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

Part 3

Contents

rMCZ South-West Deeps (West) Site area (km^2): 1,824.3

Table 1. Conservation impacts				**rMCZ South-West Deeps (West)**
1a. Ecological description				
The western boundary of this site follows the UK Continental Shelf Limit. The site comprises an area of continental shelf sea where the sea-floor habitat is dominated by subtidal mixed sediment and subtidal sand. The eastern site boundary is approximately 230km south-west of Land's End. The depth of the site is between 100 and 200 metres. The site is crossed by Celtic Sea relict sandbanks in a north-east to south-west direction (these sandbanks are listed as a geological/geomorphological interest feature in the Ecological Network Guidance). The area has also been highlighted as a foraging ground for sea birds during the summer (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 coarse sediment	239.40	-	Unfavourable Condition	Recover to Favourable Condition
Subtidal sand	1574.27	-	Unfavourable Condition	Recover to Favourable Condition
Subtidal mixed sediments	6.99	-	Unfavourable Condition	Recover to Favourable Condition
Geological and Geomorphological Features of Interest				
Celtic sea relict sandbanks	132.90	-	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 South-West Deeps (West)**
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 area of sub-tidal mixed sediment to pots and traps, nets, and hooks and	

Table 2a. Commercial fisheries **rMCZ South-West Deeps (West)**

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 close to the south-western edge of the UK's 200nm (nautical mile) fishery limit and the UK's exclusive economic zone and covers more than 10% of International Council for the Exploration of the Sea [ICES] Rectangles 27E0 and 27E1 and less than 10% of ICES Rectangle 26E0. French and Spanish vessels are active throughout the wider area (defined as the 3 ICES Rectangles 27E0 (MMO, 2011). Bottom trawling, by UK and French vessels, and mid-water trawling are the main types of fishing in the rMCZ, although there is also a low level of fishing with hooks and lines and nets (MCZ Fisheries Model). Estimated total value of UK vessel landings from the rMCZ: £0.109m/yr.

UK Bottom trawls: The rMCZ lies on the southern edge of a significant area of trawling activity. Vessels target a large area running north of the rMCZ up towards the south-west coast of Ireland, principally fished by otter trawl vessels of between 30 and 40 metres targeting megrim, monkfish and angler fish (MMO, 2011). The eastern half of the rMCZ is the most heavily fished part of the rMCZ and trawls in the area typically run in a south-west/north-east direction (Lee, 2010). Estimated value of UK bottom trawl landings from the rMCZ: £0.097m/yr.

Scenario 1: No impacts are anticipated under Scenario 1.

Scenarios 2, 3 and 4: The small proportion of the fishery described in the baseline that is covered by the rMCZ indicates that displaced vessels would be likely to target the fishing ground outside the rMCZ. The displacement of fishing effort may have knock-on consequences for fishing outside the rMCZ.

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	0.097	0.097	0.097

UK Nets: There is sporadic gill netting in the rMCZ, but the overall netting effort is low. Estimated value of UK net landings from the rMCZ: £0.001m/yr.

Scenarios 1 and 2: No impacts are anticipated under scenarios 1 and 2.

Scenarios 3 and 4: The level of netting in the rMCZ is low, as indicated by the value of landings from it, and as such no significant impacts are anticipated.

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	0.000	0.000	0.000	0.001

<table>
<tr><th colspan="2">Table 2a. Commercial fisheries rMCZ South-West Deeps (West)</th></tr>
<tr><td></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="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 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>0.097</td><td>0.097</td><td>0.098</td></tr>
<tr><td>GVA affected</td><td>0.000</td><td>0.040</td><td>0.040</td><td>0.041</td></tr>
</table></td></tr>
<tr><td>Impact on non-UK commercial fishing: Non-UK vessels using bottom trawls/dredges, mid-water trawls and static gears fish within the rMCZ (Lee, 2010). Spanish long lines recorded an estimated 240 fishing days within the rMCZ in 2010, and Spanish bottom trawlers an estimated 1,000 fishing days (ANASOL, OPPAO, OPP-7 and Puerto de Caleiro, pers. comms., 2011). All Spanish vessels active in the rMCZ are over 24 metres in length. Bottom trawlers typically target hake, megrim and monkfish and longliners target hake (ANASOL, OPPAO, OPP-7 and Puerto de Caleiro, pers. comms., 2011).

Estimated value of landings from the rMCZ by French vessels: bottom trawls/dredges: £0.014m/yr; static gears: £0.022m/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 and Spanish bottom trawlers and Spanish longliners, would be affected by the rMCZ. The rMCZ would result in the displacement of trawling and long line fishing effort. This may have unknown knock-on impacts (ANASOL, OPPAO, OPP-7 and Puerto de Caleiro, pers. comms., 2011).

In the event of a full closure of the rMCZ the estimated value of French landings affected would be £0.014m/yr (bottom trawls/dredges) and £0.022m/yr (static gears). No information on the effect of the zoned closure to static gears or the impact on Spanish vessels' value of landings is available.</td></tr>
</table>

Table 2b. National defence	**rMCZ South-West Deeps (West)**
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 South-West Deeps (West)**
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 South-West Deeps (West)**
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 South-West Deeps (West)**
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 support internationally important fish and shellfish fisheries (Fletcher and others, 2011). 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 2a.	If the conservation objectives of the features are achieved, the habitats will be recovered to favourable condition and the geological features maintained in 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 large and there is currently a high level of fishing effort. As such, the scale of habitat recovered and the magnitude of reduced (on-site) harvesting may be enough to have a positive impact on commercial stocks. 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 and off-site impacts of displaced effort.	Anticipated direction of change: ⇧ Confidence: Low

Table 4b. Recreation	**rMCZ South West Deeps (West)**	
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 South-West Deeps (West)**	
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 South-West Deeps (West)**	
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 natural hazard protection. 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 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 South-West Deeps (West)**	
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 recover and protect the features and the ecosystem services provided, and thereby the option to benefit from these services in the future, from past degradation and the risk of future degradation.	Anticipated direction of change: ⇧ Confidence: Moderate

rMCZ Studland Bay

Site area (km^2): 3.9

Table 1. Conservation impacts **rMCZ Studland Bay**

1a. Ecological description

Studland Bay is sandy, shallow (dropping to 5 metres in depth 2km from the shore) and sheltered from the prevailing south-west winds, making it an ideal habitat for a dense seagrass bed of *Zostera marina*. The underlying sea bed is made of chalk, with a fairly settled sandy/muddy substrate where species such as the lugworm *Arenicola marina* and sand mason worm *Lanice conchilega* are abundant.

The *Zostera marina* seagrass beds cover between 50ha and 91ha. A fringe of shorter seagrass occurs all along the edge of Studland Bay, containing a mixture of seagrass and mobile algae (including *Ulva* spp. and various red algae). The seagrass beds occur up to a metre high in the middle of the bay. In the seagrass there are abundant snakelocks anemones *Anemonia viridis* which live in the sunlit canopy growing on top of the seagrass.

The seagrass beds are an important habitat for two species of seahorse, *Hippocampus hippocampus* and *Hippocampus guttulatus*, and the bay is the only known breeding location for both indigenous seahorse species in the UK. The site is considered to be of international importance for the long-snouted or spiny seahorse, *H. guttulatus*, with the largest known breeding population of the species in the UK. In addition, all six species of British pipefish breed and live in Studland Bay. Native oysters *Ostrea edulis* have been found on hard substrate (and within seagrass beds), on rocky areas and on old moorings within Studland Bay.

The recommended Marine Conservation Zone (rMCZ) is situated in an area classified as having a medium level of biotope diversity which is within the top 25% of areas in the UK for species and biotope richness, as well as relatively high bird densities. The rMCZ is within a Sensitive Marine Area in recognition of its important subtidal habitats, and is adjacent to two Site of Special Scientific Interest designations. It has additional ecological importance as a nursery area for undulate ray *Raja undulate;* numerous eggcasings and sightings of juvenile undulate ray have been recorded in the bay (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	0.11	-	Favourable Condition	Maintained at Favourable Condition
Intertidal sand and muddy sand	0.03	-	Favourable Condition	Maintained at Favourable Condition
Subtidal mixed sediments	3.74	-	Favourable Condition	Maintained at Favourable Condition
Subtidal sand	0.05	-	Favourable Condition	Maintained at Favourable Condition
Habitats of Conservation Importance				
Seagrass beds	0.91	6	Unfavourable Condition	Recover to Favourable Condition
Species of Conservation Importance				
Hippocampus hippocampus	-	1	Unfavourable Condition	Recover to Favourable Condition

Ostrea edulis	-	4	Favourable Condition	Maintained at Favourable Condition
Raja undulata	-	-	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 Studland Bay**
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**
Items of archaeological interest are recorded in the site, including the wreck of a Dutch craft from 1940. Historic shipwrecks designated under the Protection of Wrecks Act 1973 are also present (Swash Channel and the Studland Bay wreck) (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).

Table 2b. Commercial fisheries	**rMCZ Studland Bay**
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 sea grass beds in the rMCZ to dredges and bottom trawls.	
Management scenario 2: Closure of sea grass beds in the rMCZ to dredges, bottom trawls, pots and traps, nets, and hooks and lines.	
Management scenario 3: Closure of entire rMCZ to dredges, bottom trawls, pots and traps, nets, and hooks and lines.	
Baseline description of activity	**Costs of impact of rMCZ on the sector**

<table>
<tr><th colspan="2">Table 2b. Commercial fisheries</th><th>rMCZ Studland Bay</th></tr>
<tr><td colspan="3">Overview: The rMCZ is situated inside the 6nm (nautical mile) limit and so is only fished by UK vessels. A low level of commercial fishing occurs within the rMCZ. This is primarily with pots and traps in the south-eastern corner of the rMCZ, which overlaps with the potting ground around Old Harry headland. There is a low level of fishing with other grears, although the rMCZ is not thought to cover known fishing grounds.

Estimated total value of UK vessel landings from the rMCZ: £0.019m/yr.</td></tr>
<tr><td colspan="2">UK Dredges: Dredging is not known to occur within the rMCZ (Southern Inshore Fisheries and Conservation Authority [IFCA], pers. comm., 2011). However, the MCZ Fisheries Model indicates that a low level of landings is taken from within the rMCZ. It is assumed that this is from fishing in the eastern edge of the rMCZ, which is outside the areas of sea grass. Estimated value of UK dredge landings from the rMCZ: £0.006m/yr.</td><td>Scenario 1: No impacts are anticipated under this scenario.

Scenario 2: As no dredging is thought to occur in the areas of sea grass, no impacts are anticipated under this scenario.

Scenario 3: The number of vessels and frequency of dredging potentially affected are not known. However, the bulk of the area of the rMCZ is not thought to be a regular fishing ground.

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></tr>
<tr><td>Value of landings affected</td><td>0.000</td><td>0.000</td><td>0.006</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th colspan="2">Table 2b. Commercial fisheries rMCZ Studland Bay</th></tr>
<tr><td>UK Bottom trawls: Trawling is not known to occur within the rMCZ (Southern IFCA, pers. comm., 2011). The MCZ Fisheries Model indicates a low level of landings from within the rMCZ. It is assumed that this is from fishing in the eastern edge of the rMCZ, which is outside the areas of sea grass. Estimated value of UK bottom trawl landings from the rMCZ: £0.002m/yr.</td><td>Scenario 1: No impacts are anticipated under this scenario.

Scenario 2: As no bottom trawling is thought to occur in the areas of sea grass, no impacts are anticipated under this scenario.

Scenario 3: The value of landings likely to be affected is quite low, and the rMCZ is not a known trawling ground. As such, no significant impacts are anticipated.

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>0.000</td><td>0.002</td></tr></table>
In establishing the draft conservation objectives, the site features were assessed as having low vulnerability to fishing with bottom trawls 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 Pots and traps: Potting takes place in the south-eastern corner of the rMCZ, which overlaps with a potting ground that is focused on the headland at Old Harry. Potting is not thought to take place within the areas of sea grass (Southern IFCA, pers. comm., 2011). Estimated value of UK pot and trap landings from the rMCZ: £0.010m/yr.</td><td>Scenario 1: No impacts are anticipated under these scenarios.

Scenario 2: As no fishing with pots and traps is thought to occur in the areas of sea grass, no impacts are anticipated under this scenario.

Scenario 3: The rMCZ will reduce the area of potting ground available around the headland. .

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></tr><tr><td>Value of landings affected</td><td>0.000</td><td>0.000</td><td>0.010</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</td></tr>
</table>

<table>
<tr><th colspan="2">Table 2b. Commercial fisheries rMCZ Studland Bay</th></tr>
<tr><td></td><td>the range, and is likely to be less restrictive than that required for other gears.</td></tr>
<tr><td>UK Hooks and lines: Fishing with hooks and lines takes place in the south-eastern corner of the rMCZ, off the headland at Old Harry. The rMCZ is not thought to cover a regular fishing ground and no fishing with hooks and lines is thought to take place within the areas of sea grass (Southern IFCA, pers. comm., 2011). Estimated value of UK hook and line landings from the rMCZ: £0.001m/yr</td><td>Scenario 1: No impacts are anticipated under this scenario.

Scenario 2: As no fishing with hooks and lines is thought to occur in the areas of sea grass, no impacts are anticipated under this scenario.

Scenario 3: The value of landings likely to be affected is quite low, and the rMCZ is not a regular ground. As such, 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></tr><tr><td>Value of landings affected</td><td>0.000</td><td>0.000</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>
<tr><td colspan="2">Total direct impact</td></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></tr><tr><td>Value of landings affected</td><td>0.000</td><td>0.000</td><td>0.019</td></tr><tr><td>GVA affected</td><td>0.000</td><td>0.000</td><td>0.009</td></tr></table></td></tr>
<tr><td>Impact on non-UK commercial fishing:</td><td>None.</td></tr>
</table>

Table 2c. National defence	**rMCZ Studland 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	**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. 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 2d. Ports, harbours, shipping and disposal sites	**rMCZ Studland Bay**
Source of costs of the rMCZ	
Management scenario 1: Increase in costs of assessing environmental impacts for future licence applications within 1km of an rMCZ. This applies to navigational dredging and disposal of dredge material only. It is anticipated that no additional mitigation of impacts on features protected by the rMCZ 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, disposal of dredge material and future potential port developments. Additional costs incurred in updating existing Maintenance Dredging Protocols (MDPs). Additional mitigation of impacts on features protected by the rMCZ, relative to baseline provided in the baseline case, may be needed for future port developments. .	
Baseline description of activity	**Costs of impact of rMCZ on the sector**
<u>*Navigational Dredging:*</u> There is a maintained dredged channel (the Swash Channel) extending out from the entrance to Poole Harbour in a south-easterly direction that allows access to the harbour by larger vessels. The channel is maintained by Poole Harbour Commissioners as part of their statutory duties. The dredged channel is within 1km of the rMCZ. No other dredging activities are within 5km of the rMCZ. Swanage Harbour is within 5km of the rMCZ. <u>*Disposal Sites:*</u> Disposal-at-sea activities occur within 5km of the rMCZ, but	***Scenario 1:*** Poole Harbour Commissioners operate under the dredging protocol and it is expected that their baseline document will need to be updated to include consideration of the effects of their dredging on features protected by the rMCZ and the potential to achieve the rMCZ conservation objectives. This is expected to result in an additional cost of approximately £0.007m (average of generic estimates by two environmental consultancies, pers. comm., 2011), recurring every 3 years from 2013 (Natural England, pers. comm., 2011). ***Scenario 2:***

not within 1km, at Bournemouth Beach (beach recharge), Brownsea disposal site (experimental site), Poole Bay disposal site and Swanage Bay disposal site. For the purposes of the Impact Assessment (IA), it is assumed that an average of 4.9 applications (equivalent to the average number/yr between 2001 and 2010 [Cefas, 2011]) for licences to dispose of material at the disposal sites will be made in each year over the timeframe of the IA.	*Navigational dredging:* costs of £0.007m/yr every 3 years will be incurred, as described under scenario 1. *Dispsal sites*: Under Scenario 2 future licence applications for disposing of material at sea within 5km of the rMCZ 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 £0.033m/yr. *Harbour development:* 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. Recreation	**rMCZ Studland Bay**
Source of costs of the rMCZ	
Recreational boating management scenario: Replacement of the existing 51 moorings with eco-moorings and deployment of a further 49 eco-moorings (total eco-mooring provision of 100); establishment of one or more no-anchor zones. The scenario detailed above is based on outputs from ongoing Studland Bay meetings being chaired by the Marine Management Organisation (MMO) and has been derived in consultation with the MMO and Royal Yachting Association (RYA). The scenario reflects a realistic mix of the potential management that is being discussed. The management scenario has been put together for the purposes of the Impact Assessment (IA) and may differ from the actual management put in place if the rMCZ is designated.	
Baseline description of activity	**Costs of impact of rMCZ on the sector**
Recreational boating: Studland Bay is a very popular destination for recreational boaters. The bay has an attractive beach and is set against the	It is anticipated that mitigation of impacts of anchoring of recreational vessels on the areas of sea grass protected by the rMCZ could be provided by replacement of the existing

Table 2e. Recreation	**rMCZ Studland Bay**
Dorset Area of Outstanding Natural Beauty (AONB), as well as a limited tidal range and good ground conditions which make the bay accessible to a range of vessels. The bay provides shelter from south, south-west and north-west winds and is the only sheltered anchorage from south-westerly winds between Weymouth and The Needles (Marine Projects, 2011). The bay is used by short-stay day boats and short-stay and overnight-stay cruising vessels, and there are no charges for mooring (there are thought to be 51 existing moorings in the bay) or anchoring. The majority of visiting boats are local, coming from between Weymouth and west of the Isle of Wight (Marina Projects, 2011) and in particular from Poole. There are approximately 5,300 leisure vessels at Poole, and nearly 9,000 between Weymouth and west of the Isle of Wight (Marine Projects, 2011). At peak times, typically weekends during the summer months, between 150 and 210 boats were observed in the bay on 6 occasions in 2009 (Dorset Wildlife Trust, 2009), although observations for 2011 show a reduced number with a maximum of 105 boats being observed at any one time (Boat Owners Response Group [BORG], pers. comm., 2011). When the weather is bad, there may be no boats, even during peak times. Anchoring of boats is concentrated in the south-west corner of the bay, where it is most sheltered. This overlaps with part of the area of sea grass in the bay. There is an existing voluntary no-anchor zone in the south-west corner of the bay, covering 0.01km^2 of the sea grass beds (approximately 1% of the mapped area of seagrass beds within the rMCZ). It is estimated that between 20% and 40% (BORG, pers. comm., 2011) of people who moor or anchor within the bay go ashore, and a large proportion of these visitors may use the Studland village shop, pub and/or café, providing important income to the local economy.	moorings with eco-moorings (eco-moorings are thought to cause less damage to marine habitats than traditional moorings) and deployment of further eco-moorings in the areas of seagrass where vessels currently anchor, so that a total of 100 eco-moorings is provided; and the establishment of one or more additional no-anchor zones (the exact size, number and location of these zones is not yet known). This management scenario is based on ongoing local area management discussions chaired by the MMO, as well as outputs from the Finding Sanctuary Vulnerability Assessment. It is thought to be unlikely that an increase in the number of moorings and a reduction in the space available for anchoring provided in the bay would make any significant difference to the number of boaters visiting the bay (BORG, pers. comm., 2011; RYA, pers. comm., 2011; Marina Projects, 2011). It is expected that some visitors to the bay may welcome the opportunity to be able to take up an existing mooring rather than anchor, and this may actually result in an increase in visiting boat numbers, particularly for overnight stays because the moorings would be more secure (Marine Projects, 2011). This is not the case for all boaters, however, and many may prefer to continue to anchor. There are concerns that a large increase in the number of moorings may be unsightly and reduce the aesthetic quality of the bay (BORG, pers. comm., 2011). It is expected that there would be a fee for use of a new eco-mooring by a visiting boat (Marine Projects, 2011). So long as it is still possible to anchor for free in parts of the bay and any charges for mooring to a buoy are reasonable, no reduction in overall numbers of visiting boats would be expected (BORG, pers. comm., 2011; RYA, pers. comm., 2011; Marina Projects, 2011). Based on the installation of 100 eco-moorings, the total cost to visiting boats paying for the use of moorings is estimated to total £0.090m/yr. Capital costs associated with the removal of the existing moorings and the installation of 100 eco-moorings are estimated to total £0.433m (Finding Sanctuary calculations based on Marina Projects (2011)). (See Annex N for the assumptions used in the calculations.) This one-off cost is assumed to occur in the first year after designation (2013). Operating costs, including maintenance of the eco-moorings and collection of mooring fees, are estimated to total £0.087m/yr (Finding Sanctuary calculations based on Marina Projects (2011)). (See Annex N for the assumptions used in the calculations.) Not all of these costs will be additional as some existing operating costs arise as a result of the

Table 2e. Recreation	**rMCZ Studland Bay**
	existing moorings. The total cost of eco-moorings is taken to be the sum of the mooring fees and capital costs, plus any operating costs not covered by the mooring fees. The present value of the costs over the 20 year tme period of the IA is £1.700m. The creation of no-anchor zones over areas of seagrass is expected to be compatible with the anchoring of boats in the bay because boaters generally prefer to avoid anchoring in areas of sea grass (BORG, pers. comm., 2011). The impact on visiting boaters will however depend on the location, size and number of zones. If no-anchor zones are designed so as to continue to allow adequate access to anchorages in the south of the bay, then no significant impacts to recreational boaters would be expected. However, the extent to which additional no-anchor zones could be provided in the bay is not clear. It was concluded in a recent mooring viability appraisal (Marina Projects, 2011) that there was adequate space in the bay to provide a dedicated eco-mooring zone for 200 boats, an overflow anchorage area, and an expansion or re-design of the existing no-anchor zone Despite this, it should be noted that, if adequate access to mooring or anchorage areas – specifically in the sheltered south-western corner of the bay - is not retained, then impacts may include the following (BORG, pers. comm., 2011): - Reduced space between boats: anchoring boats may position themselves too close to other boats, causing potential risks to safety. - Displacement of anchoring boats out of the south-west corner of the bay: the northern part of the bay does not afford the same level of shelter, and as such is a less comfortable place to anchor and often an unsafe place for recreational boats at anchor. As a result, boaters displaced out of the south-western corner of the bay may no longer visit Studland Bay. As there are no recognised local alternative places to anchor, this would significantly impact on their leisure experience. It would be expected that a reduction in the number of boats visiting Studland Bay would have an impact on local businesses in Studland village. There may also be wider impacts on the Poole Harbour area if boaters chose to relocate their harbour moorings from Poole to elsewhere. - Displacement of vessels to anchorages further from shore: if boats are forced to

Table 2e. Recreation	**rMCZ Studland Bay**
	anchor further from the shore, this may deter them from accessing the beach. This would be expected to impact on local businesses in Studland village. - Anchoring in an emergency: while anchoring within no-anchor zones would be permitted in an emergency (United Nations Convention on the Law of the Sea [UNCLOS], 1982), the presence of the no-anchor zone may still discourage a boater from dropping anchor. As a result, they may take more risks rather than anchor within a no-anchor zone, increasing risks to safety. No discussion of the potential security and insurance issues associated with eco-moorings compared with conventional moorings is included here. It is assumed that eco-moorings would only be introduced if security and insurance concerns could be satisfactorily addressed. There is a risk that, if security and insurance issues could not be satisfactorily addressed, alternative management may be required in order to achieve the conservation objectives. If this management were more stringent, then the potential costs to the sector would increase.

