Annex I2 Direct impacts arising from individual rMCZs (Finding Sanctuary) Part 1

Contents

1 Introduction

1.1.1 This annex sets out the direct impacts of each of the Finding Sanctuary recommended Marine Conservation Zones (rMCZs). The rMCZs are presented in alphabetical order, split over the three separate documents.

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 assessments.

rMCZ Axe Estuary

Site area (km^2): 0.33

Table 1. Conservation impacts **rMCZ Axe Estuary**

1a. Ecological description

At the mouth of the estuary, the recommended Marine Conservation Zone (rMCZ) overlaps with the Lyme Bay no-tow area. The Lyme Bay to Torbay candidate Special Area of Conservation (SAC) lies just seaward of the site and the River Axe (inland) is designated as an SAC. There are several Sites of Special Scientific Interest on account of the Axe's importance as a river with distinctive communities of floating vegetation.

The rMCZ stretches along approximately 2.5km of the Axe Estuary, surrounded mainly by marshes and farmland. There is a small harbour at the mouth of the estuary, sheltered by a shingle bar across the estuary mouth. The estuary is a nursery area for fish (including bass), with the supporting benthic habitats, and has been mapped as an area of higher than average taxonomic distinctness and biotope richness.

Along the lower reaches of the river, the mixed catchment geology of sandstones and limestones gives rise to calcareous waters where water crowfoot *Ranunculus penicillatus* spp. *Pseudofluitans* dominates, giving way to *Ranunculus fluitans* further downstream. Short-leaved water-starwort *Callitriche truncata* is an unusual addition to the *Ranunculus* community and gives additional interest. The estuary is of ecological importance as it contains mudflats and areas of saltmarsh; it is recognised as supporting high productivity and as a nursery area (Lieberknecht and others, 2011).

1b. MCZ Feature Baseline and Impact of MCZ

Feature	Area of feature (km2)	No. of point records	Baseline	Impact of MCZ
Broad-scale Habitats				
Coastal saltmarshes and saline reedbeds	0.01	-	Favourable Condition	Maintained at Favourable Condition
Intertidal coarse sediment	< 0.01	-	Favourable Condition	Maintained at Favourable Condition
Intertidal mixed sediments	< 0.01	-	Favourable Condition	Maintained at Favourable Condition
Intertidal mud	0.21	-	Favourable Condition	Maintained at Favourable Condition
Subtidal mixed sediments	0.04	-	Favourable Condition	Maintained at Favourable Condition
Species of Conservation Importance				
Anguilla anguilla	-	-	Unknown	Unknown

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

Table 2a. Flood and coastal erosion risk management (coastal defence)	**rMCZ Axe Estuary**
Source of costs of the 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).	
Baseline description of activity	**Costs of impact of rMCZ on the sector**
The 0 to 20 year Shoreline Management Plan policies along landward edges fo the rMCZ are: outer estuary: 'hold the line'; spit: 'no active intervention'; inner estuary: 'managed realignment'. The Axe Estuary Wetland scheme is anticipated within the next 5 years and additional schemes may come forward as a result of the hold the line policy (Environment Agency, pers. comm., 2012).	As a result of the rMCZ, 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 to 1 day of additional work, 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. It is anticipated that no additional mitigation of impacts will be required (Environment Agency, pers. comm., 2012).

Table 2b. Ports, harbours, shipping and disposal sites	**rMCZ Axe Estuary**
Source of costs of the rMCZ	
Management scenario 1: Increase in costs of assessing environmental impacts for future licence applications. This applies to navigational dredging within 1km of the rMCZ. It is not anticipated that any additional mitigation, relative to mitigation provided in the baseline, of impacts on features protected by the MCZ will be needed for activities relating to ports, harbours, shipping and disposal sites.	
Management scenario 2: Increase in costs of assessing environmental impacts for future licence applications within 5km of an rMCZ. This applies to navigational dredging and future licence applications for potential port and harbour developments within 5km of the rMCZ. Additional costs incurred in updating existing Maintenance Dredging Protocols (MDPs) and implementing new MDPs for ports that do not currently have one in place Additional mitigation, relative to mitigation provided in the baseline, of	

Table 2b. Ports, harbours, shipping and disposal sites	**rMCZ Axe Estuary**
impacts on features protected by the MCZ may be needed for future harbour developments.	
Baseline description of activity	**Costs of impact of rMCZ on the sector**
Navigational Dredging: Axmouth Harbour is a relatively small drying harbour, used primarily for recreation purposes. Within the rMCZ, annual dredging is required to maintain safe navigation around the harbour and occasional dredging is required of the sand bar at the mouth of the estuary. Licences are required for each dredging operation. For the purposes of the Impact Assessment it is assumed that the licences are for 5-year periods, with the next applications required in 2016 (Axe Yacht Club, pers. comm., 2011). *Harbour development:* Axemouth Harbour is situated within the rMCZ boundary. There are no known development plans for the harbour.	***Scenario 1:*** Future licence applications for navigational dredging in Axmouth Harbour will need to consider the potential effects of the dredging on the features protected by the rMCZ and their conservation objectives. This is expected to result in one-off additional costs of approximately £0.014m every 5 years from 2016 (calculated based on 2 licence applications – see Annex N for details). ***Scenario 2:*** *Navigational dredging:* Under scenario 2, one-off costs of £0.014m are expected every five years from 2016, as described for scenario 1 for navigational dredging within the rMCZ. No additional mitigation, beyond that provided in the baseline situation, is anticipated. Additional costs may be incurred to implement a potential new Maintenance Dredging Protocol (MDP), which will consider the potential effects of dredging on features protected by the rMCZ. The anticipated additional cost of the MDP is estimated as a one-off cost of £0.008m. *Harbour developments:* For future port and harbour developments within 5km of the rMCZ that are not yet known of, future licence applications 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 (these costs are not assessed at the site level, but are presented at the national level in Annex N11). Sufficient information is not available to identify whether any additional mitigation, relative to the baseline, of impacts on features protected by the MCZ will be needed for such future port and harbour developments. 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 recommended Marine Conservation Zone (rMCZ) (over 2013 to 2032 inclusive)	**rMCZ Axe Estuary**
Recreation; research and education; water abstraction, discharge and diffuse pollution*.	

* The IA aassumes that no additional mitigation of the 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 (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 derived from 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 in Annex H.

Table 4a. Fish and shellfish for human consumption		**rMCZ Axe Estuary**
Baseline	**Beneficial impact**	
Fletcher and others (2012) 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. The estuary is a nursery area for fish (including bass) (Environment Agency, pers. comm., 2010) and, as such, is likely to help to support potential 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 in favourable condition. However, there is currently no commercial fishing within the rMCZ and	If the conservation objectives of the features are achieved, the features will be maintained in favourable condition. No additional management (above that in the baseline situation) of fishing activities is expected. No change in on-site feature condition or harvesting of fish and shellfish is anticipated and therefore no on-site or off-site benefits are expected. 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 (because, if necessary, mitigation would be introduced, with the associated costs and benefits).	Anticipated direction of change: ⇔ Confidence : Moderate

Table 4a. Fish and shellfish for human consumption		**rMCZ Axe Estuary**
therefore no value derived from on-site fisheries. It has not been possible to estimate the value derived from off-site fisheries as a result of the nursery area function.		

Table 4b. Recreation		**rMCZ Axe Estuary**
Baseline	**Beneficial impact**	
Angling: Fletcher and others (2012) 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. The estuary is a nursery area for fish (including bass) (Environment Agency, pers. comm., 2010) and, as such, is likely to help to support potential 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 in favourable condition. Angling occurs in Axemouth harbour for species such as mullet and, occasionally, flounder, as well as further up the river. Seaton Beach, just outside the rMCZ, is a particularly popular local angling spot. It has not been possible to estimate the value of angling on-site or the proportion of the value derived from angling off-site that results from the estuary nursery area.	If the conservation objectives of the features are achieved, the features will be maintained in favourable condition. No change in on-site feature condition or fishing mortality is anticipated and therefore no on-site or off-site benefits are expected (see Table 4a for further details). 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 (as, if necessary, mitigation would be introduced, with the associated costs and benefits). The designation may lead to an increase in angling 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 UK angling.	Anticipated direction of change: ⟺ Confidence: Moderate
Diving: Diving is not known to take place in the rMCZ.	N/A	N/A
Wildlife watching: Fletcher and others (2012) identify that some of the features to be protected by the rMCZ can contribute to the delivery of recreation and tourism services. 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. The estuary is a popular area for wildlife watching, particularly bird watching over the estuary and adjacent marshes. There are viewing platforms and hides	If the conservation objectives of the features are achieved, the features will be maintained in favourable condition. No change in on-site feature condition is anticipated and therefore no benefits to wildlife watching are expected. 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 (as, if necessary, mitigation would be introduced,	Anticipated direction of change: ⟺ Confidence: Moderate

Table 4b. Recreation		**rMCZ Axe Estuary**
along the western bank of the estuary, provided as part of East Devon District Council's management of the local nature reserve. It has not been possible to estimate the value of wildlife watching in the rMCZ.	with the associated costs and benefits). 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 UK wildlife watching visits.	

Table 4c. Research and education		**rMCZ Axe Estuary**
Baseline	**Beneficial impact**	
Research: Fletcher and others (2012) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) can contribute to the delivery of research services. The extent of current research activity carried out at the estuary is unknown. It has not been possible to estimate the value derived from research activities associated with the rMCZ.	Monitoring of the rMCZ 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: ⇧ Confidence: High
Education: Fletcher and others (2012) identify that the features to be protected by the rMCZ can contribute to the delivery of education services. There is an existing programme of education events at the Axe Estuary, managed by East Devon District Council and run from the Field Studies Base and Wetlands Classroom (capacity: 50 people). This includes indoor and outdoor events and open days for the public and schoolchildren (Seaton Bay, 2012). The estuary has high numbers of visitors. 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. Designation may aid additional local (to the rMCZ) provision of education (e.g. events and interpretation boards), from which visitors to the site would derive benefit. 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: ⇧ Confidence: Moderate

Table 4d. Regulating services		**rMCZ Axe Estuary**
Baseline	**Beneficial impact**	

Table 4d. Regulating services		**rMCZ Axe Estuary**
Regulation of pollution: The features of the site contribute to the bioremediation of waste and sequestration of carbon. Coastal saltmarshes are known to be particularly efficient carbon sinks and cadmium is stored in sediment by cord grass *Spartina anglica* which grows in intertidal mud (Fletcher and others, 2012). ***Environmental resilience:*** The features of the site contribute to the resilience and continued regeneration of marine ecosystems (Fletcher and others, 2011). ***Natural hazard protection:*** The features of the site, in particular the coastal saltmarshes and intertidal habitats, contribute to local flood and storm protection (Fletcher and others, 2011). It has not been possible to estimate the value of regulating services in the site.	If the conservation objectives are achieved, the features of the site will be maintained in favourable condition. No change in feature condition and management of human activities is expected and therefore no benefit to the regulation of pollution is expected. Designating the recommended Marine Conservation Zone (rMCZ) will protect its features and the ecosystem services that they provide against the risk of future degradation from pressures caused by human activities (as, if necessary, mitigation would be introduced, with the associated costs and benefits).	Anticipated direction of change: ⇔ Confidence: Moderate

Table 4e. Non-use and option values		**rMCZ Axe 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 recommended Marine Conservation Zone (rMCZ) and the ecosystem services provided, even if they do not currently benefit from them. It has not been possible to estimate the non-use value of the rMCZ.	The rMCZ will benefit the proportion of the UK population that values conservation of the MCZ features and their 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 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: ⇧ Confidence: Moderate

rMCZ Bideford to Foreland Point

Site area (km^2): 101.0

Table 1. Conservation impacts	**rMCZ Bideford to Foreland Point**

1a. Ecological description

The site boundary follows the coastline along the mean high water mark and the width of the site varies between 0.5km and 2.5km. The site's maximum depth is 36 metres. There are a number of coastal Sites of Special Scientific Interest along the stretch of coastline covered by the recommended Marine Conservation Zone (rMCZ), many of which include intertidal areas and therefore overlap with the rMCZ. The area is within the North Devon's Biosphere Reserve and the coastline between Combe Martin and Croyde is a voluntary MCZ.

The stretch of coastline between Westward Ho! and Foreland Point is characterised by cliffs and rocky shores, with small sandy bays and inlets. The exception is Bideford Bay, an expanse of sandy shoreline backed by extensive sand dunes at the mouth of the Taw Torridge Estuary system. The area intersects with an area of higher than average benthic species and habitat diversity (within the South-West).

Areas of sublittoral sea bed are restricted to narrow current-swept channels with some extensive hard substrata including bedrock, cobbles and shell or pebbles in gravel colonised especially by hydroids, sponges, sea anemones, erect bryozoans, barnacles and mussels. Sublittoral sediments have a restricted fauna of species characteristic of disturbed conditions, including the worms *Nephtys cirrosa* and *Lanice conchilega* and the amphipods *Haustorius arenarius* and *Bathyporeia sarsi*. The sublittoral communities are thought to have a 'strong regional characteristic with sparse algal communities and rocks in many areas dominated by mussels'.

The beaches at Woolacombe are known to include rocky shore communities adjacent to sand characterised by solitary and small colonies of the honeycomb worm *Sabellaria alveolata* and by the barnacle *Balanus perforatus*. The coarse sandy beaches are colonised by species characteristic of mobile sand, including the isopod *Eurydice pulchra* and cirratulid polychaetes. At Wild Pear beach, in Combe Martin Bay, the mid-shore habitats are dominated by barnacles and limpets with sparse algal cover. Two species of particular interest are the uncommon strawberry anemone *Actinia fragacea* and the honeycomb worm *Sabellaria alveolata*.

The Exmoor coastline consists predominantly of boulder shores with occasional rocky reefs and some stretches of sand. Moderate to severe wave action reduces boulder stability which in turn reduces species richness within littoral communities. There is a rich littoral fauna off Ilfracombe: many species occur under overhangs on the lower shore where shaded, damp conditions and the turbid North Devon waters lead to the presence of circalittoral species in the intertidal area. North of Ilfracombe there are reefs of the tube-building polychaete worm *Sabellaria spinulosa*, with recorded densities of over 3,000 individuals per square metre.

Anecdotal evidence about features of conservation importance exists for: tide-swept channels near the mouth of the Taw Torridge; fragile sponge and anthozoan communities on subtidal rocky habitats; intertidal underboulder communities; sheltered muddy gravels; and Ross worm *Sabellaria spinulosa*, European eel *Anguilla anguilla*, the peacock's tail alga *Padina pavonica*, crawfish *Palinurus elephas*, anglerfish *Lophius piscatorius*, common maerl, sea slug *Onchidela celtica*, sea star *Asterina phylactica*, anemone *Anthopleura thallia*, the leopard-spotted goby *Thorogobius ephippiatus*, the allis shad *Olosa olosa*, native oyster *Ostrea edulis* and blue mussel *Mytilus edulis*. Rare, scarce and sensitive species indicated as present are: the scarlet and gold star coral *Balanophyllia regia*, the Weymouth carpet coral *Hoplangia durotrix*, the policeman anemone *Mesacmaea mitchellii*, Devonshire cup coral *Caryophyllia smithii*, the stalked jellyfish *Haliclystus auricula*, the short-snouted seahorse *Hippocampus hippocampus* and sole *Solea solea*.

The site is important for sea birds, particularly guillemot *Uria aalge* and razorbill *Alca torda*, and for cetaceans, particularly Atlantic grey seal *Halichoerus grypus* and harbour porpoise *Phocoena phocoena*. It is also a spawning, nursery and juvenile area for bass and salmon (Lieberknecht and others, 2011).

1b. MCZ Feature Baseline and Impact of MCZ

Feature	Area of feature (km2)	No. of point records	Baseline	Impact of MCZ
Broad-scale Habitats				
High energy circalittoral rock	1.42	-	Unfavourable Condition	Recover to Favourable Condition
High energy infralittoral rock	8.60	-	Favourable Condition	Maintained at Favourable Condition
High energy intertidal rock	0.89	-	Favourable Condition	Maintained at Favourable Condition
Intertidal coarse sediment	0.76	-	Favourable Condition	Maintained at Favourable Condition
Intertidal mixed sediments	0.43	-	Favourable Condition	Maintained at Favourable Condition
Intertidal mud	7.70	-	Favourable Condition	Maintained at Favourable Condition
Intertidal sand and muddy sand	0.33	-	Favourable Condition	Maintained at Favourable Condition
Low energy intertidal rock	0.12	-	Favourable Condition	Maintained at Favourable Condition
Moderate energy infralittoral rock	3.99	-	Favourable Condition	Maintained at Favourable Condition
Moderate energy intertidal rock	0.40	-	Favourable Condition	Maintained at Favourable Condition
Subtidal coarse sediment	54.20	-	Favourable Condition	Maintained at Favourable Condition
Subtidal sand	20.99	-	Favourable Condition	Maintained at Favourable Condition
Habitats of Conservation Importance				
Sabellaria alveolata reefs	-	1	Favourable Condition	Maintained at Favourable Condition
Species of Conservation Importance				
Euincella verrucosa	-	3	Favourable Condition	Maintained at Favourable Condition
Paludinella littorina	-	1	Favourable Condition	Maintained at Favourable Condition

Non-ENG Mobile Species				
Uria aalge	-	-	Favourable Condition	Maintained at Favourable Condition
Phocoena phocoena	-	-	Favourable Condition	Maintained at Favourable Condition
Alca torda	-	-	Favourable Condition	Maintained at Favourable Condition
Halichoerus grypus	-	-	Favourable Condition	Maintained 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 Bideford to Foreland Point**
Source of costs of the 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**
A total of 19 wrecks are recorded in the site (English Heritage, pers. comm., 2012).	An extra cost will 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 involved in one licence application could be in the region of £500 to £10,000 (English Heritage, pers. comm., 2011). No further impacts on activities related to archaeology are anticipated.

Table 2b. Commercial fisheries	**rMCZ Bideford to Foreland Point**

<table>
<tr><th colspan="2">Table 2b. Commercial fisheries</th><th>rMCZ Bideford to Foreland Point</th></tr>
<tr><td colspan="3">Source of costs of the 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. Multiple management scenarios have been identified for the Impact Assessment, which reflects the uncertainty. Should the site be designated, the management that will be required is likely to fall somewhere within this range.

Management scenario 1: No additional management.

Management scenario 2: Zoned closure of areas of high energy circalittoral rock to bottom trawls and dredges.

Management scenario 3: Zoned closure of areas of high energy circalittoral rock to bottom trawls, dredges, pots and traps, nets, and hooks and lines.

Management scenario 4: Closure of entire rMCZ to bottom trawls and dredges.

Management scenario 5: Closure of entire rMCZ to bottom trawls, dredges, pots and traps, nets, and hooks and lines.</td></tr>
<tr><th colspan="2">Baseline description of activity</th><th>Costs of impact of rMCZ on the sector</th></tr>
<tr><td colspan="3">Overview: The rMCZ is wholly inside 6nm, extending to a maximum of approximately 1nm from the coast, and a number of commercial fisheries restrictions are already in existence (listed in Annex E). There is no non-UK activity in the rMCZ. The area is primarily fished by potters, which account for the majority of the estimated annual landings from the rMCZ. The key species caught are lobster, edible crab and spider crab. There is hand lining for mackerel, a small amount of netting and some benthic trawling in the area. There is a local fleet of approximately 15 vessels based at Barnstaple and Ilfracombe harbours on the rMCZ coastline. Estimated total value of UK vessel landings from the rMCZ: £0.053m/yr.</td></tr>
<tr><td colspan="2">UK Bottom trawl: The wider Bideford Bay area is a key trawling ground for the North Devon fleet. The fishing ground overlaps with the western edge of the rMCZ, although fishing effort within the rMCZ is thought to be low (Finding Sanctuary Vulnerability Assessments, 2011). Trawlers may fish inside the western part of the rMCZ at certain times of the year, targeting plaice and ray (North Devon Fishermen's Association (NDFA), pers. comm., 2012). There is not thought to be any effort in the rMCZ on the north-facing coastline (Finding Sanctuary Vulnerability Assessments, 2011; NDFA, pers. comm., 2012). Bottom trawl activity does not focus on the areas of high energy circalittoral rock (that is subject to closure in Scenario 2) within the rMCZ, being limited by the rocky sea bed, and the value of landings associated with the area is low (Finding Sanctuary Vulnerability Assessments, 2011). Estimated value of</td><td>Scenario 1: No impacts are anticipated under this scenario.

Scenarios 2 and 3: As the areas of high energy circalittoral rock are not targeted by bottom trawls and are tight in to the coastline, closure of only these areas to bottom trawling is not expected to result in any significant displacement or affect the pattern of fishers' tows in the area. The value of landings that will be affected is low at £0.001m/yr.

Scenarios 4 and 5: If the entire site is closed to bottom trawling, it is anticipated that fishing will be displaced west into the main area of the Bideford Bay trawling ground. It is thought that this would not significantly affect fishers (NDFA, pers. comm., 2011). However, if significant displacement from the wind farm area occurs as a result of the proposed development, then a higher level of landings may be affected by the rMCZ. This increased impact may be more significant.</td></tr>
</table>

<table>
<tr><th colspan="2">Table 2b. Commercial fisheries rMCZ Bideford to Foreland Point</th></tr>
<tr><td>landings from the rMCZ: £0.014m/yr. Estimated value of UK bottom trawl landings from the areas of high energy circalittoral rock: £0.001m/yr.

The proposed Atlantic Array wind farm is expected to result in the exclusion of trawlers from the wind farm area due to safety risks associated with trawling between turbines (NDFA, pers. comm., 2011). The wind farm is situated to the north-east of the rMCZ. Displacement from this area may result in increased effort in Bideford Bay and in the rMCZ (NDFA, pers. comm., 2011 and 2012).</td><td>Estimated annual value of UK bottom trawl landings affected is expected to fall within the following range:

<table><tr><td>£m/yr</td><td>Scenario 1</td><td>Scenario 2</td><td>Scenario 3</td><td>Scenario 4</td><td>Scenario 5</td></tr><tr><td>Value of landings affected</td><td>0.000</td><td>0.001</td><td>0.001</td><td>0.014</td><td>0.014</td></tr></table></td></tr>
<tr><td>Pots and traps: In total, 8 potters are thought to fish within the rMCZ. Of these, 3 are vessels under 10 metres fishing out of Bideford working approximately 200 to 300 pots each. They principally target lobster between the months of March through to September and their fishing effort is concentrated within and just outside the rMCZ, particularly around Lee Bay on the north coast. Five other potters from Ilfracombe, all vessels over 10 metres, work in and just outside the rMCZ during the spring before moving further offshore towards Lundy to target crab during the summer (NDFA, pers. com., 2012).

Estimated value of pot and trap landings from the rMCZ: £0.027m/yr. Estimated value of UK pot and trap landings from the areas of high energy circalittoral rock: £0.004m/yr.

The extent of potting within the rMCZ indicated by NDFA (pers. comm., 2012) indicates that the modelled value of landings set out above may be an underestimate.</td><td>Scenarios 1, 2 and 4: No impacts are anticipated under these scenarios.

Scenario 3: Up to 8 potters may be affected by the rMCZ under this scenario, although the extent to which each fishes within the rMCZ is unclear. The estimated value of landings affected indicates that there would not be any significant impacts on the fishers, although stakeholder information indicates that this may not be the case (NDFA, pers. comm., 2012).

Scenario 5: A total of 8 potters are expected to be affected by the rMCZ under this scenario. A significant proportion of fishing activity by 3 vessels under 10 metres would be affected and 5 vessels over 10 metres would be seasonally affected. While the modelled value of landings estimate does not indicate that the rMCZ would necessarily result in the operation of the vessels becoming unviable, stakeholder information indicates that the value of landings affected may be considerably higher and that vessel viability may be affected (NDFA, pers. comm., 2012).

The ability of the smaller vessels (under 10 metres in particular) to fish further offshore is limited due to the exposed nature of the coast. If fishers chose to increase fishing effort further offshore outside the rMCZ then this may increase safety risks. It may also result in gear conflict with other existing potters and mobile gear fishers.

Estimated annual value of UK pot and trap landings affected is expected to fall within the following range:

<table><tr><td>£m/yr</td><td>Scenario 1</td><td>Scenario 2</td><td>Scenario 3</td><td>Scenario 4</td><td>Scenario 5</td></tr></table></td></tr>
</table>

<table>
<tr><th colspan="2">Table 2b. Commercial fisheries</th><th colspan="4">rMCZ Bideford to Foreland Point</th></tr>
<tr><td></td><td colspan="5"><table><tr><td>Value of landings affected</td><td>0</td><td>0</td><td>0.004</td><td>0</td><td>0.027</td></tr></table>
In establishing the draft conservation objectives, the site features were assessed as having low vulnerability to fishing with pots and traps at current levels. Where this is the case, this activity was not the primary reason for assigning a 'recover' conservation objective. As such, it is anticipated that if 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>UK Nets: There is a low level of netting in the rMCZ. One netter used to fish in the area but is no longer active, and another vessel has recently (2011) started to target bass off Baggy Point (NDFA, pers. comm., 2012). In addition, 4 boats occasionally drift net for bass within the mouth of the Taw-Torridge Estuary. It is unclear whether this activity overlaps with the rMCZ.

Estimated value of UK net landings from the rMCZ: £0.012m/yr. Estimated value of UK net landings from the areas of high energy circalittoral rock: £0.000m/yr.

The modelled value of landings estimate is based on data from 2007 to 2010. The netter currently active within the rMCZ started fishing in the area in 2011 and therefore the vessel landings are not included in the value of landings estimate. As such, the value of landings estimate is expected to be an underestimate.</td><td colspan="5">Scenarios 1, 2 and 4: No impacts are anticipated under these scenarios.

Scenario 3: One netter will be affected by the rMCZ under this scenario. The value of landings estimate is expected to be an underestimate.

Scenario 5: Under this scenario, one netter will be affected by the rMCZ, and drift netters working within the mouth of the Taw-Torridge Estuary may be affected. The value of landings estimate is expected to be an underestimate.

Estimated annual value of UK net landings affected is expected to fall within the following range:
<table><tr><td>£m/yr</td><td>Scenario 1</td><td>Scenario 2</td><td>Scenario 3</td><td>Scenario 4</td><td>Scenario 5</td></tr><tr><td>Value of landings affected</td><td>0</td><td>0</td><td>0.000</td><td>0</td><td>0.012</td></tr></table>
In establishing the draft conservation objectives, the site features were assessed as having low vulnerability to fishing with nets at current levels. Where this is the case, this activity was not the primary reason for assigning a 'recover' conservation objective. As such, it is anticipated that if 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>
</table>

<table>
<tr><th colspan="2">Table 2b. Commercial fisheries</th><th>rMCZ Bideford to Foreland Point</th></tr>
<tr><td colspan="2">UK Hooks and lines: The rMCZ is not an area known to be targeted by fishers using hooks and lines (Finding Sanctuary Vulnerability Assessments, 2011), and the value of landings from the rMCZ is low. However, 4 vessels using rod and line are thought to occasionally target bass off Baggy Point (NDFA, pers. comm., 2012).

Estimated value of hook and line landings from the rMCZ: £0.001m/yr. Estimated value of UK hook and line landings from the areas of high energy circalittoral rock: less than £0.001m/yr.</td><td>Scenarios 1, 2 and 4: No impacts are anticipated under these scenarios.

Scenario 3: Fishing effort within the rMCZ is thought to be low, as indicated by the value of landings estimate. No significant impacts are therefore anticipated under this scenario.

Scenario 5: Up to 4 occasional rod and line fishers may be affected by the rMCZ under this scenari; however, the value of landings affected is low.

Estimated annual value of UK hook and line landings affected is expected to fall within the following range:

<table><tr><td>£m/yr</td><td>Scenario 1</td><td>Scenario 2</td><td>Scenario 3</td><td>Scenario 4</td><td>Scenario 5</td></tr><tr><td>Value of landings affected</td><td>0</td><td>0</td><td><0.001</td><td>0</td><td>0.001</td></tr></table>
In establishing the draft conservation objectives, the site features were assessed as having low vulnerability to fishing with hooks and lines at current levels. Where this is the case, this activity was not the primary reason for assigning a 'recover' conservation objective. As such, it is anticipated that if 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 colspan="3">Total direct impact</td></tr>
<tr><td colspan="2">Total direct impact on UK commercial fisheries</td><td>Estimated annual value of UK vessel landings and gross value added (GVA) affected is expected to fall within the following range:

<table><tr><td>£m/yr</td><td>Scenario 1</td><td>Scenario 2</td><td>Scenario 3</td><td>Scenario 4</td><td>Scenario 5</td></tr><tr><td>Value of landings affected</td><td>0.000</td><td>0.001</td><td>0.006</td><td>0.014</td><td>0.053</td></tr><tr><td>GVA affected</td><td>0.000</td><td>0.001</td><td>0.003</td><td>0.006</td><td>0.025</td></tr></table></td></tr>
<tr><td colspan="2">Impact on non-UK commercial fisheries</td><td>None.</td></tr>
</table>

Table 2c. Flood and coastal erosion risk management (coastal defence)	**rMCZ Bideford to Foreland Point**
Source of costs of the 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).	
Baseline description of activity	**Costs of impact of rMCZ on the sector**
The 0 to 20 year Shoreline Management Plan (SMP) policies along the coastline of the rMCZ at Braunton Burrows and Saunton Down, Croyde Bay and Woolacombe Bay are for 'no active intervention'. Between Morte Point and Foreland Point the SMP policy is primarily no active intervention, with some areas of 'hold the line' in order to protect key assets. New schemes may come forward as a result of the hold the line policy (Environment Agency, pers. comm., 2012).	As a result of the rMCZ, 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 to 1 day of additional work, 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. It is anticipated that no additional mitigation of impacts will be required (Environment Agency, pers. comm., 2012).

Table 2d. National defence	**rMCZ Bideford to Foreland Point**
Source of costs of the 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. MOD will also incur costs in revising environmental tools and charts to include MCZs.	
Baseline description of activity	**Cost of impact of rMCZ on the sector**
MOD is known to make use of the rMCZ for water column activities.	It is not known whether this rMCZ will impact on MOD's activity. Impacts of rMCZs on MOD activities are assessed in Annex N and the Evidence Base (they are not assessed for this rMCZ alone).

Table 2e. Ports, harbours, shipping and disposal sites	**rMCZ Bideford to Foreland Point**
Source of costs of the rMCZ ***Management scenario 1:*** Increase in costs of assessing environmental impacts for future licence applications. This applies to future licence applications for known specific plans or proposals for port and harbour developments within 1km of the rMCZ. It is not anticipated that any additional mitigation, relative to mitigation provided in the baseline, of impacts on features protected by the MCZ will be needed for activities relating to ports, harbours, shipping and disposal sites. ***Management scenario 2:*** Increase in costs of assessing environmental impacts for future licence applications within 5km of an rMCZ. This applies to future licence applications for proposed and potential port and harbour developments within 5km of the rMCZ. Additional mitigation, relative to mitigation provided in the baseline, of impacts on features protected by the MCZ may be needed for future harour developments...	
Baseline description of activity	**Costs of impact of rMCZ on the sector**
<u>*Harbour development:*</u> Ilfracombe is the largest harbour on the north Devon coast and is situated adjacent to the rMCZ. Ilfracombe Harbour has significant redevelopment plans, the purpose of which is to update and improve existing services as well as enable new services to be offered, including to the offshore renewables industry. The plans include the development of an outer breakwater and southern commercial quay, development/redevelopment of shore-side facilities, and provision of deep water moorings for cross-channel ferries, cruise liners and an offshore energy support service (Ilfracombe Harbour Board, 2009). New infrastructure associated with the redevelopment will not overlap with the rMCZ. The timing of the redevelopment activity is not yet certain; however, it is anticipated that work on the inner harbour may be taken forward within 2 years (licence application assumed in 2014) and works on the outer breakwater within 5 years (licence application assumed in 2017) (Ilfracombe Harbour Master, pers. comm., 2011). Other ports within 5km of the rMCZ include Appledore and Lynmouth. No known port and harbour developments are planned at these ports.	***Scenario 1:*** As a result of the designation of the rMCZ, the licence applications for the Ilfracombe Harbour redevelopment plan will need to consider the potential effects of the construction and operational activities on the features protected by the rMCZ and the rMCZ conservation objectives. It is assumed that two separate licence applications will be submitted for the inner and outer works, one in 2014 and one in 2017, although it should be noted that one licence application may be made to cover both elements (Ilfracombe Harbour Master, pers. comm., 2012). This is expected to result in two additional one-off costs of approximately £0.007m each in 2014 and 2017 (see Annex N11 for details). ***Scenario 2:*** For the Ilfracombe Harbour development, additional costs of £0.007m in 2014 and 2017 are expected as described under Scenario 1. No additional mitigation, above that which would be required in the baseline, is anticipated (Natural England, pers. comm., 2012). For future port and harbour developments within 5km of the rMCZ that are not yet known of, future licence applications 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 (these costs are not assessed at the site level, but are presented at the national level in Annex N11). Sufficient information is not available to identify whether any additional mitigation, relative to

Table 2e. Ports, harbours, shipping and disposal sites	**rMCZ Bideford to Foreland Point**
	the baseline, of impacts on features protected by the MCZ will be needed for such future port and harbour developments. Unknown potentially significant costs of mitigation could arise.

Table 2f. Renewable energy	**rMCZ Bideford to Foreland Point**
Source of costs of the 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 rMCZ 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 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**
Tidal energy: The rMCZ overlaps with the inner Bristol Channel tidal energy Potential Development Area (PDA) (PMSS, 2010). Any likely development could have a footprint within the PDA of 10km^2 (PMSS, 2010) covering 0.4% of the PDA. The rMCZ covers 2.7% of the PDA. As the location of any potential energy generation installation is not known, the possible overlap of inter-array and export cables with the rMCZ is also not known. A lease was granted in 2012 to a developer by The Crown Estate for a test site off the north facing coast (The Crown Estate, 2012). A license application is assumed to come forward for the test site in the period 2015 to 2020. One further tidal energy installation is anticipated, with a license application assumed to come forwar in the period 2020 to 2025 (Department of Energy and Climate Change, pers. comm., 2011). By 2030 the developments in the PDA are expected to have a production capacity of 600MW (PMSS, 2010).	***Scenario 1:*** As a result of the designation of the rMCZ, the two potential licence applications for the tidal energy installations will be need to consider the possible effects of the construction and operational activities on the features protected by the rMCZ and the rMCZ conservation objectives. This is expected to result in two additional one-off costs of £0.017m in 2015 and 2020 (based on an average cost provided by renewable energy sector developers; see Annex N for details). ***Scenario 2:*** In addition to the costs set out under scenario 1, further costs may occur under Scenario 2. The mitigation requires the use of alternative cable protection for export and inter-array cables that have not yet been consented. As the actual location of the potential installation is unknown, it is unclear whether any cables will be sought that pass through the rMCZ and, if they are, what length of cable may be affected. The cost of this mitigation measure is estimated to be £1m/km of cable (average taken from costs supplied by wind energy developers; see Annex H13 for details) and, as such, the total mitigation cost could be significant. The likelihood and magnitude of any additional costs cannot be calculated. However, JNCC

Table 2f. Renewable energy — **rMCZ Bideford to Foreland Point**

and Natural England (pers. comm., 2012) state that the likelihood of this mitigation being required is very low. Further details are provided in Annex H14.

The impacts that are assessed in both scenarios are based on JNCC and Natural England's advice on the mitigation that could be required.

The estimated cost to tidal energy developers of this rMCZ is expected to fall within the following range:

£m (one-off cost)	Scenario 1	Scenario 2
Cost to the operator	0.034	At least 0.034

Table 2g. Other impacts that are assessed for the suite of MCZs and not for this site alone — **rMCZ Bideford to Foreland Point**

Cables (interconnectors and telecom cables): Future interconnectors and telecom cables may pass through the rMCZ. Impacts of rMCZs on future interconnectors and telecom cables are assessed in the Evidence Base, Annex H3 and Annex N3 (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 Bideford to Foreland Point**

Cables (interconnectors and telecom cables); recreation (wildlife watching subject to general code of conduct); research and education; water abstraction, discharge and diffuse pollution.

* The IA aassumes that no additional mitigation of the 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 (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 Bideford to Foreland Point**	
Baseline	**Beneficial impact**	
Fletcher and others (2012) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) contribute to the delivery of fish and shellfish services. Circalittoral and infralittoral rock are important habitats for inshore commercial fisheries species, particularly crab and lobster, as are subtidal sediments (Fletcher and others, 2012). The baseline quantity and quality of service provided is assumed to be commensurate with that provided by the features of the site when in favourable and unfavourable condition (see Table 1b). A description of on-site fishing activity and the value derived from it is set out in Table 2.	If the conservation objectives of the features are achieved, the area of high energy circalittoral rock habitat will recover to favourable condition. Other site habitats and species will be maintained in favourable condition. New management of fishing activities is expected (above the baseline situation), the costs of which are set out in Table 2b. Achievement of the conservation objectives may improve the contribution of the habitats to the provision of fish and shellfish for human consumption. Management of fishing activity within the rMCZ may reduce the on-site fishing mortality of species, which may benefit commercial stocks. As the rMCZ is small and some fishing activity may still be permitted, it is unclear whether it would have any impact on stocks of mobile commercial finfish species. Stocks of low mobility and site-attached species, such as lobster and crab, may improve as a result of a recovery in the condition of circalittoral rock habitat and reduced fishing pressure. If some fishing for such species is permitted within the rMCZ, then catches may improve. Localised beneficial spill-over effects may occur throughout the rMCZ. The potential benefits described here do not include the negative impacts of the additional fisheries management on fish and shellfish provision or the off-site impacts of displaced effort.	Anticipated direction of change: ⇧ Confidence: Low

Table 4b. Recreation	**rMCZ Bideford to Foreland Point**

Table 4b. Recreation	**rMCZ Bideford to Foreland Point**	
Baseline	**Beneficial impact**	
Angling: Fletcher and others (2012) 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. Circalittoral and infralittoral rock are important habitats for inshore commercial fisheries species, particularly crab and lobster, as are subtidal sediments (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 and unfavourable condition (see Table 1b). Sea fishing is available from charter boats in Bideford and Ilfracombe, with plaice, mackerel, bass and conger among the likely catches. Shore angling for species including mackerel, bass and grey mullet takes place, with the most intensively used areas between Combe Martin Bay in the east and Baggy Point in the west. It has not been possible to estimate the value of angling in the site.	If the conservation objectives of the features are achieved, the area of high energy circalittoral rock habitat will recover to favourable condition. Other site habitats and species will be maintained in favourable condition. New management of fishing activities is expected (above the baseline situation), the costs of which are set out in Table 2b. Achievement of the conservation objectives may improve the contribution of the habitats to the provision of fish and shellfish for human consumption. Management of fishing activity within the rMCZ may reduce the on-site fishing mortality of species. If the rMCZ results in an increase in the size and diversity of species caught by anglers then this is expected to improve the quality of angling in the site and therefore the value of the ecosystem service. The designation may lead to an increase in angling 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 UK angling.	Anticipated direction of change: ⇧ Confidence: Low
Diving: Fletcher and others (2012) identify that some of the features to be protected by the rMCZ can contribute to the delivery of recreation and tourism services. 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 and unfavourable condition (see Table 1b). There are a number of dive spots in the rMCZ, with concentrations around Rockham Bay and Lee Bay as well as off Baggy Point, Widmouth Head and Combe Martin Bay.	If the conservation objectives of the features are achieved, the area of high energy circalittoral rock habitat will recover to favourable condition. Other site habitats and species will be maintained in favourable condition. An improvement in the condition of site features and any associated increase in abundance and diversity of species, which may include recovery of fragile and slow-growing species, may improve the quality of diving in the site and therefore the value of the ecosystem service. The designation may lead to an increase in dive 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 UK diving.	Anticipated direction of change: ⇧ Confidence: Low

Table 4b. Recreation		**rMCZ Bideford to Foreland Point**
Wildlife watching: Fletcher and others (2012) identify that some of the features to be protected by the rMCZ can contribute to the delivery of recreation and tourism services. 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 and unfavourable condition. The National Trust provides several walks around Foreland Point for visitors to enjoy the wildlife, including rockpooling. Charter boats operating out of Ilfracombe and Lynmouth offer wildlife watching trips in the area. It has not been possible to estimate the value of wildlife watching in the rMCZ.	If the conservation objectives of the features are achieved, the area of high energy circalittoral rock habitat will recover to favourable condition. Other site habitats and species will be maintained in favourable condition. An improvement in the condition of site features and any associated increase in the abundance and diversity of species that are visible to wildlife watchers may improve the quality of wildlife watching in the site and therefore the value of the ecosystem service. 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 UK wildlife watching visits.	Anticipated direction of change: ⇧ Confidence: Low

Table 4c. Research and education		**rMCZ Bideford to Foreland Point**
Baseline	**Beneficial impact**	
Research: Fletcher and others (2012) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) can contribute to the delivery of research services. The rMCZ is situated within the North Devon Biosphere Reserve, through which a variety of research activities are undertaken. The full extent of current research activity carried out in the rMCZ is unknown. It has not been possible to estimate the value derived from research activities associated with the rMCZ.	Monitoring of the rMCZ 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: ⇧ Confidence: High
Education: Fletcher and others (2012) identify that the features to be protected by the rMCZ can contribute to the delivery of education services. The rMCZ is situated within the North Devon's Biosphere Reserve, and is therefore linked into a number of UNESCO education programmes. Education resources for schools are provided and on-line education tools (at	MCZ designation may provide an opportunity to expand the focus of education events into the marine environment. Designation may aid additional local (to the rMCZ) provision of education (e.g. events and interpretation boards), from which visitors to the site would derive benefit. Non-visitors may benefit if the rMCZ contributes to wider provision of education (e.g. television programmes, articles in magazines and	Anticipated direction of change: ⇧

Table 4c. Research and education	**rMCZ Bideford to Foreland Point**	
www.northdevonbiosphere.org.uk). Education events with a specific marine and coastal theme are organised in and around the rMCZ by Coastwise North Devon and Braunton Countryside Centre. The coastline of the rMCZ receives high numbers of visitors. It has not been possible to estimate the value derived from education activities associated with the rMCZ.	newspapers, and education resources developed for use in schools).	Confidence: Moderate

Table 4d. Regulating services		**rMCZ Bideford to Foreland Point**
Baseline	**Beneficial impact**	
Regulation of pollution: The features of the site contribute to the bioremediation of waste and sequestration of carbon. Marine sediments, through processes that occur in their upper layers, play an important role in the global cycling of many elements, including carbon and nitrogen (Fletcher and others, 2012). ***Environmental resilience:*** The features of the site contribute to the resilience and continued regeneration of marine ecosystems. Rock can support particularly high biodiversity (Fletcher and others, 2012). ***Natural hazard protection:*** The features of the site, in particular intertidal habitats, contribute to local flood and storm protection (Fletcher and others, 2012). It has not been possible to estimate the value of regulating services in the site.	If the conservation objectives are achieved, some of the features of the site will be recovered to favourable condition. Others will be maintained in favourable condition. Improved habitat condition and a potential reduction in anthropogenic pressures, including from bottom-towed fishing gear, may increase site benthic biodiversity and biomass, improving the regulating capacity of the site habitats. Designating the recommended Marine Conservation Zone will protect its features and the ecosystem services that they provide against the risk of future degradation from pressures caused by human activities (as, if necessary, mitigation would be introduced, with the associated costs and benefits).	Anticipated direction of change: ⇧ Confidence: Low

Table 4e. Non-use and option values	**rMCZ Bideford to Foreland Point**
Baseline	**Beneficial impact**

Table 4e. Non-use and option values		**rMCZ Bideford to Foreland Point**
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) and the ecosystem services provided, even if they do not currently benefit from them. It has not been possible to estimate the non-use value of the rMCZ.	The rMCZ will benefit the proportion of the UK population that values conservation of the MCZ 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 will protect both the features and the option to benefit from the services in the future from the risk of future degradation. Examples of these values are shown in Ranger and others (2012). Voters in the Marine Conservation Society's 'Your Seas Your Voice' campaign expressed a desire to protect the area, with the most common reasons being because of the 'spectacular scenery', because 'the whole place is amazing' and because 'it means a great deal to me personally'.	Anticipated direction of change: ⇧ Confidence: Moderate

rMCZ Broad Bench to Kimmeridge Bay

Site area (km^2): 0.09

Table 1. Conservation impacts	**rMCZ Broad Bench to Kimmeridge Bay**
1a. Ecological description	

The site lies adjacent to the Studland to Portland designated Special Area of Conservation (SAC) (above the high water mark). It also lies entirely within the Purbeck Voluntary Marine Nature Reserve as well as within the Portland to Studland Cliffs coastal SAC and the South Dorset Site of Special Scientific Interest.

