The Minister's decision about designating this site will be also informed by Natural England's and JNCC's statutory advice on MCZs that was published on 18 July 2012. It is understood that the advice suggests that the site boundary is adjusted to increase the likelihood that the MCZ features' conservation objectives can be achieved. Such adjustment is not included in the IA because the IA is an assessment of the regional MCZ projects' recommendations.<br><br>***Scenario 1:*** If the navigational dredge in the rMCZ Reference Area continues following designation, as described above, impacts on the MCZ's features will need to be considered in applications for renewal of the licence for the dredge. To avoid under-estimation of the costs, the additional costs that would be incurred are included in this Scenario.. Additional costs will be incurred as a result (a breakdown of these by activity is provided in Annex N11).<br><br>***Scenario 2:*** Future licence applications for navigational dredging and port and harbour development plans or proposals within 5km of this site will need to consider the potential effects of the activity on the features protected by the rMCZ. Additional costs will be incurred as a result (a breakdown of these by activity is provided in Annex N11). Also, additional costs will arise in updating the existing MDP as this will need to consider the potential effects of activities on the features protected by the rMCZ Reference Area. The anticipated additional cost in ther MDP is estimated to be a one-off cost of £8438. |

| **Table 2e. Recreational angling** | **rMCZ 2, Reference Area 22 North Mistley** |
|---|---|
| ***Source of costs of the recommended Marine Conservation Zone (rMCZ)***<br><br>Closure of the entire site to all recreational angling. | |
| **Baseline description of activity** | **Costs of impact of rMCZ on the sector** |

| **Table 2e. Recreational angling** | **rMCZ 2, Reference Area 22 North Mistley** |
|---|---|
| StakMap interviews indicated that areas used for recreational angling (shore fishing, charter boats and boat fishing) overlap with the rMCZ Reference Area (7 interviewees who represented 3 local clubs, with combined membership totalling 230 users). Charter boat operators interviewed stated that they used this small area and represented a total of 425 anglers/yr (StakMap 2010). Species taken include bass and mixed species. For both shore fishing and boat-based fishing activities, the rMCZ Reference Area only represents a small proportion of the overall area over which stakeholders indicated that they fished. Recreational boat angling occurs through the mid-water channel within the site near the seaward boundary (Balanced Seas Essex Sites Meeting Report, July 2011). | Because the rMCZ Reference Area represents only a small proportion of the area where anglers fish, it is anticipated that they may respond to the closure to angling by fishing elsewhere in this area. |

| **Table 2f. Recreational bait collection** | **rMCZ 2, Reference Area 22 North Mistley** |
|---|---|
| ***Source of costs of the recommended Marine Conservation Zone (rMCZ)***<br><br>Closure of entire site to all bait collection. | |
| **Baseline description of activity** | **Costs of impact of rMCZ on the sector** |
| Bait digging occurs in the Reference Area rMCZ (Balanced Seas Essex Sites Meeting Report, July 2011). An angler who fishes in the area explained that it is an important source of bait, partly because of the easy access (T. Pinborough, local angler, pers. comms., January 2012). The rMCZ Reference Area is part of a larger bait digging area, used in the summer (April to September) by local anglers and at least 3 professional bait diggers who supply 3 tackle shops (in Ipswich, Walton-on-the-Naze and Colchester).<br><br>The Stour and Orwell has a voluntary code of conduct that closes sections of the estuaries to bait digging during the winter (November to April), which | Since the site is used extensively for bait collection in summer (when it is not subject to the voluntary closure), the rMCZ Reference Area is likely to have an impact on local anglers and the three professional bait diggers (licensed by The Crown Estate) who use it, and indirectly on the three tackle shops which buy bait from these suppliers. It has not been possible to obtain quantitative information about the level of bait digging within the site or the availability of alternative sites for bait collection outside and therefore costs have not been calculated. |

| **Table 2f. Recreational bait collection** | **rMCZ 2, Reference Area 22 North Mistley** |
|---|---|
| was negotiated with local stakeholders via the Stour and Orwell Estuary Management Group (M. Sessions, local angler, pers. comms., February 2012). | |

| **Table 2g. Recreational Wildfowling** | **rMCZ 2, Reference Area 22 North Mistley** |
|---|---|
| ***Source of costs of the recommended Marine Conservation Zone (rMCZ)***<br><br>Closure of the entire site to wildfowling. | |
| **Baseline description of activity** | **Costs of impact of rMCZ on the sector** |
| Wildfowling has taken place within this rMCZ Reference Area as a traditional activity for at least 100 years. The area is now mainly used by the Grove Shooting Club (established in the early 1980s) (British Association for Shooting and Conservation (BASC), pers. comm., January 2012).<br><br>The Grove Shooting Club has a sporting rights agreement from The Crown Estate which expires in 2025, and a notice of consent from Natural England to carry out wildfowling which expires in 2020. The licensed area completely overlaps the rMCZ Reference Area and is one of several licensed areas within the Stour Estuary. Under the club's Crown Estate management plan, shooting is allowed only within 100 metres of the sea wall (i.e. not throughout the rMCZ Reference Area). The club has a no-shooting zone towards the Stutton Mill side of the rMCZ Reference Area, which incorporates some of the mussel beds (BASC, pers. comm., January 2012). | The rMCZ Reference Area covers a large proportion of the area used for wildfowling within the estuary and its closure to wildfowling could have a significant impact, particularly on wildfowlers who shoot with the Grove Shooting Club. Wildfowlers have said that areas outside the rMCZ Reference Area are of a significantly lower quality for this activity. It is therefore anticipated that the closure would have a significant impact on the people who wildfowl in the site. It has not been possible to further assess the costs of the impact on wildfowling because the club did not wish to disclose information about its membership and activity. |

## Human activities in the site that are not negatively affected by the rMCZ (over 2013 to 2032 inclusive)

| **Table 3. Human activities in the site that are not negatively affected by the recommended Marine Conservation Zone (rMCZ) (existing activities at their current levels and future proposals known to the regional MCZ projects)** | **rMCZ 2, Reference Area 22 North Mistley** |
|---|---|
| Disposal site; use of disposal site 'River Stour Water Column 3 (TH201)' (though this is within is within 500m of the rMCZ at its closest point, it is a 'beneficial | |

use' disposal site , which feeds dredged material back in to the estuary to offset impacts associated with navigational dredging. It is not anticipated that mitigation of impacts would be required (Natural England, e-mail., 10 July 2012)).
Recreation (except for the activities listed above in table 2)
Water abstraction, discharge and diffuse pollution*.

*The IA assumes that no additional mitigation of impacts of water abstraction, discharge or diffuse pollution will be required over and above that which will be provided to achieve the objectives of the Water Framework Directive through the River Basin Management Plan process (based on advice provided by Natural England, pers. comm., 2010).

## Anticipated benefits to ecosystem services

The habitats, species and other ecological features of the recommended Marine Conservation Zone (rMCZ) Reference Area contribute to the delivery of a range of ecosystem services. Designation of the rMCZ Reference Area and its subsequent management may improve the quantity and quality of the beneficial services provided, which may increase the value (contribution to economic welfare) of them. Impacts on the value of ecosystem services may occur as a result of the designation, management and/or achievement of the conservation objectives of the rMCZ Reference Area. Further discussion on the potential benefits to ecosystem services can be found in Annex L and definitions can be found in Annex H.

| **Table 4a. Fish and shellfish for human consumption** | **rMCZ 2, Reference Area 22 North Mistley** | |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| Fletcher and others (2011) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) Reference Area can contribute to the delivery of fish and shellfish for human consumption.<br><br>Intertidal mud provides habitat for fish of commercial importance and blue mussel beds which occurred here in the past potentially provide a commercial food source (Fletcher and others, 2011). The baseline quantity and quality of the ecosystem service provided is assumed to be commensurate with that provided by the features of the site when some are in in favourable condition and some are in unfavourable condition (see rMCZ 2 Table 1 for details)Given the intertidal nature of the site, there is very little commercial fishing in it. A description of on-site fishing activity and the value derived from it is set out in Table 2b.<br><br>It has not been possible to estimate the value of the off-site benefits that | If the conservation objectives of the features are achieved, the features will be recovered to reference condition.<br><br>Additional management (above that in the baseline situation) of fishing activities is expected which will prohibit fishing within the rMCZ Reference Area. The costs of this are set out in Table 2b.<br><br>Achievement of the conservation objectives may improve the contribution of the habitats to the provision of fish and shellfish for human consumption.<br><br>Closure of the rMCZ Reference Area to fishing activity will reduce the on-site fishing mortality of species, but as the site is small it is unclear whether this would benefit stocks | Anticipated direction of change:<br>⇧<br><br>Confidence: Low |

| **Table 4a. Fish and shellfish for human consumption** | **rMCZ 2, Reference Area 22 North Mistley** | |
|---|---|---|
| derive from the intertidal mud habitats. | of mobile commercial finfish species.<br><br>As no fishing will be permitted within the rMCZ Reference Area, no on-site benefits will be realised. | |

| **Table 4b. Recreation** | | **rMCZ 2, Reference Area 22 North Mistley** |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| ***Angling:*** Fletcher and others (2011) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) Reference Area can contribute to the delivery of fish and shellfish for human consumption and recreation services.<br><br>Intertidal mud provides habitat for fish of commercial importance (Fletcher and others, 2011) which may also have recreational value.<br><br>The Stour Estuary has important nursery areas for fish caught recreationally, including bass (Balanced Seas Final Recommendations Report, 2011). However, it is not known to what extent nursery areas occur within the rMCZ Reference Area. The generally high biodiversity due to the intertidal habitats within the site may support on-site and off-site fisheries. The baseline quantity and quality of the ecosystem service provided is assumed to be commensurate with that provided by the features of the site when some are in in favourable condition and some are in unfavourable condition (see rMCZ 2 Table 1 for details).<br><br>A number of anglers use the rMCZ Reference Area and a description of on-site angling activity it is set out in Table 2e but it has not been possible to estimate the value derived from this.<br><br>It has not been possible to estimate the proportion of the value derived from angling off-site that results from the potential spawning and nursery area. | If the conservation objectives of the features are achieved, the features will be recovered to reference condition.<br><br>Recovery of habitats may have benefits for fish populations. It is unclear whether any benefits for fish populations would arise as a result of reduced fishing mortality due to closure of the rMCZ Reference Area (see Table 4a).<br><br>As angling will not be permitted within the rMCZ Reference Area, any benefits will be limited to those occurring as a result of spill-over effects of species targeted by anglers outside the rMCZ Reference Area. Such benefits may be insignificant. | Anticipated direction of change:<br>⇧<br><br>Confidence: Low |

| **Table 4b. Recreation** | | **rMCZ 2, Reference Area 22 North Mistley** |
|---|---|---|
| ***Diving:*** Diving does not take place in the site. | N/A | N/A |
| ***Wildlife watching:*** Fletcher and others (2011) identify that the features to be protected by the rMCZ Reference Area can contribute to the delivery of recreation and tourism services.<br><br>Mussel beds are an important food source for birds and intertidal mud is an important habitat for bird watching (Fletcher and others, 2011). The baseline quantity and quality of the ecosystem service provided is assumed to be commensurate with that provided by the features of the site when some are in in favourable condition and some are in unfavourable condition (see rMCZ 2 Table 1 for details).<br><br>The north side of the Stour has particularly high biodiversity and abundant fish populations which support a number of internationally important foraging birds. Bird watching is popular in the nearby RSPB Stour Estuary Reserve and this activity probably extends into the rMCZ Reference Area.<br><br>It has not been possible to estimate the value derived from wildlife watching in the rMCZ Reference Area. | If the conservation objectives of the features are achieved, the features will be recovered to reference condition.<br><br>The recovery of the features to reference condition may improve their functioning as support for fish and bird populations, potentially benefiting wildlife watching within the rMCZ Reference Area. In addition, an improvement in the condition of site features and any associated increase in abundance and diversity of species that are visible to wildlife watchers may improve the quality of wildlife watching at the site and therefore the value of the ecosystem service.<br><br>The designation may lead to an increase in wildlife watching visits to the site, which may benefit the local economy. This increase may represent an overall increase in UK wildlife watching visits and/or a redistribution of location preferences.<br><br>Designating the rMCZ Reference Area will protect its features and the ecosystem services that they provide against the risk of future degradation from pressures caused by human activities. | Anticipated direction of change:<br>  <br><br>Confidence: Low |

| **Table 4b. Recreation** | **rMCZ 2, Reference Area 22 North Mistley** | |
|---|---|---|
| ***Other recreation:*** Fletcher and others (2011) identify that the features to be protected by the rMCZ Reference Area can contribute to the delivery of recreation and tourism services.<br><br>The north side of the Stour Estuary lies within the Suffolk Coast and Heaths Area of Outstanding Natural Beauty and the Stour and Orwell Path runs very close to the rMCZ Reference Area (Long Distance Walkers Association website; Stour & Orwell Estuaries Management Strategy, 2010). Sailing is popular within the wider rMCZ and recreational vessels may transit through the site.<br><br>It has not been possible to estimate the value derived from other recreation in the rMCZ Reference Area. | If the conservation objectives of the features are achieved, the features will be recovered to reference condition.<br><br>The rMCZ Reference Area is fully contained within rMCZ 2 for which the benefits of other recreation have been assessed (see above). It is not possible to identify whether the Reference Area will have additional benefits over and above this but this seems unlikely. Designating the rMCZ Reference Area will protect its features and the ecosystem services that they provide against the risk of future degradation from pressures caused by human activities. | Anticipated direction of change:<br>⇧<br>Confidence: Low |

| **Table 4c. Research and education** | **rMCZ 2, Reference Area 22 North Mistley** | |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| ***Research:*** Fletcher and others (2011) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) Reference Area can contribute to the delivery of research services.<br><br>Research is carried out in the surrounding larger rMCZ by the Stour and Orwell Estuaries Management Group (Stour & Orwell Estuaries Management Strategy, 2010) and may include the rMCZ Reference Area, but no details are available. The Harwich Haven Authority regulators group regularly surveys the area (Natural England Impact Assessment questionnaire, 16 November 2011).<br><br>It has not been possible to estimate the value derived from research activities associated with the rMCZ Reference Area. | As an rMCZ Reference Area, the site will provide an opportunity to demonstrate the state of designated marine features in the absence of many anthropogenic pressures (Natural England and JNCC, 2010). It will provide a control area against which the impacts of pressures caused by human activities can be compared as part of long-term monitoring and assessment. Other research benefits are unknown. | Anticipated direction of change:<br>⇧<br>Confidence: High |

| **Table 4c. Research and education** | **rMCZ 2, Reference Area 22 North Mistley** | |
|---|---|---|
| ***Education:*** Fletcher and others (2011) identify that the features to be protected by the rMCZ Reference Area can contribute to the delivery of education services.<br><br>No known education activities occur within the site, although such activities take place within the surrounding larger rMCZ and potentially may involve the rMCZ Reference Area.<br><br>It has not been possible to estimate the value derived from education activities associated with the rMCZ Reference Area. | MCZ Reference Area designation may provide an opportunity to use the site for education about the marine environment.<br><br>Designation may aid the development of additional local (to the rMCZ Reference Area) education activities (e.g. events and interpretation boards), from which visitors to the site would derive benefit.<br><br>Non-visitors may benefit if the rMCZ Reference Area contributes to wider provision of educational resources (e.g. television programmes, articles in magazines and newspapers, and educational resources developed for use in schools). | Anticipated direction of change:<br><br>⇧<br><br>Confidence: Moderate |

| **Table 4d. Regulating services** | **rMCZ 2, Reference Area 22 North Mistley** | |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| ***Regulation of pollution:*** Blue mussel beds, if they occur, would contribute to the bioremediation of waste and water purification. Intertidal mud contributes to sequestration of carbon (Fletcher and others, 2011).<br><br>***Environmental resilience:*** The features of the site are not known to contribute to the resilience and continued regeneration of marine ecosystems.<br><br>***Natural hazard protection:*** Blue mussel beds, if they occur, and intertidal mud would contribute to local flood and storm protection (Fletcher and others, 2011).<br><br>It has not been possible to estimate the value derived from regulating services associated with the rMCZ Reference Area. | If the conservation objectives of the features are achieved, the features will be recovered to reference condition.<br><br>Recovery of intertidal mud, blue mussel beds and starlet sea anemone *Nematostella vectensis* and closure to fishing could increase the site's benthic biodiversity and biomass, improving the regulating capacity of its habitats.<br><br>Designating the rMCZ Reference Area will protect its features and the ecosystem services that they provide against the risk of future degradation from pressures caused by human activities. | Anticipated direction of change:<br><br>⇧<br><br>Confidence: Low |

| **Table 4e. Non-use and option values** | **rMCZ 2, Reference Area 22 North Mistley** | |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| Some people gain satisfaction from the existence of marine habitats, species and other features. They also gain from having the option to benefit in the future from the habitats and species in the recommended Marine Conservation Zone (rMCZ) Reference Area and the ecosystem services provided, even if they do not currently benefit from them.<br><br>It has not been possible to estimate the value derived from non-use and option values associated with the rMCZ Reference Area. | The rMCZ Reference Area will benefit the proportion of the UK population that values conservation of its features and its contribution to an ecologically coherent network of Marine Protected Areas. Some people will gain satisfaction from knowing that the habitats and species are being conserved (existence value) and/or that they are being conserved for use by others in the current generation (altruistic value) or future generations (bequest value). The rMCZ Reference Area will protect both the features and the option to benefit from the services in the future from the risk of future degradation. | Anticipated direction of change: ⇧<br><br>Confidence: Moderate |

## rMCZ 2, Reference Area 24 Harwich Haven Site area (km$^2$): 1.01

**Table 1. Conservation impacts** **rMCZ 2, Reference Area 24 Harwich Haven**

**1a. Ecological description**

This recommended Marine Conservation Zone (rMCZ) Reference Area is an intertidal and subtidal area within the mouth of the Stour and Orwell Estuaries in rMCZ 2, and contains several extremely rare features. Low energy intertidal rock is a regionally scarce broad-scale habitat and this is the only place in the Balanced Seas Project Area that could be identified as a potential rMCZ Reference Area for this habitat. This site is one of only two sites where the honeycomb worm *Sabellaria alveolata* reef biotope has been recorded in the Balanced Seas Project Area and where both Ross worm *Sabellaria spinulosa* reef and the honeycomb worm *Sabellaria alveolata* reef biotopes have been recorded together. The site is also notable for the occurrence of Harwich Stone Band ('cement stone') (a type of the habitat Feature of Conservation Importance 'estuarine rocky habitats') which supports interesting algal communities, known only from the Stour, Orwell and Deben Estuaries; the record at this location is designated an Important Plant Area. Subtidal sands and gravels also occur here.

Source: Balanced Seas Final Recommendations (2011).

**1b. Baseline condition of MCZ features and impact of the MCZ**

| Feature | Area of feature (km2) | No. of occurrences | Baseline | Impact of the MCZ |
|---|---|---|---|---|
| ***Broad-scale Habitats*** | | | | |
| A1.3 Low energy intertidal rock | 0.07 | - | Unfavourable condition | Recover to reference condition |
| A2.1 Intertidal coarse sediment | 0.02 | - | Unfavourable condition | Recover to reference condition |
| ***Habitats of Conservation Importance*** | | | | |
| Ross worm *Sabellaria spinulosa* reef | 0.4 | - | Unfavourable condition | Recover to reference condition |
| Honeycomb worm *Sabellaria alveolata* reef | 0.02 | - | Unfavourable condition | Recover to reference condition |
| Subtidal sands and gravels | 0.11 | - | Unfavourable condition | Recover to reference condition |

## Site-specific costs arising from the effect of the rMCZ on human activities (over 2013 to 2032 inclusive)

**Table 2a. Archaeological heritage** **rMCZ 2, Reference Area 24 Harwich Haven**

***Source of costs of the recommended Marine Conservation Zone (MCZ)***

Increase in costs of assessing environmental impacts for future licence applications. Archaeological excavations, surface recovery and intrusive surveys will

| **Table 2a. Archaeological heritage** | **rMCZ 2, Reference Area 24 Harwich Haven** |
|---|---|
| be prohibited from the entire site. Diver trails, visitors and non-intrusive surveys will be allowed. | |
| **Baseline description of activity** | **Costs of impact of rMCZ on the sector** |
| Potentially 16 listed buildings abut this rMCZ Reference Area. HMS *Gipsy* (lost 1939) is recorded here; there is an Anglo Saxon mint and Beacon Hill Battery; and Viking and Anglo Saxon artefacts have been recorded within this rMCZ Reference Area (). | An extra cost would be incurred in the assessment of environmental impacts made in support of any future licence applications for archaeological activities in the site. The likelihood of a future licence application being submitted is not known so no overall cost to the sector of this rMCZ has been estimated. However, the additional cost in one licence application could be in the region of £500 to £10,000, depending on the size of the MCZ (English Heritage, pers. comm., 2012). 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 is not costed in the Impact Assessment. The prohibition of excavation and therefore interpretation of archaeological evidence from the site will decrease acquisition of historical knowledge of past human communities from the site, resulting in a cost to society. |

| **Table 2b. Commercial fisheries** | **rMCZ 2, Reference Area 24 Harwich Haven** |
|---|---|
| ***Source of costs of the recommended Marine Conservation Zone (MCZ)*** | |
| Closure of entire site to all gear types. | |
| ***Summary of all fisheries:*** The rMCZ Reference Area, lying within rMCZ 2 Stour and Orwell Estuaries, is primarily intertidal and there is little if any overlap with commercial fishing. It is unknown how many vessels fish in the rMCZ Reference Area. More detail on the approach used for the fisheries method is provided at Annexes H7 and N4. | |
| Estimated annual value of landings from the rMCZ Reference Area: £0.001m/yr (MCZ Fisheries Model). | |
| (Due to resolution issues of the MCZ Fisheries Model and the small size of many rMCZ Reference Areas in the Balanced Seas region, some fisheries | |

<table>
<tr><th colspan="2">Table 2b. Commercial fisheries rMCZ 2, Reference Area 24 Harwich Haven</th></tr>
<tr><td colspan="2">landings values may be inaccurate. They have been included as a precautionary measure and to avoid underestimating the economic value of a site.)</td></tr>
<tr><th>Baseline description of UK commercial fisheries</th><th>Costs of impact of rMCZ on UK commercial fisheries</th></tr>
<tr><td>Bottom trawls: It is unknown how many vessels use bottom trawls in the rMCZ Reference Area.<br><br>Estimated total value of landings from the rMCZ Reference Area: £100/yr (MCZ Fisheries Model).</td><td>Estimated annual value of UK vessel landings affected:<table><tr><td>£m/yr</td><td>Scenario 1</td></tr><tr><td>Value of landings affected</td><td><0.001*</td></tr></table>* £100</td></tr>
<tr><td>Nets: It is unknown how many vessels use nets in the rMCZ Reference Area.<br><br>Estimated total value of landings from the rMCZ Reference Area: £110/yr (MCZ Fisheries Model).</td><td>Estimated annual value of UK vessel landings affected:<table><tr><td>£m/yr</td><td>Scenario 1</td></tr><tr><td>Value of landings affected</td><td><0.001*</td></tr></table>* £110</td></tr>
<tr><th>Total direct impact on UK commercial fisheries</th><th></th></tr>
<tr><td></td><td>Estimated annual value of UK vessel landings and gross value added (GVA) affected:<table><tr><td>£m/yr</td><td>Scenario 1</td></tr><tr><td>Value of landings affected</td><td><0.001*</td></tr><tr><td>GVA affected</td><td>0.000</td></tr></table>* £210</td></tr>
<tr><th>Baseline description of non-UK fisheries</th><th>Costs of impact of rMCZ on non-UK commercial fisheries</th></tr>
<tr><td></td><td>None.</td></tr>
</table>

| **Table 2c. Flood and coastal erosion risk management (coastal defence)** | **rMCZ 2, Reference Area 24 Harwich Haven** |
|---|---|
| ***Source of costs of the recommended Marine Conservation Zone (MCZ)***<br><br>Increase in costs of assessing environmental impacts for future licence applications for maintenance work for the coastal defence scheme (it is not anticipated that any additional mitigation of impacts on features protected by the rMCZ will be needed relative to the mitigation provided in the baseline). | |
| **Baseline description of activity** | **Costs of impact of rMCZ on the sector** |
| The coastal defence policies in place include a combination of Advance The Line/Hold The Line/Managed Realignment/No Active Intervention. The Environment Agency is working with local community groups to trial the use of routinely dredged material from the estuary channel port and marinas, keeping it within the estuary system and placing the sediment in areas of eroding saltmarsh to encourage re-growth. This will also provide a soft coastal defence. This work is in its early stages and we do not know exact locations at this time. There is a possibility that it could overlap with this rMCZ Reference Area and impact areas of intertidal course sediment (Natural England and Environment Agency Flood and Coastal Erosion Risk Management Workshop for the Balanced Seas Project Area, 17 November 2011). An environmental assessment, permissions and licences will be required to carry out this work. | No additional costs for mitigation of impact are anticipated (Natural England and Environment Agency, pers. comm., 2012).<br><br>As a result of the rMCZ Reference Area, it is anticipated that additional costs will be incurred in assessing environmental impacts in support of future licence applications for Flood and Coastal Erosion Risk Management (FCERM) schemes. For each licence application these costs are expected to arise as a result of approximately 0.5–1 day of additional work, in most cases, although there may be cases where further additional consultant time is needed (Environment Agency, pers. comm., 2012). It has not been possible to obtain information on the likely number of licence applications that will be made over the 20 year period of the IA or estimates of the potential increase in costs. |

| **Table 2d. Ports, harbours, shipping and disposal sites** | **rMCZ 2, Reference Area 24 Harwich Haven** |
|---|---|
| ***Source of costs of the recommended Marine Conservation Zone (MCZ)***<br><br>***Management scenario 1:*** Increase in costs of assessing environmental impacts for future licence applications. This applies to future licence applications for navigational dredging and for known specific plans or proposals for port and harbour developments within 1km of the rMCZ Reference Area. It is anticipated that the entire site will be closed to navigational dredging, and future mitigation of impacts on features protected by the rMCZ will be needed for proposed future port and harbour developments relative to the mitigation provided in the baseline. | |

**Table 2d. Ports, harbours, shipping and disposal sites** **rMCZ 2, Reference Area 24 Harwich Haven**

***Management scenario 2:*** Increase in costs of assessing environmental impacts for future licence applications. This applies to future licence applications for navigational dredging and all port and harbour developments within 5 km of the rMCZ. Also, additional costs to update the existing Maintenance Dredging Protocol (MDP). It is anticipated that the entire site will be closed to navigational dredging, and future mitigation of impacts on features protected by the rMCZ will be needed for proposed future port and harbour developments relative to the mitigation provided in the baseline

**Baseline description of activity**

***Navigational dredge areas:*** Two maintenance and navigational dredge areas overlap with this rMCZ Reference Area: the Felixstowe Berths and Approach, and the Navigation House Jetty.

Maintenance dredging is undertaken at the Harwich Haven Authority Navigation House Jetty and pontoons in the north of the site 4–6 times a year. Dredging is undertaken to maintain the published berth depths of 2.5 metres to 3.5 metres, and about 1,000$m^3$ is removed per session. In addition, about 1,500$m^3$ per year is moved from under the pontoons (Harwich Haven Authority (Harwich Haven Authority), 2011).

The main approach channel to the Haven ports, at 14.5 metres deep, is the deepest in all UK container ports, and is dredged at 10–12 week intervals. Each main session removes approximately 400,000–600,000$m^3$ of silty material (Harwich Haven Authority, 2011), of which a proportion is taken from the rMCZ Reference Area.

The dredged material is used elsewhere in the Stour and Orwell Estuaries in habitat projects and for maintenance of coastal defences and environmental processes (Harwich Haven Authority, 2011).

It is assumed that each dredge area's marine licence is renewed once every 3 years. As these navigational dredge areas are covered by an MDP, it is assumed that the assessment of environmental impact is not changed over the 20 year period of the IA

**Costs of impact of rMCZ on the sector**

| *£m/yr* | Scenario 1 | Scenario 2 |
|---|---|---|
| Cost to the operator | 0.003 | 0.003* |

* This estimate for additional cost in future licence applications for port developments arising as a result of this rMCZ is not used to estimate the total costs for the IA. It is based on different assumptions to those used to estimate costs at a regional level and for the entire suite of sites. Also, this figure assumes that an assessment of environmental impact upon MCZ features is undertaken for each licence renewal (every 3 years). It does not include the cost of incorporating MCZ features in the existing MDP. It is likely to over-estimate the cost of Scenario 2 for rMCZs with ports within 5km that have MDPs because of the savings in future costs provided by an MDP. See Annex H for further information

***Closure of site to maintenance and navigational dredging in Scenarios 1 and 2:*** It is anticipated that closure of the site to maintenance and navigational dredging would lead to cessation of Harwich Haven port activities (HHA, pers. comm., 12 February 2012). Cessation of dredging at Harwich Haven Authority Navigation House Jetty would stop the operation of the pilot and harbour launches and thus operations of HHA itself (HHA, pers. comm., 12 February 2012). Because of the importance of the ports to the UK economy, the IA assumes that the dredging would continue and the impacts on the MCZ features would not be mitigated.

| **Table 2d. Ports, harbours, shipping and disposal sites** | **rMCZ 2, Reference Area 24 Harwich Haven** |
|---|---|
| ***Port development**:* Within 5km of the rMCZ there are 4 ports and harbours which may undergo development at some point in the future: Harwich Haven, Harwich International, Harwich Navyard and Felixstowe (Ports & Harbours UK, 2012). This may not represent a full list of all ports and harbours that could be impacted on by the site. It is not currently known whether future developments may impact on features in the site.<br><br>The Haven Hub Master Plan aims to provide around 8 million twenty-foot equivalent units (TEUs) of container-handling capacity within the Harwich Haven by 2030, including Berths 8 and 9 (Felixstowe South Phase 1), the planned deep-water capability of Phase 2 of the Felixstowe South development (due in 2018) and the subsequent development of the (fully consented) Harwich International Container Terminal at Bathside Bay (Port of Felixstowe, 2011). The Haven ports are integral to Britain's transport infrastructure and are close to major sea lanes, providing minimum deviation (Harwich Haven Authority (HHA), 2011). The Port of Felixstowe handles over 40% of all UK containerised traffic. It is the largest container port in Britain and is the only port in the UK that can handle the new large container ships (Port of Felixstowe, 2011). The development described in the Haven Hub Master Plan will significantly increase the value of exports that pass through the port (currently estimated at £60,000m/yr) (Hutchinson Ports, 2011). | The cost is assessed in the impact assessment (IA) in terms of the cost to the operator of providing environmental benefit that is equivalent to the impact that the navigational dredging has on the features protected by the rMCZ Reference Area. In the event that an activity impacts on achieving the conservation objectives of an MCZ's features, this would be required under Section 126(7) of the Marine and Coastal Access Act 2009. The cost of this has not been assessed because it is not yet known how equivalent environmental benefit would be provided and what it would cost.<br><br>The impacts have been assessed in this way because the assessment is of the impacts of the regional MCZ projects' site recommendations that were submitted in September 2011. The Minister's decision about designating this site will be also informed by Natural England's and JNCC's statutory advice on MCZs that was published on 18 July 2012. Where it is feasible, it is anticipated that the advice will suggest that the site recommendation is adjusted to increase the likelihood that the MCZ features' conservation objectives can be achieved. Such adjustment is not included in the IA because the IA is an assessment of the regional MCZ projects' recommendations.<br><br>***Scenario 1:*** Future licence applications for known port or harbour development plans or proposals within 1km of this site will need to consider the potential effects of the activity on the features protected by the rMCZ. Additional costs will be incurred as a result (a breakdown of these by activity is provided in Annex N11). If the navigational dredges in the rMCZ Reference Area continues following designation, as described above, impacts on the MCZ's features will need to be considered in applications for renewal of the licences for the dredges. To avoid under-estimation of the costs, the additional costs that would be incurred are included in this Scenario<br><br>Future mitigation of impacts on features protected by the rMCZ will be |

| **Table 2d. Ports, harbours, shipping and disposal sites** | **rMCZ 2, Reference Area 24 Harwich Haven** |
|---|---|
| | needed for proposed future port and harbour developments relative to the mitigation provided in the baseline. Unknown potentially significant costs of mitigation could arise.<br><br>***Scenario 2:*** Future licence applications for navigational dredging and known port and harbour development plans or proposals within 5km of this site will need to consider the potential effects of the activity on the features protected by the rMCZ. Additional costs will be incurred as a result (a breakdown of these by activity is provided in Annex N11).<br><br>Also, additional costs will arise in the updating of the existing MDPs to consider the potential effects of activities on the features protected by the rMCZ. The anticipated additional cost in the MDP is estimated to be a one-off cost of £8438.<br><br>Future mitigation of impacts on features protected by the rMCZ will be needed for proposed future port and harbour developments relative to the mitigation provided in the baseline. Unknown potentially significant costs of mitigation could arise. |

| **Table 2e. Recreational anchoring** | **rMCZ 2, Reference Area 24 Harwich Haven** |
|---|---|
| ***Source of costs of the recommended Marine Conservation Zone (MCZ)***<br><br>Closure of entire site to all recreational anchoring (except in emergency circumstances), including anchoring of racing marks. | |
| **Baseline description of activity** | **Costs of impact of rMCZ on the sector** |
| StakMap interviews showed that recreational vessels may anchor for 1–2 hrs in this rMCZ Reference Area before entering the estuaries. Local stakeholders do not consider this to be an important or popular anchorage as it is very exposed and not in a particularly attractive area. In addition, there are 6 unlicensed moorings above the stone pier but | Since anchoring is at a very low level in the site, the recreational boating sector is unlikely to be greatly impacted by the rMCZ Reference Area. However, maintenance of the existing moorings would not be allowed within the rMCZ Reference Area and so they would have to be removed and replacement eco-moorings provided outside the site. |

| **Table 2e. Recreational anchoring** | **rMCZ 2, Reference Area 24 Harwich Haven** |
|---|---|
| fewer than 5 vessels moor here at any one time. The moorings are used all year round but only sporadically depending on weather (Natural England Stakeholder Interview for rMCZ Reference Area 24 Harwich Haven, November 2011).<br><br>In addition, the shelf area within the rMCZ Reference Area is used regularly throughout the season for dinghy racing. Race marker buoys are laid for the racing. There is no equivalent area nearby for this activity (RYA BS IA 3rd Tranche Feedback, February 2012). | Using the approach developed and costs calculated for eco-mooring installation in Studland Bay (Marina Projects, 2011), capital costs for the installation of six eco-moorings are estimated to total £0.103m (See Annex N12 for the assumptions used in the calculations), a one-off cost assumed to occur in the first year after designation (2013). Operating costs, including maintenance of the eco-moorings and collection of mooring fees, are estimated to total £0.068m/yr.<br><br>It is assumed that a fee for use of the eco-mooring would be required to cover continued maintenance costs. For 6 eco-moorings, the total cost to visiting boats of such fees would be £0.068m/yr.<br><br>The total cost of eco-moorings is taken to be the sum of the mooring fees and capital costs, plus any operating costs not covered by the mooring fees. The present value of the costs is £1.069m.<br><br>In addition, prohibiting anchoring of racing marks would cause the cessation of local club's racing activities.This would significantly impact on people who race in the site as there is no alternative area for racing nearby, resulting in a lower quality of recreational opportunity (RYA BS IA 3rd Tranche Feedback, February 2012). It could also impact indirectly on local businesses through reduced expenditure by the dinghy racers. |

| **Table 2f. Recreational angling** | **rMCZ 2, Reference Area 24 Harwich Haven** |
|---|---|
| ***Source of costs of the recommended Marine Conservation Zone (MCZ)***<br><br>Closure of the entire site to all recreational angling. | |
| **Baseline description of activity** | **Costs of impact of rMCZ on the sector** |
| Thirteen StakMap interviews indicated that areas used for recreational | Because the rMCZ Reference Area represents only a small part of the total |

| **Table 2f. Recreational angling** | **rMCZ 2, Reference Area 24 Harwich Haven** |
|---|---|
| angling (shore fishing, charter boats and boat fishing) overlap with the rMCZ Reference Area. The interviews included representatives of 3 local clubs (combined membership totalling 162). Charter boat operators interviewed, representing a total of 425 anglers/yr (StakMap, 2010), stated that they used this small area,. With the exception of one shore fisher, for both shore fishing and boat-based fishing activities, the rMCZ Reference Area represents only a small proportion of the overall area over which stakeholders indicated that they fished.<br><br>About 3 shore anglers a day are thought to use the area when conditions are good and the site is used all year round (Natural England Stakeholder Interview for rMCZ Reference Area 24 Harwich Haven, November 2011). A local angler said that private boat anglers fish for cod along the ledges within the site (M. Sessions, local angler, pers. comms., February 2012). Charter boats use the site as it is a safe place to take anglers when strong winds are blowing outside the harbour. | area around Harwich Haven used by anglers, it is likely that anglers would respond to the closure by fishing at other locations. Shore anglers are likely to be most impacted (M. Sessions, local angler, pers. comms., February 2012). |

| **Table 2g. Recreational fossil collection** | **rMCZ 2, Reference Area 24 Harwich Haven** |
|---|---|
| ***Source of costs of the recommended Marine Conservation Zone (MCZ)***<br><br>Closure of entire site to all fossil collection. | |
| **Baseline description of activity** | **Costs of impact of rMCZ on the sector** |
| Under appropriate weather conditions, the site is popular, particularly with children, for collecting sharks' teeth. Local people consider this to be the only place for collecting fossils of this kind in the area (M. Sessions, local angler, pers. comms., February 2012). The number of people who collect fossils from the site is not known. | The closure to fossil collection would impact on those who collect fossils from the site. The same kind of fossils can be collected from nearby the site in Walton, which is a drive away (Natural England, SNCB 3rd Tranche Feedback, May 2012) |

| **Table 2h. Recreation – Walking (including dog walking)** | **rMCZ 2, Reference area 24 Harwich Haven** |
|---|---|
| ***Source of costs of the MCZ***<br><br>***Management scenario 1 (uniform management):*** People walking through the rMCZ Reference Area will be encouraged to use marked routes; dog walkers will be required to dispose of dog faeces in provided facilities. | |
| **Baseline description of activity** | **Costs of impact of MCZ on the sector** |
| There are a number of walkers (numbers not specified) who use the rMCZ Reference Area but relatively few walk on the rock and beach. The majority walk along the promenade which bounds the site (Natural England Stakeholder Interview for rMCZ Reference Area 24 Harwich Haven, November 2011).<br><br>Dog walking occurs every day of the year (numbers unspecified) (Natural England Stakeholder Interview for rMCZ Reference Area 24 Harwich Haven, November 2011). There is no Dog Control Order in place. | Given that walking would still be allowed in the site, impacts are likely to be negligible. Visitors would be encouraged to use routes around the features protected by the rMCZ Reference Area to avoid adverse effects.<br><br>A Dog Control Order would need to be put in place to include the entire area of the rMCZ Reference Area. Dog walkers would be required to remove and dispose of dog faeces in provided facilities. Impacts would include the cost of putting the Dog Control order in place and notifying visitors of the need to remove dog faeces and of the location of the nearest disposal facility (the costs of which are assessed in the IA as part of costs of management measures). |

## Human activities in the site that are not negatively affected by the MCZ (over 2013 to 2032 inclusive)

| **Table 3. Human activities in the site that are not negatively affected by the recommended Marine Conservation Zone (MCZ) (existing activities at their current levels and future proposals known to the regional MCZ projects)** | **rMCZ 2, Reference Area 24 Harwich Haven** |
|---|---|
| Disposal site: use of disposal site 'River Stour Area 1 Subtidal S (TH211)' (though this is within is within 250m of the rMCZ at its closest point, it is a 'beneficial use' disposal site, which feeds dredged material back in to the estuary to offset impacts associated with navigational dredging. It is not anticipated that mitigation of impacts would be required (Natural England, e-mail, 10 July 2012))<br>Recreation (except for the activities listed above in table 2)<br>Research and education<br>Water abstraction, discharge and diffuse pollution*. | |

*The IA assumes that no additional mitigation of impacts of water abstraction, discharge or diffuse pollution will be required over and above that which will be provided to achieve the objectives of the Water Framework Directive through the River Basin Management Plan process (based on advice provided by Natural England, pers. comm., 2010).

## Anticipated benefits to ecosystem services

The habitats, species and other ecological features of the recommended Marine Conservation Zone (rMCZ) Reference Area contribute to the delivery of a range of ecosystem services. Designation of the rMCZ Reference Area and its subsequent management may improve the quantity and quality of the beneficial services provided, which may increase the value (contribution to economic welfare) of them. Impacts on the value of ecosystem services may occur as a result of the designation, management and/or achievement of the conservation objectives of the rMCZ Reference Area. Further discussion on the potential benefits to ecosystem services can be found in Annex L and definitions can be found in Annex H.

| **Table 4a. Fish and shellfish for human consumption** | **rMCZ 2, Reference Area 24 Harwich Haven** | |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| Fletcher and others (2011) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) Reference Area can contribute to the delivery of fish and shellfish for human consumption.<br><br>Intertidal rock habitats are important sources of larval plankton upon which commercially important fish species feed, including mussels and larval fish of plaice and mackerel. In addition, fish scavenge in coarse sediment intertidal areas, and therefore this habitat has a beneficial ecosystem service related to commercial fisheries (Fletcher and others, 2011). The baseline quantity and quality of the ecosystem service provided is assumed to be commensurate with that provided by the features of the site when some are in in favourable condition and some are in unfavourable condition (see rMCZ 2 Table 1 for details).<br><br>The wider rMCZ in which this site is found is an important fish nursery area but no information is available as to whether the rMCZ Reference Area also contains fish nursery areas. The generally high biodiversity due to the intertidal habitats within the site may support on-site and off-site fisheries. | If the conservation objectives of the features are achieved, the features will be recovered to reference condition.<br><br>Additional management (above that in the baseline situation) of fishing activities is expected which will prohibit fishing within the rMCZ Reference Area. The costs of this are set out in Table 2b.<br><br>Achievement of the conservation objectives may improve the contribution of the habitats to the provision of fish and shellfish for human consumption.<br><br>Closure of the rMCZ Reference Area to fishing activity will reduce the on-site fishing mortality of species, but as the site is small it is unclear whether this would benefit stocks of mobile commercial finfish species.<br><br>As no fishing will be permitted within the rMCZ Reference Area, no on-site benefits will be realised. | Anticipated direction of change:<br><br>⇧<br><br>Confidence: Low |

| **Table 4a. Fish and shellfish for human consumption** | **rMCZ 2, Reference Area 24 Harwich Haven** | |
|---|---|---|
| The intertidal nature of the rMCZ Reference Area means that there is little commercial fishing within it. A description of on-site fishing activity and the value derived from it is set out in Table 2b.<br><br>It has not been possible to estimate the value of the off-site benefits that derive from any spawning and nursery areas present. | | |

| **Table 4b. Recreation** | | **rMCZ 2, Reference Area 24 Harwich Haven** |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| ***Angling:*** Fletcher and others (2011) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) Reference Area can contribute to the delivery of fish and shellfish for human consumption and recreation services.<br><br>Intertidal rock habitats are important sources of larval plankton upon which a number of fish species feed, including mussels and larval fish of plaice and mackerel. In addition, fish scavenge in coarse sediment intertidal areas, and therefore this habitat has a beneficial ecosystem service related to recreational fisheries (Fletcher and others, 2011). The Stour Estuary has important nursery areas for fish caught recreationally, including bass (Balanced Seas Final Recommendations Report, 2011). However, it is not known to what extent nursery areas occur within the rMCZ Reference Area. The generally high biodiversity due to the intertidal habitats within the site may support on-site and off-site fisheries. The baseline quantity and quality of the ecosystem service provided is assumed to be commensurate with that provided by the features of the site when some are in in favourable condition and some are in unfavourable condition (see rMCZ 2 Table 1 for details).<br><br>A small number of anglers use the site. A description of on-site angling activity is set out in Table 2f but it has not been possible to estimate the | If the conservation objectives of the features are achieved, the features will be recovered to reference condition.<br><br>Recovery of habitats may have benefits for fish populations. It is unclear whether any benefits for fish populations would arise as a result of reduced fishing mortality due to closure of the rMCZ Reference Area (see Table 4a).<br><br>As angling will not be permitted within the rMCZ Reference Area, any benefits will be limited to those occurring as a result of spill-over effects of finfish species targeted by anglers outside the rMCZ Reference Area. Such benefits may be insignificant. | Anticipated direction of change:<br><br>⇧<br><br>Confidence: Low |

| **Table 4b. Recreation** | | **rMCZ 2, Reference Area 24 Harwich Haven** |
|---|---|---|
| value derived from this.<br><br>It has not been possible to estimate the proportion of the value derived from angling off-site that results from the potential spawning and nursery area. | | |
| ***Diving:*** Diving does not take place in the site. | N/A | N/A |
| ***Wildlife watching:*** Fletcher and others (2011) identify that the features to be protected by the rMCZ Reference Area can contribute to the delivery of recreation and tourism services.<br><br>Intertidal coarse sediment provides feeding sites for wading birds at the strandline (Fletcher and others, 2011). The baseline quantity and quality of the ecosystem service provided is assumed to be commensurate with that provided by the features of the site when some are in in favourable condition and some are in unfavourable condition (see rMCZ 2 Table 1 for details).<br><br>The rMCZ is not known to be a popular wildlife watching spot itself but the wider rMCZ is extremely popular.<br><br>It has not been possible to estimate the value derived from wildlife watching in the rMCZ. | If the conservation objectives of the features are achieved, the features will be recovered to reference condition.<br><br>The recovery of the features to reference condition may improve their functioning as support for fish and bird populations, potentially benefiting wildlife watching within the rMCZ Reference Area. In addition, an improvement in the condition of site features and any associated increase in abundance and diversity of species that are visible to wildlife watchers may improve the quality of wildlife watching at the site and therefore the value of the ecosystem service.<br><br>The designation may lead to an increase in wildlife watching visits to the site, which may benefit the local economy. This increase may represent an overall increase in UK wildlife watching visits and/or a redistribution of location preferences.<br><br>Designating the rMCZ Reference Area will protect its features and the ecosystem services that they provide against the risk of future degradation from pressures caused by human activities. | Anticipated direction of change:<br><br>⇧<br><br>Confidence: Low |

| **Table 4b. Recreation** | **rMCZ 2, Reference Area 24 Harwich Haven** | |
|---|---|---|
| ***Other recreation:*** Fletcher and others (2011) identify that the features to be protected by the rMCZ Reference Area can contribute to the delivery of recreation and tourism services.<br><br>Sailing and dinghy racing, beachcombing and coastal walking are popular throughout the rMCZ Reference Area (RYA Third Tranche Feedback, 2012). A small number of swimmers use the area (Natural England Impact Assessment questionnaire, 16 November 2011).<br><br>It has not been possible to estimate the value derived from other recreation in the rMCZ Reference Area. | If the conservation objectives of the features are achieved, the features will be recovered to reference condition.<br><br>The rMCZ Reference Area is fully contained within rMCZ 2 for which the benefits of other recreation have been assessed. It is not possible to identify whether the Reference Area will have additional benefits over and above this but this seems unlikely.<br><br>Designating the rMCZ Reference Area will protect its features and the ecosystem services that they provide against the risk of future degradation from pressures caused by human activities. | Anticipated direction of change:<br>⇧<br>Confidence: Low |

| **Table 4c. Research and education** | **rMCZ 2, Reference Area 24 Harwich Haven** | |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| ***Research:*** Fletcher and others (2011) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) Reference Area can contribute to the delivery of research services.<br><br>Research is carried out in the surrounding larger rMCZ by the Stour and Orwell Estuaries Management Group and by the Harwich Haven Authority (Stour & Orwell Estuaries Management Strategy, 2010) and may include the rMCZ Reference Area, but no details are available.<br><br>It has not been possible to estimate the value derived from research activities associated with the rMCZ Reference Area. | As an rMCZ Reference Area, the site will provide an opportunity to demonstrate the state of designated marine features in the absence of many anthropogenic pressures (Natural England and JNCC, 2010). It will provide a control area against which the impacts of pressures caused by human activities can be compared as part of long-term monitoring and assessment. Other research benefits are unknown. | Anticipated direction of change:<br>⇧<br>Confidence: High |
| ***Education:*** Fletcher and others (2011) identify that the features to be protected by the rMCZ Reference Area can contribute to the delivery of education services. | MCZ Reference Area designation may provide an opportunity to use the site for education about the marine environment.<br><br>Designation may aid the development of additional local (to the | Anticipated direction of change: |

| **Table 4c. Research and education** | **rMCZ 2, Reference Area 24 Harwich Haven** | |
|---|---|---|
| No known education activities occur within the site, although such activities take place within the surrounding larger rMCZ and potentially may involve the rMCZ Reference Area.<br><br>It has not been possible to estimate the value derived from education activities associated with the rMCZ Reference Area. | rMCZ Reference Area) education activities (e.g. events and interpretation boards), from which visitors to the site would derive benefit.<br><br>Non-visitors may benefit if the rMCZ Reference Area contributes to wider provision of educational resources (e.g. television programmes, articles in magazines and newspapers, and educational resources developed for use in schools). | ⇧<br>Confidence: Moderate |

| **Table 4d. Regulating services** | **rMCZ 2, Reference Area 22 Harwich Haven** | |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| ***Regulation of pollution:*** The features of the site, in particular subtidal sands and gravels, contribute to the sequestration of carbon (Fletcher and others, 2011).<br><br>***Environmental resilience:*** The features of the site, in particular intertidal rock, contribute to the resilience and continued regeneration of marine ecosystems (Fletcher and others, 2011).<br><br>***Natural hazard protection:*** Intertidal coarse sediments would contribute to local flood and storm protection (Fletcher and others, 2011).It has not been possible to estimate the value derived from regulating services associated with the rMCZ Reference Area. | If the conservation objectives of the features are achieved, the features will be recovered to reference condition.<br><br>Recovery of intertidal rock, intertidal coarse sediments and subtidal sands and gravels and closure to fishing could increase the site's benthic biodiversity and biomass, improving the regulating capacity of its habitats.<br><br>Designating the recommended Marine Conservation Zone Reference Area will protect its features and the ecosystem services that they provide against the risk of future degradation from pressures caused by human activities. | Anticipated direction of change:<br>⇧<br>Confidence: Low |

| **Table 4e. Non-use and option values** | **rMCZ 2, Reference Area 24 Harwich Haven** | |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| Some people gain satisfaction from the existence of marine habitats, species and other features. They also gain from having the option to benefit in the future from the habitats and species in the recommended Marine Conservation Zone (rMCZ) Reference Area and the ecosystem | The rMCZ Reference Area will benefit the proportion of the UK population that values conservation of its features and its contribution to an ecologically coherent network of Marine Protected Areas. Some people will gain satisfaction from knowing | Anticipated direction of change:<br>⇧ |

| **Table 4e. Non-use and option values** | **rMCZ 2, Reference Area 24 Harwich Haven** | |
|---|---|---|
| services provided, even if they do not currently benefit from them.<br><br>It has not been possible to estimate the value derived from non-use and option values associated with the rMCZ Reference Area. | that the habitats and species are being conserved (existence value) and/or that they are being conserved for use by others in the current generation (altruistic value) or future generations (bequest value). The rMCZ Reference Area will protect the features and the ecosystem services provided, and thereby the option to benefit from these services in the future, from the risk of future degradation. | Confidence: Moderate |