Table 2f. Other impacts that are assessed for the suite of MCZs and not for this site alone	**rMCZ Studland 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 Studland Bay**
Oil and gas (existing activity); 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 Studland Bay**
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. Seagrass beds within the rMCZ provide important nursery areas for flatfish (JNCC, 2011) and as such the rMCZ is likely to help to support potential on-site and off-site fisheries. The baseline quantity/quality of service provided is assumed to be commensurate with that provided by the features of the site when in favourable and unfavourable condition. The seagrass beds are thought to be in unfavourable condition (see Table 1b). There is currently a relatively low on-site value derived from fish and shellfish services, principally through potting activity. The estimated total value of UK vessel landings from the rMCZ is £0.018m/yr, of which potting accounts for £0.010m/yr. It has not been possible to estimate the value of the off-site benefits that derive from the seagrass nursery area.	If the conservation objectives of the features are achieved, some of the features (including the seagrass beds) 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, the costs of which are set out in Table 2b. The recovery of the seagrass beds to favourable condition may improve their functioning as a nursery area, potentially benefiting fisheries exploited within and outside the rMCZ. It is unclear whether the scale of habitat (excluding seagrass) recovered and the magnitude of reduced (on-site) harvesting will be enough to have any significant positive impact on commercial stocks of mobile species. Low mobility and site-attached species populations, such as crab and crawfish, may improve as a result of improved habitat condition and reduced fishing pressure. Localised beneficial spill-over effects may occur around the rMCZ. Any on-site benefits will also depend on the extent of activity permitted in the rMCZ. The potential benefits described here do not include the negative impacts of the additional fisheries management on fish and shellfish provision and off-	Anticipated direction of change: ⇧ Confidence: Low

Table 4a. Fish and shellfish for human consumption		**rMCZ Studland Bay**
	site impacts of displaced effort.	

Table 4b. Recreation		**rMCZ Studland 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 and tourism services. The seagrass beds provide important nursery areas for flatfish (JNCC, 2011) and as such are likely to help to support potential on-site and off-site fisheries (Fletcher and others, 2012). The baseline quantity and quality of the ecosystem service provided is assumed to be commensurate with that provided by features of the site when in favourable and unfavourable condition (see Table 1b). Angling occurs along much of the beach on the landward boundary of the rMCZ. No further information is available. 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 seagrass nursery area.	If the conservation objectives of the features are achieved, some of the features, including the seagrass beds, will be recovered to favourable condition. Others will be maintained in favourable condition. The recovery of the seagrass beds to favourable condition may improve their functioning as a nursery area, potentially benefiting fisheries exploited within and outside the rMCZ (see Table 4a for further details). 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 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. SCUBA diving and snorkelling occur in Studland Bay, from boats and from the shore. The bay is a popular dive spot, with the principal attraction being the seagrass area and seahorses (both features are thought to be in unfavourable condition). 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, including the seagrass beds and seahorses, will be recovered to favourable condition. Others will be maintained in favourable condition. An improvement in the condition and/or coverage of the seagrass beds may increase habitat complexity, resulting in increased species richness and/or diversity (Fletcher and others, 2012). If the rMCZ results in more abundant seahorses and an increase in species richness and/or diversity, this is expected to increase the value of dive trips derived by divers in the site. Improved local diving may result in an increase in dive trips to the area, which may have beneficial effects on the local economy. This increase may	Anticipated direction of change: ⇧ Confidence: Low

Table 4b. Recreation		**rMCZ Studland Bay**
	represent a redistribution of 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 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 Dorset Wildlife Trust, the National Trust and Studland Sea School have created a Kayak Wildlife Trail in Studland Bay so that people can view marine wildlife above and below the water (birds, seaweeds and seagrass, crabs and fish) (Dorset Wildlife Trust, 2012). Bird watching is popular, and the bay is particularly good for rarer grebes and divers in winter, although much of this activity is concentrated around the dunes and heath (outside the rMCZ). 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 and/or coverage of the seagrass beds may increase habitat complexity, resulting in increased species richness and/or diversity (Fletcher and others, 2012). This may increase the value of wildlife watching for the (probably) small number of people who view the subtidal environment directly, e.g. via the Kayak Wildlife Trail. 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 Studland 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 Research activities are carried out within the rMCZ. Recent work has included research on seagrass and seahorses. Between 2004 and 2008 an average of 26 dives a year occurred at Studland Bay wreck site and monitoring of the site is carried out twice a year. 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

Table 4c. Research and education		**rMCZ Studland Bay**
Education: Fletcher and others (2012) identify that the features to be protected by the rMCZ can contribute to the delivery of education services. The National Trust Studland Study Centre is located in Studland Village. The National Trust runs a number of education programmes around the bay. These include: ranger-led sessions for school children covering the management and conservation of sand dunes and the surrounding coastal geomorphology; guided walks and conservation sessions on topics including sand dunes and coastal path management; and the National Trust Guardianship scheme, which provides an opportunity for local primary school children to assist rangers with scientific research and conservation (Jurassic Coast, 2008). 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 Studland Bay**
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 (Fletcher and others, 2012). ***Natural hazard protection:*** The features of the site, in particular the 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 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 Studland 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 recover and protect the features and the ecosystem services provided, and thereby the option to benefit from these services in the future, from past degradation and 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, and to safeguard the local area from possible future impacts ('Let's protect these precious areas before it's too late and they're gone forever') and for future generations ('This area is truly beautiful. We love exploring this area with our daughter; we want it to stay beautiful for her'). The aesthetic value of the area was highlighted by a number of voters ('It is an amazing site of natural beauty') as well as an emotional attachment built up from previous visits to the area ('Studland is an area of much beauty and is close to my heart from childhood memories of family holidays').	Anticipated direction of change:  Confidence: Moderate

rMCZ Reference Area Swanpool

Site area (km^2): 0.064

Table 1. Conservation impacts				**rMCZ Reference Area Swanpool**
1a. Ecological description				
Swanpool is a lagoon, fed by two freshwater streams and formed behind a sand and shingle bar on the coast at Falmouth. Swanpool has the only natural population in Britain of a species of bryozoan, the trembling sea mat *Victorella pavida* (Lieberknecht and others, 2011).				
Feature	**Area of feature (km2)**	**No. of point records**	**Baseline**	**Impact of MCZ**
Species of Conservation Importance				
Victorella pavida	-	102	Unfavourable Condition	Recover to Reference Condition

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

Table 2a. Archaeological heritage	**rMCZ Reference Area Swanpool**
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**
One record is held for a terrestrial archeological site (Falmouth Cemetery) that borders this rMCZ. Information is also held that relates to previous environmental coring work conducted within the lagoon. 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 of 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

Table 2a. Archaeological heritage	**rMCZ Reference Area Swanpool**
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**
	historical knowledge of past human communities from the site, resulting in a cost to society.

Table 2b. Recreation	**rMCZ Reference Area Swanpool**
Source of costs of the rMCZ	
Recreational angling management scenario: Closure of rMCZ to recreational angling.	
Baseline description of activity	**Costs of impact of rMCZ on the sector**
Angling: The rMCZ is not a popular angling location. Angling within the rMCZ is permitted under licence only, with 4 licences issued to individuals each year. The licences are generally reissued to the same individuals who have been fishing in Swanpool for many years. The anglers typically target mullet. The annual licences are purchased from the management body of Swanpool for £40 each (Swanpool Beach, pers. comm., 2011).	Four individuals will be affected by the closure of Swanpool for angling, and an annual income of £160 will be lost to the management body. There are no alternative sites that would offer the same angling experience to the anglers who would be affected, due to the unique nature of Swanpool, although alternative angling sites are available in the local area. Though it will not have a significant impact on the UK economy, the rMCZ Reference Area is expected to have a significant impact on the four anglers who currently fish in the site.

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 Swanpool**
Recreation (model boating); 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 Reference Area Swanpool**
Baseline	**Beneficial impact**	
There is no current evidence that the *Victorella pavida* contributes to the delivery of fish and shellfish services (Fletcher and others, 2012). No commercial fishing currently takes place in the recommended Marine Conservation Zone (rMCZ).	If the conservation objective of the feature is achieved, it will be recovered to reference condition. There is no evidence that the feature contributes to the delivery of fish and shellfish services and no commercial fishing takes place in the rMCZ. No impacts on the provision of fish and shellfish for human consumption are anticipated.	Anticipated direction of change: ⟺ Confidence: Moderate

Table 4b. Recreation	**rMCZ Reference Area Swanpool**	
Baseline	**Beneficial impact**	
Angling: There is no current evidence that the *Victorella pavida* contributes to the delivery of fish and shellfish services (Fletcher and others, 2011). A description of on-site angling activity is set out in Table 2b. It has not been possible to estimate the value of angling in the site.	If the conservation objective of the feature is achieved, it will be recovered to reference condition. There is no evidence that the feature contributes to the delivery of fish and shellfish services (for angling). No angling will be permitted in the recommended Marine Conservation Zone (rMCZ). No benefits for anglers are anticipated.	Anticipated direction of change: ⇔ Confidence: Moderate
Diving: Diving is not known to take place in the rMCZ.	N/A	N/A
Wildlife watching: There is no current evidence that the trambling sea mat *Victorella pavida* contributes to the delivery of recreation and tourism services (Fletcher and others, 2011). Swanpool is rich in wildlife. Bird watchers can spot a variety of species here including mallard, coot and little grebe. It has not been possible to estimate the value of wildlife watching in the rMCZ.	If the conservation objective of the feature is achieved, it will be recovered to reference condition. There is no evidence that the feature contributes to the delivery of recreation and tourism services. Designating the rMCZ will protect its feature (trembling sea mat) and the ecosystem services that it provides 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 Reference Area Swanpool**	
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 including ecological surveys have been carried out as part of the management of the Swanpool Local Nature Reserve (LNR). Future research objectives are included in the current management plan for the LNR (Rule, 2008). 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 events and interpretation are provided by the Swanpool Management Forum. Under the existing Swanpool management plan, aims to improve education resources are set out (Rule, 2008). 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 Swanpool**	
Baseline	**Beneficial impact**	
Regulation of pollution: There is no current evidence that *Victorella pavida* contributes to the bioremediation of waste and sequestration of carbon (Fletcher and others, 2012). ***Environmental resilience:*** There is no current evidence that *Victorella pavida* contributes to the resilience and continued regeneration of marine ecosystems (Fletcher and others, 2012). ***Natural hazard protection:*** There is no current evidence that *Victorella*	If the conservation objective of the feature is achieved it will be recovered to reference condition. It is not known whether the recommended Marine Conservation Zone (rMCZ) will result in an improvement in the delivery of regulating services.	Anticipated direction of change: ⇔ Confidence:

Table 4d. Regulating services		**rMCZ Reference Area Swanpool**
pavida contributes to local flood and storm protection (Fletcher and others, 2012). It has not been possible to estimate the value of regulating services.		Low

Table 4e. Non-use and option values		**rMCZ Reference Area Swanpool**
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 recover and protect the feature and the ecosystem services provided, and thereby the option to benefit from these services in the future, from past degradation and the risk of future degradation.	Anticipated direction of change: ⇧ Confidence: Moderate

rMCZ Tamar Estuary Sites

Site area (km^2): 15.3

Table 1. Conservation impacts	**rMCZ Tamar Estuary Sites**

1a. Ecological description

This site consists of two spatially separate component areas. The upper Tamar and Tavy estuaries form one part, along the mean high water mark from Gunnislake to just north of the Tamar Bridge at Saltash. The second part consists of the Lynher Estuary with its smaller tributaries, along the mean high water mark from the tidal limits at Tideford and north of Landrake to Jupiter Point near the mouth of the Lynher. The site is included within the Plymouth Sound and Estuaries Special Area of Conservation and overlaps with the Tamar Estuaries complex Special Protection Area and a number of Sites of Special Scientific Interest.

The Tavy's intertidal mudflats in the upper estuary consist predominantly of silt and clay. In the central and upper estuary, superficial bed sediments in the main channel, and on the upper shores of both banks when these are not saltmarsh, comprise a mixture of predominantly coarse, non-cohesive sediments with very small fractions of silt and clay. There are extensive mudflats on the western shore of the Hamoaze, in the Lyhner Estuary.

There are blue mussel beds in the recommended Marine Conservation Zone, present on intertidal sediment flats in the Lynher and Hamoaze. Surveyed beds were colonised by *Elminius modestus* with generally frequent *Littorina saxatilis* and *Littorina littorea*. *Cerastoderma edule* were also present. Attached algae or algae living on stones among the mussels included *Fucus vesiculosus* and *Ascophyllum nodosum*. On the lower shore at Jupiter Point, mussels are colonised by filamentous red algae and by abundant *Halichondria* spp. and *Bowerbankia imbricata* as well as occasional *Crepidula fornicata* and *Myxilla incrustans*.

Native oyster *Ostrea edulis*, blue mussel *Mytilus edulis* and European eel *Anguilla anguilla* are all present in the estuary. The area is of particular importance for smelt *Osmerus eperlanus*, with successful spawning events and indications of an established population being reported since the 1970s. The estuary serves an important ecological function as a nursery area.

A well developed estuarine gradient and the presence of littoral and sublittoral hard strata are the important features in the Tamar Estuary. The rarely encountered hydroid *Cordylophora caspia* has been recorded in high densities. Where the estuary opens out at Weir Quay, the polyhaline *Hartlaubella gelatinosa* has been recorded on shells and other hard strata. In the area off Ballast Punt, Torpoint, low shore shale cobbles and boulders support a rich assemblage of finely branching algae and a rich underboulder fauna. The cobbles and boulders on mud extend into the sublittoral.

Reef habitats occur within the Plymouth estuaries, comprising intertidal and subtidal low energy reefs, including some composed of limestone. This relatively soft rock is extensively bored by the bivalve *Hiatella arctica* and the spionid worms *Polydora* spp., and harbours a rich fauna. In the sublittoral this steep-sided reef is dominated by a dense hydroid and bryozoan turf interspersed with anemones and ascidians. The sublittoral is of particular importance for its kelp- and animal-dominated habitats. Abundant populations of the slow-growing, long-lived, nationally important pink sea-fan *Eunicella verrucosa* also occur at this site.

Spartina anglica saltmarsh is present in the Tavy, and *Phragmites australis* beds on the upper tidal river banks of the Tamar at Calstock. The Tamar estuaries are also important for both species of seahorse (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 biogenic reefs	0.01	-	Favourable Condition	Maintained at Favourable Condition
Intertidal coarse sediment	0.04	-	Favourable Condition	Maintained at Favourable Condition
Habitats of Conservation Importance				
Blue mussel beds	-	1	Favourable Condition	Maintained at Favourable Condition
Species of Conservation Importance				
Ostrea edulis	-	4	Favourable Condition	Maintained at Favourable Condition
Osmerus eperianus	-	-	To be determined	To be determined
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 Tamar Estuary Sites**
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 large number of industrial structures can be found in the site including an Okeltor 19th century arsenic, copper and tin mine, along with a lime kiln with adjacent buildings. Peat is also recorded for 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 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. Flood and coastal erosion risk management (coastal defence)	**rMCZ Tamar Estuary Sites**
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 shoreline of the rMCZ are for 'no active intervention' along undefended frontages and to investigate the feasibility of 'managed realignment' in other places. Where managed realignment is not possible, the policy is to 'hold the line' of existing defences. 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. Ports, harbours, shipping and disposal sites	**rMCZ Tamar Estuary Sites**
Source of costs of the rMCZ ***Management scenario 1:*** Increase in costs of assessing environmental impacts for future licence applications within 1km of an 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 future 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: Devonport naval base and dockyard is within 5km of the rMCZ. There are no known plans for development.	***Scenario 1:*** No costs are anticipated under this scenario. ***Scenario 2:*** *Harbour developments:* For future port and harbour developments within 5km of

Table 2c. Ports, harbours, shipping and disposal sites	**rMCZ Tamar Estuary Sites**
	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 2d. Other impacts that are assessed for the suite of MCZs and not for this site alone	**rMCZ Tamar Estuary 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 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 Tamar Estuary Sites**
Cables (existing interconnectors and telecom cables); commercial fisheries (collection by hand); 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 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 can be found in Annex H.

Table 4a. Fish and shellfish for human consumption		**rMCZ Tamar Estuary Sites**
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 known 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 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 4b. Recreation		**rMCZ Tamar Estuary Sites**
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. The level of angling in this site is unknown. 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 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 4b. Recreation		**rMCZ Tamar Estuary Sites**
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 one of the largest mudflats in the South-West and home to a variety of bird species including kingfishers, shelducks and a large wintering population of avocets. The Tamar Estuary Nature Reserve provides a viewpoint and hides for bird watching.	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 Tamar Estuary Sites**
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. Baseline and research projects are carried out in the area of the rMCZ under the Tamar Estuary Consultative Forum (TECF) which manages the Plymouth Sound and Estuaries European Marine Site. A number of research objectives and actions are set out in the Tamar Estuaries Management Action Plan (TECF, 2006). TECF has proposed a project to look at the potential role of Marine Protected Area management in the local area. The extent of other research activity currently conducted in and around the rMCZ is not known. It has not been possible to estimate the value derived from research activities	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 Tamar Estuary Sites**
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. A number of organisations currently provide education resources and events relating to the estuary and the area receives high numbers of visitors. The Tamar Estuaries Management Action Plan includes a number of objectives and actions to further improve and co-ordinate the provision of education (TECF, 2006). 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 Tamar Estuary Sites**
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. Native oyster beds sequester carbon and filter algae and sediment from the water (Fletcher and others, 2012). ***Environmental resilience:*** The features of the site contribute to the resilience and continued regeneration of marine ecosystems (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 Tamar Estuary 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 value). The rMCZ will recover and protect the features and the ecosystem services provided, and thereby the option to benefit from these services in the future, from past degradation and 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 of the biodiversity and scenery, and a personal connection with the site. They also expressed a desire to see the threatened habitat protected so that wildlife could recover.	Anticipated direction of change: ⇧ Confidence: Moderate

rMCZ Taw Torridge Estuary

Site area (km^2): 5.0

Table 1. Conservation impacts **rMCZ Taw Torridge Estuary**

1a. Ecological description

The site consists of two spatially separate parts, the upper Taw Estuary and the upper Torridge Estuary. In the Taw, the site overlaps with the Taw Torridge Estuary Site of Special Scientific Interest (SSSI), and in the Torridge, the recommended Marine Conservation Zone (rMCZ) boundary starts where the SSSI ends (at the old bridge).

