Natural England Commissioned Report NECR115

Potential for joined up marine monitoring and data collection between Statutory Nature Conservation Bodies and industry

First published 15 July 2013

www.naturalengland.org.uk

NATURAL ENGLAND

Foreword

Natural England commission a range of reports from external contractors to provide evidence and advice to assist us in delivering our duties. The views in this report are those of the authors and do not necessarily represent those of Natural England.

Background

Natural England is part of an ambitious programme of reform in the management and protection of England's marine environment. One of the key areas of work is the expansion of the UK Marine Protected Area (MPA) network to protect a range of marine habitats and species which inhabit our waters. As this network expands, there will be a proportionate increase in the demand for the monitoring of these protected areas in order to assess the extent to which individual site objectives and the network objectives are being met.

In English waters Natural England will be the Statutory Nature Conservation Body (SNCB) responsible for this monitoring.

Looking further ahead, the Marine Strategy Framework Directive will also be a major driver of future monitoring activity, over larger spatial scales than those currently monitored.

In order to address the increasing demand for monitoring, Natural England is building on existing partnerships with other government bodies, such as the Joint Nature Conservation Committee and the Environment Agency, and investigating the possibilities of forging innovative partnerships with developers operating in the marine environment.

The purpose of the project was to identify opportunities for closer collaboration between Natural England, other SNCBs, marine regulators and industries undertaking licensable activities in areas where joint monitoring of MPAs can be of mutual benefit within English waters.

The findings will be used by Natural England to inform some of the key recommendations of the Defra led Habitats Directives Implementation Review being taken forward by the Marine Evidence Group as well as providing a useful tool for identifying, with developers, where joint monitoring activities can take place.

This report should be cited as:

Chambers, C., McAlesse, L., Hull, S., Barham, P., Goodchild, R., Cooper, D., Pearson, A., Brutto, D., Pitts, J., Bussell, J.A., Fawcett, A. & Woodcock, T. 2012. *Potential for joined up marine monitoring and data collection between Statutory Nature Conservation Bodies and industry*. Marine Planning Consultants, in consortium with ABPmer and Peter Barham Associates. Natural England Commissioned Reports, Number 115.

Natural England Project Manager - James Bussell, Senior Environmental Specialist, Marine Operations, Temple Quay House, 2 The Square, Bristol, BS1 6EB **james.bussell2@naturalengland.org.uk**

Contractor - Marine Planning Consultants in partnership with ABPmer and Peter Barham Environmental

Keywords - Marine, sediment, intertidal, recovery, disturbance, advice

Further information
This report can be downloaded from the Natural England website: **www.naturalengland.org.uk**. For information on Natural England publications contact the Natural England Enquiry Service on 0845 600 3078 or e-mail **enquiries@naturalengland.org.uk**.

ISBN 978-1-78354-015-0

Report Warranty

This report has been prepared with due care and diligence and with the skill reasonably expected of a reputable contractor experienced in the types of work carried out under the contract and as such the findings in this report are based on an interpretation of data which is a matter of opinion on which professionals may differ and unless clearly stated is not a recommendation of any course of action. Marine Planning Consultants Ltd have prepared this report for the client identified on the front cover in fulfilment of its contractual obligations under the referenced contract and the only liabilities Marine Planning Consultants Ltd accept are those contained therein. Please be aware that further distribution of this report, in whole or part, or the use of the data for a purpose not expressly stated within the contractual work scope is at the client's sole risk and Marine Planning Consultants Ltd recommends that this disclaimer be included in any such distribution.

Report prepared by	
Marine Planning Consultants Limited	
Project Manager	Caroline Chambers, Project Manager
Project Director	Liam McAleese, Project Director
Project Team	*MPC:* Daniel Brutto, Commercial Manager Robert Goodchild, Policy Assistant Consultant Jack Pitts, GIS Assistant Consultant Danielle Cooper, Marine Consultant *ABPmer:* Stephen Hull Andrew Person *Peter Barham Environmental Ltd:* Peter Barham
Contact details	
First Floor 67-69 George Street London W1U 8LT caroline@seasurvey.co.uk liam.mcaleese@marineplanning.org.uk www.marineplanning.org.uk	

Contents

List of Figures, Tables and Appendices

Executive Summary

Natural England is at the forefront of an ambitious programme of reform in the management and protection of England's marine environment. One of the key current reforms concerns the UK Marine Protected Area (MPA) network, which is undergoing an unprecedented phase of expansion.

This expansion is necessary to provide protection for the plethora of important habitats and species which inhabit our waters. These face increasing anthropogenic pressures, driven by growth in the marine economy and systemic threats such as those posed by climate change.

As the UK MPA network expands, there will be a proportionate increase in the demand for the monitoring of these protected areas in order to assess the extent to which individual site objectives and the network objectives are being met. The responsibility for meeting this increasing monitoring burden in English waters will lie with Natural England, the Statutory Nature Conservation Body (SNCB) for England. Looking further ahead, the Marine Strategy Framework Directive will also be a major driver of future monitoring activity, over larger spatial scales than those currently monitored.

In order to address the increasing demand for monitoring, Natural England is building on existing partnerships with other government bodies such as the Marine and Coastguard Agency (MCA) and the Environment Agency and considering the possibility of forging innovative partnerships with developers operating in the marine environment. In order to gain insights into how such partnerships could be established, in December 2011 Natural England commissioned a consortium comprising Marine Planning Consultants (MPC), ABPmer and Peter Barham Environment to carry out a project to investigate this.

The purpose of the project was to identify opportunities for closer collaboration between Natural England, other SNCBs, marine regulators and industries undertaking licensable activities in areas where joint monitoring of marine MPAs can be of mutual benefit within English waters.

Initially, an assessment of the overlaps between industry development sites (where baseline monitoring or post construction monitoring by developers is taking place) and MPAs was carried out using ArcGIS. This task served to highlight the key areas in which joint monitoring might prove to be practicable. Principle findings of this assessment are outlined below:

- Aggregate license areas show a predominant overlap with MPAs across the outer Wash, East coast, Bristol Channel and Liverpool Bay.
- Subsea cables have a larger scale of overlap with MPAs, in the Dogger Bank, East coast, Thames Estuary, Lands End, Bristol Channel and Liverpool / Morecambe Bay.
- Overlap between pipelines and MPAs are closely tied to the Southern North Sea with minor overlaps also in Liverpool Bay and the outer Wash.
- Oil and gas lease areas are found to have significant areas of overlap in the southern North Sea and Morecambe Bay / Liverpool Bay areas.
- Most nuclear sites in England have a moderate overlap (>50%) with MPAs.
- Those ports of greatest overlap with MPA areas include Orford, Slaughden Quay, Walberswick (East Coast); and the Isles of Scilly and Lindisfarne (North East).

- Windfarms with a high percentage overlap with MPA sites occur within 12 nm in the Thames Estuary, Liverpool Bay and outer Wash. Other areas of overlap exist offshore of the East Coast and Dogger Bank area.

The output of the overlap assessment was used to identify a series of five case studies. The case studies were selected from areas where significant overlap between areas monitored by industry and Natural England existed. The case studies considered within this project were:

- Humber Estuary port development
- Outer Wash aggregates Licence Area 481
- Thames Estuary wind farm site Gunfleet Sands
- Bristol Channel Hinkley Point nuclear site
- Northwest oil and gas licence area.

The case studies were conducted through desk-based research, and a semi-structured interview process, which compared the monitoring requirements of Natural England and industry at these sites of mutual interest. The purpose of the case studies was to provide a lens through which the practicalities of joint monitoring could be examined and through which ideas relating to joint monitoring could be tested.

In addition to the case studies, a series of 37 interviews and discussions were conducted with marine experts from a range of private and public sector bodies in order to harness ideas and opinions on how joint monitoring might work in practice. Industry stakeholders welcomed the fact that Natural England has commissioned this project, which builds on a number of SNCB and regulator work streams to support greater efficiency.

Protocol

The outputs of the case studies and interviews were used in order to devise a set of protocols which identify:

- Opportunities for joint monitoring for MPAs and industrial operators.
- Actions where the ‘collect once, use many times’ principle can be put into practice.
- Opportunities and barriers to joint monitoring in the longer term.

The protocols were tested and refined during a workshop which was attended by representatives of industry, marine regulators and marine environmental advisory bodies. It is noted that, although there is a strong focus in the scope of this work on SNCBs (Natural England in particular), marine regulators such as the MMO often have a leading role as well. The project team and Natural England are grateful for time invested by colleagues in this workshop and during interviews.

There are five protocols divided into two types; A and B:

Type A - Protocols to enhance within-sector monitoring and provide foundations for further joint monitoring:

1. Protocol on improving information exchange on monitoring activity.
2. Protocol on improving information exchange on existing data.
3. Protocol on enhanced guidance and standardisation.

Type B) - Protocols to establish methods in joint monitoring and data collection:

4. Protocol on site monitoring and data collection.
5. Protocol on strategic monitoring and data collection.

The first set of protocols address the potential actions that are considered useful to facilitate joint monitoring. These lay foundations for good practice and help enhance relationships and cooperation between sectors involved in marine monitoring programmes, whether SNCB, regulator, central government or industry; and are valuable in their own right even if they do not lead to joint monitoring.

The key messages from the protocols include:

- The need to coordinate and make accessible information on current and future Natural England and Industry monitoring plans at a national level.
- Systematic use of MEDIN for both industry and Natural England metadata and supply of data to the Data Archive Centres.
- Improved guidance and standardisation to survey approach, analysis, processing, and quality assurance and reporting.
- Use of existing groups (such as relevant authorities groups for a specific European Marine Site) to support joint monitoring at a site level.
- Monitoring over larger spatial scales (such as regional assessments) may offer potential for joint working.

A Defra-led Habitats and Wild Birds Directives Implementation Review was undertaken at the same time, as a separate exercise to this project. This included a summary of measures set out in four key areas, two of which are relevant to this joint monitoring project:

- Improving implementation processes and streamlining guidance; and
- Improving the quality, quantity and sharing of data.

(The other two areas set out are Facilitating nationally significant infrastructure projects; and Improving the customer experience).

It has already been recognised that many of the actions defined through the Habitats Implementation Review may also have wider benefits in the licensing process generally. The relevant measures are referred to within this report where applicable to each protocol. The outputs of the joint monitoring

project and stakeholder workshop undertaken as part of this project will be fed into implementation of the Defra-led review.

1. Protocol on improving information exchange on monitoring activity

Improved knowledge of all SNCB and industry monitoring activity is essential to inform the potential for joint monitoring and data collection. This is required to formally identify what monitoring is taking place, where and when, as also identified in previous research.

Currently there are no systems or public portals that allow SNCB or industry monitoring plans to be viewed on a national scale on public platforms, apart from the 4C offshore wind website and limited information available on the United Kingdom Directory of the Marine-observing Systems (UKDMOS). More systematic sharing of information on monitoring activity would help identify and facilitate opportunities for joint monitoring.

Protocol 1: Improving information exchange on monitoring activity

> **Monitoring plans for both industry and Natural England should be coordinated and stored at a national level in one place for each industry. Ideally this would involve monitoring plans from other SNCBs (or the same place, though this is expected to be less desirable / easy to implement). For industry plans this can be implemented through consistent recording of licence conditions for consent monitoring, which is being taken forward by the MMO. Plans should be submitted in a consistent format that allows immediate insertion to a database for instant extraction of activity. Ideally the information should be made public through an online geospatial portal, either using existing platforms such as United Kingdom Directory of the Marine-observing Systems (UKDMOS), the Marine Environmental Data and Information Network (MEDIN) or the Marine Management Organisation (MMO) marine planning portal, or through development of new ones. All information uploaded should be maintained and kept up to date on a regular basis.**

2. Protocol on improving information exchange on existing data

As with monitoring plans, there is also a need for information collated on data i.e. metadata (where not already compiled) from monitoring, to be made more freely available. This will allow better understanding of where joint monitoring activities would be useful in the future, identify ongoing activities that are performed on a regular basis, identify gaps in data and develop understanding and knowledge of the marine environment.

Currently, there are many good examples of coordinated data amalgamation and integration into single databases. However there is lack of consistency in representation of different sectors and the extent to which these are made public. There is very little formal structure in place that requires any of the data to be centralised or made public for either industry or SNCBs. However, the public online MEDIN portal is used to a large extent by SNCBs and a little by industry; and is the best platform to hold data from all sectors, with a strong framework to carry this forward.

Protocol 2: Improving information exchange on existing data

Industry metadata should be supplied to the regulators as a condition of the licence and stored in a central database; and upon approval, uploaded to MEDIN. SNCB metadata for MPA datasets should be stored centrally for each MPA and uploaded to MEDIN where not already. In addition, supply of all actual industry and SNCB data to Data Archive Centres (DACs) should be explored through different data types and receptors, focusing first on those that are more likely to be shared.

In the medium term, the aim should be for all data to be uploaded to an allocated DAC. In the case of industry this should be required as part of the license condition. If this is put in place then any associated metadata will automatically appear in MEDIN metadata catalogue via the DACs, therefore removing the requirement for any separate upload of metadata by developers or regulators to MEDIN.

These recommendations are supported by Measures 15 and 16 of the Habitats Regulations Implementation Review, as provided below.

3. Protocol on Enhanced Guidance and Standardisation

Industry and Natural England MPA monitoring has different objectives depending on a number of variables, e.g. feature type, spatial and temporal scales. The monitoring carried out for both development and MPAs is considered by many stakeholders to require better definition and meet a clear set of objectives, guidelines and requirements. This is required not only to ensure the 'right' monitoring is conducted to consistent and proportionate standards but to also ensure that monitoring information can be actively used to support more effective and efficient decision making. Guidance and Standardisation was cited as applicable to survey approach, analysis, processing, quality assurance and reporting. Although enhanced guidance and standardisation would ultimately create better opportunities for joint working, it is not an essential pre-requisite and may be progressed in parallel to specific joint monitoring protocols.

Currently, there are a multitude of different guidelines for monitoring for different sectors and receptors, and between SNCBs and industry; and there is a lack of guidelines in some sectors resulting in those developed for others being used. As a result a multitude of different guidelines are used in marine monitoring leading to a loss of compatibility between sites and data sets. Also guidance does not usually inform the full cycle of data collection (analysis, reporting, data handling etc). To some extent this is understandable given that Natural England's monitoring needs are often different to those of developers (a fuller discussion on different monitoring requirements is in Chapter 4 of this report).

Knowledge of impacts from development is greatly assisted by SNCB's input into the licensing procedure. Advice and consultation provided by SNCBs to industry naturally varies between sites owing to their different characteristics. Where evidence is lacking only, or is not of suitable quality and uncertainty is high, this advice is precautionary to ensure the environment is protected, an obligation of the SNCBs and regulators. There are some viewpoints held by industry that this advice can be

overcautious. However owing to the commercial sensitivity of developers, no examples could be provided. This supports one of the principal recommendations of the project, to strengthen the relationships and trust between industry and SNCBs to better understand the issues that require addressing.

There is also a need for better analysis and amalgamation of industry data in order to increase knowledge of impacts on the environment. This may be carried out by industry and SNCBs.

Protocol 3: Enhanced Guidance and Standardisation

The various monitoring guidelines available for different industry and public sector monitoring should be improved and updated / consolidated and this should be assisted through the actions of the Habitats Regulations Implementation Review. Ideally guidelines should be the product of both industry and SNCBs to ensure maximum joining up of methods. However, this should only be adopted with full industry and SNCB consultation and extended for all marine areas (i.e. not only designated sites). These should consider single receptor guidelines and incorporate the source-pathway-receptor approach and cross-sectoral / cumulative impacts. It was noted at the stakeholder workshop that the MMO were already taking forward actions in relation to this.

Advice and consultation should be provided with a clear line of management across SNCBs, regulators and government, and to ensure agreement of all parties required for monitoring plans.

Better knowledge can be developed through re-evaluation of existing datasets. This would be assisted through data consolidation in receptors not yet addressed, e.g. birds, and then allow better understanding of gaps to focus attention on. There is also a quick win for industry to contribute to data collection for new MPAs (e.g. MCZs) at the development baseline survey stage with agreement for more directed and hypothesis led post-construction monitoring. Increasing knowledge through re-evaluation of existing datasets should also be given a higher priority within UK Marine Monitoring and Assessment Strategy (UKMMAS).

These recommendations are supported by Measures 8, 15, 16 and 17 of the Habitats Regulations Implementation Review, as provided below in the Conclusions.

4. Protocol on Site Monitoring and Data Collection

In considering how joint monitoring might be facilitated it is necessary to outline existing examples of local / site joint monitoring or data sharing and collection, what lessons can be learnt and some practical issues and actions that may support further opportunities for joint monitoring to the benefit of all.

Monitoring at site level is undertaken for different objectives, environmental resources and at different spatial and temporal scales in reflection of the different monitoring drivers.

The public and private sector commission marine surveys for a variety of different and quite often unrelated reasons. Natural England principally commissions marine surveys for two key purposes. Firstly, Natural England is responsible for the identification of areas of the sea which are of importance for nature conservation reasons, predominantly Natura 2000 Sites and Sites of Special Scientific Interest.. In order to identify, delineate and ultimately designate these areas Natural England must build up a detailed picture of the habitats and species that are found on the seabed. The detail within these pictures is established through existing data, where available, and if necessary, the commissioning of field surveys. Secondly, once a site has been designated as a protected area, Natural England has an obligation to monitor and report on the condition of the site and the extent to which the conservation objectives of a site are being met. Again, this obligation is fulfilled through the commissioning of scientific field studies. The spatial scales which are covered during these surveys are variable as they are commensurate with the size of the protected area being surveyed. The timings of the surveys can vary, although the monitoring of Natura 2000 sites is usually undertaken on a rolling 6 year cycle.

The foregoing demonstrates that for SNCB's, such as Natural England, there are two key drivers behind their need to commission marine surveys. There are also two key factors which drive industry to commission marine surveys. Legislation such as The Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations (1999, as amended) requires industries to identify the likely environmental impacts of their activities before they commence in order that relevant decision making and advisory bodies can take an informed decision in relation to whether or not the impacts of the proposed activities are acceptable. Hence, before a given project is granted permission to proceed, an industrial operator may need to acquire data on the environmental conditions and resources that are found adjacent to its area of interest. This need for data is usually satisfied through completing characterisation surveys. Subsequently, if an activity is granted permission to proceed, then the relevant industrial operator might be required to monitor the impacts of its activities in order to verify any predictions which were made ahead of the commencement of operations. Again, in order to fulfil their monitoring obligations a given industry might need to commission field surveys. Monitoring surveys are usually completed on a regular basis over a 2- 5 year period from characterisation to post-construction monitoring. The frequency depends on the industry in question and the presence and importance of any resources of environmental importance that may be found within the footprint of likely impact.

However, despite the different drivers behind, and objectives of, marine surveying for the public and private sectors it could be said the both parties commission surveys for related reasons. Essentially, both parties seek to promote an understanding of the spatial distribution of marine habitats and species and to gain an understanding of the condition or status of those habitats and species.

Across some areas the interests of marine industries and SNCBs can overlap, and hence, there are areas which are monitored by both parties. In some areas joint monitoring mechanisms have been established in order to release synergies. Currently, joint site monitoring has been enabled through a number of mechanisms including:

- Casual ad-hoc enquiries between developers to initiate joint monitoring.

- Agreements for additional data to be collected on existing developer surveys using same personnel, equipment, i.e. same contractor.
- Acceptance that differences between instrumentation are not known and a trial period to test these differences, i.e. using more than one method for Data collection from the same site.
- Formal consultation groups between developers and SNCBs; and groups within sectors for example, the Humber Estuary Relevant Authorities Group.
- Informal face to face workshops at regular intervals to discuss plans through survey design maps.
- Cost benefit modelling to help prioritise surveys for joint monitoring, calculating the cost incurred in programme changes.
- Free data sharing for good will, commonality of understanding and navigation safety.
- Data sharing for mutual gain of data swaps, monitoring design, reduction of uncertainties in future assessments, understanding in areas other than industry impacts (e.g. climate change), assistance with monitoring impacts for new technologies, and partially pre-consented sites.