## rMCZ 3 Blackwater, Crouch, Roach and Colne Estuaries — Site area (km$^2$): 304.97

| **Table 1. Conservation impacts** | | | **rMCZ 3, Blackwater, Crouch, Roach and Colne Estuaries** | |
|---|---|---|---|---|
| **1a. Ecological description** | | | | |
| This recommended Marine Conservation Zone (rMCZ) covers four estuaries from their tidal limit to where they join together and meet the Outer Thames Estuary. It is considered the most important area for both wild and cultivated native oysters in the Balanced Seas Project Area with very extensive beds in the Blackwater and Colne, and lesser although important beds within the Crouch and Roach. The rMCZ is the only place where the lagoon sea slug occurs in the Balanced Seas Project Area. The rMCZ is an important spawning and nursery ground for sand-smelt and bass (the salt marsh provides the optimum nursery ground for the early life stages of these species). The main spawning site of the Blackwater (or Thames) herring, a distinct coastal population of herring which breeds in spring (unlike offshore herring populations which breed in autumn) occurs here, as well as spawning areas for grey mullet, thornback ray, stingray, sole and brown shrimp, and nurseries for tope shark, whiting and sprat. Salmon, sea trout and eel occur in the site. The area is also an important foraging area for birds, particularly black-headed gull and brent goose, and a haul-out and pupping site for over 100 grey seals. There are also important geological features (such as Clacton Cliffs and Foreshore), fossils and rare species (e.g. algae) on rocky outcrops. This rMCZ lies within several existing designations including the Essex Estuaries Special Area of Conservation, Blackwater Estuary Site of Special Scientific Interest (SSSI), Colne Estuary SSSI, Crouch and Roach Estuary SSSI and Dengie SSSI due to the areas extensive nationally and internationally important wetlands and associated bird populations.<br><br>Source: Balanced Seas Final Recommendations (2011). | | | | |
| **1b. Baseline condition of MCZ features and impact of the MCZ** | | | | |
| **Feature** | **Area of feature (km2)** | **No. of occurrences** | **Baseline** | **Impact of the MCZ** |
| ***Broad-scale Habitats*** | | | | |
| A1.1 high energy intertidal rock | 0.09 | | Favourable condition | Maintain at favourable condition |
| A2.2 intertidal sand/muddy sand | 2.17 | | Favourable condition | Maintain at favourable condition |
| A2.4 intertidal mixed sediments | 0.08 | | Favourable condition | Maintain at favourable condition |
| ***Habitats of Conservation Importance*** | | | | |
| Native Oyster (*Ostrea edulis*) beds | 1 m$^2$ | | Favourable condition | Maintain at favourable condition |
| ***Species of Conservation Importance*** | | | | |
| European Eel (*Anguilla anguilla*) | n/a | | Favourable condition | Maintain at favourable condition |
| Lagoon Sea Slug (*Tenellia adspersa*) | | 2 records | Favourable condition | Maintain at favourable condition |
| Native Oyster (*Ostrea edulis*) | | 17 records | Favourable condition | Maintain at favourable condition |

## Site-specific costs arising from the effect of the rMCZ on human activities (over 2013 to 2032 inclusive)

| **Table 2a. Archaeological heritage** | **rMCZ 3, Blackwater, Crouch, Roach and Colne Estuaries** |
|---|---|
| ***Source of costs of the recommended Marine Conservation Zone (MCZ)*** | |
| Increase in costs of assessing environmental impacts for future licence applications (it is not anticipated that any additional mitigation of impacts on features protected by the rMCZ will be needed relative to the mitigation provided in the baseline). Archaeological excavations, surface recovery, intrusive and non-intrusive surveys, diver trails and visitors will be allowed. | |
| **Baseline description of activity** | **Costs of impact of rMCZ on the sector** |
| Several World War II defence aids/structures are recorded within the site including a bombing decoy site and pillboxes. A Neolithic settlement with burial remains is located within the site, as well as possible Neolithic cropmarks. Medieval, Roman, Bronze Age, Iron Age, Mesolithic, Neolithic and Anglo Saxon artefacts have been recorded in the site. Wrecked vessels of British, Irish and Norwegian origin are recorded within the site as well as British and German World War II aircraft wrecks. The Saxon coastal fish weir at Sales Point is a designated monument (English Heritage, 2012).<br><br>English Heritage has indicated that this site is likely to be of interest for archaeological excavation in the future as it is relevant to its National Heritage Protection Plan (theme 3A1.2). | An extra cost would be incurred in the assessment of environmental impact made in support of any future licence applications for archaeological activities in the site. The likelihood of a future licence application being submitted is not known so no overall cost to the sector of this rMCZ has been estimated. However, the additional cost in one licence application could be in the region of £500 to £10,000 depending on the size of the MCZ (English Heritage, pers. comm., 2011). No further impacts on activities related to archaeology are anticipated. |

| **Table 2b. Coastal development (excluding ports and harbours)** | **rMCZ 3, Blackwater, Crouch, Roach and Colne Estuaries** |
|---|---|
| ***Source of costs of the recommended Marine Conservation Zone (MCZ)*** | |
| Potential additional costs of assessing environmental impacts in future licence applications and provision of any mitigation that is required if the site of the existing Bradwell Nuclear Power Station is selected for construction of a new nuclear power station. | |
| **Baseline description of activity** | **Costs of impact of rMCZ on the sector** |
| The old Bradwell Nuclear Power Station is being decommissioned but the site is one of eight in the UK identified in 2010 as suitable for construction of a new | Until the site is selected for nuclear power station development and further information is available on the development, it is not possible to identify |

| **Table 2b. Coastal development (excluding ports and harbours)** | **rMCZ 3, Blackwater, Crouch, Roach and Colne Estuaries** |
|---|---|
| nuclear power station (World Nuclear Association, 2012). | whether additional costs would be incurred for future licence applications as a result of an MCZ and whether mitigation of impacts on MCZ features may be required. |

| **Table 2c. National defence** | **rMCZ 3, Blackwater, Crouch, Roach and Colne Estuaries** |
|---|---|
| ***Source of costs of the recommended Marine Conservation Zone (MCZ)*** | |
| Mitigation of impacts of Ministry of Defence (MOD) activities on features protected by the suite of rMCZs will be provided by additional planning considerations during operations and training. It is not known whether mitigation will be required for features protected by this site. MOD will also incur costs in revising environmental tools and charts to include MCZs. | |
| **Baseline description of activity** | **Costs of impact of rMCZ on the sector** |
| MOD is known to make use of the rMCZ as a firing range including for the following activities: demolition of unexploded ordnance; explosive trials; machine gun firing; mortar firing; naval gunfire support; surface-to-surface firing; and weapon trials. | It is not known whether this rMCZ will impact on MOD's use of the site. Impacts of rMCZs on national defence are assessed in Annex H10 and N9 (they are not assessed for this site alone). |

| **Table 2d. Ports, harbours, shipping and disposal sites** | **rMCZ 3, Blackwater, Crouch, Roach and Colne Estuaries** |
|---|---|
| ***Source of costs of the recommended Marine Conservation Zone (rMCZ)*** | |
| ***Management scenario 1:*** Increase in costs of assessing environmental impacts for future licence applications. This applies to future licence applications for disposal of dredged material and navigational dredging that takes place within 1km of the rMCZ. The Balanced Seas project is not aware of activities related to ports, harbours and shipping for which additional mitigation of impacts on features protected by the rMCZ will be needed relative to the mitigation provided in the baseline. | |
| ***Management scenario 2:*** Increase in costs of assessing environmental impacts for future licence applications. This applies to future licence applications for disposal of dredged material, navigational dredging and all port and harbour developments within 5 km of the rMCZ. Also, additional costs incurred in including MCZ features in a potential new MDPs for ports within 5km of the rMCZ. The Balanced Seas project is not aware of activities related to ports, harbours and shipping for which additional mitigation of impacts on features protected by the rMCZ will be needed relative to the mitigation provided in the | |

| **Table 2d. Ports, harbours, shipping and disposal sites** | **rMCZ 3, Blackwater, Crouch, Roach and Colne Estuaries** |
|---|---|
| baseline. | |
| **Baseline description of activity** | **Costs of impact of rMCZ on the sector** |
| ***Disposal sites:*** Within 1 km of the rMCZ there are three sites (TH062 Maldon Saltings, TH212 Alresford Saltings and TH215 Wivenhoe Overflow) which are licensed for disposal of channel dredge material. These are likely to be used by the ports of Brightlingsea, West Mersea and Tollesbury. The average number of licence applications received for all of these disposal sites is 0.5 per year (based on number of licence applications received between 2001 and 2010 (Cefas, pers. comm., 2011). For two of the disposal sites no licence applications were received between 2001 and 2010, but these are not closed to disposal in future (Cefas, pers. comm., 2011).<br><br>Within 5km of the rMCZ, there are the same three sites (TH062 Maldon Saltings, TH212 Alresford Saltings and TH215 Wivenhoe Overflow) which are licensed for disposal of dredged material. The average number of licence applications received for all of these disposal sites in total is 0.5 per year (based on number of licence applications received between 2001 and 2010 (Cefas, pers. comm., 2011). For two of the disposal sites no licence applications were received between 2001 and 2010, but these are not closed to disposal in future (Cefas, pers. comm., 2011).<br><br>***Navigational dredge areas:*** Within 1km of the rMCZ, there are various licensed dredged channels associated with Bradwell Marina, Bradwell Waterside, Brightlingsea, West Mersea and Tollesbury, and Crouch Harbour Authority. It is assumed that each dredge area's marine licence is renewed once every 3 years, and that an assessment of environmental | <table><tr><td>*£m/yr*</td><td>Scenario 1</td><td>Scenario 2</td></tr><tr><td>Cost to the operator</td><td>0.006</td><td>0.009</td></tr></table><br>***Scenario 1:*** Future licence applications for disposal of material and navigational dredging within 1km of this rMCZ will need to consider the potential effects of the activity on the features protected by the rMCZ. Additional costs will be incurred as a result (a breakdown of these by activity is provided in Annex N11).<br><br>Although two of the disposal sites rMCZ have not been used in the last ten years, they might be used during the 20 year period covered by the IA. Future licence applications for disposal of material in these disposal sites will need to consider the potential effects of the activity on the features protected by the rMCZ.<br><br>***Scenario 2:*** Future licence applications for disposal of material, navigational dredging and known port or harbour development plans or proposals within 5km of this rMCZ will need to consider the potential effects of the activity on the features protected by the rMCZ. Additional costs will be incurred as a result (a breakdown of these by activity is provided in Annex N11).<br><br>Additional costs will also arise to include MCZ features in a potential new MDP to consider the potential effects of activities on the features protected by the rMCZ. The anticipated additional cost in the MDP is estimated to be a one-off cost of £8438. |

| **Table 2d. Ports, harbours, shipping and disposal sites** | **rMCZ 3, Blackwater, Crouch, Roach and Colne Estuaries** |
|---|---|
| impact upon MCZ features is undertaken for each licence renewal.<br><br>Within 5km of the rMCZ there are additional channels that are dredged including Bradwell Creek and Bradwell Waterside. It is assumed that each dredge area's marine licence is renewed once every 3 years, and that an assessment of environmental impact upon MCZ features is undertaken for each licence renewal. As these navigational dredge areas will be covered by a potential new MDP, it is assumed that assessment of environmental impact is not changed over the 20 year period of the IA.<br><br>***Port development****:*<br><br>There are 6 ports and harbours within 5km of the rMCZ which could potentially undergo development at some point in the future: Brightlingsea, Burnham-on-Crouch, Wivenhoe, Fingringhoe, Maldon and Rochford (Ports & Harbours UK, 2012). This may not represent a full list of all ports and harbours impacted by the site. No port developments are known to be planned within the 20 year period of the Impact Assessment (IA). | |

| **Table 2e. Renewable energy – wind energy** | **rMCZ 3, Blackwater, Crouch, Roach and Colne Estuaries** |
|---|---|
| ***Source of costs of the recommended Marine Conservation Zone (rMCZ)***<br><br>***Management scenario 1:*** Increase in costs of assessing environmental impacts for future licence applications (it is not anticipated that any additional mitigation of impacts on features protected by the MCZ will be needed relative to the mitigation provided in the baseline).<br><br>***Management scenario 2:*** Increase in costs of assessing environmental impacts for future licence applications and increase in cable protection installation costs for power export cables and inter-array cables (relative to the mitigation provided in the baseline) | |
| **Baseline description of activity** | **Costs of impact of rMCZ on the sector** |

| **Table 2e. Renewable energy – wind energy** | **rMCZ 3, Blackwater, Crouch, Roach and Colne Estuaries** |
|---|---|
| For the purpose of the IA, it was estimated 38km of proposed and consented export cable routes from the Gunfleet 3 – Demonstration Project wind farm overlap with the rMCZ (estimate based on the length of rMCZ in the absence of information on the cable route).<br><br>It is now recognised that this overlap will be significantly shorter as the cable will make land fall near Clacton. | <table><tr><th>*£m/yr*</th><th>Scenario 1</th><th>Scenario 2</th></tr><tr><td>Cost to the operator</td><td>0.001</td><td>1.920</td></tr><tr><td>GVA affected</td><td>0.001</td><td>1.920</td></tr></table><br>***Scenario 1:*** As a result of the designation of the rMCZ, the operator may incur additional costs in assessing environmental impacts for future licence applications.<br><br>This is expected to result in an additional one-off cost of £0.012m in 2022 (for extra consultant/staff time) with a present value of £0.009m.<br><br>***Scenario 2:*** In addition to the increased costs for assessment set out under Scenario 1, under Scenario 2 costs of additional mitigation are anticipated. This additional mitigation entails use of alternative cable protection for export cables and inter-array cables that have not yet been consented. This is expected to result in an additional one-off cost of £38.392m in 2022 (based on estimated additional cost of £1m/km for yet-to-be-consented power export cable route only) with a present value of £27.217m. These costs are included in Scenario 2 to reflect uncertainty over whether this additional mitigation will be required. Inter-array cables are not expected to be proposed for installation within this rMCZ. Therefore, no additional cost to install alternative cable protection for inter-array cabling is anticipated. JNCC and Natural England (pers. comm., 2012) state that the likelihood of the cost in Scenario 2 occurring is very low. Further details are provided in Annex H14.<br><br>These figures are recognised as being an overlap given that the actual length of the cable route is shorter than was estimated.<br><br>The impacts that are assessed in both scenarios are based on JNCC and Natural England's advice on the mitigation that could be required. |

## Human activities in the site that are not negatively affected by the rMCZ (over 2013 to 2032 inclusive)

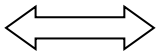
| **Table 3. Human activities in the site that are not negatively affected by the recommended Marine Conservation Zone (MCZ) (existing activities at their current levels and future proposals known to the regional MCZ projects)** | **rMCZ 3 Blackwater, Crouch, Roach and Colne Estuaries** |
|---|---|

| |
|---|
| Aquaculture |
| Commercial fishing (bottom trawls, dredges, hooks and lines, mid-water trawls, nets, pots and traps, collection by hand) |
| Flood and coastal erosion risk management |
| Recreation |
| Research and education |
| Shipping |
| Water abstraction, discharge and diffuse pollution*. |

*The IA assumes that no additional mitigation of impacts of water abstraction, discharge or diffuse pollution will be required over and above that which will be provided to achieve the objectives of the Water Framework Directive through the River Basin Management Plan process (based on advice provided by Natural England, pers. comm., 2010).

## Anticipated benefits to ecosystem services

The habitats, species and other ecological features of the recommended Marine Conservation Zone (rMCZ) contribute to the delivery of a range of ecosystem services. Designation of the rMCZ and its subsequent management may improve the quantity and quality of the beneficial services provided, which may increase the value (contribution to economic welfare) of them. Impacts on the value of ecosystem services may occur as a result of the designation, management and/or achievement of the conservation objectives of the rMCZ. Further discussion on the potential benefits to ecosystem services can be found in Annex L and definitions can be found in Annex H.

| **Table 4a. Fish and shellfish for human consumption** | **rMCZ 3, Blackwater, Crouch, Roach and Colne Estuaries** | |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| Fletcher and others (2011) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) can contribute to the delivery of fish and shellfish for human consumption.<br><br>The baseline quantity and quality of the ecosystem service provided is assumed to be commensurate with that provided by the features of the site when in favourable condition (see Table 1 for details).<br><br>The main commercial fisheries within the site are for native oysters and Pacific oysters by the Blackwater Oystermen in the Blackwater Estuary and Colchester Oyster Fisheries in the Colne Estuary, both of which are high value fisheries. Native oysters have been cultivated and harvested in | If the conservation objectives of the features are achieved, the features will be maintained in favourable condition.<br><br>No additional management (above that in the baseline situation) of fishing activities is expected. However, maintaining and monitoring the current sustainable fishing practices will safeguard the healthy population of native oyster and by ensuring no increase in fishing activity occurs or alternative gears used, it is expected that the native oyster population may increase over time and populations of the invasive Pacific oyster be kept to a minimum. The Blackwater Oystermen consider the protection of the habitat and marine wildlife as the key | Anticipated direction of change:<br><br>  <br><br>Confidence: Moderate |

| **Table 4a. Fish and shellfish for human consumption** | **rMCZ 3, Blackwater, Crouch, Roach and Colne Estuaries** | |
|---|---|---|
| this site since Roman times and have been managed by the Blackwater Oystermen since the early 1980s. The quality of the native oysters is nationally renowned and this species commands a high price (significantly higher than the price for Pacific oysters). Other commercial fisheries in the site are for cockles, whelks and to a much lesser degree pelagic and demersal fish. The total value of landings derived from commercial fisheries within this site is £1.790m/yr (MCZ Fisheries Model).<br><br>All four estuaries, and particularly the Blackwater Estuary, are important spawning and nursery grounds for commercial fish (including mullet, thornback ray, sole and brown shrimp) and nursery grounds for whiting and sprat. The salt marsh provides optimum conditions for early life stages of many of these species. The rMCZ is also the main spawning site of a distinct coastal population of herring, the Blackwater (or Thames) herring. Salmon, sea trout and eel also occur in the site (Balanced Seas Final Recommendations Report, 2011). | mechanism for ensuring the future of the species and the sustainability of the fishery.<br><br>No change in feature condition or harvesting of fish and shellfish is anticipated and therefore no impact on on-site or off-site benefits is expected.<br><br>Designating the rMCZ will protect its features and the ecosystem services that they provide against the risk of future degradation from pressures caused by human activities. | |

| **Table 4b. Recreation** | **rMCZ 3, Blackwater, Crouch, Roach and Colne Estuaries** | |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| ***Angling:*** Fletcher and others (2011) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) can contribute to the delivery of fish and shellfish for human consumption and recreation services.<br><br>The baseline quantity and quality of the ecosystem service provided is assumed to be commensurate with that provided by the features of the site when in favourable condition (see Table 1 for details).<br><br>All four estuaries (particularly the Blackwater Estuary) are important spawning and nursery grounds for fish caught recreationally (including bass, mullet, thornback ray, stingray and sole) and nursery grounds for tope shark and whiting. The salt marsh provides the optimum conditions | If the conservation objectives of the features are achieved, the features will be maintained in favourable condition.<br><br>No change in on-site feature condition or fishing mortality is anticipated and therefore no impact on on-site benefits is expected (see Table 4a). The popular angling area just outside the site in the Outer Thames Estuary may benefit from spill-over effects.<br><br>The designation may lead to an increase in angling visits to the site, which may benefit the local economy. This increase might arise from a change in anglers' preferred angling locations rather than an increase at a national scale in days spent | Anticipated direction of change:<br><br>⇔<br><br>Confidence: Moderate |

| **Table 4b. Recreation** | **rMCZ 3, Blackwater, Crouch, Roach and Colne Estuaries** | |
|---|---|---|
| for early life stages of many of these species. Salmon, sea trout and eel also occur in the site (Balanced Seas Final Recommendations Report, 2011).<br><br>Both boat and shore angling takes place throughout the rMCZ (Stakmap, 2010). It has not been possible to estimate the value derived from angling on-site or the proportion of the value derived from angling off-site that results from the estuary spawning and nursery area (the system of sand banks and channels in the Outer Thames Estuary outside the rMCZ is very popular with boat and charter boat anglers fishing for numerous species including mackerel, dogfish and ray).<br><br>It has not been possible to estimate the value derived from angling on-site or the proportion of the value derived from angling off-site that results from the potential spawning and nursery area. | angling or the number of anglers.<br><br>Designating the rMCZ will protect its features and the ecosystem services that they provide against the risk of future degradation from pressures caused by human activities. | |
| ***Diving:*** Diving is not known to take place in the rMCZ. | N/A | N/A |
| ***Wildlife watching:*** Fletcher and others (2011) identify that the features to be protected by the rMCZ can contribute to the delivery of recreation and tourism services.<br><br>The baseline quantity and quality of the ecosystem service provided is assumed to be commensurate with that provided by the features of the site when in favourable condition (see Table 1 for details).<br><br>The Blackwater Estuary is a popular area for birdwatching (marshes and estuary) and seal watching (haul-out and pupping sites on the mudflats). There are viewing platforms and hides in the RSPB nature reserves at Old Hall Marshes in the Blackwater and Wallasea Island Wild Coast Project in the Crouch Estuary (RSPB website). Essex Wildlife Trust owns several nature reserves within the rMCZ: Abbotts Hall Farm on the banks of the Blackwater Estuary; Fingringhoe Wick Nature Reserve on the | If the conservation objectives of the features are achieved, the features will be maintained in favourable condition.<br><br>No change in on-site feature condition is anticipated and therefore no benefits to wildlife watching are expected. However, if the rMCZ is designated this will provide an additional positive aspect about the location that could be promoted by organisations involved with wildlife watching and that would be expected to increase visitation rates and therefore the value of the ecosystem service.<br><br>The designation may lead to an increase in wildlife watching visits to the site, which may benefit the local economy. This increase may represent a redistribution of location preferences rather than an overall increase in wildlife watching trips at the | Anticipated direction of change:<br><br>⟺<br><br>Confidence: Moderate |

| **Table 4b. Recreation** | **rMCZ 3, Blackwater, Crouch, Roach and Colne Estuaries** | |
|---|---|---|
| banks of the Colne Estuary; and Blue House Farm Nature Reserve on the banks of the River Crouch. All reserves are open to the public and contain facilities such as bird hides (Essex Wildlife Trust website).<br><br>It has not been possible to estimate the value derived from wildlife watching in the rMCZ. | national scale.<br><br>Designating the rMCZ will protect its features and the ecosystem services that they provide against the risk of future degradation from pressures caused by human activities. | |
| ***Other recreation:*** Fletcher and others (2011) identify that the features to be protected by the rMCZ can contribute to the delivery of recreation and tourism services.<br><br>All four estuaries are extremely popular tourist destinations, especially for recreational sailing and coastal walking with numerous harbours, marinas, shopping facilities and coastal paths available for visitors and residents. Sailing clubs offer races and training for all ages (RYA website) with the largest and most popular clubs and marinas situated in Burnham-on-Crouch in the Crouch Estuary; West Mersea and Maldon on the Blackwater; and Brightlingsea near the end of the Colne Estuary (Stakmap, 2010). West Mersea is also a popular tourist destination due to the oyster fishery and associated history of the area (Stakmap, 2010).<br><br>It has not been possible to estimate the value derived from tourism in the rMCZ. | If the conservation objectives of the features are achieved, the features will be maintained in favourable condition.<br><br>No change in on-site feature condition is anticipated and therefore no benefits to tourism are expected. However, if the rMCZ is designated this will provide an additional positive aspect about the location that could be promoted by the tourism and leisure industry and that would be expected to increase visitation rates.<br><br>Designating the rMCZ will protect its features and the ecosystem services that they provide against the risk of future degradation from pressures caused by human activities. | Anticipated direction of change:<br><br>⟺<br><br>Confidence: Moderate |

| **Table 4c. Research and education** | **rMCZ 3, Blackwater, Crouch, Roach and Colne Estuaries** | |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| ***Research:*** Fletcher and others (2011) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) can contribute to the delivery of research services.<br><br>Essex Wildlife Trust carries out research throughout the rMCZ including 'rewilding' projects for salt marsh, fish monitoring, and an initiative to | Monitoring of the rMCZ will help inform understanding of how the marine environment is changing and is impacted on by anthropogenic pressures and management interventions. Other research benefits are unknown. | Anticipated direction of change:<br><br>⇧ |

| **Table 4c. Research and education** | **rMCZ 3, Blackwater, Crouch, Roach and Colne Estuaries** | |
|---|---|---|
| develop sustainable management of the native oyster with the Blackwater Oystermen (Essex Wildife Trust website and Balanced Seas Essex sites meeting, 2011). The University of Colchester undertakes academic research on the estuaries within the rMCZ (Balanced Seas Essex sites meeting, 2011). The RSPB monitors bird populations throughout the rMCZ (RSPB website). There is archaeological interest within the foreshore area and along the banks of each of the estuaries (English Heritage website).<br><br>It has not been possible to estimate the value derived from research activities associated with the rMCZ. | | Confidence: High |
| ***Education:*** Fletcher and others (2011) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) can contribute to the delivery of education services.<br><br>Essex Wildlife Trust provides formal education in the form of field trips to their nature reserves in the rMCZ and as outreach activities within classrooms and school grounds for ages ranging from pre-school to higher education. The estuaries have high numbers of school visits (Essex Wildlife Trust website).<br><br>It has not been possible to estimate the value derived from education activities associated with the rMCZ. | MCZ designation may provide an opportunity to expand the focus of education events into the marine environment.<br><br>Designation may aid additional local (to the rMCZ) provision of education activities (e.g. events, interpretation boards), from which visitors would derive benefit.<br><br>Non-visitors may benefit if the rMCZ contributes to wider provision of education (e.g. television programmes, articles in magazines and newspapers, and educational resources developed for use in schools). | Anticipated direction of change: ⇧<br><br>Confidence: Moderate |

| **Table 4d. Regulating services** | **rMCZ 3, Blackwater, Crouch, Roach and Colne Estuaries** | |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| ***Regulation of pollution:*** the features of the site contribute to water purification (Native oyster) and sequestration of carbon (intertidal rock and Native oyster) (Fletcher and others, 2011).<br><br>***Environmental resilience:*** the features of the site (intertidal rock and | If the conservation objectives of the features are achieved, the features will be maintained in favourable condition.<br><br>No change in feature condition and management of human activities is expected and therefore no benefit to the regulation of | Anticipated direction of change: ⇔ |

| **Table 4d. Regulating services** | **rMCZ 3, Blackwater, Crouch, Roach and Colne Estuaries** | |
|---|---|---|
| Native oyster) contribute to the resilience and continued regeneration of marine ecosystems (Fletcher and others, 2011)<br><br>***Natural hazard protection:*** the features of the site (Native oyster) contribute to local flood and storm protection (Fletcher and others, 2011).<br><br>It has not been possible to estimate the value derived from regulating services associated with the rMCZ. | pollution is expected.<br><br>Designating the rMCZ will protect its features and the ecosystem services that they provide against the risk of future degradation from pressures caused by human activities. | Confidence: Moderate |

| **Table 4e. Non-use and option values** | **rMCZ 3, Blackwater, Crouch, Roach and Colne Estuaries** | |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| Some people gain satisfaction from the existence of marine habitats, species and other features. They also gain from having the option to benefit in the future from the habitats and species in the rMCZ and the ecosystem services provided, even if they do not currently benefit from them.<br><br>It has not been possible to estimate the value derived from non-use and option value services associated with the rMCZ. | The rMCZ will benefit the proportion of the UK population that values conservation of the rMCZ features and its contribution to an ecologically coherent network of MPAs. Some people will gain satisfaction from knowing that the habitats and species are being conserved (existence value) and/or that they are being conserved for use by others in the current generation (altruistic value) or future generations (bequest value). The rMCZ will protect both the features and the option to benefit from the services in the future from the risk of future degradation.<br><br>Examples of these values are shown in Ranger, Lowe, Sanghera, & Solandt (2012). Voters in the MCS's 'Your Seas Your Voice' campaign felt that features of the natural environment were strong motivators for reasons why people thought areas within the rMCZ should be protected, with people frequently attaching value to biodiversity and 'spectacular scenery. The vast majority felt that allowing fish and shellfish recovery was as an important management reason to protect the site. A minority perceived the area to be 'under threat' from 'damaging and extractive activities'. | Anticipated direction of change:<br><br>⇧<br><br>Confidence: Moderate |

| **Table 4e. Non-use and option values** | **rMCZ 3, Blackwater, Crouch, Roach and Colne Estuaries** | |
|---|---|---|
| | Source: Ranger et al. (2011) | |

## rMCZ 3 Reference Area 1 Colne Point

## Site area (km$^2$): 0.95

| **Table 1. Conservation impacts** | | | | **rMCZ 3, Reference Area 1 Colne Point** |
|---|---|---|---|---|
| **1a. Ecological description** | | | | |
| This recommended Marine Conservation Zone (rMCZ) Reference Area lies within rMCZ 3 (Blackwater, Crouch, Roach and Colne Estuaries) and was selected specifically for the protection of three intertidal broad-scale habitats: intertidal sand and muddy sand; intertidal mud; and intertidal mixed sediments (for this last feature, it is the only rMCZ Reference Area identified within the Balanced Seas Project Area), although other broad-scale habitats also occur. It is also proposed for blue mussel beds and the native oyster. The wider rMCZ in which this site falls is important for spawning grounds for various fish species and foraging grounds for birds to which this smaller rMCZ Reference Area may contribute. The blue mussel beds are already managed through the existing Essex Estuaries Special Area of Conservation. The rMCZ Reference Area also lies within the Colne Estuary Site of Special Scientific Interest.<br><br>Source: Balanced Seas Final Recommendations (2011). | | | | |
| **1b.** Baseline condition of MCZ features and impact of the MCZ | | | | |
| **Feature** | **Area of feature (km2)** | **No. of occurrences** | **Baseline** | **Impact** |
| **Broad-scale habitats** | | | | |
| A2.2 Intertidal sand and muddy sand | 863.43 m$^2$ | - | Unfavourable condition | Recover to reference condition |
| A2.4 Intertidal mud | 0.19 | - | Unfavourable condition | Recover to reference condition |
| A2.4 Intertidal mixed sediments | 0.05 | - | Unfavourable condition | Recover to reference condition |
| A5.2 Subtidal sand | - | - | Unfavourable condition | Recover to reference condition |
| A5.3 Subtidal mud | - | - | Unfavourable condition | Recover to reference condition |
| A5.4 Subtidal mixed sediment | - | - | Unfavourable condition | Recover to reference condition |
| **Habitats of Conservation Importance** | | | | |
| Blue mussel beds | 0.034 | - | Unfavourable condition | Recover to reference condition |
| **Species of Conservation Importance** | | | | |
| Native Oyster *Ostrea edulis* | No data available | - | Unfavourable condition | Recover to reference condition |

## Site-specific costs arising from the effect of the rMCZ on human activities (over 2013 to 2032 inclusive)

| **Table 2a. Archaeological heritage** | **rMCZ Reference Area 1, Colne Point** |
|---|---|

| **Table 2a. Archaeological heritage** | **rMCZ Reference Area 1, Colne Point** |
|---|---|
| ***Source of costs of the recommended Marine Conservation Zone (rMCZ)***<br><br>Increase in costs of assessing environmental impacts for future licence applications. Archaeological excavations, surface recovery and intrusive surveys will be prohibited from the entire site. Diver trails, visitors and non-intrusive surveys will be allowed. | |
| **Baseline description of activity** | **Costs of impact of rMCZ on the sector** |
| Seven named and dated British wrecks are recorded within this site, plus peat records (English Heritage, 2012). | An extra cost would be incurred in the assessment of environmental impacts made in support of any future licence applications for archaeological activities in the site. The likelihood of a future licence application being submitted is not known so no overall cost to the sector of this rMCZ has been estimated. However, the additional cost in one licence application could be in the region of £500 to £10,000 depending on the size of the MCZ (English Heritage, pers. comm., 2012). 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 is not costed in the Impact Assessment. The prohibition of excavation and therefore interpretation of archaeological evidence from the site will decrease acquisition of historical knowledge of past human communities from the site, resulting in a cost to society. |

| **Table 2b. Commercial fisheries** | **rMCZ Reference Area 1, Colne Point** |
|---|---|
| ***Source of costs of the recommended Marine Conservation Zone (rMCZ)***<br><br>Closure of entire site to all gear types. | |
| ***Summary of all fisheries:*** The rMCZ Reference Area is coastal and lies in rMCZ 3 Blackwater, Crouch, Roach and Colne Estuaries. The rMCZ Reference Area represents only a small portion of the local fishing ground and the intertidal part of it does not overlap with commercial fishing interests. The sub-tidal portion overlaps with the grounds of the Colchester Oyster Company which owns the lease for the Colne Estuary water column and seabed, as well as potentially overlapping with some other commercial fishing activities as described below. | |

**Table 2b. Commercial fisheries** **rMCZ Reference Area 1, Colne Point**

. More detail on the approach used for the fisheries method is provided at Annexes H7 and N4.

Estimated annual value of landings from the rMCZ Reference Area: £0.001m/yr (MCZ Fisheries Model).

(Due to resolution issues of the MCZ Fisheries Model and the small size of many rMCZ Reference Areas in the Balanced Seas region, some fisheries landings values may be inaccurate. They have been included as a precautionary measure and to avoid underestimating the economic impact of a site.)

| Baseline description of UK commercial fisheries | Costs of impact of rMCZ on UK commercial fisheries |
|---|---|
| ***Bottom trawls:*** Vessel numbers unknown<br><br>Estimated total value of landings from the rMCZ Reference Area: £230/yr (MCZ Fisheries Model). | Estimated annual value of UK vessel landings affected:<br><br>*£m/yr* \| Scenario 1<br>Value of landings affected \| <0.001*<br>* £230 |
| ***Dredges:*** Vessels from the Blackwater Oystermen's Association and Leigh Fisherman's Cooperative operate in an area overlapping with the rMCZ Reference Area and target oysters (towed dredges) and cockles (suction dredges) (FisherMap Data 2010). In addition, the Colchester Oyster Fishery, which owns the lease for the Colne Estuary water column and seashore, targets oysters in the sub-tidal area (Balanced Seas Final Recommendations Report, 2011).<br><br>Estimated total value of landings from the rMCZ Reference Area: £450/yr (MCZ Fisheries Model). | Estimated annual value of UK vessel landings affected:<br><br>*£m/yr* \| Scenario 1<br>Value of landings affected \| <0.001*<br>* £450 |
| ***Nets:*** Vessel numbers unknown.<br><br>Estimated total value of landings from the rMCZ Reference Area: £150/yr (MCZ Fisheries Model). | Estimated annual value of UK vessel landings affected:<br><br>*£m/yr* \| Scenario 1<br>Value of landings affected \| <0.001* |

<table>
<tr><th colspan="2">Table 2b. Commercial fisheries rMCZ Reference Area 1, Colne Point</th></tr>
<tr><td></td><td>* £150</td></tr>
<tr><td>Mid-water trawls: Vessel numbers unknown.<br><br>Estimated total value of landings from the rMCZ Reference Area: no estiamte (MCZ Fisheries Model).</td><td>Estimated annual value of UK vessel landings affected:<br><br><table><tr><td>£m/yr</td><td>Scenario 1</td></tr><tr><td>Value of landings affected</td><td>No estimate</td></tr></table></td></tr>
<tr><td>Pots and traps: Three stakeholders (one from the Leigh-on-Sea Shellfish Association) have indicated that their area of operation overlaps with the rMCZ Reference Area. Target species are nephrops, crabs and whelks (MCZ Fisheries Model and associated FisherMap Data 2010).<br><br>Estimated total value of landings from the rMCZ Reference Area: £160/yr (MCZ Fisheries Model).</td><td>Estimated annual value of UK vessel landings affected:<br><br><table><tr><td>£m/yr</td><td>Scenario 1</td></tr><tr><td>Value of landings affected</td><td><0.001</td></tr></table>* £160</td></tr>
<tr><th>Total direct impact on UK commercial fisheries</th><th></th></tr>
<tr><td></td><td>Estimated annual value of UK vessel landings and gross value added (GVA) affected:<br><table><tr><td>£m/yr</td><td>Scenario 1</td></tr><tr><td>Value of landings affected</td><td>0.001</td></tr><tr><td>GVA affected</td><td>0.000</td></tr></table></td></tr>
<tr><th>Baseline description of non-UK fisheries</th><th>Costs of impact of rMCZ on non-UK commercial fisheries</th></tr>
<tr><td></td><td>None.</td></tr>
</table>

<table>
<tr><th>Table 2c. Ports, harbours, shipping and disposal sites rMCZ Reference Area 1, Colne Point</th></tr>
<tr><td>Source of costs of the recommended Marine Conservation Zone (rMCZ)<br><br>Management scenario 1: Not applicable to this site.</td></tr>
</table>

**Table 2c. Ports, harbours, shipping and disposal sites** — **rMCZ Reference Area 1, Colne Point**

***Management scenario 2:*** Increase in costs of assessing environmental impacts for all port and harbour developments within 5 km of the rMCZ.

The Balanced Seas project is not aware of activities related to ports, harbours and shipping for which additional mitigation of impacts on features protected by the rMCZ will be needed relative to the mitigation provided in the baseline

| Baseline description of activity | Costs of impact of rMCZ on the sector |
|---|---|
| ***Port development:*** There is one harbour (Brightlingsea – Ports & Harbours UK, 2012) within 5km of the rMCZ Reference Area which potentially could undergo development at some point in the future. (This may not represent a full list of all ports and harbours impacted by the site.) No port developments are known to be planned within the 20 year period of the Impact Assessment (IA). | <table><tr><td>*£m/yr*</td><td>Scenario 1</td><td>Scenario 2</td></tr><tr><td>Cost to the operator</td><td>N/A</td><td>0.000</td></tr></table> ***Scenario 1:*** Not applicable to this site. ***Scenario 2:*** Future licence applications for port or harbour development plans and proposals within 5km of this rMCZ Reference Area will need to consider the potential effects of the activity on the features protected by the rMCZ. Additional costs will be incurred as a result (a breakdown of these by activity is provided in Annex N11.) Sufficient information is not available to identify what additional mitigation of impacts on features protected by the rMCZ Reference Area will be needed for proposed future port and harbour developments relative to the mitigation provided in the baseline. Unknown potentially significant costs of mitigation could arise. |

**Table 2d. Recreational anchoring** — **rMCZ Reference Area 1, Colne Point**

***Source of costs of the recommended Marine Conservation Zone (rMCZ)***

Closure of entire site to all recreational anchoring (except in emergency circumstances).

| Baseline description of activity | Costs of impact of rMCZ on the sector |
|---|---|
| Although it was initially thought that the rMCZ Reference Area was a popular anchoring area and recreational craft are dragged across the foreshore for launching purposes (Balanced Seas Essex Sites Meeting Report, July 2011), subsequent information indicates that only 1 or 2 boats | Assuming there is a low level of anchoring and given the presence of a nearby popular anchoring spot, the closure of the rMCZ Reference Area to recreational anchoring is unlikely to impact the recreational sectors and no significant costs |

| **Table 2d. Recreational anchoring** | **rMCZ Reference Area 1, Colne Point** |
|---|---|
| anchor at the Point at weekends, mainly in the summer, and that anchoring is generally limited as the area is quite exposed and there is a more popular anchoring area to the north in the Colne (Natural England Stakeholder Interview for rMCZ Reference Area 1 Colne Point, November 2011). | are expected. |

| **Table 2e. Recreational angling** | **rMCZ Reference Area 1, Colne Point** |
|---|---|
| ***Source of costs of the recommended Marine Conservation Zone (rMCZ)***<br><br>Closure of entire site to all recreational angling. | |
| **Baseline description of activity** | **Costs of impact of rMCZ on the sector** |
| Seventeen StakMap interviews indicated that recreational angling (shore fishing, charter boats and boat fishing) overlaps with the rMCZ Reference Area. The shore and boat fishing interviews covered 3 individuals, 2 locally based clubs and 2 informal groups (representing 72 users), and charter boat operators represented 1,750 individuals/yr_. For most boat-based fishing, the rMCZ Reference Area represents only a small proportion of the overall area over which this activity takes place. Shore angling occurs along less than 200 metres of the coastline of the rMCZ Reference Area, but this small section is nevertheless important to those who use it (T. Pinborough, local angler, pers. comms., January 2012). | The closure would be likely to impact on local residents who fish from the shore. The rMCZ Reference Area is not visited often by anglers from further away. Because the rMCZ Reference Area is a small part of the area where boat-based anglers fish, they may respond by fishing in other locations.<br><br>A local angler has suggested that, if the boundaries could be moved by about 300 metres, shore anglers would not be impacted (T. Pinborough, local angler, pers. comms., January 2012). |

## Human activities in the site that are not negatively affected by the MCZ (over 2013 to 2032 inclusive)

| **Table 3. Human activities in the site that are not negatively affected by the recommended Marine Conservation Zone (rMCZ) (existing activities at their current levels and future proposals known to the regional MCZ projects)** | **rMCZ Reference Area 1 Colne Point** |
|---|---|
| Flood and coastal erosion risk management (coastal defence)<br>Recreation ( except for the activities listed above in table 2)<br>Research and education<br>Water abstraction, discharge and diffuse pollution*. | |

*The IA assumes that no additional mitigation of impacts of water abstraction, discharge or diffuse pollution will be required over and above that which will be provided to achieve the objectives of the Water Framework Directive through the River Basin Management Plan process (based on advice provided by Natural England, pers. comm., 2010).

## Anticipated benefits to ecosystem services

The habitats, species and other ecological features of the recommended Marine Conservation Zone (rMCZ) Reference Area contribute to the delivery of a range of ecosystem services. Designation of the rMCZ Reference Area and its subsequent management may improve the quantity and quality of the beneficial services provided, which may increase the value (contribution to economic welfare) of them. Impacts on the value of ecosystem services may occur as a result of the designation, management and/or achievement of the conservation objectives of the rMCZ Reference Area. Further discussion on the potential benefits to ecosystem services can be found in Annex L and definitions can be found in Annex H.

| **Table 4a. Fish and shellfish for human consumption** | **rMCZ 3, Reference Area 1 Colne Point** | |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| Fletcher and others (2011) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) Reference Area can contribute to the delivery of fish and shellfish for human consumption.<br><br>Intertidal sediments provide habitat for various fish species, including flounder, bass and plaice, which contributes to commercial and recreational fisheries benefits, and subtidal sediment is an important nursery area for many species, so it can be assumed that it is also an important area for commercial fisheries (Fletcher and others, 2011). The baseline quantity and quality of the ecosystem service provided is assumed to be commensurate with that provided by the features of the site when in favourable condition (see rMCZ 3 Table 1 for details).<br><br>The rMCZ Reference Area includes part of the Colne oyster fishery, but is otherwise little used for commercial fishing. A description of on-site fishing activity and the value derived from it is set out in Table 2b.<br><br>It has not been possible to estimate the value of the off-site benefits that derive from the spawning and nursery area. | If the conservation objectives of the features are achieved, the features will be recovered to reference condition.<br><br>Additional management (above that in the baseline situation) of fishing activities is expected which will prohibit fishing within the rMCZ Reference Area. The costs of this are set out in Table 2b.<br><br>Achievement of the conservation objectives may improve the contribution of the habitats to the provision of fish and shellfish for human consumption.<br><br>Closure of the rMCZ Reference Area to fishing activity will reduce the on-site fishing mortality of species but, as the site is small, it is unclear whether this would benefit stocks of mobile commercial finfish species.<br><br>As no fishing will be permitted within the rMCZ Reference Area, no on-site benefits will be realised. | Anticipated direction of change:<br><br>⇧<br><br>Confidence: Low |

| **Table 4b. Recreation** | **rMCZ 3, Reference Area 1 Colne Point** | |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| ***Angling:*** Fletcher and others (2011) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) Reference Area can contribute to the delivery of fish and shellfish for human consumption and recreation services.<br><br>Intertidal sediments provide habitat for various fish species, including flounder, bass and plaice, which contribute to recreational fisheries benefits, and subtidal sediment is an important nursery area for many species, so it can be assumed that it is also an important area for recreational fisheries (Fletcher and others, 2011). The baseline quantity and quality of the ecosystem service provided is assumed to be commensurate with that provided by the features of the site when in favourable condition (see rMCZ 3 Table 1 for details).<br><br>A number of anglers use the rMCZ Reference Area and a description of on-site recreational fishing activity is set out in Table 2e, but it has not been possible to estimate the value derived from this.<br><br>It has not been possible to estimate the proportion of the value derived from angling off-site that results from the potential spawning and nursery area. | If the conservation objectives of the features are achieved, the features will be recovered to reference condition.<br><br>Recovery of habitats may have benefits for fish populations. It is unclear whether any benefits for fish populations would arise as a result of reduced fishing mortality due to closure of the rMCZ Reference Area (see Table 4a).<br><br>As angling will not be permitted within the rMCZ Reference Area, any benefits will be limited to those occurring as a result of spill-over effects of finfish species targeted by anglers outside the rMCZ Reference Area. Such benefits may be insignificant. | Anticipated direction of change:<br><br>⇧<br><br>Confidence: Low |
| ***Diving:*** Diving does not take place in the site. | N/A | N/A |
| ***Wildlife watching:*** Fletcher and others (2011) identify that the features to be protected by the rMCZ Reference Area can contribute to the delivery of recreation and tourism services.<br><br>Intertidal sediments and mud provide feeding sites for wading birds at the strandline, and for other waterfowl (Fletcher and others, 2011). The baseline quantity and quality of the ecosystem service provided is assumed to be commensurate with that provided by the features of the | If the conservation objectives of the features are achieved, the features will be recovered to reference condition.<br><br>The recovery of the features to reference condition may improve their functioning as support for fish and bird populations, potentially benefiting wildlife watching within the rMCZ Reference Area. In addition, an improvement in the condition of site features and any associated increase in | Anticipated direction of change:<br><br>⇧ |

| **Table 4b. Recreation** | | **rMCZ 3, Reference Area 1 Colne Point** |
|---|---|---|
| site when in favourable condition (see rMCZ 3 Table 1 for details).<br><br>Bird watching is popular around the Colne and Blackwater Estuaries and Colne Point is a popular spot for local birders (Essex Birdwatching Society website).<br><br>It has not been possible to estimate the value derived from wildlife watching in the rMCZ Reference Area. | abundance and diversity of species that are visible to wildlife watchers may improve the quality of wildlife watching at the site and therefore the value of the ecosystem service.<br><br>The designation may lead to an increase in wildlife watching visits to the site, which may benefit the local economy. This increase may represent an overall increase in UK wildlife watching visits and/or a redistribution of location preferences.<br><br>Designating the rMCZ Reference Area will protect its features and the ecosystem services that they provide against the risk of future degradation from pressures caused by human activities. | Confidence: Low |
| ***Other recreation:*** Fletcher and others (2011) identify that the features to be protected by the rMCZ Reference Area can contribute to the delivery of recreation and tourism services.<br><br>The larger rMCZ within which the rMCZ Reference Area lies is very popular for coastal walking and recreational sailing, both of which extend into the rMCZ Reference Area itself. Caravan parks are situated nearby.<br><br>It has not been possible to estimate the value derived from other recreation in the rMCZ. | If the conservation objectives of the features are achieved, the features will be recovered to reference condition.<br><br>The rMCZ Reference Area is fully contained within rMCZ 3 for which the benefits of other recreation have been assessed. It is not possible to identify whether the Reference Area will have additional benefits over and above this but this seems unlikely.<br><br>Designating the rMCZ Reference Area will protect its features and the ecosystem services that they provide against the risk of future degradation from pressures caused by human activities. | Anticipated direction of change: ⇧<br><br>Confidence: Low |

| **Table 4c. Research and education** | **rMCZ 3, Reference Area 1 Colne Point** | |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| ***Research:*** Fletcher and others (2011) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) Reference Area can contribute to the delivery of research services.<br><br>Research activities undertaken by the Essex Wildlife Trust and the University of Colchester in the wider rMCZ in which this rMCZ Reference Area lies may overlap with this area although there is no confirmed information.<br><br>It has not been possible to estimate the value derived from research activities associated with the rMCZ Reference Area. | As an rMCZ Reference Area, the site will provide an opportunity to demonstrate the state of designated marine features in the absence of many anthropogenic pressures (Natural England and JNCC, 2010). It will provide a control area against which the impacts of pressures caused by human activities can be compared as part of long-term monitoring and assessment. Other research benefits are unknown. | Anticipated direction of change:<br><br>⇧<br><br>Confidence: High |
| ***Education:*** Fletcher and others (2011) identify that the features to be protected by the rMCZ Reference Area can contribute to the delivery of education services.<br><br>No known education activity is focused on the rMCZ Reference Area, although it may be used by Essex Wildlife Trust for such purposes.<br><br>It has not been possible to estimate the value derived from education activities associated with the rMCZ Reference Area. | MCZ Reference Area designation may provide an opportunity to use the site for education about the marine environment.<br><br>Designation may aid the development of additional local (to the rMCZ Reference Area) education activities (e.g. events and interpretation boards), from which visitors to the site would derive benefit.<br><br>Non-visitors may benefit if the rMCZ Reference Area contributes to wider provision of educational resources (e.g. television programmes, articles in magazines and newspapers, and educational resources developed for use in schools). | Anticipated direction of change:<br><br>Confidence: Moderate |

| **Table 4d. Regulating services** | **rMCZ 3, Reference Area 1 Colne Point** | |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| ***Regulation of pollution:*** The features of the site contribute to water purification (native oyster and blue mussel beds) and sequestration of carbon (native oyster) (Fletcher and others, 2011). | If the conservation objectives of the features are achieved, the features will be recovered to reference condition.<br><br>Recovery of the subtidal sediments, native oyster and blue | Anticipated direction of change: |

| **Table 4d. Regulating services** | | **rMCZ 3, Reference Area 1 Colne Point** |
|---|---|---|
| ***Environmental resilience:*** The features of the site (subtidal sediments and native oyster) contribute to the resilience and continued regeneration of marine ecosystems (Fletcher and others, 2011).<br><br>***Natural hazard protection:*** The features of the site (intertidal coarse sediments and native oyster) contribute to local flood and storm protection (Fletcher and others, 2011).<br><br>It has not been possible to estimate the value derived from regulating services associated with the rMCZ Reference Area. | mussel beds and closure to fishing could increase the site's benthic biodiversity and biomass, improving the regulating capacity of its habitats.<br><br>Designating the rMCZ Reference Area will protect its features and the ecosystem services that they provide against the risk of future degradation from pressures caused by human activities. | ⇧<br><br>Confidence: Low |

| **Table 4e. Non-use and option values** | | **rMCZ 3, Reference Area 1 Colne Point** |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| Some people gain satisfaction from the existence of marine habitats, species and other features. They also gain from having the option to benefit in the future from the habitats and species in the recommended Marine Conservation Zone (rMCZ) Reference Area and the ecosystem services provided, even if they do not currently benefit from them.<br><br>It has not been possible to estimate the value derived from non-use and option values associated with the rMCZ Reference Area. | The rMCZ Reference Area will benefit the proportion of the UK population that values conservation of its features and its contribution to an ecologically coherent network of Marine Protected Areas. Some people will gain satisfaction from knowing that the habitats and species are being conserved (existence value) and/or that they are being conserved for use by others in the current generation (altruistic value) or future generations (bequest value). The rMCZ Reference Area will protect the features and the ecosystem services provided, and thereby the option to benefit from these services in the future, from the risk of future degradation. | Anticipated direction of change:<br><br>⇧<br><br>Confidence: Moderate |

## rMCZ 3, Reference Area 2 South Mersea

## Site area (km$^2$): 0.2

| **Table 1. Conservation impacts** | | | **rMCZ 3, Reference Area 2 South Mersea** | |
|---|---|---|---|---|
| **1a. Ecological description** | | | | |
| This recommended Marine Conservation Zone (rMCZ) Reference Area lies within rMCZ 3 (Blackwater, Crouch, Roach and Colne Estuaries) and would protect a naturally bounded bed of native oysters considered to be one of the best examples in the region in a wider area thought to be the most important for both wild and cultivated native oysters in the Balanced Seas Project Area. The wider rMCZ in which this rMCZ Reference Area lies is also important for spawning grounds for various fish species and foraging grounds for birds to which this smaller rMCZ Reference Area may contribute. Despite the lack of scientific data for this site, the presence of oysters within it is well known by the oyster fishers and other local stakeholders. The oyster bed is naturally bounded by depth and so it was felt that the rMCZ Reference Area did not need to be wider in extent (i.e. it did not need to extend further into the intertidal zone).<br><br>Source: Balanced Seas Final Recommendations (2011). | | | | |
| **1b. Baseline condition of MCZ features and impact of the MCZ** | | | | |
| **Feature** | **Area of feature (km2)** | **No. of occurrences** | **Baseline** | **Impact of the MCZ** |
| ***Habitats of Conservation Importance*** | | | | |
| Native Oyster beds | No data available | - | Unfavourable condition | Recover to reference condition |
| ***Species of Conservation Importance*** | | | | |
| Native Oyster *Ostrea edulis* | No data available | - | Unfavourable condition | Recover to reference condition |

## Site-specific costs arising from the effect of the rMCZ on human activities (over 2013 to 2032 inclusive)

| **Table 2a. Commercial fisheries** | **rMCZ 3, Reference Area 2 South Mersea** |
|---|---|
| ***Source of costs of the recommended Marine Conservation Zone (rMCZ)***<br><br>Closure of entire site to all gear types. | |
| ***Summary of all fisheries:*** This is a coastal site within rMCZ 3 Blackwater, Crouch, Roach and Colne Estuaries and was suggested by the shellfisheries sector as a suitable area for the protection of the native oyster *Ostrea edulis*; if it was designated, the Blackwater Oystermen would cease use of this area (Balanced Seas Final Recommendations Report, 2011). The rMCZ might potentially overlap with other commercial fishing activities as described below but | |

**Table 2a. Commercial fisheries** **rMCZ 3, Reference Area 2 South Mersea**

fishing is considered to be a very low level in this small area. . More detail on the approach used for the fisheries method is provided in Annexes H7 and N4.