The recommended Marine Conservation Zone (rMCZ) is intertidal, characterised by rocky ledges. The strata are all sedimentary in origin. The geology of the coastline is probably its most outstanding feature and the underlying reason for the diversity of habitats and features which are found here. This area represents the eastern limit along the Channel of a number of species which have a south-western (Lusitanian) distribution.

The tidal range is small, with a maximum spring tide range of only 2 metres. On spring tides at Kimmeridge, a three-hour stand at low water occurs at mid-day – exposing the shore to high desiccation and light levels and to extreme temperatures. This encourages algal diversity and the presence of species with a normally southern or even Mediterranean range. Key species include the black-faced blenny *Trypterygion atlanticus*, Cranch's spider crab *Achaeus cranchi*, the sea slug *Aeolidiella alderi*, the sea squirt *Phallusia mammillata* (in deeper water) and the unusual alga *Cystoseira tamariscifolia* (which is on the edge of its range at Kimmeridge).

Much of the shallow sublittoral rock has a kelp fringe with associated red algae and invertebrates down to about 12 metres. Where bedrock is subject to scour, this is replaced by sea oak (podweed). Below these kelp zones is a zone dominated by red algae. Beyond this, the sea bed is dominated by sponges, bryozoans such as Ross

coral *Sabellaria spinulosa* (here at its eastern limit), horn wrack and hydroids. Vertical bedrock faces have a rich encrusting layer of animals such as colourful sponges, dead man's fingers, cup corals and anemones. Wrasse and gobies abound, as do tompot blennies. Much of the softer bedrock is bored by piddocks, leaving the characteristically riddled appearance. Extensive beds of brittlestar *Ophiothrix fragilis* have been mapped on the rock platforms forming the seaward extension of Broad Bench.

Shallow water kelp forests harbour a number of rare seaweeds such as the red seaweed *Gracilaria bursa-pastoris* and the brown seaweeds *Zanardinia prototypus* and *Padina pavonica*. Among the seaweeds are anemones such as the trumpet anemone *Aiptasia mutabilis* and sea slugs such as *Trapania maculata* and *T. pallida*. Several unusual fish are found at Kimmeridge such as Montagu's blenny, the Connemara clingfish, the Cornish sucker and the rarely recorded black-faced blenny occurring on rocky ledges. Bream are also thought to nest in the area (Lieberknecht and others, 2011).

1b. MCZ Feature Baseline and Impact of MCZ

Feature	Area of feature (km2)	No. of point records	Baseline	Impact of MCZ
Broad-scale Habitats				
Intertidal coarse sediment	< 0.01	-	Favourable Condition	Maintained at Favourable Condition
Moderate energy intertidal rock	0.03	-	Favourable Condition	Maintained at Favourable Condition
Species of Conservation Importance				
Padina pavonica	-	1	Favourable Condition	Maintained at Favourable Condition
Paludinella littorina	-	1	Favourable Condition	Maintained at Favourable Condition

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

Table 2a. National defence **rMCZ Broad Bench to Kimmeridge Bay**

Source of costs of the 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. MOD will also incur costs in revising environmental tools and charts to include MCZs.

Baseline description of activity	Cost of impact of rMCZ on the sector

MOD is known to make use of the rMCZ for aerial, surface, water column and practice landing activities. The rMCZ is in an MOD danger area.	It is not known whether this rMCZ will impact on MOD's activity. Impacts of rMCZs on MOD activities are assessed in Annex N and the Evidence Base (they are not assessed for this rMCZ alone).

Table 2b. Other impacts that are assessed for the suite of MCZs and not for this site alone	**rMCZ Broad Bench to Kimmeridge Bay**
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 the oil and gas related activities are assessed in the Evidence Base, Annex H10 and Annex N9 (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 Broad Bench to Kimmeridge Bay**
Commercial fisheries (potting); oil and gas related activities (existing activity); recreation; research and education	

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 Broad Bench to Kimmeridge Bay**	
Baseline	**Beneficial impact**	
Fletcher and others (2012) 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. 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. As the rMCZ is very small and covers only the intertidal area, fishing within the rMCZ is thought to be very limited and it is estimated that the value of landings from the rMCZ is <£0.001m/yr. Commercial fishing with pots and traps and nets occurs in the vicinity of the rMCZ.	If the conservation objectives of the features are achieved, the features will be maintained in favourable condition. No additional management (above that in the baseline situation) of fishing activities is expected. No change in feature condition or harvesting of fish and shellfish is anticipated and therefore no on-site or off-site benefits areexpected. 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 (because, if necessary, mitigation would be introduced, with the associated costs and benefits).	Anticipated direction of change: ⇔ Confidence : Moderate

Table 4b. Recreation	**rMCZ Broad Bench to Kimmeridge Bay**	
Baseline	**Beneficial impact**	
Angling: Fletcher and others (2012) 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. 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. As the rMCZ is very small and covers only the intertidal area, angling within the rMCZ is thought to be limited. It has not been possible to estimate the value of angling in the site.	If the conservation objectives of the features are achieved, the features will be maintained in favourable condition. No change in on-site feature condition or fishing mortality is anticipated and therefore no on-site or off-site benefits areexpected (see Table 4a for further details). 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 (as, if necessary, mitigation would be introduced, with the associated costs and benefits). The designation may lead to an increase in angling visits to the site, which	Anticipated direction of change: ⇔ Confidence: Moderate

Table 4b. Recreation		**rMCZ Broad Bench to Kimmeridge Bay**
	may benefit the local economy. This increase may represent a redistribution of location preferences, rather than an overall increase in UK angling.	
Diving: Fletcher and others (2012) identify that some of the features to be protected by the rMCZ can contribute to the delivery of recreation and tourism services. 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. Kimmeridge Bay provides a sheltered water sports location for activities such as SCUBA diving and snorkelling. It has not been possible to estimate the value of diving in the rMCZ.	If the conservation objectives of the features are achieved, the features will be maintained in favourable condition. No change in on-site feature condition is anticipated and therefore no benefits to diving are expected. 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 (as, if necessary, mitigation would be introduced, with the associated costs and benefits). The designation may lead to an increase in dive 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 UK diving.	Anticipated direction of change: ⟺ Confidence: Moderate
Wildlife watching: Fletcher and others (2012) identify that some of the features to be protected by the rMCZ can contribute to recreation and tourism services. 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. Dorset Wildlife Trust provides kayak safaris in Kimmeridge Bay to view the local marine wildlife, which includes sand eels, ballan wrasse, mullet and bass, diving cormorants, spider crabs, blennies, shore crabs and seaweeds (Dorset Wildlife Trust, 2012). It has not been possible to estimate the value of wildlife watching in the rMCZ.	If the conservation objectives of the features are achieved, the features will be maintained in favourable condition. No change in on-site feature condition is anticipated and therefore no benefits to wildlife watching are expected. 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 (as, if necessary, mitigation would be introduced, with the associated costs and benefits). 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 UK wildlife watching visits.	Anticipated direction of change: ⟺ Confidence: Moderate

Table 4c. Research and education	**rMCZ Broad Bench to Kimmeridge Bay**	
Baseline	**Beneficial impact**	
Research: Fletcher and others (2012) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) can contribute to the delivery of research services. The rMCZ is situated within the Purbeck Voluntary Marine Nature Reserve. Research projects and surveys are carried out in the reserve, including the rMCZ, such as the annual Shore Thing survey which contributes to a national survey monitoring intertidal climate change indicators. The full extent of current research activity carried out in the rMCZ is unknown. It has not been possible to estimate the value derived from research activities associated with the rMCZ.	Monitoring of the rMCZ 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: ⇧ Confidence: High
Education: Fletcher and others (2012) *identify* that the features to be protected by the rMCZ can contribute to the delivery of education services. The rMCZ is situated within the Purbeck Voluntary Marine Nature Reserve. The Fine Foundation Marine Centre is located at Kimmeridge Bay. This centre provides interpretation of the marine environment and includes interactive displays and aquaria. It also offers a number of public events, including curriculum-based talks, run by volunteer marine wardens. Guided glass-bottom kayak safaris were on offer during summer 2011, and in 2010 the Purbeck warden worked with the BBC *Springwatch* team to deliver pieces on Kimmeridge Bay. In the second quarter of 2010, nearly 8,000 people visited the centre (Hatcher, 2010). 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 on the marine environment. Designation may aid additional local (to the rMCZ) provision of education (e.g. events and interpretation boards), from which visitors to the site would derive benefit. 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: ⇧ Confidence: Moderate

Table 4d. Regulating services	**rMCZ Broad Bench to Kimmeridge Bay**
Baseline	**Beneficial impact**

Table 4d. Regulating services	**rMCZ Broad Bench to Kimmeridge Bay**	
Regulation of pollution: The features of the site contribute to the bioremediation of waste and sequestration of carbon (Fletcher and others, 2012). ***Environmental resilience:*** The features of the site contribute to the resilience and continued regeneration of marine ecosystems. Rock can support particularly high biodiversity (Fletcher and others, 2012). ***Natural hazard protection:*** The features of the site, in particular the intertidal habitats, contribute to local flood and storm protection (Fletcher and others, 2012). It has not been possible to estimate the value of regulating services in the site.	If the conservation objectives are achieved, the features of the site will be maintained in favourable condition. No change in feature condition and management of human activities is expected and therefore no benefit to the regulation of pollution is expected. Designating the recommended Marine Conservation Zone (rMCZ) will protect its features and the ecosystem services that they provide against the risk of future degradation from pressures caused by human activities (as, if necessary, mitigation would be introduced, with the associated costs and benefits).	Anticipated direction of change: ⇔ Confidence: Moderate

Table 4e. Non-use and option values	**rMCZ Broad Bench to Kimmeridge Bay**	
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) and the ecosystem services provided, even if they do not currently benefit from them. It has not been possible to estimate the non-use value of the rMCZ.	The rMCZ will benefit the proportion of the UK population that values conservation of the MCZ 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 will protect both the features and the option to benefit from the services in the future from the risk of future degradation. Examples of these values are shown in Ranger and others (2012). Voters in the Marine Conservation Society's 'Your Seas Your Voice' campaign expressed a desire to protect the area, with common reasons being because of the 'spectacular scenery', because 'the whole place is amazing', because 'it means a great deal to me personally' and because 'it appears unspoilt'.	Anticipated direction of change: ⇧ Confidence: Moderate

rMCZ Camel Estuary

Site area (km^2): 2.2

Table 1. Conservation impacts **rMCZ Camel Estuary**

1a. Ecological description

The site encompasses the upper reaches of the Camel Estuary. The upstream portion of the recommended Marine Conservation Zone (rMCZ) overlaps with the Camel Estuary part of the Cornwall Area of Outstanding Natural Beauty and the River Camel Valley and Tributaries Site of Special Scientific Interest (SSSI). Amble Marshes SSSI is located adjacent to the rMCZ.

The Camel Estuary is the largest and most sheltered marine inlet on the north Cornwall coast. It is predominantly shallow and sandy, deepening at the mouth, with a narrow channel at low water that meanders from one side of the estuary to the other. Water quality has been classified as grade A.

The Camel has a large range of estuarine communities, including a variable salinity rock community, with considerable local nature conservation importance. Small patches of saltmarsh occur in the small bays and inlets, and are more extensive in the upper parts of the estuary. The estuary provides an important ecological function as a nursery area (Lieberknecht and others, 2011).

1b. MCZ Feature Baseline and Impact of MCZ

Feature	Area of feature (km2)	No. of point records	Baseline	Impact of MCZ
Broad-scale Habitats				
Coastal saltmarshes and saline reedbeds	0.15	-	Favourable Condition	Maintained at Favourable Condition
Intertidal coarse sediment	0.04	-	Favourable Condition	Maintained at Favourable Condition
Intertidal mud	1.77	-	To be determined	To be determined
Low energy intertidal rock	0.01	-	Favourable Condition	Maintained at Favourable Condition
Habitats of Conservation Importance				
Estuarine rocky habitats	-	2	Favourable Condition	Maintained at Favourable Condition
Species of Conservation Importance				
Anguilla anguilla	-	-	To be determined	To be determined

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

Table 2a. Aquaculture	**rMCZ Camel Estuary**
Source of costs of the rMCZ ***Management scenario 1:*** No additional management. ***Management scenario 2:*** Compulsory use of triploid stock for Pacific oyster cultivation.	
Baseline description of activity	**Costs of impact of rMCZ on the sector**
There are 2 aquaculture businesses in the Camel Estuary. The Duchy of Cornwall is the landowner, with the Padstow Harbour Commission issuing permits for operating aquaculture within the estuary. Pacific oysters and mussels are the only species currently cultivated within the estuary. The 2 businesses both cultivate Pacific oysters, which account for an estimated 36% of the annual volume of their combined output and 50% of the annual value of their combined output (Finding Sanctuary estimates based on information from operators). The majority of the current Pacific oyster cultivation is carried out using diploid stock. Both businesses have used triploid stock but with varying levels of success. One business experienced high mortality rates when triploid stocks were used. One of these businesses has used triploid stock in the past but does not expect to use it in 2012, as cultivation of triploid stock oysters requires more labour than diploid stock. This is because the bags that the oysters are grown in have to be turned more frequently due to faster growth rates (Aquaculture operator, pers. comm., 2011). Recently there have been issues in sourcing supply of triploid seed stock in the UK (Aqaculture operators, pers. comm., 2011; Devon and Severn IFCA,	***Scenario 1:*** No costs are anticipated as a result of this scenario. ***Scenario 2:*** It is unlikely that the operators in the Camel Estuary would be able to source sufficient volumes of triploid seed stock to allow them to continue cultivating Pacific oysters at the current level. It is therefore expected that the operators would cease to produce Pacific oysters as a result of the management scenario that requires compulsory use of triploid stock. While one operator has successfully cultivated Pacific oysters using triploid stock within the estuary in the past, there is concern that triploid stock does not grow as successfully in the Camel as diploid stock. If cultivation using triploid stock could not be successfully carried out, then even if suitable supply or triploid stock could be secured, the volume of output achieved by the operators may still be significantly reduced. Scenario 2 is therefore expected to result in a cessation of Pacific oyster cultivation – this is more likely to be as a result of insufficient supply rather than poor cultivation success. It should be noted that if supply could be increased, then it may be possible for Pacific oyster cultivation to continue successfully. Given that Pacific oyster cultivation accounts for an estimated 50% of the value of output from the aquaculture industry in the Camel Estuary, if oyster production ceased the loss of output would reduce the viability of the businesses present (Aquaculture operator, pers.

Table 2a. Aquaculture	**rMCZ Camel Estuary**
pers. comm., 2011). Discussions with UK seed stock producers verify that there is a shortage of supply, with no immediate opportunity for its increase (Seasalter (Walney) Limited, pers. comm., 2011; Seasalter Shellfish (Whitstable) Limited, pers. comm., 2011). Supply from outside the UK is not possible due to the presence of the herpes virus in these stocks.	comm., 2011). One operator indicated that their business could cease to be viable as a result of the compulsory use of triploid stock due to the reduction in overall revenue, thereby resulting in the loss of the operators output of other species. Whilst it may theoretically be possible for the businesses affected to increase cultivation of other species, such as mussels, clams or cockles, to off-set the losses from Pacific oysters, this was not identified as an option by the interviewed businesses. An estimate of the cost is not provided at the level of the rMCZ because this information is commercially sensitive and there are only a small number of businesses present. See Annex N for a cost estimate for rMCZs in the Finding Sanctuary project area and the national suite of rMCZs.

Table 2b. Archaeological heritage	**rMCZ Camel Estuary**
Source of costs of the 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**
A late medieval and 19th-century bridge is located at Wadebridge. The remains of 3 hulked wrecks are located in the intertidal zone at Cant Cove, St Minver. It is not clear if these are located in the site (English Heritage, pers. comm., 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 as a result of this rMCZ has been estimated. However, the additional cost in one licence application could be in the region of £500 to £10,000 (English Heritage, pers. comm., 2011). No further impacts on activities related to archaeology are anticipated.

Table 2c. Flood and coastal erosion risk management (coastal defence)	**rMCZ Camel Estuary**
Source of costs of the 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).	
Baseline description of activity	**Costs of impact of rMCZ on the sector**
The 0 to 20 year Shoreline Management Plan policies along the landward edges of the rMCZ are predominantly to 'hold the line', with some areas of 'no active intervention'. The Amble Marshes scheme is anticipated within the next 5 years and additional schemes may come forward as a result of the hold the line policy (Environment Agency, pers. comm., 2012).	As a result of the rMCZ, 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 to 1 day of additional work, 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. It is anticipated that no additional mitigation of impacts will be required (Environment Agency, pers. comm., 2012).

Table 2d. Ports, harbours, shipping and disposal sites	**rMCZ Camel Estuary**
Source of costs of the rMCZ	
Management scenario 1: Increase in costs of assessing environmental impacts for future licence applications. This applies to future licence applications for navigational dredging within 1km of the rMCZ. It is not anticipated that any additional mitigation, relative to mitigation provided under the baseline, of impacts on features protected by the MCZ will be needed for activities relating to ports, harbours, shipping and disposal sites.	
Management scenario 2: Increase in costs of assessing environmental impacts for future licence applications within 5km of an rMCZ. This applies to navigational dredging. Additional costs incurred in updating existing Maintenance Dredging Protocols (MDPs) and implementing new MDPs for ports that do not currently have one in place. Additional mitigation, relative to mitigation provided in the baseline, of impacts on features protected by the MCZ may be needed for future harbour developments.	
Baseline description of activity	**Costs of impact of rMCZ on the sector**

Table 2d. Ports, harbours, shipping and disposal sites	**rMCZ Camel Estuary**
<u>*Navigational dredging:*</u> Padstow Harbour is located a few miles to the west of the rMCZ boundary in the Camel Estuary. Maintenance dredging is carried out by Padstow Harbour Commissioners in order to maintain navigable channels. The dredging takes place between 1km and 5km from the rMCZ. Dredged material is sold for use elsewhere where possible; however, some material does not have commercial value and is disposed of at the Padstow Bay disposal site (Padstow Harbour Commissioners, pers. comm., 2011). <u>*Harbour development:*</u> Padstow Harbour is the only harbour within 5km of the rMCZ. There are no known harbour plans for developments at Padstow Harbour.	***Scenario 1:*** No costs are anticipated under this scenario. ***Scenario 2:*** <u>*Navigational dredging:*</u> Under this scenario, future licence applications for navigational maintenance dredging at Padstow Harbour will need to consider the potential effects of the disposed material on the features protected by the rMCZ and the rMCZ conservation objectives. This is expected to result in additional costs averaging £0.002m/yr over the IA 20 year timeframe. No additional mitigation, above that required under the baseline, is anticipated. Additional costs may be incurred to implement a potential new Maintenance Dredging Protocol (MDP), which will consider the potential effects of dredging on features protected by the rMCZ. The anticipated additional cost of the MDP is estimated as a one-off cost of £0.008m. <u>*Harbour development:*</u> For future port and harbour developments within 5km of the rMCZ that are not yet known of, future licence applications 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 (these costs are not assessed at the site level, but are presented at the national level in Annex N11). Sufficient information is not available to identify whether any additional mitigation, relative to the baseline, of impacts on features protected by the MCZ will be needed for such future port and harbour developments. 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 Camel Estuary**
Recreation; research and education; water abstraction, discharge and diffuse pollution*.	

* The IA aassumes that no additional mitigation of the 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 (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 Camel Estuary**
Baseline	**Beneficial impact**	
Fletcher and others (2012) 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. The estuary is a nursery area for fish (Environment Agency, pers. comm., 2010) and, as such, is likely to help to support potential 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 in favourable condition. However, there is currently no commercial fishing within the rMCZ and therefore no value derived from on-site fisheries. It has not been possible to estimate the value derived from off-site fisheries as a result of the nursery area function.	If the conservation objectives of the features are achieved, the features will be maintained in favourable condition. No additional management (above that in the baseline situation) of fishing activities is expected. No change in feature condition or harvesting of fish and shellfish is anticipated and therefore no on-site or off-site benefits areexpected. 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 (because, if necessary, mitigation would be introduced, with the associated costs and benefits).	Anticipated direction of change: ⟺ Confidence : Moderate

Table 4b. Recreation	**rMCZ Camel Estuary**

Table 4b. Recreation		**rMCZ Camel Estuary**
Baseline	**Beneficial impact**	
Angling: Fletcher and others (2012) 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. The estuary is a nursery area for fish (Environment Agency, pers. comm., 2010) and, as such, is likely to help to support potential 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 in favourable condition. Light tackle fishing occurs in the sheltered waters of the Camel Estuary. It has not been possible to estimate the value of angling in the site.	If the conservation objectives of the features are achieved, the features will be maintained in favourable condition. No change in on-site feature condition or fishing mortality is anticipated and therefore no on-site or off-site benefits areexpected (see Table 4a for further details). 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 (as, if necessary, mitigation would be introduced, with the associated costs and benefits). The designation may lead to an increase in angling 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 UK angling.	Anticipated direction of change: ⟺ Confidence: Moderate
Diving: Diving is not known to take place in the rMCZ.	N/A	N/A
Wildlife watching: Fletcher and others (2012) identify that some of the features to be protected by the rMCZ can contribute to the delivery of recreation and tourism services. 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. Large areas of saltmarsh encourage a variety of winter waders at the Camel Estuary. Bird watching is popular here; little egrets, peregrines, mute swans and several types of duck, including shelducks, shovelers, teal and mallards, are seen in the rMCZ. Birds known to tour here include the northern lapwing and the European golden plover. It has not been possible to estimate the value of wildlife watching in the rMCZ.	If the conservation objectives of the features are achieved, the features will be maintained in favourable condition. No change in on-site feature condition is anticipated and therefore no benefits to wildlife watching are expected. 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 (as, if necessary, mitigation would be introduced, with the associated costs and benefits). 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 UK wildlife watching visits.	Anticipated direction of change: ⟺ Confidence: Moderate

Table 4c. Research and education		**rMCZ Camel Estuary**
Baseline	**Beneficial impact**	
***Research**:* Fletcher and others (2012) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) can contribute to the delivery of research services. Research activities are carried out in and around the rMCZ in relation to the existing designations in the area. This includes the Cornwall Area of Outstanding Natural Beauty (AONB) Landscape Monitoring Project. The full extent of current research activity carried out in the rMCZ is unknown. It has not been possible to estimate the value derived from research activities associated with the rMCZ.	Monitoring of the rMCZ 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: ⇧ Confidence: High
Education: Fletcher and others (2012) identify that the features to be protected by the rMCZ can contribute to the delivery of education services. The extent of existing education activities in and around the rMCZ is unknown; however, there may be links to wider programmes related to the surrounding Sites of Special Scientific Interest and Cornwall AONB. 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 on the marine environment. Designation may aid additional local (to the rMCZ) provision of education (e.g. events and interpretation boards), from which visitors to the site would derive benefit. 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: ⇧ Confidence: Moderate

Table 4d. Regulating services	**rMCZ Camel Estuary**

Table 4d. Regulating services		**rMCZ Camel Estuary**
Baseline	**Beneficial impact**	
Regulation of pollution: The features of the site contribute to the bioremediation of waste and sequestration of carbon. Coastal saltmarshes are known to be particularly efficient carbon sinks and cadmium is stored in sediment by cord grass *Spartina anglica* which grows in intertidal mud (Fletcher and others, 2011; 2012). ***Environmental resilience:*** The features of the site contribute to the resilience and continued regeneration of marine ecosystems. Rocky habitats in estuaries make a significant contribution to the overall diversity (Fletcher and others, 2012). ***Natural hazard protection:*** The features of the site, in particular the coastal saltmarshes and intertidal habitats, contribute to local flood and storm protection (Fletcher and others, 2012). It has not been possible to estimate the value of regulating services in the site.	If the conservation objectives are achieved, the features of the site will be maintained in favourable condition. No change in feature condition and management of human activities is expected and therefore no benefit to the regulation of pollution is expected. Designating the recommended Marine Conservation Zone (rMCZ) will protect its features and the ecosystem services that they provide against the risk of future degradation from pressures caused by human activities (as, if necessary, mitigation would be introduced, with the associated costs and benefits).	Anticipated direction of change: ⟺ Confidence: Moderate

Table 4e. Non-use and option values		**rMCZ Camel 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 recommended Marine Conservation Zone (rMCZ) and the ecosystem services provided, even if they do not currently benefit from them. It has not been possible to estimate the non-use value of the rMCZ.	The rMCZ will benefit the proportion of the UK population that values conservation of the MCZ 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 will protect both the features and the option to benefit from the services in the future from the risk of future degradation. Examples of these values are shown in Ranger and others (2012). Voters in	Anticipated direction of change: ⇧ Confidence: Moderate

Table 4e. Non-use and option values		**rMCZ Camel Estuary**
	the Marine Conservation Society's 'Your Seas Your Voice' campaign expressed a desire to protect the area, with reasons including because of the 'spectacular scenery' and because 'it appears unspoilt'.	

rMCZ Cape Bank

Site area (km^2): 472.8

Table 1. Conservation impacts **rMCZ Cape Bank**

1a. Ecological description

The site includes the Cape Bank section of the Land's End and Cape Bank candidate Special Area of Conservation. The site's south-westerly position on the British coast means that the sublittoral zone is exposed to the full force of the waves and oceanic swells coming in from the Atlantic, as well as experiencing full salinity, given the absence of any major source of fresh water run-off from the land. The recommended Marine Conservation Zone intersects an area of added ecological importance for the pelagic realm, with frontal activity and summer foraging birds, including sea bird colonies from the Isles of Scilly such as kittiwakes, puffins, guillemots and razorbills. Fin whales are present in the area in winter.

The crescent-shaped system of offshore upstanding rocky reefs forms the major Feature of Conservation Importance in the Cape Bank site. It measures about 35km along its central spine and 12km at its widest point. The outer part of Cape Bank is characterised by at least three sub-parallel, high linear rock ridges which extend for over 20km in a slightly curving south to north-north-east trending arc. These ridges sit on a rock platform at a depth of 45–55 metres; they can reach up to 25 metres in height and can be more than 1km wide. With steep slopes, they cover an area of over 100km^2.

The reef is characterised by high biodiversity tide-swept communities such as sponges, faunal and algal turfs and crustose communities. The offshore upstanding rocky reef areas are the most biodiverse of all the rocky reef habitats within the site. The most abundant biotope in this area is *Caryophyllia smithii* and sponges, with *Pentapora foliacea*, *Porella compressa* and crustose communities on wave-exposed circalittoral rock (Lieberknecht and others, 2011).

1b. MCZ Feature Baseline and Impact of MCZ

Feature	Area of feature (km2)	No. of point records	Baseline	Impact of MCZ
Broad-scale Habitats				
Moderate energy circalittoral rock	19.50	-	Unfavourable Condition	Recover to Favourable Condition
Subtidal coarse sediment	308.11	-	Unfavourable Condition	Recover to Favourable Condition
Species of Conservation Importance				
Palinurus elephas	-	2	Unfavourable Condition	Recover to 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 Cape Bank**
Source of costs of the 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**
The site contains the wreck of a Scottish cargo vessel (English Heritage, pers. comm., 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 of one licence application could be in the region of £500 to £10,000 (English Heritage, pers. comm., 2011). No further impacts on activities related to archaeology are anticipated.

Table 2b. Commercial fisheries	**rMCZ Cape Bank**
Source of costs of the 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. Multiple management scenarios have been identified for the Impact Assessment which reflect this uncertainty. Should the site be designated, the management that will be required is likely to fall somewhere within this range.	
Management scenario 1: No additional management.	
Management scenario 2: Closure of entire rMCZ to bottom trawls and dredges; no removal of crawfish (*Palinurus elephas*) from the rMCZ.	

<table>
<tr><th colspan="2">Table 2b. Commercial fisheries rMCZ Cape Bank</th></tr>
<tr><td colspan="2">Management scenario 3: Closure of entire rMCZ to bottom trawls and dredges; closure of area of moderate energy circalittoral rock to pots and traps, nets, and hooks and lines.

Management scenario 4: Closure of entire rMCZ to bottom trawls, dredges, pots and traps, nets, and hooks and lines.</td></tr>
<tr><th>Baseline description of activity</th><th>Costs of impact of rMCZ on the sector</th></tr>
<tr><td colspan="2">Overview: The rMCZ extends from inside the 6nm (nautical mile) limit to outside the 12nm limit and is fished by vessels from the UK, France and Belgium. The rMCZ provides significant landings revenue for most types of fishing, particularly potting. There are high levels of French and Belgian bottom trawl effort, principally in the western half of the rMCZ over the softer sediments. There is some UK beam trawl and otter trawl activity, which occurs on a seasonal basis. It is not currently a notable scallop dredging area. Netting, hand lining and potting is commonplace over the harder ground, principally in the east of the rMCZ. The Trevose closure, the Wave Hub renewable energy development, and the Land's End and Cape Bank Special Area of Conservation (SAC) as well as Inshore Fisheries and Conservation Authority (IFCA) byelaws (see Annex E for further details) all restrict, or are expected to restrict, fishing patterns in or near the rMCZ.

Estimated total value of UK vessel landings from the rMCZ: £0.635m/yr.</td></tr>
<tr><td>UK Dredges: The rMCZ does not cover a known scalloping ground and the level of dredging in the rMCZ is currently very low. There has, however, historically been dredging in the area (Scallop dredge owner, pers. comm., 2011). Estimated value of UK dredge landings from the rMCZ: £0.005m/yr.</td><td>Scenario 1: No impacts are anticipated under this scenario.

Scenario 2: The rMCZ is not currently a regular scalloping ground and average landings from it are low. While displacement of effort in response to closure to dredging is therefore expected to be limited under this scenario, it should be noted that the closure will remove a potential fishing ground option from the fleet.

Estimated annual value of UK dredge landings affected is expected to fall within the following range:
<table>
<tr><td>£m/yr</td><td>Scenario 1</td><td>Scenario 2</td><td>Scenario 3</td><td>Scenario 4</td></tr>
<tr><td>Value of landings affected</td><td>0.000</td><td>0.005</td><td>0.005</td><td>0.005</td></tr>
</table>
If the SAC results in restrictions to fishing with dredges, then this may reduce the potential impact of the rMCZ.</td></tr>
</table>

<table>
<tr><th>Table 2b. Commercial fisheries</th><th>rMCZ Cape Bank</th></tr>
<tr><td>UK Bottom trawls: A number of beam trawlers and otter trawlers fish in the area. The beam trawls principally target Dover sole, and otter trawls target a range of species including sole, monkfish, john dory, squid, skate and haddock. For beam trawlers in particular the area is an important alternative sole fishery to that on the south coast, being in the International Council for the Exploration of the Sea (ICES) Area VIIf rather than VIIe, as the availability of sole quota is far greater in ICES Area VIIf.

Beam trawling generally, although not exclusively, occurs along the western and northern edges of the rMCZ (MCZ Fisheries Model). The ground is particularly important for the 4 metre beam fleet, with estimates of 40% of some vessels' landings coming from the wider area (Ghey, 2007). Otter trawling mainly occurs to the south and north east of the rMCZ (MCZ Fisheries Model). In addition, UK and French trawlers often tow up through the rMCZ on their way to north coast fishing grounds (Otter trawl skipper, pers. comm., 2011).

The area is fished year-round and, during January, February and March when the Trevose closure is in force, vessels cannot fish north of 50.5 degrees. This concentrates effort in the area south of the Trevose closed area between the north-eastern edges of the rMCZ and the Cornish coast.

The expected closure to trawling in the area of the Wave Hub development will further concentrate this fishing effort in the area and may result in an increase in effort in the rMCZ.

Estimated value of UK bottom trawl landings from the rMCZ: £0.085m/yr.</td><td>Scenario 1: No impacts are anticipated under this scenario.

Scenario 2: Under this scenario, beam trawlers are expected to continue to target sole in the area, particularly between January and March. However, the rMCZ closure will squeeze the area available to trawlers during this period, which is when the Trevose Closure is in force. This will result in further concentration of effort in an already intensively fished area, which may affect fishers' catch rates (Beam trawl skipper, pers. comm., 2011). For beam trawlers, this could increase the difficulty that they have in catching their Dover sole quota for ICES Area VIIf.

Vessels from south coast ports that currently trawl through the rMCZ will need to steam through the rMCZ on their way to and from north coast fishing grounds rather than tow. For a typical Newlyn 20 metre otter trawler, this could add around 8 hours of unproductive steaming time in both directions for trips to the north coast fisheries, resulting in additional fuel costs and loss of revenue (Otter trawl skipper, pers. comm., 2011).

Estimated annual value of UK bottom trawl landings affected is expected to fall within the following range:
<table><tr><td>£m/yr</td><td>Scenario 1</td><td>Scenario 2</td><td>Scenario 3</td><td>Scenario 4</td></tr><tr><td>Value of landings affected</td><td>0.000</td><td>0.085</td><td>0.085</td><td>0.085</td></tr></table>If the SAC results in restrictions to fishing with bottom trawls, then this may reduce the potential impact of the rMCZ.</td></tr>
<tr><td>UK Pots and traps: There is a significant level of potting throughout the rMCZ and wider area. Up to 5 (Cornish Fish Producers Organisation (CFPO), pers. comm., 2011) large (over 15 metre) Cornish vessels working up to 1,200 pots (Ghey, 2007) operate nomadically in an area between the south west of the rMCZ and north of Newquay, including in the rMCZ.</td><td>Scenario 1: No impacts are anticipated under this scenario.

Scenario 2: A prohibition of crawfish landings from within the rMCZ is not expected to reduce the viability of potting in the Cape Bank/Bann Shoal area. This is because crawfish landings make up approximately 5% of the value of landings by potters from the rMCZ. However, the high value of crawfish makes it an important species in the mix of fish caught</td></tr>
</table>

Table 2b. Commercial fisheries **rMCZ Cape Bank**

Smaller vessels (around 10 metres) work between 600 and 800 pots in semi-fixed areas, running from inside the rMCZ towards the coast of north Cornwall, for brown crab and lobster. Their effort is concentrated between March and October, starting once the main trawling effort in the area disperses (Ghey, 2007).

Pots area used in the area principally to target lobster and crab, and occasionally crawfish.

Estimated value of UK pot and trap landings from the rMCZ: £0.357m/yr.

Crawfish are not the principal target species for potters but are particularly valuable.

Modelled estimates of the value of UK pot and trap crawfish landings from the rMCZ are £0.006m/yr.

The underlying FisherMap data for the Cornish inshore area used in the MCZ Fisheries Model do not allow for species-specific analysis. To address this, an alternative estimate has been provided which reflects the greater likelihood of catching crawfish in the rMCZ over the rocky habitat of the Bann Shoal and Cape Bank. This alternative method assumes that:

(i) the wider fishery (covering ICES Rectangle 29E4) is the source of approximately 27% of the value of all UK crawfish landings, 21% (£0.019m/yr) of which are caught by potters (MMO, 2011a)

(ii) all crawfish landings by pots and traps from ICES Rectangle 29E4 occur over the areas of rock habitat around the Cape Bank and Bann Shoal, 95% of which is inside the rMCZ (calculations based on EUNIS Level 3 broad-scale habitat mapping).

Based on these assumptions, the value of crawfish landings by potters from the rMCZ is estimated to be £0.018m/yr. This estimate is employed for the analysis to avoid underestimation of costs.

and can make up an important element of a fisher's landings.

Scenarios 3 and 4: A zoned closure or full closure of the rMCZ would significantly impact on the revenues of the (up to) 5 affected vessels and potentially the viability of their businesses. Displaced fishers are likely to have to increase their effort in other fishing grounds and/or switch to other gear types.

Estimated annual value of UK pot and trap landings affected is expected to fall within the following range:

£m/yr	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Value of landings affected	0	0.018	0.323	0.357

If the SAC results in restrictions to fishing with pots and traps, then this may reduce the potential impact of the rMCZ.

In establishing the draft conservation objectives, the site features were assessed as having low vulnerability to fishing with pots and traps at current levels. Where this is the case, this activity was not the primary reason for assigning 'recover' conservation objective(s). As such, it is anticipated that, if 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.

Table 2b. Commercial fisheries **rMCZ Cape Bank**

UK Nets: Netting occurs throughout the rMCZ with the heaviest intensity in the eastern part of the rMCZ over the hard ground of the Cape Bank and Bann Shoal, which extends from just to the north of the rMCZ through to just to the south.

Fewer than 5 vessels regularly fish using nets in the rMCZ (Netter skipper, pers. comm., 2011). Overall, at least 7 vessels fish there occasionally in any given year (Hand line skipper, pers. comm., 2011). The vessels fish multiple gears, but principally use tangle nets within the rMCZ. Netting is only possible during periods of settled weather due to the boat sizes and distance of the rMCZ from shore, and therefore normally occurs during the summer.

Estimated value of UK net landings from the rMCZ: £0.088m/yr.

Crawfish are targeted from mid-May through to September/October, typically on neap tides using tangle nets (Netter skipper, pers. comm., 2011). Access to the fishing ground is weather-dependent although nets are constantly fishing as they are hauled and re-shot in a single trip. The high value of crawfish means that even low catch rates are important to the viability of fishers' businesses, particularly during the summer months (Netter skipper, pers. comm., 2011).

Modelled estimate of value of UK netted crawfish landings from the rMCZ: £0.005m/yr.

The importance of the crawfish fishery identified through discussions with fishers and fisheries representatives indicates that this may be an underestimate. In addition, the underlying FisherMap data for the Cornish inshore area used in the MCZ Fisheries Model does not allow for species-specific analysis. To address this, an alternative estimate has been provided which reflects the preference for netters to target crawfish on the rocky habitat of the Bann Shoal and Cape Bank. The alternative method used assumes that:

Scenario 1: No impacts are anticipated under this scenario.