Protocol 4: Site Monitoring and Data Collection

Where there is perceived benefit to all from joint monitoring the following actions should be carried out:

- **An appropriate working group should be used or where not already existing, set up.**
- **Input to local groups from centralised / national meetings.**
- **Set up a centralised role within Natural England to coordinate monitoring between Natural England (and other SNCBs as appropriate)and developers / national trade associations, and target sites, consider industry funding in part.**
- **Ensure early joint planning for EIAs, potentially with formal obligations for regulators to notify SNCBs of planned activities and flag up data available to share, as part of the licensing process.**
- **Natural England (and other SNCBs as appropriate) should consider publishing long-term a regular forward look of monitoring plans.**
- **Allow a degree of flexibility without formal agreements, e.g. MoUs.**
- **Enter into discussions with industry in winter for the following year's surveys.**
- **Draw up agreements for prioritisation during work schedule changes (e.g. due to bad weather), on a case-by-case basis.**
- **Consideration of how contractual obligations and requirements imposed on SNCBs by EU procurement rules (and then potentially passed on to industry) are handled.**
- **Consider liability, health and safety and risk management on a case-by-case basis.**

The best opportunities to promote joint monitoring on a site specific basis can be found by targeting:

- **Small scale sites.**
- **Few organisations involved.**
- **Emerging industries and those already accustomed to joint working.**

- **Staying within the procurement threshold value imposed on Natural England.**
- **Receptors with limited commercial confidentiality issues (e.g. benthic ecology).**
- **Accept trial period for first few sites and agreement of potential 'break even' gains.**

These recommendations are supported by many Measures of the Habitats Regulations Implementation Review, including all of those provided below.

5. Protocol on Strategic Monitoring and Data Collection

The case studies and stakeholder feedback suggested that there are likely to be greater opportunities for joint monitoring and greater mutual benefit from approaches at a strategic or regional scale, rather than localised site specific compliance, characterisation or condition monitoring studies. As the scale of strategic monitoring is driven by industry characteristics, needs, environmental and ecological understanding, the objectives for each programme naturally vary.

Protocol 5: Strategic Monitoring and Data Collection

A number of mechanisms have been identified that facilitate joint strategic or regional monitoring. These include:

- **Research funding through funds collated from industry, e.g. tax the Marine Aggregates Levy Sustainability Fund, common interest of developers in regions to develop baseline data.**
- **Common requirement of developers in regions to assess impacts.**
- **Reduced expense and more efficient working post monitoring for EIA process.**
- **Requirement for concurrent short term licences to multiple developers within a region.**
- **Emerging technology developments requiring substantial baseline data**
- **SEA Directive.**
- **Investigation of resource availability for emerging developments.**

Opportunities for such mechanisms to benefit joint monitoring between SNCBs and developers should be sought wherever possible. These could ensure that SNCBs and developers receive a clear incentive such as a 'feedback loop' into the consenting process, cost sharing and hence cost / efficiency savings, multi agency involvement, consistency in approach and a shared evidence base and understanding to a pre-agreed quality. Such mechanisms and incentives in strategic monitoring could be considered as a model for longer-term evidence and monitoring activity, drawing on earlier recommendations such as standards (see protocol 3). Clearly, the most opportune examples of strategic monitoring to take forward would be those areas with significant interest to both industry and SNCBs, i.e. a high number of MPAs within a single or multiple sector development regions.

Significant progress has been made by the UK Marine Monitoring and Assessment Strategy (UKMMAS) community in developing better targeted and integrated biological monitoring programmes, particularly focused on EC Directive compliance. This continues to be taken

forward through the Marine Biodiversity Monitoring Programme co-ordinated by JNCC through the Healthy and Biologically Diverse Seas Evidence Group (HBDSEG). However, within UKMMAS, little attention has been paid to strategic level monitoring necessary to inform future marine licensing. Consequently there is currently little integration between developer specific led strategic activities and the wider UKMMAS member surveys and this may be an opportunity where future activity can be joined-up. Overall, progress in UKMMAS should be monitored to assess how this can assist with recommendations set out in this report. This might be facilitated through The Crown Estate and the Department of Energy and Climate Change (DECC) who already participate in UKMMAS.

Conclusions

Marine monitoring, whether condition monitoring undertaken by SNCBs, or characterisation, baseline or post-consent monitoring undertaken by developers is a complex issue governed by the detail of the operations. However, this project has identified a number of examples where joint monitoring or related activities are already taking place; and has suggested ways by which further joint monitoring might be achieved.

Nationally, much of the architecture to facilitate data sharing and exchange is already in place (e.g. MEDIN and DACs) and information sharing can be facilitated by the regulators' roles in licensing. For strategic monitoring, UKMMAS provides a forum in which to explore joint working, particularly through the Healthy and Biologically Diverse Seas Evidence Group (HBDSEG) or the JNCC led Marine Environment Monitoring Group (MEMG). There was a consensus, at the workshop and from stakeholder interviews, that regulators such as the MMO can play a leading role in supporting further progress in this area, e.g. by requiring data to be signposted in MEDIN and made available through DACs. Natural England can show further leadership through highlighting joint monitoring opportunities in their advice to developers and regulators and also through their role in Relevant Authority Groups at European Marine Site level.

The protocols outline arrangements and actions that can signpost future site based monitoring and if progress can be made in other areas, this may well lead to more joint survey work happening over time.

These arrangements and actions outlined in the protocol are made in recognition of a number of interdependent processes including the recent review into the Implementation of the Habitats and Wild Birds Directives; ongoing plans by the regulators to update their own procedures and systems; the opportunity for the protocols to be taken beyond England to a UK basis; and for future consideration of new Marine Conservation Zones (and other MPAs).

Those measures stated within the Habitats Regulations Implementation Review that are applicable to the five protocols set out in this report include:

- Measure 8: Undertake a stock-take of over 1,600 pages of current guidance and make proposals for simplification (by March 2013, Defra to action).

- Measure 13: Introduce new consistent standards on the acceptable range and quality of evidence that will enable statutory agencies to provide their advice (consult November 2012, publish March 2013; Natural England to action with EA, MMO, JNCC).
- Measure 15: Establish a Habitats and Wild Birds Directives Marine Evidence Group to address marine data sharing, research gaps, and post-construction monitoring (by July 2012, Defra to action).
- Measure 16: Explore the practical implications on operating capacity with MEDIN, the MEDIN Data Archive Centres and other equivalent data sharing facilities (by October 2012, Defra to action).
- Measure 17: Commit to managing data consistently and sharing priority data not yet publicly accessible; ensuring data can be identified through MEDIN and accessed from the MEDIN Data Archive Centres or equivalent data sharing facilities (by December 2012, to be actioned by industry, NE, EA, JNCC, MMO, the Crown Estate).

It is clear that there are many potential benefits of joint marine monitoring. Stakeholders involved in the project welcomed the leadership from Natural England in commissioning this work.

1. Introduction

1.1. Project Consortium

In December 2012, Natural England commissioned the project "Is there potential for more joined up marine monitoring and data collection between Statutory Nature Conservation Agencies (SNCBs) and industry?" to a consortium comprising Marine Planning Consultants, ABPmer and Peter Barham Environment.

The views in this document do not necessary represent those of Natural England, the JNCC, the EA, the MMO, DECC or Cefas.

1.2. Requirement for the Study

Natural England is a key part of an ambitious programme of reform in relation to the management and protection of England's marine environment. The need for this project is driven by the significant, ongoing expansion of the Marine Protected Area (MPA) network across English waters (Figure 1) and the resulting need to ensure efficient collection and use of data across both public and private sectors. The expansion of the MPA network is necessary in order to provide protection for the plethora of important habitats and species which inhabit our waters and to meet the requirements of national and international legislation and conventions. These habitats and species face increasing anthropogenic pressures, driven by a period of unprecedented growth in the marine economy and systemic threats such as those posed by climatic change.

Key components to ensure compliance with UK and international legislation and deliver better environmental outcomes include both a robust system of monitoring for MPAs, as well as proportionate and targeted monitoring of licensable activities. Whilst current monitoring is largely focussed within and around MPAs (and on a limited basis for areas outside), new drivers such as those under Marine Strategy Framework Directive (MSFD) are expected to require monitoring over broader spatial scales.

The costs of meeting monitoring requirements for new MPAs are likely to lead to an increase in cost to the public sector and potentially industry. This project therefore aims to identify opportunities for closer collaboration between Natural England, other SNCBs, marine regulators and industries undertaking licensable activities in areas where joint monitoring of marine MPAs can be of mutual benefit.

A set of joint monitoring protocols have been produced to identify:

- Opportunities for joint monitoring for MPAs and industrial operators.
- Actions where the 'collect once, use many times' principle can be put into practice.
- Barriers and opportunities to joint monitoring in the longer term.

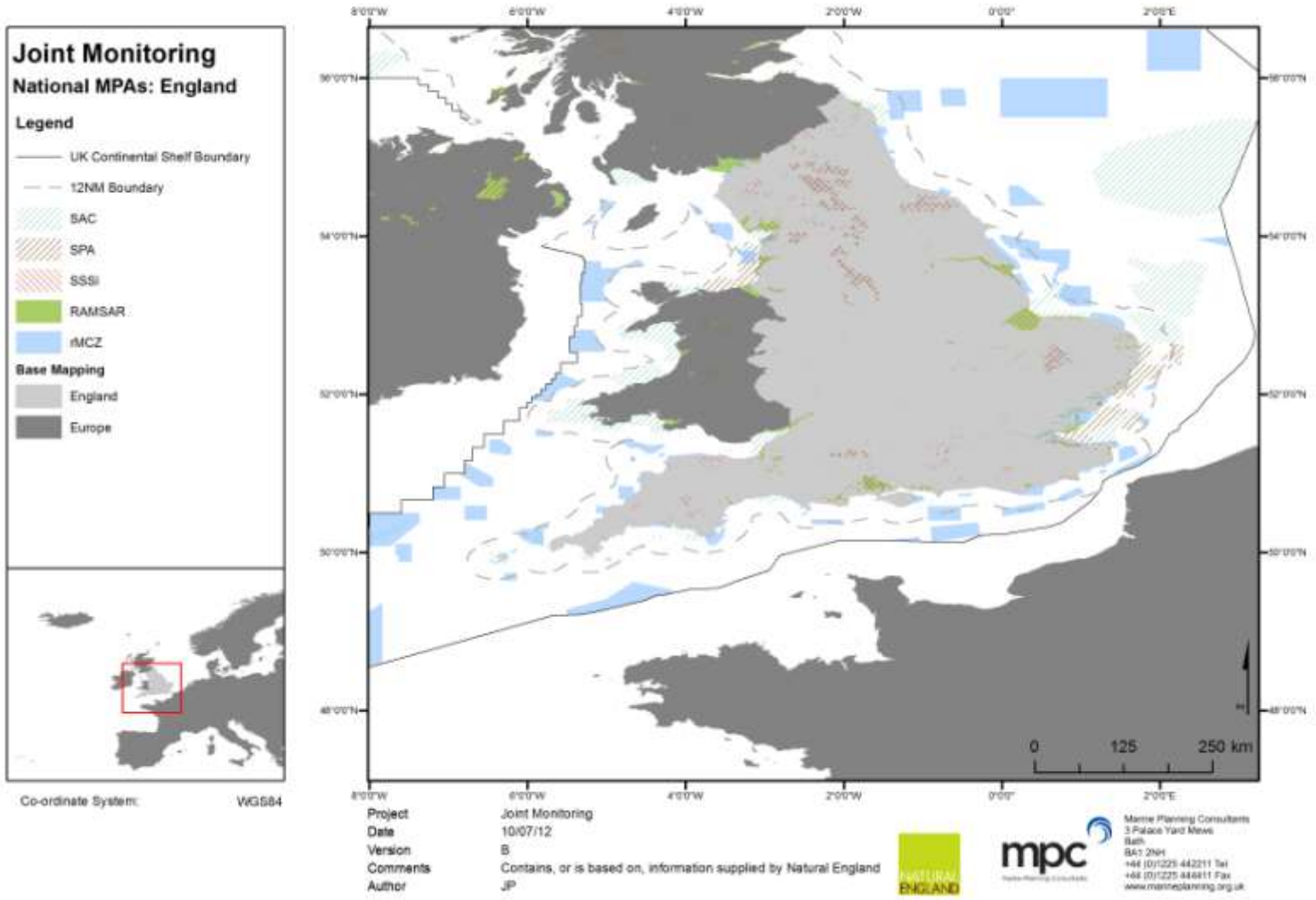


Figure 1. Current and recommended Marine Protected Areas in England including Ramsar sites, recommended Marine Conservation Zones (rMCZs), Special Areas of Conservation (SACs), Special Protected Areas (SPAs) and Sites of Special Scientific Interest (SSSI).

1.3. Project Objectives and Methods

The project objectives defined at the beginning of the project by Natural England are shown in **Table 1**. The methods employed to address these objectives are provided below:

National Assessment

At the national level, a literature review and consultation were carried out. These findings feed into each relevant section within this report and are referenced as appropriate. Also at the national level, a GIS assessment of overlapping industry and MPA sites was carried out, results of which are provided in **Section 2** and **Appendices B & C**.

Case Studies

Through identifying overlaps at a national scale, five case studies were selected to provide the detail on monitoring practice carried out by both industry and SNCBs. A summary of these case studies is provided in **Section 3** and full details in **Appendices D - H**. Each case study was supported through semi-structured interviews; a full list of those consultees approached is provided in **Section 3** and questions asked in **Appendix J**. The findings from the case studies are summarised in **Section 3** and feed into the overview of findings presented in the executive summary , as well as protocols detailed in **Sections 5, 6 and 7**.

Development of the Protocols

Using the information and ideas developed by the project team and interviewees during the literature review, national overlaps, consultation and case studies, a set of protocols were developed to signpost methods to facilitate future joint monitoring. These form the predominant output of the project and are detailed in **Sections 6 and 7**.

Workshop

A draft protocol discussion document was sent to consultees prior to a stakeholder workshop where the full protocol was presented to both industry and public sector representatives (attendee list also in **Appendix I**). The protocols and findings have been updated accordingly and with new evidence / ideas on joint monitoring.

Table 1. Key project stages and objectives defined by Natural England.

Project Objectives
Stage 1 - Review of the overlap between survey and monitoring on MPAs, the wider environment, and monitoring of marine developments.
Objective 1: *Identify areas where an overlap in monitoring and data collection requirements exists, both currently, and in the future.*
Stage 2 - Make use of survey and monitoring data from past projects to investigate how joint monitoring can be achieved and identify areas where the data collected could be used for dual purposes.
Objective 2a: *Identify which of these areas could potentially be monitored for impacts and surveillance simultaneously through the integrated efforts of Natural England and industry to the benefit of both.* ***Objective 2b:*** *Detail the adaptations that would need to be made to monitoring and data collection programmes in order to meet the needs of both parties and identify the mechanisms of achieving these adaptations.* ***Objective 2c:*** *Highlight any issues that may arise from joined up monitoring and data collection.*
Stage 3 - Use the information from past projects to inform predictions about how joint monitoring might be possible for new and ongoing developments and develop a 'Joint Monitoring Protocol' that meets Common Standards Monitoring and EIA requirements.
Objective 3: *Develop a protocol based on these outcomes that will facilitate joined up monitoring and data collection that might be applied more widely (i.e. to UKMMAS members) and be flexible enough to integrate with the UK Marine Biodiversity Monitoring Program.*

1.4. Clarifications on Scope of Project

The scope of the project has been defined during the inception stage by the definitions shown in **Table 2**, regarding geography, types of MPAs, cross border issues and monitoring focus.

Table 2. Definitions of the scope of the project.

Type	Defining Scope
Joint monitoring and data collection	Joint monitoring and data collection are terms used individually to inform an assessment. They have not been unified to a singular term as there are important differences, i.e. whether a new survey is required to obtain information or if data collected elsewhere can simply be sourced. Both these two different sources of material acquired are addressed separately in this report.
Monitoring	This project considers four types of monitoring primarily: Condition monitoring, required by SNCBs to assess the condition of sites. EIA baseline monitoring, required by the regulator to provide evidence for an EIA. EIA post consent compliance monitoring, required by the regulator in order to assure that any mitigation proposed in an ES is in place and working. Not applicable to all sectors, e.g. oil and gas do not always undertake. Strategic monitoring, involving both SNCBs and industry.
Geographic	Predominantly within NE remit of English waters to 12nm offshore; and otherwise referenced to offshore where relevant, especially in protocols. Also targeting national datasets initially then case studies focused on in more detail. However whilst England centric, to be effective, any recommendations need to be taken forward on a UK basis and include offshore.
Marine Conservation Zones (MCZs)	Not specifically covered given the current stage in the designation process but reference to where relevant, especially in protocol.
Cross borders	Not a specific focus and may complicate the study but reference to where relevant, especially in protocol.
Industry sectors	One each of renewable (offshore), ports, dredging. oil and gas, power station.
Monitoring targets	Prioritise benthic habitats and species and mobile species. Additional receptors will be considered where appropriate within the selected case studies. Also consideration of non-biological information *where appropriate* (e.g. bathymetry, water quality), relevant both in providing context for biological sampling but also for understanding pressures and impacts affecting feature condition.

'Industry'	We also consider other 3rd party monitoring for example including EA monitoring particularly where EA is essentially a developer (e.g. Flood and Coastal Defence work), the Coastal Observatories (which are collecting regional data) and environmental NGO's such as Wildlife Trusts which have done a lot of broad scale benthic surveys e.g. Devon and Dorset coasts. However, industry provides data to support applications and any joint monitoring protocol would need to take into account how industry requirements may change as a result of the new regulatory systems.
Statutory Nature Conservation Bodies (SNCBs)	Statutory marine monitoring of marine protected areas carried out by the public sector is delivered by the Statutory Nature Conservation Bodies. Within England, which is the focus of this project, this essentially is only Natural England, with the JNCC playing an important UK wide role beyond territorial waters. The The term SNCB generally covers equivalent agencies in Scotland, Wales and Northern Ireland. The use of the term SNCBs in this project therefore principally applies to Natural England. However it is recognised that Natural England and the JNCC work closely together and some of the protocols may related to the JNCC. Although the JNCC have been engaged in the project and the protocols, they have not been invited to endorse or agree with them.
Regulator	The project scope is focussed on Natural England, however would be difficult to develop a protocol without reference to the role of the regulator (principally the Marine Management Organisation in England).The role of the regulator, in both determining the requirements of any monitoring of licensable activities and facilitating joined up work with the SNCBs, should not be underestimated. The licensing process sets out a clear process by which the regulator will stipulate requirements for survey work to support EIA, and post condition monitoring of specified impacts. These requirements are partly based upon advice from primary advisors, which include the SNCBs. It should be noted however that the decision on what can be considered proportionate, targeted and consistent monitoring, as well as survey requirements, ultimately lies with the regulator. The MMO provided valuable input into the project at the workshop and offering comments. They have noted that many of the worksteams in the protocol, such as enhance guidance, are underway or actively being considered. The MMO have not been invited to endorse or agree with the actions in the protocol.

2. National Assessment

2.1. National Overlap between Industry and MPAs

At the national scale, an assessment of overlap between industry development sites and MPAs has been carried out using a number of GIS tools to inform case study selection[1], based on data sourced as shown in **Appendix A**. The overlap of sites is specifically of interest to this project as the proximity of such sites to one another is likely to yield opportunities for joint monitoring. For each sector, calculations have been made using ArcGIS to determine the percentage of each industry site (e.g. aggregate licence area or length of cable) that overlaps with MPAs. The results of the analysis are shown in map figures and a table of percentage overlap in **Appendices B & C**. The principle areas of overlap for each sector are outlined below:

- Aggregate sites show a predominant overlap with MPAs in the outer Wash, East coast, Bristol Channel and Liverpool Bay.
- Cables have a larger scale of overlap with MPAs, in the Dogger Bank, East coast, Thames Estuary, Lands End, Bristol Channel and Liverpool / Morecambe Bay.
- The location of overlap between pipelines and MPAs are closely tied to the Southern North Sea with minor overlaps also in Liverpool Bay and the outer Wash.
- Oil and gas lease areas are found to have significant areas of overlap in the southern North Sea and Morecambe Bay / Liverpool Bay areas.
- Most nuclear sites in England have a moderate overlap (>50%) with MPAs.
- Those ports of greatest overlap with MPAs include Orford, Slaughden Quay, Walberswick (East Coast); and the Isles of Scilly and Lindisfarne (North East).
- Windfarms with a high percentage overlap occur within 12nm in the Thames Estuary, Liverpool Bay and Outer Wash.; other areas of overlap exist offshore of the East Coast and Dogger Bank area.