The Taw Estuary drains an area of 1,211km^2 (Environment Agency, 2000) and forms, together with the Torridge Estuary, a twin estuarine system that discharges into the Bristol Channel. The estuary is macro-tidal (tidal range >4 metres). The rMCZ provides an important ecological function as a nursery area, in particular for sea bass.

The estuaries of the Taw and Torridge rivers together with the sand dune systems at Braunton Burrows and Northam Burrows and the grazing marshes at Braunton, are all key habitats in the area supporting many key species. There are large areas of salt marsh around Yelland and Penhill which show typical zonation of saltmarsh vegetation. Braunton Burrows at the north of the estuary (outside the rMCZ) is one of the largest dune systems in Britain.

The estuaries support a variety of soft and hard substrate-based aquatic estuarine communities, including rocky outcrops and sea walls with algal growths and mussel beds, and a reef of honeycomb worm *Sabellaria alveolata*. A large proportion of the estuary is intertidal flats and gravel beds, and it is sandy with areas of shingle towards the mouth at the foreshore. In the narrow Torridge the intertidal flats are predominantly mud and sand, while in the Taw there are extensive mudflats and sandbanks which support many marine worms and other invertebrates. Well mixed, the sands contain modern skeletal debris of consistent composition, which persists up to 18km landward from the mouth of the Taw Estuary. Although primarily a molluscan sand, remains of barnacles, bryozoans, echinoids, foraminifera, sponge spicules, decapods and coralline algae are common (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	0.08	-	Favourable Condition	Maintained at Favourable Condition
Intertidal coarse sediment	< 0.01	-	Favourable Condition	Maintained at Favourable Condition
Intertidal sand and muddy sand	0.14	-	Favourable Condition	Maintained at Favourable Condition
Low energy intertidal rock	0.02	-	Favourable Condition	Maintained at Favourable Condition
Subtidal mud	0.68	-	Favourable Condition	Maintained at Favourable Condition
Subtidal sand	< 0.01	-	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 Taw Torridge 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**
Four wrecks and peat are recorded 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 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. Flood and coastal erosion risk management (coastal defence)	**rMCZ Taw Torridge 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 (SMP) policies in the estuary and along the edge of the rMCZ are to 'hold the line' at existing settlement frontages and harbours. These will be very local interventions in the overall scale of the two estuaries. It will not be necessary to artificially maintain a particular sedimentation regime in the estuary to hold the line at these places	Should deliberate breaches in tidal defences prove necessary in time, the short-term impact of these on sediments would be modelled and mitigation options developed as necessary These options would be based around detailed siting and level settings for breaches and would not incur additional costs to mitigate impacts on MCZ features

Table 2b. Flood and coastal erosion risk management (coastal defence)	**rMCZ Taw Torridge Estuary**
– only local engineering solutions will be necessary. Overall, the dominant response to coastal change will be to allow natural processes to evolve with minimal intervention (Environment Agency, pers. comm., 2012). Changes will be inevitable in sedimentation and erosion patterns as a result of the SMP policies, but these will remain in dynamic equilibrium as the estuary boundary slowly changes over time. rMCZ interest features are associated with relatively mobile sediments and it is expected that they will be able to respond naturally to these changes (Environment Agency, pers. comm., 2012).	(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.

Table 2c. Ports, harbours, shipping and disposal sites	**rMCZ Taw Torridge Estuary**
Source of costs of the rMCZ ***Management scenario 1:*** Increase in costs of assessing environmental impacts for future licence applications within 1km of an 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 future 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: Bideford Harbour and the Port of Appledore are both within 5km of the rMCZ. There are no known development plans at either harbour.	***Scenario 1:*** No costs are anticipated under this scenario. ***Scenario 2:*** *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

Table 2c. Ports, harbours, shipping and disposal sites	**rMCZ Taw Torridge Estuary**
	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 2d. Other impacts that are assessed for the suite of MCZs and not for this site alone	**rMCZ Taw Torridge 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 Taw Torridge Estuary**
Cables (existing interconnectors and telecom cables); commercial fisheries (collection by hand); ports, harbours, shipping and disposal sites; 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 can be found in Annex H.

Table 4a. Fish and shellfish for human consumption		**rMCZ Taw Torridge 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 known 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 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 4b. Recreation		**rMCZ Taw Torridge 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. 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. The level of angling at this site is unknown. 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 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
Diving: Diving is not known to take place in the rMCZ.	N/A	N/A

Table 4b. Recreation		**rMCZ Taw Torridge Estuary**
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 home to curlews, golden plovers, lapwings, redshanks and oystercatchers. Bird hides, cycle paths, a visitor centre and walks are available at the estuary. Bats can be spotted on the Tarka Trail, which runs along the estuary. 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 Taw Torridge 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 rMCZ is situated within North Devon's 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 North Devon's Biosphere Reserve, and is	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.	Anticipated direction of change:

Table 4c. Research and education		**rMCZ Taw Torridge Estuary**
therefore linked into a number of UNESCO education programmes. Education resources for schools are provided as are on-line education tools (at www.northdevonbiosphere.org.uk). Education events with a specific marine and coastal theme are organised in and around the rMCZ by Coastwise North Devon. The area receives high numbers of visitors. It has not been possible to estimate the value derived from education activities associated with the rMCZ.	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).	⇧ Confidence: Moderate

Table 4d. Regulating services		**rMCZ Taw Torridge 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 (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 overall 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. 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 Taw Torridge 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 recover and protect the features and the ecosystem services provided, and thereby the option to benefit from these services in the future, from past degradation and 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 the spectacular nature of the site and its biodiversity.	Anticipated direction of change: Confidence: Moderate

rMCZ The Canyons

Site area (km^2): 660.58

Table 1. Conservation impacts **rMCZ The Canyons**

1a. Ecological description

This site is located in the far south-west corner of the UK's continental shelf area and is more than 330km from Land's End. The area is unique within the context of England's extensive but largely shallow shelf seas. It is located on the continental shelf break, which drops steeply from the continental shelf to the oceanic abyss. The depth within the site ranges from 200 metres at the eastern edge to 2,000 metres in the west. Within the site, there are two large canyons that indent the shelf break, further adding to the topographic complexity of the sea floor.

The recommended Marine Conservation Zone includes small slivers of continental shelf broad-scale habitats along the eastern boundary, in addition to the deep-sea broad-scale habitat beyond the shelf break. It covers a range of sea-floor habitats, including bedrock and a range of sediments varying from mud to coarse sediments.

There is a small patch of live deep-water coral reef (*Lophelia pertusa* reef), located on the northern flank of the northernmost canyon in the site. This is the only living deep-water coral reef recorded within England's seas (other deep-water coral reefs occur along the continental shelf break off Scotland and Ireland). There are more extensive patches of biogenic rubble present in the site, on the shallower spurs separating the deep canyons. This is an indication that the coral reef habitat may have been much more extensive in the past.

The site also covers an area of additional ecological importance in terms of its pelagic environment. There is upwelling of deep, nutrient-rich waters along the shelf break, as is indicated by persistent sea surface temperature fronts located along the sea surface above the shelf break. The area attracts higher than average numbers of sea birds and cetaceans (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				
Deep sea bed	655.54	-	Unfavourable Condition	Recover to Favourable Condition
Deep Circalittoral Coarse Sediment	5.22	-	-	-
Deep-Sea Bedrock	27.93	-	-	-
Deep-Sea Biogenic Gravel	57.08	-	-	-
Deep-Sea Mixed Substrata	160.37	-	-	-
Deep-Sea Mud	114.46	-	-	-
Deep-Sea Sand	15.24	-	-	-
Communities of Deep-Sea Corals	0.17	-	-	-
Subtidal coarse sediment	0.12	-	Unfavourable Condition	Recover to Favourable Condition

Subtidal sand	3.95	-	Unfavourable Condition	Recover to Favourable Condition
Habitats of Conservation Importance				
Cold-water coral reefs	-	1	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 The Canyons**

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: Zoned closure of area of cold-water coral reef to dredges, bottom trawls, pots and traps, nets, and hooks and lines.

Management scenario 2: Closure of entire rMCZ to bottom trawls and dredges; zoned closure of area of cold-water coral reef to pots and traps, nets, and hooks and lines.

Management scenario 3: Closure of entire rMCZ to dredges, bottom trawls, 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 exclusive economic zone and is wholly within International Council for the Exploration of the Sea (ICES) Rectangle 25E0. Fishing in the rMCZ is primarily by hook and line and mid-water trawl (Mid-water trawl owner, pers. comm., 2011). Hook and line vessels active in the wider area (defined as ICES Rectangle 25E0) are predominantly Spanish, while mid-water trawls are from both the UK and France (MMO, 2011a). Fishing by both gears targets the area along the edge of the shelf break, which runs roughly north–south through the middle of the rMCZ (Mid-water trawl owner, pers. comm., 2011; South West Fishing Industry Group, 2011). Estimated total value of UK vessel landings from the rMCZ: £0.028m/yr.	

<table>
<tr><th colspan="2">Table 2a. Commercial fisheries</th><th>rMCZ The Canyons</th></tr>
<tr><td colspan="2">UK Bottom trawls: UK vessels that bottom trawl in the wider area all use otter trawls, are over 30 metres in length (MMO, 2011a), and may fish inside the rMCZ. The vessels fish over large ranges, extending from the north coast of Spain northwards towards the Faroe Islands. The MCZ Fisheries Model indicates that only a very low level of effort occurs within the rMCZ. Vessels fishing in the area target megrim and monkfish/angler fish. Estimated value of UK bottom trawl landings from the rMCZ: £0.004m/yr.</td><td>Scenario 1: The zone is small, with an area of approximately 1km^2, and does not cover the main focus of fishing effort in the area; there were no UK landings from the rMCZ between 2007 and 2010. No significant impacts are therefore expected.

Scenarios 2 and 3: Under these scenarios there may be displacement of effort from the rMCZ into the surrounding area of the fishery. Overall, the value of UK bottom trawl landings from the rMCZ was low and no significant impacts are expected.

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>0.004</td><td>0.004</td></tr></table></td></tr>
<tr><td colspan="2">UK Nets: There is a very low level of activity by UK netters in the rMCZ. Fishers active in the wider area principally use set gill nets to target monkfish and angler fish (MMO, 2011a). Vessels fish along the shelf break, which runs through the rMCZ in roughly a north–south direction, and are active over large ranges extending from the north coast of Spain to the Faroe Islands (MMO, 2011a). Estimated value of UK net landings from the rMCZ: <£0.002m/yr.</td><td>Scenarios 1 and 2: The area proposed for closure covers a small proportion of the fishing grounds targeted by the affected vessels (MMO, 2011a). The affected value of landings is small and no significant impacts are anticipated.

Scenario 3: The scenario will close the whole of the rMCZ to netting. The area proposed for closure covers a small proportion of the fishing grounds targeted by the affected vessels (MMO, 2011a). The affected value of landings is small and no significant impacts are anticipated.

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><0.002</td></tr></table></td></tr>
</table>

<table>
<tr><th colspan="2">Table 2a. Commercial fisheries</th><th>rMCZ The Canyons</th></tr>
<tr><td colspan="2">UK Hooks and lines: UK hook and line activity is focused on set long lines to target hake (MMO, 2011a). Vessels fish along the shelf break, which runs through the rMCZ in roughly a north–south direction, with the fishers active over large ranges extending from the north coast of Spain to the Faroe Islands (MMO, 2011a). Estimated value of UK hook and line landings from the rMCZ: £0.011m/yr.</td><td>Scenarios 1 and 2: The area proposed for closure covers a small proportion of the fishing grounds targeted by the affected vessels (MMO, 2011a). The affected value of landings is small and no significant impacts are anticipated.

Scenario 3: The scenario will effectively close the whole of the rMCZ to hook and line fishing. The area proposed for closure covers a small proportion of the fishing grounds targeted by the affected vessels (MMO, 2011a). The affected value of landings is relatively small.

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></tr>
<tr><td>Value of landings affected</td><td>0.000</td><td>0.000</td><td>0.011</td></tr>
</table>
</td></tr>
<tr><td colspan="3">Total direct impact</td></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 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></tr>
<tr><td>Value of landings affected</td><td>0.000</td><td>0.004</td><td>0.017</td></tr>
<tr><td>GVA affected</td><td>0.000</td><td>0.002</td><td>0.009</td></tr>
</table>
</td></tr>
<tr><td colspan="2">Impact on non-UK commercial fishing: Non-UK vessels using static gears, bottom trawls/dredges and mid-water trawls, including Spanish demersal longliners and French demersal trawlers, fish within the rMCZ (Lee, 2010).

Fishing effort by Spanish longliners is estimated to have totalled 900 fishing days in 2010. Fishing effort is thought to have declined over the last 10 years. All vessels are at least 24 metres in length and the principal target species is hake (ANASOL, OPPAO, OPP-7 and Puerto de Caleiro, pers. comm., 2011).</td><td>Scenarios 1, 2 and 3: Non-UK vessels using static gears, bottom trawls/dredges, including French demersal trawlers and Spanish longliners, will be affected by the rMCZ. The rMCZ will result in the displacement of longline fishing effort equating to 900 fishing days/yr. This may have unknown knock-on impacts (ANASOL, OPPAO, OPP-7 and Puerto de Caleiro, pers. comm., 2011).

In the event of a full closure of the rMCZ, the estimated value of French landings affected will be: £0.309m/yr (bottom trawls/dredges) and £0.072m/yr (static gears). No information on the effect of the zoned closure to bottom trawls/dredges and static gears or the impact</td></tr>
</table>

Table 2a. Commercial fisheries	**rMCZ The Canyons**
Estimated value of landings from the rMCZ by French vessels: bottom trawls/dredges: £0.309m/yr; static gears: £0.072m/yr (Direction des Pêches Maritimes et de l' Aquaculture, 2011). Estimates for other countries are not available.	on Spanish vessel value of landings is available.

Table 2b. National defence	**rMCZ: The Canyons**
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 The Canyons**
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 The Canyons**
Cables (existing interconnectors and telecom cables); commercial fisheries (mid-water trawls); 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 The Canyons**
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 support internationally important fish and shellfish fisheries (Fletcher and others, 2011). 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 (see Table 1b). 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. As most of the commercial species targeted by fishers in this area are mobile finfish, 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 The Canyons**
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 The Canyons**
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. Detailed survey mapping of an area of shelf break within the rMCZ has been undertaken by the Joint Nature Conservation Committee.	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 The Canyons**
Baseline	**Beneficial impact**	
Regulation of pollution: The features of the site contribute to the bioremediation of waste and sequestration of carbon. The deep-sea bed acts as an unrivalled reservoir for sequestration of CO_2. Gas and climate regulation provided by the deep sea includes the maintenance of the chemical composition of the atmosphere and the oceans, for example via the 'biological pump', which transports carbon absorbed during photosynthesis into the deep seas. Methanotrophic microbes in the ocean floor and waters control almost all of the oceanic methane emission (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 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 The Canyons**
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 recover and protect the features and the ecosystem services provided, and thereby the option to benefit from these services in the future, from past degradation and the risk of future degradation.	Anticipated direction of change: ⇧ Confidence: Moderate

rMCZ Reference Area The Canyons

Site area (km^2): 34.55

Table 1. Conservation impacts **rMCZ Reference Area The Canyons**

1a. Ecological description

This site is located in the far south-west corner of the UK's continental shelf area and is more than 330km from Land's End. The area is unique within the context of England's extensive but largely shallow shelf seas. It is located on the continental shelf break, which drops steeply from the continental shelf to the oceanic abyss. The depth of the site is between 250 and 450 metres below sea level. The site is located on the steep flanks of a submarine canyon on the continental shelf break, and covers an area of cold water coral reef, and a diversity of sea-floor habitats across a range of depths.

There is a small patch of live deep-water coral reef (*Lophelia pertusa* reef). This is the only living deep-water coral reef recorded within England's seas (other deep-water coral reefs occur along the continental shelf break off Scotland and Ireland).

The site also covers an area of additional ecological importance in terms of its pelagic environment. There is upwelling of deep, nutrient-rich waters along the shelf break, as is indicated by persistent sea surface temperature fronts located along the sea surface above the shelf break. The area attracts higher than average numbers of sea birds and cetaceans (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				
Deep sea bed	34.51	-	Unfavourable Condition	Recover to Reference Condition
Deep-Sea Bedrock	4.28	-	-	-
Deep-Sea Biogenic Gravel	0.47	-	-	-
Deep-Sea Mixed Substrata	10.89	-	-	-
Deep-Sea Mud	17.19	-	-	-
Deep-Sea Sand	1.55	-	-	-
Communities of Deep-Sea Coral	0.17	-	-	-
Habitats of Conservation Importance				
Cold-water coral reefs	-	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 The Canyons**

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 close to the south-western edge of the UK's 200nm (nautical mile) fishery limit and exclusive economic zone and is wholly within International Council for the Exploration of the Sea (ICES) Rectangle 25E0. Fishing in the rMCZ is primarily by hook and line vessels. Hook and line vessels active in the wider area (defined as ICES Rectangle 25E0) are predominantly Spanishwhile vessels that mid-water trawl are from both the UK and France (MMO, 2011a). Fishing by both gears targets the area along the edge of the shelf break, which runs roughly north–south through the middle of the rMCZ (Mid-water trawl owner, pers. comm., 2011; South West Fishing Industry Group, 2011). Estimated total value of UK vessel landings from the rMCZ: £0.003m/yr.	
UK Bottom trawls: The MCZ Fisheries Model indicates that there was no fishing activity within the rMCZ between 2007 and 2010. Vessels are active in the area surrounding the rMCZ. These vessels are typically more than 30 metres in length and fish over large ranges extending from the north coast of Spain to the Faroe Islands (MMO, 2011a). Vessels fishing in the area target megrim and monkfish/angler fish (MMO, 2011a). Estimated value of UK bottom trawl landings from the rMCZ RA: <£0.001m/yr.	***Scenarios 1 and 2:*** The rMCZ does not cover the main focus of fishing effort in the area and there were no UK landings from the rMCZ between 2007 and 2010. No significant impacts are therefore expected. 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

<table>
<tr><th colspan="2">Table 2a. Commercial fisheries</th><th colspan="2">rMCZ Reference Area The Canyons</th></tr>
<tr><td colspan="2">UK Nets: There is a very low level of activity by UK netters in the rMCZ. Fishers active in the wider area principally use set gill nets to target monkfish and angler fish (MMO, 2011a). Vessels fish along the shelf break, which runs through the rMCZ in roughly a north–south direction, with the fishers active across a large range from the coast of northern Spain up towards the Faroe Islands (MMO, 2011a). Estimated value of UK net landings from the rMCZ RA: <£0.001m/yr.</td><td colspan="2">Scenarios 1 and 2: The rMCZ covers a small proportion of the area targeted by the affected vessels. The estimated value of landings affected indicates that the effects of displacement are likely to be insignificant.

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><0.001</td><td><0.001</td></tr></table></td></tr>
<tr><td colspan="2">UK Hooks and lines: UK vessels use set long lines to target hake in the rMCZ (MMO, 2011a). Vessels fish along the shelf break, which runs through the rMCZ in roughly a north–south direction, with the fishers active across a large range from the coast of northern Spain up towards the Faroe Islands (MMO, 2011a). Estimated value of UK hook and line landings from the rMCZ: £0.002m/yr.</td><td colspan="2">Scenarios 1 and 2: The rMCZ covers a small proportion of the area targeted by the affected vessels. Fishing in the area is still expected to be viable, with displaced effort from the rMCZ into the surrounding area of the fishery.

