Annex H14 Approach for assessing impacts on renewable energy

Contents

H14.1 This annex outlines the method used to assess the impacts of recommended Marine Conservation Zones (rMCZs) on the renewable energy sector. The method is presented under the following sections: (1) baseline description; (2) management scenarios; (3) assessment of impacts; and (4) limitations. Renewable energy refers to electricity generation from wind, wave and tidal energy. Two management scenarios have been developed for this sector.

1 Baseline description

H14.2 The baseline provides a description of existing, planned and potential renewable energy developments in each of the rMCZs over the 20-year period of the Impact Assessment (IA) that are currently known. Only those developments that it is assumed will be impacted upon by the designation of Marine Conservation Zones (MCZs) under each management scenario are described in the baseline for the IA. The IA assumes that the following developments will take place during the 20-year period of the IA. This data has been sourced from Lee, Stelzenmüller, Rogers (2010) and updated with data from individual developers and The Crown Estate (pers. comms, 2010, 2011 and 2012):

- Any yet-to-be-consented or yet-to-be-constructed offshore wind farms and known power export cable routes for wind farms (including Round 2 and Rounds 1 and 2 extensions).
- The planned locations for wind farm developments within Round 3 zones that developers have released plans for, including known power export cable routes.
- For Round 3 zones for which plans are not available the IA assumes that wind farm development could take place anywhere in the zone.
- Planned developments to generate electricity from wave and tidal energy (described in the IA as wave and tidal energy developments).
- Areas with potential for wave and tidal development during the 20 year period of the IA analysis as indicated by the Department of Energy and Climate Change (DECC) (DECC, pers. comm., 2011) and a study of renewable development potential in the south west (PMSS, 2010). Areas of strategic resource which may see developments over the medium-to-long term (The Crown Estate, pers. comm., 2012) are not expected to come forward within the next 20 years (DECC, pers. comm., 2012) and so are not included in the IA analysis.

2 Management scenarios

H14.3 The potential for renewable energy developments to impact upon MCZ features and hinder achievement of conservation objectives will be managed under the existing marine licensing framework. Two management scenarios are presented for this sector (Scenario 1 and Scenario 2).

H14.4 Scenario 1 is based on assumptions that have been informed by the Joint Nature Conservation Committee (JNCC) and Natural England (JNCC and Natural England, 2011a). The assumptions are based on the advice that JNCC and Natural England anticipate that they will provide to renewable energy developers, and the licence conditions that they anticipate will be required, because of the presence of an MCZ designation in the vicinity of a renewable energy development. These assumptions are employed in the IA because the site-specific advice that JNCC and Natural England will provide and the site-specific licence conditions that may be required are not yet known.

H14.5 In their feedback on Scenario 1, seven wind farm developers (or consortia) raised concerns that the Scenario under-estimates the impacts that MCZs may have on their operations.[1] JNCC and Natural England have indicated that many of the concerns raised by the developers are unlikely to arise, and for this reason, the developers' concerns and their estimates of the costs of these are not used to estimate the costs for the IA summary. Paragraph H14.41 provides more explanation.

H14.6 In response to the concerns raised by the developers, JNCC and Natural England advised that an alternative scenario that included some additional costs for mitigation could be used in the analysis. However, they emphasised that the assumptions about mitigation requirements in this scenario are very unlikely to occur in practice (Natural England and JNCC, pers. comm., 2012). These are presented in Scenario 2, which provides an assessment of cost in the IA which is higher than Scenario 1 but lower than the costs of the concerns raised by the developers.

H14.7 Based on the very low likelihood of costs in Scenario 2 being incurred to the wind energy sector (Natural England and JNCC, pers. comm., 2012), the best estimate of impact is assumed to be 15% of the additional installation cost in Scenario 2, plus 100% of the additional assessment of environmental impact costs in Scenario 2. This exceeds the cost of Scenario 1. This percentage is based on the assumption that:

- all of the cost to re-route Round 3 export cables and National Grid transmission cables around rMCZs that are reference areas (National Grid, 2011), which is a one-off cost of £14.700m, will be incurred (although the routes of these cables is at this stage very uncertain)

- just over 10% of the additional installation costs for renewable energy cables in rMCZs (that are not reference areas) will be incurred, which is a one-off cost of £55.729m (of a possible £484.440m) . This is based on Natural England's and JNCC's estimation of what costs are likely to be incurred

- all of the additional licence application costs for wind, wave and tidal energy developments are incurred.

H14.8 The assumptions used for each scenario and the concerns raised by developers are described separately below. The purpose of the scenarios is to ensure that the potential costs of rMCZs to the sector are realistically represented in the IA. However, the assumptions do not pre-judge any future site-specific licensing decisions. This is because the detail of development licence applications that are yet to be submitted and the decisions of the regulators are not yet known. Conditions for future licences will be decided upon on a site-by-site basis and so could differ from the assumptions used for the scenarios in the IA.

2.1 Scenario 1

Assumptions about the assessment of environmental impact

H14.9 It is already a regulatory requirement that a proposed renewable energy development must be screened to determine whether an Environmental Impact Assessment (EIA) needs to be undertaken in support of its licence application. An EIA is required for all offshore wind farms.

[1] Wave and tidal energy developers did not inform this scenario. In the one instance where an affected developer could be identified (in most instances the potential areas of development are expected in the future and do not have developers as yet), they did not feel able to provide information to contribute to an industry assessment of the cost.

H14.10 For the purposes of the IA, it is assumed that as a result of MCZs, operators will incur additional costs for EIAs for renewable energy developments (JNCC and Natural England, 2011b). These costs are likely to comprise additional time to consider and report impacts of proposals on achieving the conservation objectives of features protected by MCZs (JNCC and Natural England, 2011c).

H14.11 MCZ habitats and species of conservation importance are on the Oslo and Paris Convention (OSPAR) (of Threatened and/or Declining Species and Habitats) and on the UK List of Priority Species and Habitats (UK Biodiversity Action Plan (BAP)). Impacts upon these features should already be considered in EIAs by the renewable energy sector in the absence of MCZ designations. Therefore, there are not expected to be any additional assessment requirements for these habitats and species of conservation importance (JNCC and Natural England, 2011a; JNCC and Natural England, 2011c).

H14.12 However, there will be additional requirements of the EIA to assess the potential impacts of proposed renewable energy developments upon MCZ broad-scale habitats. Although impacts on habitats are currently assessed in the absence of MCZs, impacts are not specifically assessed for the broad-scale habitats protected by MCZs (JNCC and Natural England, 2011a; JNCC and Natural England, 2011c). As described in JNCC and Natural England (2011b), the IA assumes that the additional requirements of the EIA are likely to comprise:

- obtaining information on the MCZ, its boundary, the features it protects and their conservation objectives;
- considering the impacts of the proposed development on the MCZ broad-scale habitat features and their conservation objectives.

H14.13 It is assumed that developers will not incur costs for assessing the impact of the proposed development upon the overall ecological coherence of the MCZ network. This is because it is assumed that if such assessment is necessary, it will be undertaken by Natural England or the JNCC (JNCC and Natural England, 2011c).