2.2. Consultation on Best Practice and Barriers

Over 37 individuals were interviewed, consulted and/or attended a workshop including SNCBs, marine regulators, central government and agencies, developers, trade associations and other bodies with an interest in monitoring and data. This included both national representatives as well as those from the site level. **Table 3** shows types of organisation approached and **Appendix I** shows the full list of details. Interviewees were provided with questions shown in **Appendix J**. Many of these organisation representatives also attended the workshop to road test the draft protocols. The results of the consultation and workshop are fed into the following sections, in particular the protocols.

[1] A series of processes were carried out in ArcGIS (9.3) to facilitate the overlap assessment: compilation of numerous sources into one layer (union), re-projection, data cleaning, overlap of MPAs and industry sites (intersect) and finally calculation of areas overlapped.

Many discussions with industry were based around a semi-structured interview format. This examined opinions, evidence of and opportunities for joint monitoring, as well as mechanisms and barriers. The interviews took the following structure in most cases:

- Potential for joint monitoring.
- Current monitoring by industry.
- Current understanding of joining up.
- Survey logistics.
- Survey implementation.
- Data handling.
- Dissemination of data and information.
- Survey management.
- Further opportunities for joint monitoring.

Table 3. Organisations involved in consultation at a national level

Agency	Centre for Environment, Fisheries & Aquaculture Science (Cefas)
Agency	Environment Agency
Agency	Inshore Fisheries and Conservation Authorities (IFCAs)
Govt	Department for Energy and Climate Change (DECC)
Govt	Department for Environment, Food and Rural Affairs (Defra)
NDPB	English Heritage
NGO	Marine Environmental Data and Information Network (MEDIN)
Regulator	The Marine Management Organisation (MMO)
SNCB	Joint Nature Conservation Committee (JNCC)
SNCB	Natural England
Industry	British Marine Aggregates Producers Association (BMPA)
Industry	British Marine Federation
Industry	British Ports Association (BPA)
Industry	Centre for Marine and Coastal Studies (CMACS)
Industry	Centrica Renewables
Industry	Crown Estate
Industry	EDF Energy
Industry	Marine Space
Industry	Oil and Gas UK
Industry	Renewable UK
Industry	Renewables Wave & Tidal
Industry	Scottish Power Renewables
Industry	Shell
Industry	Subsea Cables UK
Industry	The Carbon Capture & Storage Association (CCSA)
Industry	UK Major Ports Group (UKMPG)

3. Site Case Studies

Based on identification of monitoring overlaps outlined in the previous section, the project team used a set of selection criteria to identify a 'long-list' of potential case studies which was reduced to a set of five:

- Humber Estuary port development;
- Outer Wash aggregates site 481;
- Thames Estuary wind farm site Gunfleet;
- Bristol Channel Hinkley nuclear site; and
- Northwest oil and gas licence.

These cover a broad range of scenarios to ensure that the findings of this project are applicable to as wide a range of likely joint monitoring scenarios in order to maximise the utility of the project outputs.

A consistent approach has been applied to each of the case studies researching different aspects including:

- Generic current status of industry sector;
- Overview of case study industry activities;
- Overview of case study MPA designations;
- Industry monitoring programme
  - Survey characteristics
  - Monitoring methods
  - Post survey data processing
  - Dissemination of data products
  - Internal survey management
  - Management and contract;
- MPA monitoring characteristics;
  - Same considerations as for industry.

The information has been collected from available documents, datasets, knowledge and consultation. Twelve individuals were interviewed (and a larger number approached) for information on the case studies including SNCBs, Agencies, and developers; and information, principally EIA documentation, was requested from marine regulators and central government. **Table 4** shows types of organisation approached and **Appendix I** shows the full list of details.

Table 4. Organisations involved in consultation at case study level

SNCB	Natural England
Agency	Environment Agency
Industry	DONG
Industry	EDF Energy - Nuclear New Build
Industry	Tarmac
Industry	Gateway Gas Storage
Industry	Centre for Marine and Coastal Studies (CMACS)

The discussions followed the same format shown in **Section 2.2** and **Appendix J**.

Each case study is provided in detail in a separate **Appendix – D to H**. Details of the case studies is drawn out in the Protocols in **Sections 6** and **7**.

4. Overview of Statutory Monitoring

4.1. Statutory Industry Monitoring

The landscape relating to consents for commercial activities and developments within the marine environment has been evolving over recent years. Prior to 2009, when Royal Assent was granted to the Marine and Coastal Access Act, the marine consent and licensing system was lacking centrality and a clear unification of purpose. Permission requirements for a single development were often driven by numerous different pieces of legislation, for example the Food and Environmental Protection Act (1985) and the Coastal Protection Act (1949). The passing of the Marine and Coastal Access Act (2009) into law drew many of these previously disparate licensing obligations under a streamlined marine licence system which is administered by the Marine Management Organisation (MMO).

The primary aim of industry led monitoring is to provide information that will aid impact and adaptive management, and secondly, to achieve a better understanding of cause-effect relationships and to improve EIA prediction and mitigation methods. The full cycle of the EIA and monitoring associated with it is shown in **Figure 2**.

There are essentially three types of monitoring carried out for the EIA process. As described below.

- **Characterisation monitoring:**
  - Non-statutory and carried out prior to the EIA process, perceived as useful by the developer but not a requirement imposed on them.
- **Baseline monitoring:**
  - Statutory, conducted post-consent but pre-construction / operation
  - Allows a monitoring baseline against which to assess future changes.
- **Post consent validation monitoring:**
  Measured during construction and operational stages of development to:
  - Determine any resulting impacts and ensure recommended environmental protection standards are met.
  - Assess a feature or site if a significant impact has been identified that has mitigation associated with it and therefore requires monitoring.
  - Provide 'proof' of the ES predictions (i.e. aside from any mitigation needs).
  - Comply with regulator's license conditions, based upon advice from advisors and the impacts identified within any Environmental Statement.

Marine licences are usually required for activities related to the construction, deposition or removal of any substance or object in English territorial waters and, where appropriate, outside of UK Territorial Waters. The Marine licence system is relevant to the majority of industries operating within the marine environment, however, oil and gas developments and exploration are administered under a separate

system for which the Department of Energy and Climate Change (DECC) have responsibility (MMO, 2011[2]).

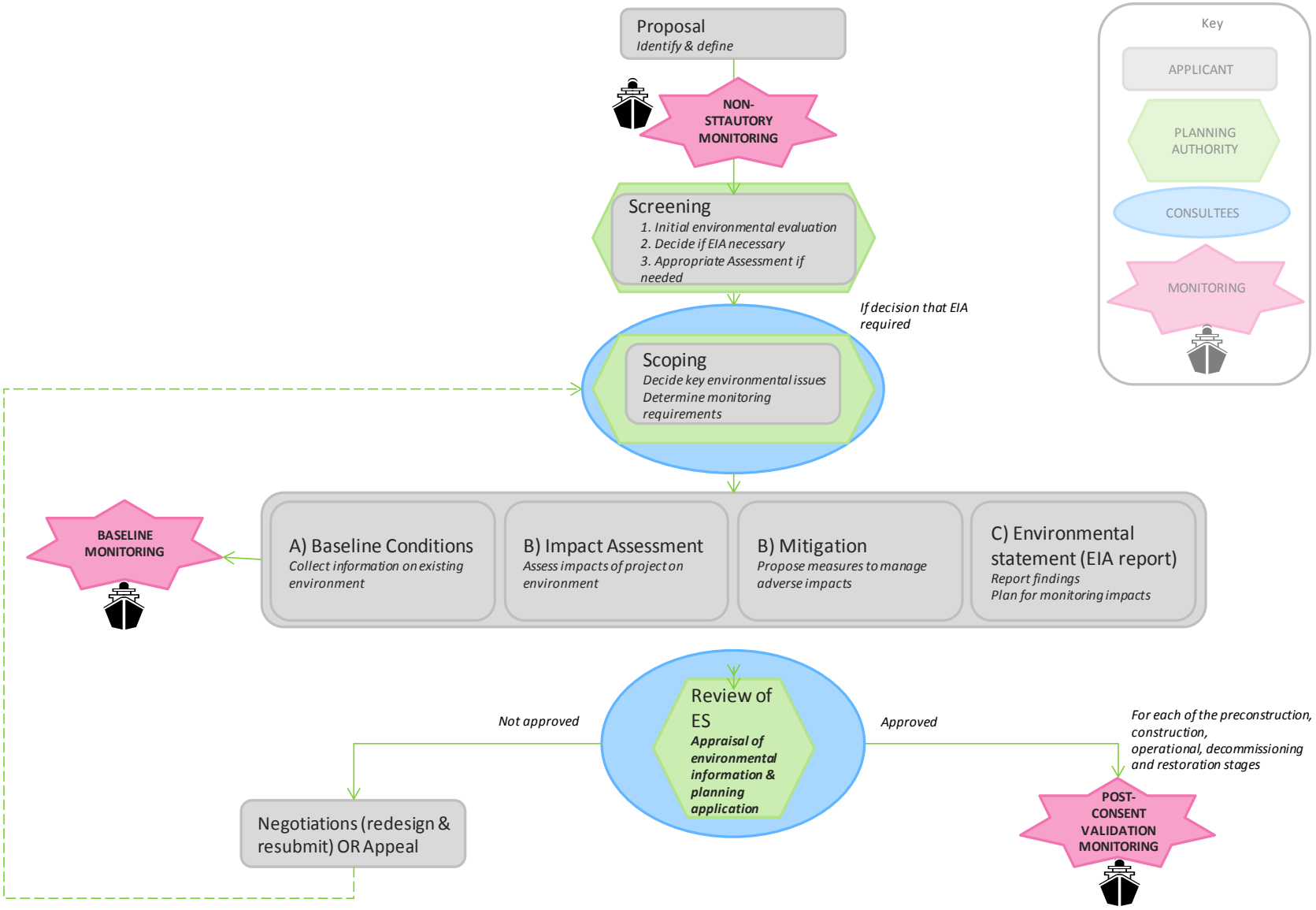
Before a Marine licence can be granted to a given development it is sometimes necessary for a detailed assessment of the likely environmental impacts to be undertaken. In such cases the MMO must ensure that applications are subject to a detailed Environmental Impact Assessment (EIA) under the Marine Works (Environmental Impact Assessment Regulations 2007), which represents the marine-specific transposition of the EU EIA Directive (1985, as amended) into UK law. The EU EIA Directive states that "the effects of a project on the environment must be assessed in order to take account of concerns to protect human health, to contribute by means of a better environment to the quality of life, to ensure maintenance of the diversity of species and to maintain the reproductive capacity of the ecosystem as a basic resource for life" (MMO, 2011[2]).

In order that the potential impacts of a marine project on the environment can be fully understood the area which lies within and adjacent to the area that is scheduled for development needs to be subjected to an environmental characterisation. An environmental characterisation usually involves the commissioning of different environmental studies. The specific surveys undertaken at the characterisation, monitoring and decommissioning stages of a given project are not identical across projects. Typically, the types of surveys required will alter depending on the type of project, the scale of the project, the geographical location of a given project, the distance offshore and the proximity and perceived sensitivity of a potentially sensitive receptor. However, marine developers working across a range of industries often commission a selection of the following studies during one or more phases of their project:

- Bird surveys;
- Marine mammal surveys;
- Fisheries studies;
- Benthic ecological studies;
- Epibenthic ecological studies;
- Bathymetric;
- Hydrographic surveys;
- Oceanographic surveys;
- Seabed sediment surveys;
- Geotechnical studies; and
- Geophysical surveys.

[2] MMO (September 2011). Marine licensing guidance 1: Overview and process, V0.5

Figure 2. The EIA process, showing organisations involved and potential timing of monitoring



Once the characterisation studies relating to a given development have been completed and an Environmental Statement for a project has been submitted to the regulator, consent may be granted for a given activity to be undertaken and a developer may receive a marine licence. Natural England plays a critical role as a statutory conservation advisor in the licensing process. The award of a marine licence can be subject to certain conditions. These conditions are used to define the limits of operation or development in the marine environment and as a means through which to validate licensing decisions and the predictions made within an Environmental Statement (MMO, 2011[2]).

Typically, the conditions attached to a Marine Licence will oblige the licensee to commission monitoring surveys which focus upon a specific receptor highlighted within the EIA process. For example, a company planning to extract aggregate from the seabed might be obliged to commission surveys of the benthic fauna of an area once every 5 years, in order to assess the extent to which the actual impacts of their operations on infauna are in line with the predictions made during the licence application process.

It is usual for the validity of a marine licence to be limited to a specific time period. For example, a licence granted for a marine aggregate licence area is usually valid for a period of 10-15 years. (Note this differs to the former FEPA licenses which were limited to 3 years post-construction.) Conditions are usually attached to a marine licence which requires the licensee to commission surveys upon decommissioning of a piece of marine infrastructure, or at the point of cessation of a given marine activity.

4.2. Statutory SNCB Monitoring of MPAs

The waters surrounding the UK support a rich variety of important habitats and species. The UK Government has the power to protect these areas within a range of different types of protected sites which can be created under a variety of legislation such as the Wildlife and Countryside Act (1981), the Conservation of Habitats and Species Regulations (2010) and the Marine and Coastal Access Act (2009). In the marine environment the protected areas created by these pieces of legislation form a network known as the Marine Protected Area network. The full range of protected sites that contribute to this network is listed in Table 5.

Each of the different types of MPA listed in Table 5 has an individual legislative driver and different objectives. Despite the differences that exist between the different types of MPA there are a number of unifying themes which underpin the sites contributing towards the UK MPA network. The overarching aims of the UK MPA network are to:

- Protect and restore the ecosystems in our seas and around our coasts.
- Ensure that the species and habitats found in UK waters can thrive and are not threatened or damaged.
- Maintain a diverse range of marine life that is resistant to changes brought about by physical disturbance, pollution and climate change.

- Provide areas where the public can enjoy a healthy marine environment learn about marine life and enjoy activities such as diving, photography, exploring rock pools and coastal walking.
- Provide natural areas for scientific study.

Table 5. Official Marine Protected Areas

Protected Area Type	Acronym	UK and EU Legislation
Special Areas of Conservation	SAC	EC Habitats Directive, under the Bern Convention
Special Protection Areas	SPA	EC Birds Directive, under the Bern and Bonn Conventions
Marine Conservation Zones	MCZ	The UK Marine and Coastal Access Act, 2009
Sites of Special Scientific Interest	SSSI	Wildlife and Countryside Act (1981)
Ramsar Sites	-	The Ramsar Convention, 1971

In order to assess the degree to which these aims are being achieved it is vital that existing and future MPAs are subject to regular monitoring and surveillance. The Statutory Nature Conservation Bodies (SNCBs) of the UK are charged with the task of planning this monitoring and ensuring that it is undertaken. Natural England is the SNCB charged with the task of overseeing the monitoring of the MPA network within English territorial waters. The following sections present a brief summary of protected site monitoring for the different types of sites which contribute to the UK MPA network.

4.2.1. Protected Site Monitoring

All of the protected sites designated across the UK are established in order to provide protection for specific habitats and/or species, which are known as the features of the site. At, or soon after the point of designation, classification or notification, the relevant SNCB will advise on the conservation objectives for the protected features within the site. Feature Condition targets and conservation objectives essentially outline the desired conditions for the features within the site. They may also advise on the purpose of a given protected area and help to objectively define how the status or condition of a site will be judged.

Every site feature has a number of attributes, which , when measured, can provide an indication of the condition of a site. For example, a sandbank has attributes which include (but are not limited to) its size, its shape and the biotopes which are found up on it. When an SNCB engages in monitoring, it is these attributes which are measured. Generally, changes in these attributes (as well as knowledge of pressures and activities on a site), monitored over time, will allow a judgment against the conservation objectives as to whether the site's condition is favourable, or unfavourable. Where all of the features of a site are deemed to be in favourable condition, the site itself may also be judged to be in favourable

condition. Where the condition of a site is deemed to be unfavourable the relevant SNCB may recommend revisions to the management plan for the site in question. **Figure 3** outlines the rationale used during the protected site monitoring process.

The monitoring programmes for protected areas run over a six-year rolling cycle. Hence within English waters, Natural England generally commission the monitoring of the features of all protected sites at least once every six years. In light of the current trend of expansion of the UK MPA network, Natural England will need to greatly increase its monitoring efforts.

The protected areas identified in Table 5 were established to protect a wide range of different species and habitats. For example, Ramsar Sites were adopted for the protection of important wetland areas; Special Protection Areas (SPAs) were established to protect rare or vulnerable, and regularly occurring migratory bird species; and Special Areas of Conservation (SACs) were established for the protection of both habitats and species as listed in Annex I and II of the EC Habitats Directive. Specific habitats and species may be monitored in different ways, using a variety of techniques and mechanisms which are appropriate those habitats and species. Natural England use Common Standards Monitoring (Common Standards Monitoring Guidance for Generic Introduction for Marine Feature Guidance, 2004) in order to identify the attributes of feature which will be monitored and uses the Marine Monitoring Handbook (2001) in order to identify the techniques that are most appropriate for monitoring them.

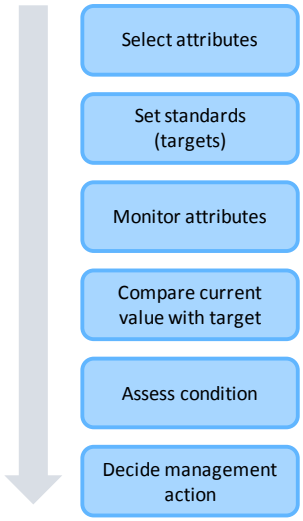


Figure 3. The rationale used during the protected site monitoring process.

Natural England typically employs the survey types outlined below in order to identify and monitor specific site attributes within the marine environment:

- Benthic surveys are typically used to monitor infaunal populations and sediment distribution.
- Epibenthic surveys are typically used to monitor demersal and epibenthic fauna.
- Seabed imagery surveys are typically used to monitor the habitats found on the seabed.
- Geophysical surveys are typically used to monitor broad scale habitats.

- Bathymetric surveys are used to measure water depth and map the topography of the seafloor.
- Vessel-based or shore-based observation surveys may be used to monitor bird and marine mammal populations, and intertidal communities.
- Aerial surveys may be used to monitor the populations of birds and marine mammals, and for the mapping of biotopes.

In addition to site- or feature-specific techniques, a given protected area may be surveyed using any, or a combination of the above methods as dependent on their suitability for monitoring the specific features of the site.

Common standards for monitoring of Sites of Special Scientific Interest (SSSIs) (and Areas of Special Scientific Interest [ASSIs]), SACs and SPAs were developed by the JNCC and agreed upon by UK SNCBs, providing a basic framework for the monitoring of designated areas. Upon this was built the JNCC's Marine Monitoring Handbook[3] which provides best practice guidelines for monitoring of SACs and is often used as a guide for marine monitoring in all sectors. These follow techniques in common standards monitoring[4].

The SNCBs have established a range of networks for monitoring different classes of marine protected area. For example, the Wetland Bird Survey (WeBS) programme has been established to facilitate the monitoring of the bird populations of wetland SPAs and Ramsar Sites.

[3] Davies, J. et al, ed. 2011. Marine Monitoring Handbook, JNCC, ISBN 1 86107 5243
[4] Williams, J.M., ed. 2006. Common Standards Monitoring for Designated Sites: First Six Year Report. Peterborough, JNCC.