There is no estimated annual value of landings for the rMCZ Reference Area (MCZ Fisheries Model).

(Due to resolution issues of the MCZ Fisheries Model and the small size of many rMCZ Reference Areas in the Balanced Seas region, some fisheries landings values may be inaccurate. They have been included as a precautionary measure and to avoid underestimating the economic impact of a site.)

| Baseline description of UK commercial fisheries | Costs of impact of rMCZ on UK commercial fisheries |
|---|---|
| ***Bottom trawls:*** The MCZ Fisheries Model shows no landings values for this rMCZ Reference Area. Nine stakeholder interviews for Fishermap indicated that the area of operation of their vessels (including from West Mersea Fishermen's Association and Leigh Fishermen's Cooperative) targeting Dover sole, cod, skate and ray using trawls overlaps with the rMCZ Reference Area (FisherMap Data 2010). In all cases the rMCZ Reference Area would represent only a tiny proportion of the areas of operation of these vessels, if indeed they use the site. | Estimated annual value of UK vessel landings affected:<br><br>Loss of bottom trawl landings from the site (no estimates of the value are available).<br><br>*£m/yr* \| Scenario 1<br>Value of landings affected \| No estimate |
| ***Dredges:*** The MCZ Fisheries Model shows no landings values for this rMCZ Reference Area. Twelve stakeholder interviews for Fishermap indicated that the area of operation of their vessels overlaps with the site; these include vessels targeting oysters (towed dredges) from the Blackwater Oystermen's Association and vessels targeting cockles (suction dredges) from the Leigh-on-Sea Shellfish Association (FisherMap Data 2010). In all cases the rMCZ Reference Area would represent only a small proportion of the areas of operation. | Estimated annual value of UK vessel landings affected:<br><br>Loss of dredge landings from the site (no estimates of the value are available).<br><br>*£m/yr* \| Scenario 1<br>Value of landings affected \| No estimate |
| ***Pots and traps:*** The MCZ Fisheries Model shows no landings values for this rMCZ Reference Area. One fisher (Leigh-on-Sea Shellfish Association) targeting whelks indicated in an interview for Fishermap that the rMCZ Reference Area overlaps with his area of operation (FisherMap Data 2010). | Estimated annual value of UK vessel landings affected:<br><br>Loss of pot landings from the site (no estimates of the value are available).<br><br>*£m/yr* \| Scenario 1<br>Value of landings affected \| No estimate |

<table>
<tr><th colspan="2">Table 2a. Commercial fisheries</th><th>rMCZ 3, Reference Area 2 South Mersea</th></tr>
<tr><td colspan="2">Mid-water trawls: The MCZ Fisheries Model shows no landings values for this rMCZ Reference Area. One stakeholder interviewed for Fishermap indicated that his area of operation overlaps with this rMCZ Reference Area. The vessel targets herring and sprat using a mid-water paired trawl (FisherMap 2010).</td><td>Estimated annual value of UK vessel landings affected:<br><br>Loss of mid-water trawl landings from the site (no estimates of the value are available).<br><br><table><tr><td>£m/yr</td><td>Scenario 1</td></tr><tr><td>Value of landings affected</td><td>No estimate</td></tr></table></td></tr>
<tr><td colspan="2">Nets: The MCZ Fisheries Model shows no landings values for this rMCZ Reference Area. Four stakeholders interviewed for Fishermap indicated that their areas of operation overlap with this rMCZ Reference Area. Target species are herring and bass using both drift and gill nets (FisherMap Data 2010).</td><td>Estimated annual value of UK vessel landings affected:<br><br>Loss of net landings from the site (no estimates of the value are available).<br><br><table><tr><td>£m/yr</td><td>Scenario 1</td></tr><tr><td>Value of landings affected</td><td>No estimate</td></tr></table></td></tr>
<tr><td colspan="2">Total direct impact on UK commercial fisheries</td><td></td></tr>
<tr><td colspan="2"></td><td>Estimated annual value of UK vessel landings and gross value added (GVA) affected:<br><table><tr><td>£m/yr</td><td>Scenario 1</td></tr><tr><td>Value of landings affected</td><td>No estimate</td></tr><tr><td>GVA affected</td><td>No estimate</td></tr></table></td></tr>
<tr><td colspan="2">Baseline description of non-UK fisheries</td><td>Costs of impact of rMCZ on non-UK commercial fisheries</td></tr>
<tr><td colspan="2"></td><td>None.</td></tr>
</table>

<table>
<tr><th colspan="2">Table 2b. Recreational anchoring</th><th>rMCZ 3, Reference Area 2 South Mersea</th></tr>
<tr><td colspan="3">Source of costs of the recommended Marine Conservation Zone (MCZ)<br><br>Closure of entire site to all recreational anchoring (except in emergency circumstances).</td></tr>
<tr><td colspan="2">Baseline description of activity</td><td>Costs of impact of rMCZ on the sector</td></tr>
<tr><td colspan="2">One StakMap interviewee (Royal Harwich Yacht Club, representing 60</td><td>Given that the rMCZ Reference Area is not good for anchoring recreational</td></tr>
</table>

| **Table 2b. Recreational anchoring** | **rMCZ 3, Reference Area 2 South Mersea** |
|---|---|
| users a year) indicated that a small proportion of an area where anchoring occurs overlaps with the rMCZ Reference Area. The level of use of the area for anchoring is likely to be low.<br><br>Local Group discussions indicated that the rMCZ Reference Area is in a location that is not good for anchoring (Essex/North Kent/Thames/Suffolk Local Group, April 2011). More recently collected information has confirmed this; if anchoring does occur, it is usually by accident. No more than 2 vessels at a time have ever been seen anchoring in the site and only in summer or in good weather at weekends (Natural England Stakeholder Interview for rMCZ Reference Area 2 South Mersea, November). | vessels and the intensity of anchoring is low, the rMCZ Reference Area is not expected to significantly impact on recreational vessel users. |

## Human activities in the site that are not negatively affected by the rMCZ (over 2013 to 2032 inclusive)

| **Table 3. Human activities in the site that are not negatively affected by the recommended Marine Conservation Zone (MCZ) (existing activities at their current levels and future proposals known to the regional MCZ projects)** | **rMCZ 3, Reference Area 2 South Mersea** |
|---|---|
| Research and education<br>Recreation (except for the activities listed above in table 2)<br>Water abstraction, discharge and diffuse pollution*. | |

*The IA assumes that no additional mitigation of impacts of water abstraction, discharge or diffuse pollution will be required over and above that which will be provided to achieve the objectives of the Water Framework Directive through the River Basin Management Plan process (based on advice provided by Natural England, pers. comm., 2010).

## Anticipated benefits to ecosystem services

The habitats, species and other ecological features of the recommended Marine Conservation Zone (rMCZ) Reference Area contribute to the delivery of a range of ecosystem services. Designation of the rMCZ Reference Area and its subsequent management may improve the quantity and quality of the beneficial services provided, which may increase the value (contribution to economic welfare) of them. Impacts on the value of ecosystem services may occur as a result of the designation, management and/or achievement of the conservation objectives of the rMCZ Reference Area. Further discussion on the potential benefits to ecosystem services can be found in Annex L and definitions can be found in Annex H.

| **Table 4a. Fish and shellfish for human consumption** | **rMCZ 3, Reference Area 2 South Mersea** |
|---|---|
| **Baseline** | **Beneficial impact** |

| **Table 4a. Fish and shellfish for human consumption** | | **rMCZ 3, Reference Area 2 South Mersea** |
|---|---|---|
| Fletcher and others (2011) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) Reference Area can contribute to the delivery of fish and shellfish for human consumption.<br><br>The baseline quantity and quality of the ecosystem service provided is assumed to be commensurate with that provided by the features of the site when in favourable condition (see rMCZ 3 Table 1 for details).<br><br>The main commercial fishery within the site is cultivation and harvesting of native oysters by the Blackwater Oystermen, which is a high value fishery. Native oysters have been cultivated and harvested in this site since Roman times and have been managed by the Blackwater Oystermen since the early 1980s. The quality of the native oysters is nationally renowned and this species commands a high price (significantly higher than the price for Pacific oysters). There may be very low levels of fishing in the site for cockles, whelks and pelagic and demersal fish. Further details are given in Table 2a, but there are insufficient data to estimate the value of fisheries in the site. | If the conservation objectives of the features are achieved, the features will be recovered to reference condition.<br><br>Additional management (above that in the baseline situation) of fishing activities is expected which will prohibit fishing within the rMCZ Reference Area. The costs of this are set out in Table 2a.<br><br>Achievement of the conservation objectives may improve the contribution of the habitats to the provision of fish and shellfish for human consumption.<br><br>Closure of the rMCZ Reference Area to fishing activity will reduce the on-site fishing mortality of species, but as the site is small it is unclear whether this would benefit stocks of mobile commercial finfish species. It is, however, anticipated by the Blackwater Oystermen themselves (Balanced Seas Final Recommendations Report, 2011) that closure to oyster dredging would benefit stocks of native oysters.<br><br>As no fishing will be permitted within the rMCZ Reference Area, no on-site benefits will be realised. | Anticipated direction of change:<br><br>  <br><br>Confidence: Low |

| **Table 4b. Recreation** | | **rMCZ 3, Reference Area 2 South Mersea** |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| ***Angling:*** Angling is not known to take place in the site. | N/A | N/A |
| ***Diving:*** Diving is not known to take place in the site. | N/A | N/A |
| ***Wildlife watching:*** Wildlife watching is not known to take place in the site. | N/A | N/A |
| ***Other recreation:*** The site is used to a very small extent by recreational boaters who may anchor there. | The site will be closed to recreational anchoring and there will thus be no increased benefit for this sector. | N/A |

| **Table 4c. Research and education** | **rMCZ 3, Reference Area 2 South Mersea** | |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| ***Research:*** Fletcher and others (2011) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) Reference Area can contribute to the delivery of research services.<br><br>Research activities undertaken by Essex Wildlife Trust in the wider rMCZ in which this rMCZ Reference Area lies may overlap with this area, although there is no confirmed information.<br><br>It has not been possible to estimate the value derived from research activities associated with the rMCZ Reference Area**.** | This rMCZ Reference Area will provide an opportunity for study of the native oyster and comparison of the population of this species within the rMCZ Reference Area with commercially exploited populations outside. Monitoring of the rMCZ Reference Area will help to inform understanding of how the marine environment is changing and how it is impacted on by anthropogenic pressures and management interventions. Other research benefits are unknown. | Anticipated direction of change:<br>⇧<br>Confidence: High |
| ***Education:*** Fletcher and others (2011) identify that the features to be protected by the rMCZ Reference Area can contribute to the delivery of education services.<br><br>No known education activity occurs in the site. | As the rMCZ Reference Area lies just offshore and is relatively inaccessible, no visitor benefits are likely to accrue.<br><br>Non-visitors may benefit if the rMCZ Reference Area contributes to wider provision of education (e.g. television programmes, articles in magazines and newspapers, and educational resources developed for use in schools). | Anticipated direction of change:<br>⇧<br>Confidence: Low |

| **Table 4d. Regulating services** | **rMCZ 3, Reference Area 2 South Mersea** | |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| ***Regulation of pollution:*** The features of the site (native oysters) contribute to the bioremediation of waste and sequestration of carbon (Fletcher and others, 2011).<br><br>***Environmental resilience:*** The features of the site (native oysters) contribute to the resilience and continued regeneration of marine | If the conservation objectives of the features are achieved, the features will be recovered to reference condition.<br><br>Recovery of the native oysters and closure to fishing could increase the site's benthic biodiversity and biomass, improving the regulating capacity of its habitats. | Anticipated direction of change:<br>⇧ |

| **Table 4d. Regulating services** | | **rMCZ 3, Reference Area 2 South Mersea** |
|---|---|---|
| ecosystems (Fletcher and others, 2011).<br><br>***Natural hazard protection:*** Native oysters would contribute to local flood and storm protection (Fletcher and others, 2011).It has not been possible to estimate the value derived from regulating services associated with the rMCZ Reference Area. | Designating the recommended Marine Conservation Zone Reference Area will protect its features and the ecosystem services that they provide against the risk of future degradation from pressures caused by human activities. | Confidence: Low |

| **Table 4e. Non-use and option values** | | **rMCZ 3, Reference Area 2 South Mersea** |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| Some people gain satisfaction from the existence of marine habitats, species and other features. They also gain from having the option to benefit in the future from the habitats and species in the recommended Marine Conservation Zone (rMCZ) Reference Area and the ecosystem services provided, even if they do not currently benefit from them.<br><br>It has not been possible to estimate the value derived from non-use and option values associated with the rMCZ Reference Area. | The rMCZ Reference Area will benefit the proportion of the UK population that values conservation of its features and its contribution to an ecologically coherent network of Marine Protected Areas. Some people will gain satisfaction from knowing that the habitats and species are being conserved (existence value) and/or that they are being conserved for use by others in the current generation (altruistic value) or future generations (bequest value). The rMCZ Reference Area will protect the features and the ecosystem services provided, and thereby the option to benefit from these services in the future, from the risk of future degradation. | Anticipated direction of change:<br><br>⇧<br><br>Confidence: Moderate |

## rMCZ 3 Reference Area 23 Abbots Hall Farm — Site area (km$^2$): 2.80

| **Table 1. Conservation impacts** | **rMCZ 3, Reference Area 23 Abbotts Hall Farm** |
|---|---|

**1a. Ecological description**

This recommended Marine Conservation Zone (rMCZ) Reference Area lies at the top of Salcott Creek within rMCZ 3 (Blackwater, Crouch, Roach and Colne Estuaries), and comprises the coastal marshes of Abbotts Hall Nature Reserve, headquarters of the Essex Wildlife Trust. It extends from the landward edge of the marshes seawards to the mean low water mark. It contains one of two records for the lagoon sea slug *Tenellia adspersa* found within the larger rMCZ, which is the only location within the Balanced Seas Project Area where this species is found. Essex Wildlife Trust has worked with the Environment Agency to undertake managed realignment of the coastline in this location, breaching the sea wall and creating coastal marshes. The lagoon sea slug typically occurs behind sea walls in the borrow dykes. The nature reserve is privately owned by Essex Wildlife Trust and therefore general access is restricted. It lies within the Essex Estuaries Special Area of Conservation and the Blackwater Estuary Site of Special Scientific Interest.

Source: Balanced Seas Final Recommendations (2011).

**1b. Baseline condition of MCZ features and impact of the MCZ**

| Feature | Area of feature (km2) | No. of occurrences | Baseline | Impact of the MCZ |
|---|---|---|---|---|
| ***Species of Conservation Importance*** | | | | |
| Lagoon Sea Slug *Tenellia.adspersa* | - | 1 record | Unfavourable condition | Recover to reference condition |

## Site-specific costs arising from the effect of the rMCZ on human activities (over 2013 to 2032 inclusive)

| **Table 2a. Archaeological heritage** | **rMCZ Reference Area 23, Abbots Hall Farm** |
|---|---|

***Source of costs of the recommended Marine Conservation Zone (MCZ)***

Increase in costs of assessing environmental impacts for future licence applications. Archaeological excavations, surface recovery and intrusive surveys will be prohibited from the entire site. Diver trails, visitors and non-intrusive surveys will be allowed.

| Baseline description of activity | Costs of impact of rMCZ on the sector |
|---|---|
| An iron-age earth mound, associated with salt industry activities, is recorded within the site, plus a sea wall structure dated to 1777 (English Heritage, 2012). | An extra cost would be incurred in the assessment of environmental impacts made in support of any future licence applications for archaeological activities in the site. The likelihood of a future licence application being submitted is not known so no overall cost to the sector of this rMCZ Reference Area has been estimated. However, the additional cost in one licence application could be in the region of |

| **Table 2a. Archaeological heritage** | **rMCZ Reference Area 23, Abbots Hall Farm** |
|---|---|
| | £500 to £10,000 depending on the size of the rMCZ (English Heritage, pers. comm., 2012). 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 is not costed in the Impact Assessment. The prohibition of excavation and therefore interpretation of archaeological evidence from the site will decrease acquisition of historical knowledge of past human communities from the site, resulting in a cost to society. |

## Human activities in the site that are not negatively affected by the MCZ (over 2013 to 2032 inclusive)

| **Table 3. Human activities in the site that are not negatively affected by the recommended Marine Conservation Zone (MCZ) (existing activities at their current levels and future proposals known to the regional MCZ projects)** | **rMCZ 3 Reference Area 23 Abbots Hall Farm** |
|---|---|
| Research and education<br>Flood and coastal erosion risk management (coastal defence)<br>Recreation<br>Water abstraction, discharge and diffuse pollution*. | |

*The IA assumes that no additional mitigation of impacts of water abstraction, discharge or diffuse pollution will be required over and above that which will be provided to achieve the objectives of the Water Framework Directive through the River Basin Management Plan process (based on advice provided by Natural England, pers. comm., 2010).

## Anticipated benefits to ecosystem services

The habitats, species and other ecological features of the recommended Marine Conservation Zone (rMCZ) Reference Area contribute to the delivery of a range of ecosystem services. Designation of the rMCZ Reference Area and its subsequent management may improve the quantity and quality of the beneficial services provided, which may increase the value (contribution to economic welfare) of them. Impacts on the value of ecosystem services may occur as a result of the designation, management and/or achievement of the conservation objectives of the rMCZ Reference Area. Further discussion on the potential benefits to ecosystem services can be found in Annex L and definitions can be found in Annex H.

| **Table 4a. Fish and shellfish for human consumption** | **rMCZ 3, Reference Area 23 Abbotts Hall Farm** |
|---|---|
| **Baseline** | **Beneficial impact** |

| **Table 4a. Fish and shellfish for human consumption** | | **rMCZ 3, Reference Area 23 Abbotts Hall Farm** |
|---|---|---|
| There are no features to be protected by the recommended Marine Conservation Zone Reference Area that contribute to the delivery of fish and shellfish for human consumption, and no fishing activities take place within the site. | N/A | N/A |

| **Table 4b. Recreation** | | **rMCZ 3, Reference Area 23 Abbotts Hall Farm** |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| ***Angling:*** Angling does not take place in the site. | N/A | N/A |
| ***Diving:*** Diving does not take place in the site. | N/A | N/A |
| ***Wildlife watching:*** As a nature reserve, this recommended Marine Conservation Zone (rMCZ) Reference Area is a key site for wildlife watching with regular visitors who come to see a range of species and habitats (Essex Wildlife Trust Website). It is not known whether the lagoon sea slug is promoted by the Essex Wildlife Trust at present as a feature of interest.<br><br>It has not been possible to estimate the value derived from wildlife watching in the rMCZ Reference Area. | If the conservation objectives of the feature are achieved, the feature will be recovered to reference condition.<br><br>The recovery of the feature to reference condition may potentially benefit wildlife watching within the rMCZ Reference Area. In addition, an improvement in the condition of site features and any associated increase in abundance and diversity of species that are visible to wildlife watchers may improve the quality of wildlife watching at the site and therefore the value of the ecosystem service.<br><br>The designation may lead to an increase in wildlife watching visits to the site, which may benefit the local economy. This increase may represent an overall increase in UK wildlife watching visits and/or a redistribution of location preferences.<br><br>Designating the rMCZ Reference Area will protect its feature and the ecosystem services that it provides against the risk of future degradation from pressures caused by human activities. | Anticipated direction of change:<br><br>⇧<br><br>Confidence: Low |

| **Table 4b. Recreation** | **rMCZ 3, Reference Area 23 Abbotts Hall Farm** | |
|---|---|---|
| ***Other recreation:*** Fletcher and others (2011) identify that the feature to be protected by the rMCZ Reference Area can contribute to the delivery of recreation and tourism services.<br><br>The rMCZ Reference Area is popular for a range of recreational activities associated with the existing nature reserve, such as walking.<br><br>It has not been possible to estimate the value derived from other recreation in the rMCZ Reference Area. | If the conservation objectives of the feature are achieved, the feature will be recovered to reference condition.<br><br>The rMCZ Reference Area is fully contained within rMCZ 3 for which the benefits of other recreation have been assessed. It is not possible to identify whether the Reference Area will have additional benefits over and above this but this seems unlikely.<br><br>Designating the rMCZ Reference Area will protect its feature and the ecosystem services that it provides against the risk of future degradation from pressures caused by human activities. | Anticipated direction of change:<br><br>⇧<br><br>Confidence: Low |

| **Table 4c. Research and education** | **rMCZ 3, Reference Area 23 Abbotts Hall Farm** | |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| ***Research:*** Fletcher and others (2011) identify that the feature to be protected by the recommended Marine Conservation Zone (rMCZ) Reference Area can contribute to the delivery of research services.<br><br>Research activities are undertaken by the Essex Wildlife Trust within the rMCZ Reference Area.<br><br>It has not been possible to estimate the value derived from research activities associated with the rMCZ Reference Area. | As an rMCZ Reference Area, the site will provide an opportunity to demonstrate the state of designated marine features in the absence of many anthropogenic pressures (Natural England and JNCC, 2010). It will provide a control area against which the impacts of pressures caused by human activities can be compared as part of long-term monitoring and assessment. Other research benefits are unknown. | Anticipated direction of change:<br><br>⇧<br><br>Confidence: High |
| ***Education:*** Fletcher and others (2011) identify that the feature to be protected by the rMCZ Reference Area can contribute to the delivery of education services.<br><br>The Essex Wildlife Trust carries out a variety of education activities at their reserve at Abbotts Hall (Essex Wildlife Trust website). | MCZ Reference Area designation may provide an opportunity to expand the focus of education events into the marine environment.<br><br>Designation may aid the development of additional local (to the rMCZ Reference Area) education activities (e.g. events and | Anticipated direction of change:<br><br>⇧ |

| **Table 4c. Research and education** | **rMCZ 3, Reference Area 23 Abbotts Hall Farm** | |
|---|---|---|
| It has not been possible to estimate the value derived from education activities associated with the rMCZ Reference Area. | interpretation boards), from which visitors to the site would derive benefit.<br><br>Non-visitors may benefit if the rMCZ Reference Area contributes to wider provision of educational resources (e.g. television programmes, articles in magazines and newspapers, and educational resources developed for use in schools). | Confidence: Moderate |

| **Table 4d. Regulating services** | **rMCZ 3, Reference Area 23 Abbotts Hall Farm** | |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| ***Regulation of pollution:*** N/A | N/A | N/A |
| ***Environmental resilience:*** N/A | N/A | N/A |
| ***Natural hazard protection:*** N/A | N/A | N/A |

| **Table 4e. Non-use and option values** | **rMCZ 3, Reference Area 23 Abbotts Hall Farm** | |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| Some people gain satisfaction from the existence of marine habitats, species and other features. They also gain from having the option to benefit in the future from the habitats and species in the recommended Marine Conservation Zone (rMCZ) Reference Area and the ecosystem services provided, even if they do not currently benefit from them.<br><br>It has not been possible to estimate the value derived from non-use and option values associated with the rMCZ Reference Area. | The rMCZ Reference Area will benefit the proportion of the UK population that values conservation of its feature and its contribution to an ecologically coherent network of Marine Protected Areas. Some people will gain satisfaction from knowing that the habitats and species are being conserved (existence value) and/or that they are being conserved for use by others in the current generation (altruistic value) or future generations (bequest value). The rMCZ Reference Area will protect the feature and the ecosystem services provided, and thereby the option to benefit from these services in the future, from the risk of future degradation. | Anticipated direction of change: ⇧<br><br>Confidence: Moderate |

## rMCZ 5 Thames Estuary

## Site area (km$^2$): 132.14

**Table 1. Conservation impacts** **rMCZ 5, Thames Estuary**

**1a. Ecological description**

This recommended Marine Conservation Zone (rMCZ) would protect benthic habitats considered to be critical to the seasonal reproductive migrations of smelt within the estuary and the seaward migration of European eels from the freshwater reaches to the sea and their subsequent recruitment as juvenile elvers into the estuary. Some of the intertidal habitats upstream of West Thurrock are considered to be integral to the lifecycle and ecology of these two species. Mass spawning of smelt takes place in the spring on sub-tidal gravels between Battersea and Wandsworth. The site has the second highest density of eels of all estuaries surveyed by the Environment Agency. The sea bed towards the estuary mouth is made up of a combination of coarse sediments, mixed sediments, sand and mud, some of which the Environment Agency considers may be in near pristine condition and important for preserving marine ecosystem services, especially fisheries. The Lower Thames Estuary also contains numerous location records for sheltered muddy gravels. The rMCZ also has an important population of tentacled lagoon worm at Greenhithe, and may have a permanent population of short-snouted seahorse. Ross worm occurs here and may provide an important function regarding habitat recovery after disruption, as it is tolerant to poor water quality and reefs are able to form on areas of soft sediment after the initial colonisation of a small area of hard substrate. The Thames is considered to be important for Dover sole, river lamprey, sea lamprey, twaite shad, salmon, flounder, bass, whiting, herring, sprat and cod.

Source: Balanced Seas Final Recommendations (2011).

**1b. Baseline condition of MCZ features and impact of the MCZ**

| Feature | Area of feature (km2) | No. of occurrences | Baseline | Impact of the MCZ |
|---|---|---|---|---|
| ***Broad-scale Habitats*** | | | | |
| A2.2 intertidal sand/muddy sand | 3.28 | - | Favourable condition | Maintain at favourable condition |
| A2.4 intertidal mixed sediments | 0.08 | - | Favourable condition | Maintain at favourable condition |
| A5.1 subtidal coarse sediment | 13.76 | - | Favourable condition | Maintain at favourable condition |
| A5.2 subtidal sand | 9.37 | | Favourable condition | Maintain at favourable condition |
| A5.3 subtidal mud | 19.88 | | Favourable condition | Maintain at favourable condition |
| ***Habitats of Conservation Importance*** | | | | |
| Sheltered muddy gravels | | 21 records | Favourable condition | Maintain at favourable condition |
| ***Species of Conservation Importance*** | | | | |

| **Table 1. Conservation impacts** | | | | **rMCZ 5, Thames Estuary** |
|---|---|---|---|---|
| Tentacled Lagoon Worm (*Alkmaria romijni*) | | 27 records | Favourable condition | Maintain at favourable condition |
| European Eel (*Anguilla anguilla*) | | 476 records | Favourable condition | Maintain at favourable condition |
| Smelt (*Osmerus eperlanus*) | | 528 records | Favourable condition | Maintain at favourable condition |

## Site-specific costs arising from the effect of the recommended Marine Conservation Zone on human activities (over 2013 to 2032 inclusive)

**Table 2a. Archaeological heritage** **rMCZ 5, Thames Estuary**

***Source of costs of the recommended Marine Conservation Zone (rMCZ)***

Increase in costs of assessing environmental impacts for future licence applications (it is not anticipated that any additional mitigation of impacts on features protected by the rMCZ will be needed relative to the mitigation provided in the baseline). Archaeological excavations, surface recovery, intrusive and non-intrusive surveys, diver trails and visitors will be allowed.

| **Baseline description of activity** | **Costs of impact of rMCZ on the sector** |
|---|---|
| Several World War II defence aids/structures are recorded in the site (e.g. pillboxes, anti-aircraft gun sites etc.). Roman, Mesolithic, Viking, Greek, Neolithic and Iron Age artefacts have been recorded in the site and evidence of cup and ring marks, earthworks and burial sites have also been recorded. Wrecked vessels of British, German, Spanish, Norwegian and Irish origin are recorded within the site. There are 3 designated monuments on the boundary of the site – Royal Terrace Pier, Town Pier, Labworth Café - and a record also exists for an archaeological excavation on Vauxhall Foreshore (English Heritage, 2012).<br><br>English Heritage has indicated that this site is likely to be of interest for archaeological excavation in the future as it is relevant to its National Heritage Protection Plan (theme 3A1.2). | An extra cost would be incurred in the assessment of environmental impact made in support of any future licence applications for archaeological activities in the site. The likelihood of a future licence application being submitted is not known so no overall cost to the sector of this rMCZ has been estimated. However, the additional cost of one licence application could be in the region of £500 to £10,000 depending on the size of the MCZ (English Heritage, pers. comm., 2012). No further impacts on activities related to archaeology are anticipated. |

| **Table 2b. Coastal development (excluding ports and harbours)** | **rMCZ 5, Thames Estuary** |
|---|---|
| ***Source of costs of the recommended Marine Conservation Zone (rMCZ)***<br><br>Increase in costs of assessing environmental impacts for future licence applications and costs of mitigation of impacts if required for the proposed Thames Estuary airport and the Thames Crossing. | |
| **Baseline description of activity** | **Costs of impact of rMCZ on the sector** |
| Plans for the Thames Estuary airport are at a very early stage and a number of locations have been suggested. The most recent proposal (the Thames Hub) is for a site that lies within 1km of the rMCZ, and that straddles the land and sea on the Isle of Grain, on the eastern end of the Hoo Peninsula (www.halcrow.com/Thames-Hub/PDF/Thames_Hub_vision.pdf).<br><br>Plans for the Lower Thames Crossing propose 3 major options to increase capacity downstream of the existing Dartford Crossing (Kent County Council 2010). The first option proposes an additional road crossing at the current Dartford Crossing and removing the old Dartford Crossing tunnels; the second option proposes a new road crossing in the Swanscombe Peninsula area, connecting the A2 near Dartford (south) to the A108, north of Tilbury Docks; and the third option proposes a new road crossing connecting the M2 motorway and M20 motorways in the south with the M25 (Jennings, N, Natural England, pers. comm., 27 March 2012). | Because the proposals for both developments are at an early stage, it is not yet known whether additional costs will be incurred as a result of the rMCZ in assessing environmental impacts for future licence applications and whether additional mitigation of impacts on MCZ features will be needed and if so, what it would entail. |

| **Table 2c. National defence** | **rMCZ 5, Thames Estuary** |
|---|---|
| ***Source of costs of the recommended Marine Conservation Zone (rMCZ)***<br><br>Mitigation of impacts of Ministry of Defence (MOD) activities on features protected by the suite of rMCZs will be provided by additional planning considerations during operations and training. It is not known whether mitigation will be required for features protected by this site. The MOD will also incur costs in revising environmental tools and charts to include MCZs. | |

| Baseline description of activity | Costs of impact of rMCZ on the sector |
|---|---|
| The MOD is known to make use of the rMCZ for surface explosions. | It is not known whether this rMCZ will impact on the MOD's use of the site. Impacts of rMCZs on national defence are assessed in Annex H10 and N9 (they are not assessed for this site alone). |

**Table 2d. Ports, harbours, shipping and disposal sites** **rMCZ 5, Thames Estuary**

***Source of costs of the recommended Marine Conservation Zon (rMCZ)***

***Management scenario 1:*** Increase in costs of assessing environmental impacts for future licence applications. This applies to future licence applications for navigational dredging and known specific plans or proposals for port and harbour developments within 1km of the rMCZ. It is anticipated that additional mitigation of impacts on features protected by the MCZ will be needed for known port developments or port-related activities relative to the mitigation provided in the baseline.

***Management scenario 2:*** Increase in costs of assessing environmental impacts for future licence applications. This applies to future licence applications for disposal of dredged material, navigational dredging and all port and harbour developments within 5 km of the rMCZ. Also, additional costs incurred in updating the existing Maintenance Dredging Protocol (MDP) in order to assess impacts of activities on MCZ features. It is anticipated that additional mitigation of impacts on features protected by the MCZ will be needed for port developments or port-related activities relative to the mitigation provided in the baseline.

| Baseline description of activity | Costs of impact of rMCZ on the sector |
|---|---|
| ***Disposal sites:*** There are no disposal sites within 1km if the site.<br><br>There is one disposal site (TH103 Garrison Point) within 5km of the rMCZ. No licence applications were received for this disposal site between 2001 and 2010 but it is not closed to disposal in future (Cefas, pers. comm., 2011).<br><br>***Navigational dredge areas:*** There is an extensive network of licensed dredge navigational channels and berths both within the rMCZ and within 1km of the rMCZ which require periodic dredging to maintain their operational depths. There are 167 specific dredge sites in and within 1km of the rMCZ, 36 of which have active licences ( (Jenkins, N, email feedback response to first tranche of material, 13 January 2012).). It is assumed that | *£m/yr* / Scenario 1 / Scenario 2<br>Cost to the operator / 0.002 / 0.006*<br><br>* This estimate for additional cost in future licence applications for port developments arising as a result of this rMCZ is not used to estimate the total costs for the IA. It is based on different assumptions to those used to estimate costs at a regional level and for the entire suite of sites. Also, this figure assumes that an assessment of environmental impact upon MCZ features is undertaken for each licence renewal (every 3 years). It does not include the cost of incorporating MCZ features in an existing or new MDP. It is likely to over-estimate the cost of Scenario 2 for rMCZs with ports within 5km that have MDPs because of the savings in future costs provided by an MDP. See Annex H for further information |

| **Table 2d. Ports, harbours, shipping and disposal sites** | **rMCZ 5, Thames Estuary** |
|---|---|
| each dredge area's marine licence is renewed once every 3 years, and that an assessment of environmental impact upon MCZ features is undertaken for each licence renewal . As these navigational dredge areas are covered by an existing MDP, it is assumed that the assessment of environmental impact is not changed over the 20 year period of the IA. The MDP, approved by Natural England, has been in place since 2003; the Thames Estuary Partnership Dredging Liaison Group reviews all dredging licences for their environmental impact.<br><br>In addition to the dredging sites mentioned above, that also therefore lie within 5km of the rMCZ, there are additional extensive maintenance dredging sites within 5km of the rMCZ under the Port of London Authority. It is assumed that each dredge area's marine licence is renewed once every 3 years.<br><br>***Port development:*** There are 5 ports and harbours, and over 80 terminals, within 5km of the rMCZ, which are undergoing or may undergo development at some point in the future: Leigh-on Sea, London, Dartford, Purfleet and Tilbury (Ports & Harbours UK, 2012). This may not represent a full list of all ports and harbours impacted by the site.<br><br>As part of the London Gateway Development, capital dredging is being carried out to create a terminal capable of handling the largest deep-sea container ships (www.londongateway.com) which will be completed before any MCZ designation. The dredging and reclamation programme, on the Essex bank of the Thames, including dredging of the approaches to the terminal site is within the rMCZ and started in March 2010 (PLA, 2011). The Port of London is the UK's second biggest port, generating £3,700m economic value added a year and 46,000 full-time equivalent jobs. Each year, the port handles some 50 million tonnes of cargo and accommodates the movement of 230,000 commercial and leisure vessels (PLA, 2010). | ***Scenario 1:*** Future licence applications for navigational dredging and known port or harbour development plans or proposals within 1km of this rMCZ will need to consider the potential effects of the activity on the features protected by the rMCZ. Additional costs will be incurred as a result (a breakdown of these by activity is provided in Annex N11).<br><br>Sufficient information is not available to identify whether any additional mitigation of impacts on features protected by the rMCZ will be needed for proposed future port and harbour developments relative to the mitigation provided in the baseline. Unknown potentially significant costs of mitigation could arise.<br><br>***Scenario 2:*** Future licence applications for disposal of dredged material, navigational dredging and port or harbour development plans and proposals within 5km of this rMCZ will need to consider the potential effects of the activity on the features protected by the rMCZ. Additional costs will be incurred as a result (a breakdown of these by activity is provided in Annex N11).<br><br>Also, additional costs will arise to the update of the existing MDP as this will need to consider the potential effects of activities on the features protected by the rMCZ. The anticipated additional cost in the MDPs is estimated to be a one-off cost of £8438.<br><br>Mitigation is not required for the current dredging (Natural England pers. Comm., 2012). Sufficient information is not available to identify what additional mitigation of impacts on features protected by the MCZ will be needed for proposed future port and harbour developments relative to the mitigation provided in the baseline. Unknown potentially significant costs of mitigation could arise. |

**Human activities in the site that are not negatively affected by the rMCZ (over 2013 to 2032 inclusive)**

| **Table 3. Human activities in the site that are not negatively affected by the rMCZ (existing activities at their current levels and future proposals known to the regional MCZ projects)** | **rMCZ 5, Thames Estuary** |
|---|---|
| Commercial fisheries (bottom trawls, dredges, hooks and lines, mid-water trawls, nets, pots and traps, collection by hand)<br>Flood and coastal erosion risk management (coastal defence)<br>Generation of electricity on land (power stations)<br>Recreation<br>Research and education<br>Shipping<br>Water abstraction, discharge and diffuse pollution*. | |

*The IA assumes that no additional mitigation of impacts of water abstraction, discharge or diffuse pollution will be required over and above that which will be provided to achieve the objectives of the Water Framework Directive through the River Basin Management Plan process (based on advice provided by Natural England, pers. comm., 2010).

## Anticipated benefits to ecosystem services

The habitats, species and other ecological features of the recommended Marine Conservation Zone (rMCZ) contribute to the delivery of a range of ecosystem services. Designation of the rMCZ and its subsequent management may improve the quantity and quality of the beneficial services provided, which may increase the value (contribution to economic welfare) of them. Impacts on the value of ecosystem services may occur as a result of the designation, management and/or achievement of the conservation objectives of the rMCZ. Further discussion on the potential benefits to ecosystem services can be found in Annex L and definitions can be found in Annex H.

| **Table 4a. Fish and shellfish for human consumption** | | **rMCZ 5, Thames Estuary** |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| Fletcher and others (2011) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) can contribute to the delivery of fish and shellfish for human consumption.<br><br>Subtidal coarse sediments, sand and mud and intertidal sand, muddy sand and mixed sediments are important for spawning and nursery grounds. These habitats can provide important nursery grounds for juvenile commercial species such as flatfishes and bass (Fletcher and others, 2011). | If the conservation objectives of the features are achieved, some features will be maintained in favourable condition and some recovered to favourable condition.<br><br>No additional management (above that in the baseline situation) of fishing activities is expected. However, maintaining and monitoring the current fishing practices will safeguard the healthy population of commercial fish and ensure no increase in fishing activity occurs or alternative gears are used. | Anticipated direction of change:<br><br>⇔<br><br>Confidence: Moderate |

| **Table 4a. Fish and shellfish for human consumption** | | **rMCZ 5, Thames Estuary** |
|---|---|---|
| The Thames Estuary is considered to be an important commercial fish nursery area for several species (including Dover sole and European eel) (Balanced Seas Final Recommendations Report, 2011). As such it is likely to help to support potential on-site and off-site fisheries.<br><br>The baseline quantity and quality of the ecosystem service provided is assumed to be commensurate with that provided by the features of the site when in favourable condition (see Table 1 for details).<br><br>A low level of commercial fishing is conducted within the Outer Estuary and some small licensed skiffs conduct eel fyke netting within the Inner Estuary. Under 15 metres vessels active in this site use dredges, bottom trawls and nets. The total value of landings derived from commercial fisheries within this site is £0.179m/yr (MCZ Fisheries Model).<br><br>It has not been possible to estimate the value of the off-site benefits that derive from the spawning and nursery area. | No change in feature condition or harvesting of fish and shellfish is anticipated and therefore no impact on on-site or off-site benefits is expected.<br><br>Designating the rMCZ will protect its features and the ecosystem services that they provide against the risk of future degradation from pressures caused by human activities. | |

| **Table 4b. Recreation** | | **rMCZ 5, Thames Estuary** |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| ***Angling:*** Fletcher and others (2011) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) can contribute to the delivery of fish and shellfish for human consumption and recreation.<br><br>The baseline quantity and quality of the ecosystem service provided is assumed to be commensurate with that provided by the features of the site when in favourable condition (see Table 1 for details).<br><br>Subtidal coarse sediments, sand and mud and intertidal sand, muddy sand and mixed sediments are important for spawning and nursery grounds. These habitats can provide important nursery grounds for juvenile commercial | If the conservation objectives of the features are achieved, the features will be maintained in favourable condition.<br><br>As no additional management of angling is expected, fishers will be able to benefit from any on-site and off-site beneficial effects. If the rMCZ results in an increase in the size and diversity of species caught then this is expected to increase the value derived by anglers.<br><br>The designation may lead to an increase in angling visits to the site, which may benefit the local economy. This increase | Anticipated direction of change:<br><br>⇔<br><br>Confidence: Moderate |

| **Table 4b. Recreation** | | **rMCZ 5, Thames Estuary** |
|---|---|---|
| species such as flatfishes and bass (Fletcher and others, 2011).<br><br>The Thames Estuary is an important nursery area for fish caught recreationally (including bass) (Balanced Seas Final Recommendations Report, 2011).<br><br>Both boat and shore angling for freshwater and marine species takes place throughout the rMCZ. Shore angling is particularly popular with local anglers off the pier at Southend-on-Sea, and charter boats take anglers fishing in the subtidal areas in the Outer Estuary within the site. The system of sand banks and channels in the Outer Thames Estuary outside the rMCZ is popular with boat and charter boat anglers fishing for numerous species including mackerel, dogfish and ray, and this off-site area may benefit from spill-over effects. Therefore, the nursery ground for several fish species within the site is likely to help to support potential on-site and off-site fisheries<br><br>It has not been possible to estimate the value derived from angling on-site or the proportion of the value derived from angling off-site that results from the intertidal and subtidal habitats. | might arise from a change in anglers' preferred angling locations rather than an increase at a national scale in days spent angling or the number of anglers. | |
| ***Diving:*** Diving is not known to take place in the rMCZ. | N/A | N/A |
| ***Wildlife watching:*** Fletcher and others (2011) identify that the features to be protected by the rMCZ can contribute to the delivery of recreation and tourism services.<br><br>The baseline quantity and quality of the ecosystem service provided is assumed to be commensurate with that provided by the features of the site when in favourable condition (see Table 1 for details).<br><br>The Thames Estuary is recognised as an important corridor for wildlife due to its transition from marine to fresh water. The diverse habitats within the site support a wide range of fish, birds and marine mammals (Thames Estuary | If the conservation objectives of the features are achieved, the features will be maintained in favourable condition.<br><br>No change in on-site feature condition is anticipated and therefore no benefits to wildlife watching are expected. However, if the rMCZ is designated this will provide an additional positive aspect about the location that could be promoted by organisations involved with wildlife watching and that would be expected to increase visitation rates and therefore the value of the ecosystem service. An increase in wildlife watching visits to the site may benefit the local | Anticipated direction of change:<br><br>⟺<br><br>Confidence: Moderate |

| **Table 4b. Recreation** | | **rMCZ 5, Thames Estuary** |
|---|---|---|
| Partnership, pers. comms, 2012). Grey and common seals have been spotted as far up as Teddington and dolphin and porpoise are a regular sight as far up as Tower Bridge (Zoological Society of London website). Seal haul-outs occur in the Lower and Outer Estuary where mudlfats provide the ideal locations and wildfowl and wintering birds are attracted in large numbers by the salt marshes and tidal flats (Stakmap, 2010).<br><br>Birdwatching is by far the most popular activity. Upstream there is the London Wetland Centre in Barnes, providing viewing platforms out across the wetlands into the estuary (London Wetland Centre website). Other reserves adjacent to the rMCZ are found in the Outer Estuary in the Essex and Kent marshes, such as those run by the RSPB at Rainham Marshes, Northward Hill, Cliffe Pools, Shorne Marshes and Canvey Marshes; all offer opportunities for birdwatching throughout the year (RSPB website). Marine mammal watching is also possible from some these locations (Thames Estuary Partnership, pers. comms. 2012).<br><br>It has not been possible to estimate the value derived from wildlife watching in the rMCZ. | economy. This increase may represent a redistribution of location preferences rather than an overall increase in wildlife watching trips at the national scale.<br><br>Designating the rMCZ will protect its features and the ecosystem services that they provide against the risk of future degradation from pressures caused by human activities. | |
| ***Other recreation:*** Fletcher and others (2011) identify that the features to be protected by the rMCZ can contribute to the delivery of recreation and tourism services.<br><br>The Thames Estuary is a very popular tourist destination especially for recreational sailing, kayaking, canoeing and coastal/estuarine walking. The Thames Path is a well known walking trail running alongside the river throughout the rMCZ (National Trails website). There are numerous sailing, kayaking and canoeing clubs within the site as well as marinas and docks attracting recreational vessels nationally and internationally (British Waterways website). Tourist trips on larger vessels including old sailing boats such as Thames barges operate throughout the rMCZ during the summer months. Archaeological and historical walks are common along the foreshore | If the conservation objectives of the features are achieved, the features will be maintained in favourable condition.<br><br>No change in on-site feature condition is anticipated and therefore no benefits to tourism are expected. However, the designation of this iconic river as an MCZ is expected to appeal to tourists and leisure users and thus increase recreation in the site.<br><br>Designating the rMCZ will protect its features and the ecosystem services that they provide against the risk of future degradation from pressures caused by human activities. | Anticipated direction of change:<br><br>⟺<br><br>Confidence: Moderate |

| **Table 4b. Recreation** | | **rMCZ 5, Thames Estuary** |
|---|---|---|
| at low tide.<br><br>It has not been possible to estimate the value derived from other recreation in the rMCZ. | | |

| **Table 4c. Research and education** | | **rMCZ 5, Thames Estuary** |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| ***Research:*** Fletcher and others (2011) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) can contribute to the delivery of research services.<br><br>Kent and Essex Wildlife Trusts and the RSPB conduct research within the rMCZ (Wildlife Trusts' and RSPB websites). The Port of London Authority (PLA) carries out regular environmental surveys and supports environmental research within the site (PLA website). Other bodies conducting research within the rMCZ include: the Zoological Society of London (ZSL), which monitors elver recruitment into the estuary and collates marine mammal sightings from the public (ZSL website); the Thames Landscape Strategy and the Thames Strategy – Kew to Chelsea (respective websites); universities and colleges within Greater London with an aquatic focus such as UCL, King's College and St Mary's University College (respective websites). | Monitoring of the rMCZ will help inform understanding of how the marine environment is changing and is impacted on by anthropogenic pressures and management interventions. Other research benefits are unknown. | Anticipated direction of change:<br><br>⇧<br><br>Confidence:<br><br>High |
| ***Education:*** Fletcher and others (2011) identify that the features to be protected by the rMCZ can contribute to the delivery of education services.<br><br>Guided walks and educational activities along the banks of the Thames Estuary are undertaken frequently by schools and universities. Numerous educational centres and environmental non-governmental organisations provide outreach services into schools that involve training days on the river, such as Thames21, London Wildlife Trust | There is still misconception that the Thames Estuary is not ecologically healthy and due to the high levels of urbanisation, many communities may not realise the resources that the river affords them. MCZ designation will provide an opportunity to reverse this incorrect perception and to expand the focus of education events into the marine environment.<br><br>Designation may aid additional local (to the rMCZ) provision of education activities (e.g. events, interpretation boards), from | Anticipated direction of change:<br><br>⇧<br><br>Confidence: |

| **Table 4c. Research and education** | | **rMCZ 5, Thames Estuary** |
|---|---|---|
| and Creekside Centre (respective websites). | which visitors would derive benefit.<br><br>Non-visitors may benefit if the rMCZ contributes to wider provision of education (e.g. television programmes, articles in magazines and newspapers, and educational resources developed for use in schools). | Moderate |

| **Table 4d. Regulating services** | | **rMCZ 5, Thames Estuary** |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| ***Regulation of pollution:*** the features of the site contribute to the bioremediation of waste (intertidal mud and subtidal sediments) and sequestration of carbon (sheltered muddy gravels) (Fletcher and others, 2011).<br><br>**Environmental resilience:** the features (sheltered muddy gravels) of the site contribute to the resilience and continued regeneration of marine ecosystems (Fletcher and others, 2011).<br><br>***Natural hazard protection:*** the features of the site, (intertidal sediments) contribute to local flood and storm protection (Fletcher and others, 2011).<br><br>It has not been possible to estimate the value derived from regulating services associated with the rMCZ. | If the conservation objectives of the features are achieved, the features will be maintained in favourable condition.<br><br>No change in feature condition and management of human activities is expected and therefore no benefit to the regulation of pollution is expected.<br><br>Designating the rMCZ will protect its features and the ecosystem services that they provide against the risk of future degradation from pressures caused by human activities. | Anticipated direction of change:<br><br>⇔<br><br>Confidence: Moderate |

| **Table 4e. Non-use and option values** | | **rMCZ 5, Thames Estuary** |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| Some people gain satisfaction from the existence of marine habitats, species and other features. They also gain from having the option to benefit in the future from the habitats and species in the rMCZ and the ecosystem services provided, even if they do not currently benefit from | The rMCZ will benefit the proportion of the UK population that values conservation of the rMCZ features and its contribution to an ecologically coherent network of MPAs. Some people will gain satisfaction from knowing that the habitats and species are being | Anticipated direction of change:<br><br>⇧ |

| **Table 4e. Non-use and option values** | | **rMCZ 5, Thames Estuary** |
|---|---|---|
| them.<br><br>It has not been possible to estimate the value derived from non-use and option value services associated with the rMCZ. | conserved (existence value) and/or that they are being conserved for use by others in the current generation (altruistic value) or future generations (bequest value). The rMCZ will protect both the features and the option to benefit from the services in the future from the risk of future degradation.<br><br>Examples of these values are shown in (Ranger, Lowe, Sanghera, & Solandt, 2012). Voters in the MCS's 'Your Seas Your Voice' campaign felt that features of the natural environment were strong motivators for reasons why people thought areas within the rMCZ should be protected, with people frequently attaching value to biodiversity and 'spectacular scenery.' Other themes that came up quite frequently were the sentiment that they felt "the whole place is amazing" and a feeling of emotional attachment to the site as well in that they 'mean a great deal to them personally'. Furthermore, maintaining species health was perceived as an important management reason to protect the site particularly fish and shellfish and the importance of the estuary as fish nursery habitat and for bird populations. Regarding non-extractive use value, ease of access and the provision of good facilities were considered important as reasons to protect this site.<br><br>Source: Ranger et al. (2011) | Confidence: Moderate |