Scenario 2: A prohibition of crawfish landings from within the rMCZ would significantly reduce the viability of netting in the Cape Bank/Bann Shoal area (Netter skipper, pers. comm., 2011). Displaced fishers are likely to have to increase their effort in other fishing grounds and/or switch to other gear types.

Scenarios 3 and 4: A zoned closure or full closure of the rMCZ would significantly impact on the revenues of the (up to) 5 affected vessels and potentially the viability of their businesses. Displaced fishers are likely to have to increase their effort in other fishing grounds and/or switch to other gear types (Netter skipper, pers. comm., 2011).

Estimated annual value of UK net landings affected is expected to fall within the following range:

£m/yr	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Value of landings affected	0	0.064	0.072	0.088

Scenarios 2, 3 and 4 will significantly affect the viability of affected fishers' businesses, particularly during the summer months when their fishing effort is focused on the Bann Shoal and Cape Bank area (Netter skipper, pers. comm., 2011). It is unlikely that vessels could adequately increase effort in their other grounds or use other gear types as the Cape Bank fishing ground is their principal summer fishery. Other grounds and use of other gear types are more suited to other seasons (netter skipper, pers. comm., 2011).

The loss of landings from the rMCZ will significantly impact on each vessel's total landings during the summer. If they are unable to adapt their fishing patterns, it is likely that their businesses would no longer be considered viable on a full-time basis and the rMCZ would thereby affect a significantly higher value of landings.

If the SAC results in restrictions to fishing with nets, then this may reduce the potential impact of the rMCZ.

In establishing the draft conservation objectives, the site features were assessed as having low vulnerability to fishing with nets at current levels. Where this is the case, this activity

<table>
<tr><th>Table 2b. Commercial fisheries</th><th>rMCZ Cape Bank</th></tr>
<tr><td>(i) the wider fishery (covering ICES Rectangle 29E4) is the source of nearly 27% of the value of all UK crawfish landings, 76% (£0.067m/yr) of which are caught by netters (MMO, 2011a);
(ii) all crawfish landings by nets from ICES Rectangle 29E4 occur over the areas of rock habitat around the Cape Bank and Bann Shoal, 95% of which is inside the rMCZ (calculations based on EUNIS Level 3 broad-scale habitat mapping).
Based on these assumptions, the value of crawfish landings by netters from the rMCZ is estimated to be £0.064m/yr. This estimate is employed for the analysis to avoid underestimation of costs.</td><td>was not the primary reason for assigning 'recover' conservation objective(s). As such, it is anticipated that, if 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>UK Hooks and lines: The wider Cape Bank and Bann Shoal area is regularly fished by at least 7–12 day-boat vessels from Hayle and St Ives (Two hand line skippers, pers. comm., 2011). The rMCZ is situated within this fishing ground. In summer 2011, the mackerel catch was relatively poor and this resulted in increased numbers of hand liners (more than 20) choosing to target pollack in that fishing ground, including within the rMCZ (Hand line skipper, pers. comm., 2011). The vessels using hooks and lines typically fish more than one gear type.
Activity in the rMCZ is limited to when weather conditions are suitable, which is typically during the summer. Hand liners target pollack in the rMCZ and wider Bann Shoal and Cape Bank fishing ground, with cod as occasional bycatch. Regular fishers in the rMCZ also occasionally target mackerel and bass in grounds close inshore (outside the rMCZ) around St Ives and Land's End, while occasional fishers in the rMCZ primarily fish on the mackerel and bass grounds (Hand line skipper, pers. comm., 2011).
Modelled estimated value of UK hook and line landings from the rMCZ: £0.063m/yr.
The importance of the fishery identified through discussions with fishers and</td><td>Scenarios 1 and 2: No impacts are anticipated under this scenario.
Scenarios 3 and 4: The Bann Shoal and Cape Bank fishing ground, which is the focus of hand line fishing effort in the rMCZ, is covered by the closed areas of both scenarios. As such, the impacts under each scenario are expected to be the same.
Closure of the rMCZ to hooks and lines is expected to remove the majority of the total fishing income earned by the at least 7–12 regular hand line vessels that fish in the rMCZ. As the rMCZ covers approximately 95% of the Bann Shoal and Cape Bank fishing ground, the affected vessels will have to move to new fisheries, such as the nearshore mackerel and bass fishery, or increase their effort using other gear types. If these vessels are not able to successfully adapt then the closure is likely to make their businesses unviable.
For vessels that occasionally hand line in the rMCZ, the closure will remove an important occasional summer fishery, which allows them to maintain a good level of landings value in years when mackerel catches are poor (such as in 2011).
The estimated annual value of UK hook and line landings affected is expected to fall within the following range:
<table>
<tr><td>£m/yr</td><td>Scenario 1</td><td>Scenario 2</td><td>Scenario 3</td><td>Scenario 4</td></tr>
<tr><td>Value of landings affected</td><td>0.000</td><td>0.000</td><td>0.100</td><td>0.100</td></tr>
</table>
</td></tr>
</table>

Table 2b. Commercial fisheries	**rMCZ Cape Bank**
fisheries representatives indicates that this may be an underestimate as the pollack fishing ground is focussed on the hard ground within the rMCZ (Hand line skippers, pers. comms., 2011) Visual analysis of a regular Bann Shoal and Cape Bank hand line vessel's waypoints (specific places where the vessel fishes) showed a concentration of fishing marks following the hard ground of the Bann Shoal and Cape Bank, inside the rMCZ, which define the fishing ground. The rMCZ covers approximately 95% of the fishing ground (calculation based on the area of circalittoral rock in EUNIS Level 3 habitat mapping that is over the Bann Shoal and Cape Bank area). In addition, there is low confidence in the underlying FisherMap data for the Cornish inshore area used in the MCZ Fisheries Model. (This is because the underlying FisheMap data do not distinguish between fishing using pots and traps, nets, and hooks and lines).. As fishing effort with nets and, in particular, with pots and traps is less focused on the rocky area of the Bann Shoal and Cape Bank, analysis based on the FisherMap data is therefore likely to underestimate the level of effort by hook and line vessels that takes place over the rocky area. To address this, an alternative estimate has been provided which reflects the preference for hand liners to target pollack on the rocky habitat of the Bann Shoal and Cape Bank. The alternative method uses the following assumptions: (i) The Cape Bank and Bann Shoal fishing ground is thought to account for the vast majority of hand-line-caught pollack from ICES Rectangle 29E4 (Two hand line skippers, pers. comm., 2011). It is assumed that 80% (an arbitrary figure based on information provided by a hand line skipper (pers. comm., 2011)) of the value of pollack landings from ICES Rectangle 27E4, which averaged £0.095m/yr between 2007 and 2010 (MMO, 2011a), are from the hard ground of the Bann Shoal and Cape Bank. (ii) 95% of vessel landings from the Bann Shoal and Cape Bank fishing ground are from within the rMCZ. This is calculated as the percentage of	If the SAC results in restrictions to fishing with hooks and lines, then this may reduce the potential impact of the rMCZ. In establishing the draft conservation objectives, the site features were assessed as having low vulnerability to fishing with hooks and lines at current levels. Where this is the case, this activity was not the primary reason for assigning 'recover' conservation objective(s). As such, it is anticipated that, if 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.

<table>
<tr><th colspan="2">Table 2b. Commercial fisheries rMCZ Cape Bank</th></tr>
<tr><td>the area of circalittoral rock over the Bann Shoal and Cape Banks area shown in EUNIS Level 3 habitat mapping which is within the rMCZ.

(iii) Pollack accounts for 90% of the value of landings by hand liners from the Bann Shoal and Cape Bank fishing ground. This is based on analysis of landings by a single vessel that works principally in the Bann Shoal and Cape Bank fishing ground (MMO, 2011a).

Alternative estimated value of UK hook and line landings from the rMCZ: £0.100m/yr. This estimate is employed for the analysis to avoid underestimation of costs.</td><td></td></tr>
<tr><th colspan="2">Total direct impact</th></tr>
<tr><td>Total direct impact on UK commercial fishing</td><td>Estimated annual value of UK vessel landings and gross value added (GVA) affected are expected to fall within the following range:

<table><tr><td>£m/yr</td><td>Scenario 1</td><td>Scenario 2</td><td>Scenario 3</td><td>Scenario 4</td></tr><tr><td>Value of landings affected</td><td>0.000</td><td>0.172</td><td>0.585</td><td>0.635</td></tr><tr><td>GVA affected</td><td>0.000</td><td>0.075</td><td>0.285</td><td>0.309</td></tr></table>
If the SAC results in restrictions to fishing, then this may reduce the potential impact of the rMCZ.</td></tr>
<tr><td>Impact on non-UK commercial fishing: Non-UK vessels (French and Belgian) using static gears, bottom trawls/dredges and mid-water trawls fish within the rMCZ (Lee, 2010). There are 14 French vessels of over 15 metres that bottom trawl in the rMCZ for species including rays, squid, cuttlefish, pollack and bass (Basse Normandie, pers. comm., 2011). They fish in the rMCZ year-round. Rising fuel costs have resulted in an increase in activity by these boats in the wider south-west region (Basse Normandie, pers. comm., 2011).

Estimated value of landings from the rMCZ by French vessels: bottom</td><td>Scenario 1: No impacts are anticipated under Scenario 1.

Scenarios 2, 3 and 4: Non-UK vessels using static gear and bottom trawls/dredges will be affected by the rMCZ, including 14 French bottom trawlers. In the event of a full closure of the rMCZ, the estimated value of French landings affected will be: £0.205m/yr (bottom trawls/dredges) and £0.005m/yr (static gears). No information on the effect of the prohibition of crawfish removal, the zoned closure to static gears or the value of landings affected for Belgian vessels is available.</td></tr>
</table>

Table 2b. Commercial fisheries	**rMCZ Cape Bank**
trawls/dredges: £0.205m/yr; static gears: £0.005m/yr (Direction des Pêches Maritimes et de l' Aquaculture, 2011). Estimates are not available for other countries.	

Table 2c. National defence	**rMCZ Cape Bank**
Source of costs of the 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. 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 for water column activities.	It is not known whether this rMCZ will impact on MOD's activity. Impacts of rMCZs on MOD activities are assessed in Annex O and the Evidence Base (they are not assessed for this rMCZ alone).

Table 2d. Renewable energy	**rMCZ Cape Bank**
Source of costs of the 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 rMCZ 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 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>
<tr><th>Table 2d. Renewable energy</th><th>rMCZ Cape Bank</th></tr>
<tr><td>Tidal energy: The rMCZ overlaps with the Land's End coastal tidal energy Potential Development Area (PDA) (PMSS, 2010). Any potential installation could have a footprint within the PDA of 5km^2 (PMSS, 2010) covering 2.6% of the PDA. The rMCZ covers 6.7% of the PDA. As the location of the potential energy generation installation is not known, the possible overlap of inter-array and export cables with the rMCZ is also not known. One potential energy installation is anticipated in the PDA, with the associated licence application expected in 2030 (Department of Energy and Climate Change (DECC), pers. comm., 2011). The development in the PDA is expected to have a production capacity of 150MW (PMSS, 2010).</td><td>Tidal energy: The estimated cost to tidal energy developers of this rMCZ is expected to fall within the following range of scenarios:
<table><tr><td>£m (one-off cost)</td><td>Scenario 1</td><td>Scenario 2</td></tr><tr><td>Cost to the operator</td><td>0.012</td><td>At least 0.012</td></tr></table>Scenario 1: The analysis assumes that the potential future tidal energy installation is planned within, or within close proximity to, the rMCZ. As a result of the designation of the rMCZ, the potential licence application for the tidal energy installation will need to consider the possible effects of construction and operational activities on the features protected by the rMCZ and the rMCZ conservation objectives. This is expected to result in an additional one-off cost of £0.012m in 2015 (based on an average cost provided by renewable energy sector developers; see Annex O for details).

Scenario 2: In addition to the costs set out under scenario 1, further costs may occur under Scenario 2. The mitigation requires the use of alternative cable protection for export and inter-array cables that have not yet been consented. As the actual location of the potential installation is unknown, it is unclear whether any cables will sought that pass through the rMCZ, and if they are what length of cable may be affected. The cost of this mitigation measure is estimated to be £1.000m/km of cable (average of wind energy developers; see Annex H13 for details) and, as such, the total mitigation cost could be significant.

The likelihood and magnitude of any additional costs cannot be calculated. However, JNCC and Natural England (pers. comm., 2012) state that the likelihood of this mitigation being required is very low. Further details are provided in Annex H14.

The impacts that are assessed in both scenarios are based on JNCC and Natural England's advice on the mitigation that could be required.</td></tr>
<tr><td>Wave energy: The rMCZ overlaps with the Isles of Scilly wave energy PDA. Any likely installation in the Isles of Scilly PDA could have a footprint within the PDA of 40km^2, covering 1.6% of the PDA (PMSS, 2010). The rMCZ covers 3.2% of the PDA. As the location of the potential installation is not known, the possible overlap of inter-array and export cables with the rMCZ is</td><td>Wave energy: The estimated cost to wave energy developers of this rMCZ is expected to fall within the following range of scenarios:
<table><tr><td>£m (one-off cost)</td><td>Scenario 1</td><td>Scenario 2</td></tr><tr><td>Cost to the operator</td><td>0.013</td><td>At least 0.013</td></tr></table></td></tr>
</table>

Table 2d. Renewable energy	**rMCZ Cape Bank**
also not known. One potential energy installation is anticipated in the PDA, with the associated licence application expected in the period 2015–20 (DECC, pers. comm., 2011). The development in the PDA is expected to have a production capacity of 400MW by 2030 (PMSS, 2010).	***Scenario 1:*** Assuming that the potential future installation is planned within, or within close proximity to, the rMCZ, as a result of the designation of the rMCZ, the potential licence application for the wave energy installation will need to consider the possible effects of construction and operational activities on the features protected by the rMCZ and the rMCZ conservation objectives. This is expected to result in an additional one-off cost of £0.013m in 2015 (based on an average cost provided by renewable energy sector developers; see Annex O for details). ***Scenario 2:*** In addition to the costs set out under scenario 1, further costs may occur under Scenario 2 if use of removable frond mattressing for cable protection is required to mitigate the impacts of scour protection. . As the actual location of the potential installation is unknown, it is unclear whether any cables will need to pass through the rMCZ, and if they are what length of cable may be affected. The cost of this mitigation measure is estimated to be £1.000m/km of cable (average of wind energy developers; see Annex H13 for details) and, as such, the total mitigation cost could be significant. However, the likelihood and magnitude of any additional costs cannot be calculated.

Table 2e. Other impacts that are assessed for the suite of MCZs and not for this site alone	**rMCZ Cape Bank**
Cables (interconnectors and telecom cables): Future interconnectors and telecom cables may pass through the rMCZ. Impacts of rMCZs on future interconnectors and telecom cables are assessed in the Evidence Base, Annex H3 and Annex N3 (they are not assessed for this site alone). **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 the oil and gas related activities are assessed in the Evidence Base, Annex H10 and Annex N9 (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 Cape Bank**
Cables (existing interconnectors and telecom cables)	
Commercial fisheries (mid-water trawls); recreation	

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 Cape Bank**
Baseline	**Beneficial impact**	
Fletcher and others (2012) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) contribute to the delivery of fish and shellfish services. Circalittoral rock provides a firm substrate for species attachment and important inshore crab and lobster fisheries, and subtidal coarse sediment helps to support a number of fisheries (Fletcher and others, 2012). Crawfish *Palinurus elephas* is a commercially targeted species. The baseline quantity and quality of service provided is assumed to be commensurate with that provided by the features of the site when in unfavourable condition. A description of on-site fishing activity and the value derived from it is set out in Table 2b.	If the conservation objectives of the features are achieved, the features will be recovered to favourable condition. Additional management (above that in the baseline situation) of fishing activities is expected, the costs of which are set out in Table 2b. Achievement of the conservation objectives may improve the contribution of the habitats to the provision of fish and shellfish for human consumption. Management of fishing activity within the rMCZ may reduce the on-site fishing mortality of species, which may benefit commercial stocks. The rMCZ is relatively large with a relatively high level of current fishing effort, and the potential reduction in fishing pressure may benefit commercial stocks of mobile and less mobile species. Crawfish stocks may also improve and, depending on whether targeting of crawfish is permitted within the rMCZ, on-site and/or off-site spill-over benefits may occur.	Anticipated direction of change: ⇧ Confidence : Low

Table 4a. Fish and shellfish for human consumption		**rMCZ Cape Bank**
	If rMCZ management involves reduced mobile gear effort, but no reductions in static gear fishing, this may reduce gear conflict between mobile and static gear fishers. Reduced gear conflict may reduce the cost of fishing in the rMCZ for static gear fishers. The potential benefits described here do not include the negative impacts of the additional fisheries management on fish and shellfish provision or the off-site impacts of displaced effort.	

Table 4b. Recreation		**rMCZ Cape Bank**
Baseline	**Beneficial impact**	
No recreational activities are known to occur in or near the recommended Marine Conservation Zone.	N/A	N/A

Table 4c. Research and education		**rMCZ: Cape Bank**
Baseline	**Beneficial impact**	
Research: Fletcher and others (2012) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) can contribute to the delivery of research services. The rMCZ overlaps a Special Area of Conservation and research activities may occur in relation to the designation.	Monitoring of the rMCZ 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: ⇧ Confidence: High
Education: Fletcher and others (2012) identify that the features to be	As the rMCZ is offshore and therefore relatively inaccessible, no benefits are	Anticipated

Table 4c. Research and education		**rMCZ: Cape Bank**
protected by the rMCZ can contribute to the delivery of education services. No known education activity is focused on the area of the rMCZ.	likely to arise from direct use of the site for education. 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).	direction of change: ⇧ Confidence: Low

Table 4d. Regulating services		**rMCZ Cape Bank**
Baseline	**Beneficial impact**	
Regulation of pollution: The features of the site contribute to the bioremediation of waste and sequestration of carbon. Marine sediments, through processes that occur in their upper layers, play an important role in the global cycling of many elements, including carbon and nitrogen (Fletcher and others, 2012). ***Environmental resilience:*** The features of the site contribute to the resilience and continued regeneration of marine ecosystems. Subtidal sediments found in sheltered or deeper water are particularly diverse habitats and rock can support particularly high levels of biodiversity (Fletcher and others, 2012). ***Natural hazard protection:*** As the site is offshore, it is unlikely to contribute to providing natural hazard protection. It has not been possible to estimate the value of regulating services in the site.	If the conservation objectives are achieved, the features of the site will be recovered to favourable condition. Improved habitat condition and a potential reduction in anthropogenic pressures, including from bottom-towed fishing gear, may increase site benthic biodiversity and biomass, improving the regulating capacity of the site habitats.	Anticipated direction of change: ⇧ Confidence: Low

Table 4e. Non-use and option values		**rMCZ Cape Bank**
Baseline	**Beneficial impact**	

Table 4e. Non-use and option values		**rMCZ Cape Bank**
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) and the ecosystem services provided, even if they do not currently benefit from them. It has not been possible to estimate the non-use value of the rMCZ.	The rMCZ will benefit the proportion of the UK population that values conservation of the MCZ 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 will protect both the features and the option to benefit from the services in the future from the risk of future degradation. Examples of these values are shown in Ranger and others (2012). Voters in the Marine Conservation Society's 'Your Seas Your Voice' campaign expressed a desire to protect 'the undersea plants and animals'.	Anticipated direction of change:  Confidence: Moderate

rMCZ Reference Area Cape Bank

Site area (km^2): 25.0

Table 1. Conservation impacts — **rMCZ Reference Area Cape Bank**

1a. Ecological description

The site includes the Cape Bank section of the Land's End and Cape Bank candidate Special Area of Conservation. The site's south-westerly position on the British coast means that the sublittoral zone is exposed to the full force of the waves and oceanic swells coming in from the Atlantic, as well as experiencing full salinity, given the absence of any major source of fresh water run-off from the land. The recommended Marine Conservation Zone (rMCZ) intersects an area of added ecological importance for the pelagic realm, with frontal activity and summer foraging birds, including sea bird colonies from the Isles of Scilly such as kittiwakes, puffins, guillemots and razorbills. Fin whales are present in the area in winter.

The crescent-shaped system of offshore upstanding rocky reefs forms the major Feature of Conservation Importance. It measures about 35km along its central spine and 12km at its widest point. The rMCZ covers an area of 5km^2 and the site's depth range is between 35 metres and 60 metres below sea level. The reef is characterised by high biodiversity tide-swept communities such as sponges, faunal and algal turfs and crustose communities. The offshore upstanding rocky reef areas are the most biodiverse of all the rocky reef habitats within the site. The most abundant biotope in this area is Devonshire cup coral *Caryophyllia smithii* and sponges, with *Pentapora foliacea*, *Porella compressa* and crustose communities on wave-exposed circalittoral rock (Lieberknecht and others, 2011).

1b. MCZ Feature Baseline and Impact of MCZ

Feature	Area of feature (km2)	No. of point records	Baseline	Impact of MCZ
Broad-scale Habitats				
High energy circalittoral rock	0.42	-	Unfavourable Condition	Recover to Reference Condition
High energy infralittoral rock	0.70	-	Unfavourable Condition	Recover to Reference Condition
Moderate energy circalittoral rock	20.59	-	Unfavourable Condition	Recover to Reference Condition
Moderate energy infralittoral rock	0.69	-	Unfavourable Condition	Recover to Reference Condition
Subtidal coarse sediment	2.60	-	Unfavourable Condition	Recover to Reference Condition
Species of Conservation Importance				
Euincella verrucosa	-	1	Unfavourable Condition	Recover to Reference Condition
Palinurus elephas	-	1	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 Reference Area Cape Bank**
Source of costs of the 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. Multiple management scenarios have been identified for the Impact Assessment which reflect this uncertainty. Should the site be designated, the management that will be required is likely to fall somewhere within this range.	
Management scenario 1: Closure of entire rMCZ to all commercial fishing, except mid-water trawls.	
Management scenario 2: Closure of entire rMCZ to all commercial fishing.	
Baseline description of activity	**Costs of impact of rMCZ on the sector**
Overview: The rMCZ is situated between the 6nm (nautical mile) and 12nm limits and is fished by vessels from the UK, France and Belgium. Due to the rocky nature of the habitat within the rMCZ, there is very limited activity by bottom trawls. Potting, netting and hand lining are commonplace throughout the rMCZ, with fishers particularly targeting the hard ground of the Cape Bank and Bann Shoal areas. There are a number of existing restrictions on fishing in the rMCZ (see Annex E). In addition, the Land's End and Cape Bank Special Area of Conservation (SAC) may restrict fishing activity within the rMCZ. Estimated total value of UK vessel landings from the rMCZ: £0.058m/yr.	

<table>
<tr><th>Table 2a. Commercial fisheries</th><th>rMCZ Reference Area Cape Bank</th></tr>
<tr><td>UK Bottom trawls: The rMCZ does not cover a known bottom trawling ground and the rocky nature of the area makes fishing unlikely to occur. Estimated value of UK bottom trawl landings from the rMCZ: £0.002m/yr.</td><td>Scenarios 1 and 2: The rMCZ covers an area of ground thought not to be suitable for trawling, and average annual landings from it are estimated to be low. No significant impacts are therefore anticipated.

Estimated annual value of UK vessel bottom trawl landings affected is expected to fall within the following range:
<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>0.002</td></tr></table>
If the SAC results in restrictions to fishing with bottom trawls, then this may reduce the potential impact of the rMCZ.</td></tr>
<tr><td>UK Pots and traps: There is a significant level of potting throughout the rMCZ and wider area. Up to 5 (Cornish Fish Producers Organisation (CFPO), pers. comm., 2011) large (over 15 metre) Cornish vessels working up to 1,200 pots (Ghey, 2007) operate nomadically in an area from within the rMCZ to north of Newquay. Estimated value of UK pot and trap landings from the rMCZ: £0.022m/yr.</td><td>Scenarios 1 and 2: The rMCZ will displace affected fishers who employ pots and traps to other parts of the fishing ground described in the baseline. This may affect catch rates and, given the large number of pots worked by the vessels, may increase conflict with other gear types and with smaller potters working in other areas.

Estimated annual value of UK vessel pot and trap landings affected is expected to fall within the following range:
<table><tr><td>£m/yr</td><td>Scenario 1</td><td>Scenario 2</td></tr><tr><td>Value of landings affected</td><td>0.022</td><td>0.022</td></tr></table>
If the SAC results in restrictions to fishing with pots and traps, then this may reduce the potential impact of the rMCZ.</td></tr>
<tr><td>UK Nets: There is a significant level of netting throughout the rMCZ and wider area. Fewer than 5 vessels regularly fish in the rMCZ (Net skipper, pers. comm., 2011). At least 7 vessels fish in the rMCZ occasionally in any given year (Hand line skipper, pers. comm., 2011). The vessels fish multiple gears but principally use tangle nets within the rMCZ. Fishing is only possible</td><td>Scenarios 1 and 2: The rMCZ would reduce the viability of netting in the Bann Shoal and Cape Bank fishing ground. Displaced fishers may increase their effort in the remainder of the ground, in other fishing grounds and/or switch to other gear types.

The location of the rMCZ in the middle of the Bann Shoal and Cape Bank fishing ground may increase steaming time and reduce landings for vessels that fish the ground if they</td></tr>
</table>

<table>
<tr><th>Table 2a. Commercial fisheries</th><th>rMCZ Reference Area Cape Bank</th></tr>
<tr><td>during periods of settled weather due to the boat sizes and distance from shore, and therefore normally occurs during the summer. Estimated value of UK net landings from the rMCZ: £0.007m/yr.</td><td>need to move their fishing effort between the northern and southern parts of the fishing ground in a single day's fishing.

Estimated annual value of UK net landings affected is expected to fall within the following range:
<table><tr><td>£m/yr</td><td>Scenario 1</td><td>Scenario 2</td></tr><tr><td>Value of landings affected</td><td>0.007</td><td>0.007</td></tr></table></td></tr>
<tr><td>UK Hooks and lines: The wider Cape Bank and Bann Shoal area is regularly fished by at least 7–12 day-boat vessels from Hayle and St Ives (Two hand line skippers, pers. comm., 2011). The rMCZ is situated within this fishing ground. In summer 2011, the mackerel catch was relatively poor and this resulted in an increased number (more than 20) of hand liners choosing to target pollack in that fishing ground, including within the rMCZ (Hand line skipper, pers. comm., 2011). The vessels using hooks and lines typically fish more than one gear type.

Activity in the rMCZ is limited to when weather conditions are suitable, which is typically during the summer. Hand liners target pollack in the rMCZ and wider Bann Shoal and Cape Bank fishing ground, with cod as occasional bycatch. Regular fishers in the rMCZ also occasionally target mackerel and bass in grounds close inshore (outside the rMCZ) around St Ives and Land's End, while occasional fishers in the rMCZ primarily fish on the mackerel and bass grounds.

Estimated value of UK hook and line landings from the rMCZ: £0.005m/yr (MCZ Fisheries Model).

The importance of the fishery identified through discussions with fishers and fisheries representatives indicates that this may be an underestimate, as the pollack fishing ground is focussed on the hard ground within the rMCZ (Hand line skippers, pers. comms., 2011). Visual analysis of a regular Bann Shoal and Cape Bank hand line vessel's waypoints – specific places where the</td><td>Scenarios 1 and 2: Closure of the rMCZ to hooks and lines is expected to have a significant impact on the landings of at least 7–12 regular hand line vessels that fish in the rMCZ RA. The affected vessels may increase effort elsewhere in the fishing ground (as the rMCZ does not cover the whole ground, and/or may be increase increase effort in other fisheries, such as the nearshore mackerel and bass fishery, or increase their effort using other gear types. If these vessels cannot successfully adapt, then the closure will significantly reduce the viability of their businesses (Hand line skipper, pers. comm., 2011).

For vessels that occasionally hand line in the rMCZ, the closure will remove an important occasional summer fishery, which allows them to maintain a good level of landings value in years when mackerel catches are poor (such as in 2011).

The location of the rMCZ in the middle of the Bann Shoal and Cape Bank fishing ground may increase steaming time and reduce landings for vessels that fish the ground if they need to move their fishing effort between the northern and southern parts of the fishing ground in a single day's fishing. This could occur when catches are not forthcoming at the targeted waypoints, or if other fishers are already active around the targeted waypoints, and would make the fishing ground less viable.

The estimated annual value of UK hook and line landings affected is expected to fall within the following range:
<table><tr><td>£m/yr</td><td>Scenario 1</td><td>Scenario 2</td></tr><tr><td>Value of landings affected</td><td>0.027</td><td>0.027</td></tr></table>If the SAC results in restrictions to fishing with hooks and lines, then this may reduce the</td></tr>
</table>

Table 2a. Commercial fisheries	**rMCZ Reference Area Cape Bank**
vessel fishes – showed a concentration of fishing marks following the hard ground of the Cape Bank and Bann Shoal, inside the rMCZ. It was estimated that approximately 25% of the fishers' waypoints fall within the rMCZ and it was acknowledged that they may account for an even higher proportion of landings from the fishing ground (Hand line skipper, pers. comm., 2011). In addition, there is low confidence in the underlying FisherMap data for the Cornish inshore area used in the MCZ Fisheries Model. (This is because the underlying FisheMap data do not distinguish between fishing using pots and traps, nets, and hooks and lines). To address this, an alternative estimate has been provided which reflects the preference for hand liners to target pollack on the rocky habitat of the Bann Shoal and Cape Bank. The alternative estimate is based on the following assumptions: (i) The Cape Bank and Bann Shoal fishing ground is thought to account for the vast majority of hand-line-caught pollack from International Council for the Exploration of the Sea (ICES) Rectangle 29E4 (Two hand line skippers, pers. comm., 2011). It is assumed that 80% (an arbitrary figure based on information provided by a hand line skipper (pers. comm., 2011)) of the value of pollack landings from ICES Rectangle 27E4, which averaged £0.095m/yr between 2007 and 2010 (MMO, 2011a), are from the hard ground of the Bann Shoal and Cape Bank. (ii) 25% (based on visual analysis of a single fisher's waypoints described earlier) of vessel landings from the Bann Shoal and Cape Bank fishing ground are from within the rMCZ. (iii) Pollack accounts for 90% of the value of landings by hand liners from the Bann Shoal and Cape Bank fishing ground (based on analysis of landings by a single vessel that works principally in the Bann Shoal and Cape Banks fishing ground [MMO, 2011a]). Alternative estimated value of landings from the rMCZ: £0.027m/yr. This estimate is employed for the analysis to avoid underestimation of costs.	potential impact of the rMCZ.

<table>
<tr><th colspan="2">Table 2a. Commercial fisheries</th><th>rMCZ Reference Area Cape Bank</th></tr>
<tr><td colspan="3">Total direct impact</td></tr>
<tr><td>Total direct impact on UK commercial fishing</td><td colspan="2">Estimated annual value of UK vessel landings and gross value added (GVA) affected are expected to fall within the following range:
<table><tr><td>£m/yr</td><td>Scenario 1</td><td>Scenario 2</td></tr><tr><td>Value of landings affected</td><td>0.058</td><td>0.058</td></tr><tr><td>GVA affected</td><td>0.030</td><td>0.030</td></tr></table></td></tr>
<tr><td>Impact on non-UK commercial fishing: Non-UK vessels using static gears, bottom trawls/dredges (including 14 French bottom trawlers), and mid-water trawls may fish within the rMCZ (Lee, 201). Rising fuel costs have resulted in an increase in activity by the French vessels in the wider south-west region (Basse Normandie, pers. comm., 2011).

Estimated value of landings from the rMCZ by French vessels: bottom trawls/dredges: £0.000m/yr; static gears: £0.000m/yr (Direction des Pêches Maritimes et de l' Aquaculture, 2011). Given that other evidence indicates that French vessels fish within the rMCZ, this may be an underestimate of landings. Estimates are not available for other countries.</td><td colspan="2">Scenario 1: Non-UK vessels using static gears, bottom trawls/dredges, including 14 French bottom trawlers, may be affected by the rMCZ. No further information on the impacts of the rMCZ was received from non-UK fisheries organisations/associations. Estimated value of French vessel landings affected is close to zero. It has not been possible to obtain information on the value of other non-UK vessel landings affected by the rMCZ.

Scenario 2: In addition to the impacts described under Scenario 1, non-UK mid-water trawlers will also be affected under Scenario 2. No further information on the impacts of the rMCZ was received from non-UK fisheries organisations/associations. It has not been possible to obtain information on the value of non-UK vessel landings affected by the rMCZ.</td></tr>
</table>

<table>
<tr><th colspan="2">Table 2b. Recreation</th><th>rMCZ Reference Area Cape Bank</th></tr>
<tr><td colspan="3">Source of costs of the rMCZ
Recreational angling management scenario: Closure of rMCZ to recreational angling.</td></tr>
<tr><td>Baseline description of activity</td><td colspan="2">Costs of impact of rMCZ on the sector</td></tr>
<tr><td>Angling: There is potentially a low level of angling from private boats but it is unlikely that charter boats visit the rMCZ (Professional Boatman's Association, pers. comm., 2011).</td><td colspan="2">There are unlikely to be any significant impacts on recreational anglers. It is anticipated that the few anglers who currently use the site will respond to the closure to angling by fishing at alternative locations in the vicinity.</td></tr>
</table>

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 Reference Area Cape Bank**
None.	

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 Reference Area Cape Bank**
Baseline	**Beneficial impact**	
Fletcher and others (2012) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) contribute to the delivery of fish and shellfish services. Circalittoral rock is the predominant habitat in the rMCZ, and provides a firm substrate for species attachment and important inshore crab and lobster fisheries (Fletcher and others, 2012). Crawfish *Palinurus elephas* is a commercially targeted species. The baseline quantity and quality of service provided is assumed to be commensurate with that provided by the features of the site when in unfavourable condition. A description of on-site fishing activity and the value derived from it is set out in Table 2b.	If the conservation objectives of the features are achieved, the features will be recovered to reference condition. Additional management (above that in the baseline situation) of fishing activities is expected which will prohibit fishing within the rMCZ, the costs of which are set out in Table 2b. Achievement of the conservation objectives may improve the contribution of the habitats to the provision of fish and shellfish for human consumption. Management of fishing activity within the rMCZ may reduce the on-site fishing mortality of species, which may benefit commercial stocks. As the rMCZ is small, it is unclear whether it would have any impact on stocks of mobile commercial finfish species. Low mobility and site-attached species populations, such as crab and crawfish, may improve as a result of reduced fishing pressure. Localised beneficial spill-over effects may occur around the rMCZ. As no fishing will be permitted within the rMCZ, no on-site benefits will be	Anticipated direction of change: ⇧ Confidence : Low

Table 4a. Fish and shellfish for human consumption		**rMCZ Reference Area Cape Bank**
	realised. The potential benefits described here do not include the negative impacts of the additional fisheries management on fish and shellfish provision or the off-site impacts of displaced effort.	

Table 4b. Recreation		**rMCZ Cape Bank Reference Area**
Baseline	**Beneficial impact**	
No recreational activities are known to occur in or near the recommended Marine Conservation Zone.	N/A	N/A

Table 4c. Research and education		**rMCZ Reference Area Cape Bank**
Baseline	**Beneficial impact**	
Research: Fletcher and others (2012) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) can contribute to the delivery of research services. The rMCZ overlaps with a Special Area of Conservation and, as such, ecological monitoring activities are currently ongoing.	As an rMCZ Reference Area, the site will provide an opportunity to demonstrate the state of its designated marine features in the context of prevailing environmental conditions and in the absence of many anthropogenic pressures. 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: ⇧ Confidence: High
Education: Fletcher and others (2012) identify that the features to be protected by the rMCZ can contribute to the delivery of education services. No known education activity is focused on the area of the rMCZ.	As the rMCZ is at least 15km offshore and therefore relatively inaccessible, no benefits are likely to arise from direct use of the site. Non-visitors may benefit if the rMCZ contributes to external educational	Anticipated direction of change:

Table 4c. Research and education		**rMCZ Reference Area Cape Bank**
	resources (e.g. television programmes, articles in magazines and newspapers, and educational resources developed for use in schools).	⇧ Confidence: Low

Table 4d. Regulating services		**rMCZ Reference Area Cape Bank**
Baseline	**Beneficial impact**	
Regulation of pollution: The features of the site contribute to the bioremediation of waste and sequestration of carbon. Marine sediments, through processes that occur in their upper layers, play an important role in the global cycling of many elements, including carbon and nitrogen (Fletcher and others, 2012). ***Environmental resilience:*** The features of the site contribute to the resilience and continued regeneration of marine ecosystems. Subtidal sediments found in sheltered or deeper water are particularly diverse habitats and rock habitats can support particularly high biodiversity (Fletcher and others, 2012). ***Natural hazard protection:*** As the site is offshore, its features are not thought to contribute to the delivery of this service (Fletcher and others, 2012). It has not been possible to estimate the value of regulating services in the site.	If the conservation objectives of the features are achieved, the features will be recovered to reference condition. Improved habitat condition and a reduction in anthropogenic pressures, including the use of bottom-towed fishing gear, may increase site benthic biodiversity and biomass, improving the regulating capacity of the site habitats.	Anticipated direction of change: ⇧ Confidence: Low

Table 4e. Non-use and option values		**rMCZ Reference Area Cape Bank**
Baseline	**Beneficial impact**	

Table 4e. Non-use and option values		**rMCZ Reference Area Cape Bank**
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) and the ecosystem services provided, even if they do not currently benefit from them. It has not been possible to estimate the non-use value of the rMCZ.	The rMCZ will benefit the proportion of the UK population that values conservation of the MCZ 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 will protect both the features and the option to benefit from the services in the future from the risk of future degradation. Examples of these values are shown in Ranger and others (2012). Voters in the Marine Conservation Society's 'Your Seas Your Voice' campaign expressed a desire to protect 'the undersea plants and animals'.	Anticipated direction of change:  Confidence: Moderate

rMCZ Celtic Deep

Site area (km^2): 347.79

Table 1. Conservation impacts	**rMCZ Celtic Deep**

1a. Ecological description

The southern tip of the site is approximately 112km to the north-west of Trevose Head, and the northern tip is approximately 84km from the Pembrokeshire coast in Wales. The depth is largely between 100 metres and 200 metres, constituting a depression on the sea floor in comparison with depths of less than 100 metres in the surrounding area. The sea floor is characterised by subtidal mud habitat, and the Celtic Deep recommended Marine Conservation Zone (rMCZ) is the only offshore area within the Finding Sanctuary Project Area where the 'mud habitats in deep water' Feature of Conservation Importance has been recorded. The deep water mud habitat is thought to be influenced by the relatively low levels of tidal stress.

At the edge of the Celtic Deep, the communities are typical of a 'boreal deep mud association' and include the brittlestars *Amphiura chiajei* and *Amphiura filiformis*, the bivalves *Nucula sulcata*, *Nucula tenuis*, *Thyasira flexuosa* and *Abra nitida*, and polychaetes *Myriochele heeri*, *Lagis* (now *Pectinaria*) *koreni* and *Amphicteis gunneri*.

The rMCZ intersects with an area where frontal systems occur during the summer months, indicating high productivity. Offshore bird observation data indicate that this is an important aggregation area for a number of sea bird species year-round. The area is also of importance for common dolphins (Lieberknecht and others, 2011).

1b. MCZ Feature Baseline and Impact of MCZ

Feature	Area of feature (km2)	No. of point records	Baseline	Impact of MCZ
Broad-scale Habitats				
Subtidal mud	347.97	-	Unfavourable Condition	Recover to Favourable Condition
Habitats of Conservation Importance				
Mud habitats in deep water	127.25	13	Unfavourable Condition	Recover to Favourable Condition

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

Table 2a. Commercial fisheries	**rMCZ Celtic Deep**

Source of costs of the rMCZ

The Joint Nature Conservation Committee (JNCC) and Natural England have advised that there is considerable uncertainty about whether additional management of

Table 2a. Commercial fisheries **rMCZ Celtic Deep**

commercial fishing gears will be required for certain features protected by this rMCZ. Multiple management scenarios have been identified for the Impact Assessment which reflect this uncertainty. Should the site be designated, the management that will be required is likely to fall somewhere within this range.

Management scenario 1: No additional management.

Management scenario 2: Closure of entire rMCZ to bottom trawls and dredges.

Baseline description of activity

Costs of impact of rMCZ on the sector

Overview: The rMCZ is close to the south-western edge of the UK's 200nm (nautical mile) fishery limit and exclusive economic zone. It covers part of a nephrops fishery targeted by UK, Irish, French and Belgian trawlers. There is no evidence of fishing effort with other gear types by UK vessels (MCZ Fisheries Model). In addition, non-UK vessels use static gears.

Estimated total value of UK vessel landings from the rMCZ: £0.024m/yr.