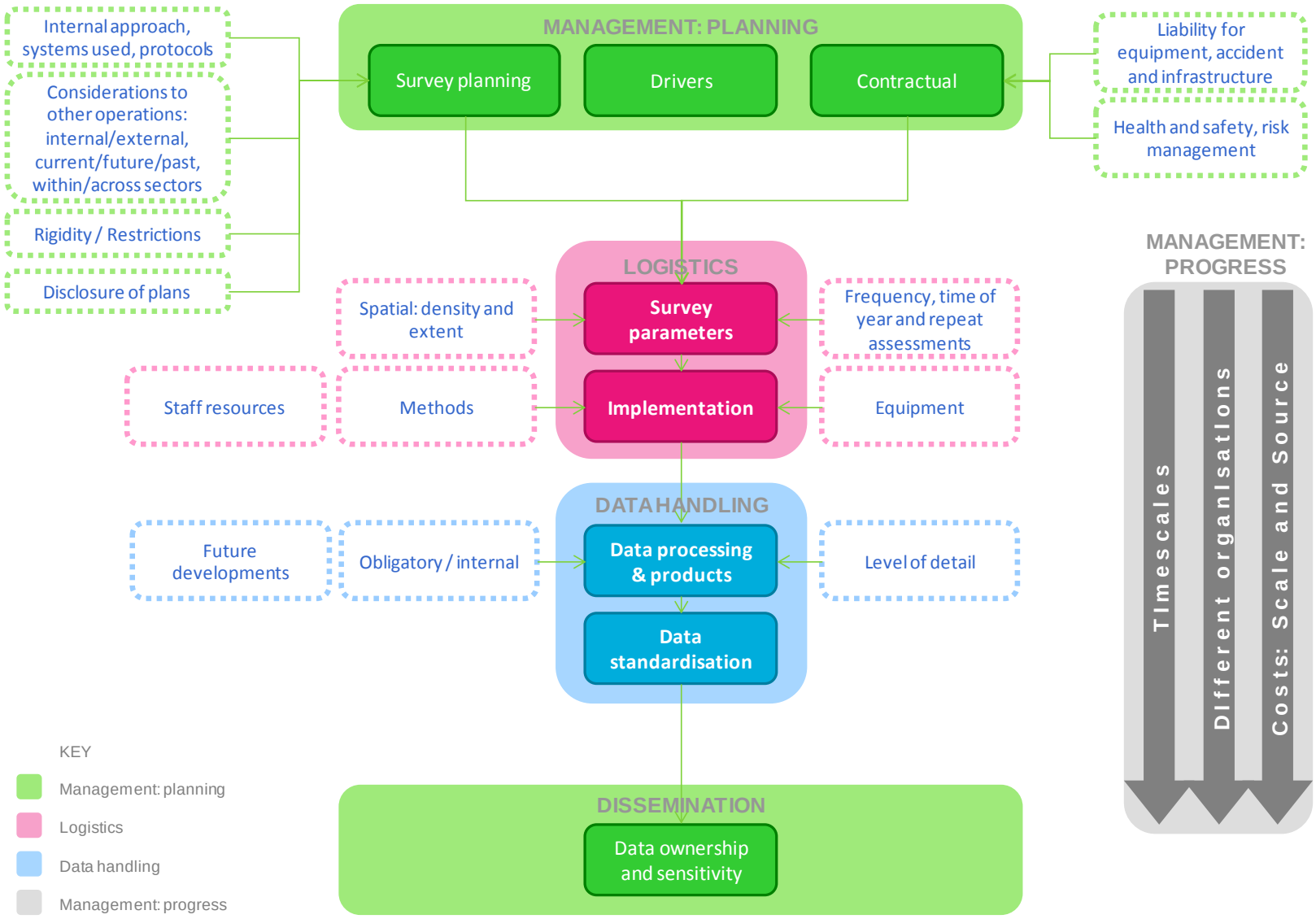
5. Development of the Protocols

Sharing data and engaging in joint monitoring practices presents Natural England, other SNCBs, regulators and industry with a degree of overlap in terms of common interests which ultimately accrue cost savings through efficiency of actual survey operations. Other mutual benefits exist for example in creating a better understanding of the ecology of habitats and species, ecosystem function and response to changing pressures (whether natural or anthropogenic) and realising this understanding in the most time and resource efficient ways; the planning and decision making process; and development of mitigation measures.

Some of the considerations to address in actual joint monitoring are summarised in **Figure 4**. These have been addressed through the case studies, consultation and development of the protocols. However the project has found that there are wider considerations governed by the communication and storage of information related to surveys as detailed below.

The following **Sections 6** and **7** present a set of 'protocols' which have been tested at a workshop (4 April, Defra, London) and altered to accommodate viewpoints expressed by delegates. The protocols are divided into two sets: **Section 6** presents three protocols detailing the requirement for better foundations in within sector monitoring; and **Section 7** presents two further protocols that detail methods in joint monitoring and data collection. This approach was considered appropriate and necessary as a high majority of stakeholders considered that there were issues with current practice.

Figure 4. The considerations to be addressed by joint monitoring



6. Protocols to enhance within sector monitoring

This section addresses the potential actions that are considered useful to facilitate joint monitoring and data collection, whether this is joining up between industry, between SNCBs, or industry and-SNCB. It is considered necessary to address this first as there are many ways in which the existing systems are not set out well to facilitate joint monitoring and even act as a barrier. Therefore this section addresses the following three protocols:

Protocol 1: Improving information exchange on monitoring activity.
Protocol 2: Improving information exchange on existing data.
Protocol 3: Enhanced guidance and standardisation.

These actions are considered useful foundations for good practice, providing the necessary infrastructure, tools and cross-sect oral relationships to facilitate joint monitoring, whether SNCB, regulator, central government or industry. Once these considerations have been applied, industry and SNCBs will be in a better position to address the more detailed aspects of joint monitoring. However, these precursors are valuable also in their own right even if they do not lead to joint monitoring. They may also be carried out in parallel to the specific joint monitoring actions in the following sections and do not prevent these other areas progressing at the same time.

6.1. Protocol 1: Improving information exchange on monitoring activity

6.1.1. Requirement

In consideration of how information on monitoring activity is currently and could in the future be exchanged between different organisations, some key questions were addressed regarding how information is stored on monitoring activity and how this is managed:

- *What is the definition of an acceptable evidence base for MPA and industry monitoring information and data?*
- *What is needed and what is practical?*
- *How should this evidence be coordinated and presented?*

These questions are crucial as improved knowledge of all monitoring activity is essential to inform the potential for joint monitoring and data collection. This is required to formally identify what monitoring is taking place, where and when, as also identified in previous research[5].

[5] ME1117 (Cefas, 2010): provided recommendations on monitoring data associated with FEPA licence conditions for offshore wind, including facilitation of joint monitoring.

6.1.2. Current Situation

Information on both industry and SNCB monitoring activity is located in disparate locations and within more than one organisation. Each of the industry and SNCB monitoring programmes relating to this are considered below in turn.

Industry

The MMO has a range of information regarding industry monitoring. The MMO is now using an online licensing system that includes a public register of all licensed activities and the evidence supporting them such as Environmental Statements. This is being updated constantly, with ~500 licences a year processed. The system includes a search facility by marine plan area for up to date information on marine licence applications and decisions (minerals extraction and renewable energy); Harbour orders; EIAs (screening, scoping opinions and consent decisions); and Wildlife licences issued. Separate databases exist for pre-April 2011 applications / decisions with online listings for minerals extraction (provided by licence number), renewable energy (by area), Food and Environmental Protection Act 1985 and Coast Protection Act 1949 (by date).

There are undoubted opportunities to pull together information on current industrial/developer monitoring (e.g. who, where, what and when). A more standardised approach to recording information or metadata on developer monitoring may support other activity around improving consistency of monitoring conditions and may facilitate access to data from monitoring activity to inform broader evidence needs and/or act as a 'feedback-loop' to inform future monitoring requirements. The current absence of information on monitoring recorded in a single and consistent way is a barrier to more joined up monitoring and better use of monitoring data to improve the evidence base. However, there are systems in place that may overcome this barrier, for example the MMO note that it would be possible to automate the system so that any metadata, monitoring plans or identified compliance returns are sent to a central point for collation.

DECC also hold industry monitoring information. The Department for Environmental and Climate Change (DECC) is in the process of implementing a new portal-based licensing system, incorporating licences from the old system. This builds on the current primary licensing database which is fed into by a number of major databases covering Petroleum Act licences, oil and gas field wells, amongst others. This current system already provides online search facilities for some licences, by developer or sub-area operator as well as licence details (block, area, number).

4C Offshore. The Global Offshore Wind Farms Database is a useful example of a coordinated initiative to display current and future actual monitoring activities in a geo-spatial interactive online format. Designed for the entire offshore wind farm industry through a commercial imitative, it has located activities in 35 countries and includes information for example on development stage, contractors and real time data (vessel locations, ports and weather). Importantly, this includes future monitoring plans and contractors. 4C Offshore, funded by advertising and sale of their wind database, have considered

developing similar portals for other industry sectors. Any future developments would be dependent on identifying industries where there is both transparency and adequate demand for information.

Natural England

Natural England have a rolling risk based approach to maintaining data on monitoring activities of protected features within SACs. Each year the Risk Based Monitoring Database is updated with the previous year's monitoring and next year's priorities are highlighted. Therefore the next year's priorities can be assessed together to give a one year forecast of locations and timescales of monitoring. However, these priorities change year on year depending on the success of previous monitoring and new designations.

At a wider, cross-organisation approach, significant steps have also been made to pull together information on public sector led monitoring activity coordinated at a strategic level by The UK Marine Monitoring and Assessment Strategy[6] (UKMMAS) which provides a framework to coordinate a range of marine and coastal monitoring activity (including some survey work) for multiple organisations. An output from the UKMMAS, UK Directory of Marine Observing Systems (UKDMOS) holds SAC and SPA designation information through a geo-spatial interactive portal, such as features to be monitored. This does not provide information on monitoring locations within an MPA or when monitoring is taking place. The current focus is on referencing datasets that are undertaken over time, rather than one-off site specific data.

Improving information exchange on monitoring activity: Current Situation

In summary there are no internal systems or public portals that allow SNCB or industry monitoring plans to be viewed publically on a national scale, apart from the 4C offshore wind website and limited information available on UKDMOS. This is a barrier that needs to be addressed to facilitate joint monitoring.

[6] **www.defra.gov.uk/environment/marine/science/ukmmas/**

6.1.3. Protocol

Industry

In order to better coordinate, compile and present industry monitoring plans and data it would be necessary to consider a number of actions. Much of this protocol refers to both baseline and consent monitoring. However it is recognised that the steps proposed are more easily implemented for consent monitoring which is planned ahead well in advance, whilst baseline monitoring is often scheduled within weeks of consultation. Recommended actions to address in this protocol are provided below:

i. Assess the extent to which licensing databases at the MMO and DECC can include information on current and planned baseline/consent monitoring activities in a consistent manner, e.g. type of monitoring expected, at what frequency and where, such that it can be extracted easily for more than one location etc.
ii. If the information on monitoring activity is supplied and recorded in a consistent format, the MMO have indicated that there may be options to automate information on monitoring that can easily or even automatically input to the database. Therefore in line with new systems put in place with regulators databases, formats should be set out to accommodate information on monitoring plans.
iii. Develop associated GIS layers to show where baseline/consent monitoring will take place with metadata (features monitored, when and how).
iv. Assess the feasibility for industry baseline/consent monitoring data to be included in or interface with an existing monitoring database, whether private or public, e.g. UKDMOS, MEDIN, marine planning portal. If action were to be taken in (i) and (ii) it would be useful to facilitate links with UKDMOS and industrial monitoring activity.
v. Industry to provide metadata to the regulators on consent monitoring upon determination.
vi. Enhance the existing licensing and consenting process to ensure developers supply details of monitoring activity in a ready format to upload to a database at the scoping stage.

SNCBs

The approach for SNCBs (and regulators) would be very similar to the above industry recommendation, within the following context:

vii. For those MPA sites that are not yet formerly designated or for those which are but do not yet have a formal management objectives or monitoring programme in place, there is a need to define the generic spatial / temporal / feature monitoring expectation (according to statutory remit).
viii. Any actions in the above area entail an ongoing commitment to keep information up to date on a regular basis.

6.1.4. Costs and Benefits

Any measures to promote joined up monitoring and better use of data to inform evidence and consenting process rely on information about monitoring activity being shared. This could have number of benefits for industry and SNCBs alike, as well as for regulators such as the MMO and organisations

such as The Crown Estate. Benefits to public sector bodies include a more streamlined response to both data requests and their own management of licences and reducing time spent by staff. Such a system might help further streamline the consenting process and thus benefit developers.

A more effective mechanism for sharing monitoring information may have benefits in terms of enabling inter and intra industry sector monitoring. Currently, developers in the oil and gas industry already contact each other (e.g. with Centrica) regularly when planning a survey to ascertain whether they are collecting data or need data within that region. This is with the hope of potentially utilising the same vessel and equipment and sharing data collected within that area.

Much of the necessary infrastructure is already in place to capture industry monitoring plans and data (e.g. licence conditions, MEDIN standards, data archive centres) and just requires some leadership from the MMO and other regulators. Facilitation of communication on survey plans may require some encouragement, enhancement of existing or new roles in government / SNCBs.

Improving information exchange on monitoring activity: Protocol 1

> **Monitoring plans for both industry and SNCBs should be coordinated and stored at a national level in one place for each of industry and SNCBs (or the same place, though this is expected to be less desirable / easy to implement). For industry plans this can be implemented through consistent recording of licence conditions for consent monitoring. Plans should be submitted in a consistent format that allows immediate insertion to a database for instant extraction of activity. Ideally the information should be made public through an online geospatial portal, either using existing platforms such as United Kingdom Directory of the Marine-observing Systems (UKDMOS), the Marine Environmental Data and Information Network (MEDIN) or the Marine Management Organisation (MMO) marine planning portal, or through development of new ones. All information uploaded should be maintained and kept up to date on a regular basis.**

6.2. Protocol 2: Improving information exchange on existing data

6.2.1. Requirement

As with monitoring plans, there is also a need for information collated from monitoring data, i.e. metadata, to be made more freely available (where not already compiled). This will: allow better understanding of where joint monitoring activities would be useful in the future; identify ongoing activities that are performed on a regular basis; and identify gaps in data and develop understanding and knowledge of the marine environment (as discussed in later sections). To help understand this process, some key questions were addressed:

- *How is data relating to designated features currently collected, stored and updated?*
- *Who takes responsibility for this?*
- *Are databases feature / sector specific or cross cutting?*
- *What are the platforms for this data, i.e. how is it accessed?*

6.2.2. Current Situation

There are a plethora of databases containing marine data in place for different sectors, receptors and with different aims. Only those relevant to MPAs and EIA monitoring specifically are addressed below.

Industry

Industry data itself is held by the individual developers and / or their contractors and in some cases the metadata is held by Government (MMO, DECC) within their databases (as detailed in the previous section). MMO are often not ultimately the data owners and in many cases the raw data or data products are kept by contractors or developers. This disparate nature has proved challenging and time-consuming in this project to get metadata on single development industry monitoring activities, with consultation required with both the developer and regulators[7]. These difficulties are compounded by the problems faced in: penetrating an organisation to identify relevant staff responsible for the monitoring programmes and reliance on existing contact networks; data not being disclosed by developers with blocks met such as clearance with internal affairs required; and information being fragmented within or between regulators. However there are some good examples of consolidated data for sectors and receptors, for example the UK Benthos database used by the oil and gas industry.

MEDIN. The Marine Environment Data and Information Network (MEDIN) as referenced above, provides information on datasets through an online geo-spatial interactive 'Discovery' portal. The metadata available depends on the willingness of the data provider to submit information. The oil and gas sector currently represent around 90% of industry data held on the portal, but reports were found of trade associations promoting use of MEDIN in other sectors too, e.g. aggregates. The vast majority of the oil and gas metadata held by MEDIN are generated by the British Geological Society (BGS) through an agreement with DECC, regarding access to site survey information carried out by Oil and Gas operators, required through the licensing process. MEDIN's objectives are to i) establish a UK wide operational framework for the management of marine data and information, through a single point of access for all major UK marine data and information by 2014 with the capability to upload and retrieve data; ii) a robust network of definitive integrated and accredited Data Archiving Centres (DACs); iii) provision of priority data sets to underpin UK and EU legislative and policy requirements; and iv) facilitation of full data flow to the DAC network for all government sponsored contracts in the marine and coastal zone environment. MEDIN standards are addressed separately in the sections below.

Commercial Confidentiality. It is also important to note that there are a number of concerns regarding the commercial confidentiality of industry data and even metadata. Some of these are more of a perceived issue, for example a significant amount of industry monitoring data associated with licence and consent conditions is considered to be public and would be disclosed under Environmental Information Regulations (EIR) or Freedom of Information Act (FOIA) in most circumstances. For example,

[7] Note that any request for monitoring information would need to be very specific: a general request for 'ALL monitoring data' could be considered to be 'manifestly unreasonable' and rejected by the regulator.

if the MMO were asked under the EIR or the FOIA to provide a list of surveys that have been carried out by a developer or in a specific area there is a presumption of disclosure and limited grounds for refusal (exemptions). Exemptions do include commercial confidentially (which is subject to a public interest test), national security, if the data is not held by the authority or if it is due to be made public at a later data. Other data is genuinely confidential, at least for a period of time (for example oil and gas prospecting or mineral and aggregate resource related data). Commercial confidentiality is a complex issue that would have to be considered on a case by case basis, aided greatly by publically available metadata, which would further speed up the processing a request that falls within the Environmental Information Regulations.

SNCBs

ENSIS. The in-house Natural England Site Information System (ENSIS) database was developed to store SSSI monitoring data in-house. This is not proactively in the public domain unless requested. It is also restricted in relation to providing outputs for multiple requests and cannot provide reasons for site condition failure.

UKDMOS. As detailed in section 6.1.2 above, this contains SAC and SPA designation information through a geo-spatial interactive portal, such as features to be monitored.

MEDIN. MEDIN, as detailed above, is used for upload of many MPA sites' metadata for data collected.

MERMAN. The Marine Environment Monitoring and Assessment National database operated by the British Oceanographic Data Centre (BODC) holds data collected under the Clean Safe Seas Environmental Monitoring Programme (CSEMP), formerly the National Marine Monitoring Programme (NMMP). This is not available publically but information may be requested.

A number of additional databases and portals show information on SNCB data collected other than MPAs. Whilst this is of great interest, it is out of scope of the project and is not addressed further.

Improving information exchange on data collected: Current Practice

In summary, there are many good examples of coordinated data amalgamation and integration into single databases but there is lack of consistency in representation of different sectors and the extent to which these are made public or not. There is very little structure in place formally that requires any of the data to be centralized or made public for either industry or SNCBs. However MEDIN is used to a large extent by SNCBs and a little by industry; and is the best platform to hold data from all sectors, is public, and has a strong framework to carry this forward.

6.2.3. Protocol

Industry

Easy to Share Data Types. There is a lot of confusion about which industry data may be available to share and commercial confidentiality may be more perception than reality in some cases. A meeting between industry representatives and regulators/SNCBs could very quickly identify those elements of monitoring which people would not see as controversial, e.g. benthic macro-invertebrate data. It could then be easier to ask industry to supply this information, either routinely or as a condition of the consent. This would then allow other aspects of data which industry may have concerns about (e.g. geology, water temperature etc) to be managed separately. An agreement on this may also pave the way for preparing more standardised approaches for collecting and storing data. This recommendation is already accommodated in part through the Report of the Habitats and Wild Birds Directives Implementation Review (herein referred to as the Habitats Regulations Implementation Review).

- Measure 15: Establish a Habitats and Wild Birds Directives Marine Evidence Group to address marine data sharing, research gaps, and post-construction monitoring (by July 2012, Defra to action).