## rMCZ 5. Reference Area 3 Holehaven Creek

**Site area (km$^2$):** 2.09

| **Table 1. Conservation impacts** | | | **rMCZ 5, Reference Area 3 Holehaven Creek** | |
|---|---|---|---|---|
| **1a. Ecological description** | | | | |
| This recommended Marine Conservation Zone (rMCZ) Reference Area lies within rMCZ 5 (Thames Estuary) and encompasses the entirety of Holehaven Creek, a tributary of the River Thames. The boundary follows the existing boundary for Holehaven Creek Site of Special Scientific Interest. It is the only rMCZ Reference Area within the Balanced seas Project Area that is recommended for sheltered muddy gravels and has also been identified for the protection of three broad-scale habitats: intertidal sand and muddy sand; intertidal mud; and subtidal mud. The wider rMCZ in which this site falls is an important spawning and nursery ground for various fish species, particularly smelt *Osmerus eperlanus* and European eel *Anguilla anguilla* and so is a biodiversity-rich area to which this smaller rMCZ Reference Area may contribute.<br><br>Source: Balanced Seas Final Recommendations (2011). | | | | |
| **1b. Baseline condition of MCZ features and impact of the MCZ** | | | | |
| **Feature** | **Area of feature (km2)** | **No. of occurrences** | **Baseline** | **Impact** |
| ***Broad-scale habitats*** | | | | |
| A2.2 Intertidal sand and muddy sand | 0.01 km$^2$ | - | Unfavourable condition | Recover to reference condition |
| A2.3 Intertidal mud | 1.5 km$^2$ | - | Unfavourable condition | Recover to reference condition |
| A5.3 Subtidal mud | - | - | Unfavourable condition | Recover to reference condition |
| ***Habitats of Conservation Importance*** | | | | |
| Sheltered muddy gravels | - | 1 record | Unfavourable condition | Recover to reference condition |

## Site-specific costs arising from the effect of the recommended Marine Conservation Zone on human activities (over 2012 to 2032 inclusive)

| **Table 2a. Archaeological heritage** | **rMCZ 5, Reference Area 3, Holehaven Creek** |
|---|---|
| ***Source of costs of the recommended Marine Conservation Zone (rMCZ)*** | |
| Increase in costs of assessing environmental impacts for future licence applications. Archaeological excavations, surface recovery and intrusive surveys will | |

| **Table 2a. Archaeological heritage** | **rMCZ 5, Reference Area 3, Holehaven Creek** |
|---|---|
| be prohibited from the entire site. Diver trails, visitors and non-intrusive surveys will be allowed. | |
| **Baseline description of activity** | **Costs of impact of rMCZ on the sector** |
| Available records include a 1940 British cargo vessel and a 1915 English barge on the edge of the rMCZ Reference Area (English Heritage, 2012). | An extra cost would be incurred in the assessment of environmental impacts made in support of any future licence applications for archaeological activities in the site. The likelihood of a future licence application being submitted is not known so no overall cost to the sector of this rMCZ has been estimated. However, the additional cost in 1 licence application could be in the region of £500 to £10,000 depending on the size of the MCZ (English Heritage, pers. comm., 2012). 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 is not costed in the IA. The prohibition of excavation and therefore interpretation of archaeological evidence from the site will decrease acquisition of historical knowledge of past human communities from the site, resulting in a cost to society. |

| **Table 2b. Commercial fisheries** | **rMCZ 5, Reference Area 3, Holehaven Creek** |
|---|---|
| ***Source of costs of the recommended Marine Conservation Zone (rMCZ)*** | |
| Closure of entire site to all gear types. | |
| **Baseline description of activity** | **Costs of impact of rMCZ on the sector** |
| ***Overview:*** This rMCZ Reference Area is primarily an intertidal area, and lies within rMCZ 5 Thames Estuary. More detail on the approach used for the fisheries method is provided at Annexes H7 and N4.<br><br>Estimated total value of landings from the rMCZ Reference Area: £10/yr (MCZ Fisheries Model).<br><br>(Due to resolution issues of the MCZ Fisheries Model and the small size of many rMCZ Reference Areas in the Balanced Seas region, some fisheries landings values may be inaccurate. They have been included as a precautionary measure and to avoid underestimating the economic impact of a site.) | |

<table>
<tr><th colspan="2">Table 2b. Commercial fisheries rMCZ 5, Reference Area 3, Holehaven Creek</th></tr>
<tr><td>Bottom trawls: It is unknown how many vessels use bottom trawls in the rMCZ Reference Area but very low activity is indicated in this site (FisherMap Data 2010).<br><br>Estimated total value of landings from the rMCZ Reference Area: £10/yr (MCZ Fisheries Model).</td><td>Estimated annual value of UK vessel landings affected:<br><br><table><tr><td>£m/yr</td><td>Scenario 1</td></tr><tr><td>Value of landings affected</td><td><0.001*</td></tr></table>* £10</td></tr>
<tr><td>Nets: It is unknown how many vessels use nets in the rMCZ Reference Area but very low activity is indicated in this site (FisherMap Data 2010).<br><br>Estimated total value of landings from the rMCZ Reference Area: £Negligible (MCZ Fisheries Model).</td><td>Estimated annual value of UK vessel landings affected:<br><br><table><tr><td>£m/yr</td><td>Scenario 1</td></tr><tr><td>Value of landings affected</td><td><0.001*</td></tr></table>* Negligible</td></tr>
<tr><td>Total direct impact on UK commercial fisheries</td><td></td></tr>
<tr><td></td><td>Estimated annual value of UK vessel landings and gross value added (GVA) affected:<br><br><table><tr><td>£m/yr</td><td>Scenario 1</td></tr><tr><td>Value of landings affected</td><td><0.001*</td></tr><tr><td>GVA affected</td><td>0.000</td></tr></table>* £10</td></tr>
<tr><td>Baseline description of non-UK fisheries</td><td>Costs of impact of rMCZ on non-UK commercial fisheries</td></tr>
<tr><td></td><td>None.</td></tr>
</table>

<table>
<tr><th>Table 2c. Flood and coastal erosion risk management rMCZ 5, Reference Area 3, Holehaven Creek</th></tr>
<tr><td>Source of costs of the recommended Marine Conservation Zone (rMCZ)<br><br>Management scenario 1: no impact arises. This is because changes in the frequency and length of time the tidal barriers will need to be closed and</td></tr>
</table>

| **Table 2c. Flood and coastal erosion risk management** | **rMCZ 5, Reference Area 3, Holehaven Creek** |
|---|---|
| changes in the volume of freshwater pumped into the creek by the pumping station do not arise as a result of climate change, or if they do arise, they do not impact on the MCZ's features.<br><br>***Management scenario 2:*** Provision of equivalent environmental benefit by the body that is operating the tidal barriers and the pumping to compensate for the impact that changes in the operation of these (in response to climate change) has on features protected by the MCZ.<br><br>***Both management scenarios 1 and 2:*** An increase in costs of assessing environmental impacts for future licence applications for maintenance work for the coastal defence scheme | |
| **Baseline description of activity** | **Costs of impact of rMCZ on the sector** |
| Holehaven Creek rMCZ Reference Area potentially impacts on 3 policy units in Zone 7 of the Thames Estuary 2100 (TE2100) Flood Risk Management Plan (Natural England and Environment Agency Flood and Coastal Erosion Risk Management Workshop for the Balanced Seas Project Area, 17 November 2011):<br><br>• Canvey Island (to the south) and Bowers March (to the north) on the east side of the creek. These are covered by policy P4 which assumes it may be necessary to take further action to keep up with climate and land-use change so that flood risk does not increase.<br>• Shellhaven and Fobbing Marshes on the west side of the creek. These are covered by policy P3 which is to continue with the existing or alternative actions to management flood risk at the current level (accepting that flood risk will increase over time from the baseline) but to supplement this with local secondary defences to protect key sites.<br><br>In addition to defences such as embankments, there are 3 tidal barriers to control flooding of the land surrounding Holehaven Creek: Fobbing Horse on Vange Creek (the northern part of Holehaven Creek); East Haven (in East Haven Creek, which runs into Holehaven Creek and connects with Benfleet Creek north of Canvey Island); and Benfleet (on Benfleet Creek north of Canvey Island). The 3 barriers are closed approximately 10 times a | ***Scenario 1***: No costs to the operator of activities that manage flood risk other than an increase in costs for future licence applications.<br><br>***Scenario 2***: Because of the social and economic importance of the flood risk management that is provided, it is assumed that necessary changes in operation of the tidal barriers and the pumping station in response to climate change will take place. It is assumed that impacts on features protected by the MCZ will not be mitigated.<br><br>The cost is assessed in the impact assessment (IA) in terms of the cost to the operator of providing environmental benefit that is equivalent to the impact that changes in operation of the tidal barriers and the pumping station have on features protected by the rMCZ. In the event that an activity impacts on achieving the conservation objectives of an MCZ's features, this would be required under Section 126(7) of the Marine and Coastal Access Act (2009). The cost of this has not been assessed because it is not yet known how equivalent environmental benefit would be provided.<br><br>The impacts have been assessed in this way because the assessment is of the impacts of the regional MCZ projects' site recommendations that were submitted in September 2011. The Minister's decision about designating this site will be also informed by Natural England's and JNCC's statutory advice on |

| **Table 2c. Flood and coastal erosion risk management** | **rMCZ 5, Reference Area 3, Holehaven Creek** |
|---|---|
| year for about 2 hours at a time, to prevent flooding. If the weather becomes stormier and the frequency of higher tides increases, the frequency and length of time the barriers will need to be closed could increase. This could impact on the amount of time intertidal species in the rMCZ Reference Area are exposed to air higher up the creek as water will be prevented from flowing up the creek due to the barriers being closed (Natural England and Environment Agency Flood and Coastal Erosion Risk Management Workshop for the Balanced Seas Project Area, 17 November 2011).<br><br>The east resources that these policies manage flood risk for are as follows:<br><br>• **Canvey Island**: If the defences were breached or overtopped, this would risk flooding low-lying marsh on the west of Canvey Island, managed by the Royal Society for the Protection of Birds, 12ha of urban land with 4 residential (isolated farms), 23 non-residential properties and 1.8km of A-class road. As there is no secondary defence between this area and the eastern side of Canvey Island, there would be a risk of flooding to the whole of the unit, which would affect a further 15,000 residential properties and an extensive industrial complex with oil and gas storage tanks that have national significance.<br>• **Shell Haven and Fobbing Marshes:** Flooding is most likely to occur through breaching or overtopping of the defences, or through failure of the Fobbing Horse Barrier. The area has 623 residential and 123 non-residential properties, including the Coryton oil refinery and the London Gateway Port at Shell Haven (now formally approved by Department for Transport (DfT) and Communities and Local Government (CLG)). The latter are assets of national significance.<br><br>Pitsea Pumping Station is operated during high rainfall to prevent upstream flooding. The freshwater is then pumped into the creek system. Climate change could result in a higher frequency of higher rainfall levels resulting | MCZs that was published on 18 July 2012. Where it is feasible, it is anticipated that the advice will suggest that the site recommendation is adjusted to increase the likelihood that the MCZ features' conservation objectives can be achieved. Such adjustment is not included in the IA because the IA is an assessment of the regional MCZ projects' recommendations.<br><br>The operator will also incur additional costs for future licence applications for the flood management activities.<br><br>***Best estimates of impacts of mitigation***: this is midway between Scenarios 1 and 2, assuming that each Scenario has an equal probability of arising<br><br>***Scenarios 1 and 2:*** As a result of the rMCZ Reference Area, it is anticipated that additional costs will be incurred in assessing environmental impacts in support of future licence applications for Flood and Coastal Erosion Risk Management (FCERM) schemes. For each licence application these costs are expected to arise as a result of approximately 0.5–1 day of additional work, in most cases, although there may be cases where further additional consultant time is needed (Environment Agency, pers. comm., 2012). It has not been possible to obtain information on the likely number of licence applications that will be made over the 20 year period of the IA or estimates of the potential increase in costs. |

| **Table 2c. Flood and coastal erosion risk management** | **rMCZ 5, Reference Area 3, Holehaven Creek** |
|---|---|
| in an increase of freshwater being pumped into the creek at Pitsea Pumping Station. This could impact on species found to live in the broad-scale habitats which prefer more saline conditions (Flood and Coastal Erosion Risk Management Workshop for the Balanced Seas Project Area, 17 November 2011). | |

**Table 2d. Ports, harbours, shipping and disposal sites** **rMCZ 5, Reference Area 3, Holehaven Creek**

***Source of costs of the recommended Marine Conservation Zone (rMCZ)***

***Management scenario 1:*** Increase in costs of assessing environmental impacts for future licence applications. This applies to future licence applications for navigational dredging that takes place within 1km of the rMCZ Reference Area. It is anticipated that the entire site will be closed to navigational and maintenance dredging.

***Management scenario 2:*** Increase in costs of assessing environmental impacts for future licence applications. This applies to future licence applications for navigational dredging and all port and harbour developments within 5 km of the rMCZ. Also, additional costs in updating the existing Maintenance Dredging Protocol (MDP) in order to assess impacts of activities on rMCZ Reference Area features. It is anticipated that the entire site will be closed to navigational and maintenance dredging and additional mitigation of impacts on features protected by the rMCZ Reference Area will be needed for proposed future port and harbour developments relative to the mitigation provided in the baseline.

| **Baseline description of activity** | **Costs of impact of rMCZ on the sector** |
|---|---|
| ***Navigational dredge areas:*** The Port of London Authority (PLA) periodically undertakes maintenance dredging of the berths in Pitsea Creek, although this has not been necessary for several years due to natural scouring by the tide (PLA, 2011). However, the PLA needs to retain the option to carry out maintenance dredging for safety reasons and in case of any changes brought about by the capital dredge in the Outer Estuary. The PLA is currently receiving requests from operators to widen/deepen channels within the site (Natural England, pers.comm., November 2011). The berths, which are used by small vessels, provide significant benefits to the local economy and there | *£m/yr* / Cost to the operator: Scenario 1 = 0.003; Scenario 2 = 0.003*<br>* This estimate for additional cost in future licence applications for port developments arising as a result of this rMCZ is not used to estimate the total costs for the IA. It is based on different assumptions to those used to estimate costs at a regional level and for the entire suite of sites. Also, this figure assumes that an assessment of environmental impact upon MCZ features is undertaken for each licence renewal (every 3 years). It does not include the cost of incorporating MCZ features in an existing or new MDP. It is likely to over-estimate the cost of Scenario 2 for rMCZs with ports within 5km that have MDPs because of the savings in future |

| **Table 2d. Ports, harbours, shipping and disposal sites** | **rMCZ 5, Reference Area 3, Holehaven Creek** |
|---|---|
| are few alternative berths for small vessels in the area (Gibson, C, Natural England, pers. comm., 2012). It is assumed that each dredge area's marine licence is renewed once every 3 years, and that an assessment of environmental impact upon MCZ features is undertaken for each licence renewal. As these navigational dredge areas are covered by an existing MDP, it is assumed that the assessment of environmental impact is not changed over the 20 year period of the IA.<br><br>***Port development:*** There is 1 harbour (Leigh-on-Sea - Ports & Harbours UK, 2012) within 5km of the rMCZ Reference Area, which potentially could undergo development at some point in the future. (This may not represent a full list of all ports and harbours impacted by the site.) No port developments are known to be planned within the 20 year period of the Impact Assessment (IA). | costs provided by an MDP. See Annex H for further information.<br><br>***Closure of site to navigational dredging in Scenarios 1 and 2:*** It is anticipated that closure of the site to navigational dredging could eventually result in closure of the berths for small vessels in Pitsea Creek. Because there are few alternative berths in the area, this could impact on vessel safety. Closure of the berths would result in significant impacts on the local businesses that provide services to the berth users. Because of the importance of the berths, the IA assumes that the dredging would continue and the impacts of this on the MCZ features would not be mitigated.<br><br>The cost is assessed in the impact assessment (IA) in terms of the cost to the operator of providing environmental benefit that is equivalent to the impact that the navigational dredging has on the features protected by the rMCZ Reference Area. In the event that an activity impacts on achieving the conservation objectives of an MCZ's features, this would be required under Section 126(7) of the Marine and Coastal Access Act 2009. The cost of this has not been assessed because it is not yet known how equivalent environmental benefit would be provided and what it would cost.<br><br>The impacts have been assessed in this way because the assessment is of the impacts of the regional MCZ projects' site recommendations that were submitted in September 2011. The Minister's decision about designating this site will be also informed by Natural England's and JNCC's statutory advice on MCZs that was published on 18 July 2012. Where it is feasible, it is anticipated that the advice will suggest that the site recommendation is adjusted to increase the likelihood that the MCZ features' conservation objectives can be achieved. Such adjustment is not included in the IA because the IA is an assessment of the regional MCZ projects' recommendations.<br><br>***Scenario 1:*** If the navigational dredge in the rMCZ Reference Area continues following designation, as described above, impacts on the MCZ's features will need to be considered in applications for renewal of the licence for the dredge. To avoid |

| **Table 2d. Ports, harbours, shipping and disposal sites** | **rMCZ 5, Reference Area 3, Holehaven Creek** |
|---|---|
| | under-estimation of the costs, the additional costs that would be incurred are included in this Scenario. Additional costs will be incurred as a result (a breakdown of these by activity is provided in Annex N11).<br><br>***Scenario 2:*** Future licence applications for navigational dredging and port developments within 5km of this rMCZ Reference Area will need to consider the potential effects of the activity on the features protected by the rMCZ. Additional costs will be incurred as a result (a breakdown of these by activity is provided in Annex N11).<br><br>Also, additional costs will be incurred to update the existing MDP to consider the potential effects of activities on the features protected by the rMCZ. The anticipated additional cost in the MDP is estimated to be a one-off cost of £8438.<br><br>Sufficient information is not available to identify whether any additional mitigation of impacts on features protected by the MCZ will be needed for proposed future port and harbour developments relative to the mitigation provided in the baseline. Unknown potentially significant costs of mitigation could arise. |

| **Table 2e. Recreational anchoring** | **rMCZ 5, Reference Area 3, Holehaven Creek** |
|---|---|
| ***Source of costs of the recommended Marine Conservation Zone (rMCZ)***<br><br>Closure of entire site to all recreational anchoring (except in emergency circumstances) and installation of eco-moorings outside the rMCZ Reference Area. | |
| **Baseline description of activity** | **Costs of impact of MCZ on the sector** |
| Recreational vessels anchor mainly at weekends and during holidays. Normally, no more than 20 visiting boats anchor at any one time; they anchor in order to unload, pick up passengers, shelter from bad weather and re-fuel the vessel opposite The Lobster Smack pub, which is also a favourite establishment amongst visitors. The mouth of the estuary is the busiest area in the rMCZ Reference Area. It has 28 moorings and a mixture | Closure to anchoring will impact on a number of recreational users, particularly anglers during competitions. It may also impact on local businesses.<br><br>To reduce the impacts of this, the IA assumes that eco-moorings would be installed outside the rMCZ Reference Area. The costs of this are included in the costs of the management scenario for the site though it is uncertain whether it installation of eco-moorings would be feasible. Using the approach |

| **Table 2e. Recreational anchoring** | **rMCZ 5, Reference Area 3, Holehaven Creek** |
|---|---|
| of commercial fishing boats and charter boats anchor. However, during angling competitions up to 60 vessels anchor in the area. There are approximately 35 moorings near Wat Tyler Country Park, where there is a Royal Yachting Association (RYA) training school. Maintenance of the 28 moorings at the mouth of the creek occurs every 2 to 3 years and involves pulling the moorings out (Natural England Stakeholder Interview for rMCZ Reference Area 3 Holehaven Creek, November 2011, and M. Sharp, Local Group Angling Representative, email, 13th January, 2012) | developed and costs calculated for eco-mooring installation in Studland Bay (Marina Projects, 2011), capital costs for the installation of 30 eco-moorings (a number suggested by the project team) outside Holehaven Creek is estimated to total £0.187m (see Annex N12 for the assumptions used in the calculations), a one-off cost assumed to occur in the first year after designation (2013). This figure would allow for removal of existing moorings. Operating costs, including maintenance of the eco-moorings and collection of mooring fees, are estimated to total £0.068m/yr. (See Annex N12 for the assumptions used in the calculations.) It is assumed that a fee for use of the eco-mooring would be required to cover continued maintenance costs. For 30 eco-moorings, the total cost to visiting boats of such fees would be £0.068m/yr.<br><br>The total cost of eco-moorings is taken to be the sum of the mooring fees and capital costs, plus any operating costs not covered by the mooring fees. The present value of the costs is £1.150m.<br><br>There are probably a limited number of suitable places for installing eco-moorings outside the rMCZ Reference Area because of the busy nature of this part of the Thames Estuary. However, it might be possible to place the eco-moorings immediately outside the seaward boundary of the rMCZ Reference Area but within the boundary of the Holehaven Site of Special Scientific Interest which is south of the site. |

| **Table 2f. Recreational angling** | **rMCZ 5, Reference Area 3, Holehaven Creek** |
|---|---|
| **Source of costs of the recommended Marine Conservation Zone (rMCZ)**<br><br>Closure of entire site to all recreational angling. | |
| **Baseline description of activity** | **Costs of impact of rMCZ on the sector** |
| Shore angling takes place in the rMCZ Reference Area, particularly from the seawall between the long jetty and The Lobster Smack pub, where | The closure will impact on local people, particularly young people, who fish in the site. Anglers may respond by fishing at other locations, which is likely to |

| **Table 2f. Recreational angling** | **rMCZ 5, Reference Area 3, Holehaven Creek** |
|---|---|
| competitions are often held involving 40 to 60 anglers. Also, 15 members of Canvey Island Angling Club fish in the rMCZ Reference Area on average 4 times a year, mostly from January to May (Natural England Stakeholder Interview for rMCZ Reference Area 3 Holehaven Creek, November 2011).<br><br>Local youngsters are introduced to the sport at this site as it is close to the Canvey Island community and has safe/easy access. Young anglers fishing with Canvey Island Angling Club use the disused concrete wharf just north of the disused jetty (M. Sharp, Local Group Angling Representative, email, 13th January, 2012). | increase their travel costs and could impact on local business (tackle shops and other amenities). If young anglers respond to the closure by fishing on Canvey Island this could increase the risks to their safety. This is because the river-facing seawall that runs the length of Canvey Island is quite steep and not easily accessible in places (M. Sharp, Local Group Angling Representative, email, 13th January, 2012). |

| **Table 2g. Recreational bait collection** | **rMCZ 5, Reference Area 3, Holehaven Creek** |
|---|---|
| ***Source of costs of the recommended Marine Conservation Zone (rMCZ)***<br><br>Closure of entire site to all bait collection. | |
| **Baseline description of activity** | **Costs of impact of rMCZ on the sector** |
| Some crab collecting occurs on the east side of the creek in May to July (Natural England Stakeholder Interview for rMCZ Reference Area 3 Holehaven Creek, November 2011). | It is anticipated that bait diggers would respond to the closure by collecting bait from other coastal areas. They may incur higher travelling costs as a result. |

| **Table 2h. Recreational motorised boating** | **rMCZ 5, Reference Area 3, Holehaven Creek** |
|---|---|
| ***Source of costs of the recommended Marine Conservation Zone (rMCZ)***<br><br>Closure of the rMCZ Reference Area to motor boats except in designated areas of passage, in order to mitigate the impacts from scour and wash on sensitive features. | |
| **Baseline description of activity** | **Costs of impact of rMCZ on the sector** |
| A total of 17 StakMap interviews indicated that 19 areas which overlap with the rMCZ Reference Area are used for recreational motorised boating (15 areas were used for motor cruising, 3 for powerboats, 1 for personal | It has not been possible to assess the impacts of creating zoned areas for passage of motorised boats. In the view of the PLA, further mitigation of impacts on sea-floor features is not necessary (PLA, pers. comm., March |

| **Table 2h. Recreational motorised boating** | **rMCZ 5, Reference Area 3, Holehaven Creek** |
|---|---|
| watercraft (PWC)). The rMCZ Reference Area only represents a small proportion of the entire area used. A total of 5,193 individuals (629 users/yr) from 17 clubs are represented by the stakeholders who were interviewed, from clubs across Essex and north Kent, including those based locally.<br><br>PWC users and water skiers use the estuary often and launch from specific areas within the site. The Port of London Authority (PLA) recreation guide shows Wat Tyler Country Park Fobbing Creek Launch at Pitsea Hall County Park, which is within the site, as 1 of only 3 designated launch areas for PWCs in the Thames as a whole (Natural England Stakeholder Interview for rMCZ Reference Area 3 Holehaven Creek, November 2011 and PLA Recreational User's Guide).<br><br>An existing PLA PWC Code of Conduct limits speeds for PWCs and jet skis and sets out restrictions at low tides to mitigate against damages to sea-floor features (PWC Code of Conduct, 2012). | 2012). |

## Human activities in the site that are not negatively affected by the rMCZ (over 2013 to 2032 inclusive)

| **Table 3. Human activities in the site that are not negatively affected by the MCZ (existing activities at their current levels and future proposals known to the regional MCZ projects)** | **rMCZ 5, Reference Area 3 Holehaven Creek** |
|---|---|
| Recreation (except for the activities listed above in table 2)<br>Water abstraction, discharge and diffuse pollution*. | |

*The IA assumes that no additional mitigation of impacts of water abstraction, discharge or diffuse pollution will be required over and above that which will be provided to achieve the objectives of the Water Framework Directive through the River Basin Management Plan process (based on advice provided by Natural England, pers. comm., 2010).

## Anticipated benefits to ecosystem services

The habitats, species and other ecological features of the recommended Marine Conservation Zone (rMCZ) Reference Area contribute to the delivery of a range of ecosystem services. Designation of the rMCZ Reference Area and its subsequent management may improve the quantity and quality of the beneficial services provided, which may increase the value (contribution to economic welfare) of them. Impacts on the value of ecosystem services may occur as a result of the designation, management and/or achievement of the conservation objectives of the rMCZ Reference Area. Further discussion on the potential benefits to ecosystem services can be found in Annex L and definitions can be found in Annex H.

| **Table 4a. Fish and shellfish for human consumption** | **rMCZ 5, Reference Area 3 Holehaven Creek** | |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| Fletcher and others (2011) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) Reference Area can contribute to the delivery of fish and shellfish for human consumption.<br><br>Intertidal mud provides habitat for fish of commercial importance and subtidal mud can provide important nursery grounds for juvenile commercial species such as flatfish and bass (Fletcher and others, 2011). The baseline quantity and quality of the ecosystem service provided is assumed to be commensurate with that provided by the features of the site when in favourable condition (see rMCZ 5 Table 1 for details).<br><br>The wider rMCZ in which this site falls is an important spawning and nursery ground for various fish species, particularly smelt *Osmerus eperlanus* and European eel *Anguilla anguilla* and so is a biodiversity-rich area to which this smaller rMCZ Reference Area may contribute.<br><br>There is currently very little fishing in the rMCZ Reference Area. A description of on-site fishing activity and the value derived from it is set out in Table 2b.<br><br>It has not been possible to estimate the value of the off-site benefits that derive from the spawning and nursery area. | If the conservation objectives of the features are achieved, the features will be recovered to reference condition.<br><br>Additional management (above that in the baseline situation) of fishing activities is expected which will prohibit fishing within the rMCZ Reference Area. The costs of this are set out in Table 2b.<br><br>Achievement of the conservation objectives may improve the contribution of the habitats to the provision of fish and shellfish for human consumption.<br><br>Closure of the rMCZ Reference Area to fishing activity will reduce the on-site fishing mortality of species but, as the site is small, it is unclear whether this would benefit stocks of mobile commercial finfish species.<br><br>As no fishing will be permitted within the rMCZ Reference Area, no on-site benefits will be realised. | Anticipated direction of change:<br><br>⇧<br><br>Confidence: Low |

| **Table 4b. Recreation** | **rMCZ 5, Reference Area 3 Holehaven Creek** | |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| ***Angling:*** Fletcher and others (2011) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) Reference Area can contribute to the delivery of fish and shellfish for human consumption and recreation services. | If the conservation objectives of the features are achieved, the features will be recovered to reference condition.<br><br>Recovery of habitats may have benefits for fish populations. It is unclear whether any benefits for fish populations would | Anticipated direction of change:<br><br>⇧ |

| **Table 4b. Recreation** | **rMCZ 5, Reference Area 3 Holehaven Creek** | |
|---|---|---|
| Intertidal mud provides habitat for fish of recreational importance and subtidal sediments can provide important nursery grounds for juvenile species such as flatfish and bass (Fletcher and others, 2011) which are important for recreational fisheries. The baseline quantity and quality of the ecosystem service provided is assumed to be commensurate with that provided by the features of the site when in favourable condition (see rMCZ 5 Table 1 for details).<br><br>The wider rMCZ in which this site falls is an important spawning and nursery ground for various fish species, particularly smelt *Osmerus eperlanus* and European eel *Anguilla anguilla* and so is a biodiversity-rich area to which this smaller rMCZ Reference Area may contribute (Balanced Seas Final Recommendations Report, 2011). However, it is not known to what extent nursery areas occur within the rMCZ Reference Area.<br><br>Angling is an important activity currently in this rMCZ Reference Area and is described in Table 2f. However, it has not been possible to estimate the value derived from this.<br><br>It has not been possible to estimate the proportion of the value derived from angling off-site that results from the potential spawning and nursery area. | arise as a result of reduced fishing mortality due to closure of the rMCZ Reference Area (see Table 4a).<br><br>As angling will not be permitted within the rMCZ Reference Area, any benefits will be limited to those occurring as a result of spill-over effects of finfish species targeted by anglers outside the rMCZ Reference Area. Such benefits may be insignificant. | Confidence: Low |
| ***Diving:*** Diving does not take place in the site. | N/A | N/A |
| ***Wildlife watching:*** Fletcher and others (2011) identify that the features to be protected by the rMCZ Reference Area can contribute to the delivery of recreation and tourism services.<br><br>Intertidal mud is a very important habitat for birds, and is particularly used by migrating birds for feeding (Fletcher and others, 2011). The baseline quantity and quality of the ecosystem service provided is | If the conservation objectives of the features are achieved, the features will be recovered to reference condition.<br><br>The recovery of the features to reference condition may improve their functioning as support for fish and bird populations, potentially benefiting wildlife watching within the rMCZ Reference Area. In addition, an improvement in the | Anticipated direction of change:<br><br>⇧ |

| **Table 4b. Recreation** | | **rMCZ 5, Reference Area 3 Holehaven Creek** |
|---|---|---|
| assumed to be commensurate with that provided by the features of the site when in favourable condition (see rMCZ 5 Table 1 for details).<br><br>Bird watching is very popular within the rMCZ Reference Area. RSPB conducts regular walks around Canvey Island and Holehaven Creek for bird watchers and there is a visitor centre for the South Essex Marshes at the Wat Tyler Country Park which lies on the banks of the site (RSPB website).<br><br>It has not been possible to estimate the value derived from wildlife watching in the rMCZ Reference Area. | condition of site features and any associated increase in abundance and diversity of species that are visible to wildlife watchers may improve the quality of wildlife watching at the site and therefore the value of the ecosystem service.<br><br>The designation may lead to an increase in wildlife watching visits to the site, which may benefit the local economy. This increase may represent an overall increase in UK wildlife watching visits and/or a redistribution of location preferences.<br><br>Designating the rMCZ Reference Area will protect its features and the ecosystem services that they provide against the risk of future degradation from pressures caused by human activities. | Confidence: Low |
| ***Other recreation:*** Fletcher and others (2011) identify that the features to be protected by the rMCZ Reference Area can contribute to the delivery of recreation and tourism services.<br>The rMCZ Reference Area is a popular destination for walking and the Thames Path runs around it. Recreational sailing and personal watercraft use the site (StakMap 2010; Natural England Impact Assessment questionnaire, 8 December 2011), and caravan and camping sites can be found nearby on Canvey Island.<br>It has not been possible to estimate the value derived from other recreation in the rMCZ Reference Area. | If the conservation objectives of the features are achieved, the features will be recovered to reference condition.<br>If the rMCZ Reference Area is designated this will provide an additional positive aspect about the location that could be promoted by the tourism and leisure industry and that might be expected to increase visitation rates.<br>Designating the rMCZ Reference Area will protect its features and the ecosystem services that they provide against the risk of future degradation from pressures caused by human activities. | Anticipated direction of change: ⇧<br>Confidence: Low |

| **Table 4c. Research and education** | | **rMCZ 5, Reference Area 3 Holehaven Creek** |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| ***Research:*** Fletcher and others (2011) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) Reference Area can contribute to the delivery of research services. | As an rMCZ Reference Area, the site will provide an opportunity to demonstrate the state of designated marine features in the absence of many anthropogenic pressures (Natural England and JNCC, 2010). It will provide a control | Anticipated direction of change: |

| **Table 4c. Research and education** | | **rMCZ 5, Reference Area 3 Holehaven Creek** |
|---|---|---|
| Research activities undertaken by the Essex Wildlife Trust and RSPB in the wider rMCZ in which this rMCZ Reference Area lies may overlap with this area although there is no confirmed information. The Port of London Authority (PLA) carries out regular environmental surveys and supports environmental research throughout the Thames Estuary and tributaries (PLA website) including the rMCZ Reference Area. The Thames Estuary Partnership has been monitoring birds in the creek in relation to proposed development at Pitsea (Natural England Impact Assessment questionnaire, 8 December 2011).<br><br>It has not been possible to estimate the value derived from research activities associated with the rMCZ Reference Area. | area against which the impacts of pressures caused by human activities can be compared as part of long-term monitoring and assessment. Other research benefits are unknown. | ⇧<br><br>Confidence: High |
| ***Education:*** Fletcher and others (2011) identify that the features to be protected by the rMCZ Reference Area can contribute to the delivery of education services.<br><br>The RSPB South Essex Marshes team have dedicated education staff and provide education days for schools and families (in the summer holidays) at their Discovery Zone within Wat Tyler Country Park (RSPB website). It is likely that some of the many organisations that carry out educational activities throughout the Thames Estuary are also active in the rMCZ Reference Area.<br><br>It has not been possible to estimate the value derived from education activities associated with the rMCZ Reference Area. | MCZ Reference Area designation may provide an opportunity to expand the focus of education events into the marine environment.<br><br>Designation may aid the development of additional local (to the rMCZ Reference Area) education activities (e.g. events and interpretation boards), from which visitors to the site would derive benefit.<br><br>Non-visitors may benefit if the rMCZ Reference Area contributes to wider provision of educational resources (e.g. television programmes, articles in magazines and newspapers, and educational resources developed for use in schools). | Anticipated direction of change:<br><br>⇧<br><br>Confidence: Moderate |

| **Table 4d. Regulating services** | **rMCZ 5, Reference Area 3 Holehaven Creek** | |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| ***Regulation of pollution:*** The features of the site contribute to the bioremediation of waste (intertidal mud and subtidal mud) and sequestration of carbon (sheltered muddy gravels) (Fletcher and others, 2011).<br><br>***Environmental resilience:*** A feature (sheltered muddy gravels) of the site contributes to the resilience and continued regeneration of marine ecosystems (Fletcher and others, 2011).<br><br>***Natural hazard protection:*** A feature of the site (intertidal mud) contributes to local flood and storm protection (Fletcher and others, 2011).It has not been possible to estimate the value derived from regulating services associated with the rMCZ Reference Area. | If the conservation objectives of the features are achieved, the features will be recovered to reference condition.<br><br>Recovery of the features and closure to fishing could increase the site's benthic biodiversity and biomass, improving the regulating capacity of its habitats.<br><br>Designating the rMCZ Reference Area will protect its features and the ecosystem services that they provide against the risk of future degradation from pressures caused by human activities. | Anticipated direction of change:<br><br>⇧<br><br>Confidence: Low |

| **Table 4e. Non-use and option values** | **rMCZ 5: Reference Area 3 Holehaven Creek** | |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| Some people gain satisfaction from the existence of marine habitats, species and other features. They also gain from having the option to benefit in the future from the habitats and species in the recommended Marine Conservation Zone (rMCZ) Reference Area and the ecosystem services provided, even if they do not currently benefit from them.<br><br>It has not been possible to estimate the value derived from non-use and option values associated with the rMCZ Reference Area. | The rMCZ Reference Area will benefit the proportion of the UK population that values conservation of its features and its contribution to an ecologically coherent network of Marine Protected Areas. Some people will gain satisfaction from knowing that the habitats and species are being conserved (existence value) and/or that they are being conserved for use by others in the current generation (altruistic value) or future generations (bequest value). The rMCZ Reference Area will protect the features and the ecosystem services provided, and thereby the option to benefit from these services in the future, from the risk of future degradation. | Anticipated direction of change:<br><br>⇧<br><br>Confidence: Moderate |

## rMCZ 6 Medway Estuary

**Site area (km$^2$)**: 64.83

| **Table 1. Conservation impacts** | | | | **rMCZ 6, Medway Estuary** |
|---|---|---|---|---|
| **1a. Ecological description** | | | | |
| This recommended Marine Conservation Zone (rMCZ) is almost entirely intertidal or subtidal mud, a relatively geographically restricted habitat in the region, with small patches of other habitats. Towards the mouth of the estuary, the habitat becomes dominated by subtidal coarse sediments and subtidal sand. The site contains good examples of estuarine rocky habitats, small patches of sheltered muddy gravels (considered to be particularly species diverse here), and peat and clay exposures. It is one of only three locations in the Balanced Seas Project Area where the tentacled lagoon worm occurs. The Medway might be one of the most suitable areas for eel recovery in the future. Nursery grounds for bass, plaice, sole and cod, and skate and smelt occur here. The estuary is also home to salmon, sea trout , and the Thames herring, and contains an important site for seal foraging and a colony of Sandwich tern at Burntwick Island<br><br>Source: Balanced Seas Final Recommendations (2011). | | | | |
| **1b. Baseline condition of MCZ features and impact of the MCZ** | | | | |
| **Feature** | **Area of feature (km2)** | **No. of occurrences** | **Baseline** | **Impact of the MCZ** |
| ***Broad-scale Habitats*** | | | | |
| A1.3 low energy intertidal rock | 0.45 | - | Favourable condition | Maintain at favourable condition |
| A2.2 intertidal sand/muddy sand | 0.11 | - | Favourable condition | Maintain at favourable condition |
| A2.4 intertidal mixed sediments | 0.06 | - | Favourable condition | Maintain at favourable condition |
| A5.1 subtidal coarse sediment | 4.10 | | Favourable condition | Maintain at favourable condition |
| A5.2 subtidal sand | 3.16 | | Favourable condition | Maintain at favourable condition |
| A5.3 subtidal mud | 19.64 | | Favourable condition | Maintain at favourable condition |
| ***Habitats of Conservation Importance*** | | | | |
| Estuarine rocky habitats | 0.02 | | Favourable condition | Maintain at favourable condition |
| Peat and clay exposures | 312.57m$^2$ | | Favourable condition | Maintain at favourable condition |
| Sheltered muddy gravels | | 41 records | Favourable condition | Maintain at favourable condition |
| ***Species of Conservation Importance*** | | | | |
| Tentacled Lagoon Worm (*Alkmaria romijni)* | | 12 records | Favourable condition | Maintain at favourable condition |

## Site-specific costs arising from the effect of the recommended Marine Conservation Zone on human activities (over 2013 to 2032 inclusive)

| **Table 2a. Archaeological heritage** | **rMCZ 6, Medway Estuary** |
|---|---|
| ***Source of costs of the recommended Marine Conservation Zone (rMCZ)*** <br><br> Increase in costs of assessing environmental impacts for future licence applications (it is not anticipated that any additional mitigation of impacts on features protected by the rMCZ will be needed relative to the mitigation provided in the baseline). Archaeological excavations, surface recovery, intrusive and non-intrusive surveys, diver trails and visitors will be allowed. <br><br> However, restrictions could also be placed upon: <br><br> • Archaeological excavation in areas of peat and clay exposures in the site. | |
| **Baseline description of activity** | **Costs of impact of rMCZ on the sector** |
| Several World War II defence aids/structures are recorded in the site (e.g. pillboxes). Wrecked vessels of British, Norwegian, Dutch, Irish, Swedish, Belgian, Danish and German origin have been recorded within the site. One wreck (the HMS *Bulwark*) is protected by the Protection of Wrecks Act 1973 by a 200m exclusion zone. Cropmarks, clearance cairns, Roman, Iron Age, Bronze Age and Anglo Saxon artefacts have been recorded within the site. There are 3 designated monuments within the site – Hoo Fort (Isle of Grain), Grain Tower and Rochester Bridge (English Heritage, 2012). <br><br> English Heritage has indicated that this site is likely to be of interest for archaeological excavation in the future as it is relevant to its National Heritage Protection Plan (theme 3A1.2) | An extra cost would be incurred in the assessment of environmental impact made in support of any future licence applications for archaeological activities in the site. The likelihood of a future licence application being submitted is not known so no overall cost to the sector of this rMCZ has been estimated. However, the additional cost of one licence application could be in the region of £500 to £10,000 depending on the size of the MCZ (English Heritage, pers. comm.. 2012). No further impacts on activities related to archaeology are anticipated. <br><br> If archaeologists respond to restrictions on excavation in areas of peat and clay exposure by undertaking alternative archaeological excavations 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 is not costed in the Impact Assessment. If archaeological excavations do not take place as a result of this restriction this will prevent interpretation of archaeological evidence from the site, which will decrease acquisition of historical knowledge of past human communities from the site, resulting in a cost to society. |

| **Table 2b. Coastal development (excluding ports and harbours)** | **rMCZ 6, Medway Estuary** |
|---|---|
| ***Source of costs of the recommended Marine Conservation Zone (rMCZ)*** | |
| Increase in costs of assessing environmental impacts for future licence applications and costs of mitigation of impacts if required for the proposed Thames Estuary airport | |
| **Baseline description of activity** | **Costs of impact of rMCZ on the sector** |
| Proposals for the Thames Estuary airport are at an early stage and a number of locations have been suggested. The most recent proposal (the Thames Hub) is for a site that lies within 1km of the rMCZ, and that straddles the land and sea on the Isle of Grain, at the eastern end of the Hoo Peninsula (www.halcrow.com/Thames-Hub/PDF/Thames_Hub_vision.pdf). | Because proposals for the airport are at an early stage it is not known whether additional costs for assessing environmental impacts in future licence applications will be incurred as a result of the rMCZ or whether additional mitigation of impacts on features protected by the MCZ will be required. |

| **Table 2c. National defence** | **rMCZ 6, Medway Estuary** |
|---|---|
| ***Source of costs of the recommended Marine Conservation Zone (rMCZ)*** | |
| Mitigation of impacts of Ministry of Defence (MOD) activities on features protected by the suite of rMCZs will be provided by additional planning considerations during operations and training. It is not known whether mitigation will be required for features protected by this site. The MOD will also incur costs in revising environmental tools and charts to include MCZs. | |
| **Baseline description of activity** | **Costs of impact of MCZ on the sector** |
| The MOD is known to make use of the rMCZ for surface explosions. | It is not known whether this rMCZ will impact on the MOD's use of the site. Impacts of rMCZs on national defence are assessed in Annex H10 and N9 (they are not assessed for this site alone). |

| **Table 2d. Ports, harbours, shipping and disposal sites** | **rMCZ 6, Medway Estuary** |
|---|---|
| ***Source of costs of the recommended Marine Conservation Zone (rMCZ)*** | |
| ***Management scenario 1:*** Increase in costs of assessing environmental impacts for future licence applications. This applies to future licence applications for navigational dredging that takes place within 1km of the rMCZ. The Balanced Seas MCZ project is not aware of activities related to ports, harbours and | |

**Table 2d. Ports, harbours, shipping and disposal sites** **rMCZ 6, Medway Estuary**

shipping for which additional mitigation of impacts on features protected by the MCZ will be needed relative to the mitigation provided in the baseline.

***Management scenario 2:*** Increase in costs of assessing environmental impacts for future licence applications. This applies to future licence applications for disposal of dredged material, navigational dredging and all port and harbour developments within 5 km of the rMCZ. Also, additional costs incurred in updating the Maintenance Dredging Protocol (MDP) that is being prepared by Medway Ports, in order to assess impacts of activities on MCZ features. The Balanced Seas MCZ project is not aware of activities related to ports, harbours and shipping for which additional mitigation of impacts on features protected by the MCZ will be needed relative to the mitigation provided in the baseline.

**Baseline description of activity**

***Disposal sites:***

There is one disposal site (TH103 Garrison Point) within 1km of the rMCZ. No licence applications were received for this disposal site between 2001 and 2010 but it is not closed to disposal in future (Cefas, pers. comm., 2011).

There is one disposal site (TH103 Garrison Point) within 5km of the rMCZ. No licence applications were received for this disposal site between 2001 and 2010 but it is not closed to disposal in future (Cefas, pers. comm., 2011).