H14.14 Where possible, site-specific costs have been used to inform site-specific assessments of additional costs for future licence applications for the renewable energy sector. Nine site-specific estimates were provided by seven wind farm developers who have developments (existing or planned) in close proximity to rMCZs. Annex N13 provides details of how the estimates provided by developers were used to derive site-specific estimates of costs. One wind farm developer (with a development in a rMCZ) did not provide a cost for the estimated additional EIA costs, and so an average of the costs provided by the other seven wind farm developers was used for that wind farm.

H14.15 There are currently no site-specific developers for areas of potential wave and tidal energy development in rMCZs. Wave and tidal energy costs for Scenario 1 are based on an average of generic costs provided by Scottish Power Renewables (pers. comm,. 2011) and by the wind farm developers.

H14.16 For reasons of commercial confidentiality, three of the wind farm developers have provided cost estimates to inform the IA on the conditions that the itemised costs can be used to inform the IA analysis but are not be published in the IA. These are Centrica (for the Round 3 Irish

Sea Zone), RWE (for the Round 3 Atlantic Array Zone) and Smartwind (for the Round 3 Dogger Bank Zone). Centrica and Smartwind have also stated that the estimates of costs that they have supplied must not be attributed to a specific wind farm development or rMCZ in the IA.

H14.17 Centrica, Smartwind and RWE have stated that the costs that they have provided can be included in total costs in the regional and national summaries of impact. However, because including Centrica's costs in the regional summary of impact in the ISCZ project area would also disclose them (because the costs are the sum of data provided by only two developers), an average of the eight cost estimates, provided by eight developers, has been used instead for this development. This means that a regional cost estimate to the renewable energy sector under Scenarios 1 and 2 can be provided in Annex F and that rMCZ-specific costs can be provided in Annex I for the Irish Sea Project Area.

H14.18 The site-specific estimates of costs for future licence applications provided by two other developers (Forewind and RWE Npower) for three rMCZs and two rMCZs respectively in Scenario 1 and Scenario 2, have also had to remain confidential in the calculation of costs at Annex N13. This is because it would be possible to identify Smartwind's site-specific costs for these rMCZs if they were included.

H14.19 The four remaining developers have confirmed that they are content for their itemised costs to be published in the IA.

Assumptions about mitigation of impacts on rMCZ features

H14.20 In rMCZs that are not rMCZ Reference Areas, in Scenario 1 it is assumed that no additional mitigation of impacts upon features protected by MCZs will be required compared to the mitigation of impacts required in the absence of the MCZ. This is because:

- impacts on MCZ habitats and species that are on the OSPAR List (of Threatened and/or Declining Species and Habitats) and the UK List of Priority Species and Habitats (UK BAP) are already mitigated for in the absence of MCZs;
- for broad-scale habitats, the footprint of renewable energy developments and their cables is unlikely to significantly impact on the overall condition of the broad-scale habitat.

H14.21 This assumption applies only to MCZs that are not rMCZ Reference Areas. It is informed by advice on the impacts that these activities could have on MCZ features (JNCC and Natural England, 2011a) compared to the mitigation of impact that is already required in the absence of MCZs for renewable energy developments. The assumption does not pre-judge any future site-specific licensing decisions.

H14.22 In rMCZs that are rMCZ Reference Areas, renewable energy developments and power export cable routes will be prohibited. This is because the installation and operation of renewable energy infrastructure is a depositional and/or extractive activity which is not permitted in an rMCZ Reference Area (JNCC and Natural England, 2010). There are currently no known existing or planned wind farm developments within any of the potential rMCZ Reference Areas. However, three rMCZ Reference Areas may overlap with areas with potential for wave and tidal energy development (The Crown Estate, pers. comm,. 2012). As it is not known if any specific licence applications are likely to come forward for these areas of potential for wave and tidal energy development, the potential cost to the sector is not assessed.

2.2 Scenario 2

H14.23 An alternative scenario was developed based on advice on additional costs of mitigation that could be included in the analysis provided by JNCC and Natural England (pers. comm., 2012). The advice was provided in response to concerns raised by renewable energy developers in their feedback to the regional MCZ projects on Scenario 1 in early 2012. The developers were concerned that Scenario 1 under-estimates the additional cost that the sector could incur due to the designation of MCZs.

H14.24 Scenario 2 allows for the possibility that further costs may be incurred once site-specific licensing decisions are made. The assumptions made in Scenario 2 (based on advice provided by JNCC and Natural England (pers. comm., 2012)) and the associated costs (based on estimates provided by developers) are set out in Table 1 and described below. JNCC and Natural England have indicated that in their view, Scenario 2 is very likely to over-estimate the impact of MCZ designations upon the renewable energy sector (pers. comm., 2012). For clarity, Table 1 also highlights the differences between Scenarios 1 and 2.

H14.25 The sources of costs used in Scenario 2 (other than those also used in Scenario 1) are given in Table 1. These costs were applied to wave and tidal energy developments as well as wind farm developments.

H14.26 Several developers who contributed cost estimates to inform the IA have requested data confidentiality. This is described at paragraphs H14.16-H14.20 and applies to data used to inform both Scenarios 1 and 2.

Assumptions about the assessment of environmental impact

H14.27 It is assumed that as a result of MCZs, operators will incur additional costs for EIAs for renewable energy developments (JNCC and Natural England, 2011b). These costs are likely to comprise additional time to consider and report impacts of proposals on achieving the conservation objectives of features protected by MCZs (JNCC and Natural England, 2011c). This assumption is the same as Scenario 1. Paragraphs H14.9-14.13 provides more explanation. The same cost estimates were used in Scenario 2 as for Scenario 1 for this assumption.

Assumptions about mitigation of impacts on rMCZ features

Re-routing of cables to mitigate impacts on rMCZ Reference Areas:

H14.28 As for Scenario 1, Scenario 2 assumes that renewable energy developments (including export cable routes and inter-array cable routes) will be prohibited within rMCZ Reference Areas. This is because the installation and operation of renewable energy infrastructure is a depositional and/or extractive activity which is not permitted in an rMCZ Reference Area (JNCC and Natural England, 2010). There are currently no known existing or planned wind farm developments (or inter-array cabling) within any of the potential rMCZ Reference Areas. Three rMCZ Reference Areas may overlap with areas with potential for wave and tidal energy development (The Crown Estate, pers. comm,. 2012). As it is not known if any specific licence applications are likely to come forward for these areas of potential for wave and tidal energy development, the potential cost to the sector is not assessed.

H14.29 Unlike Scenario 1, Scenario 2 considers the potential impact of rMCZ reference areas upon possible cable routes associated with wind farm infrastructure as illustrated in the Offshore Development Information Statement (ODIS) (National Grid, 2011). This possible impact was not identified by the renewable energy sector. Planning of routes for these cables is at very early stages and no cable specific routes are yet available. The assessment is based on a rough comparison of the location of rMCZs with the outline illustrative cable routes published in the ODIS (National Grid, 2011), which was undertaken by the regional MCZ projects. These costs are not included in Scenario 1 because they are very uncertain as the specific cable routes are not yet known and no planning applications have been submitted.