Industry Databases for actual Data. Following on from above, monitoring data once collected should have clear lines of storage outside of the developer or contractor's own in-house systems, controlled by licence conditions. These can be stored within existing relevant Data Archive Centres (DACs). These should be made more widely available, (subject to safeguards on commercial confidentially and security). There are many good examples of existing databases, in particular Marine Recorder, UKHO (bathymetric data), the British Geological Society, the British Oceanographic Data Centre, habitat maps that might also go to MESH etc. It should be the ultimate aim to have not just metadata available but the actual data itself through such databases. However the availability of data within such databases must be made clear through the publishing of metadata details.

Public Portal for Metadata. Defra / the MMO should assess the feasibility for metadata on industry baseline/consent monitoring data collected to be included with an existing database, e.g. MEDIN. This is supported through the Habitats Regulations Implementation Review:

- Measure 16: Explore the practical implications on operating capacity with MEDIN, the MEDIN Data Archive Centres and other equivalent data sharing facilities (by October 2012, Defra to action).

The update to MEDIN would be required on a pre-determined / regular basis according to the consenting process (baseline and post-consent monitoring) through licence conditions.

SNCBs

All data collated by SNCBs from MPA monitoring should be centralised in one database or one for each MPA type, as with the ENSIS database; and ultimately these should be uploaded to MEDIN where not already.

6.2.4. Costs and Benefits

One of the advantages to better availability of information on existing datasets is the reduction in expense for future monitoring. It has been noted that WFD monitoring in England required by both SNCBs and industry has been reduced by ~50% as the result of greater analysis of existing data. There may be additional costs to industry however who may have to pay their consultant's time to organise/format data to the required standards and move the data on to the holding website. Benefit to industry however, would include being able to compile much more detailed and compelling desk studies; as well as long-term savings that result from increased understanding similar to that achieved by SNCBs above.

Improving information exchange on data collected: Protocol 2

Industry metadata should be supplied to the regulators as a condition of the licence and stored in a central database; and upon approval, uploaded to MEDIN. SNCB metadata for MPA datasets should be stored centrally for each MPA and uploaded to MEDIN where not already. In addition, supply of all actual industry and SNCB data to Data Archive Centres (DACs) should be explored through different data types and receptors, focusing first on those that are more likely to be shared.

The aim should be for all data to be uploaded to an allocated DAC. In the case of industry this should be required as part of the license condition. If this is put in place then any associated metadata will automatically appear in MEDIN metadata catalogue via the DACs, therefore removing the requirement for any separate upload of metadata by developers or regulators to MEDIN.

These recommendations are supported by Measures 15 and 16 of the Habitats Regulations Implementation Review, as provided below.

6.3. Protocol 3: Enhanced Guidance and Standardisation

6.3.1. Requirement

Monitoring approaches require suitable definition to meet a clear set of objectives, guidelines and requirements. This is required not only to ensure the 'right' monitoring is done to consistent and proportionate standards but to also ensure that monitoring information can be actively used to support more effective and efficient decision making. Guidance and standardisation was cited as being applicable to survey approach, analysis, processing, quality assurance and reporting. Although enhanced guidance and standardisation would ultimately create better opportunities for joint working, it is not a

pre-cursor and may be progressed in parallel to specific joint monitoring protocols. As the SNCB guidelines were considered relatively well defined, the focus of this protocol is on industry.

Some key questions addressed in this section include:

- *What level of monitoring is proportionate to the requirements?*
  What is suitable in terms of guidance and protocols?

6.3.2. Current Situation

Four aspects have evolved from our research and consultation into the issue of proportionate and guided monitoring and data collection. These are related (in order) to guidelines on monitoring, knowledge to inform this, applying this knowledge to a better informed hypothesis, and finally delivery to data standards.

Guidelines. As stated in the report introductory chapters, SNCBs consistently follow the Common Standards[8] for monitoring of SSSIs (and Areas of Special Scientific Interest [ASSIs]), SACs and SPA, which were developed by the JNCC and agreed upon by UK SNCBs. This provides a basic framework for the monitoring of designated areas. Upon this was built the JNCC's Marine Monitoring Handbook[9] which provides best practice guidelines for monitoring of SACs and is often used as a guide for marine monitoring in all sectors. These follow techniques in Common Standards monitoring.

Developers however, follow various legislation, regulations[10] and guidelines[11] to ensure they design a suitable programme to address monitoring required as part of a licence/consent application / condition. These guidelines provide a broad framework outlining the regulators preferred approach to monitoring and field work in general. Whilst they are useful in relation to field methodologies, other aspects are more variable owing to the different approaches required on a site by site basis and lack clarity of monitoring conditions for developers, scope of surveys, consistency of approach, differences between analytical frameworks and methodologies, reporting and quality assurance, leaving industry with

[8] Williams, J.M., ed. 2006. Common Standards Monitoring for Designated Sites: First Six Year Report. Peterborough, JNCC.
[9] Davies, J. *et al*, ed. 2011. Marine Monitoring Handbook, JNCC, ISBN 1 86107 5243
[10] Marine licensing system under the Marine and Coastal Access Act 2009 (MCAA) [previously Food and Environmental Protection Act (1985), Coastal Protection Act (1949), Government View procedures for aggregates extraction]; Marine Works (Environmental Impact Assessment) (Amendment) Regulations 2011; The Harbour Work (Environmental Impact Assessment) (Amendment) (England and Wales) Regulations 2009; The Conservation of Habitats and Species Regulations (2010); The Water Framework Directive (2000); Offshore Chemicals Regulations 2002, The Offshore Petroleum Activities (Conservation of Habitats) (Amendment) Regulations 2007, The Offshore Petroleum Production and Pipeline (Assessment of Environmental Effects) 2009.
[11] E.g. Guidelines for the Conduct of Benthic Studies at Marine Aggregate Extraction Sites (MALSF, 2011); Marine Monitoring Handbook (Davies et al. 2001), Common Standards Monitoring Guidance (JNCC); OSPAR and DTI guidelines in the oil and gas industry; A Review of Assessment Methodologies for Offshore Windfarms (BOT/Cowrie, 2009); 'Guidelines for the conduct of benthic studies at aggregate dredging sites (DTLR, 2002)

uncertainty of requirements (as also identified in previous reviews[12]). It should be noted that the MMO are actively developing a range of guidance and tools, which is welcomed by industry.

Guidelines in some sectors, e.g. aggregates, are well advanced but this is not true for all sectors. In practice, as a result of this, the guidelines are often used across sectors which may not be appropriate. An example of this is provided by the offshore wind industry which frequently employs the guidelines for the Conduct of Benthic Studies at Marine Aggregate Extraction Sites[11] as in the Thames case study for offshore wind. For windfarms in general, Cefas have noted that while survey guidelines are available for benthos, survey techniques have varied across sites, sometimes in relation to these site-specific issues. There is therefore a risk of on incompatibility which is compounded by the increasing new guidelines produced[13].

Taking the Thames area as a case study to explore monitoring methods applied in practice (as carried out in this review), Cefas noted that for fish monitoring generally, while the conditions imposed are similar in nature, different target species at different sites has meant that methods and equipment has differed between wind farms. For example, some developments have used existing data (e.g. beam trawl survey data from Cefas), whereas most have commissioned new surveys. Surveys have used scientific and/or commercial gears. Some have utilised anecdotal information from fishermen or other surveys whereas others have not. Some have undertaken broad scale surveys whereas others have been more targeted. However, for other techniques, such as migration monitoring and radar surveys, standardised techniques do not exist and therefore the developers devised their own methods and analysis techniques. In some cases, these data were then not used, which should not be encouraged given that these techniques are often required for meeting licence conditions, such as those for barrier effects, which cannot be met by the basic standardised monitoring methods alone. Furthermore, some guidance is not only sector specific but also feature specific, e.g. the collection of underwater noise data during piling; and the measurements of electromagnetic fields from power cables.

Moreover, comparatively few guidance documents provide advice on the full cycle of data collection including: analysis, reporting, quality assurance, metadata guidelines and the handling and storage of data generated through survey, which will necessarily contribute to the diversity of methods used by different companies and individuals. (See later section.)

One SNCB representative noted that although development specific guidance was useful, it needed to be ‘applied’ and based on case studies. Rather that ‘tell you everything that you need to worry about”, it should be “focussed on what is really important and significant”.

Advice & Consultation. Natural England has a key scoping role which informs the developer’s monitoring programmes. There was a perception that requirements varied within SNCBs depending on

[12] E.g. Review of Round 1 sediment process monitoring data – lessons learnt (Defra, DECC, 2088); and Strategic Review of Offshore Wind Farm Monitoring Data Associated with FEPA Licence Conditions (Cefas, 2010)

[13] E.g. Cefas (2011 draft) Guidelines For Data Acquisition To Support Marine Environmental Assessments Of Offshore Renewable Energy Projects

the member of staff, yet no direct evidence was offered for this. In many cases, developers and SNCBs were able to have early and sensible discussions on monitoring. On other cases, there was an industry perception of inconsistent approaches at the local/regional office level and an over-precautionary approach to defining monitoring requirements that are seen as either unnecessary or excessive (various stakeholders raised this issue, e.g. monitoring at Strangford Lough). It was challenging in some cases to identify specific examples as evidence to this perception and it was often anecdotal in nature.

Knowledge. There are also a range of issues identified regarding understanding of impacts. It has been commented that developer monitoring once collected may not always be used to the best advantage to both SNCBs and/or industry. Areas raised by consultees include:

- Acceptance that Natural England has strong sector leads who seek to understand industry specific issues and that there is a real opportunity to share this knowledge between 'sector leads' and local/regional leads.
- Opportunities to better amalgamate results across time sufficiently to understand impacts, system structure and function, by industry in the lifetime of a project, from application to decommissioning.
- Opportunities for better use / understanding of data from monitoring. . There is an historic frustration that millions of pounds worth of data has been collected by the industry but that very little practical use is made of it. This was highlighted during the production of the 'Charting Progress 2"[14] where the Marine Assessment and Reporting Group (MARG) tasked the "Productive Seas Evidence Group (PSEG) with further work on linkages between SNCB and industry monitoring data. However, it should be recognised that Natural England have, as much as developers, a specific remit and extensive analysis of data is often outside of their budgetary resources. Therefore it does need to be recognised that this does apply to both developers and Natural England SNCBs and that this frustration is voiced by both parties equally.
- The insufficient amalgamation of results to better identify mitigation and lessons learnt to inform future monitoring requirements and avoid replication of monitoring. For example the monitoring of differing seal species was required because it was felt by regulators that lessons learned from the seals at one site could not be transferred to another site.
- There were comments that more effective monitoring has benefits for 'UK PLC' and should be considered as a key tool for meeting the UK high level marine objectives[15].
- There is an expectation from industry that SNCBs should have greater depth and breadth of expertise. However this cannot realistically be met due to resources.

Hypothesis. With a better understanding of the requirements from both guidelines and application of knowledge to enhance understanding, monitoring would become more focused or hypothesis driven, rather than being a tick box exercise. This is supported by the MMO's viewpoint that industry

[14] **http://chartingprogress.defra.gov.uk/**
[15] **www.defra.gov.uk/environment/marine/protect/planning/**

monitoring must be related to schemes and that the reasons for monitoring must accompany this demand.

Data standardisation. Data is currently not required from industry in a standard format in most sectors, yet there are some excellent tools available, principally the MEDIN standards developed specifically for marine data. Funded through both public and private funds, this is available as templates both for overarching dataset properties, as well as feature specific monitoring data properties, e.g. benthic monitoring.

One of MEDIN's three strands to their framework is to compile, develop and maintain a suite of standards and guidelines for marine data and metadata. The MEDIN Discovery metadata standard has been widely adopted within the UK Marine Community.

There are a varying degree of standards applied to data collected in different industries. The Crown Estate requires all wind farm related metadata in the MEDIN format; as do the oil and gas sector and IFCAs (Inshore Fisheries and Conservation Authorities). However no stringent requirements exist in other sectors. Other standards do exist of equally stringent quality, e.g. Oil and Gas Proforma (OGP) GIS database template, created by a consortium of companies in the field (Shell, BP etc). Whilst this is geared at the geophysical sciences, it is expected this is the best available template in the field, likely to be adopted as industry standard (not currently mandatory). Some sectors may be challenged to move from a pre-existing tailored approach to data towards a cross-sectoral standard.

Other sectors have a more variable approach: In the Humber case study, developers have their own standards that sub contractors have to work to. In the nuclear industry, EDF believe that data is supposed to conform to MEDIN but as raw data is kept externally this could not be confirmed. However EDF also work to their own metadata standards.

The MMO will require MEDIN metadata from developers in the near future, a subject addressed through the recent Habitats Regulations Implementation Review:

- Measure 16: Explore the practical implications on operating capacity with MEDIN, the MEDIN Data Archive Centres and other equivalent data sharing facilities (by October 2012, Defra to action).

- Measure 17: Commit to managing data consistently and sharing priority data not yet publicly accessible; ensuring data can be identified through MEDIN and accessed from the MEDIN Data Archive Centres or equivalent data sharing facilities (by December 2012, to be actioned by industry, Natural England, EA, JNCC, MMO, the Crown Estate).

The specification of this process has not yet been determined, but is unlikely to include small Tier 1 applications, e.g. simple moorings, buoys, boreholes, tracers, small jetties and outfalls, burial at sea, scaffolding, meteorological masts.

Enhanced Guidance and Standardisation: Current Situation

In summary, there are a multitude of different guidelines for monitoring for different sectors and receptors, and between Natural England and industry. Sector specific guidelines are often used in sectors they were not intended for (e.g. wind sector using aggregate benthic guidelines) and different methods are employed across a site, reducing compatibility of results. Guidance does not usually cover the full cycle of data collection (analysis, reporting, data handling etc). Advice and consultation by Natural England can vary between sites and may offer a precautionary approach to defining monitoring requirements. Knowledge of impacts from development is greatly assisted by Natural England sector leads but is compromised by lack of use of industry data to understand impacts further, insufficient amalgamation of data and therefore a perception that requirements are not wholly hypothesis driven. The limited resources available to Natural England do not help this.

In order to address the issues identified above and move towards more joined up monitoring opportunities, the following actions have been identified.

Improve Guidelines

i. Two of the actions under the Habitats Regulations Implementation Review are:

- Measure 8: Undertake a stock-take of over 1,600 pages of current guidance and make proposals for simplification (by March 2013, Defra to action).
- Measure 13: Introduce new consistent standards on the acceptable range and quality of evidence that will enable statutory agencies to provide their advice (consult November 2012, publish March 2013; Natural England to action with EA, MMO, JNCC).

These are mirrored in the findings in this study: to provide more detailed and better coverage in guidance, coupled with a requirement that guidelines and standards for monitoring and assessing impacts are used by developers from the pre development stage. This would provide an opportunity to join approaches if agreed between regulators, advisors (including SNCBs) and industry, and should be carried out alongside work by the Offshore Renewables Research Steering Groups (ORRSG) and Defra Marine Programmes.

ii. Seek more opportunities for consistency across sectors by creation of guidance documents that are survey or discipline specific rather than industry specific, e.g. COWRIE best-practice guidelines for boat-based and aerial platform bird and cetacean surveys. This will increase the utility of data for joint monitoring purposes. However industry has provided a clear message that guidance should allow for a number of methods to be adopted and not be too stringent on instrumentation etc.

iii. Produce more detailed guidelines in design of monitoring programmes with regard to impact-transport-receptor and cross-sectoral / cumulative impacts. Ongoing pieces of work being undertaken for both the MMO and Renewables UK on cumulative impacts may help support the development of such guidelines.

iv. To aid the above steps, improve understanding across regulators, SNCBs and other institutions as to who is working on what to reduce any replication (as currently experienced). This requires expansion on existing documentation (e.g. MMO licensing process diagram[16]) to allow for the level of detail required to avoid overlap.

Advice & Consultation

v. It is essential that the regulators are involved when SNCBs are having initial/early discussions with developers. This ensures agreement on the monitoring requirements at an early stage and can help ensure that advice from SNCBs is consistent.

Better Knowledge / Hypotheses driven monitoring.

vi. Re-evaluate / assess data already collected, in order to identify good practices and to develop understanding of impacts and assessment of significance of effects, for use in other applications. This could be undertaken in partnership with academic research programmes and / or co-funded by industry. Another option could be for this to be undertaken through Relevant Authorities Groups to undertake as part of an EMS adaptive management approach – this has happened in the Humber and Solent. This is already in progress in the aggregates industry where a rolling programme of post-construction monitoring reviews has been agreed as part of a review of the implementation of the Habitats Implementation Review.

vii. In support of above, consider consolidation of data. Currently, The Crown Estate play an important role in facilitating the consolidation of data sets into an overall map as part of the Joint Cetacean Protocol and this is helpful for both baseline studies and EIA work. A similar initiative could be carried out for other features, e.g. birds, although it is recognised that this would have its own challenge, e.g. the statistics methods used in the JCP would not be transferable. However this initiative could be further gained through monitoring at a strategic level (see later section).

viii. Address knowledge gaps from consolidation exercises and reduce these gaps. This should develop from existing practices such as the Joint Cetacean protocol and work by the Offshore Renewable Energy Licensing Group and Offshore Renewables Research Steering Groups (ORRSG).

ix. Explore funding for SNCBs to fill these gaps. This is stated on the pretext that it is understood that Natural England MPA funding is representative of the 6 year cycle; that resources are significantly constrained; and that efforts are very much restricted to the statutory requirement. This may not entail significant amounts – for example enhanced links between SNCBs and UK research funding agendas (e.g. NERC programme and European funding streams).

x. For sites where developers are expected to have limited impact and there is also insufficient MPA condition monitoring (e.g. limited to 6 years even if full condition not understood, or a new MCZ site), then developers could contribute towards MPA monitoring at the baseline characterisation stage for EIAs, with agreement for more proportionate EIA monitoring and stronger post

[16] MMO (September 2011). Marine licensing guidance 1: Overview and process, V0.5

construction monitoring to pick up on any real impact. This recommendation is put forward in recognition of the situation that arose within port maintenance dredging and the Government's Better Regulation Unit was brought in to mediate between SNCB's desire for developers to fill the gaps in condition monitoring, which was ultimately out ruled as not the developer's role.

The delivery of these actions would be greatly aided by those from the previous protocol, i.e. a better evidence base from which to examine and / or extract the data and results of monitoring.

Data Standards.

xi. The Habitats Regulations Implementation Review states one if its actions is:

- Measure 17: Commit to managing data consistently and sharing priority data not yet publicly accessible; ensuring data can be identified through MEDIN and accessed from the MEDIN Data Archive Centres or equivalent data sharing facilities (by December 2012, to be acted upon by industry, Natural England, EA, JNCC, MMO, the Crown Estate).

The joint monitoring study also reiterates this need, for MMO, DECC etc to make the overarching MEDIN template standard to all industries as part of the licence application / consent requirements. There would have to have a clear understanding at the start of standardisation to increase the degree of accuracy. This would lower the risk of compromising the standards resulting in less use to everyone. This should also apply to GIS metadata, which incorporates MEDIN. Also the availability of clear, publically available metadata as well as the data itself on all surveys undertaken would be extremely helpful to any organisation submitting an EIR request to a regulator. The MMO will require developers to submit MEDIN standard metadata to MEDIN.

xii. The requirement for standardisation was considered (at the workshop) to be of much greater significance to more streamlined guidance and should be addressed as a priority. Industry also expressed a willingness to use conformed standards and it seems to be simply a case of making these a requirement in the EIA process.

6.3.3. Costs and Benefits

There are potential benefits to industry in terms of reduced costs as well as timescales / efficiency. Costs could include the reasonable expectation that industry actively support or collaborate with these initiatives. In return, SNCBs would have further enhanced their relationship with industry that will allow a basis of trust to open up future joint working.