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>0.002</td><td>0.002</td></tr></table></td></tr>
<tr><td colspan="4">Total direct impact</td></tr>
<tr><td colspan="2">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>0.003</td><td>0.003</td></tr><tr><td>GVA affected</td><td>0.001</td><td>0.001</td></tr></table></td></tr>
<tr><td colspan="2">Impact on non-UK commercial fishing: Non-UK vessels using static gears, bottom trawls/dredges and mid-water trawls, including Spanish demersal longliners and French demersal trawlers, fish within the rMCZ (Lee, 2010).

All the Spanish vessels are at least 24 metres in length and the principal target species is hake (ANASOL, OPPAO, OPP-7 and Puerto de Caleiro,</td><td colspan="2">Scenarios 1 and 2: Non-UK vessels using static gears and bottom trawls/dredges, in particular Spanish longliners and French demersal trawlers, will be affected by the rMCZ. 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 2a. Commercial fisheries	**rMCZ Reference Area The Canyons**
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). Estimates for other countries are not 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 vessel landings affected by the rMCZ.

Table 2b. Other impacts that are assessed for the suite of MCZs and not for this site alone	**rMCZ Reference Area The Canyons**
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 Reference Area The Canyons**
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 The Canyons**
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 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 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 this 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, as most of the commercial species targeted by fishers in this area are mobile finfish, 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 The Canyons**
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 The Canyons**
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. Detailed survey mapping of the area of shelf break in and around 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 The Canyons**
has been undertaken by the Joint Nature Conservation Committee.	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 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 The Canyons**
Baseline	**Beneficial impact**	
Regulation of pollution: The features of the site contribute to the bioremediation of waste and sequestration of carbon. The deep-sea bed acts as an unrivalled reservoir for sequestration of CO_2. Gas and climate regulation provided by the deep sea includes the maintenance of the chemical composition of the atmosphere and the oceans, for example via the 'biological pump', which transports carbon absorbed during photosynthesis into the deep seas. Methanotrophic microbes in the ocean floor and waters control almost all of the oceanic methane emission (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, its features are not thought	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 4d. Regulating services		**rMCZ Reference Area The Canyons**
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.		

Table 4e. Non-use and option values		**rMCZ Reference Area The Canyons**
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 recover and protect the features and the ecosystem services provided, and thereby the option to benefit from these services in the future, from past degradation and the risk of future degradation.	Anticipated direction of change: ⇧ Confidence: Moderate

rMCZ Reference Area The Fal

Site area (km^2): 0.72

Table 1. Conservation impacts **rMCZ Reference Area The Fal**

1a. Ecological description

The eastern boundary follows the mean high water mark and is located just north of St Mawes. It has a depth range from mean high water to 7–8 metres below chart datum. The site has particularly rich benthic habitat and species diversity, with two important Features of Conservation Importance habitats present (maerl beds and seagrass beds).

The St Mawes Bank has the most extensive bed of unattached calcified seaweed (maerl) in England and Wales. Maerl beds attract many other species, particularly those sheltering among the branching interstices, for example the rare Couch's goby *Gobius couchii*. Two species of maerl have been identified, *Phymatolithon calcareum* and *Lithothamnium coralloides*. Inshore of the maerl bed, seagrass *Zostera marina* is present on the sandy substrata. At the bottom of the channel (around 34 metres), the bottom consists of broken shell and sand, with rocky outcrops (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 coarse sediment	0.05	-	Unfavourable Condition	Recover to Reference Condition
Subtidal macrophyte-dominated sediment	0.26	-	Unfavourable Condition	Recover to Reference Condition
Subtidal sand	0.38	-	Unfavourable Condition	Recover to Reference Condition
Intertidal coarse sediment	< 0.01	-	Unfavourable Condition	Recover to Reference Condition
Low energy intertidal rock	0.02	-	Unfavourable Condition	Recover to Reference Condition
Habitats of Conservation Importance				
Maerl beds	0.24	11	Unfavourable Condition	Recover to Reference Condition
Seagrass beds	0.34	2	Unfavourable Condition	Recover to Reference Condition
Species of Conservation Importance				
Lithothamnion coralloides	-	5	Unfavourable Condition	Recover to Reference Condition
Cruoria cruoriaeformis	-	1	Unfavourable Condition	Recover to Reference Condition
Ostrea edulis	-	3	Unfavourable Condition	Recover to Reference Condition
Gobius couchii	-	1	Unfavourable Condition	Recover to Reference Condition
Phymatolithon calcareum	-	7	Unfavourable Condition	Recover to Reference Condition
Grateloupia montagnei	-	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. Archaeological heritage	**rMCZ Reference Area The Fal**
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**
Features of archaeological interest and peat are recorded 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 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. Commercial fisheries	**rMCZ Reference Area The Fal**
Source of costs of the rMCZ	
Management scenario 1: Closure of entire rMCZ to all commercial fishing.	
Baseline description of activity	**Costs of impact of rMCZ on the sector**
Overview: The rMCZ is located off the St Mawes Bank in the Carrick Roads area of the Fal Estuary. A number of commercial fishing restrictions are already in existence (listed in Annex E). Non-UK vessels are not permitted to fish in the rMCZ. Within the rMCZ there is potting along the St Mawes Bank, principally for velvet crab and prawns, and the southern end of the Fal Oyster Fishery which permits licensed vessels to dredge using traditional sailing or rowing vessels. Estimated total value of UK vessel landings from the rMCZ: £0.027m/yr.	

<table>
<tr><th colspan="2">Table 2b. Commercial fisheries</th><th>rMCZ Reference Area The Fal</th></tr>
<tr><td colspan="2">UK Dredges: The rMCZ is located in the south-eastern corner of the Fal Oyster Fishery, which extends north from a line drawn between Trefusis Point and St Mawes Castle (Defra, 2006). It is a regulated oyster fishery with annual licences provided to sailing or rowing vessels that use traditional methods unique to the fishery (Defra, 2006).

The number of active vessels has declined since the 1980s, when a fleet of around 100 vessels was common. Recent years have seen a fleet of around 30 active vessels (Port of Truro, pers. comm., 2011), with 28 vessels employing 35 people identified in 2009 (Cornwall SFC, 2010). Fishing effort occurs during the winter months, outside the closed season which runs from 1 April to 31 October.

Oyster surveys are carried out by Cefas within the fishery. Though Cefas used to monitor oyster abundance in the rMCZ area it no longer surveys the area as oysters are no longer present (Cefas, pers. comm., 2011). The level of fishing effort in the rMCZ has fallen accordingly. The bulk of fishing effort takes place further north, outside the rMCZ (Royal Haskoning, 2009).

Estimated value of dredge landings from the rMCZ: negligible.</td><td>Scenario 1: The rMCZ is inside the designated oyster fishery but the rMCZ is not expected to impact significantly on the activity of traditional oyster dredgers as the area covered by the rMCZ site is not currently fished. Oyster abundance is very low within the rMCZ (Cefas, pers. comm., 2011).

<table><tr><td>£m/yr</td><td>Scenario 1</td></tr><tr><td>Value of landings affected</td><td>Negligible</td></tr></table></td></tr>
<tr><td colspan="2">UK Pots and traps: It is estimated that 8 vessels regularly fish within the rMCZ (St Mawes and District Fishermen's Association, pers. comm, 2011). All of the vessels are under 10 metres, with most being fished single-handed. As such, the majority of their fishing effort occurs within the estuary. This is particularly the case during the winter (St Mawes and District Fishermen's Association, pers. comm., 2011)

There are 2 main fisheries that occur in the rMCZ: a velvet crab fishery over the St Mawes Bank and a prawn fishery on the edge of the channel (St Mawes and District Fishermen's Association, pers. comm., 2011). MCZ Fisheries Model data are not available for this rMCZ. An alternative estimate has been calculated for the prawn fishery, but it has not been possible to obtain information regarding the value of the crab fishery.

The prawn fishery occurs along the edge of the Carrick Roads channel (St</td><td>Scenario 1: The rMCZ would remove a part of grouonds of the Falmouth prawn and velvet crab fisheries, affecting approximately 8 vessels. The affected vessels are not expected to be able to increase effort elsewhere to compensate for this loss, because all known productive areas are thought to already have gear on them (St Mawes and District Fishermen's Association, pers. comm., 2011).

It is estimated that the affected vessels would lose between 10% and 15% of their annual fishing income as a result of the rMCZ. It is expected that the impacts of this would be greatest in the winter season when fishing activity is more heavily focused within the estuary due to poor weather. The rMCZ is therefore expected to have a significant impact on the fishers' incomes and the viability of their businesses (St Mawes and District Fishermen's Association, pers. comm., 2011).

Estimated annual value of UK pot and trap landings affected (prawn landings only; therefore</td></tr>
</table>

<table>
<tr><th colspan="2">Table 2b. Commercial fisheries</th><th>rMCZ Reference Area The Fal</th></tr>
<tr><td colspan="2">Mawes and District Fishermen's Association, pers. comm., 2011), and consists of three distinct prawn fishing grounds (Royal Haskoning, 2009), one of which is inside the rMCZ. The prawn fishery (all three grounds) provides UK vessel landings (based on information from 2004) of an estimated £0.050m/yr (Environment Agency, cited in Royal Haskoning (2009)). In the absence of more recent information, it is assumed that the volume of landings has remained constant over time, with an inflation-adjusted estimated value of £0.082m/yr (value adjusted based on a 65% increase between 2004 and 2010 in the price of prawns and shrimps landed into the UK [MMO, 2011a]).. (Survey work is currently being undertaken by Cornwall Inland Fisheries and Conservation Authority [IFCA] to establish a better understanding of the prawn fishery.)

Based on an equal division of the total value of the fishery across the three grounds, and using the estimate of the value of landings of £0.082m/yr, landings from the one fishing ground within the rMCZ are estimated at £0.027m/yr.</td><td>figure will be an underestimate):

<table><tr><td>£m/yr</td><td>Scenario 1</td></tr><tr><td>Value of landings affected</td><td>0.027</td></tr></table></td></tr>
<tr><td colspan="2">UK Collection by hand: Occasional commercial scallop diving from two vessels has historically taken place within the rMCZ (J. Ellis, pers. comm., 2011). However, current scallop stocks within the rMCZ are not thought to be sufficiently abundant to enable viable harvesting (Dive scallop skipper, pers. comm., 2012).

MCZ Fisheries Model data are not available for this rMCZ and it has not been possible to calculate an alternative estimate of the value of landings.</td><td>The rMCZ would remove an area historically targeted by two commercial scallop divers. While the area of the rMCZ is not currently targeted, it is expected that it would be once scallop stocks have sufficiently recovered (Dive scallop skipper, pers. comm., 2012).</td></tr>
<tr><td colspan="3">Total direct impact</td></tr>
</table>

<table>
<tr><th colspan="2">Table 2b. Commercial fisheries</th><th>rMCZ Reference Area The Fal</th></tr>
<tr><td>Total direct impact on UK commercial fishing:</td><td colspan="2">Estimated annual value of UK vessel landings (prawn landings using pots and traps only) 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>0.027</td></tr><tr><td>GVA affected</td><td>0.013</td></tr></table></td></tr>
<tr><td>Impact on non-UK commercial fishing:</td><td colspan="2">None</td></tr>
</table>

<table>
<tr><th colspan="2">Table 2c. Ports, harbours, shipping and disposal sites</th><th>rMCZ Reference Area The Fal</th></tr>
<tr><td colspan="3">Source of costs of the rMCZ

Management scenario 1: Increase in costs of assessing environmental impacts for future licence applications within 1km of an rMCZ. This applies to navigational dredging only. 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 navigational dredging, and future potential port developments. 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 mitigiation requirements: re-location of Cross Roads buoy; and additional capital dredge mitigation. No further additional mitigation, relative to mitigation provided in the baseline, of impacts on features protected by the MCZ may be needed for future harbour developments.</td></tr>
<tr><td>Baseline description of activity</td><td colspan="2">Costs of impact of rMCZ on the sector</td></tr>
<tr><td>There are a number of ports and harbours located in the Fal Estuary. The Port of Falmouth is the largest port in the area. It includes Falmouth Docks, the Inner Harbour, Carrick Roads Anchorage and Cross Roads Anchorage, and Falmouth Bay. The key activities provided by the port are ship repair, cargo handling, cruise ships, construction of superyachts, bunkering services, recreational boating and a number of other smaller business operations. Services to the marine renewable energy sector may be offered in the future (Tibbalds Planning and Urban Design, 2011). The rMCZ is located within the harbour limits, although none of the port infrastructure is situated within the</td><td colspan="2">Scenario 1: When the licence application for the capital dredge is re-submitted, it is anticipated that the EIA that was previously conducted will need to be revised so that it explicitly considers the potential impacts on the MCZ's features and their conservation objectives. For the purposes of the IA it is assumed that a new licence application and EIA will be submitted in 2013. The rMCZ is expected to result in an additional one-off cost of producing the revised EIA of approximately £0.007m (see Annex N for calculations).

Scenario 2:

<u>Cross Roads buoy</u>: Use of the deep water berth of the Cross Roads buoy may disturb</td></tr>
</table>

rMCZ.

The Port of Truro is accessed by the main channel that runs adjacent to the rMCZ (Port of Truro, pers. comm., 2012). The port itself is more than 5km from the rMCZ. The harbours of Penryn and St Mawes are within 5km of the rMCZ

Cross Roads buoy: The Cross Roads Anchorage buoy is situated approximately 0.1km from the rMCZ. It provides one of four deep water berths for ships at the the Port of Falmouth. The buoy is used for bunkering during periods of bad weather, typically through the winter, and its provision is also a requirement of a contract between the port and the Royal Fleet Auxiliary (RFA) (Falmouth Harbour Commissioners, pers. comm., 2011). The RFA contract is for 5 years and expires in 2014 (Tibbalds Planning and Urban Design, 2011). For the purposes of this baseline it is assumed that the contract will be renewed after this period and retained over the timeframe of the Impact Assessment (IA). The buoy is also used as a mooring for distressed vessels (Falmouth Harbour Commissioners, pers. comm., 2011).

Port masterplan and planned capital dredge: In 2009, it was estimated (based on a detailed business survey) that businesses located at the Port of Falmouth directly employed 1,465 people (1,401 full time equivalent (FTE) jobs) and contributed approximately £75 million of gross value added (GVA) to the UK economy (Roger Tym and Partners, 2011). This represents 1% of the GVA of Cornwall and the Isles of Scilly.

The port has recently finalised a master plan that will enable it to maintain and develop its services and remain competitive within the context of a changing market. A key component of the master plan is to allow larger vessels to access the port, as the average size of vessels is increasing. In order to remain competitive, particularly in the ship repair market, facilities at the port will need to provide access to larger ships (Tibbalds Planning and Urban Design, 2011). A capital dredge to deepen the main approach channel from a declared depth of 5.1 metres below Chart Datum to 8.1 metres is necessary to allow for this and is essential to the master plan (Tibbalds Planning and Urban Design, 2011). At its closest point, the proposed dredge

sediment, which could be (unintentionally) deposited within the rMCZ. (There is not currently enough evidence to conclude whether sediment deposition occurs or not.) Because it is not known whether unintentional impacts on the MCZ's features arise, this scenario assumes that use of the Cross Roads buoy causes unintentional disturbance of sediment that impacts on acheving the MCZ's features conservation objectives. This could be mitigated if the buoy was re-located (Natural England, pers. comm., 2011). However, there are no other available locations further from the rMCZ that could provide for vessels of up to 200 metres in length and with 15 metre draft (Falmouth Harbour Commissioners, pers. comm., 2011). Therefore it is assumed that the buoy would need to be removed, and the activity associated with it would no longer take place. This would include:

- bunkering in periods of bad weather. It is estimated that 75% of affected vessels would use bunkering services elsewhere, while 25% would wait for an improvement in the weather to allow other Port of Falmouth bunkering facilities to be used (Falmouth Harbour Commissioners, pers. comm., 2011);
- the RFA contract would be lost as the Port of Falmouth would no longer have 4 deep water berths, which is a requirement of the contract (Falmouth Harbour Commissioners, pers. comm., 2011).

It is estimated that the combined impacts would result in an average loss in revenue from bunkering of £0.22m/yr and from the RFA contract of £5m/yr (Falmouth Harbour Commissioners, pers. comm., 2011). However, it should be noted that the costs could be significantly higher. For the financial year 2010/11 the RFA contract generated £27.2m of revenue to the port (Falmouth Harbour Commissioners [A&P Falmouth and Falmouth Harbour Commissioner Accounts], pers. comm., 2011).

The resultant estimated gross direct impact of removal of Cross Roads Buoy on UK GVA is a reduction of £3.375m/yr (Finding Sanctuary; see Annexes H and O for details of the assumptions used in these calculations). Net of displacement and substitution effects (economic activity undertaken at other UK and non-UK ports instead of at the Port of Falmouth) it is estimated that there would be a net direct impact on UK GVA of £0.035m/yr (see Annex N for details of assumptions made in these calculations). The impact on the local economy would be the full gross direct impact of £3.375m/yr. The local socioeconomic impacts may be significant and are likely to include loss of jobs associated with the bunkering and RFA contract activities. The financial impact on the Port of Falmouth wouldl

is less than 1km from the rMCZ. Through the implementation of the master plan direct employment at the port is expected to increase from 1,401 (FTE) in 2009 to 4,355 in 2030 and GVA/yr is expected to increase from £75m to £233.3m over the same period (Roger Tym and Partners, 2011). Successful implementation of the master plan is contingent upon successful completion of the capital dredge to deepen the main approach channel. Direct employment at the port is expected to fall from 1,401 in 2009 to 687 in 2030 if the master plan is not implemented (Roger Tym and Partners, 2011). The associated gross direct GVA generated is expected to fall from £75m in 2009 to £37m in 2030 (Roger Tym and Partners, 2011). An initial Environmental Impact Assessment (EIA) and licence application for the capital dredge were submitted in 2009 but were not approved, and will therefore need to be resubmitted once aspects of the application that were deemed unsatisfactory have been addressed. The EIA identified that 'sediment deposition is predicted not to occur to the east of the Carrick Roads and therefore it is not anticipated that there will be any impact on the large live maerl bank present at St Mawes Bank' (Royal Haskoning, 2009).	be an average loss of revenue of £5.22m/yr. <u>*Port masterplan and planned capital dredge*</u>: As set out under Scenario 1, when the licence application for the capital dredge is resubmitted, the EIA will need to explicitly consider the potential impacts on the rMCZ's features and their conservation objectives. This is expected to result in an additional one-off cost of producing the revised EIA of approximately £0.007m. The EIA that has already been undertaken for the planned capital dredge (Royal Haskoning, 2009) identifies that the dredge is not expected to impact on the maerl bank at St Mawes Bank'. However, to reflect the port's concerns that, following resubmission of the EIA, mitigation of the impacts of potential (unintentional) deposition of dredged material within the rMCZ may be required, the costs are included in this scenario. If mitigation was required, it may be possible for this to be provided if the dredging was restricted to outflowing tides (Natural England, pers. comm., 2011). As the dredge operation is currently planned to operate on a continuous basis, this mitigation may result in a doubling of the time taken to complete the dredge, resulting in approximately a £24m increase in its cost (equal to a 100% increase in the current estimated cost) (Falmouth Harbour Commissioners, pers. comm., 2011). 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. *Future harbour development:* 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. <u>*Overall:*</u> The present value of costs (from loss of revenue as a result of the removal of the Cross Roads buoy; increased assessment costs for the planned capital dredge and additional mitigation requirements for the planned capital dredge), measured as the net

	effect on UK GVA over the timeframe of the IA, is estimated to be £23.7m.