H14.30 The ODIS identifies that one rMCZ Reference Area potentially overlaps with a possible route of a future Round 3 wind farm export cable in the Irish Sea, and five further rMCZ Reference Areas potentially overlap with possible routes for future offshore national grid transmission cables (associated with wind farm infrastructure) (National Grid, 2011). The additional length of cable route that would be required for these possible routes to avoid rMCZ Reference Areas has been estimated by the regional MCZ projects using information that they have on the possible routes. Where the route is not known, it is assumed that the length of the additional route will be half the circumference of the rMCZ. The cost of an increase in cable route is estimated at £1.01m/km based on information provided by developers (further information is provided in Table 1)

H14.31 Any possible duplication of information on cable routes in the ODIS and proposed routes for specific Round 3 export cables provided by individual developers and The Crown Estate (pers. comms., 2011, 2012) has been removed based on the knowledge of JNCC (pers. comm., 2012) and regional MCZ project staff. A cost is not attributed to cables in the ODIS that are known to be telecom or interconnectors because of the consenting provisions that these cables are subject to, which are outlined in the cables method paper (see Annex H6). Impacts on possible cable routes for telecom and interconnector cables are not assessed under impacts on renewable energy because they are not considered to be infrastructure that is subject to the requirements for planning permission for renewables infrastructure (JNCC, pers. comm., 2012).

Mitigation of impacts of cable protection:

H14.32 In Scenario 2, it is assumed that yet-to-be-consented renewable energy cables (export and inter-array) and possible transmission cable routes as illustrated in the Offshore Development Information Statement (ODIS) (National Grid, 2011) will be required to use alternative methods of cable protection when installed in rMCZs that are not reference areas. This will be required to mitigate the potential impact of cable protection upon features protected by MCZs (Natural England, pers. comm., 2012). For the purposes of the IA, it is assumed that this additional mitigation of impacts is not required for turbine bases (Natural England, pers. comm., 2012).

H14.33 Scenario 2 assumes that mitigation of impacts of cable protection is required for the entire lengths of proposed cable routes for renewable energy developments within rMCZs and that mitigation will be provided through the use of removable frond mattressing for cable protection. Where the specific cable route is not known then the length of the cable route that would require alternative cable protection is estimated to be equal to the length of the rMCZ (at its longest point). For coastal sites it is assumed to be the length of the rMCZ perpendicular to the coast as this would be the direction of the cable route. These assumptions are made in the absence of information on the lengths of cable route for which mitigation of impacts of cable protection will be

required, the least cost method for mitigating the impacts where it is required and to avoid under-estimation of costs. For reasons described below, this greatly over-estimates the costs.

H14.34 It is assumed that the mitigation results in a one-off cost that arises for each renewable energy development that has a proposed, yet-to-be-consented cable route passing through an rMCZ (that is not a reference area). This applies to power export cable routes associated with 12 planned or proposed wind farms in the MCZ project area:

- Net Gain: Galloper Extension, Triton Knoll, Race Bank, Blyth Offshore Demonstration Site and Round 3 (Dogger Bank – Zone 3, Hornsea – Zone 4, and East Anglia – Zone 5) and national grid offshore transmission cables.
- Irish Sea: Walney Extension and Round 3 (Irish Sea – Zone 9).
- Balanced Seas: Gunfleet Sands Demonstration Site, London Array and Thanet.

H14.35 It also applies to inter-array cable routes associated with three planned or proposed wind farms in the MCZ project area: Atlantic Array in rMCZ North of Lundy (Finding Sanctuary), Walney Extension wind farm in the Potential Co-location Zone (Irish Sea) and the Round 3 Zone 4 Hornsea wind farm in rMCZ NG 7 (Net Gain). These are the only yet-to-be-consented wind farms that overlap with an rMCZ.

H14.36 Advice provided by JNCC and Natural England (pers. comm., 2012) on the mitigation of impacts of cable protection that are likely to be required as a result of MCZs in practice indicates that the above assumptions are likely to significantly over-estimate the costs. JNCC and Natural England have advised that mitigation of impacts of cable protection could only be considered to be required as a result of MCZs only for soft sediment MCZ broad-scale habitats that are sensitive to impacts of cable protection. Impacts on all FOCI should be provided in the absence of MCZs (see paragraph H14.20). Also, JNCC and Natural England have advised that the mitigation could only be considered to be required for MCZ broad-scale habitats for which the footprint of the habitat was deemed to be significantly impacted on by the cable. For these two reasons, JNCC and Natural England (pers. comm., 2012) have advised that it is highly unlikely that mitigation of impacts of cable protection will be required for any of the developments listed above due to the designation of MCZs.

H14.37 Also, JNCC and Natural England (pers. comm., 2012) have advised that if cable protection is considered to impact on MCZ features and if mitigation is therefore required, the cost of arising as a result of the MCZ is likely to be much lower than the estimate employed in the IA. This is because the alternative methods that can be employed for cable protection that would mitigate impacts will be site-specific and will not necessarily be as expensive as using frond mattressing. The IA assumes estimates the cost of mitigation in terms of the additional cost of using removable frond mattressing compared to cheaper and more commonly used forms of cable protection (such as rock dumping) that would impact on the MCZ features. Frond mattressing is an expensive form of alternative cable protection and assuming this is used to provide mitigation reduces the risk of under-estimating the impact to the sector. The IA assumes that the additional cost of using frond mattressing relative to more commonly used methods of cable protection is £1m/km of cable route, which is based on four quotes from four developers (see Table 1). JNCC (pers. comm., 2012) has indicated that this is likely to be an over-estimate.

H14.38 JNCC and Natural England (pers. comms., 2012) advise that the requirement for mitigation of impacts of cable laying in rMCZs, will be determined for each development on a site-specific basis. They point out that the operator's response to the licensing conditions is likely to be influenced by cost. For example, if mitigation of the impact of cable protection on sensitive MCZ features is required, the operator may use removable frond mattressing, or may instead re-route the cable around the sensitive MCZ feature; whichever is cheapest if the cable cannot be buried. The costs of this will be attributable to the MCZ only where mitigation is provided for MCZ features that are broad-scale habitats (as discussed above). Frond mattressing is likely to be required only for sedimentary broad-scale habitats. Micro-routing may be required around reef features but this would d would most likely be required in the absence of MCZs as mitigation of impact on MCZ features of conservation interest (habitats and species) would need to be provided anyway, because they are on the OSPAR and BAP Lists. Because of the uncertainty concerning these costs, the potential cost or re-routing around features of conservation interest in rMCZs that are not reference areas has not been estimated in the IA. Instead it is assumed that the operator would also opt to mitigation impact on rMCZ features by installing alternative cable protection.