UK Bottom trawls: The rMCZ is located in the south-western corner of the most productive nephrops fishery in the south-west marine area (MMO, 2011a; Lee, 2010). Approximately three-quarters of UK vessels active in the area around the rMCZ (the area covered by International Council for the Exploration of the Sea (ICES) Rectangle 30E3) are from Northern Ireland, and range from 10 metres in length to over 30 metres (MMO, 2011a)

Estimated value of UK bottom trawl landings from the rMCZ: £0.024m/yr. There is no significant or regular beam trawl activity in the rMCZ.

Scenario 1: No impacts are anticipated under Scenario 1.

Scenario 2: Under this scenario, displaced trawlers may respond to the closure to bottom trawling by increasing their effort to the north east of the rMCZ in the remainder of the nephrops fishery overlapped by the rMCZ. The redeployment of effort to remaining grounds risks undermining the fishery's long-term sustainable yield and may result in increased fishing effort, and therefore costs, in order to catch equivalent levels (National Federation of Fishermen's Organisations (NFFO), pers. comm., 2012).

Estimated annual value of UK bottom trawl landings affected is expected to fall within the following range:

£m/yr	Scenario 1	Scenario 2
Value of landings affected	0.000	0.024

Total direct impact

<table>
<tr><th colspan="2">Table 2a. Commercial fisheries</th><th>rMCZ Celtic Deep</th></tr>
<tr><td>Total direct impact on UK commercial fishing</td><td colspan="2">Estimated annual value of UK vessel landings and gross value added (GVA) affected are expected to fall within the following range:
<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>0.024</td></tr><tr><td>GVA affected</td><td>0.000</td><td>0.010</td></tr></table></td></tr>
<tr><td>Impact on non-UK commercial fishing: Non-UK vessels using static gears, bottom trawls/dredges (in particular Belgian, French and Irish demersal trawlers) and mid-water trawls fish within the rMCZ (Lee, 2010; JNCC, pers. comm., 2012).

Estimated value of landings from the rMCZ by French vessels: bottom trawls/dredges: £0.351m/yr; static gears: <£0.001m/yr (Direction des Pêches Maritimes et de l' Aquaculture, 2011). Estimates are not available for other countries.</td><td colspan="2">Scenario 1: No impacts are anticipated under Scenario 1.

Scenario 2: Non-UK vessels using bottom trawls/dredges, in particular French and Irish vessels, will be affected by therMCZ.

The estimated value of French landings affected will be: £0.351m/yr (bottom trawls/dredges) and <£0.001m/yr (static gears). No information on the effect on other non-UK vessels is available.</td></tr>
</table>

Table 2b. Other impacts that are assessed for the suite of MCZs and not for this site alone	**rMCZ Celtic Deep**
Cables (interconnectors and telecom cables): Future interconnectors and telecom cables may pass through the rMCZ. Impacts of rMCZs on future interconnectors and telecom cables are assessed in the Evidence Base, Annex H3 and Annex N3 (they are not assessed for this site alone).	
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 the oil and gas related activities are assessed in the Evidence Base, Annex H10 and Annex N9 (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 Celtic Deep**
Cables (existing interconnectors and telecom cables), Commercial fisheries: mid-water trawls	

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 Celtic Deep**
Baseline	**Beneficial impact**	
Fletcher and others (2012) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) contribute to the delivery of fish and shellfish services. The mud habitats of the site support commercially targeted fish and shellfish species, of which *Nephrops* are the primary target (Fletcher and others, 2012). The baseline quantity and quality of service provided is assumed to be commensurate with that provided by the features of the site when in unfavourable condition. A description of on-site fishing activity and the value derived from it is set out in Table 2b.	If the conservation objectives of the features are achieved, they will be recovered to favourable condition. New management of fishing activities is expected (above the baseline situation), the costs of which are set out in Table 2b. Achievement of the conservation objectives may improve the contribution of the habitats to the provision of fish and shellfish for human consumption. Management of fishing activity within the rMCZ may reduce the on-site fishing mortality of species, which may benefit commercial stocks. The rMCZ is relatively large with a relatively high level of current fishing effort, and the potential reduction in fishing pressure may benefit commercial stocks of mobile and less mobile species. 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: ⇧ Confidence: Low

Table 4a. Fish and shellfish for human consumption		**rMCZ Celtic Deep**
	The potential benefits described here do not include the negative impacts of the additional fisheries management on fish and shellfish provision or the off-site impacts of displaced effort.	

Table 4b. Recreation		**rMCZ Celtic Deep**
Baseline	**Beneficial impact**	
No recreational activities are known to occur in or near the recommended Marine Conservation Zone.	N/A	N/A

Table 4c. Research and education		**rMCZ Celtic Deep**
Baseline	**Beneficial impact**	
Research: Fletcher and others (2012) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) can contribute to the delivery of research services. No known research activities are currently carried out in the rMCZ.	Monitoring of the rMCZ 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: ⇧

Table 4c. Research and education		**rMCZ Celtic Deep**
		Confidence: High
Education: Fletcher and others (2012) identify that the features to be protected by the rMCZ can contribute to the delivery of education services. No known education activity is focused on the area of the rMCZ.	As the rMCZ is offshore and therefore relatively inaccessible, no benefits are likely to arise from direct use of the site for education. 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: ⇧ Confidence: Low

Table 4d. Regulating services		**rMCZ Celtic Deep**
Baseline	**Beneficial impact**	
Regulation of pollution: The features of the site contribute to the bioremediation of waste and sequestration of carbon. Marine sediments, through processes that occur in their upper layers, play an important role in the global cycling of many elements, including carbon and nitrogen (Fletcher and others, 2012). ***Environmental resilience:*** The features of the site contribute to the resilience and continued regeneration of marine ecosystems. Due to their depth and low energy regime, deep water mud habitats are very stable and often highly diverse (Fletcher and others, 2012). ***Natural hazard protection:*** As the site is offshore, it is unlikely to contribute to providing natural hazard protection.	If the conservation objectives are achieved, the features of the site will be recovered to favourable condition. Improved habitat condition and a potential reduction in anthropogenic pressures, including from bottom-towed fishing gear, may increase site benthic biodiversity and biomass, improving the regulating capacity of the site habitats.	Anticipated direction of change: ⇧ Confidence: Low

Table 4d. Regulating services		**rMCZ Celtic Deep**
It has not been possible to estimate the value of regulating services in the site.		

Table 4e. Non-use and option values		**rMCZ Celtic Deep**
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) and the ecosystem services provided, even if they do not currently benefit from them. It has not been possible to estimate the non-use value of the rMCZ.	The rMCZ will benefit the proportion of the UK population that values conservation of the MCZ 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 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: ⇧ Confidence: Moderate

rMCZ Reference Area Celtic Deep

Site area (km^2): 1.0

Table 1. Conservation impacts				**rMCZ Reference Area Celtic Deep**
1a. Ecological description				
The depth of the site is 118 metres below chart datum, constituting a depression on the sea floor in comparison with depths of less than 100 metres in the surrounding area. The sea floor is characterised by subtidal mud habitat, and is the only offshore area in the Finding Sanctuary Project Area where the 'mud habitats in deep water' Feature of Conservation Importance has been recorded. The deep water mud habitat is thought to be influenced by the relatively low levels of tidal stress. At the edge of the Celtic Deep, the communities are typical of a 'boreal deep mud association' and include the brittlestars *Amphiura chiajei* and *Amphiura filiformis*, the bivalves *Nucula sulcata*, *Nucula tenuis*, *Thyasira flexuosa* and *Abra nitida*, and polychaetes *Myriochele heeri*, *Lagis* (now *Pectinaria*) *koreni* and *Amphicteis gunneri*. The recommended Marine Conservation Zone (rMCZ) intersects with an area where frontal systems occur during the summer months, indicating high productivity. Offshore bird observation data indicate that this is an important aggregation area for a number of sea bird species year-round. The area is also of importance for common dolphins (Lieberknecht and others, 2011).				
1b. MCZ Feature Baseline and Impact of MCZ				
Feature	**Area of feature (km2)**	**No. of point records**	**Baseline**	**Impact of MCZ**
Broad-scale Habitats				
Subtidal mud	1.0	-	Unfavourable Condition	Recover to Reference Condition
Habitats of Conservation Importance				
Mud habitats in deep water	1.0	6	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 Reference Area Celtic Deep**

Source of costs of the rMCZ

The Joint Nature Conservation Committee (JNCC) 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. Multiple management scenarios have been identified for the Impact Assessment which reflect this uncertainty. Should the site be designated, the management that will be required is likely to fall somewhere within this range.

Management scenario 1: Closure of rMCZ to all commercial fishing, except mid-water trawls.

Management scenario 2: Closure of rMCZ to all commercial fishing.

Baseline description of activity	**Costs of impact of rMCZ on the sector**
Overview: The rMCZ is close to the south-western edge of the UK's 200nm (nautical mile) fishery limit and exclusive economic zone. The rMCZ covers part of a nephrops fishery targeted by UK, Irish, French and Belgian trawlers. There is no evidence of any fishing effort with other gear types (MCZ Fisheries Model). The rMCZ is small, covering just 1km^2. Estimated total value of UK vessel landings from the rMCZ: <£0.001m/yr.	
UK Bottom trawls: The rMCZ is located in the south-western corner of the most productive nephrops fishery in the south-west marine area (MMO, 2011a; Lee, 2010). Approximately three-quarters of UK vessels active in the area around the rMCZ (the area covered by International Council for the Exploration of the Sea (ICES) Rectangle 30E3) are from Northern Ireland, with vessel sizes ranging from 10 metres in length to over 30 metres (MMO, 2011a). The rMCZ is small, covering just 1km^2, and landings from the area are low. Estimated value of UK bottom trawl landings from the rMCZ RA: <£0.001m/yr.	***Scenarios 1 and 2:*** The value of landings affected by the rMCZ is small, at <£0.001m/yr. No significant impacts are therefore expected as a result of the designation. Estimated annual value of UK bottom trawl landings affected is expected to fall within the following range:

£m/yr	Scenario 1	Scenario 2
Value of landings affected	<0.001	<0.001

Total direct impact

<table>
<tr><th colspan="2">Table 2a. Commercial fisheries</th><th>rMCZ Reference Area Celtic Deep</th></tr>
<tr><td>Total direct impact on UK commercial fishing</td><td colspan="2">Estimated annual value of UK vessel landings and gross value added (GVA) affected are expected to fall within the following range:
<table><tr><td>£m/yr</td><td>Scenario 1</td><td>Scenario 2</td></tr><tr><td>Value of landings affected</td><td><0.001</td><td><0.001</td></tr><tr><td>GVA affected</td><td><0.001</td><td><0.001</td></tr></table></td></tr>
<tr><td>Impact on non-UK commercial fishing: Non-UK vessels using static gears, bottom trawls/dredges (in particular Belgian, French and Irish demersal trawlers) and mid-water trawls fish within the rMCZ RA (Lee, 2010; JNCC, pers. comm., 2012). Estimated value of landings from the rMCZ by French vessels (all gears): £0.000m/yr (Direction des Pêches Maritimes et de l' Aquaculture, 2011). Estimates are not available for other countries</td><td colspan="2">Scenarios 1 and 2: Non-UK vessels using bottom trawls/dredges, in particular French and Irish vessels, will be affected by the rMCZ, although the value of landings by French vessels from the rMCZ is estimated to be zero. No further information on the impacts of the rMCZ was received from non-UK fisheries organisations/associations. It has not been possible to obtain information on the value of other non-UK vessel landings affected by the rMCZ.</td></tr>
</table>

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 Reference Area Celtic Deep**
None.	

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 Reference Area Celtic Deep**	
Baseline	**Beneficial impact**	
Fletcher and others (2012) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) contribute to the delivery of fish and shellfish services. The mud habitats of the site support commercially targeted fish and shellfish species, of which *Nephrops* are the primary target (Fletcher and others, 2012). The baseline quantity and quality of service provided is assumed to be commensurate with that provided by the features of the site when in unfavourable condition. A description of on-site fishing activity and the value derived from it is set out in Table 2a.	If the conservation objectives of the features are achieved, they will be recovered to favourable condition. Additional management (above that in the baseline situation) of fishing activities is expected which will prohibit fishing within the rMCZ, the costs of which are set out in Table 2a. Achievement of the conservation objectives may improve the contribution of the habitats to the provision of fish and shellfish for human consumption. Management of fishing activity within the rMCZ will reduce the on-site fishing mortality of species, which may benefit commercial stocks. However, 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.	Anticipated direction of change: ⟺ Confidence: Low

Table 4b. Recreation	**rMCZ Reference Area Celtic Deep**	
Baseline	**Beneficial impact**	
No recreational activities are known to occur in or near the recommended Marine Conservation Zone.	N/A	N/A

Table 4c. Research and education	**rMCZ Reference Area Celtic Deep**	
Baseline	**Beneficial impact**	
Research: Fletcher and others (2012) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) can contribute to the delivery of research services. No known research activities currently occur in the rMCZ.	As an rMCZ Reference Area, the site will provide an opportunity to demonstrate the state of its designated marine features in the context of prevailing environmental conditions and in the absence of many anthropogenic pressures. It will provide a control area against which the	Anticipated direction of change: ⇧

Table 4c. Research and education	**rMCZ Reference Area Celtic Deep**	
	impacts of pressures caused by human activities can be compared as part of long-term monitoring and assessment. Other research benefits are unknown.	Confidence: High
Education: Fletcher and others (2012) identify that the features to be protected by the rMCZ can contribute to the delivery of education services. No known education activity is focused on the area of the rMCZ.	As the rMCZ is offshore and therefore relatively inaccessible, no benefits are likely to arise from direct use of the site for education. Non-visitors may benefit if the rMCZ contributes the 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: ⇧ Confidence: Low

Table 4d. Regulating services	**rMCZ Reference Area Celtic Deep**	
Baseline	**Beneficial impact**	
Regulation of pollution: The features of the site contribute to the bioremediation of waste and sequestration of carbon. Marine sediments, through processes that occur in their upper layers, play an important role in the global cycling of many elements, including carbon and nitrogen (Fletcher and others, 2012). ***Environmental resilience:*** The features of the site contribute to the resilience and continued regeneration of marine ecosystems. Due to their depth and low-energy regime, deep water mud habitats are very stable and often highly diverse (Fletcher and others, 2012). ***Natural hazard protection:*** As the site is offshore, its features are not thought to contribute to the delivery of this service (Fletcher and others, 2012). It has not been possible to estimate the value of regulating services in the site.	If the conservation objectives of the features are achieved, the features will be recovered to reference condition. Improved habitat condition and a reduction in anthropogenic pressures, including the use of bottom-towed fishing gear, may increase site benthic biodiversity and biomass, improving the regulating capacity of the site habitats.	Anticipated direction of change: ⇧ Confidence: Low

Table 4e. Non-use and option values	**rMCZ Reference Area Celtic Deep**	
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) and the ecosystem services provided, even if they do not currently benefit from them. It has not been possible to estimate the non-use value of the rMCZ.	The rMCZ will benefit the proportion of the UK population that values conservation of the MCZ 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 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: ⇧ Confidence: Moderate

rMCZ Chesil Beach and Stennis Ledges

Site area (km^2): 37.7

Table 1. Conservation impacts **rMCZ Chesil Beach and Stennis Ledges**

1a. Ecological description

The site shares a boundary with a number of existing and proposed environmental designations. The recommended Marine Conservation Zone (rMCZ) runs along the length of Chesil Beach from the top of the Fleet lagoon at Abbotsbury to Portland in the south-east, extending from the high water mark out to about 1.8km, with an extension to about 5km over the Stennis Ledges, an area of rocky ridges and rugose sea bed. The deepest parts of the site are approximately 40 metres below sea level. The nearby southern and western side of Portland has been mapped as an area of higher than average benthic species diversity and anecdotal evidence indicates the possible geological interest of the site, with soft lias reefs believed to be present.

Chesil Beach itself is a linear, pebble and cobble beach which links the Isle of Portland in the east to the mainland in the west and extends for over 18km. The beach is separated from the mainland by a shallow tidal lagoon known as the Fleet (outside the rMCZ). The beach crest is intermittent at the western end, but becomes continuous from Abbotsbury with a maximum height of 7 metres increasing to 14 metres above sea level at Chesilton. There are marked variations in particle shape along the length of the beach.

Rocky outcrops and boulders separated by patches of sand, mud and gravel have been observed down to 14 metres. Associations found were *Laminaria hyperborea* on bedrock and boulders, *Pagurus bernhardus–Nassarius reticulatus* on sand and Hydrozoa–Ascidiacea–Porifera on all grades of rock debris (including *Lithothamnion* and *Ostrea edulis*). At the west end of Chesil Beach, an inshore narrow zone of pebbles/shingle has been observed extending from the beach, then a wider zone of pebbles/stones mixed with sand grading into a third zone of sand/mud. Associations found were *Pagurus bernhardus–Maja squinado* on pebbles on sand. The large boulders at Chesil Cove have a low algal diversity but support a rich Hydrozoa–Ascidiacea–Porifera community.

Eunicella verrucosa and *Ostrea edulis* have been recorded in the rMCZ. Anecdotal evidence indicates the presence of bream nests and the Features of Conservation Importance habitat fragile sponge and anthozoan communities in the area (Lieberknecht and others, 2011).

1b. MCZ Feature Baseline and Impact of MCZ

Feature	Area of feature (km2)	No. of point records	Baseline	Impact of MCZ
Broad-scale Habitats				
High energy infralittoral rock	< 0.01	-	Unfavourable Condition	Recover to Favourable Condition
High energy intertidal rock	0.03	-	Favourable Condition	Maintained at Favourable Condition
Intertidal coarse sediment	< 0.01	-	Favourable Condition	Maintained at Favourable Condition
Subtidal coarse sediment	26.15	-	Unfavourable Condition	Recover to Favourable Condition

Subtidal sand	4.27	-	Unfavourable Condition	Recover to Favourable Condition
Species of Conservation Importance				
Euincella verrucosa	-	2	Unfavourable Condition	Recover to Favourable Condition
Ostrea edulis	-	2	Unfavourable Condition	Recover to 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 Chesil Beach and Stennis Ledges**
Source of costs of the 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.	
Baseline description of activity	**Costs of impact of rMCZ on the sector**
The wreck of an English cargo vessel from 1891 is recorded in the site, as well as records of numerous vessels and aircraft wrecks. Peat is recorded in this site. 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).	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 (English Heritage, pers. comm., 2011). No further impacts on activities related to archaeology are anticipated.

Table 2b. Commercial fisheries	**rMCZ Chesil Beach and Stennis Ledges**
Source of costs of the rMCZ The Joint Nature Conservation Committee and Natural England have advised that there is considerable uncertainty about whether additional management of commercial fisheries gears will be required for certain features protected by this rMCZ. Multiple management scenarios have been identified for the Impact Assessment (IA) in order to reflect this uncertainty. Should the site be designated, the management that will be required is likely to fall somewhere within this range. ***Management scenario 1:*** No additional management. ***Management scenario 2:*** Zones closure of areas of infralittoral rock* to bottom trawls, dredges, pots and traps, nets, hooks and lines. ***Management scenario 3:*** Closure of entire rMCZ to bottom trawls and dredges. ***Management scenario 4:*** Closure of entire rMCZ to bottom trawls, dredges, pots and traps, nets, hooks and lines. * The area of infralittoral rock covered by the zone is greater than the modelled area provided in Table 1 because the zoned area covers the Stennis Ledges which was mapped based on local knowledge and aerial photography. See Annex H7 for a map of the zone	
Baseline description of activity	**Costs of impact of rMCZ on the sector**
Overview: The rMCZ is situated inside the 6nm (nautical mile) limit and so is fished only by UK vessels. Activity includes scallop dredging, trawling, potting, netting and hand lining. The rMCZ is subject to a number of existing fisheries restrictions (see Annex E). In particular, there is a seasonal closure to trawlers and dredges that covers the western part of the rMCZ, and the Lyme Bay Designated Area (Fishing Restrictions) Order 2008 is situated adjacent a few kilometres to the north-west of the rMCZ. If additional restrictions on fisheries are required as a result of Special Areas of Conservation (SACs) in the area, these may also affect vessels. Lyme Bay and Torbay cSAC abuts the western end of the rMCZ, and Studland to Portland pSAC overlaps the eastern end of the rMCZ. Estimated total value of UK vessel landings from the rMCZ is £0.114m/yr.	
UK Dredges: There are approximately 8 under 15 metre vessels from south Devon and Dorset, including the ports of Brixham, Lyme Regis, West Bay and Weymouth, that regularly fish in the area (Southern Inshore Fisheries and Conservation Authorities (IFCA), pers. comm., 2011). There is a significant level of dredging in the rMCZ, concentrated around the area of the Stennis Ledges. The rMCZ covers part of a dredged area which extends east along the coast, predominantly outside of the rMCZ. The Lyme Bay closed area has affected the distribution of dredging in the	***Scenario 1:*** No impacts are anticipated under this scenario. ***Scenarios 2, 3 and 4:*** Under these scenarios, the rMCZ will reduce the area of the scallop ground located off Chesil Beach. Effort displaced from inside the rMCZ is likely to be redistributed to the remainder of the ground or to other grounds to the east and west. Scalloping grounds further offshore are less feasible for the vessels affected, which are all under 15 metres in length. Decisions to fish further offshore may increase risks to safety (South West Fishing Industry Group, 2011) (South West Fishing Industry Group, 2011) (scallop vessel owner, pers. comm., 2011).

<table>
<tr><th>Table 2b. Commercial fisheries</th><th>rMCZ Chesil Beach and Stennis Ledges</th></tr>
<tr><td>wider Lyme Bay area. Much of the effort has been displaced to grounds off Exmouth, but effort has also been displaced to the east towards Weymouth (Mangi and others, 2011)(Mangi, Gall, Hattam, Rees, & Rodwell, 2011) which includes the area of the rMCZ.

There is evidence of vessel owners affected by the Lyme Bay closed area and expected SAC management investing in larger vessels to allow them to access grounds that are further away (South West Fishing Industry Group, 2011) (South West Fishing Industry Group, 2011) (Mangi, Gall, Hattam, Rees, & Rodwell, 2011) (Mangi and others, 2011).

Estimated value of UK dredge landings from the rMCZ is £0.055m/yr.</td><td>The additional restrictions of the rMCZ may encourage more fishers to invest in larger vessels or to invest in switching to alternative gear types. Investment costs may be significant (South West Fishing Industry Group, 2011) (South West Fishing Industry Group, 2011).

The Lyme Bay closed area and expected additional fisheries management for the Lyme Bay and Torbay cSAC are already reducing the area of inshore scallop grounds available to vessels. The additional displacement of effort from the rMCZ may have knock on consequences for fishing activity outside the rMCZ. While evidence indicates that other scalloping grounds have been able to absorb displaced effort from the Lyme Bay closed area, it is uncertain whether this is likely to continue in the long term (Mangi and others, 2011) Closure of the rMCZ to dredges will add further pressure to these grounds and make their long-term sustainability less certain

Displacement from the Lyme Bay closed area has resulted in increased gear conflict between static and mobile gear fishers (Mangi and others, 2011). Displacement from the rMCZ is likely to increase this trend .

Estimated annual value of UK dredge landings affected is expected to fall within the following range:

<table>
<tr><td>£m/yr</td><td>Scenario 1</td><td>Scenario 2</td><td>Scenario 3</td><td>Scenario 4</td></tr>
<tr><td>Value of landings affected</td><td>0.000</td><td>0.021</td><td>0.055</td><td>0.055</td></tr>
</table>
</td></tr>
<tr><td>UK Bottom trawls: Otter trawls are used in the areas of softer sediment in the rMCZ. Fewer than 5 under 12 metre vessels working out of Lyme Regis, Westbay and Weymouth are known to be active in the rMCZ (Southern IFCA, pers. comm., 2011). The Lyme Bay closed area has already led to some redistribution of effort westwards (Southern IFCA, pers. comm., 2011). Some owners are choosing to buy larger boats in order to be able to fish further from port while others are considering switching to other gear types (South West Fishing Industry Group, 2011). Estimated value of UK bottom trawl landings from the rMCZ is £0.005m/yr.</td><td>Scenario 1: No impacts are anticipated under this scenario.

Scenario 2, 3 and 4: Under these scenarios, the rMCZ will displace effort into other fishing grounds in Lyme Bay. This may lead to an increase in the fishing costs of affected fishers if they are displaced to grounds further from their home port. If the affected vessels choose to fish further offshore, this may increase risks to safety (as all the vessels are under 12 metres).

There is evidence of vessel owners affected by the Lyme Bay closed area and expected SAC management investing in larger vessels to allow them to access grounds that are</td></tr>
</table>

<table>
<tr><th>Table 2b. Commercial fisheries</th><th>rMCZ Chesil Beach and Stennis Ledges</th></tr>
<tr><td></td><td>further away (South West Fishing Industry Group, 2011) (Southern IFCA, 2011) (Mangi and others, 2011). It is possible that additional restrictions of the rMCZ may encourage more fishers to invest in larger vessels or to invest in switching to alternative gear types (South West Fishing Industry Group, 2011). Investment costs may be significant. However, given the low value of landings affected, it is unlikely that the designation of the rMCZ would significantly contribute to this trend.

Displacement from the Lyme Bay closed area has resulted in increased gear conflict between static and mobile gear fishers (Mangi and others, 2011). Displacement from the rMCZ may increase this trend.

Estimated annual value of UK bottom trawl landings affected is expected to fall within the following range:

<table>
<tr><td>£m/yr</td><td>Scenario 1</td><td>Scenario 2</td><td>Scenario 3</td><td>Scenario 4</td></tr>
<tr><td>Value of landings affected</td><td>0.000</td><td>0.002</td><td>0.005</td><td>0.005</td></tr>
</table>
</td></tr>
<tr><td>UK Pots and traps: At least 6 vessels regularly fish within the rMCZ (Southern IFCA, pers. comm., 2012). Up to 4 under 10 metre boats fish in Chesil Cove, at the eastern end of the rMCZ. They launch their boats from the beach, fishing with short strings of pots as well as nets, and their activity is heavily weather dependent. This is the only place that they fish and a large proportion of their activity is thought to be within the eastern end of the rMCZ. (Southern IFCA, pers. comm., 2012)

Also, 2 or 3 under 12 metre vessels from Weymouth target lobster and crab. Their effort is focused on the area of the Stennis Ledges, which is particularly productive ground. At least one of these vessels fishes almost exclusively on the Stennis Ledges (SIFCA, pers. comm., 2012).

Estimated value of UK pots and traps landings from the rMCZ is £0.033m/yr.</td><td>Scenarios 1 and 3: No impacts are anticipated under these scenarios.

Scenarios 2 and 4: At least 6 regular vessels will be affected by the rMCZ under these scenarios. For the 2 Weymouth boats, the rMCZ is an important fishing ground and it is unclear whether they would be able to make up the lost landings from elsewhere, as grounds as productive as this one are generally already fished by other vessels (SIFCA, pers. comm., 2012).

For the 4 under 10 metre boats, the rMCZ will significantly impact on their continued viability. The nature of fishing and size of boat mean that viable alternatives are not available (SIFCA, pers. comm., 2012).

Estimated annual value of UK pot and trap landings affected is expected to fall within the following range:

<table>
<tr><td>£m/yr</td><td>Scenario 1</td><td>Scenario 2</td><td>Scenario 3</td><td>Scenario 4</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th colspan="2">Table 2b. Commercial fisheries</th><th colspan="3">rMCZ Chesil Beach and Stennis Ledges</th></tr>
<tr><td></td><td colspan="3"><table><tr><td>Value of landings affected</td><td>0.000</td><td>0.012</td><td>0.000</td><td>0.033</td></tr></table>
In establishing the draft conservation objectives, the site features were assessed as having low vulnerability to fishing with pots and traps at current levels. Where this is the case, this activity was not the primary reason for assigning 'recover' conservation objective(s). As such it is anticipated that, if 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>UK Nets: It is thought that up to 4 vessels from Weymouth and 2 vessels from West Bay fish with nets in the rMCZ and surrounding area. Fishers principally use trammel nets and tangle nets, targeting species including sole, plaice, turbot and brill. Netting takes place throughout the rMCZ (Southern IFCA, pers. comm., 2012). Estimated value of UK net landings from the rMCZ is £0.008m/yr.</td><td colspan="3">Scenarios 1 and 3: No impacts are anticipated under these scenarios.

Scenarios 2 and 4: At least 4 vessels will be affected by the rMCZ under these scenarios. The rMCZ is likely to have a greater impact on the boats from Weymouth than those from West Bay (SIFCA, pers. comm., 2012).

Estimated annual value of UK net landings affected is expected to fall within the following range:

<table><tr><td>£m/yr</td><td>Scenario 1</td><td>Scenario 2</td><td>Scenario 3</td><td>Scenario 4</td></tr><tr><td>Value of landings affected</td><td>0.000</td><td>0.004</td><td>0.000</td><td>0.008</td></tr></table>
In establishing the draft conservation objectives, the site features were assessed as having low vulnerability to fishing with nets at current levels. Where this is the case, this activity was not the primary reason for assigning 'recover' conservation objective(s). As such it is anticipated that, if 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>UK Hooks and lines: A low level of fishing with hooks and lines takes place in the rMCZ, with no vessels known to regularly target the area (Southern IFCA, pers. comm., 2012. Estimated value of UK hook and line landings from the rMCZ is £0.013m/yr.</td><td colspan="3">Scenarios 1 and 3: No impacts are anticipated under these scenarios.

Scenarios 2 and 4: As there are no regular fishers active in the rMCZ, it is considered likely that there will be no significant impacts as a result of these scenarios.

Estimated annual value of UK hook and line landings affected is expected to fall within the following range:</td></tr>
</table>

Table 2b. Commercial fisheries — **rMCZ Chesil Beach and Stennis Ledges**

£m/yr	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Value of landings affected	0.000	0.004	0.000	0.013

Total direct impact

Total direct impact on UK commercial fisheries

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

£m/yr	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Value of landings affected	0.000	0.043	0.060	0.114
GVA affected	0.000	0.021	0.028	0.056

In establishing the draft conservation objectives, the site features were assessed as having low vulnerability to fishing with hooks and lines at current levels. Where this is the case, this activity was not the primary reason for assigning 'recover' conservation objective(s). As such it is anticipated that, if 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.

Impact on non-UK commercial fisheries

None, as the rMCZ is within 6nm.

Table 2c. Flood and coastal erosion risk management (coastal defence) — **rMCZ Chesil Beach and Stennis Ledges**

Source of costs of the 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).

Baseline description of activity	**Costs of impact of rMCZ on the sector**

Table 2c. Flood and coastal erosion risk management (coastal defence)	**rMCZ Chesil Beach and Stennis Ledges**
The 0 to 20 year Shoreline Management Plan policies along the shoreline of the rMCZ include 'holding the line' to protect assets at Chiswell, 'managed realignment' to the west of Chiswell and 'no active intervention' on frontage of the Fleet. The Chiswell wave return wall scheme is anticipated within the next 5 years and additional schemes may come forward as a result of the hold the line policy (Environment Agency, pers. comm., 2012).	As a result of the rMCZ, 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 to 1 day of additional work, 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. It is anticipated that no additional mitigation of impacts will be required (Environment Agency, pers. comm., 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 rMCZ (existing activities at their current levels and future proposals known to the regional MCZ projects)	**rMCZ Chesil Beach and Stennis Ledges**
Recreation; research and education; water abstraction, discharge and diffuse pollution*.	

* The IA aassumes that no additional mitigation of the 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 (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 Chesil Beach and Stennis Ledges**

Table 4a. Fish and shellfish for human consumption	**rMCZ Chesil Beach and Stennis Ledges**	
Baseline	**Beneficial impact**	
Fletcher and others (2012) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) contribute to the delivery of fish and shellfish services. The baseline quantity and quality of service provided is assumed to be commensurate with that provided by the features of the site when in favourable and unfavourable condition (see Table 1b). A description of on-site fishing activity and the value derived from it is set out in Table 2b.	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. New management of fishing activities is expected (above the baseline situation), the costs of which are set out in Table 2b. Achievement of the conservation objectives may improve the contribution of the habitats to the provision of fish and shellfish for human consumption. Management of fishing activity within the rMCZ may reduce the on-site fishing mortality of species, which may benefit commercial stocks. As the rMCZ is small and some fishing activity may still be permitted in the rMCZ, it is unclear whether it would have any impact on stocks of mobile commercial finfish species. Stocks of low mobility and site-attached species, such as lobster and crab, may improve as a result of improved habitat condition and reduced fishing pressure. If some fishing for such species is permitted within the rMCZ, then catches may improve. Localised beneficial spill-over effects may occur around the rMCZ. A reduction in scalloping within the rMCZ as a result of new management may result in improved on-site scallop populations. If some scalloping is still permitted within the rMCZ, then fishers may benefit from improved catches within the site. If no scalloping is permitted within the rMCZ, then no on-site benefits will be derived. A healthier scallop population may result in spill-over benefits to scallop beds outside the rMCZ as a result of possible increased on-site spat production, improving catches at those scalloping grounds. If rMCZ management involves reduced mobile gear effort, but no reductions in static gear fishing, this may reduce gear conflict between mobile and static gear fishers. Reduced gear conflict may reduce the cost of fishing in the rMCZ for static gear fishers. The potential benefits described here do not include the negative impacts of the additional fisheries management on fish and shellfish provision or the off-	Anticipated direction of change: ⇧ Confidence: Low

Table 4a. Fish and shellfish for human consumption	**rMCZ Chesil Beach and Stennis Ledges**	
	site impacts of displaced effort.	

Table 4b. Recreation	**rMCZ Chesil Beach and Stennis Ledges**	
Baseline	**Beneficial impact**	
Angling: Fletcher and others (2012) 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. 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 and unfavourable condition (see Table 1b). Chesil Beach is one of the most popular angling locations in the UK. Shore angling activity is concentrated at the eastern and western ends of the rMCZ, where there are access points. Some boat angling occurs off the beach. Species targeted include dogfish, pouting, scad, cod, codling, whiting, gurnard and mackerel. It has not been possible to estimate the value of angling in the site.	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. Recovery of habitats may have benefits to fish populations. It is unclear whether any benefits to fish populations would arise as a result of reduced fishing mortality due to management of commercial fishing (see Table 4a). If the rMCZ results in an increase in the size and diversity of species caught by anglers, then this is expected to improve the quality of angling in the site and therefore the value of the ecosystem service. The designation may lead to an increase in angling 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 UK angling.	Anticipated direction of change: ⇧ Confidence : Low
Diving: Fletcher and others (2012) identify that some of the features to be protected by the rMCZ can contribute to the delivery of recreation and tourism services. 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 and unfavourable condition. There is recreational diving from the shore and from boats at a few sites in the rMCZ (although activity is concentrated outside the rMCZ at the site of the M2 submarine). It has not been possible to estimate the value of diving 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. An improvement in the condition of site features and any associated increase in the abundance and diversity of species, which may include recovery of fragile and slow-growing species, may improve the quality of diving in the site and therefore the value of the ecosystem service. The designation may lead to an increase in dive visits to the site, which may benefit the local economy. This increase may represent a redistribution of	Anticipated direction of change: ⇧ Confidence : Low

Table 4b. Recreation		**rMCZ Chesil Beach and Stennis Ledges**
	location preferences, rather than an overall increase in UK diving.	
Wildlife watching: Fletcher and others (2012) identify that some of the features to be protected by the rMCZ can contribute to the delivery of recreation and tourism services. 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 and unfavourable condition. Boat trips will often go through the rMCZ, although the main focus of the trips is on the geology of Chesil Beach rather than the marine wildlife. From the shore, there is bird watching; however, this tends to be focused on waders and sea birds feeding on the sandflats (outside the rMCZ) and viewing of other local wildlife, as well as the wildlife of the Fleet lagoon (outside the rMCZ) and the geology of Chesil Beach. It has not been possible to estimate the value of 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. An improvement in the condition of site features and any associated increase in the abundance and diversity of species visible to wildlife watchers may improve the quality of wildlife watching in the site and therefore the value of the ecosystem service. 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 UK wildlife watching visits.	Anticipated direction of change: ⇧ Confidence : Low

Table 4c. Research and education		**rMCZ Chesil Beach and Stennis Ledges**
Baseline	**Beneficial impact**	
Research: Fletcher and others (2012) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) can contribute to the delivery of research services. There is a significant level of interest in research activities around Chesil Beach, including in the marine environment. The Fleet Study Group was founded in 1975 by the Natural Environment Research Council to collect scientific and historical information about the Fleet and Chesil Beach, and to consider the environmental effects of natural and man-made change. At any one time there are between 15 and 20 members of the group. Portsmouth University surveyed a series of control markers on Chesil Beach and along the	Monitoring of the rMCZ 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: ⇧ Confidence: High

Table 4c. Research and education		**rMCZ Chesil Beach and Stennis Ledges**
Fleet foreshore to act as reference locations for future studies (Chesil Bank and the Fleet Nature Reserve, 2010). It has not been possible to estimate the value derived from research activities associated with the rMCZ.		
Education: Fletcher and others (2012) identify that the features to be protected by the rMCZ can contribute to the delivery of education services. Chesil Beach is part of the Jurassic Coast and is a popular fieldwork location. Education infrastructure is centred on the Chesil Beach Visitor Centre where much of the activity is focused on the geological feature of Chesil Beach and the Fleet lagoon (which is outside the rMCZ). In the marine environment, the centre offers audio-visual interpretations of the formation of Chesil Beach and live sea bed camera pictures (Jurassic Coast, 2008). The centre is currently being renovated to include an education room, indoor café and more exhibition space. There will also be a boardwalk to Chesil Beach, allowing easier access. The centre will offer a range of educational visits for schools, and walks, talks and training for the general public (Dorset Wildlife Trust, 2011). Approximately 29,000 people visit the centre every year (Chesil Bank and the Fleet Nature Reserve, 2012). 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. Designation may aid the development of additional local (to the rMCZ) education infrastructure (e.g. events and interpretation boards), from which visitors to the site would derive benefit. Non-visitors may benefit if the rMCZ contributes to external education programmes (e.g. television programmes, articles in magazines and newspapers, and educational resources developed for use in schools).	Anticipated direction of change: ⇧ Confidence: Moderate

Table 4d. Regulating services		**rMCZ Chesil Beach and Stennis Ledges**
Baseline	**Beneficial impact**	
Regulation of pollution: The features of the site contribute to the bioremediation of waste and sequestration of carbon. Marine sediments, through processes that occur in their upper layers, play an important role in the global cycling of many elements, including carbon and nitrogen. Native oyster beds sequester carbon and filter algae and sediment from the water (Fletcher and others, 2012).	If the conservation objectives of the features are achieved, the features will be recovered to favourable condition. Improved habitat condition and a potential reduction in anthropogenic pressures, including from the use of bottom-towed fishing gear, may increase site benthic biodiversity and biomass, improving the regulating capacity of the site habitats.	Anticipated direction of change: ⇧

Table 4d. Regulating services	**rMCZ Chesil Beach and Stennis Ledges**	
Environmental resilience: The features of the site contribute to the resilience and continued regeneration of marine ecosystems. Rock habitats can support particularly high biodiversity (Fletcher and others, 2012). ***Natural hazard protection:*** The features of the site, in particular the intertidal habitats, contribute to local flood and storm protection (Fletcher and others, 2012). It has not been possible to estimate the value of regulating services in the site.		Confidence: Low

Table 4e. Non-use and option value	**rMCZ Chesil Beach and Stennis Ledges**	
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) and the ecosystem services provided, even if they do not currently benefit from them. It has not been possible to estimate the non-use value of the rMCZ.	The rMCZ will benefit the proportion of the UK population that values conservation of the MCZ 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 will protect both the features and the option to benefit from the services in the future from the risk of future degradation. Examples of these values are shown in Ranger and others (2012). Voters in the Marine Conservation Society's 'Your Seas Your Voice' campaign expressed a desire to protect the 'wide range of plants and animals' because the 'whole place is amazing' and because 'it means a great deal to me personally' and 'appears unspoilt'.	Anticipated direction of change: ⇧ Confidence: Moderate

rMCZ Dart Estuary

Site area (km^2): 4.7

Table 1. Conservation impacts				**rMCZ Dart Estuary**
1a. Ecological description				
The site encompasses part of the upper Dart Estuary. The Dart Estuary is a ria, with steep rocky shores near the mouth of the estuary, and stretches of meandering mudflats further upstream. The upper estuary is surrounded mainly by farmland, with small patches of woodland. Littoral and sublittoral habitats in the middle and upper estuary are predominantly mud, with occasional rock outcrops. Mudflats within the estuary have been reported as having low species richness but high biomass. Ragworm *Hediste diversicolor* is abundant throughout the estuary; all the infaunal communities are dominated by polychaete worms. Sublittoral habitats are predominantly composed of muddy pebbles and cobbles with sponges, hydroids and anemones characterising the communities recorded. Dredge samples of muddy sediments have produced large numbers of polychaete worms. The Seahorse Trust has received a large number of seahorse sightings (both species) from the Dart Estuary, as far upstream as Dittisham (within the recommended Marine Conservation Zone boundary) (Lieberknecht and others, 2011).				
1b. MCZ Feature Baseline and Impact of MCZ				
Feature	**Area of feature (km2)**	**No. of point records**	**Baseline**	**Impact of MCZ**
Broad-scale Habitats				
Intertidal mud	1.90	-	Favourable Condition	Maintained at Favourable Condition
Low energy intertidal rock	< 0.01	-	Favourable Condition	Maintained at Favourable Condition
Subtidal mud	2.28	-	Favourable Condition	Maintained at Favourable Condition
Coastal saltmarsh and saline reedbeds	0.02	-	Favourable Condition	Maintained at Favourable Condition
Habitats of Conservation Importance				
Estuarine rocky habitats	-	5	Favourable Condition	Maintained at Favourable Condition
Intertidal under boulder communities	-	1	Favourable Condition	Maintained at Favourable Condition
Species of Conservation Importance				
Alkmaria romijni	-	-	Favourable Condition	Maintained at Favourable Condition
Anguilla anguilla	-	-	To be determined	To be determined

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

Table 2a. Aquaculture	**rMCZ Dart Estuary**
Source of costs of the rMCZ ***Management scenario 1:*** No additional management. ***Management scenario 2:*** Compulsory use of triploid stock for Pacific oyster cultivation.	
Baseline description of activity	**Costs of impact of rMCZ on the sector**
There are 6 aquaculture businesses in the Dart Estuary. The businesses operate under the Waddeton Fishery Order 2001 via the Devon and Severn Inshore Fisheries and Conservation Authorities (IFCA) Regulating Order and also a licence issued by the Duchy of Cornwall (Devon and Senvern IFCA, pers. comm., 2011). There is mixed shellfish cultivation within the estuary which includes mussel, cockle, clam and Pacific oyster; 5 of the 6 businesses cultivate Pacific oyster, providing the majority of the output for the estuary (Dart Estuary aquaculture operators, pers. comm., 2011). All of the current Pacific oyster cultivation is carried out using diploid stock. Some businesses have considered using triploid stock but have been unable to source it due to a lack of supply in the UK (Aquaculture operators, pers. comm., 2011). Discussions with UK seed stock producers verify that there is a shortage of supply, with no immediate opportunity to increase it (Seasalter (Walney) Limited, pers. comm., 2011 and Seasalter Shellfish (Whitstable) Limited, pers. comm., 2011). Supply from outside of the UK is not possible due to the presence of the herpes virus in these stocks (there is an agreement in place between operators on the Dart to keep the estuary virus free).	***Scenario 1:*** No costs are anticipated as a result of this scenario. ***Scenario 2:*** It is unlikely that the operators in the Dart would be able to source sufficient volumes of triploid seed stock to allow them to continue cultivating Pacific oysters at the current level. As such it is expected that the operators would cease to produce Pacific oyster as a result of the management scenario that requires compulsory use of triploid stock. While one operator has successfully cultivated Pacific oyster using triploid stock in the past, there is concern among the other operators that triploid stock may not grow as successfully in the Dart as diploid stock, as indicated by the growth trial conducted by the Devon and Severn IFCA (then known as Devon Sea Fisheries Committee) in 2009. If cultivation using triploid stock could not be successfully carried out, even if suitable supply of triploid stock could be secured, cultivation of Pacific oyster may not be viable. Scenario 2 for the rMCZ may therefore result in a cessation of Pacific oyster cultivation either due to a lack of supply or to poor cultivation success, or a combination of both (Dart Estuary aquaculture operators, pers. comm., 2011). Given that Pacific oyster cultivation accounts for the majority of the value of output from the aquaculture industry on the Dart, the loss of output would reduce the viability of the businesses present. The aquaculture operators stated that they would potentially be put out of business as a result of the compulsory use of triploid stock due to the problems in securing stock and higher mortality

Table 2a. Aquaculture	**rMCZ Dart Estuary**
One business has used triploid stock for Pacific oyster cultivation in the past, but is not currently actively farming shellfish within the estuary (Dart Estuary aquaculture operator, pers. comm., 2011). A growth trial was conducted by the Devon and Severn IFCA in 5 Devon estuaries in 2009 to compare different methods of growing Pacific oysters, including the use of triploids. It was noted that the growth of triploid Pacific oysters was much faster than diploid Pacific oysters in all the estuaries but, as a result, triploids needed much more husbandry and management. In September 2009, oyster mortality was recorded on the Dart. Higher mortality rates were recorded for triploid oyster than diploid: the mortality rate was between 23% and 42% for the triploid stock compared to a maximum mortality in diploids of 20% (Devon and Severn IFCA, 2011).	rates. If the operators went out of businesss then this may result in the loss of the entire fishery. Whilst it may theoretically be possible for the businesses affected to increase cultivation of other species, such as mussels, clams or cockles, to off-set the losses from Pacific oysters, this was not identified as an option by the interviewed businesses. An estimate of the cost is not provided at the level of the rMCZ because this information is commercially sensitive and there are only a small number of businesses present. See Annex N for an estimate of the rMCZs in the Finding Sanctuary project area and the national suite of rMCZs.