***Navigational dredge areas:*** There is an extensive network of licensed dredged channels both within and within 1km of this rMCZ associated with the Medway Ports. Medway Ports undertakes maintenance dredging in the approach channel and berths (around Sheerness, Isle of Grain, Lower Halstow). Recreational clubs undertake minor amounts of dredging elsewhere in the estuary (e.g. Chillingham Marina) (Medway Ports, 2012)). It is assumed that each dredge area's marine licence is renewed once every 3 years, and that an assessment of environmental impact upon MCZ features is undertaken for each licence renewal

Within 5km of the rMCZ there are various maintenance and navigation

**Costs of impact of MCZ on the sector**

| *£m/yr* | Scenario 1 | Scenario 2 |
|---|---|---|
| Cost to the operator | 0.002 | 0.004* |

* This estimate for additional cost in future licence applications for port developments arising as a result of this rMCZ is not used to estimate the total costs for the IA. It is based on different assumptions to those used to estimate costs at a regional level and for the entire suite of sites. Also, this figure assumes that an assessment of environmental impact upon MCZ features is undertaken for each licence renewal (every 3 years). It does not include the cost of incorporating MCZ features in an existing or new MDP. It is likely to over-estimate the cost of Scenario 2 for rMCZs with ports within 5km that have MDPs because of the savings in future costs provided by an MDP. See Annex H for further information

***Scenario 1:*** Future licence applications for navigational dredging within 1km of this rMCZ will need to consider the potential effects of the activity on the features protected by the rMCZ. Additional costs will be incurred as a result (a breakdown of these by activity is provided in Annex N11).

***Scenario 2:*** Future licence applications for disposal of dredged material, navigational dredging and port or harbour development plans and proposals within 5km of this site will need to consider the potential effects of the activity on the features protected by the rMCZ. Additional costs will be incurred as a result (a

| **Table 2d. Ports, harbours, shipping and disposal sites** | **rMCZ 6, Medway Estuary** |
|---|---|
| channels associated with various ports and harbours within this rMCZ. It is assumed that each dredge area's marine licence is renewed once every 3 years, and that an assessment of environmental impact upon MCZ features is undertaken for each licence renewal. As these navigational dredge areas will be covered by the MDP being prepared by Medway Ports, it is assumed that the assessment of environmental impact is not changed over the 20 year period of the IA.<br><br>***Port development:*** There are 7 ports and harbours within 5km of the rMCZ, which may undergo development at some point in the future: Sheerness and Chatham (both run by Medway Ports), Thamesport on the Isle of Grain, Queenborough on the Isle of Sheppey, Gillingham harbour (used for leisure only), Kingsnorth (jetty for the power station on the Hoo Peninsula), and Rochester (Ports & Harbours UK, 2012). (This may not represent a full list of all ports and harbours impacted by the site.) No port developments are known to be planned within the 20 year period of the Impact Assessment (IA). Given the importance of the main ports and terminals in the Medway and Swale (which have a combined annual turnover of 12 million tonnes) (Medway Ports, 2012), it is possible that mitigation options may need to be considered in the future. | breakdown of these by activity is provided in Annex N11).<br><br>Also, additional costs will arise to update the Maintenance Dredging Protocol (MDP) that is currently being prepared by Medway Ports as this will need to consider the potential effects of activities on the features protected by the rMCZ. The anticipated additional cost in the MDP is estimated to be a one-off cost of £8438. |

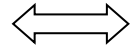
## Human activities in the site that are not negatively affected by the rMCZ (over 2013 to 2032 inclusive)

| **Table 3. Human activities in the site that are not negatively affected by the rMCZ (existing activities at their current levels and future proposals known to the regional MCZ projects)** | **rMCZ 6, Medway Estuary** |
|---|---|
| Cables (interconnectors and telecom cables),<br>Commercial fisheries (bottom trawls, dredges, hooks and lines, mid-water trawls, nets, pots and traps, collection by hand)<br>Flood and coastal erosion risk management (coastal defence)<br>Generation of electricity (power stations on land),<br>Recreation<br>Research and education<br>Shipping<br>Water abstraction, discharge and diffuse pollution*. | |

*The IA assumes that no additional mitigation of impacts of water abstraction, discharge or diffuse pollution will be required over and above that which will be provided to achieve the objectives of the Water Framework Directive through the River Basin Management Plan process (based on advice provided by Natural England, pers. comm., 2010).

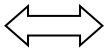
## Anticipated benefits to ecosystem services

The habitats, species and other ecological features of the recommended Marine Conservation Zone (rMCZ) contribute to the delivery of a range of ecosystem services. Designation of the rMCZ and its subsequent management may improve the quantity and quality of the beneficial services provided, which may increase the value (contribution to economic welfare) of them. Impacts on the value of ecosystem services may occur as a result of the designation, management and/or achievement of the conservation objectives of the rMCZ. Further discussion on the potential benefits to ecosystem services can be found in Annex L and definitions can be found in Annex H.

| **Table 4a. Fish and shellfish for human consumption** | | **rMCZ 6, Medway Estuary** |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| Fletcher and others (2011) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) can contribute to the delivery of fish and shellfish for human consumption.<br><br>Subtidal coarse sediments, sand and mud and intertidal sand, muddy sand and mixed sediments are important for spawning and nursery grounds. These habitats can provide important nursery grounds for juvenile commercial species such as flatfishes and bass (Fletcher and others, 2011).<br><br>The Medway Estuary is considered to be an important commercial fish nursery area for several species (including Dover sole and bass) and is thought to be an ideal place for future European eel recovery (Balanced Seas Final Recommendations Report, 2011). As such it is likely to help to support potential on-site and off-site fisheries.<br><br>The baseline quantity and quality of the ecosystem service provided is assumed to be commensurate with that provided by the features of the site when in favourable condition (see Table 1 for details).<br><br>A very low level of commercial fishing is conducted within the estuary by the | If the conservation objectives of the features are achieved, the features will be maintained in favourable condition.<br><br>No additional management (above that in the baseline situation) of fishing activities is expected. However, maintaining and monitoring the current fishing practices will safeguard the healthy population of commercial fish and ensure no increase in fishing activity occurs or alternative gears are used.<br><br>No change in feature condition or harvesting of fish and shellfish is anticipated and therefore no impact on on-site or off-site benefits is expected.<br><br>Designating the rMCZ will protect its features and the ecosystem services that they provide against the risk of future degradation from pressures caused by human activities. | Anticipated direction of change:<br><br>  <br><br>Confidence: Moderate |

| **Table 4a. Fish and shellfish for human consumption** | | **rMCZ 6, Medway Estuary** |
|---|---|---|
| Rochester Oyster and Floating Fisheries (ROFF), a group of part-time fishers with historical rights to fish within the river from the mouth of the Medway to Rochester (Balanced Seas Final Recommendations Report, 2011). Only two commercial licences are held among 18 members and no other vessels are allowed to fish within the estuary; the majority of ROFF members fish as a hobby. Cod, bass, sole and eel are taken. The total value of landings derived from commercial fisheries within this site is estimated £0.028m/yr by the MCZ Fisheries Model.<br><br>It has not been possible to estimate the value of the off-site benefits that derive from the spawning and nursery area. | | |

| **Table 4b. Recreation** | | **rMCZ 6, Medway Estuary** |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| ***Angling:*** Fletcher and others (2011) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) can contribute to the delivery of fish and shellfish for human consumption and recreation services.<br><br>Subtidal coarse sediments, sand and mud and intertidal sand, muddy sand and mixed sediments are important for spawning and nursery grounds. These habitats can provide important nursery grounds for juvenile commercial species such as flatfishes and bass (Fletcher and others, 2011).<br><br>The Medway Estuary is an important nursery area for fish caught recreationally (including bass) (Balanced Seas Final Recommendations Report, 2011).<br><br>The baseline quantity and quality of the ecosystem service provided is assumed to be commensurate with that provided by the features of the site when in favourable condition (see Table 1 for details). | If the conservation objectives of the features are achieved, the features will be maintained in favourable condition.<br><br>As no additional management of angling is expected, fishers will be able to benefit from any on-site and off-site beneficial effects. If the rMCZ results in an increase in the size and diversity of species caught then this is expected to increase the value derived by anglers.<br><br>The designation may lead to an increase in angling visits to the site, which may benefit the local economy. This increase might arise from a change in anglers' preferred angling locations rather than an increase at a national scale in days spent angling or the number of anglers. | Anticipated direction of change:<br><br>⇔<br><br>Confidence: Moderate |

| **Table 4b. Recreation** | | **rMCZ 6, Medway Estuary** |
|---|---|---|
| Both boat and shore angling for bass, thornback ray, smooth hound, grey mullet, cod and whiting takes place throughout the rMCZ (Stakmap, 2010). Shore angling is popular with local clubs organising competitions on a regular basis. Being close to London, Medway's recreational sea fisheries also attract visitors from further away (Stakmap, 2010). The system of sand banks and channels in the Outer Thames Estuary outside the rMCZ is popular with boat and charter boat anglers fishing for numerous species including mackerel, dogfish and ray and this off-site area may benefit from spill-over effects (Stakmap, 2010). Therefore, the nursery ground for several fish species within the site is likely to help to support potential on-site and off-site fisheries.<br><br>It has not been possible to estimate the value derived from angling on-site or the proportion of the value derived from angling off-site that results from the intertidal and subtidal habitats. | | |
| ***Diving:*** Diving is not known to take place in the rMCZ. | N/A | N/A |
| ***Wildlife watching:*** Fletcher and others (2011) identify that the features to be protected by the rMCZ can contribute to the delivery of recreation and tourism services.<br><br>The baseline quantity and quality of the ecosystem service provided is assumed to be commensurate with that provided by the features of the site when in favourable condition (see Table 1 for details).<br><br>The Medway Estuary is popular for wildlife watching as it has an important seal foraging site and also a colony of Sandwich terns at Burntwick Island. Birdwatching is the most popular activity. The RSPB has a reserve with birdwatching facilities in Motney Hill Marshes and Medway Council manages the Riverside Country Park adjacent to the rMCZ in which Horrid Hill is a popular birdwatching point. | If the conservation objectives of the features are achieved, the features will be maintained in favourable condition.<br><br>No change in on-site feature condition is anticipated and therefore no benefits to wildlife watching are expected. However, if the rMCZ is designated this will provide an additional positive aspect about the location that could be promoted by organisations involved with wildlife watching and that would be expected to increase visitation rates and therefore the value of the ecosystem service. An increase in wildlife watching visits to the site may benefit the local economy. This increase may represent a redistribution of location preferences rather than an overall increase in wildlife watching trips at the national scale.Designating the rMCZ will protect its features and the ecosystem services that they provide against the risk of future | Anticipated direction of change:<br><br>  <br><br>Confidence: Moderate |

| **Table 4b. Recreation** | | **rMCZ 6, Medway Estuary** |
|---|---|---|
| It has not been possible to estimate the value derived from wildlife watching in the rMCZ. | degradation from pressures caused by human activities. | |
| ***Other recreation:*** Fletcher and others (2011) identify that the features to be protected by the rMCZ can contribute to the delivery of recreation and tourism services.<br><br>The Medway Estuary is a very popular tourist destination especially for recreational sailing, kayaking, canoeing and coastal/estuarine walking. There are footpaths along the banks of the estuary (Medway Council website), and numerous sailing, kayaking and canoeing clubs within the site as well as marinas and docks. Racing events and training for novices are available from many of the clubs (Stakmap, 2010).<br><br>It has not been possible to estimate the value derived from other recreation in the rMCZ. | If the conservation objectives of the features are achieved, the features will be maintained in favourable condition.<br><br>No change in on-site feature condition is anticipated and therefore no benefits to tourism are expected. However, if the rMCZ is designated this will provide an additional positive aspect about the location that could be promoted by the tourism and leisure industry and that would be expected to increase visitation rates.<br><br>Designating the rMCZ will protect its features and the ecosystem services that they provide against the risk of future degradation from pressures caused by human activities. | Anticipated direction of change:<br><br>⇔<br><br>Confidence: Moderate |

| **Table 4c. Research and education** | | **rMCZ 6, Medway Estuary** |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| ***Research:*** Fletcher and others (2011) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) can contribute to the delivery of research services.<br><br>Greening the Gateway Kent and Medway, a partnership of public, private and third sector organisations that works to promote the sustainable regeneration of North Kent and Medway, is currently involved in the Greater Thames Marshes Nature Improvement Area, which involves research into habitat improvement (Greening the Gateway Kent and Medway website). Research is also conducted by Kent County Council in order to inform the Kent Coastal Network initiative (Kent Coastal Network website). | Monitoring of the rMCZ will help inform understanding of how the marine environment is changing and is impacted on by anthropogenic pressures and management interventions. Other research benefits are unknown. | Anticipated direction of change:<br><br>⇧<br><br>Confidence:<br><br>High |

| **Table 4c. Research and education** | | **rMCZ 6, Medway Estuary** |
|---|---|---|
| ***Education:*** Fletcher and others (2011) identify that the features to be protected by the rMCZ can contribute to the delivery of education services.<br><br>Riverside Country Park, adjacent to the rMCZ, organises events and provides educational facilities within the park which relate to the marine environment (Kent County Council website). | MCZ designation may provide an opportunity to expand the focus of education events into the marine environment.<br><br>Designation may aid additional local (to the rMCZ) provision of education activities (e.g. events, interpretation boards), from which visitors would derive benefit.<br><br>Non-visitors may benefit if the rMCZ contributes to wider provision of education (e.g. television programmes, articles in magazines and newspapers, and educational resources developed for use in schools). | Anticipated direction of change:<br><br>⇧<br><br>Confidence: Moderate |

| **Table 4d. Regulating services** | | **rMCZ 6, Medway Estuary** |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| ***Regulation of pollution:*** the features of the site contribute to the bioremediation of waste (subtidal sediments) and sequestration of carbon (intertidal rock and subtidal sediments) (Fletcher and others, 2011).<br><br>***Environmental resilience:*** the features of the site (intertidal rock and sheltered muddy gravels) contribute to the resilience and continued regeneration of marine ecosystems (Fletcher and others, 2011).<br><br>***Natural hazard protection:*** the features of the site, (intertidal sediments) contribute to local flood and storm protection (Fletcher and others, 2011).<br><br>It has not been possible to estimate the value derived from regulating services associated with the rMCZ. | If the conservation objectives of the features are achieved, the features will be maintained in favourable condition.<br><br>No change in feature condition and management of human activities is expected and therefore no benefit to the regulation of pollution is expected.<br><br>Designating the rMCZ will protect its features and the ecosystem services that they provide against the risk of future degradation from pressures caused by human activities. | Anticipated direction of change:<br><br>⇔<br><br>Confidence: Moderate |

| **Table 4e. Non-use and option values** | | **rMCZ 6, Medway Estuary** |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| Some people gain satisfaction from the existence of marine habitats, species and other features. They also gain from having the option to benefit in the future from the habitats and species in the rMCZ and the ecosystem services provided, even if they do not currently benefit from them.<br><br>It has not been possible to estimate the value derived from non-use and option value services associated with the rMCZ. | The rMCZ will benefit the proportion of the UK population that values conservation of the rMCZ features and its contribution to an ecologically coherent network of MPAs. Some people will gain satisfaction from knowing that the habitats and species are being conserved (existence value) and/or that they are being conserved for use by others in the current generation (altruistic value) or future generations (bequest value). The rMCZ will protect both the features and the option to benefit from the services in the future from the risk of future degradation.<br><br>Examples of these values are shown in Ranger, Lowe, Sanghera, & Solandt (2012). Voters in the MCS's 'Your Seas Your Voice' campaign felt that features of the natural environment were strong motivators for reasons why people thought areas within the rMCZ should be protected, with people frequently attaching value to biodiversity and 'spectacular scenery, bird populations and wildlife.' Regarding non-extractive use value, ease of access and close proximity were considered important as reasons to protect this site. Furthermore, there was a perception that the area is 'under threat'.<br><br>Source: Ranger et al. (2011) | Anticipated direction of change:<br><br>⇧<br><br>Confidence: Moderate |

## rMCZ 7, Thanet Coast

**Site area (km$^2$): 62.79**

| **Table 1. Conservation impacts** | | | | **rMCZ 7, Thanet Coast** |
|---|---|---|---|---|
| **1a. Ecological description** | | | | |
| The Thanet Coast recommended Marine Conservation Zone (rMCZ) includes the longest continuous stretch of coastal chalk in the UK, with subtidal chalk reefs that extend into the intertidal zone to form chalk cliffs and the second most extensive example of chalk caves in the UK, supporting specialised algal communities. The area is regionally noteworthy for its littoral chalk communities and subtidal chalk platforms. Intertidal blue mussel beds on mixed and sandy sediments (which is an unusual form of intertidal Ross worm reef mixed with blue mussels), and peat and clay exposures are also found here. Another unusual intertidal Ross worm biotope is recorded at Kingsgate within the rMCZ on the shore where sand fringes the chalk reef; this rare biotope is restricted to Kent, and has not been recorded elsewhere in the UK. Two very rare stalked jellyfish species occur here, St John's jellyfish and the kaleidoscope jellyfish. Algal richness is high, with Whiteness Gap containing unique algal assemblages associated with chalk platforms and caves. The rMCZ is internationally important for wintering birds and the marine life associated with the chalk cliffs, caves, reefs and sandy bays, and nationally important for the geology, the chalk stacks and an unusual chalk arch. The rMCZ provides good foraging grounds for black-legged kittiwake, with thousands present offshore in the winter. The sand banks off the Reculver–Margate coast are also an important feeding site for great cormorant. The site overlaps the Thanet Coast Site of Special Scientific Interest, the Thanet Coast Special Area of Conservation (SAC) and a small section of the southern part of Margate and Long Sands SAC and the Outer Thames Estuary Special Protection Area.<br><br>Source: Balanced Seas Final Recommendations (2011). | | | | |
| **1b. Baseline condition of MCZ features and impact of the MCZ** | | | | |
| **Feature** | **Area of feature (km2)** | **No. of occurrences** | **Baseline** | **Impact of the MCZ** |
| ***Broad-scale Habitats*** | | | | |
| A3.2 mod energy infralittoral rock | 0.25 | - | Favourable condition | Maintain at favourable condition |
| A4.2 mod energy circalittoral rock | 8.37 | - | Favourable condition | Maintain at favourable condition |
| A5.1 subtidal coarse sediment | 8.74 | - | Favourable condition | Maintain at favourable condition |
| A5.2 subtidal sand | 5.61 | | Favourable condition | Maintain at favourable condition |
| A5.4 subtidal mixed sediments | 13.46 | | Favourable condition | Maintain at favourable condition |
| ***Habitats of Conservation Importance*** | | | | |
| Blue mussel beds | 0.01 | | Favourable condition | Maintain at favourable condition |
| Peat and clay exposures | 1,319 m$^2$ | | Favourable condition | Maintain at favourable condition |
| Ross worm *(Sabellaria spinulosa)* reef | 2,107 m$^2$ | | Unfavourable condition | Recover to favourable condition |

| **Table 1. Conservation impacts** | | | | **rMCZ 7, Thanet Coast** |
|---|---|---|---|---|
| Subtidal chalk | 8.85 | | Favourable condition | Maintain at favourable condition |
| Subtidal sands and gravels | 6.04 | | Favourable condition | Maintain at favourable condition |
| ***Species of Conservation Importance*** | | | | |
| St John's Jellyfish (*Lucernariopsis cruxmelitensis*) | | 1 record | Favourable condition | Maintain at favourable condition |
| Kaleidoscope Jellyfish (*Haliclystus auricula)* | | 1 record | Favourable condition | Maintain at favourable condition |

## Site-specific costs arising from the effect of the recommended Marine Conservation Zone on human activities (over 2013 to 2032 inclusive)

| **Table 2a: Archaeological heritage** | **rMCZ 7, Thanet Coast** |
|---|---|
| ***Source of costs of the recommended Marine Conservation Zone (rMCZ)*** | |
| Increase in costs of assessing environmental impacts for future licence applications. It is not anticipated that any additional mitigation of impacts on features protected by the recommended Marine Conservation Zone (rMCZ) will be needed relative to the mitigation provided in the baseline. Archaeological excavations, surface recovery, intrusive and non-intrusive surveys, diver trails and visitors will be allowed.<br><br>However, restrictions could also be placed upon:<br><br>• anchoring in areas of vulnerable MCZ features in the site, including ross worm (*Sabellaria spinulosa*) reef;<br><br>• archaeological excavation in areas of peat and clay exposures in the site. | |
| **Baseline description of activity** | **Costs of impact of rMCZ on the sector** |
| Roman, iron-age, bronze-age and anglo-saxon artefacts, cropmarks and clearance cairns have been recorded here, as well as wrecked vessels of British, Portuguese, Belgian, American, French and Swedish vessels and a World War II German Do17 bomber crash site. Other features adjacent to the rMCZ include Droit House and Stone Pier (English Heritage, 2012).<br><br>English Heritage has indicated that this site is–likely to be of interest for archaeological excavation in the future as it is relevant to its National | An extra cost would be incurred in the assessment of environmental impacts made in support of future licence applications for archaeological activities in the site. The likelihood of a future licence application being submitted is not known, so no overall cost to the sector of this rMCZ has been estimated. However, the additional cost of one licence application could be in the region of £500 to £10,000 depending on the size of the rMCZ (English Heritage, pers. comm., 2012). No further impacts on activities related to archaeology are anticipated. |

| **Table 2a: Archaeological heritage** | **rMCZ 7, Thanet Coast** |
|---|---|
| Heritage Protection Plan (theme 3A1.2). | If archaeologists respond to restrictions on excavation in areas of peat and clay exposures, and restrictions on anchoring over areas of *Sabellaria spinulosa* reef, by undertaking alternative archaeological excavations in another locality, this could result in additional costs to the archaeologists. It is not possible to predict when or how often this may occur, so it is not costed in the Impact Assessment. If archaeological excavations do not take place as a result of these restrictions, this will prevent interpretation of archaeological evidence from the site, which will decrease acquisition of historical knowledge of past human communities from the site, resulting in a cost to society. |

| **Table 2b: Commercial fisheries** | **rMCZ 7, Thanet Coast** |
|---|---|
| ***Source of costs of the recommended Marine Conservation Zone (rMCZ)*** | |
| The Joint Nature Conservation Committee and Natural England have advised that there is considerable uncertainty about whether additional management of commercial fishing gears will be required for certain features protected by this rMCZ. Two scenarios have been employed in the Impact Assessment (IA) for these fisheries in order to reflect this uncertainty: open to certain gear types and closure of the fishery within the site. Should the site be designated, the management that will be required will fall somewhere within this range. | |
| ***Management scenario 1:*** Closure of entire rMCZ to bottom trawls and dredges to protect areas of Ross worm reefs (Statutory Nature Conservation Bodies (SNCB) informed scenario: zoned closure is not possible without additional survey work to confirm distribution because of the uncertainty of the locality of the Ross worm reef). | |
| ***Management scenario 2:*** Closure of entire rMCZ to bottom trawls, dredges, lines, nets, pots and traps to protect Ross worm reefs (SNCB informed scenario). | |
| ***Summary of all fisheries:*** The site is wholly within the 6nm (nautical mile) limit and is fished only by UK vessels. The main commercial fishing fleet using this rMCZ is made up of under 15 metre vessels based at Whitstable (7 in the main trawling fleet, 2 static gear vessels) and Ramsgate port (mostly static gear), and one trawler from Faversham works in this area (information from Fishermap questionnaires). Vessels over 17 m may not operate within 3 nm **under a** to Kent and Essex IFCA byelaws (Kent & Essex IFCA, 2011). There are also beach-launched vessels at Herne Bay and Margate harbour using static gear in this rMCZ. Some trawlers from Essex use the rMCZ if the weather allows them to travel this far. The main fisheries are static netting and hand potting, closely followed by trawling and oyster dredging (information from Fishermap questionnaires). The vessels fishing the rMCZ mainly comprise small boats, under 10 | |

**Table 2b: Commercial fisheries** **rMCZ 7, Thanet Coast**

metres, which tend to fish on 'day trips'. A variety of static and mobile gears are used according to the target species, and the type of gear used varies with the seasonal fluctuation of each fishery. A number of commercial fishing restrictions are already in existence (listed in Annex E1). More detail on the approach used for the fisheries method is provided in Annexes H7 and N4.

Estimated annual value of landings from the rMCZ: £0.079m/yr.

| Baseline description of UK commercial fisheries | Costs of impact of rMCZ on UK commercial fisheries |
|---|---|
| ***Bottom trawls:*** Numbers of vessels unknown.<br><br>Estimated total value of landings from the rMCZ: £0.019m/yr (MCZ Fisheries Model). | The estimated annual value of UK bottom trawl landings affected is expected to fall within the following range:<br><br>*£m/yr* \| Scenario 1 \| Scenario 2<br>Value of landings affected \| 0.019 \| 0.019<br><br>A Whitstable vessel owner who was interviewed for the IA questionnaire (August 2011) said that the closure of the entire rMCZ to bottom trawls would affect trawlers, in particular vessels from Whitstable (7 trawlers) and Faversham (1 trawler), resulting in an approximate 50% loss of earnings. He shared the view that displacement was not a non-viable alternative because all other fishing grounds have existing users and any increased effort within them could lead to conflict, and all available species are already fished using appropriate gears (see Annex J3a for more detail). He thought that trawlers would experience a major loss of revenue, if the entire site was closed, which would lead them to leave the fleet. He said that this would result in an important social cost to the local fishing communities with the loss of 14 jobs if this rMCZ and rMCZ 10 were closed. There would also be a secondary impact because local fish markets, restaurants, fish retailers and activities linked to the fishing fleet, such as repairs, fuel services and gear suppliers, would be affected. |
| ***Dredges:***Numbers of vessels unknown.<br><br>Estimated total value of landings from the rMCZ: £0.004m/yr (MCZ Fisheries Model). | The estimated annual value of UK dredge landings affected is expected to fall within the following range:<br><br>*£m/yr* \| Scenario 1 \| Scenario 2<br>Value of landings affected \| 0.004 \| 0.004 |

<table>
<tr><th colspan="2">Table 2b: Commercial fisheries rMCZ 7, Thanet Coast</th></tr>
<tr><td>Nets: Numbers of vessels unknown.<br><br>Estimated total value of landings from the rMCZ: £0.043m/yr (MCZ Fisheries Model).</td><td>The estimated annual value of UK net landings affected is expected to fall within the following range:<br><br><table><tr><td>£m/yr</td><td>Scenario 1</td><td>Scenario 2</td></tr><tr><td>Value of landings affected</td><td>0.000</td><td>0.043</td></tr></table>In establishing the draft conservation objectives, the site's features may have been assessed as having low vulnerability to fishing with nets at current levels, and, where this is the case, this activity was not the primary reason for assigning the 'recover' conservation objective. As such, it is anticipated that, if additional management is required, it may be towards the lower end of the range and is likely to be less restrictive than that required for other gears.</td></tr>
<tr><td>Pots and traps: Numbers of vessels unknown.<br><br>Estimated total value of landings from the rMCZ: £0.012m/yr (MCZ Fisheries Model).</td><td>The estimated annual value of UK pot and trap landings affected is expected to fall within the following range:<br><br><table><tr><td>£m/yr</td><td>Scenario 1</td><td>Scenario 2</td></tr><tr><td>Value of landings affected</td><td>0.000</td><td>0.012</td></tr></table>In establishing the draft conservation objectives, the site's features may have been assessed as having low vulnerability to fishing with pots and traps at current levels, and, where this is the case, this activity was not the primary reason for assigning the 'recover' conservation objective. As such, it is anticipated that, if additional management is required, it may be towards the lower end of the range and is likely to be less restrictive than that required for other gears.</td></tr>
<tr><td>Total direct impact on UK commercial fisheries</td><td></td></tr>
</table>

**Table 2b: Commercial fisheries** — **rMCZ 7, Thanet Coast**

The estimated annual value of UK landings and gross value added (GVA) affected is expected to fall within the following range:

| *£m/yr* | Scenario 1 | Scenario 2 |
|---|---|---|
| Value of landings affected | 0.024 | 0.079 |
| GVA affected | 0.010 | 0.035 |

| **Baseline description of non-UK fisheries** | **Costs of impact of rMCZ on non-UK commercial fisheries** |
|---|---|
| | None. |

**Table 2c: Ports, harbours, shipping and disposal sites** — **rMCZ 7, Thanet Coast**

***Source of costs of the recommended Marine Conservation Zone (rMCZ)***

***Management scenario 1:*** Increase in costs of assessing environmental impacts for future licence applications. This applies to future licence applications for disposal of dredged material and navigational dredging that takes place within 1km of the rMCZ. The Balanced Seas regional MCZ project is not aware of activities related to ports, harbours and shipping for which additional mitigation of impacts on features protected by the MCZ that will be needed relative to the mitigation provided in the baseline.

***Management scenario 2:*** Increase in costs of assessing environmental impacts for future licence applications. This applies to future licence applications for disposal of dredged material, navigational dredging and all port and harbour developments within 5 km of the rMCZ. Also, additional costs incurred in including MCZ features in a potential new MDP for Ramsgate. The Balanced Seas regional MCZ project is not aware of activities related to ports, harbours and shipping for which additional mitigation of impacts on features protected by the MCZ that will be needed relative to the mitigation provided in the baseline.

| **Baseline description of activity** | **Costs of impact of rMCZ on the sector** |
|---|---|
| ***Disposal sites:*** There are two sites (TH146 Ramsgate Harbour Site A and TH147 Ramsgate Harbour Site B) within 1km of the rMCZ, which are licensed for disposal of channel dredge material. These are likely to be used by the port of Ramsgate. The average number of licence applications received for both these disposal sites is 0.2 per year (based on number of licence applications received between 2001 and 2010 (Cefas, pers. | *£m/yr* — Scenario 1: Cost to the operator 0.004; Scenario 2: 0.004<br>***Scenario 1:*** Future licence applications for disposal of material and for navigational dredging within 1km of this rMCZ will need to consider the potential effects of the activity on the features protected by the rMCZ. Additional costs will be incurred asa result (a breakdown of these by activity is provided in Annex |

| **Table 2c: Ports, harbours, shipping and disposal sites** | **rMCZ 7, Thanet Coast** |
|---|---|
| comm., 2011).<br><br>There are four disposal sites (Ramsgate Harbour Site A, Pegwell Bay B, Port Ramsgate, Ramsgate Harbour Site B) within 5km of the rMCZ. The average number of licence applications received for all of these disposal sites is 1.2 per year (based on number of licence applications received between 2001 and 2010 (Cefas, pers. comm., 2011).<br><br>***Navigational dredge areas:*** There is licensed maintenance and navigational dredging within 1km and 5km of this rMCZ associated with Ramsgate port and Margate harbour. It is assumed that each dredge area's marine licence is renewed once every 3 years, and that an assessment of environmental impact upon MCZ features is undertaken for each licence renewal. As the navigational dredge areas in the vicinity of Ramsgate would be covered by a potentially new MDP, it is assumed that the assessment of environmental impact is not changed over the 20 year period of the IA.<br><br>***Port development:*** There are 4 ports and harbours within 5km of the rMCZ, which may undergo development at some point in the future: Margate, Broadstairs, Ramsgate and Herne Bay (Ports & Harbours UK, 2012). This may not represent a full list of all ports and harbours impacted by the site. No port developments are known to be planned within the 20 year period of the Impact Assessment (IA). | N11).<br><br>***Scenario 2:*** Future licence applications for disposal of material, navigational dredging and port or harbour development plans and proposals within 5km of this site will need to consider the potential effects of the activity on the features protected by the rMCZ. Additional costs will be incurred as a result (a breakdown of these by activity is provided in Annex N11).<br><br>Also, additional costs will arise to include MCZ features protected by the rMCZ in a new potential MDP for Ramsgate. The anticipated additional cost in the MDP is estimated to be a one-off cost of £8438. |

| **Table 2d: Other impacts that are assessed for the suite of MCZs and not for this site alone** | **rMCZ 7, Thanet Coast** |
|---|---|
| ***Oil and gas related activities (including carbon capture and storage)***<br><br>This rMCZ overlaps with an area that has potential for future oil and gas exploration and production (it overlaps licensed blocks in the 26th or 27th Seaward Licensing Rounds). However, the area is not necessarily viable to develop. Impacts of rMCZs on oil and gas related activities are assessed in the Evidence | |

| |
|---|
| Base, Annex H11 and Annex N10 (they are not assessed for this site alone). |

## Human activities in the site that are not negatively affected by the recommended Marine Conservation Zone (over 2012 to 2032 inclusive)

| **Table 3: Human activities in the site that are not negatively affected by the recommended Marine Conservation Zone (rMCZ) (existing activities at their current levels and future proposals known to the regional MCZ projects)** | **rMCZ 7: Thanet Coast** |
|---|---|
| Cables (existing interconnectors and telecom cables),<br>Commercial fisheries (mid-water trawls, collection by hand)<br>Flood and coastal erosion risk management (coastal defence)<br>Recreation<br>Research and education<br>Shipping<br>Water abstraction, discharge and diffuse pollution*. | |

*The IA assumes that no additional mitigation of impacts of water abstraction, discharge or diffuse pollution will be required over and above that which will be provided to achieve the objectives of the Water Framework Directive through the River Basin Management Plan process (based on advice provided by Natural England, pers. comm., 2010).

## Anticipated benefits to ecosystem services

The habitats, species and other ecological features of the recommended Marine Conservation Zone (rMCZ) contribute to the delivery of a range of ecosystem services. Designation of the rMCZ and its subsequent management may improve the quantity and quality of the beneficial services provided, which may increase the value (contribution to economic welfare) of them. Impacts on the value of ecosystem services may occur as a result of the designation, management and/or achievement of the conservation objectives of the rMCZ. Further discussion on the potential benefits to ecosystem services can be found in Annex L and definitions can be found in Annex H.

| **Table 4a. Fish and shellfish for human consumption** | | **rMCZ 7, Thanet Coast** |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| Fletcher and others (2011) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) can contribute to the delivery of fish and shellfish for human consumption. | If the conservation objectives of the features are achieved, one of the features (*Sabellaria* reefs) will recover to favourable condition. The rest will be maintained in favourable condition. | Anticipated direction of change: |

| **Table 4a. Fish and shellfish for human consumption** | | **rMCZ 7, Thanet Coast** |
|---|---|---|
| Subtidal coarse sediments, sand and mud are important for spawning and nursery grounds. These habitats can provide important nursery grounds for juvenile commercial species such as flatfishes and bass. (Fletcher and others, 2011). Circalittoral and infralittoral rock are important locations for commercial inshore fishing activity, particularly crab and lobster (Expert opinion in Fletcher and others, 2011).<br><br>The baseline quantity and quality of the ecosystem service provided is assumed to be commensurate with that provided by the features of the site when some are in favourable condition and some are in unfavourable condition (see Table 1 for details).<br><br>A relatively high level of commercial fishing is conducted within the subtidal areas of the site. A description of on-site fishing activity and the value derived from it is set out in Table 2b.<br><br>It has not been possible to estimate the value of the off-site benefits that derive from the spawning and nursery area. | New management of fishing activities is expected (above the baseline situation), the costs of which are set out in Table 2b, which may reduce the impacts on fish and shellfish habitats and harvesting of stocks.<br><br>As most of the commercial species targeted by fishers in this area are mobile fish and crustaceans, it is unclear whether the scale of habitat recovered and the magnitude of reduced (on-site) harvesting will be enough to have any significant positive impact on commercial stocks.<br><br>Designating the rMCZ will protect its features and the ecosystem services that they provide against the risk of future degradation from pressures caused by human activities. |  <br><br>Confidence: Low |

| **Table 4b. Recreation** | | **rMCZ 7, Thanet Coast** |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| ***Angling:*** Fletcher and others (2011) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) can contribute to the delivery of fish and shellfish for human consumption and recreation services.<br><br>Subtidal coarse sediments, sand and mud are important for spawning and nursery grounds. These habitats can provide important nursery grounds for juvenile commercial species such as flatfishes and bass (Fletcher and others, 2011).<br><br>The baseline quantity and quality of the ecosystem service provided is | If the conservation objectives of the features are achieved, some of the features (*Sabellaria* reefs) will recover to favourable condition. Others will be maintained in favourable condition.<br><br>As no additional management of angling is expected, fishers will be able to benefit from any on-site and off-site beneficial effects. If the rMCZ results in an increase in the size and diversity of species caught then this is expected to increase the value derived by anglers. | Anticipated direction of change:<br><br>  <br><br>Confidence: |

| **Table 4b. Recreation** | | **rMCZ 7, Thanet Coast** |
|---|---|---|
| assumed to be commensurate with that provided by the features of the site when some are in favourable condition and some are in unfavourable condition (see Table 1 for details)..<br><br>The Thanet Coast has very high biodiversity which attracts fish caught recreationally (including whiting and thornback ray) (Balanced Seas Final Recommendations Report, 2011).<br><br>Both boat and shore angling for bass, thornback ray, smooth hound, grey mullet, cod and whiting takes place throughout the rMCZ. Shore angling is popular and local clubs organise competitions on a regular basis (StakMap, 2010). Being close to London, the Thanet Coast also attracts visitors from further away (Thanet Coast Project website). The system of sand banks and channels in the Outer Thames Estuary outside the rMCZ is popular with boat and charter boat anglers fishing for numerous species including mackerel, dogfish and ray and this off-site area may benefit from spill-over effects (StakMap, 2010). Therefore, the nursery ground for several fish species within the site is likely to help to support potential on-site and off-site fisheries.<br><br>It has not been possible to estimate the value derived from angling on-site or the proportion of the value derived from angling off-site that results from the intertidal and subtidal habitats. | The designation may lead to an increase in angling visits to the site, which may benefit the local economy. This increase might arise from a change in anglers' preferred angling locations rather than an increase at a national scale in days spent angling or the number of anglers | Low |
| ***Diving:*** Fletcher and others (2011) identify that the features to be protected by the rMCZ can contribute to the delivery of recreation services.<br><br>Diving is very limited within the rMCZ as waters are turbid with sediment and dissolved chalk. However, some diving occurs in the far east of the site in Dumpton Gap near Ramsgate and Botany Bay near Margate (Natural England, 2007). It has not been possible to estimate the value derived from diving in the rMCZ. | If the conservation objectives of the features are achieved, one feature will recover to favourable condition and rest will be maintained in favourable condition.<br><br>If the rMCZ results in an increase in biodiversity, which may include recovery of fragile and slow-growing species as a result of reduced pressure from mobile fishing gears, this is expected to increase the value of dive visits derived by divers of the site. | Anticipated direction of change:<br><br>  |

| **Table 4b. Recreation** | | **rMCZ 7, Thanet Coast** |
|---|---|---|
| The baseline quantity and quality of the ecosystem service provided is assumed to be commensurate with that provided by the features of the site when some are in favourable condition and some are in unfavourable condition (see Table 1 for details). | Improved local diving may result in an increase in dive trips to the area, which may have beneficial effects on the local economy. This increase may represent a redistribution of dive location preferences rather than an overall increase in diving. | Confidence: Low |
| ***Wildlife watching:*** Fletcher and others (2011) identify that the features to be protected by the rMCZ can contribute to the delivery of recreation and tourism services.<br><br>Mussel beds are an important food source for birds (Fletcher and others, 2011).<br><br>The baseline quantity and quality of the ecosystem service provided is assumed to be commensurate with that provided by the features of the site when some are in favourable condition and some are in unfavourable condition (see Table 1 for details)..<br><br>The Thanet Coast is popular for wildlife watching as it is internationally important for wintering birds and for the marine life associated with the chalk cliffs, caves, reefs and sandy bays. It is also nationally important for the geology, the chalk stacks and arch, and coastal plants (Thanet Coast Project website). Birdwatching is a popular activity within the rMCZ, particularly at Foreness Point on the North Kent cliffs (RSPB website). However, the whole coast is accessible, and with the subtidal and intertidal chalk ledges providing rock-pooling opportunities on the foreshore, wildlife watchers can be found throughout the rMCZ (Thanet Coast Project website).<br><br>It has not been possible to estimate the value derived from wildlife watching in the rMCZ. | If the conservation objectives of the features are achieved, some of the features will be recovered to favourable condition. Others will be maintained in favourable condition.<br><br>The recovery of *Sabellaria* to favourable condition may improve their functioning as support for fish, bird and marine mammal populations, potentially benefitting wildlife watching within the rMCZ. Any associated increase in abundance and diversity of species that are visible to wildlife watchers may improve the quality of wildlife watching at the site and therefore the value of the ecosystem service.<br><br>The designation may lead to an increase in wildlife watching visits to the site, which may benefit the local economy. This increase may represent an overall increase in UK wildlife watching visits and/or a redistribution of location preferences.<br><br>Designating the rMCZ will protect its features and the ecosystem services that they provide against the risk of future degradation from pressures caused by human activities. | Anticipated direction of change:<br><br>⇧<br><br>Confidence: Low |

| **Table 4b. Recreation** | | **rMCZ 7, Thanet Coast** |
|---|---|---|
| ***Other recreation:*** Fletcher and others (2011) identify that the features to be protected by the rMCZ can contribute to the delivery of recreation and tourism services.<br><br>The Thanet Coast is a very popular tourist destination, especially for recreational sailing, kayaking, canoeing, personal watercraft, water skiing and coastal walking. There are numerous sailing, kayaking and canoeing clubs within the site as well as marinas, docks and launch sites. Racing events take place and training for novices is available from many of the clubs (StakMap, 2010). Coastal walking routes include the Viking Trail and easy access to the shore throughout the rMCZ (Natural England 2007).<br><br>It has not been possible to estimate the value derived from other recreation in the rMCZ. | If the conservation objectives of the features are achieved, some of the features will recover to favourable condition. Others will be maintained in favourable condition.<br><br>Designating the rMCZ will protect its features and the ecosystem services that they provide against the risk of future degradation from pressures caused by human activities.<br><br>If the rMCZ is designated this will provide an additional positive aspect about the location that could be promoted by the tourism and leisure industry and that would be expected to increase visitation rates. | Anticipated direction of change:<br><br>⇧<br><br>Confidence: Low |

| **Table 4c. Research and education** | | **rMCZ 7, Thanet Coast** |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| ***Research:*** Fletcher and others (2011) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) can contribute to the delivery of research services.<br><br>North East Kent Scientific Coastal Advisory Group has a membership consisting of scientists and governmental and non-governmental bodies who co-ordinate research in the area to inform management and public awareness activities. The Thanet Coast Project, which manages the North East Kent European Marine Sites, also initiates research projects in the area (Thanet Coast Project website). Kent Wildlife Trust regularly conducts sea-floor and sea-shore surveys through Seasearch and Shoresearch. Research is also conducted by Kent County Council in order to inform the Kent Coastal Network initiative (Kent Coastal Network website). | Monitoring of the rMCZ will help inform understanding of how the marine environment is changing and is impacted on by anthropogenic pressures and management interventions. Other research benefits are unknown. | Anticipated direction of change:<br><br>⇧<br><br>Confidence:<br><br>High |

| **Table 4c. Research and education** | | **rMCZ 7, Thanet Coast** |
|---|---|---|
| ***Education:*** Fletcher and others (2011) identify that the features to be protected by the rMCZ can contribute to the delivery of education services.<br><br>The Thanet Coast Project organises regular community events for educational purposes to raise awareness of the biodiversity in the area and to connect the local communities to the coast. There are also outreach and stakeholder activities, with a strong focus on education (Thanet Coast Project website). | MCZ designation may provide an opportunity to expand the focus of education events into the marine environment.<br><br>Designation may aid additional local (to the rMCZ) provision of education activities (e.g. events, interpretation boards), from which visitors would derive benefit.<br><br>Non-visitors may benefit if the rMCZ contributes to wider provision of education (e.g. television programmes, articles in magazines and newspapers, and educational resources developed for use in schools). | Anticipated direction of change:<br><br>⇧<br><br>Confidence: Moderate |

| **Table 4d. Regulating services** | | **rMCZ 7, Thanet Coast** |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| ***Regulation of pollution:*** the features of the site contribute to the bioremediation of waste (subtidal sediments), water purification (Blue Mussels beds and *Sabellaria*) and sequestration of carbon (subtidal sands and gravels, Blue Mussels beds and *Sabellaria*) (Fletcher and others, 2011).<br><br>***Environmental resilience:*** the features (*Sabellaria* and Blue Mussel beds) of the site contribute to the resilience and continued regeneration of marine ecosystems (Fletcher and others, 2011).<br><br>***Natural hazard protection:*** the features of the site (*Sabellaria* and Blue Mussel beds and infralittoral rock), contribute to local flood and storm protection (Fletcher and others, 2011).<br><br>It has not been possible to estimate the value derived from regulating services associated with the rMCZ. | If the conservation objectives of the features are achieved, some features will be maintained in favourable condition and some (*Sabellaria* reefs) recovered to favourable condition.<br><br>Recovery of the *Sabellaria* reefs and a potential reduction in the use of bottom towed fishing gear may increase the site's benthic biodiversity and biomass, improving the regulating capacity its habitats.<br><br>Designating the rMCZ will protect its features and the ecosystem services that they provide against the risk of future degradation from pressures caused by human activities. | Anticipated direction of change:<br><br>⇧<br><br>Confidence: Low |

| **Table 4e. Non-use and option values** | | **rMCZ 7, Thanet Coast** |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| Some people gain satisfaction from the existence of marine habitats, species and other features. They also gain from having the option to benefit in the future from the habitats and species in the rMCZ and the ecosystem services provided, even if they do not currently benefit from them.<br><br>It has not been possible to estimate the value derived from non-use and option value services associated with the rMCZ. | The rMCZ will benefit the proportion of the UK population that values conservation of the rMCZ features and its contribution to an ecologically coherent network of MPAs. Some people will gain satisfaction from knowing that the habitats and species are being conserved (existence value) and/or that they are being conserved for use by others in the current generation (altruistic value) or future generations (bequest value). The rMCZ will protect both the features and the option to benefit from the services in the future from the risk of future degradation.<br><br>Examples of these values are shown in (Ranger, Lowe, Sanghera, & Solandt, 2012). Voters in the MCS's 'Your Seas Your Voice' campaign felt that features of the natural environment were strong motivators for reasons why people thought areas within the rMCZ should be protected, with people frequently attaching value to biodiversity, particularly the seal populations resident here. Also, feelings of emotional attachment to the site were expressed as well. Regarding non-extractive use value, ease of access and the proximity of the site were considered important as reasons to protect this site. Furthermore, there was a perception that the area is 'under threat' from 'damaging activities and extraction'. (Ranger et al. (2011)<br><br>Furthermore, the existing protected North East Kent Marine Sites (NEKMS) has provided a focal point for stakeholders, increasing awareness of marine life and the environment and providing a platform from which to coordinate events which have created social, economic, health and wellbeing benefits to the community. A recent study has shown that the existing marine protected area in Thanet has promoted environmental and leisure use within the community and helped to support local infrastructure, groups and tourism within the area (Tony Child email, Thanet Coast Project, 2011). | Anticipated direction of change:<br><br>⇧<br><br>Confidence: Moderate |

## rMCZ 7, Reference Area 4 Westgate Promontory

**Site area (km$^2$): 0.23**

| **Table 1. Conservation impacts** | | | **rMCZ 7, Reference Area 4 Westgate Promontory** | |
|---|---|---|---|---|
| **1a. Ecological description** | | | | |
| This recommended Marine Conservation Zone (rMCZ) Reference Area lies within rMCZ 7 (Thanet Coast) and was identified as one of only two locations in the Balanced Seas Project Area containing survey records for the kaleidoscope jellyfish *Haliclystus auricula.* The site would also protect intertidal mud and moderate energy intertidal rock, and two habitat Features of Conservation Importance: littoral chalk communities and subtidal sands and gravels. This site is contained within the Thanet Coast Site of Special Scientific Interest and the Thanet Coast Special Area of Conservation.<br><br>Source: Balanced Seas Final Recommendations (2011). | | | | |
| **1b.** Baseline condition of MCZ features and impact of the MCZ | | | | |
| **Feature** | **Area of feature (km2)** | **No. of occurrences** | **Baseline** | **Impact** |
| ***Broad-scale habitats*** | | | | |
| A1.2 Moderate energy intertidal rock | 0.11 | - | Unfavorable condition | Recover to reference condition |
| A2.3 Intertidal mud | 0.03 | - | Unfavorable condition | Recover to reference condition |
| A3.2 Moderate energy infralittoral rock | - | - | Unfavorable condition | Recover to reference condition |
| A5.2 Subtidal sand | - | - | Unfavorable condition | Recover to reference condition |
| ***Habitats of Conservation Importance*** | | | | |
| Littoral chalk communities | 0.11 | - | Unfavorable condition | Recover to reference condition |
| Subtidal sands and gravels | 0.02 | | Unfavorable condition | Recover to reference condition |
| ***Species of Conservation Importance*** | | | | |
| Kaleidoscope jellyfish *Haliclystus.auricula* | - | 1 record | Unfavorable condition | Recover to reference condition |

## Site-specific costs arising from the effect of the rMCZ on human activities (over 2013 to 2032 inclusive)

| **Table 2a: Ports, harbours, shipping and disposal sites** | **rMCZ 7, Reference Area 4 Westgate Promontory** |
|---|---|
| ***Source of costs of the recommended Marine Conservation Zone (rMCZ)*** | |
| ***Management scenario 1:*** Not applicable to this site. | |

**Table 2a: Ports, harbours, shipping and disposal sites** **rMCZ 7, Reference Area 4 Westgate Promontory**

***Management scenario 2:*** Increase in costs of assessing environmental impacts for future licence applications. This applies to future licence applications for all port and harbour developments within 5 km of the rMCZ. The Balanced Seas regional MCZ project is not aware of activities related to ports, harbours and shipping for which additional mitigation of impacts on features protected by the MCZ that will be needed relative to the mitigation provided in the baseline.