H14.39 As JNCC and Natural England (pers. comm., 2012) advise that mitigation of impacts of cable protection on sensitive rMCZ features is highly unlikely to be required (based on the reasons given above), the potential additional cost of mitigating the impacts of cable protection for inter-array cabling within rMCZs has not been quantified in the IA. Mitigation of impacts of cable protection for proposed routes of inter-array cabling in MCZs could be a significant unknown cost of MCZs, though it is unlikely to arise. Defra (pers. comm., 2012) is content with this approach.

Additional survey costs for repowering and decommissioning:

H14.40 Scenario 2 assumes that additional assessment of impacts on MCZ features is required in the repowering plan and decommissioning plan for a renewable energy development. The costs of this are unlikely to arise for any developments within the 20 year period covered by the IA and cannot be quantified at this stage.

Table 1: Assumptions and cost estimates for the impact of MCZs upon renewable energy developments used in Scenario 2

Development phase	Assumption	Additional cost due to MCZs (£m)
Pre-planning	EIA (desk-top assessment): It is assumed that additional consultant/staff time is required to consider the MCZ location, its features and their conservation objectives in the EIA (based on JNCC and Natural England advice (JNCC and Natural England, 2011b)). This includes additional time to assess the impact of the proposed development upon the broad-scale habitats in the MCZ, but no additional data collection is assumed to be required. This assumption is also included in Scenario 1.	Developer and site-specific costs used as per Scenario 1 (nine estimates provided by seven wind farm operators and one estimate provided by wave/tidal energy developer – see Annex N13).
Construction	It is assumed that yet-to-be-consented renewable energy cables (export and inter-array) and possible transmission cable routes as illustrated in the *Offshore Development Information Statement (ODIS)* (National Grid, 2011) will be required to re-route around an MCZ that is an rMCZ Reference Area. It is assumed that all costs are one-off for each cable. This assumption is included in Scenario 1 also. However, as there are no existing or proposed cable routes passing through rMCZs Reference Areas (The Crown Estate, pers. comm., 2012), there is no cost for this in Scenario 1. Because the costs for the cable routes outlined in ODIS are very uncertain, as the specific cable routes are not yet known and no planning applications have been submitted; the cost of impact on these cables is included in Scenario 2 only. If the direction of the proposed ODIS cable route is not known then the length of the additional route to travel to re-route around the rMCZ is assumed to be half the circumference of the rMCZ.	Four quotes have been provided by 3 wind farm developers and the other from ABPmer (2011) – see Annex N13. Costs from two of the developers (Centrica and SSE RWE Npower) are however confidential. The other estimates are £2m/km/cable (Dong Energy) and £450k-£1m/km/cable (ABPMer 2011 study). An average of the four estimates is used in the IA which is £1.01m/km/cable. Although the assumption applies to inter-array cables as well as export cables, it is not anticipated that any inter-array cabling will seek to pass through rMCZ Reference Areas as no renewable energy developments are expected to overlap with rMCZ Reference Areas.
	It is assumed that yet-to-be-consented renewable energy cables (export and inter-array) and possible transmission cable routes as illustrated in the Offshore Development Information Statement (ODIS) (National Grid, 2011) will be required to use alternative methods of cable protection when installed in rMCZs that are not reference areas. This will be required to mitigate impact of the cable protection upon features protected by MCZs (Natural England, pers. comm., 2012). This cost is estimated in terms of the additional cost of using removable frond mattressing compared to alternative forms of cable protection (such as rock dumping). It is assumed that this is a one-off cost that arises for each renewable energy development.	Estimated additional cost (provided by developers) of using removable frond mattressing compared to using other types of cable protection vary considerably and range from an additional £0.1m per wind farm (RWE NPower), to approximately £1m/km of cable (specifically for a frond mat of 3m x 6m) (DONG Energy, pers. comm., 2012) to £3m/km of cable for an alternative type of installation to rock dumping (DONG Energy, pers. comm., 2012). One other estimate was provided by SSE RWE Npower but this is confidential.

Development phase	Assumption	Additional cost due to MCZs (£m)
	For the purposes of the IA, it is assumed that this additional mitigation of impacts is not required for turbine bases (Natural England, pers. comm., 2012). While mitigation of impacts of cable protection is likely only to be required in MCZs with soft sediment features (Natural England, pers. comm., 2012), for ease of analysis it is assumed to apply to all rMCZs that are likely to overlap with yet-to-be-consented power export cable routes (The Crown Estate, pers. comm., 2012) and transmission cables identified in the Offshore Development Information Statement (ODIS) (National Grid, 2011). This assumption is not included in Scenario 1 because it JNCC and Natural England have advised that it is highly unlikely that mitigation of impacts of cable protection will be required for known wind farm developments as a result of MCZs and because the cable routes outlined in ODIS are very uncertain.	Based on the above the IA assumes an additional one-off cost of £1.00m/km for alternative cable protection to mitigate the harmful impacts features protected by MCZs. If the specific cable route is not known then the length of the cable route that would require alternative cable protection is estimated to be equal to the length of the rMCZ (at its longest point). For coastal sites it is assumed to be the length of the rMCZ perpendicular to the coast as this would be the direction of the cable route. This avoids under-estimation of the costs.
Repowering	It is assumed that additional assessment of impact upon MCZ features is required in the repowering plan. Repowering is assumed to be required in year 25 of the development and is unlikely to arise within the 20 year period covered by the IA. This cost is not included in Scenario 1.	Not possible to quantify at this time.
Decommissioning	It is assumed that additional assessment of impact upon MCZ features is required in the decommissioning plan. Decommissioning is assumed to be required in year 50 of the development and is unlikely to arise within the 20 year period covered by the IA. This cost is not included in Scenario 1.	Not possible to quantify at this time.

2.3 Concerns raised by developers

H14.41 In response to Scenario 1, which is based on the advice of the JNCC and Natural England (JNCC and Natural England, 2011a), seven wind farm developers (or consortia) raised concerns about the impacts that MCZs could have on ten wind farm developments. The developers each supplied the regional MCZ projects with details of their concerns about how their operations could be impacted upon by MCZs and estimates of the costs of these impacts (set out in Table 2). The Crown Estate (pers. comms., 2011 and 2012) also stated its concerns which have been incorporated into the analysis. Wave and tidal energy developers did not provide such information. The developers' estimates are the same as those included in Scenario 1 apart from the differences explained below.

H14.42 The regional MCZ project economists discussed with the seven wind farm developers their concerns. Discussions were conducted in person, by telephone and by email. Based on information provided by the developers, the regional MCZ projects developed estimates of costs during the period August to November 2011. Both the developers' concerns and their estimates of the costs are specific to each wind farm development and developer. These estimates provide the highest valuation of costs to renewable energy in the IA (in the absence of site-specific consenting decisions about future developments). The costs are summarised in the narrative for the IA but are not included in the estimates of costs used in the IA Summary. This is because JNCC and Natural England have advised that the concerns raised by the developers and the additional costs of these are very unlikely to arise (pers. comm,. 2011).

H14.43 Three of the wind farm developers who informed the industry estimate of costs have requested that their itemised costs are kept confidential. These are Centrica (for the Round 3 Irish Sea Zone), RWE (for the Round 3 Atlantic Array Zone) and Smartwind (for the Round 3 Dogger Bank Zone). Centrica and Smartwind have also stated that the estimates of costs that they have supplied must not be attributed to a specific wind farm development or rMCZ in the IA. These costs may be used to inform cost estimates for each Project Area and for the entire suite of rMCZs only.