Table 2d. Recreation	**rMCZ Reference Area The Fal**
Source of costs of the rMCZ ***Recreational angling management scenario:*** Closure of rMCZ to recreational angling and anchoring (except in emergency). ***Recreational boating management scenario:*** Closure of rMCZ to anchoring (including anchoring of racing marks) (except in emergency).	
Baseline description of activity	**Costs of impact of rMCZ on the sector**
Angling: The rMCZ is not known as a prolific angling site but some boat angling occurs. Angling boats often anchor within the rMCZ, particularly in poor weather as the area is relatively sheltered. There is some shore angling, although the coastline is relatively inaccessible (Cornish Federation of Sea Anglers, 2011; Port of Truro, pers. comm., 2011). Species targeted include thornback ray, bull huss, small conger eels, spotted ray, pollack, small bass and occasionally mullet (Cornish Federation of Sea Anglers, 2011).	Anglers visiting the area are likely to respond to the closure by fishing at other sites in the estuary. During poor weather or easterly winds suitable alternative sites are limited. It is unclear whether this may result in an overall reduction in angling in the wider area.
Recreational boating: There are 5 main sailing clubs (Restronguet Sailing Club, Mylor Yacht Club, Flushing Sailing Club, Royal Cornwall Yacht Club and St Mawes Sailing Club) – within the Falmouth area with a total of approximately 5,480 members (Port of Falmouth Sailing Association [PoFSA], pers. comm., 2011). There are an estimated 5,575 marina berths and moorings within the Fal Estuary (Port of Truro, pers.com., 2011). There is anchoring by motorised and non-motorised recreational boats within the rMCZ during the summer, particularly when there are easterly winds. Anchoring also occurs in the rMCZ when boats are sheltering from bad weather (PoFSA, pers. comm., 2011; Port of Truro, pers. comm., 2011). Estimates of the number of boats anchoring in the rMCZ range from 20 boats on summer days with easterly winds (Port of Truro, pers. comm., 2011) to a total of between 750 and 1,500 boats over the course of a year (PoFSA, pers.	The rMCZ would affect anchoring by cruising boats as well as a proportion of the racing that occurs in the estuary, as anchoring of boats (except in emergency) and racing marks would not be permitted. There are alternative anchorage locations for visiting boats, but use of these is limited in easterly winds and periods of poor weather (Port of Truro, pers. comm., 2011). The rMCZ may therefore reduce anchorage opportunities for recreational vessels and limit the ability of participants to carry out their activities in such conditions (PoFSA, pers. comm., 2011; Port of Truro, pers. comm., 2011). The rMCZ is likely to affect the level of watersports training that takes place in the rMCZ. This may impact on the overall provision of watersports training in the Fal due to the importance of the eastern shore of the Carrick Roads for safe activities in easterly winds. Measures undertaken by watersports training providers so that they do not need to anchor vessels or markers in the rMCZ may increase risks to safety. The rMCZ may affect the

Table 2d. Recreation	**rMCZ Reference Area The Fal**
comm., 2011). It is free to anchor within the rMCZ area, unlike some other parts of the estuary. Providers of watersports training anchor their coaching and safety boats and lay course marks and operational markers within the rMCZ. The eastern shore of the Carrick Roads (which the rMCZ sits within) is a very important area for watersports training, especially when the wind direction is from the east. Windsport International is located on the banks of the Fal and offers a variety of windsport activities, including sailing, kayaking, windsurfing, canoeing and powerboating. Windsport runs courses in these activities for both individuals and groups and provide international coaching. Much of its activity takes place in and around the rMCZ, all of which involves anchoring of various boats and markers (Windsport, pers. comm., 2012). The area of the Carrick Roads (within which the pMCZ is situated) is regularly used for racing. Approximately 250 race events providing nearly 41,000 participant racing days (defined as the number of days' sailing by individuals) were estimated to take place in the Carrick Roads in 2011, accounting for over 90% of all race events and over 80% of all participant racing days in Falmouth. The participants in all Falmouth race events are estimated to spend nearly £2.3m per year in the local economy (see Annex N for calculations and assumptions). Start and finish buoys and course buoys (typically 8 anchored marks) are installed for each day of racing. Additionally, a committee boat is anchored. The locations of the start, finish and course buoys, and the committee boat depend on the conditions. The St Mawes Bank, which is inside the rMCZ, is an ideal place for racestarts in a range of winds, and anchoring of buoys and the committee boat is constrained to this area for races in the Carrick Roads area by the deep Carrick Roads shipping channel and the shallow Mylor Bank (Restronguet Sailing Club, pers. comm., 2011). At Falmouth Week 2011, 5 of the 7 races were started from within the rMCZ (Falmouth Week race officer, pers. comm., 2011). Many classes of boat, including both large and small working boat classes,	businesses that offer training activities within the area of the rMCZ. (Windsport International, pers. comm., 2012). The rMCZ would limit the ability of race officers to set appropriate start lines and courses in the Carrick Roads area which may result in : • increased likelihood of boats colliding as a result of inappropriate start lines and the first course windward mark being set too close to the start line. High numbers of collisions have occurred in the past as a result of an inappropriately set windward mark (Traditional Fleet Race Officer, pers. comm., 2011); • a reduced number of races for classes that can only race in the Carrick Roads area (PoFSA, pers. comm., 2011); • a reduced number of evening races (time constraints mean that the Carrick Roads area is the only place where these races can be held) (PoFSA, pers. comm., 2011); • racing in poor weather, when the Carrick Roads is the only safe race location, no longer being possible (PoFSA, pers. comm., 2011). The above would constrain the range of classes that can race in Falmouth, and reduce the number of days on which good quality, safe race courses can be set. This would affect the quality of the racing available in Falmouth and the ability of the clubs to attract national and international events. There may also be a reduction in club membership if boat owners chose to relocate their boats from moorings and berths in Falmouth to elsewhere as a result of the constraints on racing. (PoFSA, pers. comm., 2011) It is estimated that around 50% of all races in the Carrick Roads could be affected by the rMCZ (PoFSA, pers. comm., 2011). Two sets of analysis of local wind data indicate that on between 18% (Private individual, pers. comm., 2011) and 55% (Royal Cornwall Yacht Club, pers. comm., 2012) of race days the wind direction is such that races need to be started from within the rMCZ. Ultimately, the reduction in race options may affect the ability to attract national and international events (as described above), and overall it is estimated that there could be a 25% reduction in the number of race events held in Falmouth (Carrick Road and Falmouth Bay areas). In the absence of more detailed information, the economic impact of the rMCZ is estimated by assuming that the 25% reduction in the number of race events translates into a 25%

Table 2d. Recreation	**rMCZ Reference Area The Fal**
Gaffers, Toshers, Sunbeams, St Mawes ODs, Ajaxes, Shrimpers and a variety of dinghies race within the Carrick Roads area (Traditional Fleet Race Officer, pers. comm., 2011). For many, sailing outside the Carrick Roads in the bay is not safe, and it would be impossible to provide adequate safety cover to allow for it (Traditional Fleet Race Officer, pers. comm., 2011). In addition, evening racing only takes place in the Carrick Roads area, as there is insufficient time for boats to race in places further from the clubs, such as the bay. The wide range of racing that can be provided for in Falmouth, and the ability to set a course that allows safe sailing in most weather conditions, is key to its popularity (Restronguet Sailing Club, pers. comm., 2011). The majority of races occur in the spring through to early autumn (typically April to October) and there are occasional races in the winter. Race events include village regattas, special events and open championships including the Olympic Finn class qualifiers in 2012, the world championships for disabled sailors in 2013 and Falmouth Week. Falmouth Week is held annually and is the second largest sailing event in the UK after Cowes Week, and is thought to attract 80,000 additional visitors to Falmouth each year (Henri Lloyd Falmouth Week, 2011).	reduction in participant expenditure and expenditure by local boat owners. It is estimated that gross direct local expenditure associated with Falmouth racing could reduce by £0.572m/yr as a result of the rMCZ, resulting in an associated reduction in gross direct GVA of £0.269m/yr (see Annex N for assumptions and calculations). Allowing for a redistribution of the lost racing expenditure into expenditure on other activities in the local area and into expenditure on racing and other activities in other UK locations, it is estimated that there would be a reduction in local GVA of £0.192m/yr and in UK GVA of £0.067m/yr (see Annex N for assumptions and calculations). Consideration has been given by Natural England to whether a specific licence to anchor could be granted for the committee boat in order to enable start lines to continue to be set witin the rMCZ. It has not been possible to establish the likelihood of this and as such it has not been included as a management scenario. However, it should be noted that if this were viable then the impacts on racing would be significantly reduced.

Table 2e. Other impacts that are assessed for the suite of MCZs and not for this site alone	**rMCZ Reference Area The Fal**
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 Reference Area The Fal**
Ports, harbours, shipping and disposal (transit of ships); Recreation (water skiing, including existing water ski area markings and moorings, swimming); 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 Reference Area The Fal**
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. Both maerl beds and seagrass beds act as nursery areas for commercial fish and shellfish species. There is evidence that maerl beds provide structurally complex feeding areas for commercially important juvenile fish species such as Atlantic cod (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 not in reference 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 this 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. In particular the nursery area function of the seagrass and maerl beds may be enhanced, providing beneficial spill-over effects of fish and shellfish.	Anticipated direction of change: ⇧ Confidence: Low

Table 4a. Fish and shellfish for human consumption	**rMCZ Reference Area The Fal**	
	As no fishing will be permitted within the rMCZ, no on-site benefits will be realised. The potential benefits 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 Reference Area The Fal**
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 not in reference condition (see Table 1b). A description of on-site angling activity is set out in Table 2d. 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 recovered to reference condition. Recovery of habitats may have benefits for fish populations. It is unclear whether any benefits for fish populations would arise as a result of reduced fishing mortality due to 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 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 not in reference condition. There are regular sightings of dolphins and porpoises in the Fal. Species include the bottlenose, white-beaked, common, striped, Atlantic white-sided and Risso's dolphin. Many aquatic birds can be spotted on the Fal: little egrets, curlews, shelducks, swans, oystercatchers and kingfishers can all be seen.	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 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	Anticipated direction of change: ⇧ Confidence: Low

Table 4b. Recreation		**rMCZ Reference Area The Fal**
Local companies offer boat trips to explore the local wildlife. It has not been possible to estimate the value of wildlife watching in the rMCZ.	wildlife watching visits.	

Table 4c. Research and education		**rMCZ Reference Area The Fal**
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 estuary has been subject to a variety of research activities. Within the rMCZ surveys of the seagrass and maerl have previously been undertaken. Future research is likely to occur as a result of the estuary's Special Area of Conservation designation and plans for redevelopment of part of the Port of Falmouth. 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. A wide variety of education events and interpretation are provided around the Fal Estuary by organisations including the Cornwall Wildlife Trust. The extent of activity within the rMCZ is unknown but is only likely to a fraction of that over the wider estuary. 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 The Fal**	
Baseline	**Beneficial impact**	
Regulation of pollution: The features of the site contribute to the bioremediation of waste and sequestration of carbon. Seagrass beds are known to be particularly efficient carbon sinks (Fletcher and others, 2012). ***Environmental resilience:*** The features of the site contribute to the resilience and continued regeneration of marine ecosystems. Maerl forms complex and heterogeneous habitats which provide a wide range of niches for infaunal and epifaunal organisms. Rocky habitats in estuaries make a significant contribution to the overall diversity of the estuary (Fletcher and others, 2012). ***Natural hazard protection:*** The features of the site, in particular the 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 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: ⇧ Confidence: Low

Table 4e. Non-use and option values	**rMCZ Reference Area The Fal**	
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 recover and protect the features and the ecosystem services provided, and thereby the option to benefit from these services in the future, from past degradation and the risk of future degradation.	Anticipated direction of change: ⇧ Confidence: Moderate

rMCZ Reference Area The Fleet

Site area (km^2): 2.1

Table 1. Conservation impacts **rMCZ Reference Area The Fleet**

1a. Ecological description

The Fleet recommended Marine Conservation Zone (rMCZ) Reference Area sits within the northern half of the Fleet Lagoon and the northern, eastern and western boundaries follow the mean high water mark. The Fleet rMCZ Reference Area sits within the boundary of the Special Area of Conservation, Special Protection Area and Site of Special Scientific Interest that cover the Fleet Lagoon and Chesil Beach.

The Fleet is a shallow tidal inlet some 13km long, separated from the sea by Chesil Beach, and connected to the sea by a narrow channel entering Portland Harbour. Sea water percolates through Chesil Bank, influencing salinity along the length of the Fleet. Low freshwater input results in fully saline or polyhaline conditions throughout most of the lagoon; only the Abbotsbury embayment at the western end has low-salinity brackish water.

The coarse sediments of the inlet channel are predominately colonised by brown and red algae, whereas the soft mud beds of the lagoonal basin support seagrass (*Zostera* and *Ruppia* spp.) and green algal meadows. The Fleet is the largest saline/brackish lagoon in England, and as a result has been designated as a protected area under a range of designations (Lieberknecht and others, 2011). The rMCZ contains rare lagoon species that have very limited distribution due to their specific habitat requirements (Natural England, 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 saltmarshes and saline reedbeds	< 0.01	-	Unfavourable Condition	Recover to Reference Condition
Intertidal coarse sediment	0.02	-	Unfavourable Condition	Recover to Reference Condition
Intertidal mud	0.11	-	Unfavourable Condition	Recover to Reference Condition
Intertidal sediments dominated by aquatic angiosperms	< 0.01	-	Unfavourable Condition	Recover to Reference Condition
Subtidal coarse sediment	1.80	-	Unfavourable Condition	Recover to Reference Condition
Habitats of Conservation Importance				
Seagrass beds	1.09	5	Unfavourable Condition	Recover to Reference Condition
Species of Conservation Importance				
Tenellia adspersa	-	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. Archaeological heritage	**rMCZ Reference Area The Fleet**
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**
A World Ware II anti-tank ditch is located behind Chesil Beach (Lee, Stelzenmüller & Rogers, 2010), although it is not clear whether this is located in the rMCZ. 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. Commercial fisheries	**rMCZ Reference Area The Fleet**
Source of costs of the rMCZ ***Management scenario 1:*** Closure of entire rMCZ to all commercial fishing.	
Baseline description of activity	**Costs of impact of rMCZ on the sector**

<table>
<tr><th colspan="2">Table 2b. Commercial fisheries</th><th>rMCZ Reference Area The Fleet</th></tr>
<tr><td colspan="3">Overview: The rMCZ is situated inside the 6nm (nautical mile) limit and as such is subject to a number of existing fisheries restrictions (see Annex E). Fyke netting occurs under licence with the Environment Agency. There is no other commercial fishing in the rMCZ. Estimated total value of UK vessel landings from the rMCZ: £0.014m/yr.</td></tr>
<tr><td colspan="2">UK Nets: Fyke netting for eels occurs inside the rMCZ, in the western end of The Fleet, under authority from the Environment Agency. There is a closed season over the winter months. No other forms of netting occur within the rMCZ (Environment Agency, pers. comm., 2011). Though gill netting occurs in The Fleet this is concentrated in the eastern end, outside the rMCZ. There are currently 6 active fyke net licences, all held by individuals from the Weymouth area, for a total of 100 nets. Given declines in eel populations nationally an increase in the number of authorities granted is considered unlikely (Environment Agency, pers. comm., 2011).

Value of net landings of eels is estimated at £0.014m/yr based on the volume of landings between 2007 and 2010 (Environment Agency, pers. comm., 2011) and an average price of eels of £6/kg between 2007 and 2010 (The Fleet eel fishers and Environment Agency, pers. comms., 2011).</td><td>Scenario 1: The rMCZ is likely to result in the closure of the eel fishery. This would have an impact on the incomes of the 6 affected fishers.

Based on the estimate set out in the baseline, the annual value of UK net landings affected:

<table><tr><td>£m/yr</td><td>Scenario 1</td></tr><tr><td>Value of landings affected</td><td>0.014</td></tr></table></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:

<table><tr><td>£m/yr</td><td>Scenario 1</td></tr><tr><td>Value of landings affected</td><td>0.014</td></tr><tr><td>GVA affected</td><td>0.006</td></tr></table></td></tr>
<tr><td colspan="2">Impact on non-UK commercial fishing:</td><td>None</td></tr>
</table>

Table 2c. Recreation	**rMCZ Reference Area The Fleet**
Source of costs of the rMCZ ***Wildfowling:*** Closure of rMCZ to wildfowling.	
Baseline description of activity	**Costs of impact of rMCZ on the sector**
Wildfowling: Wildfowling is permitted between Langton Herring (in land from the rMCZ) and the Narrows (to the south-east of the rMCZ) from 1 October through to 20 February. Whilst wildfowlers do not enter the rMCZ, they may shoot birds flying over it. Three of the best shoot locations are on the shore of the lagoon, on the rMCZ boundary (The Fleet Warden, pers. comm., 2012). Wildfowling in the area is regulated through the issue of permits to the Fleet Wildfowlers Group by Ilchester Estates. In total 65–75 permits are issued each year. The level of activity has remained broadly similar over the years with 400–600 birds taken each year, the majority of which comprise wigeon and pochard (Moxom & Colombé, 2010).	Wildflowling within the rMCZ would not be permitted as it is extractive (Natural England, pers. comm., 2012) (JNCC and Natural England, 2010). As three of the best locations for shooting are on the rMCZ boundary, from which participants shoot over the rMCZ, it is anticipated that the rMCZ would result in a significant deterioration in the quality of wildfowling available on the Ilchester Estate (The Fleet Warden, pers. comm., 2012). This may result in a reduced level of participation and a reduction in revenue generated through wildfowling for Ilchester Estates. However, it has not been possible to obtain any estimates of the impact on participation rates or the associated financial implications.

Table 2d. Other impacts that are assessed for the suite of MCZs and not for this site alone	**rMCZ Reference Area The Fleet**
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 recommended Marine Conservation Zone (MCZ) (existing activities at their current levels and future proposals known to the regional MCZ projects)	**rMCZ Reference Area The Fleet**
Recreation (swannery, rowing boats, dedicated access points); 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 Reference Area The Fleet**
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. Seagrass beds within the rMCZ provide important nursery areas for flatfish (JNCC, 2011) and as such the rMCZ is likely to help to support potential on-site and off-site fisheries. The baseline quantity and quality of service provided is assumed to be commensurate with that provided by the features of the site when not in reference 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 this 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. In particular the nursery area function of the seagrass beds may be enhanced, providing beneficial spill-over effects of fish and shellfish. 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 The Fleet**
	realised. The potential benefits 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 Reference Area The Fleet**
Baseline	**Beneficial impact**	
Angling: Recreational angling is not known to take place in the rMCZ.	N/A	N/A
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 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 not in reference condition. The Fleet rMCZ Reference Area is home to a wide variety of water birds including the oldest managed swan population in the world. 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 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 Reference Area The Fleet**	
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 the Fleet, including in the marine environment. The Fleet Study Group was founded in 1975 by the Natural Environment Research Council to collect scientific and historic 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 15 to 20 members of the group (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.	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 infrastructure is based around the Chesil Beach Visitor Centre and much of the activity of the centre is focused on the Fleet Lagoon. However, it is likely that much of this occurs at the eastern end of the lagoon, outside the rMCZ, where the centre is located. The centre offers 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 (average of the last ten years) (Chesil Bank and the Fleet Nature Reserve, 2008). At the western end of the lagoon, overlapping with the rMCZ, is a swannery. Interpretation is provided at the swannery. 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 The Fleet**	
Baseline	**Beneficial impact**	
Regulation of pollution: The features of the site contribute to the bioremediation of waste and sequestration of carbon. Coastal saltmarshes and seagrass beds 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, 2012). ***Natural hazard protection:*** The features of the site, in particular the coastal saltmarshes, 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 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: ⇧ Confidence: Low

Table 4e. Non-use and option values	**rMCZ Reference Area The Fleet**	
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 recover and protect the features and the ecosystem services provided, and thereby the option to benefit from these services in the future, from past degradation and the risk of future degradation.	Anticipated direction of change: ⇧ Confidence: Moderate

rMCZ The Manacles

Site area (km^2): 3.5

Table 1. Conservation impacts **rMCZ The Manacles**

1a. Ecological description

The landward boundary of this site runs along the mean high water mark from Porthoustock Point around Manacle Point, as far as Polcries. The seaward boundary extends approximately 2.3km to sea, to encompass the Manacles rocky reef. The Manacles are a large underwater rocky reef system and a popular dive spot due to the high number of shipwrecks that surround them. The depth of the site is between 14 and 57 metres below sea level (chart datum). The high-quality reefs support a number of associated Features of Conservation Interest (FOCI) species, including one of the best examples of pink sea-fan *Eunicella verrucosa* communities and the pink sea-fan anemone *Amphianthus dohrnii* in the region, with dense populations particularly on the flat open sea bed below the Voices on the Manacles, and on Pencra Reef.The Ross coral *Pentapora fascialis,* crawfish *Palinurus elephas* and short-snouted seahorses have been recorded in the site. Local group feedback indicates that the FOCI habitats 'fragile sponge and anthozoan communities on subtidal rocky habitats' and 'intertidal underboulder communities' are present in this site, but there are no records of these features mapped.

The west of the Manacles has deeply gullied outcropping bedrock, with gullies opening out into an area of large boulders. Gully sides are almost sheer and up to 5 metres high. The top of the gully sides contains sparse kelp and red foliose algae. The gully floor and sides are dominated by hydroids, including *Aglaophenia pluma* and *Halecium halecium* (abundant). Anthozoans are also strongly represented, with *Actinothoe sphyrodeta*, occasional colonies of *Alcyonium glomeratum*, *Caryophyllia*, *Corynactis* and *Metridium senile*.