| Baseline description of activity | Costs of impact of rMCZ on the sector |
|---|---|
| ***Port development:*** There is one port within 5km of the rMCZ Reference Area (Margate) which may undergo development at some point in the future (Ports & Harbours UK, 2012). This may not represent a full list of all ports and harbours impacted by the site. No port developments are known to be planned within the 20 year period of the Impact Assessment (IA). | *£m/yr* \| Scenario 1 \| Scenario 2<br>Cost to the operator \| N/A \| 0.000<br>***Scenario 1:*** Not applicable to this site.<br>***Scenario 2:*** Future licence applications for port or harbour development plans and proposals within 5km of this rMCZ Reference Area will need to consider the potential effects of the activity on the features protected by the rMCZ. Additional costs will be incurred as a result (a breakdown of these by activity are provided in N11). |

**Table 2b: Recreational anchoring** **rMCZ 7, Reference Area 4 Westgate Promontory**

***Source of costs of the recommended Marine Conservation Zone (rMCZ)***

Closure of entire site to all recreational anchoring (except in emergency circumstances).

| Baseline description of activity | Costs of impact of rMCZ on the sector |
|---|---|
| Forty-nine Stakmap interviewees (representing clubs throughout south-east England and a combined total of 13,713 individuals (3,663 users/yr)) indicated that their yachting interests overlap with the rMCZ Reference Area, but none mentioned that they anchor there.<br><br>The only anchoring known to occur is that of 1 or 2 vessels a month in July and August, because the substrate is largely unsuitable for anchoring (Natural England Stakeholder Interview for rMCZ Reference Area 4 | Because the substrate is unsuitable for anchoring and the intensity of anchoring is very low, closure to anchoring is expected to have a negligible impact on recreational vessel users. |

| **Table 2b: Recreational anchoring** | **rMCZ 7, Reference Area 4 Westgate Promontory** |
|---|---|
| Westgate Promontory, November 2011). | |

| **Table 2c: Recreational angling** | **rMCZ 7, Reference Area 4 Westgate Promontory** |
|---|---|
| ***Source of costs of the recommended Marine Conservation Zone (rMCZ)*** | |
| Closure of entire site to all recreational angling. | |
| **Baseline description of activity** | **Costs of impact of rMCZ on the sector** |
| Five Stakmap interviewees indicated that areas used for recreational angling (including charter boat operators who use the area and represent 1,200 anglers/yr), shore fishing and boat fishing (two clubs comprising 210 individuals) overlap with the rMCZ Reference Area. However, the rMCZ Reference Area represents a small proportion of the overall area over which stakeholders indicated that they fished. | The rMCZ Reference Area was developed in conjunction with the Regional Stakeholder G group recreational sea angling representative and local Nayland Boat Sea Fishing Club so that it would have minimal impact on their activities. It is understood that if the rMCZ Reference Area were designated, Nayland Boat Sea Fishing Club and their members would agree to halt any angling that currently takes place in the rMCZ Reference Area.<br><br>Because the rMCZ Reference Area is a small proportion of the wider area where anglers fish, it is anticipated that anglers may respond to the closure by fishing at other locations. This may increase their travel costs. |

| **Table 2d: Recreational bait collection** | **rMCZ 7, Reference Area 4 Westgate Promontory** |
|---|---|
| ***Source of costs of the recommended Marine Conservation Zone (rMCZ)*** | |
| Closure of entire site to all recreational bait collection. | |
| **Baseline description of activity** | **Costs of impact of rMCZ on the sector** |
| It was reported at the Essex Sites meeting in July 2011 that lugworm digging may occur in the site. Nayland Boat Sea Fishing Club members said that they do not dig for bait in the area but bait collection does occur by shore anglers at very low levels (T. Hills, RSG Angling Representative, | Development of the boundaries of this site was informed by a meeting between the recreational sea angling Regional Stakeholder Group (RSG) representative and local Nayland Boat Sea Fishing Club so that it has minimal impact on the Club's activities, including bait digging (Balanced Seas Final Recommendation |

| **Table 2d: Recreational bait collection** | **rMCZ 7, Reference Area 4 Westgate Promontory** |
|---|---|
| pers. comms., April 2012). | Report, 2011).<br><br>Due to the low level of activity, the site is not expected to impact bait diggers significantly, and any activity could be displaced to other areas of the coast. |

| **Table 2e. Recreation – Rockpooling** | **rMCZ 7, Reference area 4 Westgate Promontory** |
|---|---|
| ***Source of costs of the recommended Marine Conservation Zone (rMCZ)***<br><br>***Management scenario 1:*** No removal of material from the site by people who are rock-pooling. | |
| **Baseline description of activity** | **Costs of impact of MCZ on the sector** |
| Over the summer (June – September) an estimated 6 people rock pool each day in the rock pools in this rMCZ Reference Area. They turn over stones but the features that have been recommended for protection in the site are unlikely to be collected (Natural England Stakeholder Interview for rMCZ Reference Area 4 Westgate Promontory, November 2011). | Given that rock pooling will still be allowed in the site, the prohibition on removal of material is likely to have a negligible effect on people using the site. Costs will be incurred in notifying visitors that no material can be removed from the site (which are considered as part of the costs of managing the site). |

| **Table 2f. Recreation – Walking (including dog walking)** | **rMCZ 7, Reference area 4 Westgate Promontory** |
|---|---|
| ***Source of costs of the MCZ***<br><br>***Management scenario 1*** People walking through the rMCZ will be encouraged to use marked routes; dog walkers will be required to dispose of dog faeces in provided facilities. | |
| **Baseline description of activity** | **Costs of impact of MCZ on the sector** |
| Walkers tend to stick to the Promenade, which forms part of the Viking Coastal Trail, and is above the rMCZ rather than come down on to the foreshore (Natural England Stakeholder Interview for rMCZ Reference Area 4 Westgate Promontory, November 2011).<br><br>An estimated 24 people walk dogs within the rMCZ every day of the year. | Given that walking would still be allowed in the site, impacts are likely to be negligible. Visitors would be encouraged to use marked routes to avoid affecting features protected by the rMCZ. Dog walkers would be required to remove and dispose of dog faeces in provided facilities. Impacts would include the cost of notifying visitors of the need to stay to designated paths, to remove dog faeces and of the location of the nearest disposal facility (which are |

| **Table 2f. Recreation – Walking (including dog walking)** | **rMCZ 7, Reference area 4 Westgate Promontory** |
|---|---|
| A. About half of the dog walkers leave faeces, but a Dog Exclusion Order is in place in part of the site, up to the groyne (dogs are not allowed on the main Westgate beach between 10.00 and 18.00 from 1 May to 30 September (The Dogs Exclusion (Thanet District Council) (No 1) Order 2009; http://www.thanet.gov.uk/environment__planning/dog_byelaws.aspx; Natural England Stakeholder Interview for rMCZ Reference Area 4 Westgate Promontory, November 2011; Tony Childs Thanet Coast Project,e-mail, 15/6/12). | considered as part of the costs of managing the site). |

| **Table 2g: Other impacts that are assessed for the suite of MCZs and not for this site alone** | **rMCZ 7, Reference Area 4 Westgate Promontory** |
|---|---|
| ***Oil and gas related activities (including carbon capture and storage)*** <br><br> This rMCZ Reference Area overlaps with an area that has potential for future oil and gas exploration and production (it overlaps licensed blocks in the 27th Seaward Licensing Rounds). However, it is unlikely that any oil and gas (including carbon capture and storage) infrastructure will be proposed in future in this rMCZ Reference Area due to its location and size (DECC, pers. comm., 2012). Impacts of rMCZ Reference Areas on oil and gas related activities are assessed in the Evidence Base, Annex H11 and Annex N 10 (they are not assessed for this site alone). | |

**Human activities in the site that are not negatively affected by the rMCZ (over 2013 to 2032 inclusive)**

| **Table 3: Human activities in the site that are not negatively affected by the recommended Marine Conservation Zone (rMCZ) (existing activities at their current levels and future proposals known to the regional MCZ projects)** | **rMCZ 7, Reference Area 4 Westgate Promontory** |
|---|---|
| Flood and coastal erosion risk management (coastal defence) <br> Recreation (except the activities listed above in table 2) <br> Research and education <br> Water abstraction, discharge and diffuse pollution*. | |

*The IA assumes that no additional mitigation of impacts of water abstraction, discharge or diffuse pollution will be required over and above that which will be provided to achieve the objectives of the Water Framework Directive through the River Basin Management Plan process (based on advice provided by Natural England, pers. comm., 2010).

## Anticipated benefits to ecosystem services

The habitats, species and other ecological features of the recommended Marine Conservation Zone (rMCZ) Reference Area contribute to the delivery of a range of ecosystem services. Designation of the rMCZ Reference Area and its subsequent management may improve the quantity and quality of the beneficial services provided, which may increase the value (contribution to economic welfare) of them. Impacts on the value of ecosystem services may occur as a result of the designation, management and/or achievement of the conservation objectives of the rMCZ Reference Area. Further discussion on the potential benefits to ecosystem services can be found in Annex L and definitions can be found in Annex H.

| **Table 4a. Fish and shellfish for human consumption** | **rMCZ 7, Reference Area 4 Westgate Promontory** | |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| Fletcher and others (2011) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) Reference Area can contribute to the delivery of fish and shellfish for human consumption.<br><br>Intertidal mud provides habitat for fish of commercial importance. Infralittoral rock is a suitable habitat for inshore commercial fisheries species, particularly lobster and crab (Fletcher and others, 2011). The baseline quantity and quality of the ecosystem service provided is assumed to be commensurate with that provided by the features of the site when some are in favourable condition and some are in unfavourable condition (see rMCZ 7 Table 1).<br><br>There is no evidence of any commercial fishing taking place in the site (Stakmap 2010) and given the intertidal nature of the rMCZ Reference Area, it is unlikely to occur.<br><br>It has not been possible to estimate the value of the off-site benefits that derive from any spawning and nursery areas that might occur in the site. | If the conservation objectives of the features are achieved, the features will be recovered to reference condition.<br><br>Additional management (above that in the baseline situation) of fishing activities is expected which will prohibit fishing within the rMCZ Reference Area. Achievement of the conservation objectives may improve the contribution of the habitats to the provision of fish and shellfish for human consumption.<br><br>Closure of the rMCZ Reference Area to fishing activity will not reduce the on-site fishing mortality of species due to lack of this activity and, as the site is small, it is unclear whether this would benefit stocks of mobile commercial finfish species in general. If stocks did improve commercial fishers may benefit from spillover effects from the site. | Anticipated direction of change:<br><br>⇧<br><br>Confidence: Low |

| **Table 4b. Recreation** | **rMCZ 7, Reference Area 4 Westgate Promontory** | |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| ***Angling:*** Fletcher and others (2011) identify that the features to be | If the conservation objectives of the features are achieved, the | Anticipated |

| **Table 4b. Recreation** | **rMCZ 7, Reference Area 4 Westgate Promontory** | |
|---|---|---|
| protected by the recommended Marine Conservation Zone (rMCZ) Reference Area can contribute to the delivery of fish and shellfish for human consumption and recreation services.<br><br>Intertidal mud provides habitat for fish of commercial importance, and infralittoral rock is a suitable habitat for inshore commercial fisheries species (Fletcher and others, 2011) so it can be assumed that these habitats may also be an important area for recreational fisheries. The baseline quantity and quality of the ecosystem service provided is assumed to be commensurate with that provided by the features of the site when some are in favourable condition and some are in unfavourable condition (see rMCZ 7 Table 1).<br><br>Angling takes place in this rMCZ Reference Area at a very low level and a description of this activity is set out in Table 2c. However, it has not been possible to estimate the value derived from this.<br><br>It has not been possible to estimate the proportion of the value derived from angling off-site that results from any spawning and nursery areas that might occur in the site. | features will be recovered to reference condition.<br><br>Recovery of habitats may have benefits for fish populations. It is unclear whether any benefits for fish populations would arise as a result of reduced fishing mortality due to closure of the rMCZ Reference Area (see Table 4a).<br><br>As angling will not be permitted within the rMCZ Reference Area, any benefits will be limited to those occurring as a result of spill-over effects of finfish species targeted by anglers outside the rMCZ Reference Area. Such benefits may be insignificant. | direction of change:<br><br>⇧<br><br>Confidence: Low |
| ***Diving:*** Diving is not known to take place in the site. | N/A | N/A |
| ***Wildlife watching:*** Fletcher and others (2011) identify that the features to be protected by the rMCZ Reference Area can contribute to the delivery of recreation and tourism services.<br><br>Macroinvertebrates are an essential link between high trophic levels (e.g. fish and birds) and low trophic levels (e.g. algae) on intertidal rock habitat (Fletcher and others, 2011). The baseline quantity and quality of the ecosystem service provided is assumed to be commensurate with that provided by the features of the site when some are in favourable condition and some are in unfavourable condition (see rMCZ 7 Table 1). | If the conservation objectives of the features are achieved, the features will be recovered to reference condition.<br><br>The recovery of the features to reference condition may improve their functioning as support for fish and bird populations, potentially benefiting wildlife watching within the rMCZ Reference Area. The kaleidoscope jellyfish is particularly attractive and, provided the activity is adequately controlled, many people would probably like to see it. In addition, an improvement in the condition of site features and | Anticipated direction of change:<br><br>⇧<br><br>Confidence: Low |

| **Table 4b. Recreation** | **rMCZ 7, Reference Area 4 Westgate Promontory** | |
|---|---|---|
| The whole of the Thanet Coast is important for wintering birds and the coastline is accessible, and therefore it can be assumed that this rMCZ Reference Area will be used by bird watchers. Rockpooling is popular along this coast and the habitat in the rMCZ Reference Area affords the opportunity for this activity; about six people a day go rockpooling in the site from June to September (Natural England Reference Area questionnaire, 29 November 2011)<br><br>It has not been possible to estimate the value derived from wildlife watching in the rMCZ Reference Area. | any associated increase in abundance and diversity of species that are visible to wildlife watchers may improve the quality of wildlife watching at the site and therefore the value of the ecosystem service.<br><br>The designation may lead to an increase in wildlife watching visits to the site, which may benefit the local economy. This increase may represent an overall increase in UK wildlife watching visits and/or a redistribution of location preferences.<br><br>Designating the rMCZ Reference Area will protect its features and the ecosystem services that they provide against the risk of future degradation from pressures caused by human activities. | |
| ***Other recreation:*** Fletcher and others (2011) identify that the features to be protected by the rMCZ Reference Area can contribute to the delivery of recreation and tourism services.<br><br>The rMCZ Reference Area is popular for walking (at least 24 dogs are walked along the shore every day) (Natural England Reference Area questionnaire, 29 November 2011).<br><br>It has not been possible to estimate the value derived from other recreation in the rMCZ Reference Area. | If the conservation objectives of the features are achieved, the features will be recovered to reference condition.<br><br>The rMCZ Reference Area is fully contained within rMCZ 7 for which the benefits of other recreation have been assessed. It is not possible to identify whether the Reference Area will have additional benefits over and above this but this seems unlikely. Designating the rMCZ Reference Area will protect its features and the ecosystem services that they provide against the risk of future degradation from pressures caused by human activities. | Anticipated direction of change:<br><br>⇧<br><br>Confidence: Low |

| **Table 4c. Research and education** | **rMCZ 7, Reference Area 4 Westgate Promontory** | |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| ***Research:*** Fletcher and others (2011) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) | As an rMCZ Reference Area, the site will provide an opportunity to demonstrate the state of designated marine | Anticipated direction of |

| **Table 4c. Research and education** | **rMCZ 7, Reference Area 4 Westgate Promontory** | |
|---|---|---|
| Reference Area can contribute to the delivery of research services.<br><br>Research activities are undertaken by Kent Wildlife Trust and the Thanet Coast Project in the wider rMCZ in which this rMCZ Reference Area lies and may overlap. The Thanet Coast Project has been monitoring the spread of the invasive Pacific oyster *Crassostrea gigas* for the past three years. As a result of the research undertaken a new management approach for controlling marine invasive species is being trialled for the first time within the wider rMCZ and this activity may extend into the rMCZ Reference Area.<br><br>It has not been possible to estimate the value derived from research activities associated with the rMCZ Reference Area. | features in the absence of many anthropogenic pressures (Natural England and JNCC, 2010). It will provide a control area against which the impacts of pressures caused by human activities can be compared as part of long-term monitoring and assessment. Other research benefits are unknown. | change:<br><br>⇧<br><br>Confidence: High |
| ***Education:*** Fletcher and others (2011) identify that the features to be protected by the rMCZ Reference Area can contribute to the delivery of education services.<br><br>The Thanet Coast Project, Kent Wildlife Trust and Wildwood Trust all undertake educational activities for schools, individuals, clubs and societies in the broader rMCZ and a number of these may overlap with the rMCZ Reference Area. For example, Seashore Safaris (an educational activity run by the Thanet Coast Project two or three times a year, with some 50 to 60 people on each safari) visit the rMCZ Reference Area (Natural England Reference Area questionnaire, 29 November 2011)<br><br>It has not been possible to estimate the value derived from education activities associated with the rMCZ Reference Area. | MCZ Reference Area designation may provide an opportunity to expand the focus of education events into the marine environment.<br><br>Designation may aid the development of additional local (to the rMCZ Reference Area) education activities (e.g. events and interpretation boards), from which visitors to the site would derive benefit. Activities such as Seashore Safaris which discourage the removal of any material from the site would be able to continue and expand.<br><br>Non-visitors may benefit if the rMCZ Reference Area contributes to wider provision of educational resources (e.g. television programmes, articles in magazines and newspapers, and educational resources developed for use in schools). | Anticipated direction of change:<br><br>⇧<br><br>Confidence: Moderate |

| **Table 4d. Regulating services** | **rMCZ 7, Reference Area 4 Westgate Promontory** | |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| ***Regulation of pollution:*** The features of the site, in particular subtidal sands and gravels, contribute to the bioremediation of waste and sequestration of carbon (Fletcher and others, 2011).<br><br>***Environmental resilience:*** The features of the site, in particular intertidal rock, contribute to the resilience and continued regeneration of marine ecosystems (Fletcher and others, 2011).<br><br>***Natural hazard protection:*** Intertidal mud would contribute to local flood and storm protection (Fletcher and others, 2011).It has not been possible to estimate the value derived from regulating services associated with the rMCZ Reference Area. | If the conservation objectives of the features are achieved, the features will be recovered to reference condition.<br><br>Recovery of the intertidal and subtidal broad-scale habitats and closure to fishing could increase the site's benthic biodiversity and biomass, improving the regulating capacity of its habitats.<br><br>Designating the recommended Marine Conservation Zone Reference Area will protect its features and the ecosystem services that they provide against the risk of future degradation from pressures caused by human activities. | Anticipated direction of change:<br><br>⇧<br><br>Confidence: Low |

| **Table 4e. Non-use and option values** | **rMCZ 7, Reference Area 4 Westgate Promontory** | |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| Some people gain satisfaction from the existence of marine habitats, species and other features. They also gain from having the option to benefit in the future from the habitats and species in the recommended Marine Conservation Zone (rMCZ) Reference Area and the ecosystem services provided, even if they do not currently benefit from them.<br><br>It has not been possible to estimate the value derived from non-use and option values associated with the rMCZ Reference Area. | The rMCZ Reference Area will benefit the proportion of the UK population that values conservation of its features and its contribution to an ecologically coherent network of Marine Protected Areas. Some people will gain satisfaction from knowing that the habitats and species are being conserved (existence value) and/or that they are being conserved for use by others in the current generation (altruistic value) or future generations (bequest value). The rMCZ Reference Area will protect the features and the ecosystem services provided, and thereby the option to benefit from these services in the future, from the risk of future degradation. | Anticipated direction of change:<br><br>⇧<br><br>Confidence: Moderate |

## rMCZ 7, Reference Area 5 Turner Contemporary

**Site area (km$^2$): 0.38**

**Table 1. Conservation impacts** **rMCZ 7 Reference Area 5 Turner Contemporary**

**1a. Ecological description**

This site falls within recommended Marine Conservation Zone 7 (Thanet Coast) and captures the only regional record of the St John's jellyfish *Lucernariopsis cruxmelitensis.* The site lies within an area of high biodiversity and algal richness (benthic biotope and benthic species richness) which is underpinned by the habitat complexity captured within the boundaries. Other features identified for specific protection are littoral chalk communities, subtidal chalk and subtidal sands and gravels, as well as seven broad-scale habitats listed in the table below. This site falls within the Thanet Coast Site of Special Scientific Interest and the Thanet Coast Special Area of Conservation.

Source: Balanced Seas Final Recommendations (2011).

**1b.** Baseline condition of MCZ features and impact of the MCZ

| Feature | Area of feature (km2) | No. of occurrences | Baseline | Impact |
|---|---|---|---|---|
| ***Broad-scale habitats*** | | | | |
| A1.2 Moderate energy intertidal rock | 0.07 | - | Unfavorable condition | Recover to reference condition |
| A2.2 Intertidal sand and muddy sand | 4.4 m$^2$ | - | Unfavorable condition | Recover to reference condition |
| A2.3 Intertidal mud | 0.04 | - | Unfavorable condition | Recover to reference condition |
| A3.2 Moderate energy infralittoral rock | - | - | Unfavorable condition | Recover to reference condition |
| A4.2 Moderate energy circalittoral rock | - | - | Unfavorable condition | Recover to reference condition |
| A5.2 Subtidal sand | - | - | Unfavorable condition | Recover to reference condition |
| A5.4 Subtidal mixed sediments | - | - | Unfavorable condition | Recover to reference condition |
| ***Habitats of Conservation Importance*** | | | | |
| Littoral chalk communities | 0.08 | - | Unfavorable condition | Recover to reference condition |
| Subtidal chalk | 0.04 | - | Unfavorable condition | Recover to reference condition |
| Subtidal sands and gravels | 0.02 | - | Unfavorable condition | Recover to reference condition |
| ***Species of Conservation Importance*** | | | | |
| St John's jellyfish *Lucernariopsis cruxmelitensis* | - | 1 record | Unfavorable condition | Recover to reference condition |

## Site-specific costs arising from the effect of the rMCZ on human activities (over 2013 to 2032 inclusive)

| **Table 2a: Archaeological heritage** | **rMCZ 7, Reference Area 5 Turner Contemporary** |
|---|---|
| ***Source of costs of the recommended Marine Conservation Zone (rMCZ)*** <br><br> Increase in costs of assessing environmental impacts for future licence applications. Archaeological excavations, surface recovery and intrusive surveys will be prohibited from the entire site. Diver trails, visitors and non-intrusive surveys will be allowed. | |
| **Baseline description of activity** | **Costs of impact of rMCZ on the sector** |
| The available records indicate the presence of an unidentified wrecked vessel and two features that abut the site, the Stone Pier and Droit House, which are identified as Listed Buildings (English Heritage, 2012). | An extra cost would be incurred in the assessment of environmental impacts made in support of any future licence applications for archaeological activities in the site. The likelihood of a future licence application being submitted is not known, so no overall cost to the sector of this rMCZ has been estimated. However, the additional cost of one licence application could be in the region of £500 to £10,000 depending on the size of the rMCZ (English Heritage, pers. comm., 2012). 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. It is not possible to predict when or how often this may occur, so it is not costed in the Impact Assessment. If archaeological excavations do not take place as a result of these restrictions, this will prevent interpretation of archaeological evidence from the site, which will decrease acquisition of historical knowledge of past human communities from the site, thus resulting in a cost to society. |

| **Table 2b: Commercial fisheries** | **rMCZ 7, Reference Area 5 Turner Contemporary** |
|---|---|
| ***Source of costs of the recommended Marine Conservation Zone (rMCZ)*** <br><br> Closure of entire site to all gear types. | |
| ***Summary of all fisheries:*** The rMCZ Reference Area is coastal and lies within rMCZ 7 Thanet Coast. It is primarily intertidal and therefore does not overlap significantly with commercial fishing interests. It is unknown how many vessels use this rMCZ Reference Area. The MCZ Fisheries Model suggests that bottom trawls, dredges, pots and traps and nets are used at very low levels in the rMCZ but this is likely to be an over-estimate given that the site is largely intertidal. More detail on the approach used for the fisheries method is provided at Annexes H7 and N4. Estimated annual value of landings from the rMCZ | |

<table>
<tr><th>Table 2b: Commercial fisheries</th><th>rMCZ 7, Reference Area 5 Turner Contemporary</th></tr>
<tr><td colspan="2">Reference Area: £420/yr (MCZ Fisheries Model).<br><br>(Due to resolution issues of the MCZ Fisheries Model and the small size of many rMCZ Reference Areas in the Balanced Seas MCZ, some fisheries landings values may be inaccurate. They have been included as a precautionary measure and to avoid underestimating the economic value of the site.)</td></tr>
<tr><th>Baseline description of UK commercial fisheries</th><th>Costs of impact of rMCZ on UK commercial fisheries</th></tr>
<tr><td>Bottom trawls: It is unknown how many vessels use bottom trawls in the rMCZ Reference Area, but it was indicated that there was a low level of activity (MCZ Fisheries Model).<br><br>Estimated total value of landings from the rMCZ Reference Area: £120/yr (MCZ Fisheries Model).</td><td>Estimated annual value of UK vessel landings affected:<br><br><table><tr><td>£m/yr</td><td>Scenario 1</td></tr><tr><td>Value of landings affected</td><td><0.001*</td></tr></table>* £120/yr.</td></tr>
<tr><td>Dredges: It is unknown how many vessels use dredges in the rMCZ Reference Area, but it was indicated that there was a low level of activity (MCZ Fisheries Model).<br><br>Estimated total value of landings from the rMCZ Reference Area: £30/yr (MCZ Fisheries Model).</td><td>Estimated annual value of UK vessel landings affected:<br><br><table><tr><td>£m/yr</td><td>Scenario 1</td></tr><tr><td>Value of landings affected</td><td><0.001*</td></tr></table>* £30/yr.</td></tr>
<tr><td>Pots and traps: It is unknown how many vessels use pots and traps in the rMCZ Reference Area, but it was indicated that there was a low level of activity (MCZ Fisheries Model).<br><br>Estimated total value of landings from the rMCZ Reference Area: £80/yr (MCZ Fisheries Model).</td><td>Estimated annual value of UK vessel landings affected:<br><br><table><tr><td>£m/yr</td><td>Scenario 1</td></tr><tr><td>Value of landings affected</td><td><0.001*</td></tr></table>* £80/yr.</td></tr>
<tr><td>Nets: It is unknown how many vessels use nets in the rMCZ Reference Area, but it was indicated that there was a low level of activity (MCZ Fisheries Model).<br><br>Estimated total value of landings from the rMCZ Reference Area: £190/yr</td><td>Estimated annual value of UK vessel landings affected:<br><br><table><tr><td>£m/yr</td><td>Scenario 1</td></tr><tr><td>Value of landings affected</td><td><0.001*</td></tr></table></td></tr>
</table>

| **Table 2b: Commercial fisheries** | **rMCZ 7, Reference Area 5 Turner Contemporary** |
|---|---|
| (MCZ Fisheries Model). | * £90/yr. |
| **Total direct impact on UK commercial fisheries** | |
| | Estimated annual value of UK vessel landings and gross value added (GVA) affected:<br>*£m/yr* — Scenario 1<br>Value of landings affected — <0.001*<br>GVA affected — 0.000<br>* £420/yr. |
| **Baseline description of non-UK fisheries** | **Costs of impact of rMCZ on non-UK commercial fisheries** |
| | None. |

| **Table 2c: Ports, harbours, shipping and disposal sites** | **rMCZ 7, Reference Area 5 Turner Contemporary** |
|---|---|
| ***Source of costs of the recommended Marine Conservation Zone (rMCZ)*** | |
| ***Management scenario 1:*** Not applicable to this site. | |
| ***Management scenario 2:*** Increase in costs of assessing environmental impacts for future licence applications. This applies to future licence applications for all port and harbour developments within 5 km of the rMCZ. No port developments are known to be planned within the 20 year period of the Impact Assessment (IA). | |
| **Baseline description of activity** | **Costs of impact of rMCZ on the sector** |
| ***Port development:*** There are 2 harbours within 5km (Margate and Broadstairs) of the rMCZ Reference Area, which may undergo development at some point in the future (Ports & Harbours UK, 2012). This may not represent a full list of all ports and harbours impacted by the site and it is possible that mitigation options may need to be considered in the future. | *£m/yr* — Scenario 1 — Scenario 2<br>Cost to the operator (port development) — N/A — 0.000<br>***Scenario 1:*** Not applicable to this site.<br>***Scenario 2:*** Future licence applications for port or harbour development plans and proposals within 5km of this rMCZ Reference Area will need to consider the potential effects of the activity on the features protected by the rMCZ. Additional costs will be incurred as a result (a breakdown of these by activity is provided in N11). |

| **Table 2d: Recreational anchoring** | **rMCZ 7, Reference Area 5 Turner Contemporary** |
|---|---|
| ***Source of costs of the recommended Marine Conservation Zone (rMCZ)***<br><br>Closure of entire site to all recreational anchoring (except in emergency circumstances). | |
| **Description of activity and its impact on interest features** | **Costs of effect of rMCZ on the sector** |
| Fifty-one Stakmap interviewees (representing clubs throughout south-east England and a combined total of 15,893 individuals (6,675 users/yr)) indicated that yachting interests overlap with the rMCZ Reference Area but the rMCZ Reference Area represents a small proportion of the total area used by sailing boats. In addition, within the site, boats are launched from slipways: the Royal National Lifeboat Institution launches its boat twice a week, all year round, and the local Yacht Club launches up to 30 boats twice a week from June to September. However, none of these activities result in significant anchoring, and it is thought that only 1 to 2 vessels anchor per month in the site and only do so from June to August (Natural England Stakeholder Interview for rMCZ Reference Area 5 Turner Contemporary, November 2011). | As only 1 to 2 boats anchor in the site at weekends in the summer, the closure of the site to anchoring is expected to have a negligible impact on recreational vessel users |

| **Table 2e: Recreational angling** | **rMCZ 7, Reference Area 5 Turner Contemporary** |
|---|---|
| ***Source of costs of the recommended Marine Conservation Zone (rMCZ)***<br><br>Closure of entire site to all recreational angling. | |
| **Baseline description of activity** | **Costs of impact of rMCZ on the sector** |

| **Table 2e: Recreational angling** | **rMCZ 7, Reference Area 5 Turner Contemporary** |
|---|---|
| Six Stakmap interviewees indicated that areas used for recreational angling (charter boats, shore fishing and boat fishing) overlap with the rMCZ Reference Area. The interviewees represent two clubs, based on the North Kent coast (comprising 61 users/yr), and charter boat operators representing a total of 1,200 anglers per year. The rMCZ Reference Area only represents a small proportion of the overall area over which stakeholders indicated that they fished. | Given the low numbers of anglers involved, the impact of the site is likely to be localised and small. The site was developed in conjunction with local anglers and the boundaries were designed such that the rMCZ Reference Area excludes areas used to access ramps for boat launching. It is expected that anglers who fish in the site will respond by fishing at alternative locations along the coast, which they will be able to travel to at very little extra cost. It is anticipated that there will be a negligible impact on local tackle shops and other amenities. |

| **Table 2f. Recreation – boat launching** | **rMCZ 7, Reference area 5 Turner Contemporary** |
|---|---|
| ***Source of costs of the MCZ***<br><br>***Management scenario 1:*** no additional management because launching of boats is not found to impact on the MCZ's features.<br><br>***Management scenario 2:*** launching of personal water craft and boats in the site is restricted to the slipway (except the lifeboat on active service) to mitigate impacts on the MCZ's features. | |
| **Baseline description of activity** | **Costs of impact of MCZ on the sector** |
| Vehicles are used to launch both personal water craft (PWC) and sailing dinghies from along the shore in the site. Throughout the summer (June – September), there are up to 10 vehicle movements every weekend. The Royal National Lifeboat Institution (RNLI) also uses its quad bike twice a week to launch its lifeboat; there is no marked route but the boat is launched across the sand, and the quad bikes are unlikely to damage the features of the rRA (Natural England Stakeholder Interview for rMCZ Reference Area 5 Turner Contemporary, November 2011) | ***Scenario 1:*** if boat launching does not impact on achieving the conservation objectives of the MCZ's features, no mitigation will be required and no costs will arise.<br><br>***Scenario 2:*** if boat launching impacts on the achieving the conservation objectives of the MCZ's features, launching of boats would need to be restricted to the slipway (except for the lifeboat on active service) to mitigate impacts. It is not known whether this will impact significantly on vessel users but they will still be able to launch vessels from the slip way. Costs will include notifying vessel owners of the restriction and providing signs if necessary (which are included in the assessment of costs of managing the site).<br><br>***Best estimate of impact:*** this is the midpoint between scenarios 1 and 2 |

| **Table 2f. Recreation – boat launching** | **rMCZ 7, Reference area 5 Turner Contemporary** |
|---|---|
| | assuming that there is an equal probability of each scenario arising. |

| **Table 2g. Recreation – Rockpooling** | **rMCZ 7, Reference area 5 Turner Contemporary** |
|---|---|
| ***Source of costs of the MCZ*** <br><br> ***Management scenario 1:*** No removal of material from the site by people who are rock-pooling. | |
| **Baseline description of activity** | **Costs of impact of MCZ on the sector** |
| Throughout the summer and autumn (June –November), 2 to 3 people rock pool in the rock pools in the rMCZ Reference Area. They are unlikely to damage features of the site as they are largely removing crabs. (Natural England Stakeholder Interview for rMCZ Reference Area 5 Turner Contemporary, November 2011). | Given that rockpooling will still be allowed in the site, impacts are likely to be negligible. Impacts will include the costs of notifying visitors that no material can be removed from the site (which are included in the costs of managing the site). |

| **Table 2h. Recreation – Walking (including dog walking)** | **rMCZ 7, Reference Area 5 Turner Contemporary** |
|---|---|
| ***Source of costs of the MCZ*** <br><br> People walking through the rMCZ will be encouraged to use marked routes; dog walkers will be required to dispose of dog faeces in provided facilities. | |
| **Baseline description of activity** | **Costs of impact of MCZ on the sector** |

| **Table 2h. Recreation – Walking (including dog walking)** | **rMCZ 7, Reference Area 5 Turner Contemporary** |
|---|---|
| Throughout the summer (June – September), around 50 people a day have been estimated to walk within the rMCZ Reference Area. This may increase now that the Turner Gallery is open. Other walkers use the Promenade directly above the site.<br><br>An estimated 24 dogs are walked in the rMCZ Reference Area every day. About half of the dog walkers leave faeces. There is no Dog Control Order (Natural England Stakeholder Interview for rMCZ Reference Area 5 Turner Contemporary, November 2011; Tony Childs,Thanet Coast Project, e-mail 15th June 2012). | Visitors would be encouraged to use existing routes through or around the features protected by the rMCZ to avoid adverse effects. Given that walking would still be allowed in the site, impacts on users of the site are likely to be negligible. Impacts would include the cost of notifying visitors of the need to stay to designated paths (which are considered as part of the management of the site).<br><br>A Dog Control Order would need to be put in place for the entire area of the rMCZ Reference Area. Dog walkers would be required to remove and dispose of dog faeces in provided facilities. Impacts would include the cost of putting the Dog Control order in place and notifying visitors of the need to remove dog faeces and of the location of the nearest disposal facility (which are considered as part of management of the site). |

| **Table 2i: Other impacts that are assessed for the suite of MCZs and not for this site alone** | **rMCZ 7, Reference Area 5 Turner Contemporary** |
|---|---|
| ***Oil and gas related activities (including carbon capture and storage)***<br><br>This rMCZ Reference Area overlaps with an area that has potential for future oil and gas exploration and production (it overlaps licensed blocks in the 27th Seaward Licensing Rounds). However, it is unlikely that any oil and gas (including carbon capture and storage) infrastructure will be proposed in future in this rMCZ Reference Area due to its location and size (DECC, pers. comm., 2012). Impacts of rMCZ Reference Areas on oil and gas related activities are assessed in the Evidence Base, Annex H11 and Annex N10 (they are not assessed for this site alone). | |

## Human activities in the site that are not negatively affected by the rMCZ (over 2013 to 2032 inclusive)

| **Table 3: Human activities in the site that are not negatively affected by the recommended Marine Conservation Zone (rMCZ) (existing activities at their current levels and future proposals known to the regional MCZ projects)** | **rMCZ 7, Reference Area 5 Turner Contemporary** |
|---|---|
| Flood and coastal erosion risk management (coastal defence)<br>Recreation (except the activities listed above in table 2)<br>Research and education<br>Water abstraction, discharge and diffuse pollution*. | |

*The IA assumes that no additional mitigation of impacts of water abstraction, discharge or diffuse pollution will be required over and above that which will be provided to achieve the objectives of the Water Framework Directive through the River Basin Management Plan process (based on advice provided by Natural England, pers. comm., 2010).

## Anticipated benefits to ecosystem services

The habitats, species and other ecological features of the recommended Marine Conservation Zone (rMCZ) Reference Area contribute to the delivery of a range of ecosystem services. Designation of the rMCZ Reference Area and its subsequent management may improve the quantity and quality of the beneficial services provided, which may increase the value (contribution to economic welfare) of them. Impacts on the value of ecosystem services may occur as a result of the designation, management and/or achievement of the conservation objectives of the rMCZ Reference Area. Further discussion on the potential benefits to ecosystem services can be found in Annex L and definitions can be found in Annex H.

| **Table 4a. Fish and shellfish for human consumption** | **rMCZ 7, Reference Area 5 Turner Contemporary** | |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| Fletcher and others (2011) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) Reference Area can contribute to the delivery of fish and shellfish for human consumption.<br><br>Subtidal mixed sediments, sand and mud are important for spawning and nursery grounds. These habitats can provide important nursery grounds for juvenile commercial species such as flatfish and bass (Fletcher and others, 2011). Circalittoral and infralittoral rock are important locations for commercial inshore fishing activity, particularly crab and lobster (Fletcher and others, 2011). The baseline quantity and quality of the ecosystem service provided is assumed to be commensurate with that provided by the features of the site when | If the conservation objectives of the features are achieved, the features will be recovered to reference condition.<br><br>Additional management (above that in the baseline situation) of fishing activities is expected which will prohibit fishing within the rMCZ Reference Area. The costs of this are set out in Table 2b.<br><br>Achievement of the conservation objectives may improve the contribution of the habitats to the provision of fish and shellfish for human consumption.<br><br>Closure of the rMCZ Reference Area to fishing activity will reduce the on-site fishing mortality of species but, as the site is small, it is | Anticipated direction of change:<br><br>⇧<br><br>Confidence: Low |

| **Table 4a. Fish and shellfish for human consumption** | **rMCZ 7, Reference Area 5 Turner Contemporary** | |
|---|---|---|
| some are in favourable condition and some are in unfavourable condition (see rMCZ 7 Table 1).<br><br>There is a small amount of fishing in the rMCZ Reference Area. A description of on-site fishing activity and the value derived from it is set out in Table 2b.<br><br>It has not been possible to estimate the value of the off-site benefits that derive from the potential spawning and nursery area. | unclear whether this would benefit stocks of mobile commercial finfish species.<br><br>As no fishing will be permitted within the rMCZ Reference Area, no on-site benefits will be realised. | |

| **Table 4b. Recreation** | **rMCZ 7, Reference Area 5 Turner Contemporary** | |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| ***Angling:*** Fletcher and others (2011) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) Reference Area can contribute to the delivery of fish and shellfish for human consumption and recreation services.<br><br>Subtidal mixed sediments, sand and mud are important for spawning and nursery grounds. These habitats can provide important nursery grounds for juvenile commercial species such as flatfish and bass which are also popular recreational fish (Fletcher and others, 2011). The baseline quantity and quality of the ecosystem service provided is assumed to be commensurate with that provided by the features of the site when some are in favourable condition and some are in unfavourable condition (see rMCZ 7 Table 1)..<br><br>A very small amount of angling takes place in this rMCZ Reference Area, as described in Table 2e.<br><br>It has not been possible to estimate the value derived from angling on-site or the proportion of the value derived from angling off-site that results from the potential spawning and nursery area. | If the conservation objectives of the features are achieved, the features will be recovered to reference condition.<br><br>Recovery of habitats may have benefits for fish populations. It is unclear whether any benefits for fish populations would arise as a result of reduced fishing mortality due to closure of the rMCZ Reference Area (see Table 4a).<br><br>As angling will not be permitted within the rMCZ Reference Area, any benefits will be limited to those occurring as a result of spill-over effects of finfish species targeted by anglers outside the rMCZ Reference Area. Such benefits may be insignificant. | Anticipated direction of change:<br><br>  <br><br>Confidence: Low |

| **Table 4b. Recreation** | **rMCZ 7, Reference Area 5 Turner Contemporary** | |
|---|---|---|
| ***Diving:*** Diving is not known to take place in the site. | N/A | N/A |
| ***Wildlife watching:*** Fletcher and others (2011) identify that the features to be protected by the rMCZ Reference Area can contribute to the delivery of recreation and tourism services.<br><br>Macroinvertebrates are an essential link between high trophic levels (e.g. fish and birds) and low trophic levels (e.g. algae) on intertidal rock habitat (Fletcher and others, 2011). The baseline quantity and quality of the ecosystem service provided is assumed to be commensurate with that provided by the features of the site when some are in favourable condition and some are in unfavourable condition (see rMCZ 7 Table 1).The Thanet coast is important for wintering birds and the coastline is accessible, and therefore it can be assumed that this rMCZ Reference Area will be used by bird watchers. Rockpooling is popular along the coast and the habitat here affords the opportunity for this activity; two or three people a day use the site for rockpooling in the summer months (Natural England Reference Area questionnaire, 29 November 2011).<br><br>It has not been possible to estimate the value derived from wildlife watching in the rMCZ Reference Area. | If the conservation objectives of the features are achieved, the features will be recovered to reference condition.<br><br>The recovery of the features to reference condition may improve their functioning as support for fish and bird populations, potentially benefiting wildlife watching within the rMCZ Reference Area. The St John's jellyfish is particularly attractive and, provided the activity is adequately controlled, many people would probably like to see it. In addition, an improvement in the condition of site features and any associated increase in abundance and diversity of species that are visible to wildlife watchers may improve the quality of wildlife watching at the site and therefore the value of the ecosystem service.<br><br>The designation may lead to an increase in wildlife watching visits to the site, which may benefit the local economy. This increase may represent an overall increase in UK wildlife watching visits and/or a redistribution of location preferences.<br><br>Designating the rMCZ Reference Area will protect its features and the ecosystem services that they provide against the risk of future degradation from pressures caused by human activities. | Anticipated direction of change:<br><br>  <br><br>Confidence: Low |

| **Table 4b. Recreation** | **rMCZ 7, Reference Area 5 Turner Contemporary** | |
|---|---|---|
| ***Other recreation:*** Fletcher and others (2011) identify that the features to be protected by the rMCZ Reference Area can contribute to the delivery of recreation and tourism services.<br><br>The area is popular for walking, with about 24 dog walkers using the foreshore each day, and 50 walkers a day in general using the site in the summer months. A variety of small recreational vessels use the area (for launching and surface navigation) (Natural England Reference Area questionnaire, 29 November 2011).<br><br>It has not been possible to estimate the value derived from other recreation in the rMCZ Reference Area. | If the conservation objectives of the features are achieved, the features will be recovered to reference condition.<br><br>The rMCZ Reference Area is fully contained within rMCZ 7 for which the benefits of other recreation have been assessed. It is not possible to identify whether the Reference Area will have additional benefits over and above this but this seems unlikely. Designating the rMCZ Reference Area will protect its features and the ecosystem services that they provide against the risk of future degradation from pressures caused by human activities. | Anticipated direction of change:<br><br>⇧<br><br>Confidence: Low |

| **Table 4c. Research and education** | **rMCZ 7, Reference Area 5 Turner Contemporary** | |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| ***Research:*** Fletcher and others (2011) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) Reference Area can contribute to the delivery of research services.<br><br>Research activities are undertaken by Kent Wildlife Trust and the Thanet Coast Project in the wider rMCZ in which this rMCZ Reference Area lies and may overlap. The Thanet Coast Project has been monitoring the spread of the invasive Pacific oyster *Crassostrea gigas* for the past three years. As a result of the research undertaken a new management approach for controlling marine invasive species is being trialled for the first time within the wider rMCZ, which may also involve the rMCZ Reference Area.<br><br>It has not been possible to estimate the value derived from research activities associated with the rMCZ Reference Area. | As an rMCZ Reference Area, the site will provide an opportunity to demonstrate the state of designated marine features in the absence of many anthropogenic pressures (Natural England and JNCC, 2010). It will provide a control area against which the impacts of pressures caused by human activities can be compared as part of long-term monitoring and assessment. Other research benefits are unknown. | Anticipated direction of change:<br><br>⇧<br><br>Confidence: High |

| **Table 4c. Research and education** | **rMCZ 7, Reference Area 5 Turner Contemporary** | |
|---|---|---|
| ***Education:*** Fletcher and others (2011) identify that the features to be protected by the rMCZ Reference Area can contribute to the delivery of education services.<br><br>The rMCZ Reference Area is used for training Coastal Wardens for the Thanet Coast Project two or three times a year, with about 25 people taking part in the training each time (Natural England Reference Area questionnaire, 29 November 2011). Kent Wildlife Trust and Wildwood Trust both undertake educational activities for schools, individuals, clubs and societies in the broader rMCZ and a number of these may overlap with the rMCZ Reference Area.<br><br>It has not been possible to estimate the value derived from education activities associated with the rMCZ Reference Area. | MCZ Reference Area designation may provide an opportunity to expand the focus of education events into the marine environment.<br><br>Designation may aid the development of additional local (to the rMCZ Reference Area) education activities (e.g. events and interpretation boards), from which visitors to the site would derive benefit.<br><br>Non-visitors may benefit if the rMCZ Reference Area contributes to wider provision of educational resources (e.g. television programmes, articles in magazines and newspapers, and educational resources developed for use in schools). | Anticipated direction of change:<br><br>⇧<br><br>Confidence: Moderate |

| **Table 4d. Regulating services** | **rMCZ 7, Reference Area 5 Turner Contemporary** | |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| ***Regulation of pollution:*** The features of the site contribute to the bioremediation of waste (subtidal sediments) and sequestration of carbon (subtidal sands and gravels) (Fletcher and others, 2011).<br><br>***Environmental resilience:*** The features of the site are not known to contribute to the resilience and continued regeneration of marine ecosystems (Fletcher and others, 2011).<br><br>***Natural hazard protection:*** A feature of the site (infralittoral rock) contributes to local flood and storm protection (Fletcher and others, 2011).<br><br>It has not been possible to estimate the value derived from regulating services associated with the rMCZ Reference Area. | If the conservation objectives of the features are achieved, the features will be recovered to reference condition.<br><br>Recovery of the subtidal sediments and infralittoral rock and closure to fishing could increase the site's benthic biodiversity and biomass, improving the regulating capacity of its habitats.<br><br>Designating the recommended Marine Conservation Zone Reference Area will protect its features and the ecosystem services that they provide against the risk of future degradation from pressures caused by human activities. | Anticipated direction of change:<br><br>⇧<br><br>Confidence: Low |

| **Table 4e. Non-use and option values** | **rMCZ 7, Reference Area 5 Turner Contemporary** | |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| Some people gain satisfaction from the existence of marine habitats, species and other features. They also gain from having the option to benefit in the future from the habitats and species in the recommended Marine Conservation Zone (rMCZ) Reference Area and the ecosystem services provided, even if they do not currently benefit from them.<br><br>It has not been possible to estimate the value derived from non-use and option values associated with the rMCZ Reference Area. | The rMCZ Reference Area will benefit the proportion of the UK population that values conservation of its features and its contribution to an ecologically coherent network of Marine Protected Areas. Some people will gain satisfaction from knowing that the habitats and species are being conserved (existence value) and/or that they are being conserved for use by others in the current generation (altruistic value) or future generations (bequest value). The rMCZ Reference Area will protect the features and the ecosystem services provided, and thereby the option to benefit from these services in the future, from the risk of future degradation. | Anticipated direction of change:<br><br>⇧<br><br>Confidence: Moderate |

## rMCZ 8, Goodwin Sands — Site area (km$^2$): 276.91

**Table 1. Conservation impacts** — **rMCZ 8, Goodwin Sands**

**1a. Ecological description**

The main feature of this site is the Goodwin Sands, a large, constantly changing area of subtidal sand and coarse sediments that is regularly exposed at low tide. The subtidal coarse sediment is of particularly high biodiversity. The site contains Ross worm reefs and a subtidal blue mussel bed in the same area; both features are dependent on the underlying broad-scale habitat and it has been suggested that together they could stabilise the sediment if their distribution and density were to increase. Part of the English Channel Outburst Flood Feature lies in the site, which is geomorphological evidence of a megaflood which occurred circa. 200,000 years ago when a huge glacial lake in the North Sea burst through the Dover Straits Isthmus, thus separating England from mainland Europe. The rMCZ is one of two primary seal haul-out sites in the Balanced Seas project area, with an estimated 1,000 seals, two thirds of which are grey seals and the rest harbour seals. Haul-out sites are likely to be close to hot-spots for fish and crustaceans on which the seals feed. Surveys have indicated the importance of this area for benthic species taxonomic distinctness, benthic species richness, regular pelagic seasonal fronts, areas of additional pelagic ecological interest, great cormorant and black-legged kittiwake foraging ranges (RSPB), and fulmar and gannet seasonal foraging areas. This site is not associated with any existing designation. There are a number of protected wrecks.

Source: Balanced Seas Final Recommendations (2011).