Enhanced Guidance and Standardisation: Protocol 3

The various monitoring guidelines available for different industry and public sector monitoring should be improved and updated / consolidated and this should be assisted through the actions of the Habitats Regulations Implementation Review. Ideally guidelines should be the product of both industry and SNCBs to ensure maximum joining up of methods. However, this should only be adopted with full industry and SNCB consultation and extended for all marine

areas (i.e. not only designated sites). These should consider single receptor guidelines and incorporate the source-pathway-receptor approach and cross-sectoral / cumulative impacts. It was noted at the stakeholder workshop that the MMO were already taking forward actions in relation to this.

Advice and consultation should be provided with a clear line management across SNCBs, regulators and government, and ensure agreement of all parties required for monitoring plans.

Better knowledge can be developed through re-evaluation of existing datasets. This would be assisted through data consolidation in receptors not yet addressed, e.g. birds, and then allow better understanding of gaps to focus attention on. There is also a quick win for industry to contribute to data collection for new MPAs (e.g. MCZs) at the development baseline survey stage with agreement for more directed and hypothesis led post-construction monitoring. Increasing knowledge through re-evaluation of existing datasets should also be given a higher priority within UK Marine Monitoring and Assessment Strategy (UKMMAS).

These recommendations are supported by Measures 8, 15, 16 and 17 of the Habitats Regulations Implementation Review, as provided below in the Conclusions.

7. Protocols to establish methods in joint monitoring and data collection

The previous sections look at a range of cross-cutting actions that are likely to build foundations for more opportunities in joint monitoring. Now the following sections consider actual joint monitoring, for both site specific monitoring as well as strategic or regional level approaches adopted; and how these could be used to develop a protocol for joint monitoring in England. This is provided through two further protocols:

Protocol 4: Site monitoring and data collection.
Protocol 5: Strategic monitoring and data collection.

7.1. Protocol 4: Site Monitoring and Data Collection

7.1.1. Requirement

In considering how joint monitoring might be facilitated it is necessary to outline existing examples of joint monitoring or data sharing and collection, what lessons can be learnt and some practical issues and actions that may support further opportunities for joint monitoring. 'Site' monitoring is defined as an area that includes at least one MPA and industry development, but may include several, e.g. Bristol Channel or Humber Estuary. It does not refer to the regional studies that purposely include many developers: these are addressed separately in Strategic Monitoring.

7.1.2. Current Situation

Developers within an area have to form similar evidence bases prior to development. There are, however, often different sectoral considerations as it is more useful to those located close together and often in the same sector, e.g. oil and gas concession blocks. Examples of joining up include:

Inter/Intra Industry Site Joint Monitoring and Data Sharing

- Each time oil and gas developer Gateway Gas Storage undertakes a survey in Liverpool Bay, they will contact the operations/project manager at Centrica or other relevant developers to determine whether they are collecting data or need data within that region. This is with the hope of perhaps utilising the same vessel and equipment and sharing data collected within that area. As the aim would be to use the same contractor, to reduce mobilisation and costs associated with this, the data is collected in the same way and is standardised to the contractor's methods so no discussion of joined up working practice is required.

- A monitoring scheme has been put in place covering several locations within the Humber Estuary as part of the Environmental Management and Monitoring Plan (EMMP) for two port projects, Immingham Outer Harbour (IOH) and Quay 2005. The EMMP has been in place since 2004. This project has been monitoring Immingham Outer Harbour, Hull Riverside Container Terminal, Welwick, Chowder Ness and Doigs Creek for various features. The frequency of this ongoing monitoring has remained consistent as stated in the EMMP. As part of this work, baseline surveys were carried out prior to construction of developments.

- As part of the Humber Managed Realignment Monitoring Group the Environment Agency collects LiDAR data, which is used by multiple users.
- Aggregate companies with an interest in a particular Licence Area at times pool resources in order to share the expense of operating a licence so that they can also jointly share the benefits of commercially exploiting the licence.
- The East Irish Sea Developers Group, involves a range of offshore wind developers active in the East Irish Sea, SNCBs and TCE. It aims to identify opportunities for joint evidence, data and survey issues (such as joint aerial and boat based marine mammal surveys.
- On a less positive note, there is experience of joint monitoring in the oil and gas sector between developers historically. However over time, the contractual aspects of working together have not allowed joint monitoring to continue. This barrier was purely placed within the contracts teams of each developer. Whilst contracts had been agreed previously on many occasions, the experience of pre-project negotiations led to a lack of enthusiasm for following projects. It has not been possible to ascertain whether this was due to timescales for contract negotiations or risks / costs involved (unable to source information due to changes in staff), although the former seemed likely. However within the renewables industry it was also noted that contractual negotiations between developers in the renewable sector and in the aggregates sector can be time consuming and expensive.

Inter-SNCB Site Monitoring.

- Natural England have a joined up approach with EA, Cefas, JNCC and others through various mechanisms, one of which is the Cross Agency Survey Group. The group meet up regularly to bring “Dots on Maps” to the table, i.e. show their monitoring plans on paper maps. This is a very practical approach to joined up monitoring on a case by case basis. They did not see that an online method of this would be any better and thought that perhaps it might hinder joint monitoring. It is recognised that working with other government bodies provides an easier avenue for joint working due to the similar drivers for monitoring, different financial drivers, and a longer-term outlook than some industry monitoring.
- Natural England had planned on setting up a monitoring project with ABP on the Humber Estuary but it was cheaper for Natural England to work with EA and make use of their boats.
- In Wales, CCW and the EA have an agreement for joined up monitoring with WFD monitoring programmes. To address differences in methods, they have simply adopted both methods in areas of difference, e.g. sieve sizes, and will assess after the results are compared whether to adopt just one for both purposes.
- The EA working, with the MCA MoU for multibeam data acquisition. MCA work with a cost-benefit model to prioritise their surveys. If for example Natural England find they would like a

survey that is of greater priority to them compared to MCA, the model outputs the difference in cost required to bring it forward in their programme, costs which Natural England then meet.

- Although not a programme of site specific monitoring the JNCC are currently leading on the development of the UK Marine Biodiversity Monitoring Programme[17]. The Programme is expected to develop a common framework for seabirds, cetaceans and benthic habitats monitoring for all UK seas.

Industry-SNCB Data Sharing.

Data sharing has been identified in a large number of situations for non-monetary gain. This tends to take the form of industry data shared with SNCBs or other bodies for return of data or other non-data benefits. Examples of data sharing include:

- The European Marine Energy Centre (EMEC) providing partially pre-consented sites with cables to shore for developers to try new applications, in return for data to inform studies on noise and animal to improve the process and reduce uncertainties and future monitoring requirements.
- Developer data of concern to safety shared with authorities, e.g. bathymetry data collected by EDF at Hinkley shared with UKHO where it met the high standards required. This example does not have any direct benefit to the developer other than their overall interest in protecting safety outside of their own operations.
- Metocean data funded by developers, e.g. wave buoy in the Bristol Channel which provides public data. This was requested by EDF owing to their interest in "commonality of understanding".
- EDF work with the Environment Agency on fish entrainment at the cooling water intakes of the Hinkley Point nuclear power plant. Through provision of the EA's expert advice, EDF have succeeded in engineering a better system and in return provide the EA with fish population numbers monitored which have been used to inform long-term change in the Bristol Channel, relating to natural changes in the environment.
- Assistance from RSPB on their monitoring systems to apply to EDF's assessment of the Bristol Channel in return for shared data.
- Existing datasets from ABP, North East Lincolnshire Council, BP and the EA in the Humber used by Natural England in condition assessment to increase the spatial coverage.
- ABP bathymetric data collected in the Humber Estuary is published locally in the form of charts and plans. These are used by the VTS officers and Pilots to assist in bringing vessels safely into the Port. In addition, all the survey information is sent to the United Kingdom Hydrographic Office, where it is used in the compilation of British Admiralty Charts. Thus the surveys produced by the Humber Estuary Services (HES) are available to anyone with an up to date Admiralty Chart covering the Humber. In addition, some information of a particularly urgent or temporary nature, may be disseminated by means of local and / or Admiralty notices to mariners.

[17] **http://jncc.defra.gov.uk/page-4221**

- The EA and ABP have an informal agreement to share LiDAR and Bathymetric data in the Humber Estuary. This data can only be used by the EA and cannot be passed on to a third party. EA could use the Bathymetric data to monitor the fluid movement of the substrate in the estuary.
- The aggregates industry has offered to help monitor rMCZs where they are next to existing aggregate sites, subject to continued activity in these areas . The majority of the cost in surveys is in mobilization so it is relatively cheap for an existing survey to tag on e.g. an extra 500m line of geophysical multibeam data acquisition. The aim is to widen the geographic scale of knowledge, helping both the SNCBs but also ensuring that commercial activities are better managed with better technical knowledge and best practice.

Industry-SNCB Consultation Groups

The data shared between industry and SNCBs discussed above is, in many cases, a result of close and regular communication between the two sectors. In many cases this is informal but there are also cases of formal groups set up for this very purpose. Examples of successful group working are provided below:

- The Humber Local Nature Partnership is a government initiative to bring together a range of stakeholders with the overall aim to join forces and contribute to the sustainable development of the local area and engages existing and new stakeholders to the Humber Management Scheme (HMS) and is running from January to June 2012.

- The Humber Industry Nature Conservation Association (HINCA) was formed to address the challenge and opportunities of natural conservation within an industrial environment. This organisation serves as a forum for industry, regulators, planner and conservation organisations to develop business and nature in a sustainable manner that will benefit the region's economy and environment. Importantly, they also act as an advisory body providing guidance on ecological legislation.

- There is currently exiting collaborations of monitoring on the Humber including the HMS which is made up of two parts; the Humber Advisory Group (HAG) and; the Humber Estuary Relevant Authorities Group (HERAG), which is made up of over 30 organisations with statutory duties for the Humber Estuary EMS, including ABP, Natural England and the EA.

- The Humber Managed Realignment Monitoring Group includes industry and Natural England as members which aims to promote and help communication between organisations undertaking realignment and disseminate progress on the realignment projects to the wider estuary community.

- Data is regularly shared between organisations in these Humber Estuary groups along with association academic and research organisations such as IECS and ABPmer, with the overall aim of improving knowledge of the estuary.

- Current discussions are taking place in view of a user group for the Bristol Channel focused on the Hinkley power station. This would be led by EDF but with inclusion of various members including SNCBs as observers (though the idea was proposed by SNCBs). The group working builds on the existing relationships already developed from data sharing as noted above. This is looked on favourably by EDF and follows another similar arrangement for Sizewell. This group has successfully shared a lot of data and assessments / reports and gain from operating within a small group.

Industry-SNCB Site Monitoring

There were no examples of joint monitoring on a site by site basis between Natural England and developers. The majority of joint working is limited to data sharing which avoids the more complex issues that must be addressed in survey logistics. However there is a feeling within industry that we need to see some examples of the benefits of working together to encourage other initiatives.

7.1.3. Protocol

A number of mechanisms have been demonstrated through examples of successful joint monitoring and data collection to date, carried out on a site specific basis. These mechanisms, together with further protocols are detailed below to guide future site joint monitoring:

Group Working

i. **Working Groups**. There is evidence that joint working can happen both with and without a formalised group. Formalised groups can easily build on existing groups. For example Relevant Authority Groups established under Management Scheme for European Marine Sites are especially relevant in areas of moderate to high development and can facilitate data sharing and greater coordination of activity. For offshore sites, there are examples of coordination and working groups between regulators and relevant industries (for example, convened by The Crown Estate). It would be desirable that such groups are managed on a national then regional hierarchy to allow coordination with SNCBs and any joint monitoring programme that might be taken forward. This is currently lacking but continues to be recommended for a number of other drivers, e.g. Integrated Coastal Zone Management.

Site Monitoring and Data Collection: Current Situation

In summary, joint site monitoring has been enabled through a number of mechanisms including:
- Casual ad-hoc enquiries between developers to join monitoring.
- Agreements for additional data to be collected on existing developer surveys using same personnel, equipment, i.e. same contractor.
- Acceptance that differences between instrumentation are not known and a trial period to test these differences, i.e. using more than one method for data collection from the same site.

- Formal consultation groups between developers and SNCBs; and groups within sectors.
- Informal face to face workshops on regular interval to show maps of survey plans
- Cost benefit model to help prioritise surveys for joint monitoring, calculating cost incurred in programme changes.
- Data shared freely for good will, commonality of understanding and navigation safety.
- Data shared for mutual gain of: data swaps, monitoring design, reduction of uncertainties in future assessments, understanding in areas other than industry impacts (e.g. climate change), assistance with monitoring impacts for new technologies, and partially pre-consented sites.

ii. **Framework Agreements with SNCBs**. Natural England are currently procuring a framework contract for marine monitoring suppliers. It is possible that this will develop over time to include other SNCBs and regulators such as the MMO. This will certainly help joined up monitoring between SNCBs and may help identify areas for joint monitoring between developers. This framework should be used widely for site monitoring and will especially help in those areas where there is no formal group operating across SNCBs and industry The Robin Rigg windfarm has a monitoring committee to do specific monitoring but it has been stated that a framework agreement would ensure that post construction monitoring could be used to identify better solutions and that monitoring could also be used to test hypotheses about possible impacts.

iii. **Facilitation Role**. To promote framework agreements and / or to support general site joint monitoring, appoint an SNCB staff joint monitoring coordinator/'clearing house' function specifically to focus on industry. (This has been piloted within Natural England, with an EA secondee undertaking a similar role and acting as a coordinating point between the two organisations.) This will allow the position to raise above the complex issues dealt with day to day within and between SNCBs for their own monitoring remits to develop better relationships with and knowledge of industry. This position / role would target trade associations initially, to help prioritise potential joint monitoring cases, to follow on to develop relationships with specific developers and join up their working with local Natural England case workers. The role could initially focus on specific sectors, or take a 'receptor' approach (e.g. all benthic monitoring) but the ultimate aim should be to cover all sectors and receptors that joint monitoring aims to target. This would greatly enhance the current de-centralised working of Natural England with much of the local knowledge and data remaining with regional offices and staff, therefore the new approach would allow for central understanding consistency and application of lessons learnt elsewhere within SNCBs / industry. Also as Natural England is a Government body it cannot be seen to be benefiting a particular company, and its role must not be (or perceived to be) compromised. This risk would be reduced if the operations were coordinated centrally as the post could ensure that Natural England only goes ahead if a number of programmes are in place with different developers and sectors. The central SNCB / industry role would need to draw on lead Natural England specialists for specific receptors and local issues addressed, but should always be

coordinated by the central role. (Whilst this recommendation is focused on site specific monitoring, should any joint initiatives be developed at a national scale, similar to the Joint Cetacean Protocol, this would require a specialist national lead.) Subject to the specification of such a role, it would not be unreasonable to seek some resource from industry to support it. Also drivers from the Habitats Regulations Implementation Review will help push this facilitation role forward (various measures).

Planning ahead

iv. **Early involvement in EIA planning.** Whether SNCBs are to become more involved with industry (for application of joint monitoring) through a formalised group working, SNCB industry coordinator or remaining at the local more ad-hoc level, it is essential that both SNCBs and industry join up their thinking as early in the consenting process as possible. For example significant information on Gunfleet wind farm (Thames) is from aerial surveys carried out before construction of the wind farm and which cannot now be repeated due to health and safety issues. This does not provide comparable data between pre and post construction monitoring which is a missed opportunity. Given the important role of SNCBs at the pre-application and screen/scoping phases, opportunities for joined up monitoring should be considered as a formal part of the process. Also, the opportunities for joint monitoring may be more open at the baseline monitoring stage for industry, when specific post construction impacts are not being assessed and so the early involvement may reap significant rewards. Participants at the workshop noted that the regulators such as the MMO could play a leadership role in encouraging SNCBs and developers to identify joint monitoring opportunities at the scoping stage.

v. **Flexibility.** Memoranda of Understanding have been set up between SNCBs and other public sector bodies not involved in the licensing process (e.g. MCA), and seem to work well in at least one case identified (MCA multibeam surveys). However MoUs should be avoided between SNCBs and developers as this may slow down the process, cause unnecessary blocks, require greater staff time input in administration and therefore less likely to be adopted by industry. It would be better to rely more on the group / coordinated working outlined above.

vi. **Timing**. SNCBs should take into consideration the different timetables that each of industry and SNCBs work to. A survey company will typically take orders for surveys through late winter into spring and may often reach full bookings by mid spring for the year's good weather months, as per developer's requirements and often short turnaround contracts. As SNCBs have the more long term planning of up to 6 years for MPAs, they should ensure they are in discussion with developers and / or survey companies by early winter so that any plans are considered in the wider timetable.

Promotion of activities

vii. **Survey advertising**. Given the centrally coordinated and public display of monitoring activity detailed in Section 6.1, the SNCB lead on industry monitoring (previous recommendation) would need to check these on a regular basis to identify opportunities. However there would still be a

need for a certain level of more local 'survey advertising' to promote these activities through stakeholder groups. For example, considerations this might adopt the "dots on maps" approach taken by Cross Agency Survey Group, or take place within the Relevant Authority Group at EMS level. A quick win identified by consultees could develop if the Crown Estate and DECC were to join the Cross Agency Survey Group meetings and discussions under UKMMAS.

Survey Planning and Agreements

viii. **Prioritisation**. If joint surveys were to go ahead the situation may well arise where a priority is given to one of the other organisations' data collection. E.g. this may result from issues with weather delays, and relate to turn around of reporting required on projects. Developers cannot allow such a situation to result in them failing to meet the conditions attached to their licence; i.e. industry would have to be given higher priority in such cases. However MPA survey timing is not very flexible particularly for birds (because it has to coincide with when the birds are expected in location). Also prioritisation needs to be considered in the context of mobilization / lead times, e.g. industry can mobilize surveys in very short timescales (e.g. oil and gas 24 hour lead time) due to their freedom of choice of contractors etc. Therefore following consideration of all aspects of timing, prioritisation should be agreed pre-survey through a contract with vessel / staff contractors in the field trained and informed of the decision making process that may be required. This should be done on a case by case basis and cannot easily be developed into a single protocol.

ix. **Vessel**. The best examples of actual joint monitoring (inter/intra-industry) happen where the same contractor is used to do monitoring for both parties whilst in the same area. If SNCB/Industry joint monitoring opportunities were to be identified, this would be more straight forward approach and simply requires each of the SNCB and developer to have their own contract with the vessel operator / survey company. This already happens in inter/intra industry joint monitoring cases but perhaps limits the scope for 'joint cost savings' on equipment and mobilisation costs. The survey contractor is usually in discussion with each of the developer and SNCB separately (and through a supply chain hierarchy) and therefore they are not aware that savings are possible.

x. **Procurement** SNCBs are bound into operating within EU procurement rules. In addition, current UK Government practice has a requirement to advertise any procurement activity over £25,000. If joint monitoring opportunities were indentified at a very early stage, it is possible to meet EU procurement requirements and advertise invitations to tender for monitoring activity. Adding on additional SNCB monitoring activity costing over £25,000 to an existing contract undertaken by a contractor on behalf of a developer would not be possible without a formal procurement process.

xi. **Contractual / Liability**. Having reviewed the practicalities of liability, health and safety and risk management, it is most likely that these need to be considered on a case by case basis for joint monitoring between industry and developers and cannot easily be fitted into a generic model. However this could be aided by a generic model contract to speed up the process as opportunities

are identified (as suggested by consultees) and this could develop on the existing framework being set up by Natural England for marine monitoring by developers.