Table 2b. Archaeological heritage	**rMCZ Dart Estuary**
Source of costs of the 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.	
Baseline description of activity	**Costs of impact of rMCZ on the sector**
Four wrecks are recorded in the site, including the remains of a hulked English houseboat. A D-Day landing craft maintenance site is also recorded on the River Dart, although it is not clear if this is inside the rMCZ (English Heritage, pers. comm., 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 one licence application could be in the region of £500 to £10,000 (English Heritage, pers. comm., 2011). No further impacts on activities related to archaeology are anticipated.

Table 2c. Ports, harbours, shipping and disposal sites	**rMCZ Dart Estuary**
Source of costs of the rMCZ	
Management scenario 1: Increase in costs of assessing environmental impacts for future licence applications with 1km of the rMCZ. It is not anticipated that any additional mitigation, relative to mitigation provided in the baseline, of impacts on features protected by the MCZ will be needed for activities relating to ports, harbours, shipping and disposal sites.	
Management scenario 2: Increase in costs of assessing environmental impacts for future licence applications within 5km of an rMCZ. This applies to future licence applications for potential port and harbour developments within 5km of the rMCZ. Additional mitigation, relative to mitigation provided in the baseline, of impacts on features protected by the MCZ may be needed for future harbour developments.	
Baseline description of activity	**Costs of impact of rMCZ on the sector**
Harbour development: Dart Harbour, Brittania Royal Naval College and Dart Marina are all between 1km and 5km from the rMCZ. There are no known plans for developments.	***Scenario 1:*** No costs are anticipated under scenario 1. ***Scenario 2:*** Under scenario 2, for future port and harbour developments within 5km of the rMCZ that are not yet known of, future licence applications 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 (these costs are not assessed at the site level, but are presented at the national level in Annex N11). Sufficient information is not available to identify whether any additional mitigation, relative to the baseline, of impacts on features protected by the MCZ will be needed for such future port and harbour developments. 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 Dart Estuary**

Recreation; research and education; water abstraction, discharge and diffuse pollution*.

* The IA aassumes that no additional mitigation of the 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 (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 Dart Estuary**
Baseline	**Beneficial impact**	
Fletcher and others (2012) 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. The estuary is a nursery area for fish (Environment Agency, pers. comm., 2010) and, as such, is likely to help to support potential 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 in favourable condition. However, there is currently no commercial fishing within the rMCZ and therefore no value derived from on-site fisheries. It has not been possible to estimate the value derived from off-site fisheries as a result of the nursery area function.	If the conservation objectives of the features are achieved, the features will be maintained in favourable condition. No additional management (above that in the baseline situation) of fishing activities is expected. No change in feature condition or harvesting of fish and shellfish is anticipated and therefore no on-site or off-site benefits are expected. 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 (because, if necessary, mitigation would be introduced, with the associated costs and benefits).	Anticipated direction of change: ⇔ Confidence : Moderate

Table 4b. Recreation		**rMCZ Dart Estuary**
Baseline	**Beneficial impact**	
Angling: Fletcher and others (2012) 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. The estuary is a nursery area for fish (Environment Agency, pers. comm., 2010) and, as such, is likely to help to support potential 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 in favourable condition. Fishing takes place at a number of marks around the estuary, including shore angling and angling from boats. It has not been possible to estimate the value of angling in the site.	If the conservation objectives of the features are achieved, the features will be maintained in favourable condition. No change in on-site feature condition or fishing mortality is anticipated and therefore no on-site or off-site benefits are expected (see Table 4a for further details). 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 (as, if necessary, mitigation would be introduced, with the associated costs and benefits). The designation may lead to an increase in angling 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 UK angling.	Anticipated direction of change: ⟺ Confidence: Moderate
Diving: Diving is not known to take place in the rMCZ.	N/A	N/A
Wildlife watching: Fletcher and others (2012) identify that some of the features to be protected by the rMCZ can contribute to the delivery of recreation and tourism services. 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. The Dart Estuary supports a wide variety of wildlife. Grey seals, otters and occasionally dolphins can be seen in the rMCZ. Visitors can watch seals collect on the Mew Stone which is a short distance outside of the mouth of the estuary. The Dart supports a large number of bird species: herons, little egrets, cormorants and kingfishers can all be seen within the estuary. In addition, visitors walking along the estuary can see redshanks, greenshanks, dunlins and oystercatchers, mute swans and shelducks. It has not been possible to	If the conservation objectives of the features are achieved, the features will be maintained in favourable condition. No change in on-site feature condition is anticipated and therefore no benefits to wildlife watching are expected. 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 (as, if necessary, mitigation would be introduced, with the associated costs and benefits). 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 UK	Anticipated direction of change: ⟺ Confidence: Moderate

Table 4b. Recreation		**rMCZ Dart Estuary**
estimate the value of wildlife watching in the rMCZ.	wildlife watching visits.	

Table 4c. Research and education		**rMCZ Dart Estuary**
Baseline	**Beneficial impact**	
Research: Fletcher and others (2012) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) can contribute to the delivery of research services. Research activities are carried out under the Dart Estuary Management Plan, including baseline surveys of critical habitats and individual species (South Devon AONB, 2006). The full extent of current research activity carried out in the rMCZ is unknown. It has not been possible to estimate the value derived from research activities associated with the rMCZ.	Monitoring of the rMCZ 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: ⇧ Confidence: High
Education: Fletcher and others (2012) identify that the features to be protected by the rMCZ can contribute to the delivery of education services. Interpretation and education of the estuary environment is provided for through the Dart Estuary Management Plan. This includes links with local schools and colleges and public events (South Devon AONB, 2006). The estuary receives high numbers of visitors. 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 on the marine environment. Designation may aid additional local (to the rMCZ) provision of education (e.g. events and interpretation boards), from which visitors to the site would derive benefit. 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: ⇧ Confidence: Moderate

Table 4d. Regulating services		**rMCZ Dart Estuary**
Baseline	**Beneficial impact**	
Regulation of pollution: The features of the site contribute to the bioremediation of waste and sequestration of carbon. Coastal saltmarshes are known to be particularly efficient carbon sinks and cadmium is stored in sediment by cord grass *Spartina anglica* which grows in intertidal mud (Fletcher and others, 2011; 2012). ***Environmental resilience:*** The features of the site contribute to the resilience and continued regeneration of marine ecosystems. Rocky habitats in estuaries make a significant contribution to the overall diversity (Fletcher and others, 2012). ***Natural hazard protection:*** The features of the site, in particular the coastal saltmarshes and intertidal habitats, contribute to local flood and storm protection (Fletcher and others, 2012). It has not been possible to estimate the value of regulating services in the site.	If the conservation objectives of the features are achieved, the features will be maintained in favourable condition. No change in feature condition and management of human activities is expected and therefore no benefit to the regulation of pollution is expected. Designating the recommended Marine Conservation Zone will protect its features and the ecosystem services that they provide against the risk of future degradation from pressures caused by human activities (as, if necessary, mitigation would be introduced, with the associated costs and benefits).	Anticipated direction of change: ⟺ Confidence: Moderate

Table 4e. Non-use and option values		**rMCZ Dart 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 recommended Marine Conservation Zone (rMCZ) and the ecosystem services provided, even if they do not currently benefit from them. It has not been possible to estimate the non-use value of the rMCZ.	The rMCZ will benefit the proportion of the UK population that values conservation of the MCZ 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 will protect both the features and the option to benefit from the	Anticipated direction of change: ⇧ Confidence:

Table 4e. Non-use and option values		**rMCZ Dart Estuary**
	services in the future from the risk of future degradation.	Moderate

rMCZ Devon Avon Estuary

Site area (km^2): 1.84

Table 1. Conservation impacts **rMCZ Devon Avon Estuary**

1a. Ecological description

The recommended Marine Conservation Zone encompasses the whole Devon Avon Estuary up to the mean high water mark, as far as Aveton Gifford. The estuary is small (approximately 4km long), consisting predominantly of a sand bottom. It has steep-sided margins, cut into relatively weak Devonian slates and grits, and is generally considered a ria-type (drowned river) estuary. The estuary has since been in-filled by an accumulation of sediment so that, at low water, the channels are narrow and shallow. The estuary has conservation importance due to high productivity and its ecological function as a nursery area.

The five main depositional environments in the estuary include beach and dune deposits at Bantham and Cockleridge; an extensive ebb-tidal delta forming part of the tombolo behind Burgh Island; a flood-tidal delta with several intertidal shoals in the outer estuary; a main tidal channel that meanders along the entire estuary, with a tidal weir at Aveton Gifford; and saltmarshes in the upper estuary.

The estuary has been described as having a coarse, scoured channel at the mouth and the head of the estuary; predominantly coarse and fine sand in the lower estuary; and a mixture of fine sand (channel and intertidal shoals) and silt (saltmarsh and tidal flat) in the upper estuary. The mouth of the estuary has semi-exposed rock platforms with rich rock pool, underboulder and overhang communities on the low shore.

The saltmarsh sediments in the Devon Avon are up to about 1 metre thick and are underlain by intertidal sand. The saltmarshes are largely limited to pioneer vegetation, with a narrower band of low to mid marsh species and small areas of mid-upper marsh species. Upper saltmarsh vegetation is not found within the key saltmarsh areas adjacent to the main river channel, but may be found along some of the tributaries that flow into the channel. The marshes are likely to be vulnerable to future sea level rise and coastal squeeze due to the constraints placed upon them by the valley sides (Lieberknecht and others, 2011).

1b. MCZ Feature Baseline and Impact of MCZ

Feature	Area of feature (km2)	No. of point records	Baseline	Impact of MCZ
Broad-scale Habitats				
Coastal saltmarsh and saline reedbeds	0.07	-	Favourable Condition	Maintained at Favourable Condition
High energy infralittoral rock	0.24	-	Favourable Condition	Maintained at Favourable Condition
Intertidal coarse sediment	0.01	-	Favourable Condition	Maintained at Favourable Condition
Intertidal mud	1.12	-	Favourable Condition	Maintained at Favourable Condition
Intertidal sand and muddy sand	0.10	-	Favourable Condition	Maintained at Favourable Condition

Moderate energy intertidal rock	0.04	-	Favourable Condition	Maintained at Favourable Condition
Subtidal mud	0.01	-	Favourable Condition	Maintained at Favourable Condition
Subtidal sand	0.01	-	Favourable Condition	Maintained at Favourable Condition
Species of Conservation Importance				
Alkmaria romijni	-	1	Favourable Condition	Maintained at Favourable Condition
Anguilla anguilla	-	-	To be determined	To be determined

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

Table 2a. Aquaculture	**rMCZ Devon Avon Estuary**
Source of costs of the rMCZ ***Management scenario 1:*** No additional management. ***Management scenario 2:*** Compulsory use of triploid stock for Pacific oyster cultivation.	
Baseline description of activity	**Costs of impact of rMCZ on the sector**
There is one aquaculture business in the Devon Avon Estuary. Pacific oyster are the only species farmed in the estuary. The land is leased from the landowner (the Duchy of Cornwall) to Evans Estates, which leases the fishing rights to the sole operator. At present, 10% of the seed stock used in the estuary is triploid seed, which seems to grow well. The use of triploid stock is limited to 10% because larger amounts cannot be sourced from within the UK (Bigbury Bay Oysters, pers. comm., 2011). Discussions with UK seed stock producers verify that there is a shortage of supply, with no immediate opportunity to increase it (Seasalter (Walney) Limited, pers. comm., 2011 and Seasalter Shellfish (Whitstable) Limited, pers. comm., 2011). Supply from outside of the UK is not possible	***Scenario 1:*** No costs are anticipated as a result of this scenario. ***Scenario 2:*** It is unlikely that the operator in the Devon Avon Estuary would be able to source sufficient volumes of triploid seed stock to allow it to continue cultivating Pacific oyster at the current level. As such, it would be expected to lose 90% of its Pacific oyster output (the remaining 10% is farmed using triploid stock). The compulsory use of triploid stock is therefore likely to significantly reduce the income of the business and may result in it becoming unviable. The current use of triploid stock (10% of total seed stock) in the estuary indicates that if sufficient additional supply could be attained then the operator could successfully continue its current operations under this management scenario with relatively limited change in

Table 2a. Aquaculture	**rMCZ Devon Avon Estuary**
due to the presence of the herpes virus in these stocks.	underlying costs. This it is unlikely that sufficient stocks would be available from the UK. An estimate of the cost is not provided at the level of rMCZ because this information is commercially sensitive as there is only one business present. See Annex N for an estimate of the south-west suite of rMCZs and national suite of rMCZs.

Table 2b. Archaeological heritage	**rMCZ Devon Avon Estuary**
Source of costs of the 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.	
Baseline description of activity	**Costs of impact of rMCZ on the sector**
A World Ware II Type 24 pillbox is situated on the west side of Sedgewell Cove. It is not known if this is located in the site or nearby (English Heritage, pers. comm., 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 one licence application could be in the region of £500 to £10,000 (English Heritage, pers. comm., 2011). No further impacts on activities related to archaeology are anticipated.

Table 2c. Flood and coastal erosion risk management (coastal defence)	**rMCZ Devon Avon Estuary**
Source of costs of the 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).	

Table 2c. Flood and coastal erosion risk management (coastal defence)	**rMCZ Devon Avon Estuary**
Baseline description of activity	**Costs of impact of rMCZ on the sector**
The 0 to 20 year Shoreline Management Plan policies along the landward edges of the rMCZ are predominantly 'managed realignment' along the inner estuary and 'no active intervention' at the outer estuary. The Aveton Gifford Habitat Scheme is anticipated within the next 5 years (Environment Agency, pers. comm., 2012).	As a result of the rMCZ, 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 to 1 day of additional work, 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. It is anticipated that no additional mitigation of impacts will be required (Environment Agency, pers. comm., 2012).

Table 2d. Other impacts that are assessed for the suite of MCZs and not for this site alone	**rMCZ Devon Avon Estuary**
Cables (interconnectors and telecom cables): Future interconnectors and telecom cables may pass through the rMCZ. Impacts of rMCZs on future interconnectors and telecom cables are assessed in the Evidence Base, Annex H3 and Annex N3 (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 Devon Avon Estuary**
Cables (existing interconnectors and telecom cables); recreation; research and education; water abstraction, discharge and diffuse pollution*.	

* The IA aassumes that no additional mitigation of the 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 (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 Devon Avon Estuary**
Baseline	**Beneficial impact**	
Fletcher and others (2012) 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. The estuary is a nursery area for fish (Environment Agency, pers. comm., 2010) and, as such, is likely to help to support potential 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 in favourable condition. However, there is currently no commercial fishing within the rMCZ and therefore no value derived from on-site fisheries. It has not been possible to estimate the value derived from off-site fisheries as a result of the nursery area function.	If the conservation objectives of the features are achieved, the features will be maintained in favourable condition. No additional management (above that in the baseline situation) of fishing activities is expected. No change in feature condition or harvesting of fish and shellfish is anticipated and therefore no on-site or off-site benefits are expected. 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 (because, if necessary, mitigation would be introduced, with the associated costs and benefits).	Anticipated direction of change: ⟺ Confidence : Moderate

Table 4b. Recreation		**rMCZ Devon Avon Estuary**
Baseline	**Beneficial impact**	
Angling: Fletcher and others (2012) identify that the features to be protected by the rMCZ can contribute to the delivery of fish and shellfish for human consumption and recreation services. The estuary is a nursery area for fish	If the conservation objectives of the features are achieved, the features will be maintained in favourable condition.	Anticipated direction of change:

Table 4b. Recreation		**rMCZ Devon Avon Estuary**
(Environment Agency, pers. comm., 2010) and, as such, is likely to help to support potential 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 in favourable condition. Shore angling and angling from boats occurs in the estuary, targeting species including bass and sea trout. It has not been possible to estimate the value of angling in the site.	No change in on-site feature condition or fishing mortality is anticipated and therefore no on-site or off-site benefits are expected (see Table 4a for further details). 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 (as, if necessary, mitigation would be introduced, with the associated costs and benefits). The designation may lead to an increase in angling 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 UK angling.	⟺ Confidence: Moderate
Diving: Diving is not known to take place in the rMCZ.	N/A	N/A
Wildlife watching: Fletcher and others (2012) identify that some of the features to be protected by the rMCZ can contribute to the delivery of recreation and tourism services. 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. There are several walks along the Devon Avon Estuary where visitors can enjoy the local wildlife. The estuary attracts waders including curlews, lapwings, redshanks and greenshanks and common sandpipers. Little grebes, black-headed gulls, herring gulls, common gulls, herons and little egrets are often spotted and shelducks breed in the area. In the winter, mute swans gather at the estuary which is known as one of the best places in Devon to spot swans. It has not been possible to estimate the value of wildlife watching in the rMCZ.	If the conservation objectives of the features are achieved, the features will be maintained in favourable condition. No change in on-site feature condition is anticipated and therefore no benefits to wildlife watching are expected. 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 (as, if necessary, mitigation would be introduced, with the associated costs and benefits). 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 UK wildlife watching visits.	Anticipated direction of change: ⟺ Confidence: Moderate

Table 4c. Research and education	**rMCZ Devon Avon Estuary**
Baseline	**Beneficial impact**

Table 4c. Research and education		**rMCZ Devon Avon Estuary**
Research: Fletcher and others (2012) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) can contribute to the delivery of research services. Research activities are carried out under the Avon Estuary Forum and Avon Estuary Management Plan, including research related to catchment sensitive farming (Avon Estuary Forum, 2009). The John Crawford Environmental Award scheme provides funding for projects of relevance to the river. The first award (in 2008) contributed to the funding of a project studying the possible effects of oestrogen mimics (widespread water pollutants) on a particular species of clam (Watts, 2008). The full extent of current research activity carried out in the rMCZ is unknown. It has not been possible to estimate the value derived from research activities associated with the rMCZ.	Monitoring of the rMCZ 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: ⇧ Confidence: High
Education: Fletcher and others (2012) identify that the features to be protected by the rMCZ can contribute to the delivery of education services. The Aune Conservation Association (ACA) organises environmental management activities, walks and public lectures (ACA Forum, 2012); while the Avon Estuary Management Plan has objectives to establish a school visits programme and a series of summer lectures walks and events over the period 2011 to 2016 (Avon Estuary Forum, 2009). 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 on the marine environment. Designation may aid additional local (to the rMCZ) provision of education (e.g. events and interpretation boards), from which visitors to the site would derive benefit. 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: ⇧ Confidence: Moderate

Table 4d. Regulating services		**rMCZ Devon Avon Estuary**
Baseline	**Beneficial impact**	
Regulation of pollution: The features of the site contribute to the bioremediation of waste and sequestration of carbon. Coastal saltmarshes are known to be particularly efficient carbon sinks and cadmium is stored in	If the conservation objectives of the features are achieved, the features will be maintained in favourable condition. No change in feature condition and management of human activities is	Anticipated direction of change:

Table 4d. Regulating services		**rMCZ Devon Avon Estuary**
sediment by cord grass *Spartina anglica* which grows in intertidal mud (Fletcher and others, 2011). ***Environmental resilience:*** The features of the site contribute to the resilience and continued regeneration of marine ecosystems. Rocky habitats in estuaries make a significant contribution to the overall diversity (Fletcher and others, 2012). ***Natural hazard protection:*** The features of the site, in particular the coastal saltmarshes and intertidal habitats, contribute to local flood and storm protection (Fletcher and others, 2012). It has not been possible to estimate the value of regulating services in the site.	expected and therefore no benefit to the regulation of pollution is expected. Designating the recommended Marine Conservation Zone will protect its features and the ecosystem services that they provide against the risk of future degradation from pressures caused by human activities (as, if necessary, mitigation would be introduced, with the associated costs and benefits).	⟺ Confidence: Moderate

Table 4e. Non-use and option values		**rMCZ Devon Avon 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 recommended Marine Conservation Zone (rMCZ) and the ecosystem services provided, even if they do not currently benefit from them. It has not been possible to estimate the non-use value of the rMCZ.	The rMCZ will benefit the proportion of the UK population that values conservation of the MCZ 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 will protect both the features and the option to benefit from the services in the future from the risk of future degradation. Examples of these values are shown in Ranger and others (2012). Voters in the Marine Conservation Society's 'Your Seas Your Voice' campaign expressed a desire to protect the area because they felt it was under threat, and because they had a personal affinity with the site and thought the 'whole place is amazing'.	Anticipated direction of change: ⇧ Confidence: Moderate

rMCZ East of Celtic Deep

Site area (km^2): 94.9

Table 1. Conservation impacts				**rMCZ East of Celtic Deep**
1a. Ecological description				
The site is approximately 40km south of the Pembrokeshire coast in Wales. The depth is within the 50–100 metre range, with the western edge dipping below the 100 metre depth contour. The sea bed is characterised by subtidal sand, with a patch of mud. The site has added ecological importance as it is in an area where frontal systems occur during the summer months, indicating high productivity. Offshore bird observation data indicate that this is an important aggregation area for a number of sea bird species year-round; and is of particular importance for wintering birds (Lieberknecht and others, 2011).				
1b. MCZ Feature Baseline and Impact of MCZ				
Feature	**Area of feature (km2)**	**No. of point records**	**Baseline**	**Impact of MCZ**
Broad-scale Habitats				
Subtidal sand	84.01	-	Unfavourable Condition	Recover to Favourable Condition
Subtidal mud	10.18	-	Unfavourable Condition	Recover to Favourable Condition
Subtidal coarse sediment	0.71	-	Unfavourable Ccondition	Recover to Favourable Condition

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

Table 2a. Commercial fisheries	**rMCZ East of Celtic Deep**
Source of costs of the rMCZ	
The Joint Nature Conservation Committee and Natural England have advised that there is considerable uncertainty about whether additional management of commercial fisheries gears will be required for certain features protected by this rMCZ. Multiple management scenarios have been identified for the Impact Assessment in order to reflect this uncertainty. Should the site be designated, the management that will be required is likely to fall somewhere within this range.	
Management scenario 1: No additional management.	

Table 2a. Commercial fisheries **rMCZ East of Celtic Deep**

Management scenario 2: Closure of entire rMCZ to bottom trawls and dredges.

Baseline description of activity	**Costs of impact of rMCZ on the sector**
Overview: The rMCZ is situated outside the 12nm (nautical mile) limit, on the median line between English and Welsh waters. The rMCZ is located on the eastern edge of a nephrops fishery targeted by UK, Irish, French and Belgian trawlers. There is no evidence of fishing effort with other gear types by UK vessels (MCZ Fisheries Model). In addition, non-UK vessels use static gears. Estimated total value of UK vessel landings from the rMCZ is £0.002m/yr.	
UK Bottom trawls: The rMCZ is located on the eastern edge of the most productive nephrops fishery in the south-west marine area, although the level of fishing effort inside the rMCZ is relatively low (MCZ Fisheries Model). Activity is dominated by Northern Irish nephrops trawlers. Estimated value of UK bottom trawl landings from the rMCZ is £0.002m/yr.	***Scenario 1:*** No impacts are anticipated under Scenario 1. ***Scenario 2:*** The value of landings affected by the rMCZ is small, at £0.002m/yr. No significant impacts are therefore expected as a result of the designation under this scenario. Estimated annual value of UK bottom trawl landings affected is expected to fall within the following range: *£m/yr* | Scenario 1 | Scenario 2 Value of landings affected | 0.000 | 0.002
Total direct impact	
Total direct impact on UK commercial fisheries:	Estimated annual value of UK vessel 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 | 0.000 | 0.002 GVA affected | 0.000 | 0.001
Impact on non-UK commercial fisheries: Non-UK vessels using static gears, bottom trawls/dredges (in particular Belgian, French and Irish demersal trawlers) and mid-water trawls fish within the rMCZ (Lee, 2010).	***Scenario 1:*** No impacts are anticipated under Scenario 1. ***Scenario 2:*** Non-UK vessels using bottom trawls/dredges, in particular French vessels, will

Table 2a. Commercial fisheries	**rMCZ East of Celtic Deep**
Estimated value of landings from the rMCZ by French vessels − bottom trawls/dredges: £0.066m/yr; static gears: £0.005m/yr (Direction des Pêches Maritimes et de l' Aquaculture, 2011). Estimates are not available for other countries.	be affected by the rMCZ. The estimated value of French landings affected: £0.066m/yr (bottom trawls/dredges). No information on the effect on other non-UK vessels is available.

Table 2b. Other impacts that are assessed for the suite of MCZs and not for this site alone	**rMCZ East of Celtic Deep**
Cables (interconnectors and telecom cables): Future interconnectors and telecom cables may pass through the rMCZ. Impacts of rMCZs on future interconnectors and telecom cables are assessed in the Evidence Base, Annex H3 and Annex N3 (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 East of Celtic Deep**
Cables (existing interconnectors and telecom cables), commercial fisheries (mid-water trawl)	

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 East of Celtic Deep**
Baseline	**Beneficial impact**	
Fletcher and others (2012) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) contribute to the delivery of fish and shellfish services. Offshore sediment habitats can support internationally important fish and shellfish fisheries (Fletcher and others, 2012). The baseline quantity and quality of service provided is assumed to be commensurate with that provided by the features of the site when in unfavourable condition. A description of on-site fishing activity and the value derived from it is set out in Table 2a.	If the conservation objectives of the features are achieved, the features will be recovered to favourable condition. Additional management of commercial fishing is expected, the costs of which are set out in Table 2a. Achievement of the conservation objectives may improve the contribution of the habitats to the provision of fish and shellfish for human consumption. Management of fishing activity within the rMCZ may reduce the on-site fishing mortality of species, which may benefit commercial stocks. However, the current level of fishing effort is very low, so a minimal reduction in fish and shellfish harvesting is anticipated. 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 of mobile fish. Potential benefits may arise on-site, for fishers permitted to fish within the rMCZ, and off-site from spill-over benefits. The potential benefits described here do not include the negative impacts of the additional fisheries management on fish and shellfish provision or the off-site impacts of displaced effort.	Anticipated direction of change: ⇧ Confidence: Low

Table 4b. Recreation	**rMCZ East of Celtic Deep**
Baseline	**Beneficial impact**

Table 4b. Recreation		**rMCZ East of Celtic Deep**
No recreational activities are known to occur in or near the recommended Marine Conservation Zone.	N/A	N/A

Table 4c. Research and education		**rMCZ East of Celtic Deep**
Baseline	**Beneficial impact**	
Research: Fletcher and others (2012) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) can contribute to the delivery of research services. No known research activities are currently carried out in the rMCZ.	Monitoring of the rMCZ 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: ⇧ Confidence: High
Education: Fletcher and others (2012) identify that the features to be protected by the rMCZ can contribute to the delivery of education services. No known education activity is focused on the area of the rMCZ.	As the rMCZ is offshore and therefore relatively inaccessible, no benefits are likely to arise from direct use of the site for education. 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: ⇧ Confidence: Low

Table 4d. Regulating services	**rMCZ East of Celtic Deep**

Table 4d. Regulating services		**rMCZ East of Celtic Deep**
Baseline	**Beneficial impact**	
Regulation of pollution: The features of the site contribute to the bioremediation of waste and sequestration of carbon. Marine sediments, through processes that occur in their upper layers, play an important role in the global cycling of many elements, including carbon and nitrogen (Fletcher and others, 2012). ***Environmental resilience:*** The features of the site contribute to the resilience and continued regeneration of marine ecosystems. Subtidal sediments found in sheltered or deeper water are particularly diverse habitats (Fletcher and others, 2012). ***Natural hazard protection:*** As the site is offshore, it is unlikely to contribute to providing natural hazard protection. It has not been possible to estimate the value of regulating services in the site.	If the conservation objectives are achieved, the features of the site will be recovered to favourable condition. Improved habitat condition and a potential reduction in anthropogenic pressures, including from bottom-towed fishing gear, may increase site benthic biodiversity and biomass, improving the regulating capacity of the site habitats.	Anticipated direction of change: ⇧ Confidence: Low

Table 4e. Non-use and option values		**rMCZ East of Celtic Deep**
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) and the ecosystem services provided, even if they do not currently benefit from them. It has not been possible to estimate the non-use value of the rMCZ.	The rMCZ will benefit the proportion of the UK population that values conservation of the MCZ 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 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: ⇧ Confidence: Moderate

rMCZ East of Haig Fras

Site area (km^2): 399.38

Table 1. Conservation impacts				rMCZ East of Haig Fras
1a. Ecological description				
The south-eastern corner of the site is approximately 67km from the Land's End peninsula. The site is an area of continental shelf, most of which is between 50 metres and 100 metres in depth. Small areas in the western end of the site dip below the 100 metre depth contour. The sea bed is characterised by coarse sediment and sand (Lieberknecht and others, 2011).				
1b. MCZ Feature Baseline and Impact of MCZ				
Feature	**Area of feature (km2)**	**No. of point records**	**Baseline**	**Impact of MCZ**
Broad-scale Habitats				
Moderate energy circalittoral rock	9.79	-	Unfavourable Condition	Recover to favourable condition
Subtidal sand	154.65	-	Unfavourable Condition	Recover to favourable condition
Subtidal coarse sediment	235.53	-	Unfavourable Condition	Recover to favourable condition

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

Table 2a. Commercial fisheries	rMCZ East of Haig Fras
Source of costs of the 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. Multiple management scenarios have been identified for the Impact Assessment which reflect this uncertainty. Should the site be designated, the management that will be required is likely to fall somewhere within this range.	
Management scenario 1: No additional management.	
Management scenario 2: Closure of entire rMCZ to bottom trawls and dredges.	
Management scenario 3: Closure of entire rMCZ to bottom trawls and dredges; zoned closure of moderate energy circalittoral rock to pots and traps, nets, and hooks and	

Table 2a. Commercial fisheries **rMCZ East of Haig Fras**

lines.

Management scenario 4: Closure of entire rMCZ to bottom trawls, dredges, pots and traps, nets, and hooks and lines.

Baseline description of activity	**Costs of impact of rMCZ on the sector**

Overview: The rMCZ is situated midway between the UK 12nm (nautical mile) limit and the UK's 200nm fishery limit. Fishing effort is dominated by French otter trawlers, with lower levels of UK and Belgian beam trawling (Lee, 2010; South West Fishing Industry Group, 2011; MCZ Fisheries Model). Netting by UK vessels takes place throughout the rMCZ and there is a low level of long lining and hand lining by UK vessels (MCZ Fisheries Model). Estimated total value of UK vessel landings from the rMCZ: £0.049m/yr.

UK Bottom trawls: The rMCZ lies on the western side of an area of significant UK beam trawl activity (MCZ Fisheries Model). As the rMCZ is well offshore, only larger beam trawlers, typically of between 20 and 40 metres in length, tend to fish in the area (Beam trawl skipper, pers. comm., 2011). Vessels active in the wider area (defined as the International Council for the Exploration of the Sea (ICES) Rectangles 29E3 and 30E3) principally target monkfish, sole and megrim (MMO, 2011a). Estimated value of UK bottom trawl landings from the rMCZ: £0.035m/yr.

Scenario 1: No impacts are anticipated under Scenario 1.

Scenarios 2, 3 and 4: Under these scenarios, displaced vessels may increase their effort to the east of the rMCZ in the more heavily fished area.

Estimated annual value of UK bottom trawl landings affected is expected to fall within the following range:

£m/yr	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Value of landings affected	0.000	0.035	0.035	0.035

<table>
<tr><th colspan="2">Table 2a. Commercial fisheries rMCZ East of Haig Fras</th></tr>
<tr><td>UK Nets: A description of the baseline is not available for this rMCZ. Estimated value of UK net landings from the rMCZ: £0.014m/yr.</td><td>Scenarios 1 and 3: No impacts are anticipated under these scenarios.

Scenarios 2 and 4: A relatively low value of landings will be affected under this scenario. No further information on the impacts was obtained..

Estimated annual value of UK net landings affected is expected to fall within the following range:

<table><tr><td>£m/yr</td><td>Scenario 1</td><td>Scenario 2</td><td>Scenario 3</td><td>Scenario 4</td></tr><tr><td>Value of landings affected</td><td>0.000</td><td>0.000</td><td>0.000</td><td>0.014</td></tr></table>
In establishing the draft conservation objectives, the site features were assessed as having low vulnerability to fishing with nets at current levels. Where this is the case, this activity was not the primary reason for assigning 'recover' conservation objective(s). As such, it is anticipated that if 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>UK Hooks and lines: There is a low level of hook and line activity in the rMCZ. Estimated value of UK hook and line landings from the rMCZ: less than £0.001m/yr.</td><td>Scenarios 1 and 3: No impacts are anticipated under these scenarios.

Scenarios 2 and 4: The affected value of landings is low under these scenarios, at less than £0.001m/yr, and therefore no significant impacts are anticipated.

Estimated annual value of UK hook and line landings affected is expected to fall within the following range:

<table><tr><td>£m/yr</td><td>Scenario 1</td><td>Scenario 2</td><td>Scenario 3</td><td>Scenario 4</td></tr><tr><td>Value of landings affected</td><td><0.001</td><td><0.001</td><td><0.001</td><td><0.001</td></tr></table>
In establishing the draft conservation objectives, the site features were assessed as having low vulnerability to fishing with hooks and lines at current levels. Where this is the case, this activity was not the primary reason for assigning 'recover' conservation objective(s). As such, it is anticipated that if 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>
</table>

Table 2a. Commercial fisheries **rMCZ East of Haig Fras**

Total direct impact

Total direct impact on UK commercial fishing

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

£m/yr	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Value of landings affected	0.000	0.035	0.035	0.049
GVA affected	0.000	0.015	0.015	0.021

Impact on non-UK commercial fishing: Non-UK vessels using static gears, bottom trawls/dredges (in particular French otter trawlers, with lower levels of Belgian beam trawling) and mid-water trawls fish within the rMCZ (Lee, 2010). Rising fuel costs have resulted in an increase in activity by these boats in the wider south-west region (Basse Normandie, pers. comm., 2011). Estimated value of landings from the rMCZ by French vessels: bottom trawls/dredges: £0.162m/yr; static gears: £0.000m/yr (Direction des Pêches Maritimes et de l' Aquaculture, 2011). Estimates are not available for other countries.

Scenario 1: No impacts are anticipated under Scenario 1.

Scenarios 2, 3 and 4: Non-UK vessels using bottom trawls/dredges, in particular French otter trawlers, would be affected by the rMCZ. In the event of a full closure of the rMCZ the estimated value of French landings affected will be £0.162m/yr (bottom trawls/dredges). No information on the effect of the zoned closure to static gears or the impact on Belgian vessels' value of landings is available.

Table 2b. Other impacts that are assessed for the suite of MCZs and not for this site alone **rMCZ East of Haig Fras**

Cables (interconnectors and telecom cables): Future interconnectors and telecom cables may pass through the rMCZ. Impacts of rMCZs on future interconnectors and telecom cables are assessed in the Evidence Base, Annex H3 and Annex N3 (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)	**pMCZ East of Haig Fras**
Cables (existing interconnectors and telecom cables), Commercial fishing (mid-water trawl),	

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 East of Haig Fras**
Baseline	**Beneficial impact**	
Fletcher and others (2012) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) contribute to the delivery of fish and shellfish services. Offshore sand and coarse sediment habitats (the two dominant habitats in the rMCZ) support internationally important fish and shellfish fisheries (Fletcher and others, 2012). The baseline quantity and quality of service provided is assumed to be commensurate with that provided by the features of the site when in unfavourable condition. A description of on-site fishing activity and the value derived from it is set out in Table 2a.	If the conservation objectives of the features are achieved, the features will be recovered to favourable condition. New management of fishing activities is expected (above the baseline situation), the costs of which are set out in Table 2a. Achievement of the conservation objectives may improve the contribution of the habitats to the provision of fish and shellfish for human consumption. Management of fishing activity within the rMCZ may reduce the on-site fishing mortality of species, which may benefit commercial stocks. The rMCZ is relatively large with a relatively high level of current fishing	Anticipated direction of change: ⇧ Confidence: Low

Table 4a. Fish and shellfish for human consumption		**rMCZ East of Haig Fras**
	effort, and the potential reduction in fishing pressure may benefit commercial stocks of mobile and less mobile species. Potential benefits may arise on-site, for fishers permitted to fish within the rMCZ, and off-site from spill-over benefits. The potential benefits described here do not include the negative impacts of the additional fisheries management on fish and shellfish provision or the off-site impacts of displaced effort.	