**1b. Baseline condition of MCZ features and impact of the MCZ**

| Feature | Area of feature (km2) | No. of occurrences | Baseline | Impact of the MCZ |
|---|---|---|---|---|
| ***Broad-scale Habitats*** | | | | |
| A3.2 mod energy infralittoral rock | 0.65 | - | Favourable condition | Maintain at favourable condition |
| A4.2 mod energy circalittoral rock | 0.58 | - | Favourable condition | Maintain at favourable condition |
| A5.1 subtidal coarse sediment | 115.55 | - | Favourable condition | Maintain at favourable condition |
| A5.2 subtidal sand | 159.97 | | Favourable condition | Maintain at favourable condition |
| ***Habitats of Conservation Importance*** | | | | |
| Blue mussel beds | 312.57 m$^2$ | | Favourable condition | Maintain at favourable condition |
| Ross worm *(Sabellaria spinulosa)* reef | 625.29 m$^2$ | | Favourable condition | Maintain at favourable condition |

## Site-specific costs arising from the effect of the rMCZ on human activities (over 2013 to 2032 inclusive)

**Table 2a: Archaeological heritage** — **rMCZ 8, Goodwin Sands**

| **Table 2a: Archaeological heritage** | **rMCZ 8, Goodwin Sands** |
|---|---|
| ***Source of costs of the recommended Marine Conservation Zone (rMCZ)*** | |
| Increase in costs of assessing environmental impacts for future licence applications. It is not anticipated that any additional mitigation of impacts on features protected by the rMCZ will be needed relative to the mitigation provided in the baseline. Archaeological excavations, surface recovery, intrusive and non-intrusive surveys, diver trails and visitors will be allowed.<br><br>However, restrictions could also be placed upon anchoring in areas of vulnerable MCZ features in the site, including *Sabellaria* reef. | |
| **Baseline description of activity** | **Costs of impact of rMCZ on the sector** |
| Wrecked vessels of British, Norwegian, Dutch, Irish, Swedish, Belgian, Danish and German origin have been recorded within the site. The following wrecks are designated under the Protection of Wrecks Act 1973: *Restoration* and *Northumberland*, *Stirling Castle*, *Rooswijk* and the *Admiral Gardner* (English Heritage, 2012). | An extra cost would be incurred in the assessment of environmental impacts made in support of any future licence applications for archaeological activities in the site. The likelihood of a future licence application being submitted is not known, so no overall cost to the sector of this rMCZ has been estimated. However, the additional cost of one licence application could be in the region of £500 to £10,000, depending on the size of the rMCZ (English Heritage, pers. comm., 2012). No further impacts on activities related to archaeology are anticipated.<br><br>If archaeologists respond to restrictions on anchoring over areas of *Sabellaria* reef by undertaking alternative archaeological excavations in another locality, this could result in additional costs to the archaeologists. It is not possible to predict when or how often this may occur, so it is not costed in the Impact Assessment. If archaeological excavations do not take place as a result of these restrictions, this will prevent interpretation of archaeological evidence from the site, which will decrease acquisition of historical knowledge of past human communities from the site, thus resulting in a cost to society. |

| **Table 2b: National defence** | **rMCZ 8, Goodwin Sands** |
|---|---|

***Source of costs of the recommended Marine Conservation Zone (rMCZ)***

Mitigation of impacts of Ministry of Defence (MOD) activities on features protected by the suite of sites will be provided by additional planning considerations during operations and training. It is not known whether mitigation will be required for features protected by this site. MOD will also incur costs in revising environmental tools and charts to include Marine Conservation Zones.

| **Baseline description of activity** | **Costs of impact of rMCZ on the sector** |
|---|---|
| MOD is known to make use of the rMCZ for towed array (surveillance system). | It is not known whether this rMCZ will impact on MOD's use of the site. Impacts of rMCZs on national defence are assessed in Annex H10 and N9 (they are not assessed for this site alone). |

| **Table 2c: Renewable energy-wind energy** | **rMCZ 8, Goodwin Sands** |
|---|---|

***Source of costs of the recommended Marine Conservation Zone (rMCZ)***

***Management Scenario 1***: Increase in costs of assessing environmental impacts for licence applications (it is not anticipated that any additional mitigation of impacts on features protected by the MCZ will be needed relative to the mitigation provided in the baseline).

***Management Scenario 2***: Increase in costs of assessing environmental impacts for licence applications and increase in cable protection installation costs for power export cables and inter-array cables (relative to the mitigation provided in the baseline).

| **Baseline description of activity** | **Costs of impact of rMCZ on the sector** |
|---|---|
| An estimated 16km of operational power export cable routes from the Thanet wind farm may overlap with the rMCZ (estimated using the length of rMCZ). | The estimated cost to renewable energy developers operating in this rMCZ is expected to fall within the following range of scenarios:<br><br>*£m/yr* \| Scenario 1 \| Scenario 2<br>Cost to the operator \| 0.001 \| 0.809<br>GVA affected \| 0.001 \| 0.809<br><br>***Scenario 1:*** The licence application for the Thanet wind farm export cable route will need to consider the potential effects of the development on achieving the conservation objectives of the rMCZ's features. This is expected to result in an additional one-off cost of £0.012m in 2022 |

| **Table 2c: Renewable energy-wind energy** | **rMCZ 8, Goodwin Sands** |
|---|---|
| | (for extra consultant/staff time) with a present value cost of £0.009m..<br><br>***Scenario 2:*** In addition to the increased costs for assessment set out under Scenario 1, under Scenario 2 costs of additional mitigation are anticipated. This additional mitigation entails use of alternative cable protection for export cables and inter-array cables that have not yet been consented. This is expected to result in an additional one-off cost of £16.160m in 2022 (based on estimated additional cost of £1m/km for yet-to-be-consented power export cable route only) with a present value cost of £11.465m. These costs are included in Scenario 2 to reflect uncertainty over whether this additional mitigation will be required. Inter-array cables are not expected to be proposed for installation within this rMCZ. Therefore, no additional cost to install alternative cable protection for inter-array cabling is anticipated. JNCC and Natural England (pers. comm., 2012) state that the likelihood of the cost in Scenario 2 occurring is very low. Further details are provided in Annex H14.<br><br>The impacts that are assessed in both scenarios are based on JNCC and Natural England's advice on the mitigation that could be required. |

| **Table 2d: Other impacts that are assessed for the suite of MCZs and not for this site alone** | **rMCZ 8, Goodwin Sands** |
|---|---|
| ***Oil and gas related activities (including carbon capture and storage)***<br><br>This rMCZ overlaps with an area that has potential for future oil and gas exploration and production (it overlaps licensed blocks in the 26th or 27th Seaward Licensing Rounds). However, the area is not necessarily viable to develop. Impacts of rMCZs on oil and gas related activities are assessed in the Evidence Base, Annex H11 and Annex N10 (they are not assessed for this site alone). | |

## Human activities in the site that are not negatively affected by the rMCZ (over 2013 to 2032 inclusive)

| **Table 3: Human activities in the site that are not negatively affected by the recommended Marine Conservation Zone (rMCZ) (existing activities at their current levels and future proposals known to the regional MCZ projects)** | **rMCZ 8, Goodwin Sands** |
|---|---|
| Cables (existing interconnectors and telecom cables)<br>Commercial fisheries (bottom trawls, dredges, hooks and lines, mid-water trawls, nets, pots and traps)<br>Recreation | |

| **Table 3: Human activities in the site that are not negatively affected by the recommended Marine Conservation Zone (rMCZ) (existing activities at their current levels and future proposals known to the regional MCZ projects)** | **rMCZ 8, Goodwin Sands** |
|---|---|
| Research and education<br>Shipping<br>(For information on aggregates, please see Annex F and the national evidence base) | |

## Anticipated benefits to ecosystem services

The habitats, species and other ecological features of the recommended Marine Conservation Zone (rMCZ) contribute to the delivery of a range of ecosystem services. Designation of the rMCZ and its subsequent management may improve the quantity and quality of the beneficial services provided, which may increase the value (contribution to economic welfare) of them. Impacts on the value of ecosystem services may occur as a result of the designation, management and/or achievement of the conservation objectives of the rMCZ. Further discussion on the potential benefits to ecosystem services can be found in Annex L and definitions can be found in Annex H.

| **Table 4a. Fish and shellfish for human consumption** | | **rMCZ 8, Goodwin Sands** |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| Fletcher and others (2011) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) can contribute to the delivery of fish and shellfish for human consumption.<br><br>Subtidal coarse sediments and sand are important for spawning and nursery grounds for juvenile commercial species such as flatfishes and bass. Circalittoral and infralittoral rock are important locations for commercial inshore fishing activity, particularly crab and lobster (Expert opinion in Fletcher and others, 2011).<br><br>The baseline quantity and quality of the ecosystem service provided is assumed to be commensurate with that provided by the features of the site when in favourable condition (see Table 1 for details).<br><br>A relatively high level of commercial fishing is conducted within the subtidal areas of the site. The UK under 10 metre commercial fishing fleets from Ramsgate and Deal use mainly static and drift fishing gear in the site, targeting mainly Dover sole and bass as well as lobster fished | If the conservation objectives of the features are achieved, the features will be maintained in favourable condition.<br><br>No additional management (above that in the baseline situation) of fishing activities is expected. However, maintaining and monitoring the current fishing practices will safeguard the population of commercial fish and ensure no increase in fishing activity occurs or alternative gears are used.<br><br>No change in feature condition or harvesting of fish and shellfish is anticipated and therefore no impact on on-site or off-site benefits is expected.<br><br>Designating the rMCZ will protect its features and the ecosystem services that they provide against the risk of future degradation from pressures caused by human activities. | Anticipated direction of change:<br><br>⇔<br><br>Confidence: Moderate |

| **Table 4a. Fish and shellfish for human consumption** | | **rMCZ 8, Goodwin Sands** |
|---|---|---|
| from among the wrecks. The total value of landings derived from commercial fisheries within this site is £0.134m/yr (MCZ Fisheries Model).<br><br>It has not been possible to estimate the value of the off-site benefits that derive from the spawning and nursery area. | | |

| **Table 4b. Recreation** | | **rMCZ 8, Goodwin Sands** |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| ***Angling:*** Fletcher and others (2011) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) can contribute to the delivery of fish and shellfish for human consumption and recreation services.<br><br>Subtidal coarse sediments and sand are important for spawning and nursery grounds for juvenile commercial species such as flatfishes and bass (Fletcher and others, 2011).<br><br>The baseline quantity and quality of the ecosystem service provided is assumed to be commensurate with that provided by the features of the site when in favourable condition (see Table 1 for details).<br><br>Goodwin Sands has very high biodiversity due to the diverse bathymetry and substrate and is thought to be a spawning ground for thornback ray. This high biodiversity attracts fish caught recreationally (including whiting, bass, smooth hound and mackerel) (Balanced Seas Final Recommendations Report, 2011), and is likely to help to support potential on-site and off-site fisheries.<br><br>Private boat and charter boat angling for bass, thornback ray, smooth hound, mullet, cod and whiting takes place throughout the rMCZ, particularly around the numerous wrecks within the site (StakMap, 2010). | If the conservation objectives of the features are achieved, the features will be maintained in favourable condition.<br><br>As no additional management of angling is expected, fishers will be able to benefit from any on-site and off-site beneficial effects. If the rMCZ results in an increase in the size and diversity of species caught then this is expected to increase the value derived by anglers.<br><br>The designation may lead to an increase in angling visits to the site, which may benefit the local economy. This increase might arise from a change in anglers' preferred angling locations rather than an increase at a national scale in days spent angling or the number of anglers. | Anticipated direction of change:<br><br>⟺<br><br>Confidence: Moderate |

| **Table 4b. Recreation** | | **rMCZ 8, Goodwin Sands** |
|---|---|---|
| It has not been possible to estimate the value derived from angling on-site or the proportion of the value derived from angling off-site that results from the subtidal habitats. | | |
| ***Diving:*** Fletcher and others (2011) identify that the features to be protected by the rMCZ can contribute to the delivery of recreation services.<br><br>Diving is popular within the rMCZ due to the numerous wrecks found there. Both the archaeological interest and the increased biodiversity known to be around the wrecks, due to their function as an artificial habitat, attract divers to the area (StakMap, 2010). Most clubs within easy reach of the area dive here.<br><br>It has not been possible to estimate the value derived from diving in the rMCZ. | If the conservation objectives of the features are achieved, the features will be maintained in favourable condition.<br><br>If the rMCZ is designated it may result in an increase in dive trips to the area, which may have beneficial effects on the local economy. This increase may represent a redistribution of dive location preferences rather than an overall increase in diving. | Anticipated direction of change:<br><br>⇔<br><br>Confidence: Moderate |
| ***Wildlife watching:*** Fletcher and others (2011) identify that the features to be protected by the rMCZ can contribute to the delivery of recreation and tourism services.<br><br>*Sabellaria* reefs increase the habitat complexity of the surrounding environment and provide microhabitats for other organisms in crevices and cavities; mussel beds are an important food source for birds; and subtidal coarse sediments, sand and mud are important for spawning and nursery grounds. These habitats can provide important nursery grounds for juvenile commercial species such as flatfishes and bass (Fletcher and others, 2011).<br><br>The baseline quantity and quality of the ecosystem service provided is assumed to be commensurate with that provided by the features of the site when in favourable condition (see Table 1 for details). | If the conservation objectives of the features are achieved, the features will be maintained in favourable condition.<br><br>No change in on-site feature condition is anticipated and therefore no benefits to wildlife watching are expected. Charter boat clients and visitors in transit across the Channel may benefit from any increased biodiversity through more regular sightings of birds and marine mammals.<br><br>The designation may lead to an increase in wildlife watching visits to the site, which may benefit the local economy. This increase may represent an overall increase in UK wildlife watching visits and/or a redistribution of location preferences.<br><br>Designating the rMCZ will protect its features and the ecosystem services that they provide against the risk of future | Anticipated direction of change:<br><br>⇔<br><br>Confidence: Moderate |

| **Table 4b. Recreation** | | **rMCZ 8, Goodwin Sands** |
|---|---|---|
| Goodwin Sands is popular for wildlife watching as it is one of two primary haul-out sites in the Balanced Seas project area for grey seals. The rMCZ is also an important foraging area for great cormorant and black-legged kittiwake. The presence of both marine mammals and birds in this offshore site indicates the high biodiversity of the area. Charter boats from Ramsgate and Dover conduct wildlife watching trips within the site. The site occurs within an area of the Channel used by ferries, which may carry wildlife watchers, particularly those interested in marine mammals.<br><br>It has not been possible to estimate the value derived from wildlife watching in the rMCZ. | degradation from pressures caused by human activities. | |
| ***Other recreation:*** Other recreation is not known to take place in the rMCZ. | N/A | N/A |

| **Table 4c. Research and education** | | **rMCZ 8, Goodwin Sands** |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| ***Research:*** Fletcher and others (2011) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) can contribute to the delivery of research services.<br><br>As a result of their shifting nature and the risk this poses to shipping, the Goodwin Sands are surveyed at regular intervals by the UK Hydrographic Office; the 2009 survey consisted of a full survey of the whole area, the results of which are shown in UK Hydrographic Office (2010). Seasearch, co-ordinated by Kent Wildlife Trust, is very active in the area, conducting sea-floor surveys regularly. Archaeological research and monitoring are also carried out on a regular basis. | Monitoring of the rMCZ will help inform understanding of how the marine environment is changing and is impacted on by anthropogenic pressures and management interventions. Other research benefits are unknown. | Anticipated direction of change:<br><br>⇧<br><br>Confidence:<br><br>High |

| **Table 4c. Research and education** | | **rMCZ 8, Goodwin Sands** |
|---|---|---|
| ***Education:*** Fletcher and others (2011) identify that the features to be protected by the rMCZ can contribute to the delivery of education services.<br><br>No known education activity occurs in this rMCZ. | As the rMCZ is approximately 5km offshore and therefore relatively inaccessible, no benefits are likely to arise from direct use of the site for education.<br><br>Non-visitors may benefit if the rMCZ contributes to wider provision of educational resources (e.g. television programmes, articles in magazines and newspapers, and educational resources developed for use in schools). | Anticipated direction of change:<br><br>⇧<br><br>Confidence: Low |

| **Table 4d. Regulating services** | | **rMCZ 8, Goodwin Sands** |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| ***Regulation of pollution:*** the features of the site contribute to the bioremediation of waste (subtidal sediments) and sequestration of carbon (subtidal sediments) (Fletcher and others, 2011).<br><br>***Environmental resilience:*** the features of the site (subtidal sediments) contribute to the resilience and continued regeneration of marine ecosystems (Fletcher and others, 2011).<br><br>***Natural hazard protection:*** the features of the site (subtidal sediments), contribute to local flood and storm protection (Fletcher and others, 2011); although the site is offshore, the Goodwin Sands play a very important role in relation to coastal dynamics.<br><br>It has not been possible to estimate the value derived from regulating services associated with the rMCZ. | If the conservation objectives of the features are achieved, the features will be maintained in favourable condition.<br><br>No change in feature condition and management of human activities is expected and therefore no benefit to the regulation of pollution is expected.<br><br>Designating the rMCZ will protect its features and the ecosystem services that they provide against the risk of future degradation from pressures caused by human activities. | Anticipated direction of change:<br><br>⇔<br><br>Confidence: Moderate |

| **Table 4e. Non-use and option values** | | **rMCZ 8, Goodwin Sands** |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| Some people gain satisfaction from the existence of marine habitats, species and other features. They also gain from having the option to benefit in the future from the habitats and species in the rMCZ and the ecosystem services provided, even if they do not currently benefit from them.<br><br>It has not been possible to estimate the value derived from non-use and option value services associated with the rMCZ. | The rMCZ will benefit the proportion of the UK population that values conservation of the rMCZ features and its contribution to an ecologically coherent network of MPAs. Some people will gain satisfaction from knowing that the habitats and species are being conserved (existence value) and/or that they are being conserved for use by others in the current generation (altruistic value) or future generations (bequest value). The rMCZ will protect both the features and the option to benefit from the services in the future from the risk of future degradation. | Anticipated direction of change:<br><br>⇧<br><br>Confidence: Moderate |

## rMCZ 8, Reference Area 6 Goodwin Knoll

**Site area (km$^2$): 23.18**

| **Table 1. Conservation impacts** | | | **rMCZ 8, Reference Area 6 Goodwin Knoll** | |
|---|---|---|---|---|
| **1a. Ecological description** | | | | |
| This site lies within recommended Marine Conservation Zone (rMCZ) 8 (Goodwin Sands) and has been identified to protect subtidal sand and subtidal coarse sediment. It incorporates the North Goodwin Sands Bank, a drying area at low tide, where there is a lower level of human activity. Environment Agency data indicate that this is a good area for biodiversity; it is also highly dynamic due to the nature of the shifting sands, and important as a seal haul-out spot (North Sand Bank) and sea bird foraging ground. The rMCZ Reference Area contains numerous wrecks and is thus of high interest for its heritage and archaeology.<br><br>Source: Balanced Seas Final Recommendations (2011). | | | | |
| **1b.** Baseline condition of MCZ features and impact of the MCZ | | | | |
| **Feature** | **Area of feature (km2)** | **No. of occurrences** | **Baseline** | **Impact** |
| ***Broad-scale habitats*** | | | | |
| A5.1 Subtidal coarse sediment | 0.85 | - | Unfavorable condition | Recover to reference condition |
| A5.2 Subtidal sand | 22.32 | - | Unfavorable condition | Recover to reference condition |

**Site-specific costs arising from the effect of the rMCZ on human activities (over 2013 to 2032 inclusive)**

| **Table 2a: Archaeological heritage** | **rMCZ 8, Reference Area 6 Goodwin Knoll** |
|---|---|
| ***Source of costs of the recommended Marine Conservation Zone (rMCZ)***<br><br>Increase in costs of assessing environmental impacts for future licence applications. Archaeological excavations, surface recovery and intrusive surveys will be prohibited from the entire site. Diver trails, visitors and non-intrusive surveys will be allowed. | |
| **Baseline description of activity** | **Costs of impact of rMCZ on the sector** |
| The available information identifies a 'named location' for this site, which includes 674 records including British, Norwegian, Dutch, Irish, Swedish, Belgian, Danish and German wrecked vessels. Identified within the rMCZ Reference Area are a World War I German U-Boat (U 48, lost 1917); a cargo vessel lost 1721; an | An extra cost would be incurred in the assessment of environmental impacts made in support of any future licence applications for archaeological activities in the site. The likelihood of a future licence application being submitted is not known, so no overall cost to the sector |

| **Table 2a: Archaeological heritage** | **rMCZ 8, Reference Area 6 Goodwin Knoll** |
|---|---|
| English Brig lost 1832; and the wreck of a barge lost 1924. The following sites are designated under the Protection of Wrecks Act 1973: *Admiral Garner*, *Northumberland*, *Restoration*, *Stirling Castle* and *Rooswijk*, and are located very close to the rMCZ Reference Area (English Heritage, 2012). | of this rMCZ has been estimated. However, the additional cost in one licence application could be in the region of £500 to £10,000 depending on the size of the rMCZ (English Heritage, pers. comm., 2012). 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. It is not possible to predict when or how often this may occur, so it is not costed in the Impact Assessment. If archaeological excavations do not take place as a result of these restrictions, this will prevent interpretation of archaeological evidence from the site, which will decrease acquisition of historical knowledge of past human communities from the site, thus resulting in a cost to society.<br><br>Prohibition of surface recovery and excavation of a protected wreck in an rMCZ could result in the loss of archaeological features that would otherwise be protected. This would result in a loss of benefits of those archaeological features to society (English Heritage, pers. comm., 2012). As a result of the rMCZ, English Heritage may incur additional costs in its condition assessment of the protected wreck, which would have significant implications for protected wrecks that are considered to be 'heritage at risk'. |

| **Table 2b: Commercial fisheries** | **rMCZ 8, Reference Area 6 Goodwin Knoll** |
|---|---|
| ***Source of costs of the recommended Marine Conservation Zone (rMCZ)***<br><br>Closure of entire site to all gear types. | |
| **Description of activity and its impact on interest features** | **Costs of impact of rMCZ on the sector** |

**Table 2b: Commercial fisheries** **rMCZ 8, Reference Area 6 Goodwin Knoll**

***Summary of all fisheries:*** The rMCZ Reference Area is non coastal and lies within rMCZ 8 Goodwin Sands within the 6nm limit. FisherMap indicates low fishing activity (this rMCZ Reference Area coincides largely with the 'drying area' of the Goodwin Sands where the water is often very shallow), with the use of occasional static gear and light trawling effort. A number of commercial fishing restrictions are already in existence (listed in Annex E1). More detail on the approach used for the fisheries method is provided at Annexes H7 and N4.

Estimated annual value of landings from the rMCZ Reference Area: £0.017m/yr.

(Due to resolution issues of the MCZ Fisheries Model and the small size of many rMCZ Reference Areas in the Balanced Seas region, some fisheries landings values may be inaccurate. They have been included as a precautionary measure and to avoid underestimating the economic impact of a site.)

| Baseline description of UK commercial fisheries | Costs of impact of rMCZ on UK commercial fisheries |
|---|---|
| ***Bottom trawls:*** Numbers not known<br><br>Estimated value of landings from the rMCZ Reference Area: £470/yr (MCZ Fisheries Model). | Estimated annual value of UK vessel landings affected:<br><br>*£m/yr* \| Scenario 1<br>Value of landings affected \| <0.001*<br>* £470 |
| ***Dredges:*** It is unknown how many vessels use this rMCZ Reference Area but stakeholders interviewed for Fishermap indicated that no vessels use this rMCZ Reference Area (FisherMap Data 2010).<br><br>Estimated value of landings from the rMCZ Reference Area: £0.000m/yr (MCZ Fisheries Model). | Estimated annual value of UK vessel landings affected:<br><br>*£m/yr* \| Scenario 1<br>Value of landings affected \| <0.001*<br>* Negligible |
| ***Mid-water trawls:*** It is unknown how many vessels fish in this rMCZ Reference Area (FisherMap Data 2010).<br><br>Estimated value of landings from the rMCZ Reference Area: £150/yr (MCZ Fisheries Model). | Estimated annual value of UK vessel landings affected:<br><br>*£m/yr* \| Scenario 1<br>Value of landings affected \| <0.001*<br>* £150 |

<table>
<tr><th colspan="2">Table 2b: Commercial fisheries</th><th>rMCZ 8, Reference Area 6 Goodwin Knoll</th></tr>
<tr><td colspan="2">Hooks and lines: Vessel numbers unknown.<br><br>Estimated total value of landings from the rMCZ Reference Area: £0.017m/yr (MCZ Fisheries Model).</td><td>Estimated annual value of UK vessel landings affected:<br><br><table><tr><td>£m/yr</td><td>Scenario 1</td></tr><tr><td>Value of landings affected</td><td>0.017</td></tr></table></td></tr>
<tr><td colspan="2">Nets: Vessels from the Thanet Fishermen's Association fish with drift and gill nets in areas that are reported to overlap with the rMCZ Reference Area (FisherMap Data 2010). Species targeted include bass, dover sole, cod, skates and rays.<br><br>Estimated value of landings from the rMCZ Reference Area: £0.017m/yr (MCZ Fisheries Model).</td><td>Estimated annual value of UK vessel landings affected:<br><br><table><tr><td>£m/yr</td><td>Scenario 1</td></tr><tr><td>Value of landings affected</td><td>0.017</td></tr></table></td></tr>
<tr><td colspan="2">Pots and traps: One stakeholder (from the Thanet Fishermen's Association) who was interviewed targets whelks and lobster in an area overlapping with this rMCZ Reference Area FisherMap Data 2010).<br><br>Estimated total value of landings from the rMCZ Reference Area: £120/yr (MCZ Fisheries Model).</td><td>Estimated annual value of UK vessel landings affected:<br><br><table><tr><td>£m/yr</td><td>Scenario 1</td></tr><tr><td>Value of landings affected</td><td><0.001*</td></tr></table>* £120/yr.</td></tr>
<tr><td colspan="2">Total direct impact on UK commercial fisheries</td><td></td></tr>
<tr><td colspan="2"></td><td>Estimated annual value of UK vessel landings and gross value added (GVA) affected:<br><table><tr><td>£m/yr</td><td>Scenario 1</td></tr><tr><td>Value of landings affected</td><td>0.017</td></tr><tr><td>GVA affected</td><td>0.010</td></tr></table></td></tr>
<tr><td colspan="2">Baseline description of non-UK fisheries</td><td>Costs of impact of rMCZ on non-UK commercial fisheries</td></tr>
<tr><td colspan="2"></td><td>None.</td></tr>
</table>

| **Table 2c: Recreational angling** | **rMCZ 8, Reference Area 6 Goodwin Knoll** |
|---|---|

***Source of costs of the recommended Marine Conservation Zone (rMCZ) Reference Area***

Closure of the entire site to all recreational angling.

| **Baseline description of activity** | **Costs of impact of MCZ on the sector** |
|---|---|
| Three StakMap interviewees (2 representing charter boat fishing, 1 representing boat anglers in a single club) indicated that their areas of activity overlap with the rMCZ Reference Area. For the boat anglers, the area of overlap is substantial. As well as fishing, some recreational anglers anchor in the site. At the local group meeting in November 2010, participants said that vessels anchor up from the current and drift bait down over the wrecks.<br><br>StakMap showed that charter boat operators take some 1,060 people/yr angling in this rMCZ Reference Area. At the Essex/Kent Local Group meeting in November 2010, participants said that the wrecks in the area are heavily fished by recreational anglers. According to a local charter boat operator (D. Hancock, Regional Stakeholder Group (RSG) charter boat representative, email, 5th December, 2011), a total of 26 vessels (3 based at Dungeness, 7 at Dover, 2 at Folkestone, 8 at Ramsgate, 3 at Rye and 3 beach-launched vessels at Deal) probably fish within the site due to its proximity to their launch ports. They can take up to 8 anglers per trip. The same operator estimated that these vessels could fish in this inshore site for up to 150 days a year. The Balanced Seas project team consider that this is an over estimate as charter boats typically work a total 200 days a year (as indicated by StakMap interviews) and visit a number of sites. The estimated average revenue per charter vessel is £300/day (D. Hancock, Regional Stakeholder Group (RSG) charter boat representative, pers. comms., January, 2012). | Anglers and charter boat operators may respond to the closure by angling other areas nearby if the weather or fish movements allow. However, there are times when the rMCZ Reference Area is the only suitable site for angling in the area (D. Hancock, RSG charter boat representative, pers. comms., January, 2012). One charter boat operator has indicated that the closure would have a major impact on his activities (D. Hancock, Regional Stakeholder Group (RSG) charter boat representative, email, 5th December,).<br><br>To avoid underestimation of costs, the IA assumes that charter boat operators will lose all revenue from angling trips. Since the estimate of 150 days use of the site (D. Hancock, RSG charter boat representative) is considered an over-estimate, the IA is assuming that a third (15 days) of this number is more realistic, given the charter boats' use of a number of sites, and allowing for displacement of some of their activity to alternative locations. Consequently, Balanced Seas estimates that on average each of the 26 vessels loses revenue of £300/day for 50 days a year. Since the charter vessels using this site may be capable of fishing elsewhere nearby,depending on the weather and fish movements, the value of actual revenue lost may nevertheless be lower than the estimate that is provided here.<br><br>*£m/yr* — Scenario 1<br>Loss of revenue — 0.390<br>GVA affected — 0.183 |

| **Table 2d: Other impacts that are assessed for the suite of MCZs and not for this site alone** | **rMCZ 8, Reference Area 6 Goodwin Knoll** |
|---|---|
| ***Oil and gas related activities (including carbon capture and storage)*** | |
| This rMCZ Reference Area overlaps with an area that has potential for future oil and gas exploration and production (it overlaps licensed blocks in the 27th Seaward Licensing Rounds). However, it is unlikely that any oil and gas (including carbon capture and storage) infrastructure will be proposed in future in this rMCZ Reference Area due to its location and size (DECC, pers. comm., 2012). Impacts of rMCZ Reference Areas on oil and gas related activities are assessed in the Evidence Base, Annex H11 and Annex N 10 (they are not assessed for this site alone). | |

## Human activities in the site that are not negatively affected by the rMCZ (over 2013 to 2032 inclusive)

| **Table 3: Human activities in the site that are not negatively affected by the recommended Marine Conservation Zone (rMCZ) (existing activities at their current levels and future proposals known to the regional MCZ projects)** | **rMCZ 8, Reference Area 6 Goodwin Knoll** |
|---|---|
| Recreation (except for the activities listed above in table 2)<br>Research and education<br>Shipping | |

## Anticipated benefits to ecosystem services

The habitats, species and other ecological features of the recommended Marine Conservation Zone (rMCZ) Reference Area contribute to the delivery of a range of ecosystem services. Designation of the rMCZ Reference Area and its subsequent management may improve the quantity and quality of the beneficial services provided, which may increase the value (contribution to economic welfare) of them. Impacts on the value of ecosystem services may occur as a result of the designation, management and/or achievement of the conservation objectives of the rMCZ Reference Area. Further discussion on the potential benefits to ecosystem services can be found in Annex L and definitions can be found in Annex H.

| **Table 4a. Fish and shellfish for human consumption** | | **rMCZ 8, Reference Area 6 Goodwin Knoll** |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| Fletcher and others (2011) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) Reference Area can contribute to the delivery of fish and shellfish for human consumption.<br><br>Subtidal coarse sediments and sand are important for spawning and nursery grounds for juvenile commercial species such as flatfish and | If the conservation objectives of the features are achieved, the features will be recovered to reference condition.<br><br>Additional management (above that in the baseline situation) of fishing activities is expected which will prohibit fishing within the rMCZ Reference Area. The costs of this are set out in Table 2b. | Anticipated direction of change:<br><br>⇧ |

| **Table 4a. Fish and shellfish for human consumption** | | **rMCZ 8, Reference Area 6 Goodwin Knoll** |
|---|---|---|
| bass (Fletcher and others, 2011). The baseline quantity and quality of the ecosystem service provided is assumed to be commensurate with that provided by the features of the site when in favourable condition (see rMCZ8 Table 1 for details).<br><br>There is only a low level of fishing in the rMCZ Reference Area as this is the drying area of the Goodwin Sands. A description of on-site fishing activity and the value derived from it is set out in Table 2b.<br><br>It has not been possible to estimate the value of the off-site benefits that derive from the spawning and nursery area. | Achievement of the conservation objectives may improve the contribution of the habitats to the provision of fish and shellfish for human consumption.<br><br>Closure of the rMCZ Reference Area to fishing activity will reduce the on-site fishing mortality of species but, as the site is small, it is unclear whether this would benefit stocks of mobile commercial finfish species.<br><br>As no fishing will be permitted within the rMCZ Reference Area, no on-site benefits will be realised. | Confidence: Low |

| **Table 4b. Recreation** | | **rMCZ 8, Reference Area 6 Goodwin Knoll** |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| ***Angling:*** Fletcher and others (2011) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) Reference Area can contribute to the delivery of fish and shellfish for human consumption and recreation services.<br><br>Subtidal coarse sediments and sand are important for spawning and nursery grounds for juvenile commercial species such as flatfish and bass (Fletcher and others, 2011). The baseline quantity and quality of the ecosystem service provided is assumed to be commensurate with that provided by the features of the site when in favourable condition (see rMCZ8 Table 1 for details).<br><br>Goodwin Sands has very high biodiversity due to the diverse bathymetry and substrate and it is thought to be a spawning ground for thornback ray. This high biodiversity attracts fish caught recreationally (including whiting, bass, smooth hound and mackerel) (Balanced Seas Final Recommendations Report, 2011), and is likely to help to support potential on-site and off-site fisheries. However, it is not known to what | If the conservation objectives of the features are achieved, the features will be recovered to reference condition.<br><br>Recovery of habitats may have benefits for fish populations. It is unclear whether any benefits for fish populations would arise as a result of reduced fishing mortality due to closure of the rMCZ Reference Area (see Table 4a).<br><br>As angling will not be permitted within the rMCZ Reference Area, any benefits will be limited to those occurring as a result of spill-over effects of finfish species targeted by anglers outside the rMCZ Reference Area. Such benefits may be insignificant. | Anticipated direction of change: ⇧<br><br>Confidence: Low |

| **Table 4b. Recreation** | | **rMCZ 8, Reference Area 6 Goodwin Knoll** |
|---|---|---|
| extent nursery areas occur within the rMCZ Reference Area. The generally high biodiversity due to the intertidal habitats within the site may also support on-site and off-site fisheries.<br><br>Angling is an important activity in this rMCZ Reference Area, as described in Table 2c.<br><br>It has not been possible to estimate the value derived from angling on-site or the proportion of the value derived from angling off-site that results from the potential spawning and nursery area. | | |
| ***Diving:*** Diving may occur around the wrecks in the rMCZ Reference Area. | If the conservation objectives of the features are achieved, the features will be recovered to reference condition.<br><br>The recovery of the features to reference condition may improve their functioning as support for fish and other marine wildlife (including increases in size and diversity of species), potentially benefiting diving within the rMCZ Reference Area. Any increase may represent a redistribution of dive location preferences rather than an overall increase in diving. | Anticipated direction of change:<br><br>⇧<br><br>Confidence: Low |
| ***Wildlife watching:*** Fletcher and others (2011) identify that the features to be protected by the rMCZ Reference Area can contribute to the delivery of recreation and tourism services.<br><br>Subtidal coarse sediments and sand are important for spawning and nursery grounds for juvenile flatfish and bass (Fletcher and others, 2011) which will potentially be foraged by sea birds and mammals. The baseline quantity and quality of the ecosystem service provided is assumed to be commensurate with that provided by the features of the site when in favourable condition (see rMCZ8 Table 1 for details). | If the conservation objectives of the features are achieved, the features will be recovered to reference condition.<br><br>The recovery of the features to reference condition may improve their functioning as support for fish and bird populations, potentially benefiting wildlife watching within the rMCZ Reference Area. In addition, an improvement in the condition of site features and any associated increase in abundance and diversity of species that are visible to wildlife watchers may improve the quality of wildlife watching at the site and therefore the value of the ecosystem service. | Anticipated direction of change:<br><br>⇧<br><br>Confidence: Low |

| **Table 4b. Recreation** | **rMCZ 8, Reference Area 6 Goodwin Knoll** | |
|---|---|---|
| This rMCZ Reference Area lies within a popular wildlife watching spot and incorporates one of the primary seal haul-outs in the South-East. Also, it is important for foraging birds. Charter boats from Ramsgate and Dover conduct wildlife watching trips within the site. The site occurs within an area of the Channel used by ferries, which may carry wildlife watchers, particularly those interested in marine mammals.<br><br>It has not been possible to estimate the value derived from wildlife watching in the rMCZ Reference Area. | The designation may lead to an increase in wildlife watching visits to the site, which may benefit the local economy. This increase may represent an overall increase in UK wildlife watching visits and/or a redistribution of location preferences.<br><br>Designating the rMCZ Reference Area will protect its features and the ecosystem services that they provide against the risk of future degradation from pressures caused by human activities. | |
| ***Other recreation:*** Other recreation is not known to take place in the site. | N/A | N/A |

| **Table 4c. Research and education** | **rMCZ 8, Reference Area 6 Goodwin Knoll** | |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| ***Research:*** Fletcher and others (2011) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) Reference Area can contribute to the delivery of research services.<br><br>Research is carried out in the wider rMCZ by the UK Hydrographic Office; the 2009 survey consisted of a full survey of the whole area, the results of which are shown in UK Hydrographic Office (2010). Seasearch, co-ordinated by Kent Wildlife Trust, is very active in the area, conducting sea-floor surveys regularly. Archaeological research and monitoring are also carried out on a regular basis. These activities will almost certainly also involve the rMCZ Reference Area.<br><br>It has not been possible to estimate the value derived from research activities associated with the rMCZ Reference Area**.** | As an rMCZ Reference Area, the site will provide an opportunity to demonstrate the state of designated marine features in the absence of many anthropogenic pressures (Natural England and JNCC, 2010). It will provide a control area against which the impacts of pressures caused by human activities can be compared as part of long-term monitoring and assessment. Other research benefits are unknown. | Anticipated direction of change:<br>⇧<br>Confidence: High |
| ***Education:*** Fletcher and others (2011) identify that the features to be protected by the rMCZ Reference Area can contribute to the delivery of | As the rMCZ Reference Area is about 7km offshore and is therefore relatively inaccessible, no benefits are likely to arise | Anticipated direction of |

| **Table 4c. Research and education** | **rMCZ 8, Reference Area 6 Goodwin Knoll** | |
|---|---|---|
| education services.<br><br>No known education activity occurs in the site. | from direct use of the site for education.<br><br>Non-visitors may benefit if the rMCZ Reference Area contributes to wider provision of educational resources (e.g. television programmes, articles in magazines and newspapers, and educational resources developed for use in schools). | change:<br><br>⇧<br><br>Confidence: Low |

| **Table 4d. Regulating services** | | **rMCZ 8, Reference Area 6 Goodwin Knoll** |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| ***Regulation of pollution:*** A feature of the site (subtidal sediments) contributes to the bioremediation of waste and sequestration of carbon (Fletcher and others, 2011).<br><br>***Environmental resilience:*** A feature of the site (subtidal sediments) contributes to the resilience and continued regeneration of marine ecosystems (Fletcher and others, 2011).<br><br>***Natural hazard protection:*** A feature of the site (subtidal sediments) contributes to local flood and storm protection (Fletcher and others, 2011); although the site is offshore, as part of the Goodwin Sands it plays a very important role in relation to coastal dynamics (Fletcher and others, 2011).<br><br>It has not been possible to estimate the value derived from regulating services associated with the rMCZ Reference Area. | If the conservation objectives of the features are achieved, the features will be recovered to reference condition.<br><br>Recovery of the subtidal sediments and closure to fishing could increase the site's benthic biodiversity and biomass, improving the regulating capacity of its habitats.<br><br>Designating the recommended Marine Conservation Zone Reference Area will protect its features and the ecosystem services that they provide against the risk of future degradation from pressures caused by human activities. | Anticipated direction of change:<br><br>⇧<br><br>Confidence: Low |

| **Table 4e. Non-use and option values** | **rMCZ 8, Reference Area 6 Goodwin Knoll** | |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| Some people gain satisfaction from the existence of marine habitats, species and other features. They also gain from having the option to benefit in the future from the habitats and species in the recommended Marine Conservation Zone (rMCZ) Reference Area and the ecosystem services provided, even if they do not currently benefit from them.<br><br>It has not been possible to estimate the value derived from non-use and option values associated with therpMCZ Reference Area. | The rMCZ Reference Area will benefit the proportion of the UK population that values conservation of its features and its contribution to an ecologically coherent network of Marine Protected Areas. Some people will gain satisfaction from knowing that the habitats and species are being conserved (existence value) and/or that they are being conserved for use by others in the current generation (altruistic value) or future generations (bequest value). The rMCZ Reference Area will protect the features and the ecosystem services provided, and thereby the option to benefit from these services in the future, from the risk of future degradation. | Anticipated direction of change:<br><br>⇧<br><br>Confidence: Moderate |

## rMCZ 9 Offshore Foreland

**Site area (km$^2$):** 252.49

| **Table 1. Conservation impacts** | | | | **rMCZ 9, Offshore Foreland** |
|---|---|---|---|---|
| **1a. Ecological description** | | | | |
| The site contains high energy infralittoral rock, high and moderate energy circalittoral rock, subtidal coarse sediment and subtidal sand. Various species of flatfishes (e.g. plaice, sole and undulate ray) are likely to be present, and thus there might be spawning and nursery grounds within the site. The site overlaps the very northern section of the English Channel Outburst Flood Feature, which runs from the southern North Sea along the Solent Paleochannel and is geomorphological evidence of a megaflood which occurred some 200,000 years ago when a huge glacial lake in the North Sea burst through the Dover Straits Isthmus, thus separating England from mainland Europe. The north of the site exhibits the top 10% of benthic species taxonomic distinctness in the region. The boundaries of the site have been drawn so that the site abuts the French Banc de Flandres Special Area of Conservation and Special Protection Area (SPA) in the north-east, which has the same broad-scale habitats, and Cap Gris Nez SPA in the south-west.<br><br>Source: Balanced Seas Final Recommendations (2011). | | | | |
| **1b. Baseline condition of MCZ features and impact of the MCZ** | | | | |
| **Feature** | **Area of feature (km2)** | **No. of occurrences** | **Baseline** | **Impact of the MCZ** |
| ***Broad-scale Habitats*** | | | | |
| A3.1 high energy infralittoral rock | 3.10 | - | Unfavourable condition | Recover to favourable condition |
| A4.1 high energy circalittoral rock | 72.86 | - | Unfavourable condition | Recover to favourable condition |
| A4.2 mod energy circalittoral rock | 12.68 | - | Unfavourable condition | Recover to favourable condition |
| A5.1 subtidal coarse sediment | 93.65 | - | Favourable condition | Maintain at favourable condition |
| A5.2 subtidal sand | 68.61 | - | Favourable condition | Maintain at favourable condition |

## Site-specific costs arising from the effect of the recommended Marine Conservation Zone (rMCZ) on human activities (over 2013 to 2032 inclusive)

| **Table 2a. Commercial fisheries** | **rMCZ 9, Offshore Foreland** |
|---|---|
| ***Source of costs of the recommended Marine Conservation Zone (rMCZ)*** | |
| The Joint Nature Conservation Committee and Natural England have advised that there is considerable uncertainty about whether additional management of commercial fishing gear will be required for certain features protected by this rMCZ. Therefore, two scenarios have been employed in the Impact Assessment | |

**Table 2a. Commercial fisheries** **rMCZ 9, Offshore Foreland**

(IA) for these fisheries to reflect this uncertainty. Should the site be designated, the management that will be required will fall somewhere within this range.

***Management scenario 1***: No additional management (SNCB informed scenario).

***Management scenario 2***: Zoned closure of the western half of the rMCZ to bottom trawls and dredges to protect areas of high energy infralittoral rock and high/moderate energy circalittoral rock (Balanced Seas informed scenario based on stakeholder recommendations).

***Management scenario 3***: Closure of entire rMCZ to bottom trawls and dredges and 50% reduction in activity of lines, nets, pots and traps to protect areas of high energy infralittoral rock and high/moderate energy circalittoral rock (SNCB informed scenario).

***Summary of all fisheries:*** The rMCZ lies between 6 nautical miles (nm) and 12nm. The French and Belgian commercial fleet have historical fishing rights between 6nm and 12nm for demersal species and herring and actively fish in this rMCZ. Germany has historic fishing rights for herring, but it is not known if the fleet uses this rMCZ. UK vessels, both under and over below 15 metres use this rMCZ and are involved in bottom trawling, scallop dredging, potting, set netting and long lining activity including local fleets from Folkestone. Larger UK beam trawlers may fish the area when moving between North Sea and English Channel grounds. Trawlers and netters land a variety of fish from this rMCZ including sole plaice, dab, bass, cod, herring, sprat and thornback rays. Other vessels fish scallops, oysters, whelks, lobster and, to a lesser extent, mussels and crab from this rMCZ (information from FisherMap questionnaires). A number of commercial fishing restrictions are already in existence (listed in Annex E1). More detail on the approach used for the fisheries model is provided in Annexes H7 and N4.