H14.44 Centrica, Smartwind and RWE have stated that the costs that they have provided can be included in total costs in the regional and national summaries of impact. However, because including Centrica's costs in the regional summary of impact in the ISCZ project area would also disclose them (because the costs are the sum of data provided by only two developers), it is not possible to provide a regional figure for the industry estimate of cost for the Irish Sea Project Area.

H14.45 The four remaining developers have confirmed that they are content for their itemised costs to be published in the IA.

Assumptions about the increased costs of assessing environmental impacts in future licence applications

H14.46 Developers anticipate that the additional work involved in assessing impacts of proposed developments on MCZ features in support of future licence applications will significantly exceed that assumed in Scenarios 1 and 2 (set out in Section 2.1). Details are provided in Table 2. The Crown Estate has also stated that it anticipates that developers will be asked to conduct surveys of MCZ FOCI, which they do not currently carry out (The Crown Estate, pers. comm., 2012).

Assumptions about mitigation of impacts upon rMCZ features

H14.47 Developers also anticipate that the additional mitigation of impacts of renewable energy developments upon MCZ features that will be required will exceed that anticipated by JNCC and Natural England and assumed in Scenarios 1 and 2. The additional mitigation that developers anticipate will be needed differs between developments. Further information is provided in Table 2.

Table 2: Developers' assumptions and estimates for additional site-specific impacts of MCZs upon wind farm developments. Some costs are confidential are omitted from the table (source: wind farm developers, pers. comms., 2011)

Development phase	Developers' concerns about potential additional impacts of MCZs	Additional cost arising due to MCZs (£m)
Pre-planning	EIA (additional surveys): Centrica, DONG Energy, RWE and Forewind are concerned that a different level of survey, assessment and monitoring could be required for ecosystem modelling, design surveys plus pre-construction surveys. As a result, increased costs could be incurred for additional benthic and bird surveys, as well as additional analysis of water quality. The same developers are concerned that as a result of MCZs they may have to target surveys at MCZ Features of Conservation Importance (i.e. redesign their survey method) which could involve additional time and cost to the developer. The same amount of work would need to be undertaken in relation to one rMCZ as for a number of rMCZs	*Centrica (Round 3 Irish Sea Zone):* Up to [cost omitted] additional costs for each EIA. These costs relate to (arise from) the following rMCZs in the Irish Sea: rMCZ 3 and rMCZ Reference Area S. *DONG Energy (Walney 1and2, Walney Extension and West of Duddon Sands and East Anglia wind farms):* If a new EIA is needed, a one-off additional cost of £5m could be incurred, if extensive geophysical surveys that involved vessel hire are required as a result of the MCZ. DONG energy anticipates that additional surveys may be required to monitor the impact of anchoring, noise and vibration, wave-buoy installation, marine traffic, localised sediment removal (benthic grabs) and seabed disturbance, varying in cost from £0.035m to £0.2m per survey. Relates to Net Gain rMCZs 1b and 8 in the North Sea and the Potential Co-Location Zone (PCLZ) in the Irish Sea. *RWE (Atlantic Array wind farm)*: Additional survey cost of between [cost omitted] and [cost omitted]. One year delay in commencement of profit generation – 1 year of profit roughly equal to [cost omitted] of capital costs. Relates to Morte Platform and North of Lundy rMCZs. *Forewind (Dogger Bank wind farm):* Additional cost of conducting Phase 2 habitat surveys for any landfall and that increased coverage of geophysical survey will be needed. Estimated at approximately £0.005m to £0.02m per project. For

Table 2: Developers' assumptions and estimates for additional site-specific impacts of MCZs upon wind farm developments. Some costs are confidential are omitted from the table (source: wind farm developers, pers. comms., 2011)

Development phase	Developers' concerns about potential additional impacts of MCZs	Additional cost arising due to MCZs (£m)
		individual rMCZs the additional cost varies from £0.025m to £0.120m. Relates to Net Gain rMCZs 5, 6, 8, 9, 10, 11 and 13 in the North Sea.
	EIA (licensing cost): Centrica is concerned that the Marine Management Organisation (MMO) will invoice the developer for its time to consider and review the impact upon MCZ features and their conservation objectives in the licence application process. It is also concerned that the Infrastructure Planning Commission (IPC) will contract in specialist expertise (e.g. a benthic ecology expert) to inform its consideration of the impact of the licence application upon the MCZ features and conservation objectives. Centrica assumes that the cost of this will be invoiced to the developer and will be incurred for each EIA. Centrica is also concerned that regulators and statutory nature conservation bodies will take longer to respond to proposed development consultations as a result of MCZ designation, which will lead to delays to project delivery.	*Centrica (Round 3 Irish Sea Zone):* Assuming that these additional costs arise, Centrica provides the following estimates. One-off costs of [cost omitted] for inputs by the MMO are assumed to be incurred per EIA although the cost could be considerably more depending on what information/evidence of impact the MMO seeks. A conservative estimate is made for expertise contracted by the IPC of [cost omitted] per EIA (one-off cost). However, this could be much higher depending on what specialist expertise the IPC contracts. Relates to rMCZ 3 and rMCZ Reference Area S in the Irish Sea.
	EIA (desk-top assessment): The developers listed in the costs column anticipate that additional consultant/staff time is required to consider the MCZ location, its features and their conservation objectives in the EIA (JNCC and Natural England, 2011c). This includes additional time to assess the impact of the proposed development upon the broad-scale habitats in the MCZ, but the estimates of costs assume that no additional data collection is required. The costs of this are also included in Scenarios 1 and 2.	*Centrica (Round 3 Irish Sea Zone):* The additional one-off cost for each EIA is assumed to be 20 days at [cost omitted]. The maximum cost of [cost omitted] includes other costs such as additional legal fees to review the EIA, provide advice, re-review, and attend meetings with agencies etc. Relates to rMCZ 3 and rMCZ Reference Area S in the Irish Sea. *DONG Energy (Walney 1and2, Walney Extension, West of Duddon Sands and East Anglia wind farms):* The additional cost for each EIA is assumed to be 3 days at £700/day = £0.002m one-off cost per broad-scale habitat. Relates to NG1b, NG8 in the North Sea and PCLZ in the Irish Sea.