Table 4b. Recreation		**rMCZ East of Haig Fras**
Baseline	**Beneficial impact**	
No recreational activities are known to occur in or near the recommended Marine Conservation Zone.	N/A	N/A

Table 4c. Research and education		**rMCZ East of Haig Fras**
Baseline	**Beneficial impact**	
Research: Fletcher and others (2012) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) can contribute to the delivery of research services. No known research activities are currently carried out in the rMCZ.	Monitoring of the rMCZ 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: ⇧ Confidence: High
Education: Fletcher and others (2012) identify that the features to be	As the rMCZ is offshore and therefore relatively inaccessible, no benefits are	Anticipated

Table 4c. Research and education		**rMCZ East of Haig Fras**
protected by the rMCZ can contribute to the delivery of education services. No known education activity is focused on the area of the rMCZ.	likely to arise from direct use of the site for education. 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).	direction of change: ⇧ Confidence: Low

Table 4d. Regulating services		**rMCZ East of Haig Fras**
Baseline	**Beneficial impact**	
Regulation of pollution: The features of the site contribute to the bioremediation of waste and sequestration of carbon. Marine sediments, through processes that occur in their upper layers, play an important role in the global cycling of many elements, including carbon and nitrogen (Fletcher and others, 2012). ***Environmental resilience:*** The features of the site contribute to the resilience and continued regeneration of marine ecosystems. Subtidal sediments found in sheltered or deeper water are particularly diverse habitats and rock habitats can support particularly high biodiversity (Fletcher and others, 2012). ***Natural hazard protection:*** As the site is offshore, it is unlikely to contribute to providing natural hazard protection. It has not been possible to estimate the value of regulating services in the site.	If the conservation objectives of the features are achieved, the features will be recovered to favourable condition. Improved habitat condition and a potential reduction in anthropogenic pressures, including from bottom-towed fishing gear, may increase site benthic biodiversity and biomass, improving the regulating capacity of the site habitats.	Anticipated direction of change: ⇧ Confidence: Low

Table 4e. Non-use and option values	**rMCZ East of Haig Fras**

Table 4e. Non-use and option values		**rMCZ East of Haig Fras**
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) and the ecosystem services provided, even if they do not currently benefit from them. It has not been possible to estimate the non-use value of the rMCZ.	The rMCZ will benefit the proportion of the UK population that values conservation of the MCZ 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 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: ⇧ Confidence: Moderate

rMCZ East of Jones Bank

Site area (km^2): 359.38

Table 1. Conservation impacts				**rMCZ East of Jones Bank**
1a. Ecological description				
The eastern site boundary is approximately 126km to the west of Land's End. The site is at a depth of between 100 metres and 200 metres, and is largely characterised by moderate energy circalittoral rock. There is anecdotal evidence that this area is characterised not by solid bedrock but by loose cobbles (Lieberknecht and others, 2011).				
1b. MCZ Feature Baseline and Impact of MCZ				
Feature	**Area of feature (km2)**	**No. of point records**	**Baseline**	**Impact of MCZ**
Broad-scale Habitats				
Moderate energy circalittoral rock	342.75	-	Unfavourable Condition	Recover to Favourable Condition
Subtidal mud	14.44	-	Unfavourable Condition	Recover to Favourable Condition
Subtidal sand	2.19	-	Unfavourable Condition	Recover to Favourable Condition

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

Table 2a. Commercial fisheries	**rMCZ East of Jones Bank**
Source of costs of the 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. Multiple management scenarios have been identified for the Impact Assessment which reflect this uncertainty. Should the site be designated, the management that will be required is likely to fall somewhere within this range.	
Management scenario 1: No additional management.	
Management scenario 2: Closure of entire rMCZ to bottom trawls and dredges.	
Management scenario 3: Zoned closure of moderate energy circalittoral rock in the rMCZ to bottom trawls, dredges, pots and traps, nets, and hooks and lines.	

<table>
<tr><th colspan="2">Table 2a. Commercial fisheries</th><th>rMCZ East of Jones Bank</th></tr>
<tr><td colspan="3">Management scenario 4: Closure of entire rMCZ to bottom trawls, dredges, pots and traps, nets, and hooks and lines.</td></tr>
<tr><th>Baseline description of activity</th><th colspan="2">Costs of impact of rMCZ on the sector</th></tr>
<tr><td colspan="3">Overview: The rMCZ is situated midway between the UK 12nm (nautical mile) limit and the UK's 200nm fishery limit. Fishing in the rMCZ is dominated by French otter trawlers. There is a low level of UK beam trawling and gill netting in the rMCZ (MCZ Fisheries Model). Netters are active throughout the rMCZ. Estimated total value of UK vessel landings from the rMCZ: £0.013m/yr.</td></tr>
<tr><td>UK Bottom trawls: UK trawlers active in the wider area (defined as the International Council for the Exploration of the Sea (ICES) Rectangles 28E2 and 29E2) are typically beam trawlers of between 20 and 35 metres in length. Fishing effort in the rMCZ is low (MCZ Fisheries Model). Estimated value of UK bottom trawl landings from the rMCZ: £0.06m/yr.</td><td colspan="2">Scenario 1: No impacts are anticipated under Scenario 1.

Scenarios 2, 3 and 4: The rMCZ does not cover a known trawling ground (South West Fishing Industry Group, 2011) and landings from it are low. As such no significant impacts are anticipated under these scenarios. The area of zoned management (scenario 3) covers the majority of the rMCZ and the impacts are therefore assumed to be the same as for full rMCZ closure (scenarios 2 and 4).

Estimated annual value of UK bottom trawl landings affected is expected to fall within the following range:
<table><tr><td>£m/yr</td><td>Scenario 1</td><td>Scenario 2</td><td>Scenario 3</td><td>Scenario 4</td></tr><tr><td>Value of landings affected</td><td>0.000</td><td>0.006</td><td>0.006</td><td>0.006</td></tr></table></td></tr>
<tr><td>UK Nets: A description of the baseline is not available for this rMCZ. Estimated value of UK net landings from the rMCZ: £0.007m/yr.</td><td colspan="2">Scenarios 1 and 2: No impacts are anticipated under these scenarios.

Scenarios 3 and 4: A relatively low value of landings will be affected under these scenarios. No further information on the impacts was obtained..

Estimated annual value of UK net landings affected is expected to fall within the following range:
<table><tr><td>£m/yr</td><td>Scenario 1</td><td>Scenario 2</td><td>Scenario 3</td><td>Scenario 4</td></tr><tr><td>Value of landings affected</td><td>0.000</td><td>0.000</td><td>0.007</td><td>0.007</td></tr></table></td></tr>
</table>

<table>
<tr><th colspan="2">Table 2a. Commercial fisheries</th><th>rMCZ East of Jones Bank</th></tr>
<tr><td colspan="2"></td><td>In establishing the draft conservation objectives, the site features were assessed as having low vulnerability to fishing with nets at current levels. Where this is the case, this activity was not the primary reason for assigning 'recover' conservation objective(s). As such, it is anticipated that if 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 colspan="3">Total direct impact</th></tr>
<tr><td colspan="2">Total direct impact on UK commercial fishing:</td><td>Estimated annual value of UK vessel landings and gross value added (GVA) affected is expected to fall within the following range:
<table>
<tr><td>£m/yr</td><td>Scenario 1</td><td>Scenario 2</td><td>Scenario 3</td><td>Scenario 4</td></tr>
<tr><td>Value of landings affected</td><td>0.000</td><td>0.006</td><td>0.013</td><td>0.013</td></tr>
<tr><td>GVA affected</td><td>0.000</td><td>0.003</td><td>0.006</td><td>0.006</td></tr>
</table></td></tr>
<tr><td colspan="2">Impact on non-UK commercial fishing: Non-UK vessels using static gears, bottom trawls/dredges (in particular French otter trawlers) and mid-water trawls fish within the rMCZ (Lee, 2010). Estimated value of landings from the rMCZ by French vessels: bottom trawls/dredges: £0.175m/yr; static gears: <£0.001m/yr (Direction des Pêches Maritimes et de l' Aquaculture, 2011). Estimates are not available for other countries.</td><td>Scenario 1: No impacts are anticipated under Scenario 1.

Scenarios 2, 3 and 4: Non-UK vessels using static gears and bottom trawls/dredges, in particular French otter trawlers, would be affected by the rMCZ. In the event of a full closure of the rMCZ the estimated value of French landings affected would be: £0.175m/yr (bottom trawls/dredges) and <£0.001 (static gears). No information on the effect on the value of landings of other countries' vessels is available. The area of zoned management covers the majority of the rMCZ and the impacts are therefore likely to be similar as for full rMCZ closure.</td></tr>
</table>

Table 2b. National defence	rMCZ East of Jones Bank

Table 2b. National defence	**rMCZ East of Jones Bank**
Source of costs of the 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. 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 for water column activities. The rMCZ is in an MOD exercise area.	It is not known whether this rMCZ will impact on MOD's activity. Impacts of rMCZs on MOD activities are assessed in Annex N and the Evidence Base (they are not assessed for this rMCZ alone).

Table 2c. Other impacts that are assessed for the suite of MCZs and not for this site alone	**rMCZ East of Jones Bank**
Cables (interconnectors and telecom cables): Future interconnectors and telecom cables may pass through the rMCZ. Impacts of rMCZs on future interconnectors and telecom cables are assessed in the Evidence Base, Annex H3 and Annex N3 (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 East of Jones Bank**
Cables (existing interconnectors and telecom cables), commercial fishing (mid-water trawl)	

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 East of Jones Bank**	
Baseline	**Beneficial impact**	
Fletcher and others (2012) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) contribute to the delivery of fish and shellfish services. Offshore sand and coarse sediment habitats (the two dominant habitats in the rMCZ) support internationally important fish and shellfish fisheries (Fletcher and others, 2012). The baseline quantity and quality of service provided is assumed to be commensurate with that provided by the features of the site when in unfavourable condition. A description of on-site fishing activity and the value derived from it is set out in Table 2a.	If the conservation objectives of the features are achieved, they will be recovered to favourable condition. New management of fishing activities is expected (above the baseline situation), the costs of which are set out in Table 2a. Achievement of the conservation objectives may improve the contribution of the habitats to the provision of fish and shellfish for human consumption. Management of fishing activity within the rMCZ may reduce the on-site fishing mortality of species, which may benefit commercial stocks. The rMCZ is relatively large with a relatively high level of current fishing effort, and the potential reduction in fishing pressure may benefit commercial stocks of mobile and less mobile species. Potential benefits may arise on-site, for fishers permitted to fish within the rMCZ, and off-site from spill-over benefits. The potential benefits described here do not include the negative impacts of the additional fisheries management on fish and shellfish provision or the off-site impacts of displaced effort.	Anticipated direction of change: ⇧ Confidence: Low

Table 4b. Recreation	**rMCZ East of Jones Bank**	
Baseline	**Beneficial impact**	
No recreational activities are known to occur in or near the recommended Marine Conservation Zone.	N/A	N/A

Table 4c. Research and education	**rMCZ East of Jones Bank**	
Baseline	**Beneficial impact**	
Research: Fletcher and others (2012) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) can contribute to the delivery of research services. No known research activities are currently carried out in 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: ⇧ Confidence: High
Education: Fletcher and others (2012) identify that the features to be protected by the rMCZ can contribute to the delivery of education services. No known education activity is focused on the area of the rMCZ.	As the rMCZ is offshore and therefore relatively inaccessible, no benefits are likely to arise from direct use of the site for education. 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: ⇧ Confidence: Low

Table 4d. Regulating services	**rMCZ East of Jones Bank**	
Baseline	**Beneficial impact**	
Regulation of pollution: The features of the site contribute to the bioremediation of waste and sequestration of carbon. Marine sediments, through processes that occur in their upper layers, play an important role in the global cycling of many elements, including carbon and nitrogen (Fletcher and others, 2012). ***Environmental resilience:*** The features of the site contribute to the resilience and continued regeneration of marine ecosystems. Subtidal sediments found in sheltered or deeper water are particularly diverse habitats, and rock habitats can support particularly high biodiversity (Fletcher and others, 2012). ***Natural hazard protection:*** As the site is offshore, it is unlikely to contribute to providing natural hazard protection. It has not been possible to estimate the value of regulating services in the site.	If the conservation objectives of the features are achieved, the features will be recovered to favourable condition. Improved habitat condition and a potential reduction in anthropogenic pressures, including from bottom-towed fishing gear, may increase site benthic biodiversity and biomass, improving the regulating capacity of the site habitats.	Anticipated direction of change: ⇧ Confidence: Low

Table 4e. Non-use and option values	**rMCZ East of Jones Bank**	
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) and the ecosystem services provided, even if they do not currently benefit from them. It has not been possible to estimate the non-use value of the rMCZ.	The rMCZ will benefit the proportion of the UK population that values conservation of the MCZ 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 will protect both the features and the option to benefit from the services in the future from the risk of future degradation. Examples of these values are shown in Ranger and others (2012). Voters in the Marine Conservation Society's 'Your Seas Your Voice' campaign expressed a desire to protect the area, with the most common reasons being	Anticipated direction of change: ⇧ Confidence: Moderate

Table 4e. Non-use and option values		**rMCZ East of Jones Bank**
	because of the 'spectacular scenery', because 'the whole place is amazing' and because 'it means a great deal to me personally'.	

rMCZ Erme Estuary

Site area (km^2): 1.32

Table 1. Conservation impacts — **rMCZ Erme Estuary**

1a. Ecological description

The recommended Marine Conservation Zone encompasses the whole of the Erme Estuary up to the mean high water mark, as far as the weir just south of Sequer's Bridge. The Erme is a narrow, sheltered estuary approximately 6.5km long. It is very secluded, has steep wooded banks and is a notified Site of Special Scientific Interest for its woodland. It lies within an Area of Outstanding Natural Beauty, and within the South Devon Heritage Coast.

The habitats are predominantly sedimentary with some broken sand-scoured bedrock at the mouth. Mobile sediments near the channel have a typical crustacean–polychaete community characterised by the amphipods *Bathyporeia pilosa* and *Eurydice pulchra*. More sheltered sediment infaunal communities are characterised by the ragworm *Hediste diversicolor*. Low shore shingle and cobble habitats are colonised by the brackish water algae *Fucus ceranoide*s. The estuary is a spawning ground for sea trout and has a population of the European otter.

European eel *Anguilla anguilla* has been reported in the estuary. Sampling of four major taxonomic groups has been carried out in the estuary: oligochaetes; amphipod crustaceans (mainly *Gammarus* spp.); the ragworm *Nereis diversicolor*; and either mysids (mainly *Neomysis integer*) or the brown shrimp *Crangon crangon* (Lieberknecht and others, 2011).

1b. MCZ Feature Baseline and Impact of MCZ

Feature	Area of feature (km2)	No. of point records	Baseline	Impact of MCZ
Broad-scale Habitats				
High energy infralittoral rock	0.14	-	Favourable Condition	Maintained at Favourable Condition
High energy intertidal rock	< 0.01	-	Favourable Condition	Maintained at Favourable Condition
Intertidal coarse sediment	0.02	-	Favourable Condition	Maintained at Favourable Condition
Intertidal mixed sediments	0.01	-	Favourable Condition	Maintained at Favourable Condition
Low energy infralittoral rock	0.07	-	Favourable Condition	Maintained at Favourable Condition
Low energy intertidal rock	0.01	-	Favourable Condition	Maintained at Favourable Condition
Moderate energy infralittoral rock	0.03	-	Favourable Condition	Maintained at Favourable Condition
Moderate energy intertidal rock	0.03	-	Favourable Condition	Maintained at Favourable Condition

Subtidal mud	0.01	-	Favourable Condition	Maintained at Favourable Condition
Subtidal sand	0.04	-	Favourable Condition	Maintained at Favourable Condition
Habitats of Conservation Importance				
stuarine rocky habitats	-	3	Favourable Condition	Maintained at Favourable Condition
Sheltered muddy gravels	0.07	-	Favourable Condition	Maintained at Favourable Condition
Species of Conservation Importance				
Anguilla anguilla	-	-	To be determined	To be determined

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

Table 2a. Archaeological heritage	**rMCZ Erme Estuary**
Source of costs of the 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**
Post-Roman pottery scatter is recorded in the site. The Erme Estuary Wreck found in the site is designated as a historic shipwreck under the Protection of Wrecks Act 1973. Since 2003, one licence has been granted each year to survey the wreck. 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).	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 (English Heritage, pers. comm., 2011). No further impacts on activities related to archaeology are anticipated.

Table 2b. Flood and coastal erosion risk management (coastal defence)	**rMCZ Erme Estuary**
Source of costs of the 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).	
Baseline description of activity	**Costs of impact of rMCZ on the sector**
The 0 to 20 year Shoreline Management Plan policies along the edge of the rMCZ advocate 'managed realignment' where possible instead of 'hold the line', and 'no active intervention' along undefended frontages. Schemes may come forward as a result of the hold the line policy (Environment Agency, pers. comm., 2012).	As a result of the rMCZ, 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 to 1 day of additional work, 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. It is anticipated that no additional mitigation of impacts will be required (Environment Agency, pers. comm., 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 rMCZ (existing activities at their current levels and future proposals known to the regional MCZ projects)	**rMCZ Erme Estuary**
Recreation; research and education; water pollution from activities on land.	

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 Erme Estuary**
Baseline	**Beneficial impact**	
Fletcher and others (2012) 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. The estuary is a nursery area for fish (Environment Agency, pers. comm., 2010) and, as such, is likely to help to support potential 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 in favourable condition. However, there is currently no commercial fishing within the rMCZ and therefore no value derived from on-site fisheries. It has not been possible to estimate the value derived from off-site fisheries as a result of the nursery area function.	If the conservation objectives of the features are achieved, the features will be maintained in favourable condition. No additional management (above that in the baseline situation) of fishing activities is expected. No change in feature condition or harvesting of fish and shellfish is anticipated and therefore no on-site or off-site benefits are expected. 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 (because, if necessary, mitigation would be introduced, with the associated costs and benefits).	Anticipated direction of change: ⇔ Confidence : Moderate

Table 4b. Recreation	**rMCZ Erme Estuary**
Baseline	**Beneficial impact**

Table 4b. Recreation		**rMCZ Erme Estuary**
Angling: Fletcher and others (2012) 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. The estuary is a nursery area for fish (Environment Agency, pers. comm., 2010) and, as such, is likely to help to support potential 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 in favourable condition. At least 25 angling permits are issued (free of charge) each year and it is estimated that approximately 15 of the visitors staying at the holiday cottages fish on the estuary each year (Flete Estate, pers. comm., 2011). Therefore, at least 40 anglers (25 permit holders and 15 visitors) are expected to use the site each year. The water bailiff runs a charter boat business which includes angling charters within and outside the estuary. It has not been possible to estimate the value of angling in the site.	If the conservation objectives of the features are achieved, the features will be maintained in favourable condition. No change in on-site feature condition or fishing mortality is anticipated and therefore no on-site or off-site benefits are expected (see Table 4a for further details). 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 (as, if necessary, mitigation would be introduced, with the associated costs and benefits). The designation may lead to an increase in angling 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 UK angling.	Anticipated direction of change: ⟺ Confidence: Moderate
Diving: Diving is not known to take place in the rMCZ.	N/A	N/A
Wildlife watching: Fletcher and others (2012) identify that some of the features to be protected by the rMCZ can contribute to the delivery of recreation and tourism services. 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. Egrets, herons, kingfishers, curlews, oystercatchers and shelducks can be seen regularly at the estuary. Visitors to the estuary can also see otters on a regular basis. It has not been possible to estimate the value of wildlife watching in the rMCZ.	If the conservation objectives of the features are achieved, the features will be maintained in favourable condition. No change in on-site feature condition is anticipated and therefore no benefits to wildlife watching are expected. 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 (as, if necessary, mitigation would be introduced, with the associated costs and benefits). 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 UK wildlife watching visits.	Anticipated direction of change: ⟺ Confidence: Moderate

Table 4c. Research and education		**rMCZ Erme Estuary**
Baseline	**Beneficial impact**	
Research: Fletcher and others (2012) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) can contribute to the delivery of research services. Research activities are carried out under the Erme Estuary Management Plan, and the current plan seeks to encourage activities such as baseline and survey work of key habitats (Coast and Countryside Service, 2003). The Erme Estuary wreck and Erme Ingot heritage sites received approximately 50 dives a year between them (English Heritage, pers. comm., 2011). The full extent of current research activity carried out in the rMCZ is unknown. It has not been possible to estimate the value derived from research activities associated with the rMCZ.	Monitoring of the rMCZ 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: ⇧ Confidence: High
Education: Fletcher and others (2012) identify that the features to be protected by the rMCZ can contribute to the delivery of education services. Education activities at the estuary are not known. The Erme Estuary Management Plan seeks to encourage links with schools and public events such as lectures and walks (Coast and Countryside Service, 2003). In 2007, Bournemouth University used the Erme Ingot heritage site to train marine archaeology students. 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 in the marine environment. Designation may aid additional local (to the rMCZ) provision of education (e.g. events and interpretation boards), from which visitors to the site would derive benefit. 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: ⇧ Confidence: Moderate

Table 4d. Regulating services		**rMCZ Erme Estuary**
Baseline	**Beneficial impact**	
Regulation of pollution: The features of the site contribute to the bioremediation of waste and sequestration of carbon (Fletcher and others, 2012). ***Environmental resilience:*** The features of the site contribute to the resilience and continued regeneration of marine ecosystems. Rocky habitats in estuaries make a significant contribution to the overall diversity (Fletcher and others, 2012). ***Natural hazard protection:*** The features of the site, in particular the intertidal habitats, contribute to local flood and storm protection (Fletcher and others, 2012). It has not been possible to estimate the value of regulating services in the site.	If the conservation objectives of the features are achieved, the features will be maintained in favourable condition. No change in feature condition and management of human activities is expected and therefore no benefit to the regulation of pollution is expected. Designating the recommended Marine Conservation Zone (rMCZ) will protect its features and the ecosystem services that they provide against the risk of future degradation from pressures caused by human activities (as, if necessary, mitigation would be introduced, with the associated costs and benefits).	Anticipated direction of change: ⇔ Confidence: Moderate

Table 4e. Non-use and option values		**rMCZ Erme 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 recommended Marine Conservation Zone (rMCZ) and the ecosystem services provided, even if they do not	The rMCZ will benefit the proportion of the UK population that values conservation of the MCZ 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	Anticipated direction of change: ⇧

Table 4e. Non-use and option values		**rMCZ Erme Estuary**
currently benefit from them. It has not been possible to estimate the non-use value of the rMCZ.	(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.	Confidence: Moderate

rMCZ Reference Area Erme Estuary

Site area (km^2): 0.19

Table 1. Conservation impacts **rMCZ Reference Area Erme Estuary**

1a. Ecological description

Recommended Marine Conservation Zone Reference Area Erme Estuary sits in the upper extent of the estuary. The site boundary follows the mean high water mark on all banks. The Erme is a narrow, sheltered estuary and approximately 6.5km long. It is very secluded, has steep wooded banks and has been notified as a Site of Special Scientific Interest for its woodland habitat. It lies within an Area of Outstanding Natural Beauty and within the South Devon Heritage Coast.

The habitats are predominantly sedimentary with some broken sand scoured bedrock at the mouth. Mobile sediments near the channel have a typical crustacean–polychaete community characterised by the amphipods *Bathyporeia pilosa* and *Eurydice pulchra*. More sheltered sediment infaunal communities are characterised by ragworm *Hediste diversicolor*. Low shore shingle and cobble habitats are colonised by the brackish water algae *Fucus ceranoide*s. The estuary is a spawning ground for sea trout and has a population of European otter.

European eel *Anguilla anguilla* has been reported in the estuary. Sampling of four major taxonomic groups has been carried out in the estuary for: oligochaetes; amphipod crustaceans (mainly *Gammarus* spp.); ragworm *Nereis diversicolor*; and either mysids (mainly *Neomysis integer)* or brown shrimp *Crangon crangon* (Lieberknecht and others, 2011).

1b. MCZ Feature Baseline and Impact of MCZ

Feature	Area of feature (km2)	No. of point records	Baseline	Impact of MCZ
Broad-scale Habitats				
Low energy infralittoral rock	0.02	-	Favourable Condition	Recover to Reference Condition
Subtidal mud	< 0.01	-	Favourable Condition	Recover to Reference Condition
Coastal saltmarshes and saline reedbeds	0.04	-	Favourable Condition	Recover to Reference Condition
Intertidal mud	0.13	-	Favourable Condition	Recover to Reference Condition
Habitats of Conservation Importance				
Sheltered muddy gravels	0.07	-	Favourable 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 Erme Estuary**
Source of costs of the rMCZ	
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 Peat Database holds a record at this location. 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).	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 has been estimated. However, the additional cost in one licence application could be in the region of £500 to £10,000 (English Heritage, pers. comm., 2011). 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. Flood and coastal erosion risk management (coastal defence)	**rMCZ Reference Area Erme Estuary**
Source of costs of the 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	

Table 2b. Flood and coastal erosion risk management (coastal defence)	**rMCZ Reference Area Erme Estuary**
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 0 to 20 year Shoreline Management Plan policies along the edge of the rMCZ advocate 'managed realignment' where possible instead of 'hold the line', and 'no active intervention' along undefended frontages. Schemes may come forward as a result of the hold the line policy (Environment Agency, pers. comm., 2012).	As a result of the rMCZ, 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 to 1 day of additional work, 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. It is anticipated that no additional mitigation of impacts will be required (Environment Agency, pers. comm., 2012).

Table 2c. Recreation	**rMCZ Reference Area Erme Estuary**
Source of costs of the rMCZ	
Recreational angling management scenario: Closure of rMCZ to recreational angling.	
Recreational boating: Closure of rMCZ to anchoring (except in emergency).	
Wildfowling management scenario: Closure of rMCZ to wildfowling.	
Baseline description of activity	**Costs of impact of rMCZ on the sector**
Recreational angling: The Erme Estuary is a 'several fishery' (one where the property rights to the fishery are bestowed to a specific individual or organisation). Angling on the estuary is permitted only for permit holders, people who fish with the water bailiff and people who are staying in one of the 9 holiday cottages in the area (Flete Estate, pers. comm., 2011).	The rMCZ does not cover the whole estuary, and better fishing is thought to be available outside the rMCZ (Flete Estate, pers. comm., 2011). However, the closure of the rMCZ to anglers would be expected to reduce the choice of marks and may affect the quality of fishing on the estuary. At least 40 anglers per year are expected to be affected by the rMCZ.

Table 2c. Recreation	**rMCZ Reference Area Erme Estuary**
At least 25 angling permits are issued (free of charge) each year. In addition it is estimated that approximately 15 of the visitors staying at the holiday cottages on the edge of the estuary fish on the estuary each year (Flete Estate, pers. comm., 2011). Therefore at least 40 anglers (25 permit holders and 15 visitors) are expected to use the site each year. The water bailiff runs a charter boat business which includes angling charters within and outside the estuary. The number of anglers who use this service is not known. The water bailiff, together with the gamekeeper, also manages angling on the estuary on behalf the Flete Estate (Flete Estate, pers. comm., 2011). The rMCZ covers an area of 0.19km^2 part way up the estuary, equivalent to approximately 15% of the estuary's main area. Angling takes place throughout the estuary, including in the pMCZ, although areas outside the pMCZ are thought to provide better fishing (Flete Estate, pers. comm., 2011). The key species targeted by anglers are primarily bass and mullet and occasionally dab.	Angling on the estuary is part of the attraction of the holiday cottages operated by the Flete Estate and other individuals. The rMCZ may reduce the quality of this attraction which may result in reduced rental income (Flete Estate, pers. comm., 2011). The rMCZ would remove an area potentially targeted by anglers who charter the water bailiff's boat. This may affect the number of individuals taken on angling trips by the water bailiff, affecting his business revenue. It should be noted that the water bailiff also provides effective on-the-ground policing of activities on the estuary. If the continuation of the role of water bailiff became unviable as a result of new rMCZ management then this would affect the level of policing of activities on the estuary, which might result in management measures being less strictly adhered to.
Recreational boating: Six recreational boats anchor in Saltercrease, which is within the rMCZ boundary. Three of these are linked to Saltercrease Cottage, a riverside rental property. These boats are occasionally anchored on the mudflats directly in front of the cottage. The three other boats over-winter in Saltercrease as it provides more shelter than the moorings further down the estuary. One of these boats belongs to the Erme Estuary water bailiff, who continues to regularly use his boat commercially from this location during the winter months (Flete Estate, pers. comm., 2012).	Saltercrease provides an appropriate sheltered area for over-wintering anchorages on the estuary and suitable alternatives are not available (Flete Estate, pers. comm., 2012). Because of this, vessel owners are expected to respond to the rMCZ by taking boats out of the water during winter months, rather than anchor them in Saltercrease. This may result in additional costs of use and storage for the boat owners. The additional time required to launch and remove a boat for each use may deter owners from using their boats during the winter, reducing the benefit they receive from the activity. For the water bailiff, this is likely to impact on the operation of his business, and may result in a loss of earnings (Flete Estate, pers. comm., 2012). Boats anchored on the mudflats will need to be removed from the water after each use. This may affect the frequency with which the boats are used, reducing boating activity. This may also impact on the attractiveness of the rental property Saltercrease Cottage (Flete Estate, pers. comm., 2012)

Table 2c. Recreation	**rMCZ Reference Area Erme Estuary**
Wildfowling: Wildfowling occurs throughout much of the estuary, and the rMCZ covers the main and best area. Wildfowling typically occurs during the autumn and winter months. The species targeted within the estuary include mallard, wigeon, teal and occasionally snipe. There are 12 days of formal shoots per year, usually involving 8 people per shoot (equating to 96 individuals/yr), where guests participate by invitation only and under the supervision of the gamekeeper and/or landowner. There are also a few informal shoots each year. Dogs are used to collect the quarry as well as to chase pheasants, some of which are shot within the rMCZ. People who shoot at the estuary may stay in the holiday cottages, particularly Pamflete House, located to the south-west of the rMCZ (Flete Estate, pers. comm., 2011). Flete Estate receives annual revenue of approximately £0.059m from wildfowling activities. This is an important part of the estate's annual income. People who go wildfowling and also stay in Pamflete House provide further income for the estate. The house is rented out for between £2,350 and £3,000 per week. The owner of the hunting dogs used for the shoots also receives an income from the activity (value not available) (Flete Estate, pers. comm., 2011).	Wildflowling within the rMCZ would not be permitted as it is extractive (Natural England, pers. comm., 2012) (JNCC and Natural England, 2010). The rMCZ covers the main and best area used for wildfowling within the estuary. The closure of the rMCZ to wildfowling could result in complete cessation of wildfowling within the estuary and an approximate loss of income to Flete Estate of at least £0.059m/yr (Flete Estate, 2011). If there was not sufficient demand for holiday lets for Pamflete House arising from its other attractions, this could further impact on the income of the Flete Estate. There could also be a loss of income for the owner of the hunting dogs used for the shoots. However, wildfowling may continue at a reduced level in areas of the estuary outside the rMCZ, but the quality of the wildfowling experience would be significantly lower than that provided by the area covered by the rMCZ. Approximately 96 individual wildfowlers per year would be expected to be affected by the rMCZ. While there are other locations for wildfowling in South Devon such as Kingsbridge, the River Tamar and the River Tavy (British Association for Shooting and Conservation, 2011), the Erme Estuary is considered to be unique in that it offers accommodation for wildfowlers (and their partners) and is by invitation only.

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 Reference Area Erme Estuary**
Recreation (horse riding [subject to code of conduct], swimming, walking); research and education.	

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 Reference Area Erme Estuary**	
Baseline	**Beneficial impact**	
Fletcher and others (2012) 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. The estuary is a nursery area for fish (Environment Agency, pers. comm., 2010) and, as such, is likely to help to support potential 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 in favourable condition. However, there is currently no commercial fishing within the rMCZ and therefore no value derived from on-site fisheries. It has not been possible to estimate the value derived from off-site fisheries as a result of the nursery area function.	If the conservation objectives of the features are achieved, the features will be recovered to reference condition. Additional management (above that in the baseline situation) of fishing activities is expected, which will prohibit fishing within the rMCZ, although there is no current commercial fishing activity. No change in feature condition or harvesting of fish and shellfish is anticipated and no fishing will be permitted within the rMCZ. Therefore no on-site or off-site benefits are expected. Designating the rMCZ will protect its features and the ecosystem services that they provide against the risk of future degradation from anthropogenic pressures (as, if necessary, mitigation would be introduced, with the associated costs and benefits).	Anticipated direction of change: ⇔ Confidence Moderate

Table 4b. Recreation	**rMCZ Reference Area Erme Estuary**	
Baseline	**Beneficial impact**	
Angling: Fletcher and others (2012) 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. 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 1b). A description of on-site angling activity is set out in Table 2c. It has not been possible to estimate the value of angling at the site.	If the conservation objectives of the features are achieved, the features will be recovered to reference condition. Recovery of habitats may have benefits to fish populations. It is unclear whether any benefits to fish populations would arise as a result of reduced fishing mortality due to management of commercial fishing (see Table 4a). As angling will not be permitted within the rMCZ, any benefits will be limited to those occurring as a result of spill-over effects of finfish species targeted by anglers. Such benefits may be insignificant.	Anticipated direction of change: ⇔ Confidence Low
Diving: Diving is not known to take place in the rMCZ.	N/A	N/A
Wildlife watching: Fletcher and others (2012) identify that some of the features to be protected by the rMCZ can contribute to the delivery of recreation and tourism services. 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. Egrets, heron, kingfishers, curlew, oystercatcher and shelduck can be seen regularly at the estuary. Visitors to the estuary can also see otters on a regular basis. It has not been possible to estimate the value of wildlife watching in the rMCZ.	If the conservation objectives of the features are achieved, the features will be recovered to reference condition. 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. 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.	Anticipated direction of change: ⇧ Confidence Low

Table 4c. Research and education	**rMCZ Reference Area Erme Estuary**
Baseline	**Beneficial impact**

Table 4c. Research and education		**rMCZ Reference Area Erme Estuary**
Research: Fletcher and others (2012) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) can contribute to the delivery of research services. Research activities are carried out under the Erme Estuary Management Plan, which seeks to encourage activities such as baseline and survey work of key habitats (Coast and Countryside Service, 2003). The full extent of current research activity carried out at the rMCZ is unknown. It has not been possible to estimate the value derived from research activities associated with the rMCZ.	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. 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: ⇧ Confidence: High
Education: Fletcher and others (2012) identify that the features to be protected by the rMCZ can contribute to the delivery of education services. Education activities at the estuary are not known. The Erme Estuary Management Plan seeks to encourage linkages with schools and public events such as lectures and walks (Coast and Countryside Service, 2003). 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 on the marine environment. Designation may aid additional local (to the rMCZ) provision of education (e.g. events and interpretation boards), from which visitors to the site would derive benefit. 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: ⇧ Confidence: Moderate

Table 4d. Regulating services		**rMCZ Reference Area Erme Estuary**
Baseline	**Beneficial impact**	
Regulation of pollution: The features of the site contribute to the bioremediation of waste and sequestration of carbon. Coastal saltmarshes are known to be particularly efficient carbon sinks and cadmium is stored in sediment by cord grass *Spartina anglica*, which grows in intertidal mud (Fletcher and others, 2012).	If the conservation objectives of the features are achieved, the features will be recovered to reference condition. Improved habitat condition and a reduction in anthropogenic pressures may increase site benthic biodiversity and biomass, improving the regulating capacity of the site habitats.	Anticipated direction of change: ⇧

Table 4d. Regulating services		**rMCZ Reference Area Erme Estuary**
Environmental resilience: The features of the site contribute to the resilience and continued regeneration of marine ecosystems. Rocky habitats in estuaries make a significant contribution to the overall diversity (Fletcher and others, 2012). ***Natural hazard protection:*** The features of the site, in particular the intertidal habitats, contribute to local flood and storm protection (Fletcher and others, 2012). It has not been possible to estimate the value of regulating services in the site.		Confidence: Low

Table 4e. Non-use and option values		**rMCZ Reference Area Erme 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 recommended Marine Conservation Zone (rMCZ) and the ecosystem services provided, even if they do not currently benefit from them. It has not been possible to estimate the non-use value of the rMCZ.	The rMCZ will benefit the proportion of the UK population that values conservation of the MCZ 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 will protect both the features and their option to benefit from the services in the future from the risk of future degradation.	Anticipated direction of change: ⇧ Confidence: Moderate

rMCZ Greater Haig Fras

Site area (km^2): 2,040.95

Table 1. Conservation impacts **rMCZ Greater Haig Fras**

1a. Ecological description

The western boundary of the recommended Marine Conservation Zone (rMCZ) is aligned with the UK Continental Shelf Limit. The remainder of the site encompasses the entirety of the geomorphological feature Haig Fras and Haig Fras candidate Special Area of Conservation, with surrounding areas of sediment. The easternmost boundary of the rMCZ is approximately 120km west of Land's End.

Greater Haig Fras is an isolated, fully submarine bedrock outcrop located in the soth-west offshore area. It is the only substantial area of rocky reef in the Celtic Sea beyond the coastal margin. It supports a variety of fauna, ranging from jewel anemones and Devonshire cup coral near the peak of the outcrop to encrusting sponges, crinoids and Ross coral towards the base of the rock (where boulders surround its edge). The rock is granite, mostly smooth with occasional fissures. The rocky outcrop protrudes from an area of surrounding sediment and is approximately 45km long, 15km wide and in one area rises to a peak 1km wide, which lies just 38 metres beneath the sea surface. Around the base of the shoal, boulders and cobbles partially embedded in sediment provide a complex habitat. Distinct biotopes are associated with both the rock habitat and the sediment 'pockets' which occur on the platform area.

On the uppermost parts of the Haig Fras shoal, the exposed bedrock is dominated by the jewel anemone *Corynactis viridis.* This region also supports encrusting sponges and bryozoans, as well as mobile fauna such as the sea urchin *Echinus esculentus* and gastropod mollusc *Calliostoma* spp. At the shallowest depth surveyed (c. 52 metres), small patches of encrusting pink coralline algae were observed, indicating that the peak of the shoal protrudes into the photic zone. At depths of between 60 and 70 metres, the shoal bedrock is slightly covered in silt and is not widely colonised except by cup coral *Caryophyllia smithii* (which is abundant) and a few mobile species such as the urchin *Echinus esculentus*, gastropod mollusc *Calliostoma s*pp. and crinoids (*Antedon* spp.). High numbers of cup corals have been seen on parts of the rock platform away from the shoal. At the base of the shoal, the rock is covered with a thin layer of fine calcareous sand and mud and supports cup sponges, erect branching sponges, *Caryophyllia smithii* (although in lower numbers than shallower parts of the shoal) and crinoids. The boulders and cobbles around the base of the shoal support encrusting sponge, *Caryophyllia smithii* and crinoids in low numbers; brittlestars, squat lobster (*Munida* spp.) and the Ross coral *Pentapora foliacea* (now *Pentapora fascialis*) are also present (Lieberknecht and others, 2011).

1b. MCZ Feature Baseline and Impact of MCZ

Feature	Area of feature (km2)	No. of point records	Baseline	Impact of MCZ
Broad-scale Habitats				
Moderate energy circalittoral rock	688.98	-	Unfavourable Condition	Recover to Favourable Condition

Subtidal coarse sediment	413.46	-	Unfavourable Condition	Recover to Favourable Condition
Subtidal mixed sediments	115.79	-	Unfavourable Condition	Recover to Favourable Condition
Subtidal mud	236.39	-	Unfavourable Condition	Recover to Favourable Condition
Subtidal sand	316.79	-	Unfavourable Condition	Recover to Favourable Condition
Geological and Geomorphological Features of Interest				
Haig Fras rock complex	74.73	-	Favourable Condition	Maintained at Favourable Condition

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

Table 2a. Commercial fisheries	**rMCZ Greater Haig Fras**
Source of costs of the rMCZ	
The Joint Nature Conservation Committee (JNCC) 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. Multiple management scenarios have been identified for the Impact Assessment which reflect this uncertainty. Should the site be designated, the management that will be required is likely to fall somewhere within this range.	
Management scenario 1: No additional management.	
Management scenario 2: Closure of entire rMCZ to bottom trawls and dredges.	
Management scenario 3: Closure of entire rMCZ to bottom trawls, dredges, pots and traps, nets, and hooks and lines.	
Baseline description of activity	**Costs of impact of rMCZ on the sector**
Overview: The rMCZ is close to the south-western edge of the UK's 200nm (nautical mile) fishery limit and the UK's exclusive economic zone. Fishing in the rMCZ is dominated by French otter trawling (JNCC, pers. comm., 2012) and there is also a significant amout of gill netting, principally by UK vessels. Estimated total value of UK vessel landings from the rMCZ: £0.16m/yr.	

<table>
<tr><th colspan="2">Table 2a. Commercial fisheries</th><th>rMCZ Greater Haig Fras</th></tr>
<tr><td colspan="2">UK Bottom trawls: UK trawlers active in the wider area (defined as the International Council for the Exploration of the Sea [ICES] Rectangle 29E2) are typically beam trawlers of between 20 and 35 metres in length. Fishing effort in the rMCZ is low (MCZ Fisheries Model). Estimated value of UK bottom trawl landings from the rMCZ: £0.002m/yr.</td><td>Scenario 1: No impacts are anticipated under Scenario 1.