Estimated annual value of landings from the rMCZ: £0.071m/yr.

| **Baseline description of UK commercial fisheries** | **Costs of impact of rMCZ on UK commercial fisheries** |
|---|---|
| ***Bottom trawls:*** Include both under and over 15 metre vessels. Number of vessels unknown.<br><br>Estimated total value of landings from the rMCZ: £0.005m/yr (MCZ Fisheries Model). | The estimated annual value of UK bottom trawl landings affected is expected to fall within the following range of scenarios:<br><br>*£m/yr* \| Scenario 1 \| Scenario 2 \| Scenario 3<br>Value of landings affected \| 0.000 \| 0.002 \| 0.005 |
| ***Dredges:*** Number of vessels unknown.<br><br>Estimated total value of landings from the rMCZ: £0.002m/yr (MCZ Fisheries Model). | The estimated annual value of UK dredge landings affected is expected to fall within the following range of scenarios:<br><br>*£m/yr* \| Scenario 1 \| Scenario 2 \| Scenario 3 |

<table>
<tr><th colspan="2">Table 2a. Commercial fisheries</th><th colspan="2">rMCZ 9, Offshore Foreland</th></tr>
<tr><td></td><td colspan="3"><table><tr><td>Value of landings affected</td><td>0.000</td><td>0.002</td><td>0.002</td></tr></table></td></tr>
<tr><td>Hooks and lines: Number of vessels unknown.<br><br>Estimated total value of landings from the rMCZ: £0.002m/yr (MCZ Fisheries Model).</td><td colspan="3">The estimated annual value of UK hook and line landings affected is expected to fall within the following range of scenarios:<br><br><table><tr><td>£m/yr</td><td>Scenario 1</td><td>Scenario 2</td><td>Scenario 3</td></tr><tr><td>Value of landings affected</td><td>0.000</td><td>0.000</td><td>0.002</td></tr></table>In establishing the draft conservation objectives, the site's features may have been assessed as having low vulnerability to fishing with hooks and lines at current levels and, where this is the case, this activity was not the primary reason for assigning the 'recover' conservation objectives. As such, it is anticipated that, if additional management is required, it may be towards the lower end of the range, and is likely to be less restrictive than that required for other gears.</td></tr>
<tr><td>Nets: Number of vessels unknown<br><br>Estimated total value of landings from the rMCZ: £0.003m/yr (MCZ Fisheries Model).</td><td colspan="3">The estimated annual value of UK net landings affected is expected to fall within the following range of scenarios:<br><br><table><tr><td>£m/yr</td><td>Scenario 1</td><td>Scenario 2</td><td>Scenario 3</td></tr><tr><td>Value of landings affected</td><td>0.000</td><td>0.000</td><td>0.003</td></tr></table>In establishing the draft conservation objectives, the site's features may have been assessed as having low vulnerability to fishing with nets at current levels and, where this is the case, this activity was not the primary reason for assigning the 'recover' conservation objectives. As such, it is anticipated that, if additional management is required, it may be towards the lower end of the range, and is likely to be less restrictive than that required for other gears.</td></tr>
<tr><td>Pots and traps: Number of vessels unknown.<br><br>Estimated total value of landings from the rMCZ: £450/yr (MCZ Fisheries Model)..</td><td colspan="3">The estimated annual value of UK pot and trap landings affected is expected to fall within the following range of scenarios:<br><br><table><tr><td>£m/yr</td><td>Scenario 1</td><td>Scenario 2</td><td>Scenario 3</td></tr><tr><td>Value of landings affected</td><td>0.000</td><td>0.000</td><td><0.001*</td></tr></table></td></tr>
</table>

<table>
<tr><th colspan="2">Table 2a. Commercial fisheries rMCZ 9, Offshore Foreland</th></tr>
<tr><td></td><td>*£450<br><br>In establishing the draft conservation objectives, the site's features may have been assessed as having low vulnerability to fishing with pots and traps at current levels and, where this is the case, this activity was not the primary reason for assigning the 'recover' conservation objectives. As such, it is anticipated that, if additional management is required, it may be towards the lower end of the range, and is likely to be less restrictive than that required for other gears.</td></tr>
<tr><th>Total direct impact on UK commercial fisheries</th><th></th></tr>
<tr><td></td><td>The estimated annual value of UK landings and gross value added (GVA) affected is expected to fall within the following range of scenarios:<br><table><tr><td>£m/yr</td><td>Scenario 1</td><td>Scenario 2</td><td>Scenario 3</td></tr><tr><td>Value of landings affected</td><td>0.000</td><td>0.004</td><td>0.012</td></tr><tr><td>GVA affected</td><td>0.000</td><td>0.002</td><td>0.006</td></tr></table></td></tr>
<tr><th>Baseline description of non-UK fisheries</th><th>Costs of impact of rMCZ on non-UK commercial fisheries</th></tr>
<tr><td>The rMCZ is fished by French and Belgian beam trawlers and trawlers, most heavily in the north-eastern half of the site.<br><br>Activity by vessels from France:<br><br>• Haute Normandie fleet: 4 French trawlers over 20 metres and 2 trawlers over 80 metres use this rMCZ and target whiting and herring, accounting for 70% of their turnover ((Viera,, A., IA questionnaire for International Stakeholders, 8 August 2011).).<br><br>• Nord Pas de Calais/Picardie fleet: this rMCZ is used intensively by vessels from Boulogne-sur-Mer including trawlers who use it from September to January, accounting for 25–70% of their turnover and 2 line fishing vessels under 15 metres that use the</td><td>Scenario 1: No impacts are anticipated under Scenario 1.<br><br>Scenario 2: Non-UK vessels using bottom trawls and dredges in the western half of the site (notably French and Belgian vessels) will be affected by this management scenario for the rMCZ. The value of French landings affected under this scenario has not been estimated. No information on the effect on other non-UK vessels is available; the Dutch representative on the regional stakeholder group considered that there would be less impact on the Dutch fleet through a zonation scheme such as this rather than closure of the entire site to certain gears.<br><br>Scenario 3: Non-UK vessels using bottom trawls and dredges throughout the site (notably French and Belgian vessels) will be affected by this management scenario for the rMCZ. The estimated value of French landings affected will be: £0.757m/yr (£0.754m/yr (bottom trawls/dredges), and 0.003/yr (static gears)) (Direction des</td></tr>
</table>

| **Table 2a. Commercial fisheries** | **rMCZ 9, Offshore Foreland** |
|---|---|
| rMCZ from March to December ; 50–100 trawlers 8–25 metres in size also use the site throughout the year; 9 netters under 15 metres from Calais use the eastern part of the rMCZ from September to October to May (French Department of Maritime Fishing and Aquaculture. 2012; Viera,, A., IA questionnaire for International Stakeholders, 8 August 2011).<br><br>Vessels from the Netherlands: have historical rights for herring and to use beam trawling in a small part of the area; there is active fishing but no information is available on number of vessels or gear types used, although low impact sumwing gear is used at least part of the time (Balanced Seas Final Recommendations Report, 2011).<br><br>Vessels from Belgium: have historical rights for demersal species and herring; the Belgian fleet fishes the area heavily with beam trawls (more in the east than the west because of the harder ground in the latter) (Balanced Seas Final Recommendations Report, 2011).<br><br>Vessels from Germany: Germany has historical rights in the area for herring fishing but there is no information as to whether this activity takes place within the rMCZ .<br><br>Estimated value of landings from the rMCZ by French vessels: bottom trawls/dredges: £0.754m/yr; static gears: £0.003m/yr (Direction des Pêches Maritimes et de l' Aquaculture, 2011). Estimates for value of landings are not available for other countries. | Pêches Maritimes et de l' Aquaculture, 2011). No information on the effect on other non-UK vessels is available. |

| **Table 2b. National defence** | **rMCZ 9, Offshore Foreland** |
|---|---|
| ***Source of costs of the recommended Marine Conservation Zone (rMCZ)*** | |
| Mitigation of impacts of Ministry of Defence (MOD) activities on features protected by the suite of rMCZs will be provided by additional planning considerations during operations and training. It is not known whether mitigation will be required for features protected by this site. The MOD will also incur costs in revising environmental tools and charts to include MCZs. | |
| **Baseline description of activity** | **Costs of impact of MCZ on the sector** |
| The MOD is known to make use of the rMCZ for towed array (surveillance system). | Cost of impact to sector: It is not known whether this rMCZ will impact on the MOD's use of the site. Impacts of rMCZs on national defence are assessed in Annex H10 and N9 (they are not assessed for this site alone). |

| **Table 2c: Other impacts that are assessed for the suite of MCZs and not for this site alone** | **rMCZ 9, Offshore Foreland** |
|---|---|
| **Oil and gas related activities (including carbon capture and storage)** | |
| This rMCZ overlaps with an area that has potential for future oil and gas exploration and production (it overlaps licensed blocks in the 26th or 27th Seaward Licensing Rounds). However, the area is not necessarily viable to develop. Impacts of rMCZs on oil and gas related activities are assessed in the Evidence Base, Annex H11 and Annex N10 (they are not assessed for this site alone). | |

**Human activities in the site that are not negatively affected by the rMCZ (over 2013 to 2032 inclusive)**

| **Table 3. Human activities in the site that are not negatively affected by the rMCZ (existing activities at their current levels and future proposals known to the regional MCZ projects)** | **rMCZ 9, Offshore Foreland** |
|---|---|
| Cables (existing interconnectors and telecom cables)<br>Commercial fisheries (mid-water trawls)<br>Recreation<br>Shipping | |

## Anticipated benefits to ecosystem services

The habitats, species and other ecological features of the recommended Marine Conservation Zone (rMCZ) contribute to the delivery of a range of ecosystem services. Designation of the rMCZ and its subsequent management may improve the quantity and quality of the beneficial services provided, which may increase the value (contribution to economic welfare) of them. Impacts on the value of ecosystem services may occur as a result of the designation, management and/or achievement of the conservation objectives of the rMCZ. Further discussion on the potential benefits to ecosystem services can be found in Annex L and definitions can be found in Annex H.

| **Table 4a. Fish and shellfish for human consumption** | | **rMCZ 9, Offshore Foreland** |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| Fletcher and others (2011) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) can contribute to the delivery of fish and shellfish for human consumption.<br><br>Offshore sand and coarse sediment habitats (the two dominant habitats in the rMCZ) support internationally important fish and shellfish fisheries (Fletcher and others, 2011).<br><br>The rMCZ is potentially a spawning and nursery ground for flatfishes, including Dover sole and plaice (Balanced Seas Final Recommendations Report, 2011) and thus may help to support potential on-site and off-site fisheries.<br><br>The baseline quantity and quality of the ecosystem service provided is assumed to be commensurate with that provided by the features of the site when in unfavourable condition (see Table 1 for details).<br><br>There is currently a relatively high on-site value derived from fish and shellfish services, principally through trawling activity. A description of on-site fishing activity and the value derived from it is set out in Table 2a.<br><br>It has not been possible to estimate the value of the off-site benefits that derive from the spawning and nursery area. | If the conservation objectives of the features are achieved, some features will be maintained in favourable condition and some recovered to favourable condition.<br><br>New management of fishing activities is expected (above the baseline situation), the costs of which are set out in Table 2a, which may reduce the impacts on fish and shellfish habitats and harvesting of stocks.<br><br>As most of the commercial species targeted by fishers in this area are mobile flatfish, it is unclear whether the scale of habitat recovered and the magnitude of reduced (on-site) harvesting will be enough to have any significant positive impact on commercial stocks.<br><br>Potential benefits may arise on-site, for fishers permitted to fish within the rMCZ, and off-site from spill-over benefits. | Anticipated direction of change:<br><br>⇧<br><br>Confidence: Low |

| **Table 4b. Recreation** | | **rMCZ 9, Offshore Foreland** |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| ***Angling:*** Fletcher and others (2011) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) can contribute to the delivery of fish and shellfish for human consumption and recreation services.<br><br>Offshore sand and coarse sediment habitats (the two dominant habitats in the rMCZ) support internationally important fish and shellfish fisheries (Fletcher and others, 2011).<br><br>The baseline quantity and quality of the ecosystem service provided is assumed to be commensurate with that provided by the features of the site when in unfavourable condition (see Table 1 for details).<br><br>The rMCZ is not popular with private angling boats, but may be used for fishing by charter vessels on their way over to fish French waters. The Varne Bank just to the south of the rMCZ is extremely popular. The potential spawning ground for flatfishes and generally high biodiversity due to the complex habitats within the site are likely to help to support potential on-site and off-site fisheries.<br><br>It has not been possible to estimate the value derived from angling on-site or the proportion of the value derived from angling off-site that results from the potential spawning and nursery area. | If the conservation objectives of the features are achieved, some of the features will be recovered to favourable condition. Others will be maintained in favourable condition.<br><br>The recovery of the broad scale habitats to favourable condition may improve their functioning as a nursery area, potentially benefiting fisheries exploited within and outside the rMCZ (see Table 4a).<br><br>As no additional management of angling is expected, fishers will be able to benefit from any on-site and off-site beneficial effects. If the rMCZ results in an increase in the size and diversity of species caught then this is expected to increase the value derived by anglers.<br><br>The designation may lead to an increase in angling visits to the site, which may benefit the local economy. This increase is likely to arise from a change in anglers' preferred angling locations rather than an increase in days spent angling or the number of anglers at a national scale. The adjacent popular angling spot, the Varne Bank, may benefit from possible spill-over effects. | Anticipated direction of change:<br><br>⇧<br><br>Confidence: Low |
| ***Diving:*** Diving is not known to take place in the rMCZ. | N/A | N/A |
| ***Wildlife watching:*** Fletcher and others (2011) identify that the features to be protected by the rMCZ can contribute to the delivery of recreation and tourism services. | If the conservation objectives of the features are achieved, some of the features will be recovered to favourable condition. Others will be maintained in favourable condition. | Anticipated direction of change:<br><br>⇧ |

| **Table 4b. Recreation** | | **rMCZ 9, Offshore Foreland** |
|---|---|---|
| The baseline quantity and quality of the ecosystem service provided is assumed to be commensurate with that provided by the features of the site when in unfavourable condition (see Table for details).<br><br>Due to its offshore location, the rMCZ has not been identified as a popular area for wildlife watching. However, the site has particularly high biodiversity and abundant fish populations which support a number of foraging birds and potentially marine mammals. The site occurs within an area of the Channel used by ferries, which may carry wildlife watchers, particularly those interested in marine mammals.<br><br>It has not been possible to estimate the value derived from wildlife watching in the rMCZ. | The recovery of the broad scale habitats to favourable condition may improve their functioning as support for fish, bird and marine mammal populations. Any associated increase in abundance and diversity of species that are visible to wildlife watchers may improve the quality of wildlife watching at the site and therefore the value of the ecosystem service.<br><br>The designation may lead to an increase in wildlife watching visits to the site, which may benefit the local economy. This increase may represent a redistribution of location preferences rather than an overall increase in wildlife watching trips at the national scale.<br><br>Designating the rMCZ will protect its features and the ecosystem services that they provide against the risk of future degradation from pressures caused by human activities. | Confidence: Low |
| ***Other recreation:*** Tourism is not known to take place in the rMCZ | N/A | N/A |

| **Table 4c. Research and education** | | **rMCZ 9, Offshore Foreland** |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| ***Research:*** Fletcher and others (2011) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) can contribute to the delivery of research services.<br><br>No known formal research activities are currently carried out in the rMCZ. However, ferries crossing the Channel may be used by marine mammal observers whose data contribute to national databases. | Monitoring of the rMCZ will help inform understanding of how the marine environment is changing and is impacted on by anthropogenic pressures and management interventions. Other research benefits could be more robust data through increased marine mammal sightings. Other research benefits are unknown. | Anticipated direction of change:<br><br>⇧<br><br>Confidence: High |

| **Table 4c. Research and education** | | **rMCZ 9, Offshore Foreland** |
|---|---|---|
| ***Education:*** Fletcher and others (2011) identify that the features to be protected by the rMCZ can contribute to the delivery of education services.<br><br>No known education activity is focused on the area of the rMCZ. | As the rMCZ is approximately 12km offshore and therefore relatively inaccessible, no benefits are likely to arise from direct use of the site for education.<br><br>Non-visitors may benefit if the rMCZ contributes to wider provision of educational resources (e.g. television programmes, articles in magazines and newspapers, and educational resources developed for use in schools). | Anticipated direction of change:<br><br>⇧<br><br>Confidence:<br><br>Low |

| **Table 4d. Regulating services** | | **rMCZ 9, Offshore Foreland** |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| ***Regulation of pollution:*** the features of the site contribute to the sequestration of carbon (subtidal sediments) (Fletcher and others, 2011).<br><br>***Environmental resilience:*** the features of the site (subtidal sediments) contribute to the resilience and continued regeneration of marine ecosystems (Fletcher and others, 2011).<br><br>***Natural hazard protection:*** as the site is offshore, its features are not thought to contribute to the delivery of this service (Fletcher and others, 2011).<br><br>It has not been possible to estimate the value derived from regulating services associated with the rMCZ. | If the conservation objectives of the features are achieved, some features will be maintained in favourable condition and some (circalittoral rock) recovered to favourable condition.<br><br>Recovery of the circalittoral rock and a potential reduction in the use of bottom towed fishing gear may increase the site's benthic biodiversity and biomass, improving the regulating capacity its habitats.<br><br>Designating the rMCZ will protect its features and the ecosystem services that they provide against the risk of future degradation from pressures caused by human activities. | Anticipated direction of change:<br><br>⇧<br><br>Confidence:<br>Low |

| **Table 4e. Non-use and option values** | | **rMCZ 9, Offshore Foreland** |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| Some people gain satisfaction from the existence of marine habitats, species and other features. They also gain from having the option to benefit in the future from the habitats and species in the rMCZ and the ecosystem services provided, even if they do not currently benefit from them.<br><br>It has not been possible to estimate the value derived from non-use and option value services associated with the rMCZ. | The rMCZ will benefit the proportion of the UK population that values conservation of the rMCZ features and its contribution to an ecologically coherent network of MPAs. Some people will gain satisfaction from knowing that the habitats and species are being conserved (existence value) and/or that they are being conserved for use by others in the current generation (altruistic value) or future generations (bequest value). The rMCZ will protect both the features and the option to benefit from the services in the future from the risk of future degradation. | Anticipated direction of change:<br><br>⇧<br><br>Confidence: Moderate |

## rMCZ 10 The Swale Estuary

**Site area (km$^2$):** 51.05

| **Table 1. Conservation impacts** | | | | **rMCZ 10, Swale Estuary** |
|---|---|---|---|---|
| **1a. Ecological description** | | | | |
| This recommended Marine Conservation Zone (rMCZ) has been identified for protection of subtidal habitats (mud and mixed sediments) in the main channel of the Swale Estuary to complement the intertidal habitats that are already protected. Subtidal sands and gravels have also been recommended for protection at The Street in Whitstable and on the boundary of the site where the Swale joins with the Medway. The Swale Estuary is in general a highly biodiverse area with large areas of salt marshes that support breeding wildfowl, and provide feeding grounds for migratory species as they move to wintering grounds further south. The site also contains intertidal and subtidal blue mussel beds and native oysters; although these populations are not currently considered to be in good condition, they are thought to have potential for recovery if the overall conditions are allowed to improve. Other features of conservation interest are peat and clay exposures (specifically of London clay), Ross worm reef, good examples of sheltered muddy gravels, rare algal communities on shingle, peacock worm and sea squirt beds. The estuary is considered an important spawning and nursery ground for various fish species. This site overlaps The Swale Site of Special Scientific Interest and Special Protection Area (SPA), the Outer Thames Estuary SPA, and two Ramsar sites: The Swale, and Thanet Coast and Sandwich Bay.<br><br>Source: Balanced Seas Final Recommendations (2011). | | | | |
| **1b. Baseline condition of MCZ features and impact of the MCZ** | | | | |
| **Feature** | **Area of feature (km2)** | **No. of occurrences** | **Baseline** | **Impact** |
| ***Broad-scale habitats*** | | | | |
| A1.3 low energy intertidal rock | 0.61 | - | Favourable condition | Maintain at favourable condition |
| A3.3 low energy infralittoral rock | 0.96 | - | Favourable condition | Maintain at favourable condition |
| A5.2 subtidal sand | 9.23 | - | Favourable condition | Maintain at favourable condition |
| A5.3 subtidal mud | 6.65 | - | Favourable condition | Maintain at favourable condition |
| A5.4 subtidal mixed sediments | 13.53 | - | Favourable condition | Maintain at favourable condition |
| ***Habitats of Conservation Importance*** | | | | |
| Blue mussel beds | 0.21 | - | Unfavourable condition | Recover to favourable condition |
| Peat and clay exposure | 0.74 | - | Favourable condition | Maintain at favourable condition |
| Rossworm (*Sabellaria spinulosa*) reef | 625.67m$^2$ | - | Unfavourable condition | Recover to favourable condition |
| Subtidal sands and gravels | 0.24 | - | Favourable condition | Maintain at favourable condition |
| Sheltered muddy gravels | - | 11 records | Favourable condition | Maintain at favourable condition |

| ***Species of Conservation Importance*** | | | | |
|---|---|---|---|---|
| Native Oyster (*Ostrea edulis*) | - | 2 records | Favourable condition | Maintain at favourable condition |
| European Eel (*Anguilla anguilla*) | n/a | - | Favourable condition | Maintain at favourable condition |

## Site-specific costs arising from the effect of the recommended Marine Conservation Zone on human activities (over 2013 to 2032 inclusive)

| **Table 2a. Archaeological heritage** | **rMCZ 10, The Swale Estuary** |
|---|---|
| ***Source of costs of the recommended Marine Conservation Zone (rMCZ)*** | |
| Increase in costs of assessing environmental impacts for future licence applications (it is not anticipated that any additional mitigation of impacts on features protected by the MCZ will be needed relative to the mitigation provided in the baseline). Archaeological excavations, surface recovery, intrusive and non-intrusive surveys, diver trails and visitors will be allowed.<br><br>However, restrictions could also be placed upon:<br><br>• Anchoring in areas of vulnerable MCZ features in the site, including Ross worm *Sabellaria spinulosa* reef<br><br>• Archaeological excavation in areas of peat and clay exposures in the site. | |
| **Baseline description of activity** | **Costs of impact of rMCZ on the sector** |
| There have been 87 named and dated wrecks reported within this site and several other unidentified wrecks. These are made up of vessels, landing crafts and barges. A World War II anti-aircraft battery is reported within the site, although it is not stated whether it is still present. Roman-age artefacts have been found within the site (English Heritage, 2012). | An extra cost would be incurred in the assessment of environmental impact made in support of any future licence applications for archaeological activities in the site. The likelihood of a future licence application being submitted is not known so no overall cost to the sector of this rMCZ has been estimated. However, the additional cost in 1 licence application could be in the region of £500 to £10,000 depending on the size of the MCZ (English Heritage, pers. comm., 2012). No further impacts on activities related to archaeology are anticipated.<br><br>If archaeologists respond to restrictions on excavation in areas of peat and clay exposures and restrictions on anchoring over areas of Ross worm *Sabellaria spinulosa* reef by undertaking alternative |

| **Table 2a. Archaeological heritage** | **rMCZ 10, The Swale Estuary** |
|---|---|
| | archaeological excavations 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 is not costed in the IA. If archaeological excavations do not take place as a result of these restrictions this will prevent interpretation of archaeological evidence from the site, which will decrease acquisition of historical knowledge of past human communities from the site, resulting in a cost to society. |

| **Table 2b. Coastal development (excluding ports and harbours)** | **rMCZ 10, The Swale Estuary** |
|---|---|
| ***Source of costs of the recommended Marine Conservation Zone (rMCZ)*** | |
| Increase in costs of assessing environmental impacts for future licence applications and costs of mitigation of impacts if required for the proposed Thames Estuary airport. | |
| **Baseline description of activity** | **Costs of impact of MCZ on the sector** |
| Plans for the Thames Estuary airport are at a very early stage and a number of locations have been suggested. The most recent proposal (the Thames Hub) is for a site that lies within 1km of the rMCZ, and that straddles the land and sea on the Isle of Grain, which is the eastern end of the Hoo Peninsula. Proposed road and rail links and plans for a terminal fall within 1km of the rMCZ (www.halcrow.com/Thames-Hub/PDF/Thames_Hub_vision.pdf). | Because the proposals are at an early stage, it is not yet known whether additional costs will be incurred as a result of the rMCZ in assessing environmental impacts for future licence applications and whether additional mitigation of impacts on MCZ features will be needed. |

| **Table 2c. Commercial fisheries** | **rMCZ 10, The Swale Estuary** |
|---|---|
| ***Source of costs of the recommended Marine Conservation Zone (rMCZ)*** | |
| The Joint Nature Conservation Committee and Natural England have advised that there is considerable uncertainty about whether additional management of commercial fishing gears will be required for certain features protected by this rMCZ. Therefore, two scenarios have been employed in the Impact Assessment (IA) for these fisheries to reflect this uncertainty. Should the site be designated, the management that will be required will fall somewhere within | |

**Table 2c. Commercial fisheries** **rMCZ 10, The Swale Estuary**

this range.

***Management scenario 1:*** Closure of entire rMCZ to bottom trawls and dredges to protect areas of Ross worm reef *Sabellaria spinulosa* (Statutory Nature Conservation Bodies (SNCB) informed scenario). Zoned closure is not possible without verification of the distribution of ross worm reef.

***Management scenario 2:*** Closure of entire rMCZ to bottom trawls, dredges, lines, nets, pots and traps to protect blue mussel beds and areas of Ross worm reef *Sabellaria spinulosa* (SNCB informed scenario).

***Summary of all fisheries:*** The rMCZ is entirely within the 6 nautical mile (nm) limit and is fished only by UK vessels. Most fishing vessels are from Queenborough, Whitstable and Faversham. Under 15 metre vessels are engaged in bottom trawling, oyster dredging and potting activity (information from Fishermap questionnaires). Mussel seed dredging occurs in the northern section of the site (Natural England feedback response to first tranche of material, 13 January 2012.). Cockle suction dredgers from Leigh-on-Sea occasionally fish the north-eastern part of the site in the mud/sand if cockle beds are present. FisherMap indicates that no vessels over 15 metres are operating in the site. A number of commercial fishing restrictions are already in existence (listed in Annex E1). More detail on the approach used for the fisheries method is provided at Annexes H7 and N4.

Estimated annual value of landings from the rMCZ: £0.097m/yr.

| **Baseline description of UK commercial fisheries** | **Costs of impact of rMCZ on UK commercial fisheries** |
|---|---|
| ***Bottom trawls:*** Number of vessels unknown.<br><br>Estimated value of UK net landings from the rMCZ: £0.010m/yr (MCZ Fisheries Model). | The estimated annual value of UK bottom trawl landings affected is expected to fall within the following range of scenarios:<br><br>*£m/yr* \| Scenario 1 \| Scenario 2<br>Value of landings affected \| 0.010 \| 0.010<br><br>A Whitstable vessel owner (IA questionnaire response from Whitstable vessel owner, August 2011) indicated that closure of the entire rMCZ to bottom trawls would affect trawlers, in particular vessels from Whitstable (7 trawlers) and Faversham (1 trawler), resulting in an approximate 50% loss of earnings. He shared the view that displacement was not a non-viable alternative as: (i) all other fishing grounds have existing users and any increased effort within them could lead to conflict, and (ii) all available species are already fished using appropriate gears. Because of this, closure of the site to bottom trawls may result in major loss of revenue, which would lead to fishers leaving the fleet |

<table>
<tr><th>Table 2c. Commercial fisheries</th><th>rMCZ 10, The Swale Estuary</th></tr>
<tr><td></td><td>(see Annex J3a for more detail). The Whitstable vessel owner said that this could lead to the loss of 14 jobs if both this rMCZ and rMCZ 7 are closed, which would result in an important social cost for the local fishing communities. There would also be a secondary impact in that local fish markets, restaurants, fish retailers, and activities linked to the fishing fleet such as repairs, fuel services and gear suppliers would be affected.</td></tr>
<tr><td>Dredges: Number of vessels unknown.<br><br>Estimated total value of landings from the rMCZ: £0.082m/yr (MCZ Fisheries Model).</td><td>The estimated annual value of UK dredge landings affected is expected to fall within the following range of scenarios:<br><br><table><tr><td>£m/yr</td><td>Scenario 1</td><td>Scenario 2</td></tr><tr><td>Value of landings affected</td><td>0.082</td><td>0.082</td></tr></table></td></tr>
<tr><td>Nets: Number of vessels unknown.<br><br>Estimated total value of landings from the rMCZ: £0.004m/yr (MCZ Fisheries Model).</td><td>The estimated annual value of UK net landings affected is expected to fall within the following range of scenarios:<br><br><table><tr><td>£m/yr</td><td>Scenario 1</td><td>Scenario 2</td></tr><tr><td>Value of landings affected</td><td>0.000</td><td>0.004</td></tr></table>In establishing the draft conservation objectives, the site's features may have been assessed as having low vulnerability to fishing with nets at current levels and, where this is the case, this activity was not the primary reason for assigning the 'recover' conservation objectives. As such, it is anticipated that, if additional management is required, it may be towards the lower end of the range, and is likely to be less restrictive than that required for other gears.</td></tr>
<tr><td>Pots and traps: Number of vessels unknown<br><br>Estimated total value of landings from the rMCZ: £0.002m/yr (MCZ Fisheries Model).</td><td>The estimated annual value of UK pot and trap landings affected is expected to fall within the following range of scenarios:<br><br><table><tr><td>£m/yr</td><td>Scenario 1</td><td>Scenario 2</td></tr><tr><td>Value of landings affected</td><td>0.000</td><td>0.002</td></tr></table>In establishing the draft conservation objectives, the site's features may have been assessed as having low vulnerability to fishing with pots and traps at</td></tr>
</table>

<table>
<tr><th colspan="2">Table 2c. Commercial fisheries rMCZ 10, The Swale Estuary</th></tr>
<tr><td></td><td>current levels and, where this is the case, this activity was not the primary reason for assigning the 'recover' conservation objectives. As such, it is anticipated that, if additional management is required, it may be towards the lower end of the range, and is likely to be less restrictive than that required for other gears.</td></tr>
<tr><td>Total direct impact on UK commercial fisheries</td><td></td></tr>
<tr><td></td><td>The estimated annual value of UK landings and gross value added (GVA) affected is expected to fall within the following range of scenarios:
<table>
<tr><td>£m/yr</td><td>Scenario 1</td><td>Scenario 2</td></tr>
<tr><td>Value of landings affected</td><td>0.092</td><td>0.097</td></tr>
<tr><td>GVA affected</td><td>0.043</td><td>0.045</td></tr>
</table></td></tr>
<tr><td>Baseline description of non-UK fisheries</td><td>Costs of impact of rMCZ on non-UK commercial fisheries</td></tr>
<tr><td></td><td>None.</td></tr>
</table>

<table>
<tr><th>Table 2d. Ports, harbours, shipping and disposal sites rMCZ 10, The Swale Estuary</th></tr>
<tr><td>Source of costs of the recommended Marine Conservation Zone (rMCZ)<br><br>Management scenario 1: Increase in costs of assessing environmental impacts for future licence applications. This applies to future licence applications for navigational dredging that takes place within 1km of the rMCZ. The Balanced Seas regional MCZ project is not aware of activities related to ports, harbours and shipping for which additional mitigation of impacts on features protected by the MCZ that will be needed relative to the mitigation provided in the baseline.<br><br>Management scenario 2: Increase in costs of assessing environmental impacts for future licence applications. This applies to future licence applications for disposal of dredged material, navigational dredging and all port and harbour developments within 5 km of the rMCZ. Also, additional costs in updating the Maintenance Dredging Protocol (MDP) that is being developed by Medway Ports. The Balanced Seas regional MCZ project is not aware of activities related to ports, harbours and shipping for which additional mitigation of impacts on features protected by the MCZ that will be needed relative to the mitigation provided in the baseline.</td></tr>
</table>

**Table 2d. Ports, harbours, shipping and disposal sites** — **rMCZ 10, The Swale Estuary**

| **Baseline description of activity** | **Costs of impact of rMCZ on the sector** |
|---|---|
| ***Disposal sites:*** There are no disposal sites either in or within 1km of rMCZ 10 and so Scenario 1 will not apply.<br><br>There are 2 disposal sites (TH103 Garrison Port and TH073 Whitstable C) within 5km of the rMCZ which are likely to be used by Faversham Port and Whitstable Harbour. For 1 of the disposal sites (Garrison Port) no licence applications were received between 2001 and 2010 but it is not closed to disposal in future (Cefas, pers. comm., 2011). The average number of licence applications received for the remaining disposal site disposal site (Whitstable C) is 0.2 per year (based on number of licence applications received between 2001 and 2010 (Cefas, pers. comm., 2011).<br><br>***Navigational dredge areas:*** There are licensed maintenance and navigational dredge channels within 1km of this rMCZ associated with Faversham Port and the Whitstable Harbour Board. It is assumed that each dredge area's marine licence is renewed once every 3 years, and that an assessment of environmental impact upon MCZ features is undertaken for each licence renewal.<br><br>There are licensed maintenance and navigational dredge channels within 5km of this rMCZ associated with Faversham Port and the Whitstable Harbour Board. It is assumed that each dredge area's marine licence is renewed once every 3 years, and that an assessment of environmental impact upon MCZ features is undertaken for each licence renewal. Some navigational dredge areas mill be covered by the MDP being prepared by Medway Ports, and for this it is assumed that the assessment of environmental impact is not changed over the 20 year period of the IA. It is assumed that an MDP will not be required for Faversham and Whitstable. | *£m/yr* — Scenario 1: Cost to the operator 0.002; Scenario 2: 0.004*<br><br>* This estimate for additional cost in future licence applications for port developments arising as a result of this rMCZ is not used to estimate the total costs for the IA. It is based on different assumptions to those used to estimate costs at a regional level and for the entire suite of sites. Also, this figure assumes that an assessment of environmental impact upon MCZ features is undertaken for each licence renewal (every 3 years). It does not include the cost of incorporating MCZ features in an existing or new MDP. It is likely to over-estimate the cost of Scenario 2 for rMCZs with ports within 5km that have MDPs because of the savings in future costs provided by an MDP. See Annex H for further information<br><br>***Scenario 1:*** Future licence applications for navigational dredging within 1km of this site will need to consider the potential effects of the activity on the features protected by the rMCZ. Additional costs will be incurred as a result (a breakdown of these by activity is provided in Annex N11).<br><br>***Scenario 2:*** Future licence applications for disposal of material, navigational dredging and port or harbour development plans and proposals within 5km of this rMCZ will need to consider the potential effects of the activity on the features protected by the rMCZ. Additional costs will be incurred as a result (a breakdown of these by activity is provided in Annex N11).<br><br>Also, additional costs will be incurred to update the Maintenance Dredging Protocol (MDP) being developed by Medway Ports as this will need to consider the potential effects of activities on the features protected by the rMCZ. The anticipated additional cost in the Medway MDP is estimated to be a one-off cost of £8438. |

| **Table 2d. Ports, harbours, shipping and disposal sites** | **rMCZ 10, The Swale Estuary** |
|---|---|
| ***Port development:*** There are 3 ports and harbours within 5km of the rMCZ, which may undergo development at some point in the future: Faversham, Whitstable and Ridham Dock (Ports & Harbours UK, 2012 – This may not represent a full list of all ports and harbours impacted by the site). No port developments are known to be planned within the 20 year period of the Impact Assessment (IA). | |

| **Table 2e. Recreation al anchoring)** | **rMCZ 10, The Swale Estuary** |
|---|---|
| ***Source of costs of the recommended Marine Conservation Zone (rMCZ)***<br><br>Creation of a no-anchoring zone (except in emergency circumstances) over Ross worm *Sabellaria spinulosa* reef. | |
| **Baseline description of activity** | **Costs of impact of rMCZ on the sector** |
| The Swale Estuary is popular for recreational boating. There are 5 yacht clubs, 3 boat-based sea angling clubs and 2 registered charter vessels within the Swale and many more associated with the Medway that also use the area. Vessels anchor in good weather on approach into and within the mouth of the main channel because of the attractive scenery, and the estuary is a haven for small craft in bad weather (RYA BS IA 1st Tranche Feedback, January, 2012).<br><br>Project data show that *Sabellaria* occurs within a few metres of the seaward boundary of the rMCZ where the Thames Estuary meets the Swale Estuary. Nautical charts do not show any designated anchorage areas overlapping the feature. Stakmap shows that 1 club anchors within the Swale, in an area covering the western half of the approach into the estuary which overlaps with *Sabellaria*. Because of the proximity of the area of *Sabellaria* to Whitstable Harbour and the entrance to the Swale Estuary, anchoring of other vessels may also occur in this area. | Due to the relatively low level of anchoring over the feature, the creation of a no-anchoring zone over the small areas of *Sabellaria* is not expected to impact on recreational vessel users extensively (RYA BS IA 1st Tranche Feedback, January, 2012) and no significant costs are expected.<br><br>Local Group and Regional Stakeholder Group members felt there was low confidence in the data records for *Sabellaria* and believe it does not exist within the site (Balanced Seas North Kent Sites meeting report, July 2011). The groups recommended that a survey is undertaken before designation, as if *Sabellaria* is found to be more widespread then recreational users may be significantly impacted and provision of eco-moorings may be needed. Survey costs have been included in monitoring costs in Annex N12. |

**Table 2f: Renewable energy-wind energy** **rMCZ 10, The Swale**

***Source of costs of the recommended Marine Conservation Zone (rMCZ)***

***Management Scenario 1***: Increase in costs of assessing environmental impacts for licence applications (it is not anticipated that any additional mitigation of impacts on features protected by the MCZ will be needed relative to the mitigation provided in the baseline).

***Management Scenario 2***: Increase in costs of assessing environmental impacts for licence applications and increase in cable protection installation costs for power export cables and inter-array cables (relative to the mitigation provided in the baseline).

| **Baseline description of activity** | **Costs of impact of rMCZ on the sector** |
|---|---|
| An estimated 12km of consented and under construction power export cable routes from the London Array wind farm may overlap with the rMCZ (estimate based on the length of the rMCZ). | The estimated cost to renewable energy developers operating in this rMCZ is expected to fall within the following range of scenarios:<br><br>*£m/yr* \| Scenario 1 \| Scenario 2<br>Cost to the operator \| 0.001 \| 0.607<br>GVA affected \| 0.001 \| 0.607<br><br>***Scenario 1:*** The licence application for the London Array wind farm export cable route will need to consider the potential effects of the development on achieving the conservation objectives of the rMCZ's features. This is expected to result in an additional one-off cost of £0.012m in 2022 (for extra consultant/staff time) with a present value of £0.009m.<br><br>***Scenario 2:*** In addition to the increased costs for assessment set out under Scenario 1, under Scenario 2 costs of additional mitigation are anticipated. This additional mitigation entails use of alternative cable protection for export cables and inter-array cables that have not yet been consented. This is expected to result in an additional one-off cost of £12.120m in 2022 (based on estimated additional cost of £1m/km for yet-to-be-consented power export cable route only) with a present value cost of £8.601m. These costs are included in Scenario 2 to reflect uncertainty over whether this additional mitigation will be required. Inter-array cables are not expected to be proposed for installation within this rMCZ. Therefore, no additional cost to install alternative cable protection for inter- |

| | |
|---|---|
| | array cabling is anticipated. JNCC and Natural England (pers. comm., 2012) state that the likelihood of the cost in Scenario 2 occurring is very low. Further details are provided in Annex H14.<br><br>The impacts that are assessed in both scenarios are based on JNCC and Natural England's advice on the mitigation that could be required. |

| **Table 2g: Other impacts that are assessed for the suite of MCZs and not for this site alone** | **rMCZ 10, The Swale** |
|---|---|
| ***Oil and gas related activities (including carbon capture and storage)***<br><br>This rMCZ overlaps with an area that has potential for future oil and gas exploration and production (it overlaps licensed blocks in the 26th or 27th Seaward Licensing Rounds). However, the area is not necessarily viable to develop. Impacts of rMCZs on oil and gas related activities are assessed in the Evidence Base, Annex H11 and Annex N10 (they are not assessed for this site alone). | |

## Human activities in the site that are not negatively affected by the rMCZ (over 2013 to 2032 inclusive)

| **Table 3. Human activities in the site that are not negatively affected by the rMCZ (existing activities at their current levels and future proposals known to the regional MCZ projects)** | **rMCZ 10, the Swale** |
|---|---|
| Aquaculture<br>Commercial fisheries (mid-water trawls, collection by hand)<br>Flood and coastal erosion risk management (coastal defence)<br>Recreation (except for the activities listed above in table 2)<br>Research and education<br>Shipping<br>Water abstraction, discharge and diffuse pollution*. | |

*The IA assumes that no additional mitigation of impacts of water abstraction, discharge or diffuse pollution will be required over and above that which will be provided to achieve the objectives of the Water Framework Directive through the River Basin Management Plan process (based on advice provided by Natural England, pers. comm., 2010).

## Anticipated benefits to ecosystem services

The habitats, species and other ecological features of the recommended Marine Conservation Zone (rMCZ) contribute to the delivery of a range of ecosystem services. Designation of the rMCZ and its subsequent management may improve the quantity and quality of the beneficial services provided, which may increase the value (contribution to economic welfare) of them. Impacts on the value of ecosystem services may occur as a result of the designation, management and/or achievement of the conservation objectives of the rMCZ. Further discussion on the potential benefits to ecosystem services can be found in Annex L and definitions can be found in Annex H.

| **Table 4a. Fish and shellfish for human consumption** | | **rMCZ 10, Swale Estuary** |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| Fletcher and others (2011) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) can contribute to the delivery of fish and shellfish for human consumption.<br><br>Subtidal sand, mud and mixed sediments are important for spawning and nursery grounds. These habitats can provide important nursery grounds for juvenile commercial species such as flatfishes and bass. Infralittoral rock is a suitable habitat for inshore commercial fisheries species, particularly lobster and crab. Intertidal rock habitats are important sources of larval plankton on which commercially important fish species feed, including mussels and larval fish of plaice and mackerel (Fletcher and others, 2011).<br><br>Stakeholders consider the Swale Estuary to have spawning and nursery grounds but no specific information is available on individual species of fish. The estuary is historically very important for its cockle and mussel beds, which still exist in a reduced form and are considered important for reseeding (Balanced Seas Final Recommendations Report, 2011). As such it is likely to help to support potential on-site and off-site fisheries.<br><br>The baseline quantity and quality of the ecosystem service provided is assumed to be commensurate with that provided by the features of the site when some are in favourable condition and some are in | If the conservation objectives of the features are achieved, some features will be maintained in favourable condition and some (*Sabellaria* and blue mussel beds) recovered to favourable condition.<br><br>New management of fishing activities is expected (above the baseline situation), the costs of which are set out in Table 2c, which may reduce the impacts on fish and shellfish habitats and harvesting of stocks.<br><br>As most of the commercial species targeted by fishers in this rMCZ are shellfish, it is unclear whether the scale of habitat recovered and the magnitude of reduced (on-site) harvesting will be enough to have any significant positive impact on commercial stocks. For reasons that are currently unknown, the native oyster and blue mussel fisheries have declined considerably over recent decades in the Swale Estuary, ((Balanced Seas Final Recommendations Report, 2011). However, maintaining and monitoring the current level of potting practices and restricting other fishing practices over certain features may safeguard current populations of shellfish and by ensuring no increase in fishing activity occurs or alternative gears used, it is expected that the shellfish and other fish species population may increase over time. | Anticipated direction of change:<br><br>⇧<br><br>Confidence: Low |

| **Table 4a. Fish and shellfish for human consumption** | | **rMCZ 10, Swale Estuary** |
|---|---|---|
| unfavourable condition (see Table 1 for details).<br><br>The Swale Estuary is fished by vessels from Queenborough, Whitstable, Faversham and Leigh-on-Sea that target commercial fish, oysters (there are four private oyster fisheries as well as a public fishery) and other shellfish (Balanced Seas Final Recommendations Report, 2011), particularly mussel seed in the northern section of the site (Natural England, pers. comm., 2012) and cockles in the north-eastern part of the site in the mud/sand if cockle beds are present. A description of on-site fishing activity and the value derived from it is set out in Table 2c.<br><br>It has not been possible to estimate the value of the off-site benefits that derive from the spawning and nursery areas. | Potential benefits may arise on-site, for fishers permitted to fish within the rMCZ, and off-site from spill-over benefits.<br><br>As new management is expected, some fishers will be able to benefit from both on-site and off-site beneficial effects, whilst others will only benefit from off-site beneficial effects.<br><br>Designating the rMCZ will protect its features and the ecosystem services that they provide against the risk of future degradation from pressures caused by human activities. | |

| **Table 4b. Recreation** | | **rMCZ 10, Swale Estuary** |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| ***Angling:*** Fletcher and others (2011) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) can contribute to the delivery of fish and shellfish for human consumption and recreation services.<br>Subtidal sand and mud and intertidal sand, muddy sand and mixed sediments are important for spawning and nursery grounds. These habitats can provide important nursery grounds for juvenile commercial species such as flatfishes and bass (Fletcher and others, 2011).<br>The baseline quantity and quality of the ecosystem service provided is assumed to be commensurate with that provided by the features of the site when in favourable condition some are in favourable condition and some are in unfavourable condition (see Table 1 for details).<br>Stakeholders consider the Swale Estuary to have spawning and nursery grounds but no specific information is available on individual species of fish (Balanced Seas Final Recommendations Report, 2011). | If the conservation objectives of the features are achieved, some features will be maintained in favourable condition and some (*Sabellaria* and blue mussel beds) recovered to favourable condition.<br>As no additional management of angling is expected, fishers will be able to benefit from any on-site and off-site beneficial effects. If the rMCZ results in an increase in the size and diversity of species caught then this is expected to increase the value derived by anglers.<br>The designation may lead to an increase in angling visits to the site, which may benefit the local economy. This increase might arise from a change in anglers' preferred angling locations rather than an increase at a national scale in days spent angling or the number of anglers. | Anticipated direction of change:<br><br>Confidence: Low |

| **Table 4b. Recreation** | | **rMCZ 10, Swale Estuary** |
|---|---|---|
| The Swale Estuary is an important nursery area for fish caught recreationally (including bass) (Balanced Seas Final Recommendations Report, 2011).<br>Both boat and shore angling for bass, thornback ray, smooth hound, grey mullet, cod and whiting takes place mainly in the mouth of the Swale Estuary as navigation round the back of the Isle of Sheppey is very tide dependent (StakMap, 2010). Shore angling is popular with local clubs organising competitions on a regular basis. Being close to London, the Swale's recreational sea fisheries also attract visitors from further away (StakMap, 2010). The system of sand banks and channels in the Outer Thames Estuary outside the rMCZ is popular with boat and charter boat anglers fishing for numerous species including mackerel, dogfish and ray, and this off-site area may benefit from spill-over effects (StakMap, 2010). Therefore, the nursery ground for several fish species within the site is likely to help to support potential on-site and off-site fisheries.<br>It has not been possible to estimate the value derived from angling on-site or the proportion of the value derived from angling off-site that results from the intertidal and subtidal habitats. | | |
| ***Diving:*** Diving is not known to take place in the rMCZ. | N/A | N/A |
| ***Other recreation:*** Fletcher and others (2011) identify that the features to be protected by the rMCZ can contribute to the delivery of recreation and tourism services.<br>The Swale Estuary is a very popular tourist destination especially for recreational sailing, kayaking, canoeing and coastal/estuarine walking. There are numerous sailing, kayaking and canoeing clubs within the site as well as marinas and docks. Racing events take place and training for novices is available from many of the clubs (StakMap, 2010). Walking opportunities are available along the banks of the estuary.<br>It has not been possible to estimate the value derived from other recreation in the rMCZ. | If the conservation objectives of the features are achieved, some features will be maintained in favourable condition and some (*Sabellaria* and blue mussel beds) recovered to favourable condition.<br>Designating the rMCZ will protect its features and the ecosystem services that they provide against the risk of future degradation from pressures caused by human activities.<br>If the rMCZ is designated this will provide an additional positive aspect about the location that could be promoted by the tourism and leisure industry and that would be expected to increase visitation rates. | Anticipated direction of change:<br>⇧<br>Confidence: Low |

| **Table 4b. Recreation** | | **rMCZ 10, Swale Estuary** |
|---|---|---|
| ***Wildlife watching:*** Fletcher and others (2011) identify that the features to be protected by the rMCZ can contribute to the delivery of recreation and tourism services.<br><br>Subtidal coarse sediments, sand and mud and intertidal sand, muddy sand and mixed sediments are important for spawning and nursery grounds. These habitats can provide important nursery grounds for juvenile species such as flatfishes and bass, thus supporting an important level of the food chain. Mussel beds are an important food source for birds (Fletcher and others, 2011).<br><br>The baseline quantity and quality of the ecosystem service provided is assumed to be commensurate with that provided by the features of the site when some are in favourable condition and some are in unfavourable condition (see Table 1 for details).<br><br>The Swale Estuary is popular for wildlife watching due to extensive salt marshes and a generally high biodiversity supporting large populations of migratory species and wildfowl (Balanced Seas Final Recommendations, 2011). Kent Wildlife Trust manages Oare Marshes and Elmley Marshes, which are adjacent to the rMCZ and provide shelters and hides for birdwatchers (Kent Wildlife Trust website).<br><br>It has not been possible to estimate the value derived from wildlife watching in the rMCZ. | If the conservation objectives of the features are achieved, some features will be maintained in favourable condition and some (*Sabellaria* and blue mussel beds) recovered to favourable condition.<br><br>An improvement in the condition of site features and any associated increase in abundance and diversity of species that are visible to wildlife watchers may improve the quality of wildlife watching at the site and therefore the value of the ecosystem service.<br><br>The designation may lead to an increase in wildlife watching visits to the site, which may benefit the local economy. This increase may represent an overall increase in UK wildlife watching visits and/or a redistribution of location preferences.<br><br>Designating the rMCZ will protect its features and the ecosystem services that they provide against the risk of future degradation from pressures caused by human activities.<br><br>If the rMCZ is designated this will provide an additional positive aspect about the location that could be promoted by the tourism and leisure industry and that would be expected to increase visitation rates. | Anticipated direction of change:<br><br>⇧<br><br>Confidence: Low |

| **Table 4c. Research and education** | **rMCZ 10, Swale Estuary** |
|---|---|
| **Baseline** | **Beneficial impact** |

| **Table 4c. Research and education** | | **rMCZ 10, Swale Estuary** |
|---|---|---|
| ***Research:*** Fletcher and others (2011) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) can contribute to the delivery of research services.<br><br>The Medway Swale Estuary Partnership promotes and supports research in the estuary (Visit Medway website). Kent Wildlife Trust and Kent and Essex Inshore Fisheries and Conservation Authority conduct research in the estuary (North Kent site meeting, 2011). Research is also conducted by Kent County Council in order to inform the Kent Coastal Network initiative (Kent Coastal Network website).<br><br>It has not been possible to estimate the value derived from research activities associated with the rMCZ. | Monitoring of the rMCZ will help inform understanding of how the marine environment is changing and is impacted on by anthropogenic pressures and management interventions. Other research benefits are unknown. | Anticipated direction of change:<br><br>⇧<br><br>Confidence: High |
| ***Education:*** Fletcher and others (2011) identify that the features to be protected by the rMCZ can contribute to the delivery of education services.<br><br>The Medway Swale Estuary Partnership organises educational activities (Medway Swale Estuary Partnership website). Kent Wildlife Trust also organises educational activities, particularly in the reserves adjacent to the rMCZ. It also provides practical and theoretical learning opportunities that may relate to the rMCZ, either as taught lessons at its centres or as outreach in schools from pre-school to young adults (Kent Wildlife Trust website).<br><br>It has not been possible to estimate the value derived from education activities associated with the rMCZ. | MCZ designation may provide an opportunity to expand the focus of education events into the marine environment.<br><br>Designation may aid the development of additional local (to the rMCZ) education activities (e.g. events, interpretation boards), from which visitors to the site would derive benefit.<br><br>Non-visitors may benefit if the rMCZ contributes to wider provision of educational resources (e.g. television programmes, articles in magazines and newspapers, and educational resources developed for use in schools). | Anticipated direction of change:<br><br>⇧<br><br>Confidence: Moderate |

| **Table 4d. Regulating services** | | **rMCZ 10, Swale Estuary** |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| ***Regulation of pollution:*** the features of the site contribute to the | If the conservation objectives of the features are achieved, some | Anticipated |

| **Table 4d. Regulating services** | | **rMCZ 10, Swale Estuary** |
|---|---|---|
| bioremediation of waste (Blue Mussel beds, Native oyster, subtidal sediments), water purification (Blue Mussel beds, Native oysters and *Sabellaria*) and sequestration of carbon (Blue Mussel beds, *Sabellaria,* intertidal rock and subtidal sediments) (Fletcher and others, 2011).<br><br>***Environmental resilience:*** the features of the site (Blue Mussel beds, *Sabellaria*, intertidal rock and sheltered muddy gravels) contribute to the resilience and continued regeneration of marine ecosystems (Fletcher and others, 2011).<br><br>***Natural hazard protection:*** the features of the site, (Blue Mussel beds, *Sabellaria* and Native oysters) contribute to local flood and storm protection (Fletcher and others, 2011).<br><br>It has not been possible to estimate the value derived from regulating services associated with the rMCZ. | features will be maintained in favourable condition and some (*Sabellaria* and Blue Mussel beds) recovered to favourable condition.<br><br>Recovery of the *Sabellaria* and Blue Mussel beds and a potential reduction in the use of bottom towed fishing gear may increase the site's benthic biodiversity and biomass, improving the regulating capacity its habitats.<br><br>Designating the rMCZ will protect its features and the ecosystem services that they provide against the risk of future degradation from pressures caused by human activities. | direction of change:<br><br>⇧<br><br>Confidence: Low |

| **Table 4e. Non-use and option values** | | **rMCZ 10, Swale Estuary** |
|---|---|---|
| **Baseline** | **Beneficial impact** | |
| Some people gain satisfaction from the existence of marine habitats, species and other features. They also gain from having the option to benefit in the future from the habitats and species in the pMCZ and the ecosystem services provided, even if they do not currently benefit from them.<br><br>It has not been possible to estimate the value derived from non-use and option value services associated with the rMCZ. | The rMCZ will benefit the proportion of the UK population that values conservation of the pMCZ features and its contribution to an ecologically coherent network of MPAs. Some people will gain satisfaction from knowing that the habitats and species are being conserved (existence value) and/or that they are being conserved for use by others in the current generation (altruistic value) or future generations (bequest value). The rMCZ will protect the features and the ecosystem services provided, and thereby the option to benefit from these services in the future, from the risk of future degradation.<br><br>Examples of these values are shown in (Ranger, Lowe, Sanghera, & Solandt, 2012). Voters in the MCS's 'Your Seas Your | Anticipated direction of change:<br><br>⇧<br><br>Confidence: Moderate |

| **Table 4e. Non-use and option values** | | **rMCZ 10, Swale Estuary** |
|---|---|---|
| | Voice' campaign felt that features of the natural environment were strong motivators for reasons why people thought that some areas within the rMCZ should be protected, with people frequently attaching value to biodiversity and areas that 'appear unspoilt'. Furthermore, respondents felt that the area was important for bird populations particularly the Marsh Harrier. Furthermore, there was a perception that the area is 'under threat' from 'damage caused by jet skiing' and trawling and static netting (the latter comments came from a commercial fisherman).<br><br>Source: Ranger et al. (2011) | |