Table 2: Developers' assumptions and estimates for additional site-specific impacts of MCZs upon wind farm developments. Some costs are confidential are omitted from the table (source: wind farm developers, pers. comms., 2011)

Development phase	Developers' concerns about potential additional impacts of MCZs	Additional cost arising due to MCZs (£m)
		Forewind (Dogger Bank wind farm): The additional cost for each EIA per development is assumed to be £0.005m to £0.010m. This relates to NG5, NG6, NG8, NG9, NG10, NG11 and NG13 in the North Sea. *Narec (Blythe offshore wind demonstration site):* The additional cost for each EIA is assumed to be £0.005m. Relates to NG13 in the North Sea. *SSE RWE Npower (Galloper Extension wind farm):* The additional cost is assumed to be £0.025m for additional analysis and consultation assessments, assuming only a small overlap with NG1b in the North Sea. *RWE Npower (Triton Knoll wind farm):* The additional costs arising as a result of NG4 and NG6 in the North Sea would be £0.025m. For NG5 in the North Sea this would be £0.05m. *RWE (Atlantic Array)*: between 16 and 20 additional days at [cost omitted]. Relates to rMCZ North of Lundy in the Celtic Sea.
Pre-construction (post-consent)	Additional surveys: DONG Energy and Forewind are concerned that, as a condition of development consent, additional geophysical or geotechnical surveys will be required due to MCZ designation. They anticipate that these surveys will be required to inform the development and design of alternative technical and engineering design options.	*DONG Energy (Walney 1and2, Walney Extension, West of Duddon Sands and East Anglia wind farms):* If the additional survey work cannot be adequately completed, the technical design and engineering cannot be completed and the licence terms will not be fulfilled. The licensing body could then prevent construction of the wind farm. The additional cost would be at

Table 2: Developers' assumptions and estimates for additional site-specific impacts of MCZs upon wind farm developments. Some costs are confidential are omitted from the table (source: wind farm developers, pers. comms., 2011)

Development phase	Developers' concerns about potential additional impacts of MCZs	Additional cost arising due to MCZs (£m)
		least £0.4m per development proposal. Relates to NG1b, NG8 in the North Sea and PCLZ in the Irish Sea. *Forewind (Dogger Bank wind farm):* For individual rMCZs the cost of additional coverage for the geophysical survey varies from £0.025m to £1m. Relates to NG5, NG6, NG8, NG9, NG10, NG11 and NG13 in the North Sea.
	Additional monitoring: RWE NPower is concerned that licence conditions will require additional monitoring of the various impacts upon the MCZ features, over and beyond the monitoring planned in the absence of the MCZ. The monitoring would be more frequent and employ a different methodology, and a longer monitoring period would be required than in the absence of an MCZ. It is also concerned there may be a need to re-assess and submit an entirely new EIA if different requirements for baseline work are required as a result of the MCZ.	*RWE Npower (Triton Knoll wind farm):* Additional costs up to £0.25m/yr may be incurred in each year that additional monitoring is required. Relates to NG4, NG5 and NG6 in the North Sea.
Development and construction	Centrica, RWE Npower, DONG Energy and SSE RWE Npower are concerned that there will be additional cable installation costs for cables that pass through an MCZ. Also that additional costs will arise for re-routing round an rMCZ Reference Area the route for a cable that would have been proposed through rMCZ Reference Area in the absence of the site. It is assumed that all costs are one-off for each export cable.	*Centrica (Round 3 Irish Sea Zone):* Additional installation costs of [cost omitted]. Re-routing cost of [cost omitted]. Relates to rMCZ 3 and rMCZ Reference Area S in the Irish Sea. *RWE Npower (Triton Knoll wind farm):* Re-routing costs could be £0.6m per 132kV cable per km offshore and £0.59m per 132kV cable per km onshore. Additional costs per site vary from £5.4m to £101m. Relates to NG4, NG5 and NG6 in the North Sea. *DONG Energy (East Anglia wind farm only):* Re-routing costs could be £2m/km of cable. Relates to NG1b, NG8 in the North Sea and PCLZ in the Irish Sea.

Table 2: Developers' assumptions and estimates for additional site-specific impacts of MCZs upon wind farm developments. Some costs are confidential are omitted from the table (source: wind farm developers, pers. comms., 2011)

Development phase	Developers' concerns about potential additional impacts of MCZs	Additional cost arising due to MCZs (£m)
		SSE RWE Npower (Galloper Extension wind farm): Re-routing costs could be £0.6m per 132kV cable per km. Relates to NG1b in the North Sea.
	DONG Energy and RWE are concerned that alternative forms of foundation will need to be explored/designed in order to reduce the area of seabed impacted upon by each turbine foundation in an MCZ, compared to if the MCZ was not designated. Redesign of the foundation would need to consider both the size of the foundation required and the amount of scour protection required. Currently, the foundation types that take up the least area of seabed are monopile, jacket and gravity base. There are other foundation types that are not yet in commercial production but are currently considered experimental (e.g. caisson/buckets and floating turbines). Of these the caisson/bucket would not be likely to reduce the area of seabed impacted compared to say a monopile.	*DONG Energy (Walney 1and2, Walney Extension, West of Duddon Sands and East Anglia):* It is not possible to estimate the additional costs at this time. DONG Energy anticipates that the additional costs would apply once per development proposal. If the regulator's preferred foundation is different to the most viable in terms of maximum stability, there would be a cost impact. If a licence condition was revoked and a new type of foundation was required, the financially viability of a development would be undermined. Relates to NG1b, NG8 in the North Sea and PCLZ in the Irish Sea. *RWE (Atlantic Array):* If rock-dumping is not acceptable and alternative scour protection methods are required, such as frond mattresses, this could result in an increase or decrease in costs of approximately [cost omitted] per turbine. Relates to North of Lundy in the Celtic Sea.
	DONG Energy are concerned that if the use of jack-up vessels was prevented as a condition of a licence for a wind farm in an MCZ, an alternative stable platform would need to be sought. Other vessels (i.e. dynamic positioning vessel or a floating barge) would not be appropriate as construction would become extremely risky. No known alternative is currently known.	*DONG Energy (Walney 1and2, Walney Extension and West of Duddon Sands):* Not possible to cost at this time. Relates to NG1b, NG8 in the North Sea and PCLZ in the Irish Sea.
	Ploughing penetrates the seabed when laying cables and is the preferred installation by both the developer and usually the regulator. DONG Energy and RWE are concerned that, if an alternative	*DONG Energy (Walney 1and2, Walney Extension and West of Duddon Sands):* Not possible to cost at this time. Currently, DONG Energy assumes that power export cables would be

Table 2: Developers' assumptions and estimates for additional site-specific impacts of MCZs upon wind farm developments. Some costs are confidential are omitted from the table (source: wind farm developers, pers. comms., 2011)