Scenarios 2 and 3: The rMCZ does not cover a known trawling ground (South West Fishing Industry Group, 2011) and landings from it are low. As such no significant impacts are anticipated under these scenarios.

Estimated annual value of UK bottom trawl landings affected is expected to fall within the following range:

<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>0.002</td><td>0.002</td></tr></table></td></tr>
<tr><td colspan="2">UK Nets: UK vessels active in the area around the rMCZ (defined as ICES Rectangles 29E1 and 29E2) are typically of between 15 and 20 metres in length and primarily use gill nets to target hake and Pollack (MMO, 2011a). Some vessels use both gill nets and trammel nets, using the latter to target turbot and monkfish (MMO, 2011a). Netting occurs throughout the rMCZ, but is concentrated in two areas, one in the far west of the rMCZ along the shelf break, the other in the south-east of the rMCZ following the area of circalittoral rock (MCZ Fisheries Model). Estimated value of UK net landings from the rMCZ: £0.158m/yr.</td><td>Scenarios 1 and 2: No impacts are anticipated under scenarios 1 and 2.

Scenario 3: A relatively high value of landings will be affected under this scenario. No further information on the impacts was obtained.

Estimated annual value of UK net landings affected is expected to fall within the following range:

<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>0.158</td></tr></table>
In establishing the draft conservation objectives, the site features were assessed as having low vulnerability to fishing with nets at current levels. Where this is the case, this activity was not the primary reason for assigning 'recover' conservation objective(s). As such, it is anticipated that if 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 colspan="3">Total direct impact</td></tr>
</table>

Table 2a. Commercial fisheries — **rMCZ Greater Haig Fras**

Total direct impact on UK commercial fishing	Estimated annual value of UK vessel landings and gross value added (GVA) affected is expected to fall within the following range:

£m/yr	Scenario 1	Scenario 2	Scenario 3
Value of landings affected	0.000	0.002	0.160
GVA affected	0.000	0.001	0.071

Impact on non-UK commercial fishing: Non-UK vessels using static gears, bottom trawls/dredges (in particular French otter trawlers) and mid-water trawls fish within the rMCZ (Lee, 2010). Estimated value of landings from the rMCZ by French vessels: bottom trawls/dredges: £0.970m/yr; static gears: £0.081m/yr (Direction des Pêches Maritimes et de l' Aquaculture, 2011). Estimates are not available for other countries.	***Scenario 1:*** No impacts are anticipated under Scenario 1. ***Scenarios 2 and 3:*** Non-UK vessels using bottom trawls/dredges (in particular French otter trawlers) and static gears would be affected by the rMCZ. In the event of a full closure of the rMCZ the estimated value of French landings affected would be £0.97m/yr (bottom trawls/dredges) and £0.081m/yr (static gears). No information on the effect of the zoned closure to static gears or the impact on other countries' vessels' value of landings is available.

Table 2b. National defence — **rMCZ Greater Haig Fras**

Source of costs of the 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. 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 for water column activities. The rMCZ is in an MOD exercise area.	It is not known whether this rMCZ will impact on MOD's activity. Impacts of rMCZs on MOD activities are assessed in Annex N and the Evidence Base (they are not assessed for this rMCZ alone).

Table 2c. Other impacts that are assessed for the suite of MCZs and not for this site alone	**rMCZ Greater Haig Fras**
Cables (interconnectors and telecom cables): Future interconnectors and telecom cables may pass through the rMCZ. Impacts of rMCZs on future interconnectors and telecom cables are assessed in the Evidence Base, Annex H3 and Annex N3 (they are not assessed for this site alone). **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 the oil and gas related activities are assessed in the Evidence Base, Annex H10 and Annex N9 (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 Greater Haig Fras**
Cables (existing interconnectors and telecom cables), commercial fishing (mid-water trawls)	

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 Greater Haig Fras**
Baseline	**Beneficial impact**	
Fletcher and others (2012) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) contribute to the delivery of fish and shellfish services. Offshore circalittoral rock and sediment habitats support internationally important fish and shellfish fisheries (Fletcher and others, 2012). 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. A description of on-site fishing activity and the value derived from it is set out in Table 2a.	If the conservation objectives of the features are achieved, the habitats will be recovered to favourable condition. 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. The rMCZ is relatively large and the improvement in habitat condition and potential reduction in fishing pressure may benefit commercial stocks of mobile and less mobile species. Potential benefits may arise on-site, for fishers permitted to fish within the rMCZ, and off-site from spill-over benefits. The potential effects described here do not include the negative impacts of the additional fisheries management on fish and shellfish provision and off-site impacts of displaced effort.	Anticipated direction of change: ⇧ Confidence: Low

Table 4b. Recreation		**rMCZ Greater Haig Fras**
Baseline	**Beneficial impact**	
No recreational activities are known to occur at or near the recommended Marine Conservation Zone.	N/A	N/A

Table 4c. Research and education		**rMCZ Greater Haig Fras**
Baseline	**Beneficial impact**	
Research: Fletcher and others (2012) identify that the features to be protected	Monitoring of the rMCZ will help to inform understanding of how the marine	Anticipated

Table 4c. Research and education		**rMCZ Greater Haig Fras**
by the recommended Marine Conservation Zone (rMCZ) can contribute to the delivery of research services. The rMCZ overlaps a Special Area of Conservation and research activities may occur as a result of the designation.	environment is changing and how it is impacted on by anthropogenic pressures and management interventions. Other research benefits are unknown.	direction of change: ⇧ Confidence: High
Education: Fletcher and others (2012) identify that the features to be protected by the rMCZ can contribute to the delivery of education services. No known education activity is focused on the area of the rMCZ.	As the rMCZ is offshore and therefore relatively inaccessible, no benefits are likely to arise from direct use of the site for education. 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: ⇧ Confidence: Low

Table 4d. Regulating services		**rMCZ Greater Haig Fras**
Baseline	**Beneficial impact**	
Regulation of pollution: The features of the site contribute to the bioremediation of waste and sequestration of carbon. Marine sediments, through processes that occur in their upper layers, play an important role in the global cycling of many elements, including carbon and nitrogen (Fletcher and others, 2012). ***Environmental resilience:*** The features of the site contribute to the resilience and continued regeneration of marine ecosystems. Subtidal sediments found in sheltered or deeper water are particularly diverse habitats and rock habitats	If the conservation objectives of the features are achieved, the features will be recovered to favourable condition. Improved habitat condition and a potential reduction in anthropogenic pressures, including from bottom-towed fishing gear, may increase site benthic biodiversity and biomass, improving the regulating capacity of the site habitats.	Anticipated direction of change: ⇧ Confidence: Low

Table 4d. Regulating services		**rMCZ Greater Haig Fras**
can support extremely high biodiversity (Fletcher and others, 2012). ***Natural hazard protection:*** As the site is offshore, it is unlikely to contribute to providing natural hazard protection. It has not been possible to estimate the value of regulating services in the site.		

Table 4e. Non-use and option values		**rMCZ Greater Haig Fras**
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) and the ecosystem services provided, even if they do not currently benefit from them. It has not been possible to estimate the non-use value of the rMCZ.	The rMCZ will benefit the proportion of the UK population that values conservation of the MCZ 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 will protect both the features and their option to benefit from the services in the future from the risk of future degradation.	Anticipated direction of change: ⇧ Confidence: Moderate

rMCZ Reference Area Haig Fras

Site area (km^2): 148.23

Table 1. Conservation impacts — **rMCZ Reference Area Haig Fras**

1a. Ecological description

The recommended Marine Conservation Zone (rMCZ) has a depth ranging from 76 to 132 metres below sea level and is located approximately 155km off Land's End. It intersects with the Haig Fras rock complex, an Ecological Network Guidance-listed geological/geomorphological feature of importance. The rMCZ boundary contains 5.0% (3.71 km^2) of the feature.

Greater Haig Fras is an isolated, fully submarine bedrock outcrop located in the south-west offshore area, 95km north-west of the Isles of Scilly. It is the only substantial area of rocky reef in the Celtic Sea beyond the coastal margin. It supports a variety of fauna, ranging from jewel anemones and Devonshire cup coral near the peak of the outcrop to encrusting sponges, crinoids and Ross coral towards the base of the rock (where boulders surround its edge). The rock is granite, mostly smooth with occasional fissures. The rocky outcrop protrudes from an area of surrounding sediment and is approximately 45km long, 15km wide and in one area rises to a peak 1km wide, which lies just 38 metres beneath the sea surface. Around the base of the shoal, boulders and cobbles partially embedded in sediment provide a complex habitat. Distinct biotopes are associated with both the rock habitat and the sediment 'pockets' which occur on the platform area (Lieberknecht and others, 2011).

1b. MCZ Feature Baseline and Impact of MCZ

Feature	Area of feature (km2)	No. of point records	Baseline	Impact of MCZ
Broad-scale Habitats				
Moderate energy circalittoral rock	30.01	-	Unfavourable Condition	Recover to Reference Condition
Subtidal coarse sediment	48.20	-	Unfavourable Condition	Recover to Reference Condition
Subtidal mixed sediments	54.45	-	Unfavourable Condition	Recover to Reference Condition
Subtidal mud	8.50	-	Unfavourable Condition	Recover to Reference Condition
Subtidal sand	7.06	-	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 Reference Area Haig Fras**

Source of costs of the 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. Multiple management scenarios have been identified for the Impact Assessment which reflect this uncertainty. Should the site be designated, the management that will be required is likely to fall somewhere within this range.

Management scenario 1: Closure of entire rMCZ to all commercial fishing gears, except mid-water trawls.

Management scenario 2: Closure of entire rMCZ to all commercial fishing.

Baseline description of activity	**Costs of impact of rMCZ on the sector**
Overview: The rMCZ is close to the south-western edge of the UK's 200nm (nautical mile) fishery limit and the UK's exclusive economic zone. Fishing in the rMCZ is dominated by gill netting, principally by UK vessels. There is also a high level of French otter trawl effort in the rMCZ (Lee, 2010). Estimated total value of UK vessel landings from the rMCZ: £0.017m/yr.	
UK Nets: UK vessels active in the area around the rMCZ (defined as the International Council for the Exploration of the Sea [ICES] Rectangles 29E1 and 29E2) are typically of between 15 and 20 metres in length and primarily use gill nets to target hake and Pollack (MMO, 2011a). Some vessels use both gill nets and trammel nets, using the latter to target turbot and monkfish (MMO, 2011a). Estimated value of UK net landings from the rMCZ: £0.017m/yr.	***Scenarios 1 and 2:*** The rMCZ covers a small proportion of the area targeted by fishers, and displaced vessels may increase their effort in the area surrounding the rMCZ. This may affect catch rates for all netters active in the wider area. Estimated annual value of UK net landings affected is expected to fall within the following range: *£m/yr* | Scenario 1 | Scenario 2 Value of landings affected | 0.017 | 0.017
Total direct impact	
Total direct impact on UK commercial fishing:	Estimated annual value of UK vessel landings and gross value added (GVA) affected is expected to fall within the following range: *£m/yr* | Scenario 1 | Scenario 2

<table>
<tr><th colspan="2">Table 2a. Commercial fisheries</th><th colspan="3">rMCZ Reference Area Haig Fras</th></tr>
<tr><td></td><td>Value of landings affected</td><td>0.017</td><td>0.017</td></tr>
<tr><td></td><td>GVA affected</td><td>0.008</td><td>0.008</td></tr>
<tr><td>Impact on non-UK commercial fishing: Non-UK vessels using static gears, bottom trawls/dredges (in particular French otter trawlers) and mid-water trawls fish within the rMCZ (Lee, 2010). Estimated value of landings from the rMCZ by French vessels: bottom trawls/dredges: £0.047m/yr; static gears: £0.008m/yr (Direction des Pêches Maritimes et de l' Aquaculture, 2011). Estimates for other countries are not available.</td><td colspan="3">Scenario 1: Non-UK vessels using static gears and bottom trawls/dredges, in particular French otter trawlers, would be affected by the rMCZ. In the event of a full closure of the rMCZ the estimated value of French landings affected would be: £0.047m/yr (bottom trawls/dredges) and £0.008m/yr (static gears). No information on the effect on other countries' vessels' value of landings is available.

Scenario 2: In addition to the impacts described under Scenario 1, non-UK mid-water trawlers will also be affected under Scenario 2. No further information on the impacts of the rMCZ was received from non-UK fisheries organisations/associations. It has not been possible to obtain information on the value of non-UK vessels' landings affected by the rMCZ.</td></tr>
</table>

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 Reference Area Haig Fras**
None.	

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 Reference Area Haig Fras**	
Baseline	**Beneficial impact**	
Fletcher and others (2012) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) contribute to the delivery of fish and shellfish services. Offshore circalittoral rock and sediment habitats support internationally important fish and shellfish fisheries (Fletcher and others, 2012). 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. A description of on-site fishing activity and the value derived from it is set out in Table 2a.	If the conservation objectives of the features are achieved, the habitats will be recovered to reference condition. Additional management (above that in the baseline situation) of fishing activities is expected, which will prohibit fishing within the rMCZ, the costs of which are set out in Table 2a. Achievement of the conservation objectives may improve the contribution of the habitats to the provision of fish and shellfish for human consumption. Management of fishing activity within the rMCZ may reduce the on-site fishing mortality of species, which may benefit commercial stocks. 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 of mobile species. As no fishing will be permitted within the rMCZ, no on-site benefits will be realised. The potential effects described here do not include the negative impacts of the additional fisheries management on fish and shellfish provision and off-site impacts of displaced effort.	Anticipated direction of change: ⇧ Confidence: Low

Table 4b. Recreation	**rMCZ Reference Area Haig Fras**	
Baseline	**Beneficial impact**	
No recreational activities are known to occur at or near the recommended Marine Conservation Zone.	N/A	N/A

Table 4c. Research and education	**rMCZ Reference Area Haig Fras**	
Baseline	**Beneficial impact**	
Research: Fletcher and others (2012) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) can contribute to the delivery of research services. The rMCZ overlaps with a Special Area of Conservation and existing research activities may occur as a result of the designation.	As an rMCZ Reference Area, the site will provide an opportunity to demonstrate the state of its designated marine features, in the context of prevailing environmental conditions, in the absence of many anthropogenic pressures**.** 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: ⇧ Confidence: High
Education: Fletcher and others (2012) identify that the features to be protected by the rMCZ can contribute to the delivery of education services. No known education activity is focused on the area of the rMCZ.	As the rMCZ is offshore and therefore relatively inaccessible, no benefits are likely to arise from direct use of the site for education. Non-visitors may benefit if the rMCZ contributes to wider provision of education resources (e.g. television programmes, articles in magazines and newspapers, and educational resources developed for use in schools).	Anticipated direction of change: ⇧ Confidence: Low

Table 4d. Regulating services	**rMCZ Reference Area Haig Fras**	
Baseline	**Beneficial impact**	
Regulation of pollution: The features of the site contribute to the bioremediation of waste and sequestration of carbon. Marine sediments, through processes that occur in their upper layers, play an important role in the global cycling of many elements, including carbon and nitrogen (Fletcher and others, 2012). ***Environmental resilience:*** The features of the site contribute to the resilience and continued regeneration of marine ecosystems. Subtidal sediments found in sheltered or deeper water are particularly diverse habitats and rock habitats can support extremely high biodiversity (Fletcher and others, 2012). ***Natural hazard protection:*** As the site is offshore, its features are not thought to contribute to the delivery of this service (Fletcher and others, 2012). It has not been possible to estimate the value of regulating services in the site.	If the conservation objectives of the features are achieved, the features will be recovered to reference condition. Improved habitat condition and a reduction in anthropogenic pressures, including the use of bottom-towed fishing gear, may increase site benthic biodiversity and biomass, improving the regulating capacity of the site habitats.	Anticipated direction of change: ⇧ Confidence: Low

Table 4e. Non-use and option values	**rMCZ Reference Area Haig Fras**	
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) and the ecosystem services provided, even if they do not currently benefit from them. It has not been possible to estimate the non-use value of the rMCZ.	The rMCZ will benefit the proportion of the UK population that values conservation of the MCZ 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 will protect both the features and their option to benefit from the services in the future from the risk of future degradation.	Anticipated direction of change: ⇧ Confidence: Moderate

rMCZ Hartland Point to Tintagel

Site area (km^2): 303.8

Table 1. Conservation impacts	**rMCZ Hartland Point to Tintagel**

1a. Ecological description

The site boundary follows the coastline along the mean high water mark from Tintagel Head to Hartland Point. The seaward boundary is made up of three distinct areas. Virtually the entire stretch of coastline along the recommended Marine Conservation Zone (rMCZ) is designated as a Site of Special Scientific Interest (SSSI), for the most part including the intertidal area and therefore intersecting with the rMCZ.

The coastline of the rMCZ is exposed to high levels of wave energy and is characterised by steep rocky cliffs, sea caves and stretches of sandy surf beaches. The site extends from the shoreline to depths of approximately 50 metres. The rMCZ intersects with an area of higher than average benthic species diversity, and the Bude and Boscastle sections intersect with areas of higher than average benthic habitat diversity.

Bude Bay faces west and is fully exposed to the Atlantic; north of Bude, the shoreline is a long sandy beach interrupted by high rock outcrops, some extending to the level of low water neap tides, while to the south of Bude the mid-low intertidal zone is a rock platform of east-west orientated reefs, except for a long stretch of sand at Widemouth. Mussel *Mytilus edulis* beds are extensive in the northern half of the bay, but colonies are scarce in the south.

More generally, the near-shore sublittoral regions are composed of gently sloping bedrock, occasionally very broken, with boulders at some sites; rock surfaces have an even covering of sand. These habitats are dominated by algae. Infralittoral algal communities cover a very wide depth range. Infralittoral communities are dominated by foliose red algae; *Dictyota dichotoma* and *Dictyopteris membranacea* are abundant. A number of other notable species of algae has also been recorded in the rMCZ, for example the Mediterranean species *Choristocarpus tenellus*. Vertical and upward facing rock is dominated by bryozoans, sea squirts and sponges; erect sponges such as *Raspailia hispida* are common. At Duckpool, a small, sheltered sandy bay, the lower shore habitats have exceptionally fine colonies of the reef-building tubeworm *Sabellaria alveolata*.

Eunicella verrucosa and short-snouted seahorse have been reported in the rMCZ; the northern stretch of the rMCZ is considered important for cetaceans. Clumps of potato crisp bryozoan together with branching sponges have been identified in the rMCZ, indicating a probable fragile sponge and anthozoan community (Lieberknecht and others, 2011).

Breeding razorbill *Alca torda*, guillemot *Uria aalge* and herring gull *Larus argentatus*, protected through the adjacent SSSI, use the area of the rMCZ for loafing, preening and roosting (RSPB, pers. comm., 2012).

1b. MCZ Feature Baseline and Impact of MCZ

Feature	Area of feature (km2)	No. of point records	Baseline	Impact of MCZ

Broad-scale Habitats				
Coastal saltmarsh and saline reedbeds	< 0.01	-	Favourable Condition	Maintained at Favourable Condition
High energy infralittoral rock	1.43	-	Favourable Condition	Maintained at Favourable Condition
High energy intertidal rock	1.76	-	Favourable Condition	Maintained at Favourable Condition
Intertidal coarse sediment	1.56	-	Favourable Condition	Maintained at Favourable Condition
Intertidal mixed sediments	0.79	-	Favourable Condition	Maintained at Favourable Condition
Intertidal mud	1.40	-	Favourable Condition	Maintained at Favourable Condition
Intertidal sand and muddy sand	0.22	-	Favourable Condition	Maintained at Favourable Condition
Moderate energy intertidal rock	0.01	-	Favourable Condition	Maintained at Favourable Condition
Subtidal coarse sediment	155.64	-	Favourable Condition	Maintained at Favourable Condition
Subtidal sand	141.07	-	Favourable Condition	Maintained at Favourable Condition
Habitats of Conservation Importance				
Fragile sponge and anthozoan communities on subtidal rocky habitats	-	1	Favourable Condition	Maintained at Favourable Condition
Sabellaria alveolata reefs	-	-	Favourable Condition	Maintained at Favourable Condition
Species of Conservation Importance				
Euincella verrucosa	-	5	To be determined	To be determined
Padina pavonica	-	1	Favourable Condition	Maintained 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 Hartland Point to Tintagel**
Source of costs of the 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**
There is a series of World War II anti-tank obstacles situated at Crackington Haven, Widemouth Beach, the entrance to Bude Canal Basin and Budehaven although it is not clear whether these are located in the site. Fishers have reported 12 wrecks in the area, and there are several further possible wrecks. There is evidence of Romano-British and early medieval settlement, and a medieval church, castle and associated features on Tintagel Island and the adjoining mainland. The Chapel of the Holy Trinity and St Michael are situated at the end of the breakwater. An unusual design of a World War II reinforced concrete pillbox is located there, situated at Wrangle Point on the cliffs at the north end of Crooklets Beach, Bude. Peat is recorded in the area. Again, it is not clear whether these features are located in the site. 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).	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 (English Heritage, pers. comm., 2011). No further impacts on activities related to archaeology are anticipated.

<table>
<tr><th colspan="2">Table 2b. Commercial fisheries rMCZ Hartland Point to Tintagel</th></tr>
<tr><td colspan="2">Source of costs of the 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. Multiple management scenarios have been identified for the Impact Assessment which reflect this uncertainty. Should the site be designated, the management that will be required is likely to fall somewhere within this range.

Management scenario 1: No additional management.

Management scenario 2: Closure of entire rMCZ to bottom trawls and dredges.</td></tr>
<tr><th>Baseline description of activity</th><th>Costs of impact of rMCZ on the sector</th></tr>
<tr><td colspan="2">Overview: The rMCZ is predominantly inside 6nm (nautical miles) and a number of commercial fishing restrictions are already in existence (listed in Annex E). There are small fishing fleets at Bude and Boscastle that typically operate a mix of static gears, principally pots and nets, throughout much of the rMCZ. Potters from Padstow also fish in the area. Bottom trawlers from North Devon fish within the rMCZ, although the level of effort is low as most of their activity is further north (South West Fishing Industry Group, 2011). The far western corner of the rMCZ is outside 6nm and is fished by UK, French and Belgian bottom trawlers outslide the seasonal Trevose closure (see Annex E for an explanation of the Trevose closure). The area of the Trevose closure overlaps with the part of the rMCZ that is outside 6nm. Estimated total value of UK vessel landings from the rMCZ: £0.196m/yr.</td></tr>
<tr><td>UK Dredges: There is no regular dredging in the rMCZ (MCZ Fisheries Model). However, in recent years there is thought to have been some dredging effort around the north-west corner of the rMCZ, inside 6nm (Cornwall Inland Fisheries and Conservation Authority (IFCA), pers. comm., 2012). This suggests that dredging effort in the rMCZ may increase in future. Estimated value of UK dredge landings from the rMCZ: £0.000m/yr.</td><td>Scenario 1: No impacts are anticipated under this scenario.

Scenario 2: The rMCZ is not currently a regular scalloping ground and no immediate impacts of a closure are anticipated. However, the recent increase in effort around the north-west of the rMCZ indicates the potential for landings from the rMCZ to occur. The closure will remove this potential fishing ground option for vessels dredging in the area.

Estimated annual value of UK dredge landings affected is expected to fall within the following range:</td></tr>
</table>

<table>
<tr><th colspan="2">Table 2b. Commercial fisheries</th><th>rMCZ Hartland Point to Tintagel</th></tr>
<tr><td></td><td colspan="2"><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>0.000</td></tr></table></td></tr>
<tr><td>UK Bottom trawls: There is a low level of bottom trawl activity in the rMCZ, principally by vessels from Padstow and North Devon ports targeting sole and bass (South West Fishing Industry Group, 2011). Historically there has been trawling by North Devon fishers over the Hartland Patch (North Devon Fishermen's Association, pers. comm., 2011), which covers part of the rMCZ, although this is currently thought to be a low level of activity (Cornwall IFCA and Devon and Severn IFCA, pers. comm., 2011). Much of this activity occurs in a corridor that is outside the rMCZ and runs between the western and eastern halves of the rMCZ (Bottom trawl owner, pers. comm., 2011).

The Trevose closure, within which fishing with dredges, bottom trawls and nets is not permitted from 1 February to 31 March, overlaps with the part of the rMCZ that is outside 6nm. When the Trevose closure is in force, vessels, many of which are under 10 metres, fish along the edges of the closed area inside 6nm (Armstrong and others, 2007) including the area inside the rMCZ (South West Fishing Industry Group, 2011). Estimated value of UK bottom trawl landings from the rMCZ: £0.006m/yr.</td><td colspan="2">Scenario 1: No impacts are anticipated under this scenario.

Scenario 2: The rMCZ is not heavily fished and average landings from it are low (MCZ Fisheries Model). While the effect of displacement arising as a result of closure to bottom trawls is therefore expected to be limited, the closure would remove a potential fishing ground option from the fleet, particularly when the Trevose closure is in effect. This will push vessels to the south or north during this time, to areas where existing fishing effort is greater. It may also result in additional unproductive steaming time for vessels travelling from ports in the north to fishing grounds south of the rMCZ, and vice versa.

Estimated annual value of UK bottom trawl landings affected is expected to fall within the following range:<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>0.006</td></tr></table></td></tr>
<tr><td colspan="3">Total direct impact</td></tr>
<tr><td>Total direct impact on UK commercial fishing</td><td colspan="2">Estimated annual value of UK vessel landings and gross value added (GVA) affected is expected to fall within the following range:<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>0.006</td></tr><tr><td>GVA affected</td><td>0.000</td><td>0.002</td></tr></table></td></tr>
<tr><td>Impact on non-UK commercial fishing: Only a small area of the rMCZ, which is outside 6nm, is targeted by non-UK vessels. There is a low level of</td><td colspan="2">Scenario 1: No impacts are anticipated under Scenario 1.</td></tr>
</table>

Table 2b. Commercial fisheries	**rMCZ Hartland Point to Tintagel**
fishing effort by non-UK vessels using bottom trawls/dredges within the rMCZ (Lee, 2010). Estimated value of landings from the rMCZ by French vessels: £0.000m/yr (all gear types) (Direction des Pêches Maritimes et de l' Aquaculture, 2011). Estimates are not available for other countries.	***Scenario 2:*** Non-UK vessels using bottom trawls/dredges will be affected by closure of the part of the rMCZ that is outside 6nm. Given the small area of the rMCZ open to non-UK fishers, no significant impacts are anticipated.

Table 2c. Flood and coastal erosion risk management (coastal defence)	**rMCZ Hartland Point to Tintagel**
Source of costs of the 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).	
Baseline description of activity	**Costs of impact of rMCZ on the sector**
The 0 to 20 year Shoreline Management Plan policies advocate 'no active intervention' along most of the coastline of the rMCZ, with 'hold the line' around developed areas. Schemes may come forward as a result of the hold the line policy (Environment Agency, pers. comm., 2012).	As a result of the rMCZ, 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 to 1 day of additional work, 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. It is anticipated that no additional mitigation of impacts will be required (Environment Agency, pers. comm., 2012).

Table 2d. Ports, harbours, shipping and disposal sites	**rMCZ Hartland Point to Tintagel**
Source of costs of the rMCZ	
Management scenario 1: Increase in costs of assessing environmental impacts for future licence applications within 1km of the rMCZ. (Not relevant for this rMCZ). It is anticipated that no additional mitigation, relative to mitigation provided in the baseline, of impacts on features protected by the MCZ will be needed for activities relating to ports, harbours, shipping and disposal sites.	
Management scenario 2: Increase in costs of assessing environmental impacts for future licence applications within 5km of an rMCZ. This applies to unknown potential future port and harbour developments. Additional mitigation, relative to mitigation provided in the baseline, of impacts on features protected by the MCZ may be needed for future harbour developments.	
Baseline description of activity	**Costs of impact of rMCZ on the sector**
Harbour development: Boscastle Harbour and Bude Harbour are both situated on the coastline of the rMCZ. There are no known plans for developments at either harbour.	***Scenario 1:*** No costs are anticipated under scenario 1. ***Scenario 2:*** For future port and harbour developments within 5km of the rMCZ that are not yet known of, future licence applications 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 (these costs are not assessed at the site level, but are presented at the national level in Annex N11). Sufficient information is not available to identify whether any additional mitigation, relative to the baseline, of impacts on features protected by the MCZ will be needed for such future port and harbour developments. Unknown potentially significant costs of mitigation could arise.

Table 2e. Renewable energy	**rMCZ Hartland Point to Tintagel**
Source of costs of the 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	

Table 2e. Renewable energy **rMCZ Hartland Point to Tintagel**

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 licence applications and increase in cable protection 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**
Tidal energy: The rMCZ overlaps with the Lundy and Outer Severn tidal energy Potential Development Area (PDA) (PMSS, 2010). Any likely installation could have a footprint within the PDA of 5km^2 (PMSS, 2010) covering 1.3% of the PDA. The rMCZ covers 2.3% of the PDA. As the location of the potential energy generation installation is not known, the possible overlap of inter-array and export cables with the rMCZ is also not known. One potential energy installation is anticipated in the PDA, with the associated licence application expected in the period 2015–20 (Department of Energy and Climate Change (DECC), pers. comm., 2011). By 2030 the development in the PDA is expected to have a production capacity of 210MW (PMSS, 2010).	***Tidal energy:*** The estimated cost to tidal energy developers of this rMCZ is expected to fall within the following range of scenarios: *£m (one-off cost)* | Scenario 1 | Scenario 2 Cost to the operator | 0.016 | At least 0.016 ***Scenario 1:*** The analysis assumes that the potential future tidal energy installation is planned within, or within close proximity to, the rMCZ. As a result of the designation of the rMCZ, the potential licence application for the tidal energy installation would need to consider the possible effects of the construction and operational activities on the features protected by the rMCZ and rMCZ conservation objectives. This is expected to result in an additional one-off cost of £0.016m in 2015 (based on an average cost provided by renewable energy sector developers; see Annex N for details). ***Scenario 2:*** In addition to the costs set out under scenario 1, further costs may occur under Scenario 2 The mitigation requires the use of alternative cable protection for export and inter-array cables that have not yet been consented. As the actual location of the potential installation is unknown, it is unclear whether any cables will be sought that pass through the rMCZ, and if they are what length of cable may be affected. The cost of this mitigation measure is estimated to be £1m/km of cable (average of wind energy developers; see Annex H14 for details) and as such the total mitigation cost could be significant. The likelihood and magnitude of any additional costs cannot be calculated. However, JNCC and Natural England (pers. comm., 2012) state that the likelihood of this mitigation being required is very low. Further details are provided in Annex H14. The impacts that are assessed in both scenarios are based on JNCC and Natural

<table>
<tr><th colspan="2">Table 2e. Renewable energy rMCZ Hartland Point to Tintagel</th></tr>
<tr><td></td><td>England's advice on the mitigation that could be required.</td></tr>
<tr><td>Wave energy: The rMCZ overlaps with the North Cornwall and Devon Coastal wave energy PDA (PMSS, 2010). Any likely installation could have a footprint within the PDA of 50km^2 (PMSS, 2010) covering 1.5% of the PDA. The rMCZ covers 7.1% of the PDA. As the location of the potential installation is not known, the possible overlap of inter-array and export cables with the rMCZ is also not known. One potential energy installation is anticipated in the PDA, with the associated licence application expected in 2030 (DECC, pers. comm., 2011). The development in the PDA is expected to have a production capacity of 100MW (PMSS, 2010)</td><td>Wave energy: The estimated cost to wave energy developers of this rMCZ is expected to fall within the following range of scenarios:
<table><tr><td>£m (one-off cost)</td><td>Scenario 1</td><td>Scenario 2</td></tr><tr><td>Cost to the operator</td><td>0.016</td><td>At least 0.016</td></tr></table>Scenario 1: The analysis assumes that the potential future tidal energy installation is planned within, or within close proximity to, the rMCZ. As a result of the designation of the rMCZ the potential licence application for the wave energy installation would need to consider the possible effects of the construction and operational activities on the features protected by the rMCZ and the rMCZ conservation objectives. This is expected to result in an additional one-off cost of £0.016m in 2030 (based on an average cost provided by renewable energy sector developers; see Annex N for details).
Scenario 2: In addition to the costs set out under scenario 1, further costs may occur under Scenario 2 if use of removable frond mattressing for cable protection is required to mitigate the impacts of scour protection.. As the actual location of the potential installation is unknown, it is unclear whether any cables will need to pass through the rMCZ, and if they are what length of cable may be affected. The cost of this mitigation measure is estimated to be £1m/km of cable (average of wind energy developers; see Annex H14 for details) and as such the total mitigation cost could be significant. However, the likelihood</td></tr>
</table>

Table 2e. Renewable energy	**rMCZ Hartland Point to Tintagel**
	and magnitude of any additional costs cannot be calculated.

Table 2f. Other impacts that are assessed for the suite of MCZs and not for this site alone	**rMCZ Hartland Point to Tintagel**
Cables (interconnectors and telecom cables): Future interconnectors and telecom cables may pass through the rMCZ. Impacts of rMCZs on future interconnectors and telecom cables are assessed in the Evidence Base, Annex H3 and Annex N3 (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 Hartland Point to Tintagel**
Cables (existing interconnectors and telecom cables), commercial Commercial fishing (pots and traps, nets); recreation; research and education.	

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 inAnnex H.

Table 4a. Fish and shellfish for human consumption		**rMCZ Hartland Point to Tintagel**
Baseline	**Beneficial impact**	
Fletcher and others (2012) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) contribute to the delivery of fish and shellfish services. Circalittoral and infralittoral rock are important habitats for inshore commercial fisheries species, particularly crabs and lobsters, as are subtidal sediments (Fletcher and others, 2012). 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 and unfavourable condition (see Table 1b). A description of on-site fishing activity and the value derived from it is set out in Table 2b.	If the conservation objectives of the features are achieved, the features will be maintained in favourable condition. Additional management (above that in the baseline situation) of fishing activities is expected, which will prohibit fishing within the rMCZ, the costs of which are set out in Table 2b. Management of fishing activity within the rMCZ may reduce the on-site fishing mortality of species, which may benefit commercial stocks. 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 of mobile species. Stocks of low-mobility and site-attached species, such as lobsters and crabs, may improve as a result of a recovery in the condition of circalittoral rock habitat and reduced fishing pressure. If some fishing for such species is permitted within the rMCZ, then catches may improve. Localised beneficial spill-over effects may occur around the rMCZ. The potential effects described here do not include the negative impacts of the additional fisheries management on fish and shellfish provision and off-site impacts of displaced effort.	Anticipated direction of change: ⇧ Confidence: Low

Table 4b. Recreation	**rMCZ Hartland Point to Tintagel**

Table 4b. Recreation	**rMCZ Hartland Point to Tintagel**	
Baseline	**Beneficial impact**	
Angling: Fletcher and others (2012) 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. 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. Shore fishing is popular at points along the coastline and there are various rock platforms for sea fishing around Tintagel. Species include mackerel, pollack, wrasse and garfish. There are two sea fishing charters based at Bude. It has not been possible to estimate the value of angling at the site.	If the conservation objectives of the features are achieved, the features will be maintained in favourable condition. No change in on-site feature condition or fishing mortality is anticipated and therefore no on-site or off-site benefits are expected (see Table 4a for further details). 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 (as, if necessary, mitigation would be introduced, with the associated costs and benefits). The designation may lead to an increase in angling 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 UK angling.	Anticipated direction of change: ⟺ Confidence: Moderate
Diving: Fletcher and others (2012) identify that some of the features to be protected by the rMCZ can contribute to the delivery of recreation and tourism services. 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. Diving takes place in the rMCZ, including at the SS *Anna Sophie* and sites around Dizzard Point and Cambeak. It has not been possible to estimate the value of diving at the site.	If the conservation objectives of the features are achieved, the features will be maintained in favourable condition. No change in on-site feature condition is anticipated and therefore no benefits to diving are expected. 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 (as, if necessary, mitigation would be introduced, with the associated costs and benefits). The designation may lead to an increase in dive 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 UK diving.	Anticipated direction of change: ⟺ Confidence: Moderate
Wildlife watching: Fletcher and others (2012) identify that some of the features to be protected by the rMCZ can contribute to the delivery of recreation and tourism services. The baseline quantity and quality of the ecosystem service provided is assumed to be commensurate with that	If the conservation objectives of the features are achieved, the features will be maintained in favourable condition. No change in on-site feature condition is anticipated and therefore no benefits to wildlife watching are expected.	Anticipated direction of change: ⟺

Table 4b. Recreation		**rMCZ Hartland Point to Tintagel**
provided by the features of the site when in favourable condition. There are many nature reserves, walks and bird-watching points around Tintagel. Lye Rock, visible from Tintagel, is a breeding site for puffins and a variety of other birds, including peregrine falcon, razorbill, shag, kittiwake, great black-backed gull, lesser black-backed gull, herring gull and fulmar. The *Ilfracombe Princess* offers wildlife cruises, which offer views of Hartland Point and provide sightings of seals and porpoises for visitors. It has not been possible to estimate the value of wildlife watching in the rMCZ.	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 (as, if necessary, mitigation would be introduced, with the associated costs and benefits). 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.	Confidence: Moderate

Table 4c. Research and education		**rMCZ Hartland Point to Tintagel**
Baseline	**Beneficial impact**	
Research: Fletcher and others (2012) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) can contribute to the delivery of research services. The northern part of the rMCZ is situated within North Devon's Biosphere Reserve, through which a variety of research activities are undertaken. The full extent of current research activities carried out at the rMCZ is unknown. It has not been possible to estimate the value derived from research activities associated with the rMCZ.	Monitoring of the rMCZ 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: ⇧ Confidence: High
Education: Fletcher and others (2012) identify that the features to be protected by the rMCZ can contribute to the delivery of education services. The northern part of the rMCZ is situated within North Devon's Biosphere Reserve and is therefore linked into a number of UNESCO education programmes. Educational resources for schools are provided and online educational tools are also available (at www.northdevonbiosphere.org.uk).	MCZ designation may provide an opportunity to expand the focus of education events on the marine environment. Designation may aid additional local (to the rMCZ) provision of education (e.g. events and interpretation boards), from which visitors to the site would derive benefit. 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: ⇧ Confidence:

Table 4c. Research and education		**rMCZ Hartland Point to Tintagel**
Education events with a specific marine and coastal theme are organised in and around the rMCZ by Coastwise North Devon. There is a World Heritage Site at Hartland Quay. The full extent of education activities is not known. It has not been possible to estimate the value derived from education activities associated with the rMCZ.		Moderate

Table 4d. Regulating services		**rMCZ Hartland Point to Tintagel**
Baseline	**Beneficial impact**	
Regulation of pollution: The features of the site contribute to the bioremediation of waste and sequestration of carbon. Coastal saltmarshes are known to be particularly efficient carbon sinks and cadmium is stored in sediment by cord grass *Spartina anglica*, which grows in intertidal mud. Marine sediments, through processes that occur in their upper layers, play an important role in the global cycling of many elements, including carbon and nitrogen (Fletcher and others, 2012). ***Environmental resilience:*** The features of the site contribute to the resilience and continued regeneration of marine ecosystems. Rock habitats can support particularly high biodiversity (Fletcher and others, 2012). ***Natural hazard protection:*** The features of the site, in particular the coastal saltmarshes and intertidal habitats, contribute to local flood and storm protection (Fletcher and others, 2012). It has not been possible to estimate the value of regulating services in the site.	If the conservation objectives of the features are achieved, the features will be maintained in favourable condition. A potential reduction in anthropogenic pressures, including from the use of bottom-towed fishing gear, may increase site benthic biodiversity and biomass, improving the regulating capacity of the site habitats. Designating the recommended Marine Conservation Zone will protect its features and the ecosystem services that they provide against the risk of future degradation from pressures caused by human activities (as, if necessary, mitigation would be introduced, with the associated costs and benefits).	Anticipated direction of change: ⇧ Confidence: Low

Table 4e. Non-use and option values	**rMCZ Hartland Point to Tintagel**	
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) and the ecosystem services provided, even if they do not currently benefit from them. It has not been possible to estimate the non-use value of the rMCZ.	The rMCZ will benefit the proportion of the UK population that values conservation of the MCZ 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 will protect both the features and their option to benefit from the services in the future from the risk of future degradation. Examples of these values are shown in Ranger and others (2012). Voters in the Marine Conservation Society 'Your Seas Your Voice' campaign expressed a desire to protect the biodiversity of the site area, with the most common reasons being because of the 'spectacular scenery' and because 'the whole place is amazing'.	Anticipated direction of change:  Confidence: Moderate

rMCZ Isles of Scilly Sites[1] Site area (km^2): 50.22

Table 1. Conservation impacts	rMCZ Isles of Scilly Sites

1a. Ecological description

The Isles of Scilly Sites recommended Marine Conservation Zone (rMCZ) consists of 11 spatially separate areas. The boundaries of the sites, as presented in the MCZ Recommendations Report, mostly follow contour lines for ease of navigation (generally the 50 metre depth contour and mean high water springs). (It should be noted that, since the recommendations were submitted, the Isles of Scilly Local Group has suggested amending the boundaries so that they are straight, in line with the advice in the Ecological Network Guidance (Natural England, pers. comm., 2012).) Of the 11 areas that make up rMCZ Isles of Scilly Sites, 10 overlap with Sites of Special Scientific Interest and the Isles of Scilly Complex Special Area of Conservation.