Taking Joint Monitoring Forward at a Site Level

xii. **Small scale**. Joint monitoring between industry and SNCBs should be trialled with as few organisations involved as possible and managed at a local level in the first instance, e.g. through the relevant authorities group of a specific European Marine Site. The greater likelihood for success in these cases would then lead to better understanding of the management involved regarding contracts, prioritization etc that could then be rolled out to additional and ultimately larger / more complex sites. Small scale will also help address the need for Natural England to advertise any contracts over £25,000, i.e. any contract initially should be below this mark. The ideal was to address small scale sites would be close to shore single receptor surveys, e.g. intertidal mudflat cores.

xiii. **Target Receptors**. Feedback from the workshop suggests that some receptors are likely to be more amenable to joined-up monitoring activity than others, as also outlined in the data sharing in previous sections. As promoted for data sharing, a meeting between industry and SNCBs should allow the most easily shared data types to be identified and targeted.

xiv. **Emerging Industries**. The project has found that the newer emerging sectors, e.g. wave and tidal, carbon capture and storage or wind, may offer some of the best opportunities for joint monitoring (and already show readiness to share data from the EIA process). These industries often have less rigid processes and established practices in place and in some cases some element of public funding available to support the deployment of new technology. There are also examples of access to funds, e.g. Low Carbon Innovation Fund and Carbon Trust who have paid substantially (50%) into environmental assessments for tidal demonstration sites.

xv. **Accepting Trial Period.** The first few joint monitoring projects carried out will need to accept that the gains may form more of a 'break even' situation rather than substantial wins whilst the process is being developed and case by case details more clearly understood. From the feedback at the joint monitoring workshop, there was a lot of openness to trialling joint monitoring at a site level discussions despite this. One of the impacts however of reduced gain in early joint monitoring trials may be that some additional funding is required as one-off cases to explore the process, although this is not necessarily essential. As discussed above in the case of the MCA socio-economic model for prioritizing surveys with SNCBs, the best approach is to adopt a funding model to make benefits clear to both parties. The acceptance of a trial period also applies to understanding what the more tangential rewards or gains are as these may not be clear at first.

xvi. **Target Sites.** To initiate the process and discussions with industry, SNCBs should produce a list of sites that require monitoring within the next 4 years. This would be of advantage particularly if discussions are opened up with developers that operate a number of sites to assess the suitability of any of these for joint monitoring.

7.1.4. Costs and Benefits

Given the limited experience to date on Natural England /developer joint monitoring at site level it is difficult to identify exact cost and benefits. Examples of joint-monitoring (between SNCBs or between developers) and views at the workshop suggest that that the benefits of more site-level joint monitoring could include better understanding of an MPA/site and an associated feedback loop to future monitoring activity and potential cost savings.

Feedback from the workshop suggested that site level joint monitoring would in some cases have the potential to reduce costs for SNCBs and developers. In other cases, the transaction costs and potential administrative burden associated with joint procurement and co-ordination of effort may be such that it is not cost effective.

Site Monitoring and Data Collection: Protocol 4

Where there is perceived benefit to all from joint monitoring the following actions should be carried out:

- **An appropriate working group should be used or where not already existing, set up.**
- **Input to local groups from centralised / national meetings.**
- **Set up a centralised role within Natural England or JNCC to coordinate between SNCBs and developers / national trade associations, and target sites, consider industry funding in part.**
- **Ensure early joint planning for EIAs, potentially with formal obligations for regulators to notify SNCBs of planned activities and flag up data available to share, as part of the licensing process.**
- **Allow a degree of flexibility without formal agreements, e.g. MoUs.**
- **Enter into discussions with industry in winter for the following year's surveys, at a minimum.**
- **Draw up agreements for prioritisation during work schedule changes (e.g. due to bad weather), on a case-by-case basis.**
- **Any contractual obligations and impacts imposed on SNCBs by the EU procurement rules (and then potentially passed on to industry) should be accommodated by SNCBs.**
- **Consider liability, health and safety and risk management on a case-by-case basis.**

The best opportunities to promote joint monitoring can be found by targeting:

- **Small scale sites.**
- **Few organisations involved.**
- **Emerging industries and those already accustomed to joint working.**
- **Staying within the procurement threshold value imposed on Natural England.**
- **Receptors with limited commercial confidentiality issues (e.g. benthic ecology).**
- **Accept trial period for first few sites and agreement of potential 'break even' gains.**

These recommendations are supported by many Measures of the Habitats Regulations Implementation Review, including all of those provided below.

7.2. Protocol 5: Strategic Monitoring and Data Collection

7.2.1. Requirement

The case studies and stakeholder feedback suggested that there are likely to be some significant opportunities for joint monitoring and greater mutual benefit from approaches at a strategic or regional scale.

7.2.2. Current Situation

Currently there are many cases of industries joining up prior to the EIA process to develop better regional understanding and help reduce monitoring needs at the actual EIA stage. There is a sense among developers that doing more than the minimum from the outset does have a benefit in creating the right environment and raising confidence, but that cutting back on unnecessary work in time is also important. There is also a sense that doing more than the minimum may help to create greater confidence in understanding the impacts. Examples of this practice are found in the following cases:

- Funded through levies imposed by Government and re-cycled back to the aggregate sector through the Marine Aggregate Levy Sustainability Fund (MALSF), there have been a series of Regional Environmental Characterisations (RECs) in England in the dominant areas of dredging activity (East English Channel, South Coast, Outer Thames Estuary, East Coast and Humber regions). These have provided a wealth of information. The overall objective of the RECs was to provide integrated broadscale seabed maps in order to support the sustainable management of offshore resources now and into the future. The basis of the maps is a regional assessment of the physical, biological and archaeological environment[18].

- Regional Environmental Assessments (REAs) are similar in nature to the RECs, but focused on aggregate extraction areas grouped together in regional blocks. Funded by industry operators, REAs investigate the potential cumulative and in-combination effects of minerals extraction for similar regions covered by RECs. The reports are a voluntary undertaking by the aggregates industry, and serve as a considerable source of information which can be drawn upon for licence applications and renewals and the EIA process.

- A series of EIAs in support of applications for the renewal of Marine Aggregate Licences throughout UK waters are currently being conducted, targeting short-term licence applications to bridge the gap between the EIA compliance deadline of October 2012 and 15-year renewal programme arranged to start in 2013. Funded through a consortium of aggregate operators, and co-ordinated by BMAPA, these were initially designed on a regional basis (under the synonym Regional Environmental Impact Assessment, similar in nature to the REAs which were

[18] Tappin, D R, Pearce, B, Fitch, S, Dove, D, Gearey, B, Hill, J M, Chambers, C, Bates, R, Pinnion, J, Diaz Doce, D, Green, M, Gallyot, J, Georgiou, L, Brutto, D, Marzialetti, S, Hopla, E, Ramsay, E, and Fielding, H. 2011. The Humber Regional Environmental Characterisation. British Geological Survey Open Report OR/10/54. 357pp.

unavailable at the time) as some aggregate licences may not have required full EIAs. However industry regulators and operators decided this approach was insufficient to assess impacts and with much overlap with the REA process. Therefore, individual screening reports are now being carried out for each licence area, though do not require additional surveys.

- The British Energy Estuarine and Marine Studies (BEEMS) framework to collate data prior to EIA process is so effective that they believe they have not had to carry out any monitoring at the EIA stage. (However this was set up due to the high levels of exploratory technology and high risk programmes being put in place.)

- Strategic Environmental Assessments are required by law under the European Strategic Environmental Assessment Directive (Directive 2001/42/EC) since 2004, although earlier SEAs were carried out in accordance with its requirements. Oil and gas SEAs were carried out for eight regions of the UK Continental Shelf, the eighth being included in the Offshore Energy SEA (which covered all UK waters). SEAs have also been carried out for the offshore Energy SEA (OESEA, 2008/2009) addressing the offshore wind, oil and gas and carbon capture and storage; and OESEA2 for offshore wind, wave and tidal, oil and gas, hydrocarbon and carbon capture and storage. SEAs have included wide scale surveys to add to existing data collections.

- The Zonal Appraisal and Planning (ZAP) approach has been adopted for offshore wind. This aims to identify areas within a given zone that could be suitable for offshore wind farm development, in order identify potential development areas to take through the planning process. This was led by industry and the Crown Estate.

- The Crown Estate (TCE) has co-ordinated a number of broad-scale survey programmes to inform R3 developments, including for birds and marine mammals. Similarly, Marine Scotland and TCE jointly funded bird surveys in Pentland Firth & Orkney Waters to provide information to inform Round 1 wave and tidal developments. In renewables, the industry is also working with RUK to do a strategic review of monitoring needs and there are discussions with the MMO on the future of monitoring.

- The MMO is carrying out a legal review of monitoring needs and is looking at possible generic conditions through review of monitoring data for wind farms.

- Oil and Gas UK (formerly UKOOA) commissioned an analysis of seabed environmental surveys carried out on behalf of UK North Sea offshore oil operators. The purpose of these surveys was to monitor the seabed in the vicinity of offshore operations with the aim of detecting environmental impact (Oil and Gas UK, 2009). The analysis was completed in three phases. Phase 1 consisted of the compilation of an inventory of surveys carried out in the UK sector. This initially summarised the results of 472 environmental surveys carried out between 1975 and 1998 by environmental monitoring contractors, government agencies and universities. Phase 2 involved the production of database files containing detailed biological, chemical and location data. Phase 3 examined the extent of contamination from offshore exploration and production

activities and impacts on the biota, and attempted to determine any large-scale trends over wider geographical areas (UKOOA, 2001). This final phase was completed in April 2001. Care has been taken to record the database in a format that ensures the contaminant concentrations measured by different analytical methods are kept separate. Data is published within a report entitled 'Analysis of UK Offshore Oil and Gas Environmental Surveys' (UKOOA, 2001) and is available within the UK Benthos Database.

Strategic Monitoring and Data Collection: Current Situation

In summary, joint strategic monitoring has been enabled through a number of mechanisms including:
- Research funding through funds collated from industry development.
- Common interest of developers in regions to develop baseline data.
- Common requirement of developers in regions to assess impacts.
- Reduced expense and more efficient working post monitoring for EIA process.
- Requirement for concurrent short term licences to multiple developers within a region.
- Emerging technology developments requiring substantial baseline data.
- SEA Directive.
- Investigation of resource availability for emerging developments.

7.2.3. Protocol

The case studies and stakeholder feedback suggested that there are likely to be greater opportunities for joint monitoring and greater mutual benefit from approaches at a strategic or regional scale, in comparison to localised site specific compliance, characterisation or condition monitoring studies. As the scale of strategic monitoring is driven by industry characteristics, needs, environmental and ecological understanding, the objectives for each programme naturally vary.

7.2.1. Costs and Benefits

The upfront cost of strategic/regional monitoring is high for industry, and has often involved some element of public funding. The benefit are that SNCBs and industry can have joint ownership of evidence which can help expedite the licensing process and overtime reduce costs.

Strategic Monitoring and Data Collection: Protocol 5

A number of mechanisms have been identified that facilitate joint strategic or regional monitoring. These include:

- **Research funding through funds collated from industry development.**
- **Common interest of developers in regions to develop baseline data.**
- **Common requirement of developers in regions to assess impacts.**
- **Reduced expense and more efficient working post monitoring for EIA process.**
- **Requirement for concurrent short term licences to multiple developers within a region.**

- **Emerging technology developments requiring substantial baseline data.**
- **SEA Directive.**
- **Investigation of resource availability for emerging developments.**

Opportunities for such mechanisms to benefit joint monitoring between SNCBs and developers should be sought wherever possible. These could ensure that SNCBs and developers receive a clear incentive such as a 'feedback loop' into the consenting process, cost sharing and hence cost / efficiency savings, multi agency involvement, consistency in approach and a shared evidence base and understanding to a pre-agreed quality. Such mechanisms and incentives in strategic monitoring could be considered as a model for longer-term evidence and monitoring activity, drawing on earlier recommendations such as standards (see protocol 3). Clearly, the most opportune examples of strategic monitoring to take forward would be those areas with significant interest to both industry and SNCBs, i.e. a high number of MPAs within a single or multiple sector development regions.

Significant progress has been made by the UK Marine Monitoring and Assessment Strategy (UKMMAS) community in developing better targeted and integrated biological monitoring programmes, particularly focused on EC Directive compliance. This continues to be taken forward through the Marine Biodiversity Monitoring Programme co-ordinated by JNCC through the Healthy and Biologically Diverse Seas Evidence Group (HBDSEG). However, within UKMMAS, little attention has been paid to strategic level monitoring necessary to inform future marine licensing. Consequently there is currently little integration between developer specific led strategic activities and the wider UKMMAS member surveys and this may be an opportunity where future activity can be joined-up. Overall, progress in UKMMAS should be monitored to assess how this can assist with recommendations set out in this report. This might be facilitated through The Crown Estate and the Department of Energy and Climate Change (DECC) who already participate in UKMMAS.

8. Conclusions

Five protocols have been developed as a result of the assessment in this project of the potential for joint monitoring and data collection between Natural England and industry. These are grouped by A) protocols to enhance within sector monitoring foundations and B) protocols to establish methods in joint monitoring and data collection. The first set (A) would help lay foundations for joint monitoring whilst the second (B) are specifically related to joint monitoring practice and measures that could be put in place to facilitate this. Due to the length of information presented in the protocols in Sections 6 and 7, a short summary of each is provided below.

The **first protocol is to improve information exchange on monitoring activity** through the availability of a public portal. This addresses the need for a centralised storage of information at the national level for both SNCB and industry monitoring activity plans, which may be implemented through regulators imposing requirements on industry, e.g. through licence consent, and setting up (together with SNCBs) portals to hold this information.

The **second protocol is to improve information exchange on existing data**. This addresses the need for supply of metadata and actual data to central databases, i.e. MEDIN and Data Archive Centres (DACs), again possible through consent conditions for industry. This may require some exploration of those receptors that industry consider less sensitive in terms of data held.

The **third protocol is to enhance guidance and standardisation on monitoring** and data processing / handling. This addresses a need to update / consolidate existing guidance potentially through a receptor specific approach rather than by sector. The SNCBs role in providing advice on monitoring may also require better coordination across public sector organisations to ensure the best form of joint working; and may be assisted through increased knowledge, e.g. through re-evaluation of existing datasets which would be assisted through further data consolidation. This may be contributed to by industry, e.g. collection of additional data for their own existing surveys for new MPAs.

The **fourth protocol drew on existing examples of site monitoring and data** collection, whether between industry, between SNCBs or SNCB-industry. The examples helped identify a number of mechanisms that could serve as a protocol to further site specific joint monitoring. The steps proposed include support 'props' such as working groups; more involvement at a local level from the regulator and central initiatives on joint monitoring; use of the framework agreement being drawn up between Natural England and contractors; and a new role within Natural England to help facilitate this at a national level, acting as an industry representative. The more procedural site based steps include early planning on the EIA process; avoiding use of formal agreements e.g. MoUs; agreements drawn up for prioritization on surveys; monopolising one contractor for multiple surveys; and to consider liability, health and safety and risk management on a case by case basis.

It was considered that the best opportunities for joint monitoring can be found by targeting small scale sites with low costs (below the contractual threshold for Natural England) with as few organizations involved as possible to start with. This might target emerging industries initially and potentially focus on receptors with less confidentiality issues. However it would have to be accepted that a trial period is

required and willingness shown on both sides, with more significant benefits emerging in following joint work.

The **fifth protocol focused on strategic monitoring and data collection**, moving away from the site based monitoring previously detailed. This was an area that sourced a great number of excellent examples in joint monitoring, albeit primarily based on co-operation amongst industry players. However many of these related to strategic baseline/research studies rather than compliance monitoring studies, the scale of which is driven by industry characteristics, needs and have different objectives. (However these studies have been of great benefit to both industry and SNCB monitoring alike, e.g. REC data used to inform *Sabellaria spinulosa* quality in assessment of a new SAC.) It has been noted that there is currently little integration between these activities and the wider UKMMAS member surveys which may be an opportunity to join-up future activity. There is also potential to build on some of the common lessons in these approaches and consider them as models for longer term evidence and monitoring activity, e.g. a clear incentive for developers, cost sharing, multi agency involvement, consistency in approach and a shared evidence base and understanding to a pre-agreed quality. Further consideration should be given on the extent to which regional/strategic approaches can be optimized in the future (drawing on earlier recommendations such as standards). By targeting areas that could benefit from similar initiatives, e.g. to the REAs, yet still to include MPA sites, these would be the most opportune examples to take forward.

Having summarised the five protocols, it should be re-stated that there is a distinction between what has been recommended at a national level on existing within sector monitoring and management, compared to the local / regional level actual joint monitoring. Whilst the former (national coordination) have been necessary to provide a back drop and foundation to the joint monitoring overview, it is the latter (actual joint monitoring practice on a project basis) that provide the most practical approaches on the ground to take forward, which may be of most interest to Natural England and other SNCBs now.

Taking the protocols forward, a certain number of wider aspects should be considered. Firstly, a significant part of the protocols or recommendations could be assisted through the recent Habitats Regulations Implementation Review. Those measures applicable to these protocols include:

- Measure 8: Undertake a stock-take of over 1,600 pages of current guidance and make proposals for simplification (by March 2013, Defra to action).
- Measure 13: Introduce new consistent standards on the acceptable range and quality of evidence that will enable statutory agencies to provide their advice (consult November 2012, publish March 2013; Natural England to action with EA, MMO, JNCC).
- Measure 15: Establish a Habitats and Wild Birds Directives Marine Evidence Group to address marine data sharing, research gaps, and post-construction monitoring (by July 2012, Defra to action).

- Measure 16: Explore the practical implications on operating capacity with MEDIN, the MEDIN Data Archive Centres and other equivalent data sharing facilities (by October 2012, Defra to action).
- Measure 17: Commit to managing data consistently and sharing priority data not yet publicly accessible; ensuring data can be identified through MEDIN and accessed from the MEDIN Data Archive Centres or equivalent data sharing facilities (by December 2012, to be actioned by industry, Natural England, EA, JNCC, MMO, The Crown Estate).

These should all be used as tools or levers to ensure the protocols can be delivered most effectively. In addition, specific actions being taken forward by regulators that would assist with the above protocols include the update of the MMO licence database.

It is also clear that whilst joint monitoring should be driven forward and facilitated by the regulators and SNCBs, it requires active industry engagement and support, as opposed to a purely reactive response to the public sector's plans. Establishing a clear an on-going dialogue between Natural England and industry would be beneficial in terms of identifying potential opportunities for synergies to be realised on a site-by-site basis. In return for such a proactive support to joint monitoring, both the SNCBs and industry can expect to have better confidence in the data, which is fundamental to better joining up and relationship building in general. However it is evident that industry may benefit from better solidified relationships with SNCBs to facilitate increased sharing of information to inform the process. Any joint activity would also give rise to concerns related to the end-uses, and end-users, of any data acquired through joint mechanisms which will be of primary concern to industry and require addressing. In essence, any attempt to move towards joint monitoring and data collection strategies must present a clear case relating to the tangible benefits that will be realised by both industry and SNCBs and must also clearly identify how the risks perceived by developers will be mitigated and/or eliminated.

Lastly, the findings of this project would benefit from an expanded geographical coverage and update in time. Whilst this project has been England centric, to be effective any recommendations need to be taken forward on a UK basis including both inshore and offshore waters. Also the requirements for monitoring by both industry and SNCBs is ever changing and in order to keep the protocols up to date and effective, consideration needs to be made of new Marine Conservation Zones (as well as other new MPAs), which may differ substantially, e.g. in size. A repeat assessment of overlaps as carried out in this study should be carried out for MCZs in order to assess as early as possible what the potential overlaps with industry there might be.