Development phase	Developers' concerns about potential additional impacts of MCZs	Additional cost arising due to MCZs (£m)
	installation method was required as a condition of a licence due to the presence of an MCZ, this would incur additional capital cost, but also additional cost from potential time delays.	ploughed in the site and that inter-array cables would be jetted in the site. The next best alternative if required by marine licence due to the presence of an MCZ would be to use a remotely operated vehicle and trenching. If this was not allowed rock-cutting would be used. Relates to NG1b, NG8 in the North Sea and PCLZ in the Irish Sea. *RWE (Atlantic Array):* Additional costs would arise from restrictions on use of secondary inter-array cable protection. RWE also assumes that trenching will be required rather than ploughing in areas of hard seabed. These could increase cabling costs by [cost omitted]. Relates to North of Lundy rMCZ in the Celtic Sea.
	DONG Energy is concerned that a full baseline geophysical survey will be required across a wind farm site (or for a larger area than would currently be considered in the absence of an MCZ) during construction as well as pre-construction.	*DONG Energy (Walney 1and2, Walney Extension and West of Duddon Sands):* These additional costs would range from £0.1m to £0.5m. Relates to NG1b, NG8 in the North Sea and PCLZ in the Irish Sea.
	Centrica, RWE Npower, Forewind, SSE RWE Npower and RWE are concerned that there will be vessel restrictions and possibly no vessel access in MCZs, including seasonal closures and restricted working times (due to the impacts of noise and disturbance etc.).	*Centrica (Round 3 Irish Sea Zone):* There would be extra fees for mobilisation and demobilisation of vessels. An environmental based survey vessel costs approximately [cost omitted] per day. The impacts on the use of construction vessels could be larger. This is because mobilisation rates for construction vessels are much greater than for development survey vessels (depending on water depth costs can be up to [cost omitted]). Other issues with seasonal closures generally arise from the difficulty in sourcing the same crew, paying higher rates to retain crew for an additional time period etc. Also it is assumed that there is an additional cost of [cost omitted]

Table 2: Developers' assumptions and estimates for additional site-specific impacts of MCZs upon wind farm developments. Some costs are confidential are omitted from the table (source: wind farm developers, pers. comms., 2011)

Development phase	Developers' concerns about potential additional impacts of MCZs	Additional cost arising due to MCZs (£m)
		per year of construction for vessels to navigate around rMCZs and rMCZ Reference Areas. Additional costs that could arise during construction include delayed first power, additional mobilisation fees etc. Relates to rMCZ 3 and rMCZ Reference Area S in the Irish Sea. *RWE Npower (Triton Knoll wind farm):* If more specialist vessels need to be used, this could lead to an estimated additional cost of £0.3m/km. Relates to NG4, NG5 and NG6 in the North Sea. *Forewind (Dogger Bank wind farm):* If more specialist vessels need to be used, this could lead to an estimated additional cost of £0.3m/km. Additional costs per site would range from £2m to £80m. Seasonal restrictions would lead to delays in cable installation at an additional cost of £0.08m to £0.1m/day. Seasonal restrictions of 1 month could push the construction period further into winter, which would cause additional delays, as for more than 50% of the winter period work cannot be done because of the weather conditions. Total estimated delay is around 3 months at a total additional cost of £7 to £9m per project. Relates to NG5, NG6, NG8, NG9, NG10, NG11 and NG13 in the North Sea. *SSE RWE Npower (Galloper Extension wind farm):* If more specialist vessels need to be used, this could lead to an estimated additional cost of £0.3m/km. Relates to NG1b in the North Sea.

Table 2: Developers' assumptions and estimates for additional site-specific impacts of MCZs upon wind farm developments. Some costs are confidential are omitted from the table (source: wind farm developers, pers. comms., 2011)

Development phase	Developers' concerns about potential additional impacts of MCZs	Additional cost arising due to MCZs (£m)
		RWE (Atlantic Array wind farm): Additional costs could arise from micro-siting of vessel anchorages [Cost omitted] and if an alternative cable installation vessel is required (although the latter is unlikely). Additional cost of cable laying with alternative vessel: [cost omitted]. Relates to North of Lundy rMCZ in the Celtic Sea.
	Centrica and RWE Npower anticipate that there would be knock-on delays to applications to the National Grid if the EIA is delayed or requires extra surveys, modelling or assessment.	*Centrica (Round 3 Irish Sea Zone):* [Cost omitted]. Relates to rMCZ 3 and rMCZ Reference Area S in the Irish Sea. *RWE Npower (Triton Knoll wind farm):* A delay of 3 months could result in additional costs of £150 to £200m. Relates to NG4, NG5 and NG6 in the North Sea.
	The six developers listed in the costs column are concerned that there would be knock-on delays to cable construction associated with delays in cable installation.	*Forewind (Dogger Bank wind farm):* A delay of 3 months could equate to additional costs of £125m per project. Additional costs per site would range from £625m to £990m. Relates to NG5, NG6, NG8, NG9, NG10, NG11 and NG13 in the North Sea. *SSE RWE Npower (Galloper Extension wind farm):* A delay of 3 months could equate to additional costs of £150m to £200m. Relates to NG1b in the North Sea. *RWE Npower (Triton Knoll wind farm):* Any delay in cable installation could increase costs by up to £0.3m/km. *DONG Energy (East Anglia wind farm only):* Any delay in cable installation could increase costs by up to £360m. *SSE RWE Npower (Galloper Extension wind farm):* Any delay in

Table 2: Developers' assumptions and estimates for additional site-specific impacts of MCZs upon wind farm developments. Some costs are confidential are omitted from the table (source: wind farm developers, pers. comms., 2011)

Development phase	Developers' concerns about potential additional impacts of MCZs	Additional cost arising due to MCZs (£m)
		installation could increase costs by up to £0.3m/km. *RWE (Atlantic Array wind farm):* Micro-siting of jack-up barges would be required. This would incur an additional cost [cost omitted]. Repeat of geotechnical site investigation could be required, although the probability of this occurring is low. Relates to North of Lundy rMCZ in the Celtic Sea.
Operation and maintenance	Centrica and RWE are concerned that there would be vessel restrictions including seasonal closures and restricted working times (due to the impacts of noise and disturbance etc.) and possibly no access in MCZs.	*Centrica (Round 3 Irish Sea Zone):* If there are restrictions on vessel movements, additional fuel may be required to avoid rMCZs or rMCZ Reference Areas because routes would be longer [cost omitted]. Centrica assumes that this results in a yearly cost starting from the assumed first year of operation. Other additional costs that could arise are costs that would arise if an EIA is required for use of jack-up vessels, costs that would arise from delays in power generation and costs that would arise indirectly from contractual power delays. An EIA, depending on surveys and work, can cost from [cost omitted] for a 1 gigawatt site. There would be a knock-on delay in power generation and revenue. Relates to rMCZ 3 and rMCZ Reference Area S in the Irish Sea. *RWE (Atlantic Array wind farm):* If required, additional costs of micro-siting of vessel anchorages Are [Cost omitted]. An alternative cable repair vessel may be required although this is unlikely. Additional cost of cable laying with alternative vessel [cost omitted]. Relates to North of Lundy rMCZ in the Celtic Sea.