The areas within this rMCZ range in depth from sea level to approximately 70 metres. They largely cover high and moderate energy infralittoral rock, and moderate energy circalittoral rock. They also include some patches of subtidal coarse sediment and subtidal mixed sediments, and subtidal macrophyte-dominated sediment (which coincide with the Features of Conservation Importance (FOCI) habitat seagrass beds). A diverse range of intertidal habitats are also present within these areas.

The Isles of Scilly have been well-studied for their intertidal and shallow sublittoral biota and are considered to be exceptionally rich in biodiversity, as well as representative of exceptionally high quality examples of a range of habitats. There is a large range of FOCI that occur in the Isles of Scilly.

The primary FOCI habitats are fragile sponge and anthozoan communities, and seagrass beds, but there are records of others including intertidal underboulder communities and the only records of tide-swept communities in the South-West. These habitats support a large range of FOCI species, including *Eunicella verrucosa, Leptopsammia pruvoti, Palinurus elephas, Gobius cobitis* and *Lucernariopsis campanulata,* as well as areas of importance for seahorses. There are many reports in the scientific and survey literature of records of FOCI species and habitats within the Isles of Scilly.

Extensive subtidal and intertidal sandy sediments occur between the islands. These sandbanks are particularly important due to their extent and associated communities, which are very specific due in part to the combination of sheltered conditions, mild climate, constant salinity and low silt conditions. The latter are primarily a result of the oceanic nature of the surrounding seas, which have a low suspended sediment concentration and a lack of any major riverine input. These factors provide ideal conditions for some of the most extensive and diverse beds of seagrass *Zostera marina* found in the UK. Extensive sediment areas occur in the Isles of Scilly, including in the rMCZs, and support rich intertidal communities. The Isles of Scilly also have a high diversity of seaweeds.

There is hard bedrock reef, both infralittoral and circalittoral, in some cases extending to depths well beyond 50 metres. Exposure levels vary: some reefs are very exposed,

[1] Recommended MCZ Isles of Scilly Sites is comprised of 11 different rMCZs which have been put forward as a group by the Isles of Scilly Local Group (Finding Sanctuary): Bishop to Crim, Bristows to the Stones, Gilstone to Gorregan, Hanjague to Deep Ledge, Higher Town, Lower Ridge to Innisvouls, Men a Vaur to White Island, Peninnis to Dry Ledge, Plympton to Spanish Ledge, Smith Sound Tide-swept Channel and Tean.

others sheltered. The topographic complexity of the reefs is low. The south-westerly position of the islands leads to a range of warm water species being present, including sunset cup coral *Leptopsammia pruvoti*, pink sea-fan *Eunicella verrucosa*, and Weymouth carpet-coral *Hoplangia durotrix* (Lieberknecht and others, 2011).

1b. MCZ Feature Baseline and Impact of MCZ

Feature	Area of feature (km2)	No. of point records	Baseline	Impact of MCZ
Broad-scale Habitats				
High energy infralittoral rock	4.11	Not available	Unfavourable/ Favourable Condition	Recover to/ Maintained at Favourable Condition
High energy circalittoral rock	0.49	Not available	Unfavourable/ Favourable Condition	Recover to/ Maintained at Favourable Condition
Moderate energy circalittoral rock	19.81	Not available	Unfavourable/ Favourable Condition	Recover to/ Maintained at Favourable Condition
Moderate energy infralittoral rock	14.6	Not available	Unfavourable/ Favourable Condition	Recover to/ Maintained at Favourable Condition
Subtidal coarse sediment	1.76	Not available	Favourable Condition	Maintained at Favourable Condition
Subtidal macrophyte-dominated sediment	0.66	Not available	Favourable Condition	Maintained at Favourable Condition
Subtidal mixed sediments	1.62	Not available	Favourable Condition	Maintained at Favourable Condition
High energy intertidal rock	Not available	Not available	Favourable Condition	Maintained at Favourable Condition
Intertidal coarse sediment	Not available	Not available	Favourable Condition	Maintained at Favourable Condition
Intertidal mixed sediments	Not available	Not available	Favourable Condition	Maintained at Favourable Condition
Intertidal mud	Not available	Not available	Favourable Condition	Maintained at Favourable Condition
Intertidal sand and muddy sand	Not available	Not available	Favourable Condition	Maintained at Favourable Condition
Low energy intertidal rock	Not available	Not available	Favourable Condition	Maintained at Favourable Condition
Moderate energy intertidal rock	Not available	Not available	Favourable Condition	Maintained at Favourable Condition
Habitats of Conservation Importance				

Peat and clay exposures	Not available	Not available	Favourable Condition	Maintained at Favourable Condition
Tide-swept channel	Not available	Not available	Favourable Condition	Maintained at Favourable Condition
Fragile sponge and anthozoan communities on subtidal rocky habitats	Not available	Not available	Unfavourable/ Favourable Condition	Recover to/ Maintained at Favourable Condition
Seagrass beds	Not available	Not available	Favourable Condition	Maintained at Favourable Condition
Species of Conservation Importance				
Amphianthus dohrnii	Not available	Not available	Favourable Condition	Maintained at Favourable Condition
Arctica islandica	Not available	Not available	Favourable Condition	Maintained at Favourable Condition
Cruoria cruoiaeormis	Not available	Not available	Favourable Condition	Maintained at Favourable Condition
Gobius cobitis	Not available	Not available	Favourable Condition	Maintained at Favourable Condition
Grateloupia montagnei	Not available	Not available	Favourable Condition	Maintained at Favourable Condition
Haliclystus auricula	Not available	Not available	Favourable Condition	Maintained at Favourable Condition
Lucernariopsis campanulata	Not available	Not available	Favourable Condition	Maintained at Favourable Condition
Lucernariopsis cruxmelitensis	Not available	Not available	Favourable Condition	Maintained at Favourable Condition
Palinurus elephas	Not available	Not available	Unfavourable Condition	Recover to Favourable Condition
Paludinella littorina	Not available	Not available	Favourable Condition	Maintained at Favourable Condition

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

Table 2a. Archaeological heritage	**rMCZs Isles of Scilly Sites**
Source of costs of the rMCZs	
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 rMCZs will be needed relative to the mitigation provided in the baseline). Archaeological excavations, surface recovery, intrusive and non-intrusive surveys, diver trails	

Table 2a. Archaeological heritage	**rMCZs Isles of Scilly Sites**
and visitors will be allowed.	
Baseline description of activity	**Costs of impact of rMCZs on the sector**
There are 12 wrecks throughout these sites including one historic shipwreck designated under the Protection of Wrecks Act 1973 (Tearing Ledge Wreck). The are around 123 records of items of archaeological significance in the rMCZs ranging from buildings and field systems to artefacts. 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).	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 these rMCZs has been estimated. However, the additional cost in one licence application could be in the region of £500 to £10,000 (English Heritage, pers. comm., 2011). If archaeologists respond to restrictions on excavation in areas of peat and clay exposures 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. If archaeological excavations do not take place as a result 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	**rMCZs Isles of Scilly Sites**
Source of costs of the rMCZs	
Management scenario 1 (Finding Sanctuary Steering Group recommendation):	
• Closure of all rMCZs to bottom trawls and dredges. • Three-month seasonal closure (22 December to 22 March) for all commercial fishing in all rMCZs. • Closure of all rMCZs to commercial sand eel fishing. • Recording zone, in rMCZ Gugh Reef.	

Table 2b. Commercial fisheries **rMCZs Isles of Scilly Sites**

- Closure of non-disturbance zones to all commercial fishing, in rMCZs Smith Sound and Tean.

No additional management scenarios have been considered for these rMCZs as the site was put forward by the Finding Sanctuary Steering Group with these specific management recommendations, which were developed by the Isles of Scilly Local Group during the Finding Sanctuary planning process.

<table>
<tr><th>Baseline description of activity</th><th>Costs of impact of rMCZs on the sector</th></tr>
<tr><td colspan="2">Overview: There are a number of commercial fishing restrictions already in existence around the Isles of Scilly (see Annex E). The rMCZs are all within 6nm (nautical miles) and so are fished only by UK vessels. All of the Isles of Scilly rMCZs, with the exception of Bristows to the Stones, are within 1nm of the islands. Static gear is used at varying intensities throughout the Isles of Scilly rMCZs, with potting accounting for the majority of the effort. There is a commercial fishing fleet of 18 vessels based at the Isles of Scilly (MMO, 2010). There are no trawling vessels currently based in the islands, with the last one having left the fleet a few years ago (Isles of Scilly Fishermen's Association, pers. comm., 2011). The Isles of Scilly vessels operate a single static gear or a mix of static gears. The local fleet are all day boats, typically less than 10 metres in length, and fish in and around the islands, generally no more than 6 or 7nm from shore (Isles of Scilly Fishermen's Association, pers. comm., 2011). Estimated total value of UK vessel landings from the rMCZs: £0.042m/yr.</td></tr>
<tr><td>UK Dredges: Scallop dredging does not occur in and around the islands. There is anecdotal evidence of occasional activity over the Bristows to the Stones rMCZ to the north-east of the islands, although current activity is thought to be limited. Estimated value of UK dredge landings from the rMCZ: less than £0.001m/yr.</td><td>Scenario 1: Given the very low level of activity, no significant impacts are expected. Estimated annual value of UK dredge 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></td></tr>
<tr><td>UK Bottom trawls: Trawling does not occur close to the islands. The last local trawler left the fleet a few years ago (Isles of Scilly Fishermen's Association, pers. comm., 2011). There is evidence of occasional activity over the Bristows to the Stones rMCZ to the north-east of the islands, although current activity is thought to be limited. Estimated value of UK bottom trawl landings from the rMCZ: £0.001m/yr.</td><td>Scenario 1: Given the very low level of activity, no significant impacts are expected. Estimated annual value of UK bottom trawl 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></td></tr>
<tr><td>UK Pots and traps: Potting occurs throughout the Isles of Scilly and in most of the rMCZs (Isles of Scilly Vulnerability Assessment, 2011). It is the main gear used by the local fleet, primarily targeting lobster and crab. The majority of fishers do not fish during the winter months when the weather limits the</td><td>Scenario 1: The low level of activity during the winter means that the three-month winter closure will have a limited effect on the fishing activity of most fishers who employ pots and traps. For fishers who remain active part-time during the winter the closure will affect their part-time income. It has not been possible to estimate landing values from the three-</td></tr>
</table>

Table 2b. Commercial fisheries	**rMCZs Isles of Scilly Sites**
number of available fishing days (Isles of Scilly Fishermen's Association, pers. comm., 2011). Estimated value of landings from the rMCZs: £0.035m/yr. A number of residents own small numbers of pots that they use on a recreational basis (Isles of Scilly Inland Fisheries and Conservation Authority [IFCA], pers. comm., 2011). Fishing generally only occurs during the summer.	month winter closure, although stakeholders have indicated that the impact is not likely to be significant (Isles of Scilly Fishermen's Association, pers. comm., 2010).
UK Netting: Netting using tangle nets and gill nets occurs throughout the islands, including in six of the individual Isles of Scilly rMCZs (Isles of Scilly Vulnerability Assessment, 2011). Key target species include turbot and brill. Netting is principally by the local fleet; however, netters from mainland ports such as Newlyn occasionally fish in the area (Isles of Scilly Fishermen's Association, pers. comm., 2010). The majority of local fishers do not fish during the winter months when the weather limits the number of available fishing days (Isles of Scilly Fishermen's Association, pers. comm., 2010). Estimated value of UK net landings from the rMCZs: £0.005m/yr.	***Scenario 1:*** The low level of activity during the winter means that the three-month winter closure will have a limited effect on the activity of most fishers. However, for fishers who remain active part-time during the winter the closure will affect their part-time income. It has not been possible to estimate landing values from the three-month winter closure, although opinion is that the impact is not likely to be significant (Isles of Scilly Fishermen's Association, pers. comm., 2010).
UK Hooks and lines: Hand lining occurs in a number of areas around the Isles of Scilly, although limited effort is concentrated in the rMCZs (Isles of Scilly IFCA, pers. comm., 2011). The main target species is pollack. The majority of local fishers do not fish during the winter months when the weather limits the number of available fishing days (Isles of Scilly Fishermen's Association, pers. comm., 2011). Estimated value of UK hook and line landings from the rMCZs: £0.001m/yr.	***Scenario 1:*** The low level of activity during the winter means that the three-month winter closure will have a limited effect on the activity of most fishers. However, for fishers who remain active part-time during the winter the closure will affect their part-time income. It has not been possible to estimate landing values for the three-month winter closure, although opinion is that the impact is not likely to be significant (Isles of Scilly Fishermen's Association, pers. comm., 2010).
Total direct impact	

<table>
<tr><th colspan="2">Table 2b. Commercial fisheries rMCZs Isles of Scilly Sites</th></tr>
<tr><td>Total direct impact on UK commercial fishing</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>Note that these figures are an underestimate as they do not include values for the seasonal closure of the sites to pots and traps, nets, and hooks and lines.</td></tr>
<tr><td>Impact on non-UK commercial fishing</td><td>None.</td></tr>
</table>

<table>
<tr><th colspan="2">Table 2c. Flood and coastal erosion risk management (coastal defence) rMCZs Isles of Scilly Sites</th></tr>
<tr><td colspan="2">Source of costs of the rMCZs
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 rMCZs will be needed relative to the mitigation provided in the baseline).</td></tr>
<tr><th>Baseline description of activity</th><th>Costs of impact of rMCZs on the sector</th></tr>
<tr><td>Extensive coastal change pressures occur at the Isles of Scilly and the 0 to 20 year Shoreline Management Plan (SMP) policies include a complex array of options specific to local risks. Schemes may come forward along the shoreline of the rMCZs as a result of the SMP policies (Environment Agency, pers. comm., 2012).</td><td>As a result of the rMCZs, 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 to 1 day of additional work, 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. It is anticipated that no additional mitigation of impacts will be required (Environment Agency, pers. comm., 2012).</td></tr>
</table>

Table 2d. National defence	**rMCZs Isles of Scilly Sites**
Source of costs of the rMCZs	
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 rMCZs.	
Baseline description of activity	**Costs of impact of rMCZs on the sector**
MOD is known to make use of the rMCZs for aerial, surface and water column activities. The rMCZs are in an MOD exercise area.	It is not known whether the rMCZs will impact on MOD's activity. Impacts of rMCZs on MOD activities are assessed in Annex N and the Evidence Base (they are not assessed for these rMCZs alone).

Table 2e. Ports, harbours, shipping and disposal sites	**rMCZs Isles of Scilly Sites**
Source of costs of the rMCZs	
Management scenario 1:	
(a) Increase in costs of assessing environmental impacts for future licence applications within 1km of the rMCZ. (Not relevant for this rMCZ). It is anticipated that no additional mitigation, relative to mitigation provided in the baseline, of impacts on features protected by the MCZ will be needed for activities relating to ports, harbours, shipping and disposal sites.	
(b) Anchoring Restrictions (on vessels over 10 metres) (within pMCZs Hanjague to Deep Ledge, Higher Town, Lower Ridge to Innisvouls and Plympton to Spanish Ledge) and Control of Future Mooring Expansions (within pMCZs Higher Town and Lower Ridge to Innisvouls)	
Management scenario 2:	
(a) Increase in costs of assessing environmental impacts for future licence applications within 5km of an rMCZ. Yhis applies to unknown potential future port and harbour developments. Additional mitigation, relative to mitigation provided in the baseline, of impacts on features protected by the MCZ may be needed for future harbour developments.	
(b) Anchoring Restrictions (on vessels over 10 metres) (within pMCZs Hanjague to Deep Ledge, Higher Town, Lower Ridge to Innisvouls and Plympton to Spanish Ledge) and Control of Future Mooring Expansions (within pMCZs Higher Town and Lower Ridge to Innisvouls)	

Table 2e. Ports, harbours, shipping and disposal sites	**rMCZs Isles of Scilly Sites**
Baseline description of activity	**Costs of impact of rMCZ on the sector**
Harbour development: St. Mary's Harbour is situated within 1km of at least one of the Irlses of Scilly rMCZs. There are no known plans for developments at the harbour. *Anchoring and Moorings*: there is currently no anchoring of vessels over 10 metres in any of the listed rMCZs, and no existing plans to expand the provision of moorings.	***Scenario 1:*** No costs are anticipated under scenario 1. ***Scenario 2:*** For future port and harbour developments within 5km of the rMCZ that are not yet known of, future licence applications 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 (these costs are not assessed at the site level, but are presented at the national level in Annex N11). Sufficient information is not available to identify whether any additional mitigation, relative to the baseline, of impacts on features protected by the MCZ will be needed for such future port and harbour developments. Unknown potentially significant costs of mitigation could arise.

Table 2f. Renewable energy	**rMCZs Isles of Scilly Sites**
Source of costs of the rMCZs	
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 rMCZs 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 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 rMCZs on the sector**
Wave energy: The rMCZs overlap with the Isles of Scilly wave energy Potential Development Area (PDA). Any likely installation in the Isles of Scilly PDA could have a footprint within the PDA of 40km^2, covering 1.6% of the PDA (PMSS, 2010). The rMCZs cover 3.2% of the PDA. However, the rMCZs are not located in areas likely to be appropriate for wave energy installations (Council of the Isles of Scilly, pers. comm., 2011). As the location of the	***Wave energy:*** The estimated cost to wave energy developers of these rMCZs is expected to fall within the following range of scenarios: *£m (one-off cost)* / Scenario 1 / Scenario 2 Cost to the operator / 0.018 / At least 0.018 ***Scenario 1:*** The analysis assumes that the potential future tidal energy installation is

Table 2f. Renewable energy	**rMCZs Isles of Scilly Sites**
potential installation is not known, the possible overlap of export cables with the rMCZs are also not known. One potential energy installation is anticipated in the PDA, with the associated licence application expected in the period 2015–20 (Department of Energy and Climate Change, pers. comm., 2011). The development in the PDA is expected to have a production capacity of 400MW by 2030 (PMSS, 2010).	planned within, or within close proximity to, the rMCZ. As a result of the designation of the rMCZs the potential licence application for the wave energy installation would need to consider the possible effects of the construction and operational activities on the features protected by the rMCZs and the rMCZ conservation objectives. This is expected to result in an additional one-off cost of £0.018m in 2015 (based on an average cost provided by renewable energy sector developers; see Annex N for details). ***Scenario 2:*** In addition to the costs set out under scenario 1, further costs may occur under Scenario 2. The mitigation requires the use of alternative cable protection for export and inter-array cables that have not yet been consented. As the actual location of the potential installation is unknown, it is unclear whether any cables will be sought that pass through the rMCZs, and if they are what length of cable may be affected. The cost of this mitigation measure is estimated to be £1m/km of cable (average of wind energy developers; see Annex H 14 for details) and as such the total mitigation cost could be significant. The likelihood and magnitude of any additional costs cannot be calculated. However, JNCC and Natural England (pers. comm., 2012) state that the likelihood of this mitigation being required is very low. Further details are provided in Annex H14. 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	**rMCZs Isles of Scilly Sites**
Cables (interconnectors and telecom cables): Future interconnectors and telecom cables may pass through the rMCZ. Impacts of rMCZs on future interconnectors and telecom cables are assessed in the Evidence Base, Annex H3 and Annex N3 (they are not assessed for this site alone).	

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

Table 3. Human activities in the site that are not negatively affected by the rMCZs (existing activities at their current levels and future proposals known to the regional MCZ projects)	**rMCZs Isles of Scilly Sites**
Cables (existing interconnectors and telecom cables); recreation; research and education; water abstraction, discharge and diffuse pollution*.	

* The IA aassumes that no additional mitigation of the 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 (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 Isles of Scilly Sites**
Baseline	**Beneficial impact**	
Fletcher and others (2012) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) contribute to the delivery of fish and shellfish services. Circalittoral and infralittoral rock are important habitats for inshore commercial fisheries species, particularly crabs and lobsters, as are subtidal sediments (Fletcher and others, 2012). Seagrass beds within the rMCZ provide important nursery areas for flatfish (Joint Nature Conservation Committee, 2011) and, as such, the rMCZ is likely to help to support potential on-site and off-site fisheries. Crawfish *Palinurus elephas* is a commercially targeted species. The baseline quantity and quality of the	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. Additional management (above that in the baseline situation) of fishing activities is expected, which will prohibit fishing within the rMCZ, the costs of which are set out in Table 2b. Management of fishing activity within the rMCZ may reduce the on-site fishing mortality of species, which may benefit commercial stocks. It is unclear whether the scale of habitat recovered and the magnitude of	Anticipated direction of change: ⇧ Confidence: Low

Table 4a. Fish and shellfish for human consumption		**rMCZ Isles of Scilly Sites**
ecosystem service provided is assumed to be commensurate with that provided by the features of the site when in favourable and unfavourable condition (see Table 1b). A description of on-site fishing activity and the value derived from it is set out in Table 2b.	reduced (on-site) harvesting will be enough to have any significant positive impact on commercial stocks of mobile species. Stocks of low-mobility and site-attached species, such as lobsters and crabs, may improve as a result of a recovery in the condition of circalittoral rock habitat and reduced fishing pressure. Crawfish stocks may also improve. As fishing with static gears will be permitted for most of the year in the majority of the area covered by the rMCZ, some on-site benefits may occur, as well as potential off-site spill-over benefits. The potential effects described here do not include the negative impacts of the additional fisheries management on fish and shellfish provision and off-site impacts of displaced effort.	

Table 4b. Recreation		**rMCZ Isles of Scilly Sites**
Baseline	**Beneficial impact**	
Angling: Fletcher and others (2012) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) contribute to the delivery of fish and shellfish services. 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 and unfavourable condition (see Table 1b). There are several companies that provide boats which can be chartered for angling, which take visitors out on the reefs, or for sharking. Species caught include pollack, wrasse, mackerel, bull huss and conger. It has not been possible to estimate the value of angling at the site.	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. 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. The designation may lead to an increase in angling 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 UK angling.	Anticipated direction of change: ⇧ Confidence: Low
Diving: Fletcher and others (2012) identify that some of the features to be protected by the rMCZ can contribute to the delivery of recreation and tourism services. The baseline quantity and quality of the ecosystem service provided	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:

Table 4b. Recreation		**rMCZ Isles of Scilly Sites**
is assumed to be commensurate with that provided by the features of the site when in favourable and unfavourable condition (see Table 1b). The Isles of Scilly are known as one of the best places for diving around the British Isles due to the excellent underwater visibility and nutrient-rich sea water. There are several diving companies that provide beginner and advanced courses. Divers can experience large underwater rock formations, reef walls and shipwrecks, and have the opportunity to swim among grey seals. It has not been possible to estimate the value of diving in the rMCZ.	An improvement in the condition of site features and any associated increase in abundance and diversity of species, which may include recovery of fragile and slow-growing species, may improve the quality of diving at the site and therefore the value of the ecosystem service. The designation may lead to an increase in dive 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 UK diving.	⇧ Confidence: Low
Wildlife watching: Fletcher and others (2012) identify that the features to be protected by the rMCZ can contribute to the delivery of recreation and tourism services. 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 and unfavourable condition (see Table 1b). The Isles of Scilly are famous for being Europe's top location for seeing rare and migrant birds. Bird watchers can see wryneck, bluethroat, pectoral sandpiper, common rosefinch, ortolan, snow and Lapland bunting, jack snipe, rose-coloured starling and spotted crake. Grey seals are also draw wildlife watchers. There are small companies that offer specialised bird watching and wildlife watching tours and accommodation is available on all of the inhabited islands. Wildlife watching boat trips leave from St Mary's to visit Annet − an uninhabited island that is a bird sanctuary and is famous for its breeding puffins − and other popular breeding and feeding grounds for sea birds. It has not been possible to estimate the value of 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. 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. 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.	Anticipated direction of change: ⇧ Confidence: Low

Table 4c. Research and education	**rMCZ Isles of Scilly Sites**
Baseline	**Beneficial impact**

Table 4c. Research and education		**rMCZ Isles of Scilly Sites**
Research: Fletcher and others (2012) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) can contribute to the delivery of research services. Significant levels of environmental and conservation research activities take place on the Isles of Scilly. A number of papers are cited in Lieberknecht and others (2012) on which the ecological description in Table 1a was based. A number of marine research initiatives have enhanced baseline information and are set out in the Area of Outstanding Natural Beauty (AONB) Management Plan and are required as a result of existing environmental designations and local heritage (Isles of Scilly AONB Unit, 2010). Examples of recent research include the Isles of Scilly Marine Biodiversity Audit 2008, and underwater camera surveys of the Special Area of Conservation reef habitat. Sea birds have the longest-running biodiversity datasets on the islands, with over 30 years of data collected (Isles of Scilly AONB Unit, 2010). It has not been possible to estimate the value derived from research activities associated with the rMCZ.	Monitoring of the rMCZ 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: ⇧ Confidence: High
Education: Fletcher and others (2012) identify that the features to be protected by the rMCZ can contribute to the delivery of education services. The Isles of Scilly Wildlife Trust conducts educational projects, including working with school groups. AONB ran a programme of 'enrichment sessions' while RSPB has produced a series of events with the local education authority as part of the 'after-school club to promote wildlife awareness'. Hard copy and electronic interpretation material, public events and walks are provided by a wide range of environmental and conservation organisations. The Isles of Scilly AONB Management Plan seeks to further improve the islands' education services through an interpretation strategy (Isles of Scilly AONB Unit, 2010). 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 on the marine environment. Designation may aid additional local (to the rMCZ) provision of education (e.g. events and interpretation boards), from which visitors to the site would derive benefit. 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: ⇧ Confidence: Moderate

Table 4d. Regulating services		**rMCZ Isles of Scilly Sites**
Baseline	**Beneficial impact**	
Regulation of pollution: The features of the site contribute to the bioremediation of waste and sequestration of carbon. Seagrass habitats are particularly efficient carbon sinks. Marine sediments, through processes that occur in their upper layers, play an important role in the global cycling of many elements, including carbon and nitrogen (Fletcher and others, 2012). ***Environmental resilience:*** The features of the site contribute to the resilience and continued regeneration of marine ecosystems. Rock habitats can support particularly high biodiversity (Fletcher and others, 2012). ***Natural hazard protection:*** The features of the site, in particular seagrass beds and intertidal habitats, contribute to local flood and storm protection (Fletcher and others, 2012). It has not been possible to estimate the value of regulating services in the site.	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. Improved habitat condition and a potential reduction in anthropogenic pressures, including the use of bottom-towed fishing gear, may increase site benthic biodiversity and biomass, improving the regulating capacity of the site habitats. Designating the recommended Marine Conservation Zone will protect its features and the ecosystem services that they provide against the risk of future degradation from pressures caused by human activities (as, if necessary, mitigation would be introduced, with the associated costs and benefits).	Anticipated direction of change: ⇧ Confidence: Low

Table 4e. Non-use and option values		**rMCZ Isles of Scilly Sites**
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) and the ecosystem services provided, even if they do not currently benefit from them. It has not been possible to estimate the non-use value of the rMCZ.	The rMCZ will benefit the proportion of the UK population that values conservation of the MCZ 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	Anticipated direction of change: ⇧

Table 4e. Non-use and option values		**rMCZ Isles of Scilly Sites**
	value). The rMCZ will protect both the features and their option to benefit from the services in the future from the risk of future degradation. Examples of these values are shown in Ranger and others (2012). Voters in the Marine Conservation Society 'Your Seas Your Voice' campaign expressed a personal affiliation with the area and a desire to protect the marine wildlife, including sea bed species and habitats, and large megafauna ('It would be great to see the below-water wildlife get the same care and protection that the land-based wildlife gets in order to preserve these amazing habitats'). Voters wanted to safeguard the local area from possible future impacts ('Please help to save this fabulous environment before it is irrevocably damaged'). The aesthetic value of the area was highlighted by a number of voters, as was an emotional attachment to the site.	Confidence: Moderate

rMCZ Land's End

Site area (km^2): 18.6

Table 1. Conservation impacts — **rMCZ Land's End**

1a. Ecological description

The site boundary follows the coastline along the mean high water mark from Treen Cliff/Cribba Head to Gwennap Head. The seaward boundary extends westwards for about 3.5km and then runs back in an arc towards Cribba Head. The site occupies a depth range of between 0 and approximately 60 metres. Two coastal Sites of Special Scientific Interest are located alongside this recommended Marine Conservation Zone (rMCZ).

The rMCZ intersects with an area of higher than average benthic species diversity. It contains the Runnelstone reef, which is ecologically of high importance for a large range of mobile species, including sea birds, cetaceans and basking shark, which use the site as a feeding area. It is also an important haul-out and pupping location for grey seal. The area is of importance for migratory sea birds, including Balearic shearwater *Puffinus mauretanicus*, auks, kittiwakes and gannets.

This site encompasses an arc of sea area around an exposed shoreline with granite cliffs and sandy inlets. The area contains fine examples of very exposed rocky shore communities. Upper shores are dominated by barnacles, limpets and winkles. Low shores are carpeted with the pink tufted coralline alga *Corallina officinalis* and overlain with the kelp *Alaria esculenta*.

Haliclystus auricula and *Palinurus elephas* have been recorded close to the boundaries of the rMCZ and may also be present within it. The Land's End peninsula (from Penzance to St Ives) is the only place in the region where the gooseneck barnacle *Pollicipes pollicipes* has been recorded, including near Land's End itself, at Sennen Cove and at Tater Du.

Sublittoral habitats and communities surveys have shown a dense forest of *Laminaria hyperborea* covering the shallow horizontal surfaces, with an understorey dominated by foliose red, green and brown algae. The sublittoral fringe recorded at Porthcurno contained *Alaria esculenta*, *Himanthalia elongata*, *Mytilus edulis* and coralline red algae. With increasing depth, vertical surfaces become dominated by *Corynactis* and *Metridium*, with tubes of jassid amphipods prevalent on upfaces. At 34 metres at Carn Base, several other species were documented, including *Holothuria*, *Stolonia socialis* and *Raspailia*, all of which occurred in shallow water at more sheltered sites (Lieberknecht and others, 2011).

1b. MCZ Feature Baseline and Impact of MCZ

Feature	Area of feature (km2)	No. of point records	Baseline	Impact of MCZ
Broad-scale Habitats				
High energy circalittoral rock	0.09	-	Favourable Condition	Maintained at Favourable Condition

High energy infralittoral rock	3.36	-	Favourable Condition	Maintained at Favourable Condition
High energy intertidal rock	0.03	-	Favourable Condition	Maintained at Favourable Condition
Intertidal coarse sediment	0.01	-	Favourable Condition	Maintained at Favourable Condition
Intertidal mud	0.03	-	Favourable Condition	Maintained at Favourable Condition
Intertidal sand and muddy sand	0.02	-	Favourable Condition	Maintained at Favourable Condition
Moderate energy circalittoral rock	1.74	-	Favourable Condition	Maintained at Favourable Condition
Moderate energy infralittoral rock	0.27	-	Favourable Condition	Maintained at Favourable Condition
Subtidal coarse sediment	1.92	-	Favourable Condition	Maintained at Favourable Condition
Subtidal sand	11.09	-	Favourable Condition	Maintained at Favourable Condition
Species of Conservation Importance				
Euincella verrucosa	-	2	Favourable Condition	Maintained at Favourable Condition
Paludinella littorina	-	1	Favourable Condition	Maintained at Favourable Condition
Non-ENG Mobile Species				
Phocoena phocoena	-	-	Favourable Condition	Maintained at Favourable Condition
Cetorhinus maximus	-	-	Favourable Condition	Maintained at Favourable Condition
Tursiops truncates	-	-	Favourable Condition	Maintained 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 Land's End**

Source of costs of the 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**
There are 27 wrecks located in the site (English Heritage, pers. comm., 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 one licence application could be in the region of £500 to £10,000 (English Heritage, pers. comm., 2011). No further impacts on activities related to archaeology are anticipated.

Table 2b. National defence	**rMCZ Land's End**
Source of costs of the 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. 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 for aerial, surface, water column and practice landing activities, including practice firing. The rMCZ is in an MOD exercise area.	It is not known whether this rMCZ will impact on MOD's activity. Impacts of rMCZs on MOD activities are assessed in Annex N and the Evidence Base (they are not assessed for this rMCZ alone).

Table 2c. Renewable energy **rMCZ Land's End**

Source of costs of the 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 rMCZ 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 costs for power export cables and inter-array cables (relative to the mitigation provided in the baseline).

Baseline description of activity

Wave energy: The rMCZ overlaps with the South Cornwall Coastal wave energy Potential Development Area (PDA) (PMSS, 2010). Any potential installation could have a footprint within the PDA of 20km^2, covering 0.4% of the PDA (PMSS, 2010). The rMCZ covers 0.002% of the PDA. As the location of the potential installation is not known, the possible overlap of inter-array and export cables with the rMCZ is also not known. One potential energy installation is anticipated in the PDA, with the associated licence application expected in 2030 (Department of Energy and Climate Change, pers. comm., 2011). The development in the PDA is expected to have a production capacity of 150MW (PMSS, 2010).

Costs of impact of rMCZ on the sector

Wave energy: The estimated cost to wave energy developers of this rMCZ is expected to fall within the following range of scenarios:

£m (one-off cost)	Scenario 1	Scenario 2
Cost to the operator	0.016	At least 0.016

Scenario 1: The analysis assumes that the potential future tidal energy installation is planned within, or within close proximity to, the rMCZ. As a result of the designation of the rMCZ the potential licence application for the wave energy installation will need to consider the possible effects of the construction and operational activities on the features protected by the rMCZ and the rMCZ conservation objectives. This is expected to result in an additional one-off cost of £0.016m in 2015 (based on an average cost provided by renewable energy sector developers; see Annex N for details).

Scenario 2: In addition to the costs set out under scenario 1, further costs may occur under Scenario 2 The mitigation requires the use of alternative cable protection for export and inter-array cables that have not yet been consented. As the actual location of the potential installation is unknown, it is unclear whether any cables will be sought that pass through the

Table 2c. Renewable energy	**rMCZ Land's End**
	rMCZ, and if they are what length of cable may be affected. The cost of this mitigation measure is estimated to be £1m/km of cable (average of wind energy developers; see Annex H14 for details) and as such the total mitigation cost could be significant. The likelihood and magnitude of any additional costs cannot be calculated. However, JNCC and Natural England (pers. comm., 2012) state that the likelihood of this mitigation being required is very low. Further details are provided in Annex H14. 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 Land's End**
Cables (interconnectors and telecom cables): Future interconnectors and telecom cables may pass through the rMCZ. Impacts of rMCZs on future interconnectors and telecom cables are assessed in the Evidence Base, Annex H3 and Annex N3 (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 Land's End**
Cables (existing interconnectors and telecom cables); commercial fishing (dredges, bottom trawls, pots and traps, nets, hooks and lines); recreation; research and education; water abstraction, discharge and diffuse pollution*.	

* The IA aassumes that no additional mitigation of the 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 (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 Land's End**
Baseline	**Beneficial impact**	
Fletcher and others (2012) 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. Circalittoral and infralittoral rock are important habitats for inshore commercial fisheries species, particularly crabs and lobsters, as are subtidal sediments (Fletcher and others, 2012). Crawfish *Palinurus elephas* is a commercially targeted species. 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. Potting is the main fishing gear used in the rMCZ, targeting rocky areas. Some netting, primarily wreck netting and bass netting also occurs. Estimated value of UK vessel landings: £0.028m/yr.	If the conservation objectives of the features are achieved, the features will be maintained in favourable condition. No additional management (above that in the baseline situation) of fishing activities is expected. No change in feature condition or harvesting of fish and shellfish is anticipated and therefore no on-site or off-site benefits are expected. 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 (as, if necessary, mitigation would be introduced, with the associated costs and benefits).	Anticipated direction of change: ⟺ Confidence: Moderate

Table 4b. Recreation		**rMCZ Land's End**
Baseline	**Beneficial impact**	
Angling: Fletcher and others (2012) 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.	If the conservation objectives of the features are achieved, the features will be maintained in favourable condition.	Anticipated direction of change:

Table 4b. Recreation		**rMCZ Land's End**
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. Several companies in the area provide charter boats that can take anglers to Land's End grounds. Species caught include pollack and haddock. It has not been possible to estimate the value of angling at the site.	No change in on-site feature condition or fishing mortality is anticipated and therefore no on-site or off-site benefits are expected (see Table 4a for further details). 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 (as, if necessary, mitigation would be introduced, with the associated costs and benefits). The designation may lead to an increase in angling 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 UK angling.	⟺ Confidence: Moderate
Diving: Fletcher and others (2012) identify that some of the features to be protected by the rMCZ can contribute to the delivery of recreation and tourism services. 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. There are businesses that offer chartered trips to some of the best dive sites across Cornwall, including the Runnelstone reef and Logan's gulley, to experience reefs and wrecks. It has not been possible to estimate the value of diving in the rMCZ.	If the conservation objectives of the features are achieved, the features will be maintained in favourable condition. No change in on-site feature condition is anticipated and therefore no benefits to diving are expected. 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 (as, if necessary, mitigation would be introduced, with the associated costs and benefits). The designation may lead to an increase in dive 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 UK diving.	Anticipated direction of change: ⟺ Confidence: Moderate
Wildlife watching: Fletcher and others (2012) identify that some of the features to be protected by the rMCZ can contribute to the delivery of recreation and tourism services. 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. Local companies provide boat trips for wildlife watching around Cornwall that pass Land's End. Visitors have the chance to see many species of sea birds as well as dolphins, harbour porpoise, basking shark and ocean sunfish. It has	If the conservation objectives of the features are achieved, the features will be maintained in favourable condition. No change in on-site feature condition is anticipated and therefore no benefits to wildlife watching are expected. 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 (as, if necessary, mitigation would be	Anticipated direction of change: ⟺ Confidence: Moderate

Table 4b. Recreation		**rMCZ Land's End**
not been possible to estimate the value of wildlife watching in the rMCZ.	introduced, with the associated costs and benefits). 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.	

Table 4c. Research and education		**rMCZ Land's End**
Baseline	**Beneficial impact**	
Research: Fletcher and others (2012) identify that the features to be protected by the recommended Marine Conservation Zone (rMCZ) can contribute to the delivery of research services. Southampton, Plymouth and Exeter universities currently use the area around Land's End for educational purposes (Natural England, 2009). It has not been possible to estimate the value derived from research activities associated with the rMCZ.	Monitoring of the rMCZ 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: ⇧ Confidence: High
Education: Fletcher and others (2012) identify that the features to be protected by the rMCZ can contribute to the delivery of education services. The RSPB Discovery Centre at Sennen allows visitors to watch marine wildlife (with help from information wardens). Southampton, Plymouth and Exeter universities currently use the area around Land's End for educational purposes (Natural England, 2009). 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 on the marine environment. Designation may aid additional local (to the rMCZ) provision of education (e.g. events and interpretation boards), from which visitors to the site would derive benefit. 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: ⇧ Confidence:

Table 4c. Research and education		**rMCZ Land's End**
		Moderate

Table 4d. Regulating services		**rMCZ Land's End**
Baseline	**Beneficial impact**	
Regulation of pollution: The features of the site contribute to the bioremediation of waste and sequestration of carbon. Marine sediments, through processes that occur in their upper layers, play an important role in the global cycling of many elements, including carbon and nitrogen (Fletcher and others, 2012). ***Environmental resilience:*** The features of the site contribute to the resilience and continued regeneration of marine ecosystems. Rock habitats can support particularly high biodiversity (Fletcher and others, 2012). ***Natural hazard protection:*** The features of the site, in particular the intertidal habitats, contribute to local flood and storm protection (Fletcher and others, 2012). It has not been possible to estimate the value of regulating services in the site.	If the conservation objectives of the features are achieved, the features will be maintained in favourable condition. No change in feature condition and management of human activities is expected and therefore no benefit to the regulation of pollution is expected. Designating the recommended Marine Conservation Zone will protect its features and the ecosystem services that they provide against the risk of future degradation from pressures caused by human activities (as, if necessary, mitigation would be introduced, with the associated costs and benefits).	Anticipated direction of change: ⟺ Confidence: Moderate

Table 4e. Non-use and option values	**rMCZ Land's End**
Baseline	**Beneficial impact**

Table 4e. Non-use and option values		**rMCZ Land's End**
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) and the ecosystem services provided, even if they do not currently benefit from them. It has not been possible to estimate the non-use value of the rMCZ.	The rMCZ will benefit the proportion of the UK population that values conservation of the MCZ 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 will protect both the features and their option to benefit from the services in the future from the risk of future degradation. Examples of these values are shown in Ranger and others (2012). The most common reasons provided by voters in the Marine Conservation Society 'Your Seas Your Voice' campaign, for wanting to protect areas within the rMCZ, were for megafauna, including whales, cetaceans, sharks and dolphins, and the spectacular scenery above and below the sea ('This is a stunning area of natural underwater beauty'). Bequest values and a desire for recovery were also mentioned ('Amazing marine biodiversity here – I want it protected for my children's children'; 'The Runnelstone deserves complete protection. Its unique position and the richness of its marine wildlife mean that with protection it could flourish into a spectacular example of what our coastal waters could be like').	Anticipated direction of change: Confidence: Moderate