In the east, the sea bed consists of large boulders and rocky outcrops separated by areas of muddy shell gravel. The majority of the rock surface is covered by a hydroid/bryozoans turf in which *Polyzonias* and *Obelia dichotoma* are common. Other conspicuous species include pink sea-fan *Eunicella verrucosa*, *Alcyonium digitatum*, *Nemertesia antennina* and Ross coral *Pentapora foliacea*.

There are productive tidal fronts in this area. The area is of importance for basking sharks, and is an important feeding area for small cetaceans, in particular harbour porpoise and (seasonally) minke whale (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	0.03	-	Favourable Condition	Maintained at Favourable Condition
Intertidal mixed sediments	0.02	-	Favourable Condition	Maintained at Favourable Condition
Intertidal mud	< 0.01	-	Favourable Condition	Maintained at Favourable Condition
Intertidal sand and muddy sand	< 0.01	-	Favourable Condition	Maintained at Favourable Condition
Moderate energy circalittoral rock	0.18	-	Favourable Condition	Maintained at Favourable Condition

Moderate energy infralittoral rock	0.19	-	Favourable Condition	Maintained at Favourable Condition
Moderate energy intertidal rock	0.04	-	Favourable Condition	Maintained at Favourable Condition
Subtidal coarse sediment	0.95	-	Favourable Condition	Maintained at Favourable Condition
Subtidal macrophyte-dominated sediment	1.03	-	Favourable Condition	Maintained at Favourable Condition
Subtidal mixed sediments	0.08	-	Favourable Condition	Maintained at Favourable Condition
Subtidal sand	0.96	-	Favourable Condition	Maintained at Favourable Condition
Habitats of Conservation Importance				
Maerl beds	1.01	-	Favourable Condition	Maintained at Favourable Condition
Species of Conservation Importance				
Amphianthus dohrnii	-	3	Favourable Condition	Maintained at Favourable Condition
Eunicella verrucosa	-	58	Favourable Condition	Maintained at Favourable Condition
Haliclystus auricula	-	1	Favourable Condition	Maintained at Favourable Condition
Leptopsammia pruvoti	-	2	Favourable Condition	Maintained at Favourable Condition
Palinurus elephas	-	2	Unfavourable Condition	Recover to Favourable Condition
Non-ENG Mobile Species				
Phocoena phocoena	-	-	Favourable Condition	Maintained at Favourable Condition
Cetorhinus maximus	-	-	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 The Manacles**
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**
Five wrecks are recorded 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.,

Table 2a. Archaeological heritage	**rMCZ The Manacles**
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**
	2011). No further impacts on activities related to archaeology are anticipated.

Table 2b. Commercial fisheries	**rMCZ The Manacles**
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.	
Baseline description of activity	**Costs of impact of rMCZ on the sector**
Overview: The rMCZ is wholly within 6nm (nautical miles), and so is fished only by UK vessels. It extends to approximately 1nm from shore over the Manacles rocks. A number of commercial fishing restrictions are already in existence (see Annex E). There is potting throughout most of the rMCZ and the rMCZ also overlaps with part of a bass hand line fishery. Small parts of the rMCZ are worked by dredges and bottom trawls. Estimated total value of UK vessel landings from the rMCZ: £0.008m/yr.	

<table>
<tr><th colspan="2">Table 2b. Commercial fisheries rMCZ The Manacles</th></tr>
<tr><td>UK Dredges: A small number (fewer than 5) of local scalloping vessels work to the east of the rMCZ (Cornwall Inland Fisheries and Conservation Authority [IFCA], pers. comm., 2011), including a narrow band of soft sediment approximately 300 metres wide in the eastern part of the rMCZ. Within the rMCZ access to suitable channels between the rocky outcrops is difficult and so visiting boats are not thought to fish there (Cornwall IFCA, pers. comm., 2011). Estimated value of UK dredge landings from the rMCZ: less than £0.001m/yr.</td><td>Scenario 1: No impacts are anticipated under Scenario 1.

Scenario 2: The rMCZ covers only a small amount of towable ground. While in some years valuable tows may be carried out in the rMCZ, overall the area covers a small proportion of the ground fished by scalloping vessels in the area and average annual landings are estimated to be low. No significant impacts are therefore anticipated under this scenario.

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></tr><tr><td>Value of landings affected</td><td><0.001</td><td><0.001</td></tr></table></td></tr>
<tr><td>UK Bottom trawls: Otter trawls work to the south and east of the rMCZ, including a narrow band of soft sediment approximately 300 metres wide over the eastern part of the rMCZ. Within the rMCZ access to suitable channels between the rocky outcrops is difficult and so visiting boats are not thought to fish there (Cornwall IFCA, pers. comm., 2011). Estimated value of UK bottom trawl landings from the rMCZ: £0.002m/yr.</td><td>Scenario 1: No impacts are anticipated under Scenario 1.

Scenario 2: The rMCZ covers only a small amount of towable ground. While in some years valuable tows may be carried out in the rMCZ, overall the area covers a small proportion of the ground fished using otter trawls in the area and average annual landings are estimated to be low.

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>0.002</td></tr></table></td></tr>
</table>

<table>
<tr><th colspan="2">Table 2b. Commercial fisheries</th><th>rMCZ The Manacles</th></tr>
<tr><td colspan="2">UK Pots and traps: Potting occurs throughout the rMCZ and is carried out primarily by small under 10 metre vessels. Potters typically target crab and lobster. Crawfish is not a target species as the south coast is not thought to be natural crawfish habitat (Finding Sanctuary Vulnerability Assessment). Estimated value of landings from the rMCZ: £0.001m/yr.

It has not been possible to estimate the value of landings attributed to crawfish; however, given the overall estimate and the fact that crawfish are not a target species it is assumed that the value of crawfish landings is <£0.001m/yr.</td><td>Scenario 1: No impacts are anticipated under Scenario 1.

Scenario 2: Crawfish are not a target species of potters active within the rMCZ and the value of crawfish landings is low. As such, no significant impacts are anticipated.

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></tr><tr><td>Value of landings affected</td><td>0.000</td><td><0.001</td></tr></table></td></tr>
<tr><td colspan="2">UK Netting: Netting occurs throughout the rMCZ and is carried out primarily by small under 10 metre vessels. Tangle netting in the rMCZ typically targets crustaceans and monkfish. Crawfish is not thought to be a target species as the south coast is not thought to be natural crawfish habitat (Finding Sanctuary Vulnerability Assessment). Estimated value of landings from the rMCZ: £0.003m/yr.

It has not been possible to estimate the value of landings attributed to crawfish; however, given the overall estimate and the fact that crawfish are not a target species it is assumed that the value of crawfish landings is <£0.001m/yr.</td><td>Scenario 1: No impacts are anticipated under Scenario 1.

Scenario 2: Crawfish are not a target species of netters active within the rMCZ and the value of crawfish landings is low. As such, no significant impacts are anticipated

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>0.000</td><td><0.001</td></tr></table></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></tr><tr><td>Value of landings affected</td><td>0.000</td><td>0.003</td></tr><tr><td>GVA affected</td><td>0.000</td><td>0.001</td></tr></table></td></tr>
<tr><td colspan="2">Impact on non-UK commercial fishing</td><td>None.</td></tr>
</table>

Table 2c. National defence	**rMCZ The Manacles**
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.	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).

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 The Manacles**
Aquaculture, commercial fishing (pots & traps, nets, hooks & lines), recreation, 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 The Manacles**
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 sediments help to support a number of fisheries (Fletcher and others, 2011). Subtidal macrophyte-dominated sediment habitats and maerl beds provide important nursery areas for commercial species (Fletcher and others, 2011; JNCC, 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 service provided is assumed to be commensurate with that provided by the features of the site when in favourable condition, with the exception of crawfish which is 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, most of the features of the rMCZ will be maintained in favourable condition. Crawfish populations 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. Management of fishing activity within the rMCZ may reduce the on-site fishing mortality of species which may benefit commercial stocks, particularly crawfish which are the subject of targeted management. As landings of crawfish from the rMCZ may not be permitted, any benefits will be through local spill-over of individuals. With the exception of local crawfish populations, it is unclear whether the magnitude of reduced (on-site) fish harvesting will be enough to have any significant positive impact on commercial stocks of mobile species. No change in the condition of site habitats and their contribution to fish and shellfish provision is expected. The potential benefits 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 The Manacles**
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 service provided is assumed to be commensurate with that provided by the features of the site when in	If the conservation objectives of the features are achieved the features will be maintained in favourable condition. Crawfish will be recovered to favourable condition. Additional management (above that in the baseline situation) of fishing activities is expected, which will prohibit the landing of crawfish from the rMCZ.	Anticipated direction of change: ⇔

Table 4b. Recreation		**rMCZ The Manacles**
favourable condition, with the exception of crawfish which is in unfavourable condition. Local charter boats offer fishing trips to the Manacles throughout the year. Bass fishing is particularly popular at the Manacles. It has not been possible to estimate the value of angling in the site.	No change in feature condition or general harvesting of fish and shellfish (with the exception of crawfish, which is not typically targeted by anglers) 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).	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 service provided is assumed to be commensurate with that provided by the features of the site when in favourable condition, with the exception of crawfish which is in unfavourable condition. The Manacles is a popular dive site, providing reefs, jewel anemones, crustaceans and wreck sites. Local companies provide beginner and advanced diving experiences**.**	If the conservation objectives of the features are achieved the features will be maintained in favourable condition (with the exception of crawfish which is not typically a focus for divers). 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 an overall increase in UK dive visits and/or a redistribution of location preferences.	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 service provided is assumed to be commensurate with that provided by the features of the site when in favourable condition, with the exception of crawfish which is in unfavourable condition. Harbour porpoises and dolphins can be spotted around the Manacles. Visitors can use local boat trips to view the wildlife. 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 (with the exception of crawfish which is not typically a focus for wildlife watching). 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).	Anticipated direction of change: ⟺ Confidence: Moderate

Table 4b. Recreation		**rMCZ The Manacles**
	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 The Manacles**
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. 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. Current education provision is unknown. 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 The Manacles**
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. Maerl forms complex and heterogeneous habitats which provide a wide range of niches for infaunal and epifaunal organisms and 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 are achieved one of the features will be recovered to favourable condition. Others will be maintained in favourable condition. 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: Moderate

Table 4e. Non-use and option values		**rMCZ The Manacles**
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 recover and protect the features and the ecosystem services provided, and thereby the option to benefit from these services in the future, from past degradation and the risk of future degradation.	Anticipated direction of change: ⇧ Confidence: Moderate

Table 4e. Non-use and option values		**rMCZ The Manacles**
	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 ('We surely must protect this breath-taking site') and to safeguard the local area from possible future impacts ('It's abundant with marine life and mammals and should stay that way!') and for future generations ('I have enjoyed diving over the years and would like my grandchildren to be able to enjoy the same'). The aesthetic value of the area was highlighted by a number of voters ('... it has a great view and it shouldn't be spoilt') as well as an emotional attachment built up from previous visits to the area ('I spent much of my childhood in this area and it is simply stunning').	

rMCZ Torbay

Site area (km^2): 19.9

Table 1. Conservation impacts	**rMCZ Torbay**

1a. Ecological description

The recommended Marine Conservation Zone (rMCZ) boundary mainly follows the boundary of the Torbay section of the Lyme Bay and Torbay candidate Special Area of Conservation (cSAC), extending from the coastline to depths of approximately 30 metres, and overlaps with Sites of Scientific Interest (SSSIs) in the area., the English Riviera Global Geopark and Berry Head National Nature Reserve. The rMCZ intersects with a mapped area of higher than average benthic species and habitat diversity. Local group feedback has highlighted the sea caves present in and around Torbay (though reefs and sea caves are protected by the SAC designation). There is an important wintering bird roost at Broadsands, and the second most important area for wintering diver and grebe concentrations in the South-West. The area, in particular around Berry Head, is important for sea birds. Species making up the assemblage include wintering divers and grebes (including black-throated diver *Gavia arctica*, great northern diver *Gavia immer*, great crested grebe *Podiceps cristatus* and breeding guillemot *Uria aalge*. The bay is an important breeding area and nursery for commercial fish species.

The inshore areas of Torbay are described as predominantly soft muddy sands with communities characterised by the heart urchin *Echinocardium cordatum* and brittlestars *Amphiura* spp. and *Ophiura* spp., whereas cleaner sands close inshore hold dense populations of razor shells *Ensis* spp., heart urchins *Echinocardium cordatum* and seagrass *Zostera marina*. Two rare sublittoral habitats, peat bog and fossil forest, are found in the western end of Torbay. The peat bog is heavily bored by the common piddock. A layer of peat is also present intertidally, though submerged beneath the sandy beach.

There are communities of polychaete worms and piddocks *Pholas dactylus*. Sublittoral limestone rock pinnacles, rich with sea squirts, sea anemones and sponges, are common. Where the sea bed becomes muddy, there are burrowing species including the angular crab *Goneplax rhomboides* and the red band fish *Cepola rubescens*. The substratum of offshore sea-bed fauna of Great West Bay is relatively uniform and the community present has been characterised as a 'boreal offshore muddy sand association'.

The limestone has been eroded leading to the formation of caves, an uncommon marine habitat. Littoral caves pepper the headlands and islets of Torbay, and at Berry Head many extend into the sublittoral or are entirely sublittoral. In a cave near Rock Dove Cave (a limestone cliff south of Berry Head), *Caryophyllia inornata* was recorded as common together with the larger Devonshire cup coral *Caryophyllia smithii,* seven species of sponge, ten species of mollusc and 12 species of algae.

Zostera beds (at least 80ha) have been identified at seven sites around Torbay, most of them concentrated into two groups centred around the sheltered north-west and south-west corners of the bay. The beds at Elberry Cove and Torre Abbey Sands are the largest and rich faunas are associated with them, particularly of burrowing worms, anemones and echinoderms. There are several reports of seahorses within the seagrass beds.

Native oyster *Ostrea edulis*, peacock's tail *Padina pavonica* and honeycomb worm *Sabellaria alveolata* reefs have been identified in Torbay. The sheltered limestone and sandstone shores of Torbay are rich in animals, many of which are more typically found underwater but can be found here in profusion in damp, shaded locations. Sponges in particular are abundant, many of the rocky shores holding over a dozen species.

Bouldery areas are occasionally consolidated by the frequent reefs of the honeycomb worm *Sabellaria alveolata* and these areas have varied underboulder fauna. Hollicomber holds probably the densest population of the green sea urchin *Psammechinus miliaris* on the south-west coast of Britain as well as acting from time to time as a

settlement area for the common starfish *Asterias rubens* (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	0.11	-	Favourable Condition	Maintained at Favourable Condition
Intertidal mixed sediments	0.11	-	Favourable Condition	Maintained at Favourable Condition
Intertidal mud	0.48	-	Favourable Condition	Maintained at Favourable Condition
Intertidal sand and muddy sand	0.02	-	Favourable Condition	Maintained at Favourable Condition
Low energy intertidal rock	0.06	-	Favourable Condition	Maintained at Favourable Condition
Moderate energy intertidal rock	0.07	-	Favourable Condition	Maintained at Favourable Condition
Subtidal mud	8.83	-	Unfavourable Condition	Recover to Favourable Condition
Habitats of Conservation Importance				
Intertidal under boulder communities	-	6	Favourable Condition	Maintained at Favourable Condition
Sabellaria alveolata reefs	-	1	Favourable Condition	Maintained at Favourable Condition
Seagrass beds	0.90	3	Unfavourable Condition	Recover to Favourable Condition
Species of Conservation Importance				
Hippocampus guttulatus	-	1	Favourable Condition	Maintained at Favourable Condition
Ostrea edulis	-	4	Favourable Condition	Maintained at Favourable Condition
Padina pavonica	-	4	Favourable Condition	Maintained at Favourable Condition
Paludinella littorina	-	1	Favourable Condition	Maintained at Favourable Condition
Non-ENG Mobile Species				
Gavia arctica	-	-	Favourable Condition	Maintained at Favourable Condition
Gavia immer	-	-	Favourable Condition	Maintained at Favourable Condition
Podiceps cristatus	-	-	Favourable Condition	Maintained at Favourable Condition
Podiceps nigricollis	-	-	Favourable Condition	Maintained at Favourable Condition
Podiceps grisegena	-	-	Favourable Condition	Maintained at Favourable Condition
Podiceps auritus	-	-	Favourable Condition	Maintained at Favourable Condition
Uria aalge	-	-	Favourable Condition	Maintained at Favourable Condition
Phocoena phocoena	-	-	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 Torbay**
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**
Six wrecks are recorded 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. Commercial fisheries	**rMCZ Torbay**
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:*** Zoned closure of sea grass beds in the rMCZ to dredges and bottom trawls. ***Management scenario 2:*** Zoned closure of sea grass beds in the rMCZ to dredges, bottom trawls, pots and traps, nets, and hooks and lines. ***Management scenario 3:*** Closure of entire rMCZ to bottom trawls and dredges. ***Management scenario 4:*** Closure of entire rMCZ to dredges, bottom trawls, pots and traps, nets, and hooks and lines.	
Baseline description of activity	**Costs of impact of rMCZ on the sector**
Overview: The rMCZ encompasses Brixham Harbour, one of the UK's principal fishing ports, as well as Paignton and Torquay harbours. The rMCZ extends to approximately 1nm (nautical mile) from shore and is fished only by UK vessels. There is bottom trawling for sole, squid and cuttlefish, and mid-water trawling for sprat and	

<table>
<tr><th colspan="2">Table 2b. Commercial fisheries rMCZ Torbay</th></tr>
<tr><td colspan="2">anchovy in the bay, including in the rMCZ. Scalloping occurs seasonally (there are seasonal restrictions in place in the Devon and Severn Inland Fisheries and Conservation Authority (IFCA) district) and effort can be high, concentrated around the two headlands. Netters primarily targeting pollack and bass work throughout the bay, including within the rMCZ, while hand liners target mackerel around the headlands. There is some potting in the rMCZ, principally targeting brown crabs, although whelks, lobster, cuttlefish and spider crabs and also caught. Estimated total value of UK vessel landings from the rMCZ: £0.040m/yr

The rMCZ is subject to a number of existing Devon and Severn IFCA fisheries restrictions (see Annex E), including a 'gentlemen's agreement' for fishers using dredges and bottom trawls not to fish in areas of sea grass. The rMCZ also overlaps with part of the Lyme Bay and Torbay candidate Special Area of Conservation (SAC). Management of activities required for the cSAC may impose further restrictions on fishing activity in the area and therefore the area of the rMCZ. This may include limiting access to the cSAC for dredges and bottom trawls through the use of inshore vessel monitoring systems (VMS). This should allow vessels to continue to target much of the ground where they currently work (Devon and Severn IFCA, pers. comm., 2011).</td></tr>
<tr><td>UK Dredges: It is estimated that either 10 (South West Fishing Industry Group, 2011) or 11 (Devon and Severn IFCA, 2011) scallopers, all of less than 15 metres, fish in and around the rMCZ. Of these vessels, 8 are set up to use trawls as well as dredges.

Scallop dredging occurs seasonally and effort can be intensive. Fishing effort is focused around two headlands, Hope's Nose and Berry Head. The rMCZ, which extends approximately 1nm from shore, covers a proportion of the fishery around the two headlands (Hope's Nose and Berry Head). Outputs from the MCZ Fisheries Model indicate that the area inside the rMCZ accounts for approximately 20% of the value of landings from the intensively fished areas around the headlands.

Estimated value of UK dredge landings from the rMCZ: £0.011m/yr.

In the South Devon inshore area, there are 5 known scallop beds (Curtis & Anderson, 2008). The rMCZ overlaps with one of these. Access to another one of these five is currently limited as a result of the Lyme Bay Designated Area (Fishing Restrictions) Order 2008. Evidence indicates that fishers displaced by the Lyme Bay closed area have increased effort in the remaining scalloping grounds, including around Torbay (Mangi and others, 2011).</td><td>Scenarios 1 and 2: Fishing with dredges in areas of sea grass is thought to be minimal, due to the existing gentlemen's agreement, although dredging is thought to still occasionally occur within these areas. No significant impacts of these scenarios are anticipated.

Scenarios 3 and 4: As the rMCZ does not cover the whole area of the scallop grounds off Torbay, the scenarios would only close part of the grounds. .Effort displaced from inside the rMCZ is likely to be redistributed to the remainder of the Torbay ground or to other grounds in the South Devon inshore area. Scalloping grounds further offshore are less feasible for the vessels affected by these scenarios as they are all under 15 metres. Decisions by these vessels to fish further offshore may increase risks to safety.