Table 2: Developers' assumptions and estimates for additional site-specific impacts of MCZs upon wind farm developments. Some costs are confidential are omitted from the table (source: wind farm developers, pers. comms., 2011)

Development phase	Developers' concerns about potential additional impacts of MCZs	Additional cost arising due to MCZs (£m)
	It is assumed that the use of a jack-up vessel for occasional operation and maintenance would be restricted because of restrictions on where the legs may be placed, when and how often. This would hinder or prevent continued maintenance. It is assumed that a floating crane would be used in the site, as an alternative to a jack-up vessel.	*DONG Energy (Walney 1and2, Walney Extension, West of Duddon Sands and East Anglia):* It is assumed that ongoing maintenance will be required over the life of each wind farm (so from the year of first operation to the end of the 20-year period of this IA). The additional costs are estimated based on £0.1m/day for using a floating crane instead of a jack-up vessel for a 2–4-week period each year. Relates to NG1b, NG8 in the North Sea and PCLZ in the Irish Sea.
	DONG energy and RWE are concerned that additional baseline geophysical surveys will be required across the whole wind farm site (or for a larger area than would currently be considered) in the 3 years post-construction.	*DONG Energy (Walney 1and2, Walney Extension and West of Duddon Sands):* This would incur an additional cost of £0.1m to £1.5m. Relates to NG1b, NG8 in the North Sea and PCLZ in the Irish Sea. *RWE (Atlantic Array wind farm):* Additional ongoing monitoring of environmental impacts would cost [cost omitted] for 5 years. Relates to North of Lundy rMCZ in the Celtic Sea.
	Forewind, RWE Npower and RWE are concerned that there would be an increase in the time taken to repair cables, which would result in a loss of revenue. This is because they are concerned that additional mitigation of impacts on MCZ features may be required compared with the mitigation needed in the absence of an MCZ. Also, as a result of MCZs, there could be a delay in gaining permission to repair cables.	*Forewind (Dogger Bank wind farm):* A delay of 3 months could equate to additional costs of £125m per project. Additional costs per site would range from £625m to £990m. Relates to NG5, NG6, NG8, NG9, NG10, NG11 and NG13 in the North Sea. *RWE Npower (Triton Knoll wind farm):* Lost revenue of several £m per day would arise from such delays. Relates to NG4, NG5 and NG6 in the North Sea. *RWE (Atlantic Array wind farm):* There would be additional downtime while the repair strategy was agreed with statutory bodies. RWE is also concerned that there would be restrictions on use of secondary inter-array cable protection. Additional

Table 2: Developers' assumptions and estimates for additional site-specific impacts of MCZs upon wind farm developments. Some costs are confidential are omitted from the table (source: wind farm developers, pers. comms., 2011)

Development phase	Developers' concerns about potential additional impacts of MCZs	Additional cost arising due to MCZs (£m)
		installation techniques would need to be attempted before secondary protection was accepted. Relates to North of Lundy rMCZ in the Celtic Sea.
	DONG energy is concerned that certain maintenance may be prevented or restricted and that re-jetting or rock-dumping for a cable that has become exposed would be prevented, leading to the cable becoming a hazard to fishers and anchorage.	*DONG Energy (Walney 1and2, Walney Extension and West of Duddon Sands):* Not possible to cost at this time. Relates to NG1b, NG8 in the North Sea and PCLZ in the Irish Sea.
Repowering	Centrica is concerned that additional assessment of impact upon MCZ features will be required in the repowering plan. Repowering is assumed to be required in year 25 of the development.	*Centrica (Round 3 Irish Sea Zone):* It is assumed that additional costs [cost omitted] would be incurred in the repower EIA in order to consider the impact upon MCZ features. The costs would arise from re-modelling, re-surveys and consultancy work. They excludes geotechnical surveys. This would happen after the 20-year IA period. Relates to rMCZ 3 and rMCZ Reference Area S in the Irish Sea.
Decommissioning	Centrica is concerned that additional assessment of impact upon MCZ features is required in the decommissioning plan. Decommissioning is assumed to be required in year 50 of the development.	*Centrica (Round 3 Irish Sea Zone):* It is assumed that additional costs [cost omitted] would be incurred in producing the decommissioning EIA in order to consider the impact upon MCZs. The costs would arise from re-modelling, re-surveys and consultancy work. They exclude geotechnical surveys. This would happen after the 20-year IA period. Relates to rMCZ 3 and rMCZ Reference Area S in the Irish Sea.

3 Assessment of the impact

H14.48 Information was collected from 11 renewable energy developers during the period June 2011 to November 2011 regarding the economic, environmental and social impacts of MCZs upon the renewable energy sector. Where relevant, concerns that they raised are presented in Annex F, Annex J1c and the Evidence Base. Eight of these developers (seven wind farm developers, one developer on behalf of wave and tidal energy) provided costs estimates to inform the IA.

H14.49 Where potential wave and tidal energy developments may in the future overlap with rMCZ Reference Areas, a qualitative description of the likely implications has been provided.

4 Limitations

H14.50 There are a number of limitations associated with the approach adopted in the IA that derive from the assumptions made for the purposes of the IA. These include:

- In both scenarios, in the absence of information about future renewable energy developments over the next 20 years, the IA assumptions may underestimate or overestimate the actual number of development proposals that will be impacted on by MCZs.
- In both scenarios, in the absence of information about what application decisions will actually be made over the next 20 years, the IA assumptions may underestimate or overestimate the costs of the actual additional mitigation that will be required to protect the MCZ features.
- In both scenarios, estimates of additional costs anticipated over the next 20 years are site-specific where possible. However, in the absence of information on future licence applications for renewable energy developments (for example, the scale, design and techniques suggested for the development) and the licence conditions that will be required, the additional costs may differ from the true costs.
- In Scenario 2, the economist has medium to low confidence in the additional cost of frond mattressing compared to other forms of cable protection.
- It has not been possible to publish all anticipated additional costs to specific rMCZs and developments in the IA because of the commercial sensitivity of some of the data.
- It has not been possible to verify cost estimates provided by industry. Site-specific costs provided by developers have been used where possible in order to account for the differences in renewable energy developments and their costs.

References

ABPmer. 2011. *Quantifying the Potential Impact of a Marine Conservation Zone Network on the Deployment of Offshore Renewables.* ABP Marine Environmental Research Ltd, Report R. 1763.

JNCC and Natural England. 2010. *Marine Conservation Zone Reference Areas: Guidance Document for Regional MCZ Projects. Version 1.1.* Peterborough: Joint Nature Conservation Committee and Natural England.

JNCC and Natural England. 2011a. *General Advice on Assessing Potential Impacts of and Mitigation for Human Activities on MCZ Features, Using Existing Regulation and Legislation.* Peterborough: Joint Nature Conservation Committee and Natural England.

JNCC and Natural England. 2011b. *Supplementary Advice on the Impacts of MCZs on Information Provision and Decisions in Relation to Marine Licensing Proposals.* Peterborough: Joint Nature Conservation Committee and Natural England.

JNCC and Natural England. 2011c. *Draft: Increases in Costs for Assessing Environmental Impacts of Future Plans and Projects Arising as a Result of Marine Conservation Zones (MCZs),* dated 18 July 2011. Peterborough: Joint Nature Conservation Committee and Natural England.

Lee J, Stelzenmüller V, Rogers S. 2010. *Provision of geo-data on human activities and pressures to support the selection of MCZ sites*. DEFRA contract MB106: Milestone 2.

National Grid. 2011. *Non-Technical Summary: 2011 Offshore Development Information Statement.*

PMSS. 2010. *Offshore Renewables Resources Assessment and Development (ORRAD) Project – Technical Report.* Exeter: South West Regional Development Agency.