The additional restrictions in these scenarios may encourage more fishers to invest in larger vessels or to invest in switching to alternative gear types. Investment costs may be significant.

The Lyme Bay closed area and expected management restrictions from 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 to the remaining grounds may result in lower catch rates by scallopers in these grounds. It may also result in increased steaming costs, particularly for vessels from Brixham, for which the Torbay scallop ground is the closest to port. While evidence indicates that scalloping grounds have been able to absorb displaced effort from the Lyme Bay closed area, it is questioned whether this is likely to continue to be sustainable in the long term (Mangi and others, 2011). . Displacement of effort due to the closure of the rMCZ may add further pressure to these grounds, increasing</td></tr>
</table>

<table>
<tr><th colspan="2">Table 2b. Commercial fisheries rMCZ Torbay</th></tr>
<tr><td></td><td>uncertainty over their long-term sustainability.

Displacement from the Lyme Bay closed area has resulted in increased gear conflict between static and mobile gear fishers. Displacement from the rMCZ in these scenarios 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>0.000</td><td>0.011</td><td>0.011</td></tr></table>
As a result of restrictions under the SAC, the potential impact of the rMCZ may be less significant than described above.</td></tr>
<tr><td>UK Bottom trawls: Trawling activity occurs year-round in and around Torbay, with some effort occurring inside the rMCZ, particularly around the two headlands of Hope's Nose and Berry Head. Much of the effort is by otter trawls, which follow cuttlefish into the rMCZ in late summer (the cuttlefish fishery lasts about a month). Sole and squid are targeted year-round in the area and the bay provides a sheltered fishing ground during the winter. Beam trawling is less prevalent, with effort in the area focused to the south of Berry Head, largely outside the rMCZ.

It is estimated that 11 trawlers (Devon and Severn IFCA, 2011), all of less than 15 metres, fish within the rMCZ (although not exclusively). Of these vessels, 6 are set up to switch between trawling and dredging.

Estimated value of UK bottom trawl landings from the rMCZ: £0.011m/yr.

Evidence indicates that bottom trawl fishers displaced by the Lyme Bay closed area, which is approximately 30km to the north-east of the rMCZ, have increased effort in grounds to the east of the area (Mangi and others, 2011), which is likely to include the area of the rMCZ.</td><td>Scenarios 1 and 2: Fishing with trawls in areas of sea grass is thought to be minimal, due to the existing gentlemen's agreement, although trawling is thought to still occasionally occur within these areas. No significant impacts are anticipated..

Scenarios 3 and 4: These scenarios would directly affect the 11 vessels that fish in the area, displacing their effort to other grounds within the Torbay area that are beyond 1nm (the approximate distance of the rMCZ from shore), and to other fishing grounds.

Based on the value of landings estimate, the level of displaced effort is not likely to be high enough to affect catch rates elsewhere in the area. However, the costs and catch rates of the 11 vessels that fish in the area may be affected. In particular, impacts may arise during the cuttlefish season and during the winter when the bay affords decent shelter for fishing in poor weather. The vessels are limited in their ability to fish offshore due to their size and decisions to fish further offshore may increase risks to safety.

There is evidence of fishers 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; Southern IFCA, pers. comm., 2011; Mangi and others, 2011). 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</td></tr>
</table>

<table>
<tr><th colspan="2">Table 2b. Commercial fisheries rMCZ Torbay</th></tr>
<tr><td></td><td>may be significant.

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>0.000</td><td>0.011</td><td>0.011</td></tr></table>
As a result of restrictions under the SAC, the potential impact of the rMCZ may be less significant than described above.</td></tr>
<tr><td>UK Pots and traps: There is some potting in the rMCZ, principally targeting brown crabs, as well as whelks, lobster, cuttlefish and spider crabs. Potting is not thought to occur in areas of sea grass. Estimated value of UK pot and trap landings from the rMCZ: £0.014m/yr.</td><td>Scenarios 1, 2 and 3: No impacts are anticipated under these scenarios.

Scenario 4: Under this scenario, the rMCZ would displace potting activity from the near-shore areas around Torbay.

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><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 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>
</table>

<table>
<tr><th colspan="2">Table 2b. Commercial fisheries</th><th>rMCZ Torbay</th></tr>
<tr><td colspan="2">UK Nets: One netter is known to be active within the rMCZ, using set nets around Broadsands. Netting is not thought to occur in the areas of sea grass. Some drift netting (pelagic) occurs for herring and mackerel (Devon and Severn IFCA, pers. comm., 2011). Estimated value of UK net landings from the rMCZ: <£0.001m/yr.</td><td>Scenarios 1, 2 and 3: No impacts are anticipated under these scenarios.

Scenario 4: One vessel is likely to be affected by the rMCZ under this scenario. The estimated value of landings affected is low, and as such no significant impacts are anticipated.

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><0.001</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="2">UK Hooks and lines: The rMCZ is not a regular fishing ground for fishers using hooks and lines, although some occasional activity does occur. Estimated value of UK hook and line landings from the rMCZ: £0.001m/yr.</td><td>Scenarios 1, 2 and 3: No impacts are anticipated under these scenarios.

Scenario 4: The rMCZ does not cover a regular fishing ground, and the estimated value of landings affected is low. As such no signficiant impacts are anticipated under this scenario.

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>0.000</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 2b. Commercial fisheries **rMCZ Torbay**

Total direct impact

Total direct impact on UK commercial fishing

Estimated annual value of UK vessel landings and gross value added (GVA) affected:

£m/yr	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Value of landings affected	0.000	0.000	0.022	0.038
GVA affected	0.000	0.010	0.010	0.018

Impact on non-UK commercial fishing

None.

Table 2c. Flood and coastal erosion risk management (coastal defence) **rMCZ Torbay**

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**
Much of the coastline of the rMCZ is protected from erosion although natural cliff edges remain. The approach favoured in the Shoreline Management Plan (SMP) along the coastline of the rMCZ is to 'hold the line' on the protected frontages and allow natural erosion to occur elsewhere. The SMP highlights the value of the sandy beaches to the tourist offer of Torbay and indicates that these may need to be artificially nourished in the medium and longer term (Environment Agency, pers. comm., 2012). Besides ongoing repair and maintenance routines for existing structures, in time more significant investment will be needed to maintain current standards of protection. Much of the investment will be to existing structures but there may be a need for new near-shore structures to reduce wave heights on vulnerable frontages. Schemes for near-shore structures are unlikely to be	The rMCZ would be unlikely to result in any additional mitigation requirements beyond those required for the Lyme Bay and Torbay cSAC. No additional mitigation costs are therefore anticipated (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.

Table 2c. Flood and coastal erosion risk management (coastal defence)	**rMCZ Torbay**
required within the Impact Assessment's 20-year timeframe Some disturbance may be unavoidable to offshore reefs as a result of longer-term schemes for near-shore structures Mitigation may need to be provided for impacts on features protected by the Lyme Bay and Torby cSAC. It is likely that this mitigation would be within the normal range of options typically required for large engineering projects of this nature (Environment Agency, pers. comm., 2012).	

Table 2d. Ports, harbours, shipping and disposal sites	**rMCZ Torbay**
Source of costs of the rMCZ	
Management scenario 1: Increase in costs of assessing environmental impacts for future licence applications within 1km of an rMCZ. This applies to planned harbour developments only. 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 navigational dredging, disposal of dredge material and port 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: As part of Brixham Harbour's long-term regeneration strategy, a new outer harbour breakwater, known as the Northern Arm Breakwater, is planned. The planned breakwater will not overlap with the rMCZ, but is within 500 metres of it. The purpose of the breakwater is to provide calmer wave conditions in the harbour to protect existing commercial and leisure activities, to facilitate the development of leisure uses (specifically the development of marina facilities) and to provide an enclosed safe harbour in all weather conditions (Torbay Development Agency, 2012). A concept design report and site development brief were produced in 2011; however, funding is not currently available with which to take the development forward.	***Scenario 1:*** As a result of the designation of the rMCZ, the licence applications for the Brixham Harbour Northern Arm Breakwater 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. The year in which the development is likely to come forward is currently unknown. For the purposes of the Impact Assessment (IA), it is assumed that a licence application will be submitted in the middle year of the IA period, 2022. These additional environmental assessment requirements are expected to result in an additional one-off cost of approximately £0.007m (see Annex N for calculations). ***Scenario 2:*** for the Brixham harbour development, an additional one-off cost of £0.007m is

Table 2d. Ports, harbours, shipping and disposal sites	**rMCZ Torbay**
Once funding can be put in place it is anticipated that the development will proceed (Torbay Development Agency, pers. comm., 2012). The harbours of Paignton and Torquay are also within 5km of the rMCZ.	expected in 2022 as a result of additional environmental impact assessment requirements (as detailed under Scenario 1). In addition, extra mitigation of potential impacts to MCZ features may be required. However, there is currently insufficient information on which to base any conclusions on the likelihood of additional mitigation being required and what that mitigation, if required, may entail (Natural England, pers. comm., 2012). For other 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 Torbay**
Aquaculture; commercial fishing (mid-water trawls, pots & traps, nets, hooks & lines); recreation (anchoring permitted subject to existing code of conduct; passage of boats around Berry Head subject to speed restrictions); 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 Torbay**
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 sediments help to support a number of fisheries (Fletcher and others, 2011). The bay is an important breeding and nursery area for commercial fish species; in particular, seagrass beds within the rMCZ provide important nursery areas for flatfish (JNCC, 2011), and as such the rMCZ is likely to help to support potential on-site and off-site fisheries. 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. 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. 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. 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. Low mobility and site-attached species populations, such as crab and crawfish, may improve as a result of improved habitat condition and reduced fishing pressure. Localised beneficial spill-over effects may occur around the rMCZ. Recovery of the seagrass beds may improve their nursery area function, benefiting populations of commercial species. The potential benefits 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 Torbay**
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 that provided by features of the site when in favourable and unfavourable condition (see Table 1b). Torbay is a popular area for fishing. Shore-based fishing occurs all along the coastline. There is a particular concentration of shore- based and boat angling around the headlands of Hope's Nose and Berry Head. Species targeted include wrasse, bass, mackerel, garfish, bream, dab, dogfish, conger, codling and mullet. 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 be recovered to favourable condition. Others will be maintained in favourable condition. Recovery of habitats may have benefits for fish populations. It is unclear whether any benefits for fish populations would arise as a result of reduced fishing mortality due to 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 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. Several diving clubs are active across Torbay, offering beginner and advanced diving lessons. There are many wreck sites off Torbay for divers to experience. 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 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
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	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	Anticipated direction of change: ⇧

Table 4b. Recreation		**rMCZ Torbay**
when in favourable and unfavourable condition. Marine life is abundant in Torbay and porpoises, dolphins and occasionally basking sharks are spotted. There are various companies offering boat trips to visitors. It has not been possible to estimate the value of wildlife watching in the rMCZ.	increase in 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.	Confidence: Low

Table 4c. Research and education		**rMCZ Torbay**
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. 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. A wide range of education-related activities are available in the Torbay area, which is a popular destination for visitors and schools. The UNESCO-recognised Geopark promotes education about and understanding of the geology around Torbay. The Torbay Coast and Countryside Trust undertakes a range of events and interpretation for schools, groups and the public as well as providing volunteer and training opportunities. The Berry Head Visitor Centre and the Seashore Centre are two centres for education interpretation and events. It has not been possible to estimate the value derived from	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 4c. Research and education		**rMCZ Torbay**
education activities associated with the rMCZ.		

Table 4d. Regulating services		**rMCZ Torbay**
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. Native oyster beds sequester carbon and filter algae and sediment from the water (Fletcher and others, 2012). ***Environmental resilience:*** The features of the site contribute to the resilience and continued regeneration of marine ecosystems (Fletcher and others, 2012). ***Natural hazard protection:*** The features of the site, in particular the 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 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 Torbay**
Baseline	**Beneficial impact**

Table 4e. Non-use and option values		**rMCZ Torbay**
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 recover and protect the features and the ecosystem services provided, and thereby the option to benefit from these services in the future, from past degradation and 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 the spectacular and wide range of plants and animals in the bay ('This is a stunning area of natural underwater beauty, protecting it will benefit all the species that live there as well as the surrounding areas') followed by a sense that the whole site is amazing, and that it is of personal importance to stakeholders. Many voters demonstrated an emotional attachment to the area ('My birthplace, and where I grew up'; 'Many happy memories of playing by the sea here'; 'My favourite place in the world!').	Anticipated direction of change: ⇧ Confidence: Moderate

rMCZ Upper Fowey and Pont Pill

Site area (km^2): 2.0

Table 1. Conservation impacts **rMCZ Upper Fowey and Pont Pill**

1a. Ecological description

This recommended Marine Conservation Zone is made up of two parts. The larger part consists of the upper Fowey Estuary, with the site boundary following the coastline along the mean high water mark, from the tidal limit at Lostwithiel to Bodmin Pill, a small tributary to the estuary south of Golant. The second part consists of Pont Pill, a tributary estuary flowing into the Fowey on the eastern side. The site encompasses the Fowey Estuary Voluntary Marine Conservation Area.

The Fowey Estuary is a ria, with areas of intertidal mud and saltmarsh in the upper reaches. Previously, large quantities of sediment were introduced into the upper ria by ore mining activity. Today, in common with other rias, the Fowey receives a low riverine sediment input. Blue mussel *Mytilus edulis* and European eel *Anguilla anguilla* have been reported in the estuary. The estuary also serves an 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 saltmarsh and saline reedbeds	0.01	-	Favourable Condition	Maintained at Favourable Condition
Intertidal coarse sediment	< 0.01	-	Favourable Condition	Maintained at Favourable Condition
Intertidal mud	1.51	-	Favourable Condition	Maintained at Favourable Condition
Intertidal sand and muddy sand	< 0.01	-	Favourable Condition	Maintained at Favourable Condition
Low energy intertidal rock	0.02	-	Favourable Condition	Maintained at Favourable Condition
Habitats of Conservation Importance				
Estuarine rocky habitats	-	13	Favourable Condition	Maintained at Favourable Condition
Sheltered muddy gravels	0.01	-	Favourable Condition	Maintained at Favourable Condition
Species of Conservation Importance				
Anguilla anguilla			To be confirmed	To be confirmed

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 Upper Fowey and Pont Pill**
Source of costs of the recommended Marine Conservation Zone (MCZ)	
Increase in costs of assessing environmental impacts for future licence applications (it is not anticipated that any additional mitigation of impacts on features protected by the rMCZ will be needed relative to the mitigation provided in the baseline).	
Baseline description of activity	**Costs of impact of rMCZ on the sector**
The 0 to 20 year Shoreline Management Plan policies along the edges of the rMCZ are for 'hold the line' at Polruan and Fowey and for 'no active intervention' elsewhere. 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 Upper Fowey and Pont Pill**
Source of costs of the recommended Marine Conservation Zone (MCZ)	
Management scenario 1: Increase in costs of assessing environmental impacts for future licence applications within 1km of an rMCZ. This applies to disposal sites only. It is anticipated that no additional mitigation of impacts on features protected by the rMCZ 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 disposal sites and future potential port developments. Additional mitigation of impacts on features protected by the rMCZ, relative to baseline provided in the baseline case, may be needed for future port developments.	
Baseline description of activity	**Costs of impact of rMCZ on the sector**
Disposal Sites: Lantic Bay disposal site is situated off Fowey (more than 1km from the rMCZ and less than 5km). For the purposes of the Impact Assessment (IA), it is assumed that an average of 0.9 applications	***Scenario 1:*** No costs are anticipated under Scenario 1. ***Scenario 2:***

Table 2b. Ports, harbours, shipping and disposal sites	**rMCZ Upper Fowey and Pont Pill**
(equivalent to the average number/yr between 2001 and 2010) (Cefas, 2011) for licences to dispose of material at the disposal site will be made in each year over the timeframe of the IA. *Harbour development:* The harbours of Fowey and Polruan are within 5km of the rMCZ. There are no known plans for development at either harbour.	*Disposal sites:* Future licence applications for disposing of material at the Lantic Bay disposal site 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 £0.006m/yr (see Annex N for calculations). *Harbour development:* 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: Upper Fowey and Pont Pill**
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 can be found in Annex H.

Table 4a. Fish and shellfish for human consumption	**rMCZ Upper Fowey and Pont Pill**	
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 known 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 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 4b. Recreation	**rMCZ Upper Fowey and Pont Pill**	
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	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	Anticipated direction of change: ⟺

Table 4b. Recreation		**rMCZ Upper Fowey and Pont Pill**
when in favourable condition. Fowey is a popular place to fish with popular rock locations. Local companies provide charter boats for angling. It is a good location for salmon and sea trout fishing. It has not been possible to estimate the value of angling in the site.	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 in the area for wildlife watchers, and boat trips are provided for visitors wishing to experience the marine wildlife. Egrets, kingfishers, cormorants and shoals of grey mullet are often spotted along the River Fowey. 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 Upper Fowey and Pont Pill**	
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. Surveys on parts of the estuary have been carried out by the National Trust and the Environment Agency and the estuary management plan expresses a desire for further survey work and research to be undertaken (Smith & Porter, 2003). 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 events for schools and the public are provided by Cornwall Wildlife Trust and Friends of the Fowey, often linked to the Fowey Voluntary Marine Conservation Area. Events include guided walks, a snorkel safari and talks. The estuary management plan recognises the benefits of undertaking public education and interpretation around the estuary (Smith & Porter, 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 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 Upper Fowey and Pont Pill**	
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 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	Anticipated direction of change: ⇔

Table 4d. Regulating services		**rMCZ Upper Fowey and Pont Pill**
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 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.	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 Upper Fowey and Pont Pill**
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 recover and protect the features and the ecosystem services provided, and thereby the option to benefit from these services in the future, from past degradation and 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. The most common reasons were for the spectacular scenery, because they felt the area was unspoilt, and because of a personal affiliation with the site.	Anticipated direction of change: ⇧ Confidence: Moderate

rMCZ Western Channel

Site area (km^2): 1,613.5

Table 1. Conservation impacts	**rMCZ Western Channel**

1a. Ecological description

The northern tip of the Western Channel recommended Marine Conservation Zone is located approximately 54km to the south-east of the Lizard Peninsula. The depth of the sea bed is in the 50–100 metre range, with the western end of the site dipping below the 100 metre contour. The sea-bed habitat is characterised by coarse sediment, rock and mixed sediment. There is anecdotal evidence that the rock habitat here consists of cobbles, not bedrock. The area is of additional ecological importance in that it is an area of productive frontal systems and of importance for sea birds and cetaceans, and intersects with areas of higher than average benthic biodiversity (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 coarse sediment	756.20	-	Unfavourable Condition	Recover to Favourable Condition
Subtidal mixed sediments	175.42	-	Unfavourable Condition	Recover to Favourable Condition
Moderate energy circalittoral rock	676.23	-	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 Western Channel**

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 area of moderate energy circalittoral rock and sub-tidal mixed sediment to pots and traps, nets, and hooks and lines.

Table 2a. Commercial fisheries **rMCZ Western Channel**

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 on the edge of the UK's 200nm (nautical mile) fishery limit and exclusive economic zone, and the median line between UK and French waters. Vessels from a number of different nations, predominantly UK, French and Belgian, are active in the rMCZ (Lee, 2010; South West Fishing Industry Group, 2011). Bottom trawling is the main type of fishing in the rMCZ, with activity concentrated in the western part of the rMCZ (MCZ Fisheries Model). There is also a significant amount of netting and a relatively low level of fishing with other gears (MCZ Fisheries Model). Estimated total value of UK vessel landings from the rMCZ: £0.204m/yr.	
UK Dredges: The rMCZ is not a regular scalloping ground, although there is scalloping all around it. Occasional scalloping activity occurs in the rMCZ, typically to investigate the viability of the area, and the rMCZ area has been successfully dredged for scallops in the past (Scallop dredge owner, pers. comm., 2011). Estimated value of UK dredge landings from the rMCZ: £0.001m/yr. The rMCZ has historically been dredged for scallops more heavily than at present (Scallop vessel owner, pers. comm., 2011). As scalloping is carried out on a cyclical basis, it is expected that, despite the low level of activity in the last 4 years, the fishery would be targeted again in future years. This may particularly be the case when larger vessels return from the eastern channel, where scalloping effort has been very high in recent years as a result of increased scallop abundance in the area (Defra, 2011). This may result in higher annual landings from the rMCZ.	***Scenario 1:*** No impacts are anticipated under Scenario 1. ***Scenarios 2, 3 and 4:*** As the rMCZ is not currently a regular scalloping ground it is not expected to have a significant impact on vessels' current fishing patterns under these scenarios. However, it would remove an area of known potential from being fished in the future. When the current prolificacy of the eastern channel area reduces, scallopers may begin to target these historical areas again, if viable dredges can be landed (Scallop dredge owner, pers. comm., 2011). As such the estimate of the value of landings affected per year may be an underestimate of future landings. Estimated annual value of UK dredge 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 | 0.001 | 0.001 | 0.001
UK Bottom trawls: Large beam trawlers, typically over 25 metres in length, are active in the western part of the pMCZ principally targeting monkfish and sole (MMO, 2011a). The pMCZ lies on the edge of a large, heavily trawled area, which extends north and west (MCZ Fisheries Model). There is also a low level of activity by otter trawls, principally in the northern corner of the pMCZ (MCZ Fisheries Model). Estimated value of UK bottom trawl landings from the pMCZ: £0.143m/yr. In late 2010 and early 2011 there were significant catches of cuttlefish from	***Scenario 1:*** No impacts are anticipated under Scenario 1. ***Scenarios 2, 3 and 4:*** Displaced beam trawlers are likely to increase effort to the north and west of the rMCZ. However, some effort may also be pushed east, particularly by vessels from ports from east of the rMCZ. Potential increases in effort in ICES Rectangle 27E4 as a result of recent success in cuttlefish landings would be affected by the rMCZ. The rMCZ covers approximately 11% of the ICES Rectangle, thereby reducing the available open ground to trawlers. Its shape may

<table>
<tr><th colspan="2">Table 2a. Commercial fisheries rMCZ Western Channel</th></tr>
<tr><td>the western half of the pMCZ (South West Fishing Industry Group, 2011). Cuttlefish lands by beam trawlers from within ICES Rectangle 27E4, which overlaps the western half of the pMCZ totalled over £0.308m in 2010 (data for 2011 is not yet available), more than four times the average from the previous three years. The high value of cuttlefish landings, which saw the Newlyn port landings record broken nearly ten times in two week, may lead to an increase in the number of days fishing done in the area by trawlers if similar catches can be landed in forthcoming years (beam trawl owner, pers. com., 2011).</td><td>hinder tow lines in north/south directions.

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>0.143</td><td>0.143</td><td>0.143</td></tr></table>The displacement of fishing effort from the Western Channel rMCZ may put pressure on the Mid-channel Potting Agreement – an agreement between mobile and static gear fishers for seasonal trawling closures to a series of fishing grounds in the mid-channel, to the east of the rMCZ. Estimates of UK vessel landings from the areas included in the agreement are £0.764m/yr by pots, £0.287m/yr by dredges and £0.753m/yr by bottom trawls. The success of the agreement, and the landings obtained by fishers in the area, may be affected if trawlers displaced from the rMCZ seek to change the location, number or period of the seasonal trawl closures (South West Fishing Industry Group, 2011).</td></tr>
<tr><td>UK Pots and traps: There is a low level of potting along the eastern edge of the rMCZ by vessels in excess of 12 metres in length (MMO, 2011a). The rMCZ does not cover a regular potting ground (Cornish Fish Producers Organisation [CFPO], pers. comm., 2012), with activity concentrated east of the rMCZ in the area of the mid-channel potting agreement (MCZ Fisheries Model). Estimated value of UK pot and trap landings from the rMCZ: £0.010m/yr.</td><td>Scenarios 1 and 2: No impacts are anticipated under scenarios 1 and 2.

Scenarios 3 and 4: A low level of potting will be affected under these scenarios, as indicated by the estimated value of landings affected. The rMCZ does not cover a regular potting ground. Significant impacts are therefore not expected under these scenarios.

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><tr><td>Value of landings affected</td><td>0.000</td><td>0.000</td><td>0.008</td><td>0.010</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</td></tr>
</table>

<table>
<tr><th colspan="2">Table 2a. Commercial fisheries rMCZ Western Channel</th></tr>
<tr><td></td><td>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 activity spread across much of the rMCZ. Vessels active in the wider area (defined as ICES Rectangles 27E4 and 27E5) are typically over 15 metres in length, and principally use set gill nets to target pollack, although a wide range of species are caught (MMO, 2011a). The rMCZ is not thought to cover a regular fishing ground for netters (CFPO, pers. comm., 2012). Areas of greater netting intensity are located to the north of the rMCZ (MCZ Fisheries Model). Estimated value of UK net landings from the rMCZ: £0.048m/yr.</td><td>Scenarios 1 and 2: No impacts are anticipated under scenarios 1 and 2.

Scenarios 3 and 4: Despite the relatively low value of landings per unit of area, as the rMCZ is large the total value of landings affected is relatively high (compared with other south-west rMCZs). However, as the rMCZ is not thought to cover a regular fishing ground for netters, significant impacts are not anticipated under these scenarios.

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>0.042</td><td>0.048</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 very low level of fishing with lines in the rMCZ, as indicated by the value of landings estimate, and the rMCZ does not cover a regular fishing ground (CFPO, pers. comm., 2012). Estimated value of UK hook and line landings from the rMCZ: £0.001m/yr.</td><td>Scenarios 1 and 2: No impacts are anticipated under scenarios 1 and 2.

Scenarios 3 and 4: The rMCZ does not cover a regular fishing ground and the estimated value of landings affected is low. Therefore no significant impacts are expected under these scenarios.

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><0.001</td><td>0.001</td></tr></table>In establishing the draft conservation objectives, the site features were assessed as having</td></tr>
</table>

<table>
<tr><th colspan="2">Table 2a. Commercial fisheries rMCZ Western Channel</th></tr>
<tr><td></td><td>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>
<tr><td colspan="2">Total direct impact</td></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 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>0.144</td><td>0.194</td><td>0.202</td></tr>
<tr><td>GVA affected</td><td>0.000</td><td>0.060</td><td>0.083</td><td>0.087</td></tr>
</table>
</td></tr>
<tr><td>Impact on non-UK commercial fishing: Non-UK vessels using static gears, bottom trawls/dredges and mid-water trawls, primarily French demersal trawlers and to a lesser extent Belgian beam trawlers, fish within the rMCZ (Lee, 2010).

Estimated value of landings from the rMCZ by French vessels: bottom trawls/dredges: £2.301m/yr; static gears: £0.393m/yr (Direction des Pêches Maritimes et de l' Aquaculture, 2011). Estimates for other countries are not available.</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 demersal trawlers and to a lesser extent Belgian beam trawlers, will be affected by the rMCZ. In the event of a full closure of the rMCZ the estimated value of French landings affected will be £2.301m/yr (bottom trawls/dredges) and £0.393m/yr (static gears). No information on the effect of the zoned closure to static gears or the impact on Belgian vessels is available.</td></tr>
</table>

<table>
<tr><th>Table 2b. National defence rMCZ Western Channel</th></tr>
<tr><td>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.</td></tr>
</table>

Table 2b. National defence	**rMCZ Western Channel**
Baseline description of activity	**Costs of impact of rMCZ on the sector**
MOD is known to make use of the rMCZ for aerial, surface and 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 Western Channel**
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 Western Channel**
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 Western Channel**
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 support internationally important fish and shellfish fisheries (Fletcher and others, 2011). 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 large and there is currently a high level of fishing effort. As such, the scale of habitat recovered and the magnitude of reduced (on-site) harvesting may be enough to have a positive impact on commercial stocks. 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 and off-site impacts of displaced effort.	Anticipated direction of change: ⇧ Confidence: Low

Table 4b. Recreation		**rMCZ Western Channel**
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 Western Channel**
Baseline	**Beneficial impact**

Table 4c. Research and education		**rMCZ Western Channel**
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 Western Channel**
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 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 Western Channel**
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.		

Table 4e. Non-use and option values		**rMCZ Western Channel**
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 recover and protect the features and the ecosystem services provided, and thereby the option to benefit from these services in the future, from past degradation and the risk of future degradation.	Anticipated direction of change: ⇧ Confidence: Moderate

rMCZ Whitsand and Looe Bay

Site area (km^2): 51.5

Table 1. Conservation impacts **rMCZ Whitsand and Looe Bay**

1a. Ecological description

The site boundary follows the coastline along the mean high water mark, extending seawards to depths of up to 25 metres. Whitsand Bay is a 6km stretch of sand and shingle with gullies carved by strong tides and cross currents. Mapped data show the whole subtidal area of the site as sediment – East Whitsand Bay is composed of clean sand also dominated by polychaetes with *Magelona mirabilis* occurring in abundance. Further west, the sediment is muddier and characterised by a heart urchin *Echinocardium cordatum* and brittlestar *Amphiura filiformis* community. There are rocky ledges present in the bay, with associated hard substrate species (e.g. pink sea-fan *Eunicella verrucosa*).

The site intersects with an area of higher than average benthic species diversity and is a good breeding area and nursery for commercial fish species, as well as an important site for sea birds. Blue mussel beds, intertidal underboulder communities, tide-swept biotopes, the fan mussel *Atrina pectinata* and the sunset cup coral *Leptopsammia pruvoti* are found in this site.

An extensive series of gullies, overhangs, reefs and rock pools are present on the lower shore. Extensive shallow lagoons, partially sand-filled, support a great variety of plants and animals, including patches of seagrass *Zostera marina*. *Jania rubens*, a southern species of red corraline alga, has been recorded as being unusually abundant within these pools. Ocean quahog *Arctica islandica*, pink sea-fan *Eunicella verrucosa*, pink sea-fan anemone *Amphianthus dohrnii*, giant goby *Gobius cobitis* and seahorses (mainly in the Looe area) have also been recorded in the site.

Off Rame Head the sediment is mainly fine sand and mud and infaunal communities are numerically dominated by polychaetes, with sea cucumbers *Leptosynapta inhaerens* and *Trachythyone elongata* and the burrowing prawn *Callianassa subterranea* 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	-	-	Favourable Condition	Maintained at Favourable Condition
High energy infralittoral rock	1.26	-	Favourable Condition	Maintained at Favourable Condition
High energy intertidal rock	0.03	-	Favourable Condition	Maintained at Favourable Condition
Intertidal coarse sediment	0.47	-	Favourable Condition	Maintained at Favourable Condition
Intertidal mixed sediments	0.45	-	Favourable Condition	Maintained at Favourable Condition
Intertidal sand and muddy sand	0.18	-	Favourable Condition	Maintained at Favourable Condition
Low energy intertidal rock	0.06	-	Favourable Condition	Maintained at Favourable Condition
Moderate energy intertidal rock	0.07	-	Favourable Condition	Maintained at Favourable Condition

Subtidal coarse sediment	25.61	-	Favourable Condition	Maintained at Favourable Condition
Subtidal sand	22.35	-	Favourable Condition	Maintained at Favourable Condition
Habitats of Conservation Importance				
Seagrass beds	0.02	-	Favourable Condition	Maintained at Favourable Condition
Species of Conservation Importance				
Amphianthus dohrnii	-	4	Favourable Condition	Maintained at Favourable Condition
Arctica islandica	-	3	Favourable Condition	Maintained at Favourable Condition
Eunicella verrucosa	-	26	Favourable Condition	Maintained at Favourable Condition
Gobius cobitis	-	3	Favourable Condition	Maintained at Favourable Condition
Haliclystus auricula	-	2	Favourable Condition	Maintained at Favourable Condition
Hippocampus guttulatus	-	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 Whitsand and Looe Bay**
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**
Several World War II defences can be found in the site (Lee, 2010). Four wrecks and peat are recorded 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 2b. Commercial fisheries **rMCZ Whitsand and Looe Bay**

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 areas of sea-fan anenone *Amphianthus dohrnii,* ocean quahog *Arctica islandica,* pink sea-fan *Eunicella verrucosa,* giant goby *Gobius cobitis,* kaleidoscope jellyfish *Haliclystus auricula* and long-snouted seahorse *Hippocampus guttulatus* in the rMCZ to bottom trawls and dredges.

Management scenario 3: 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 wholly inside 6nm (nautical miles) (so is fished only by UK vessels) and a number of commercial fishing restrictions are already in existence (listed in Annex E). Nets are the most common gear used in the rMCZ, targeting red mullet during the summer and bass year-round. Ring netters target Cornish sardine during the summer and anchovy during the winter (Cornwall Inland Fisheries and Conservation Authority [IFCA], pers. comm., 2010). Sporadic hand lining and use of trolled lines primarily target mackerel (Cornwall IFCA, pers. comm., 2010). Potting activity is focused on lobster, spider crabs and brown crabs. There is a low level of mobile gear fishing in the rMCZ typically by vessels from Looe, although the number of trawlers working out of the port has been in decline (Cornwall IFCA, pers. comm., 2010). There is a commercial fishing fleet of 38 vessels (Cornwall SFC, 2010) operating out of Looe Harbour at the western end of the bay. Estimated total value of UK vessel landings from the rMCZ: £0.076m/yr.	
UK Dredges: Dredging is not common in the rMCZ, although there is some occasional activity by under 15 metre vessels (MCZ Fisheries Model). Estimated value of UK dredge landings from the rMCZ: £0.009m/yr.	***Scenario 1:*** No impacts are anticipated under Scenario 1. ***Scenario 2 and 3:*** The rMCZ is not a regular scalloping ground and there are therefore not expected to be any significant impacts on UK vessels as a result of the rMCZ under these scenarios. However, it should be noted that the closure would 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:

£m/yr	Scenario 1	Scenario 2	Scenario 3
Value of landings affected	0.000	0.003	0.009

<table>
<tr><th colspan="2">Table 2b. Commercial fisheries</th><th>rMCZ Whitsand and Looe Bay</th></tr>
<tr><td colspan="2">UK Bottom trawls: Fewer than 5 vessels from Looe (Cornwall IFCA, pers. comm., 2011), all less than 15 metres in length, work in the rMCZ regularly, although not exclusively, targeting a variety of flat fish (South West Fishing Industry Group, 2011; Cornwall IFCA, pers. comm., 2011). The bay is also occasionally used by other vessels for sheltered fishing in poor weather, although this is not thought to contribute much to landings values (South West Fishing Industry Group, 2011). Estimated value of UK bottom trawl landings from the rMCZ: £0.035m/yr.</td><td>Scenario 1: No impacts are anticipated under Scenario 1.

Scenarios 2 and 3: Vessels that regularly fish in the site may respond to the scenarios by increasing their fishing effort further offshore, outside the rMCZ boundary. This will pose a risk to the safety of those vessels because the vessels are all small and are not suitable for working further offshore except in good weather (South West Fishing Industry Group, 2011). If the affected fishers feel unable to increase their fishing effort outside the rMCZ then this may affect the viability of their businesses.

As the bay is occasionally used by visiting trawlers during poor weather, closure of the rMCZ may result in a safety risk by causing these vessels to fish further offshore and could affect their ability to successfully fish on poor weather days (South West Fishing Industry Group, 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></tr>
<tr><td>Value of landings affected</td><td>0.000</td><td>0.012</td><td>0.035</td></tr>
</table>
</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></tr>
<tr><td>Value of landings affected</td><td>0.000</td><td>0.015</td><td>0.044</td></tr>
<tr><td>GVA affected</td><td>0.000</td><td>0.007</td><td>0.019</td></tr>
</table>
</td></tr>
<tr><td colspan="2">Impact on non-UK commercial fishing</td><td>None.</td></tr>
</table>

Table 2c. Flood and coastal erosion risk management (coastal defence)	**rMCZ Whitsand and Looe Bay**
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 shoreline of the rMCZ are 'hold the line' at Seaton, Looe and Plaidy, and 'no active intervention' elsewhere. 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 Whitsand and Looe 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	**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 2e. Ports, harbours, shipping and disposal sites	**rMCZ Whitsand and Looe Bay**
Source of costs of the rMCZ	
Management scenario 1: Increase in costs of assessing environmental impacts for future licence applications within 1km of an rMCZ. This applies to disposal of dredge material only. It is anticipated that no additional mitigation of impacts on features protected by the rMCZ 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 disposal of dredge material and future potential port developments. Additional mitigation of impacts on features protected by the rMCZ, relative to baseline provided in the baseline case, may be needed for future port developments.	
Baseline description of activity	**Costs of impact of rMCZ on the sector**
<u>*Disposal sites:*</u> Rame Head South dredge disposal ground is located less than 1km to the south of the rMCZ. This is an active disposal site for dredged material from both maintenance and capital works. The site received an average of 111,700 tonnes of material from maintenance dredging works per annum, and 76,800 wet tonnes of material from capital dredging works, over the period 1999 to 2008 (Cefas, 2011). For the purposes of the Impact Assessment (IA), it is assumed that an average of 1.7 applications (equivalent to the average number/yr between 2001 and 2010) (Cefas, 2011) for licences to dispose of material at the Rame Head South dredge disposal ground will be made in each year over the timeframe of the IA. The Fort Picklecombe Y disposal ground is located to the east of the rMCZ near Cawsand Bay. For the purposes of the IA, it is assumed that an average of 0.2 applications (equivalent to the average number/yr between 2001 and 2010) (Cefas, 2011) for licences to dispose of material at the Fort Picklecombe Y disposal ground will be made in each year over the timeframe of the IA. <u>*Harbour development:*</u> The harbours of Looe and Portwrinkle are adjacent to the rMCZ and Polperro Harbour is within 5km. There are no known plans for development at either harbour.	***Scenario 1:*** Future licence applications for disposal of material at the Rame Head South dredge disposal ground will need to consider the potential effects of disposal activity on the features protected by the rMCZ, and the rMCZ conservation objectives. This is expected to result in additional costs averaging £0.011m/yr over the timeframe of the IA (see Annex N for details). ***Scenario 2:*** <u>*Disposal sites:*</u> Future licence applications for disposal of material at the Rame Head South and Fort Picklecombe Y disposal grounds will need to consider the potential effects of disposal activity on the features protected by the rMCZ, and the rMCZ conservation objectives. This is expected to result in additional costs averaging £0.013m/yr over the timeframe of the IA (see Annex N for details). <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 Whitsand and Looe Bay**
Commercial fishing (mid-water trawls, pots & traps, nets, hooks & 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 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 can be found in Annex H.

Table 4a. Fish and shellfish for human consumption		**rMCZ Whitsand and Looe 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 rMCZ overlaps a nursery area for commercial fish species 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. 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, 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. In particular it may improve benefits occurring through the site's nursery area function. If some fishing is permitted within the rMCZ, then catches may improve. Beneficial spill-over effects may occur around the rMCZ, particularly as a result of the improved nursery area function. The potential benefits described here do not include the negative impacts of the additional fisheries management on fish and shellfish provision and off-	Anticipated direction of change: ⇧ Confidence: Low

Table 4a. Fish and shellfish for human consumption		**rMCZ Whitsand and Looe Bay**
	site impacts of displaced effort.	

Table 4b. Recreation		**rMCZ Whitsand and Looe 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. Looe and Whitsand Bay are popular fishing locations. Species targeted include wrasse, conger, flatfish, ray, pollack, mackerel, whiting, dab, bass and shark. Local companies offer specialised boat trips such as for shark fishing. 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: 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. Whitsand Bay is popular with experienced divers and there are many wreck sites in the area. 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	Anticipated direction of change: ⇔ Confidence: Moderate

Table 4b. Recreation		**rMCZ Whitsand and Looe Bay**
	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 condition. There are many walks and boat trips on offer for visitors to experience the local wildlife including great black gulls and grey seals. 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 Whitsand and Looe 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. A variety of research activities take place around the rMCZ. These have included the Marine Biological Association's cuttlefish tag survey, research on the potential environmental impacts of the nearby Rame Head disposal site, and mapping in Looe Voluntary Marine Conservation Area (VMCA) by Cornwall Wildlife Trust. 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 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 Whitsand and Looe Bay**
Education: Fletcher and others (2012) identify that the features to be protected by the rMCZ can contribute to the delivery of education services. Cornwall Wildlife Trust runs a number of education events in and around the rMCZ, including guided walks and volunteer opportunities, with a particular focus on Looe Island and Looe VMCA. Glass-bottomed boats can be taken from nearby Looe Harbour to view the underwater marine wildlife. 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 Whitsand and Looe Bay**
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 the 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 are achieved the features will be maintained in favourable condition. 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 Whitsand and Looe 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 recover and protect the features and the ecosystem services provided, and thereby the option to benefit from these services in the future, from past degradation and 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. The most common reasons were the 'spectacular scenery', 'the whole place is amazing' and 'it means a great deal to me personally' ('It is my local coast and these sites are very beautiful'; 'I have been graced to see each of these larger sea creatures, and hold all the life in the Bay close to my heart. I would ask, plead, from the heart, for this Bay to be protected').	Anticipated direction of change: ⇧ Confidence: Moderate

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