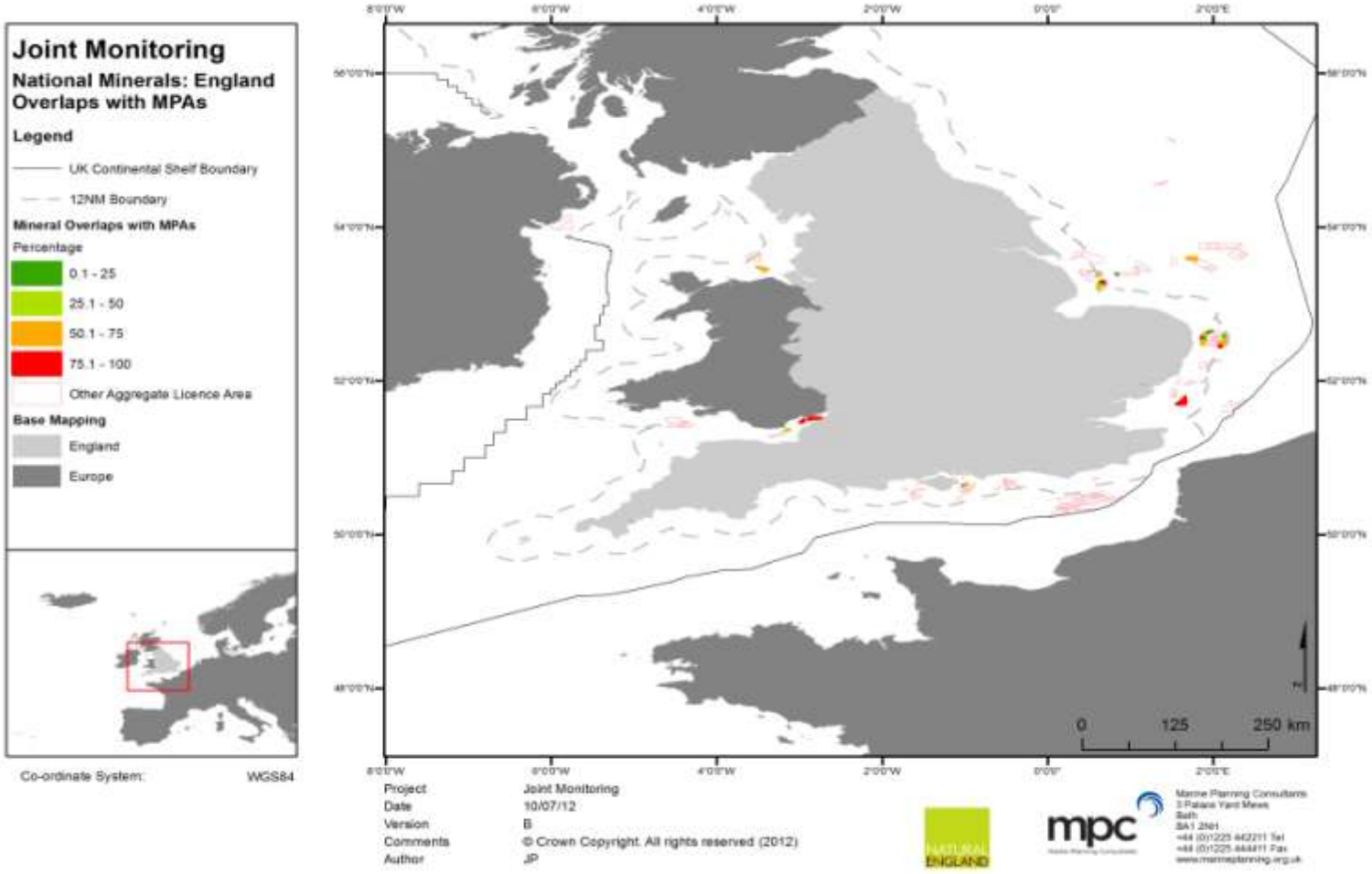
Appendix A. GIS Industry Data Sourced to Inform National Assessment of Overlaps

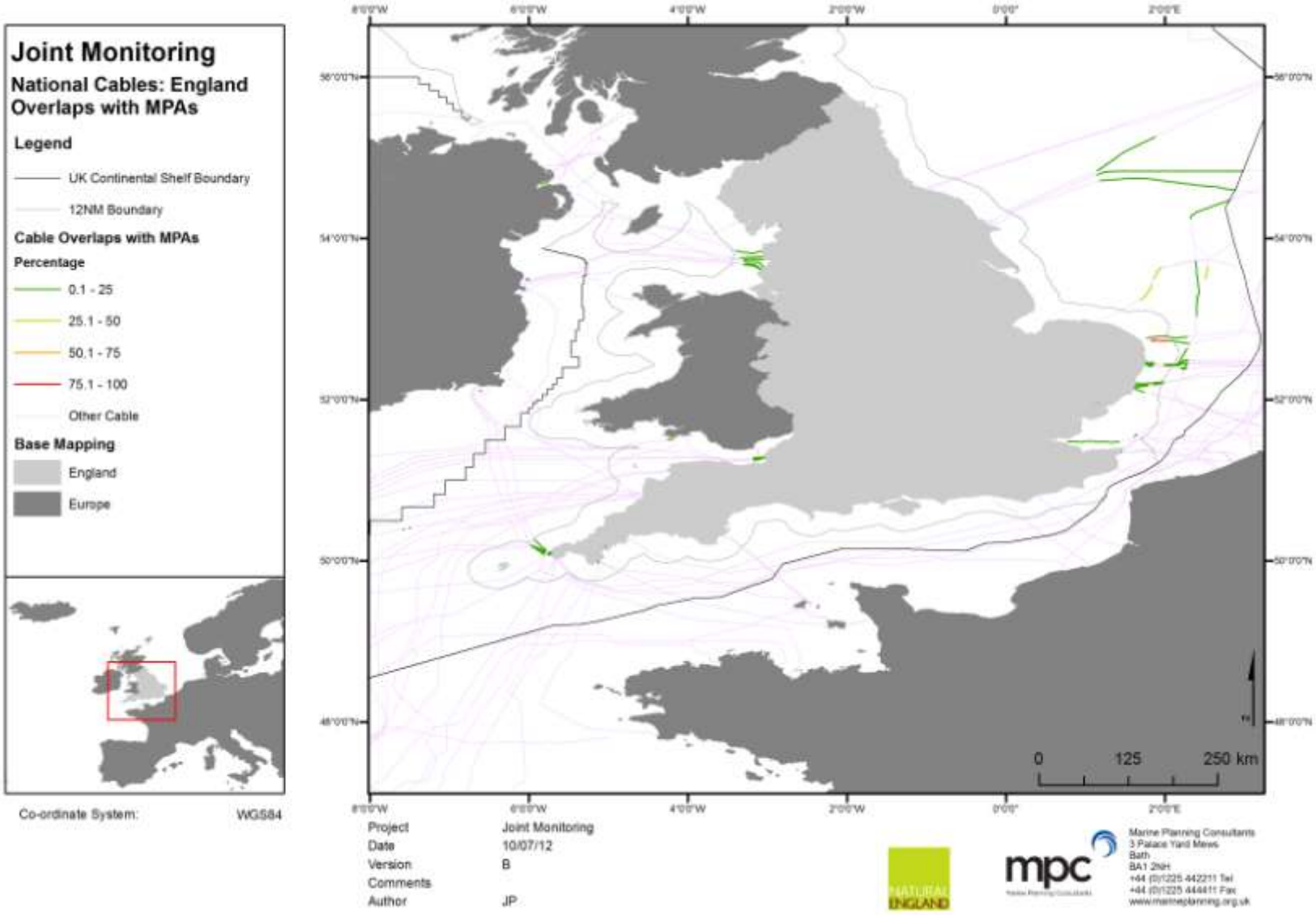
Activity	Type	Source
CCS gas and storage lease	Agreement for lease	The Crown Estate
CCS gas and storage lease	Lease	The Crown Estate
Wave and tidal activity	Wave lease	The Crown Estate - 19/08/12
Wave and tidal activity	Tidal lease	The Crown Estate - 19/08/12
Marine mineral activity	Production licence	The Crown Estate - 12/01/12
Marine mineral activity	Application area	The Crown Estate - 12/01/12
Marine mineral activity	Option / Prospecting area	The Crown Estate - 12/01/12
Offshore wind	Round 1 site	The Crown Estate - 19/08/2011
Offshore wind	Round 2 site	The Crown Estate - 19/08/2011
Offshore wind	Round 1 or 2 extension	The Crown Estate - 19/08/2011
Offshore wind	Round 3 zone	The Crown Estate - 19/08/2011
Offshore wind	Wind farm demonstration site	The Crown Estate - 19/08/2011
Offshore wind	Blyth wind farm site	The Crown Estate - 19/08/2011
Aquaculture	Aquaculture lease	The Crown Estate - 14/02/12
Cables and pipelines	Cable lease	Kingfisher - Nov 2011
Cables and pipelines	Active cable outside 12nm	Kingfisher - Nov 2011
Cables and pipelines	Pipeline lease	UK DEAL - 24/10/11
Cables and pipelines	Active pipeline outside 12nm	UK DEAL - 24/10/11
Coastal Development	Ports	UK Ports website[19] (http://ports.org.uk/) - historical
Coastal Power Stations	Nuclear	MAGIC - 16/06/08
Coastal Power Stations	Oil, gas	DECC - Jan 2012

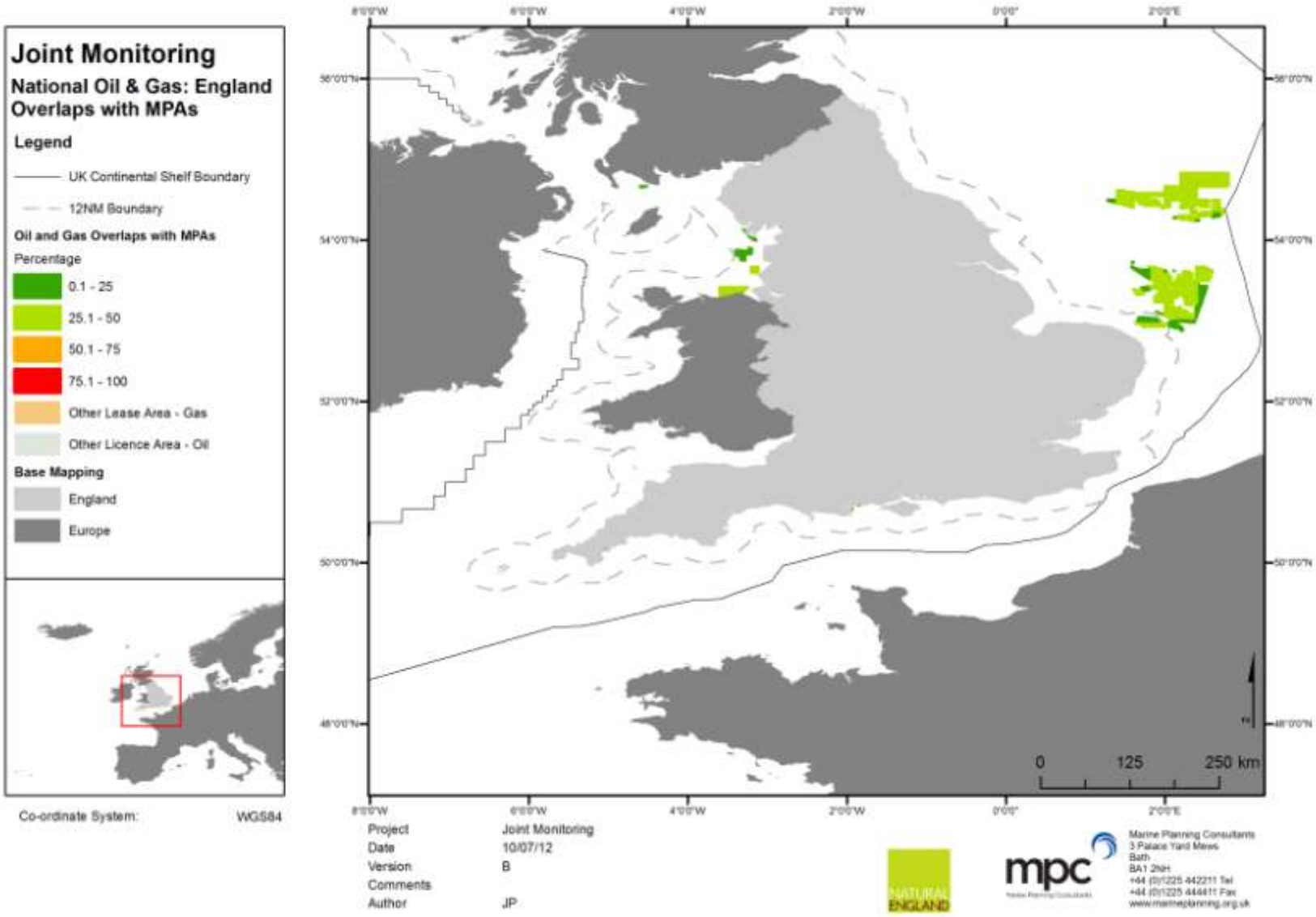
[19] MMO ports layer was not received at time of GIS assessment

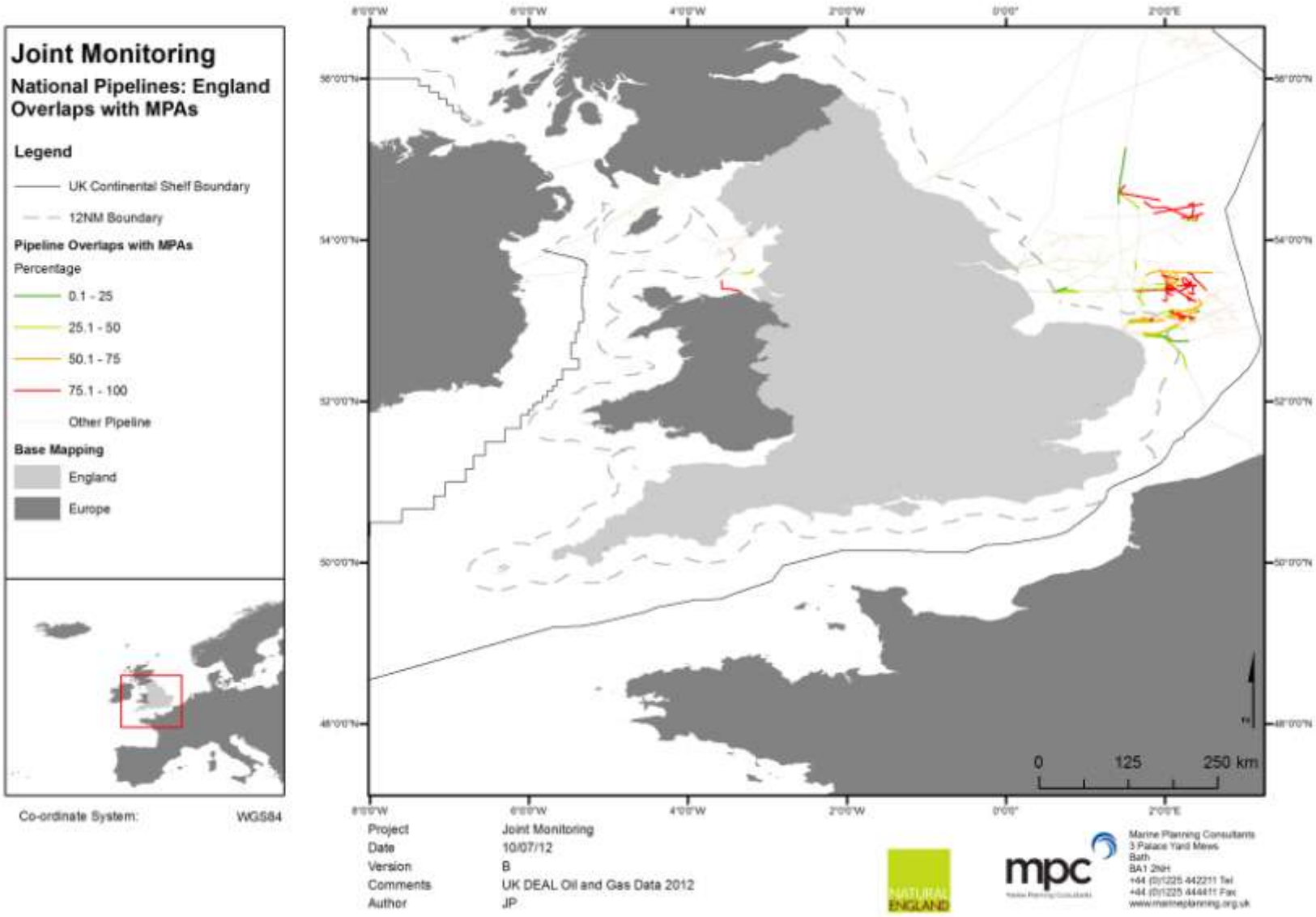
Appendix B. Maps Showing Overlap between Industry and MPAs at a National Scale

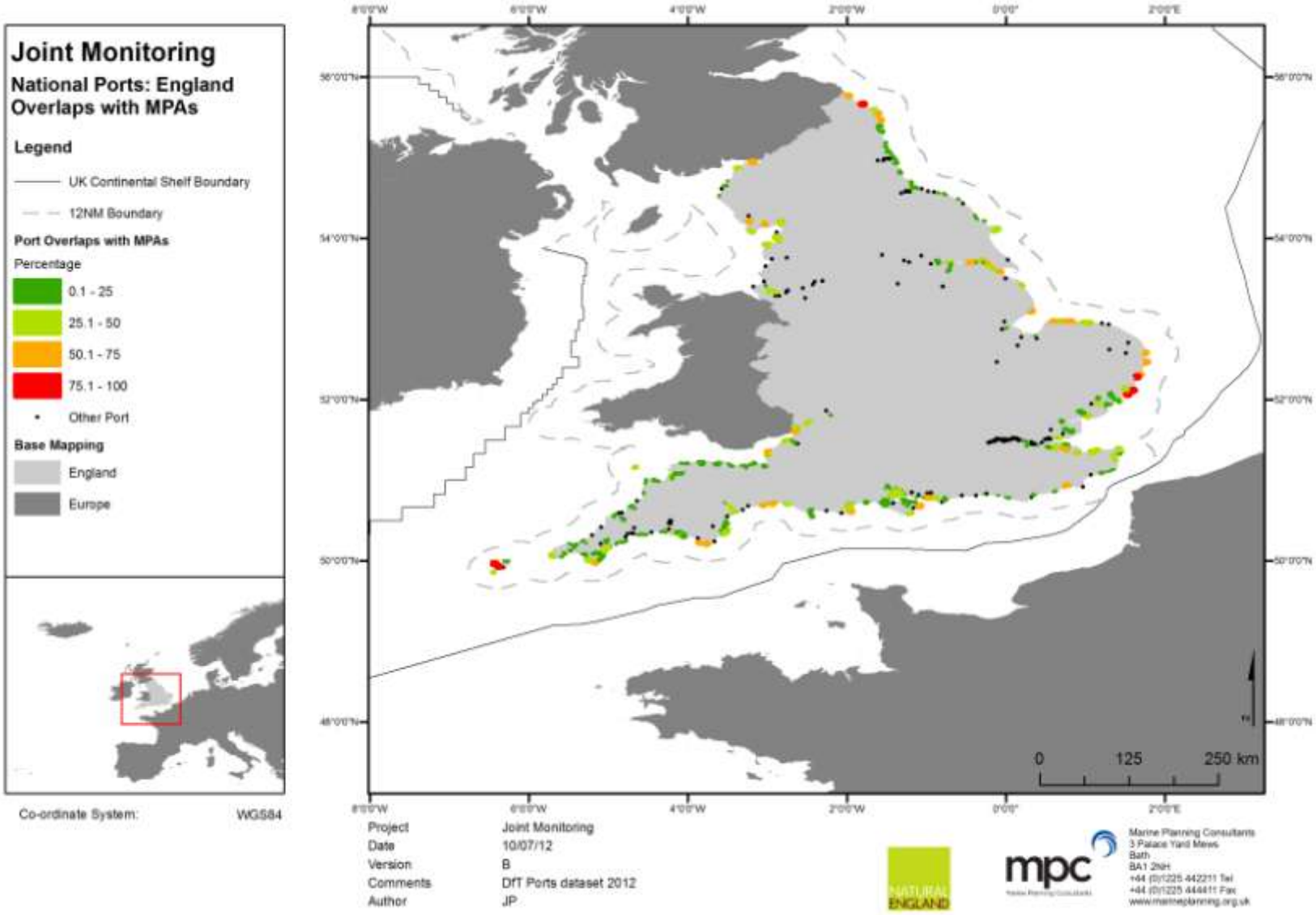
For each sector, calculations have been made using ArcGIS to determine the percentage of each industry site (e.g. aggregate licence area or length of cable) that overlaps with MPAs. These overlaps are shown in block colour from green (<50% overlap) through to red (>50%).

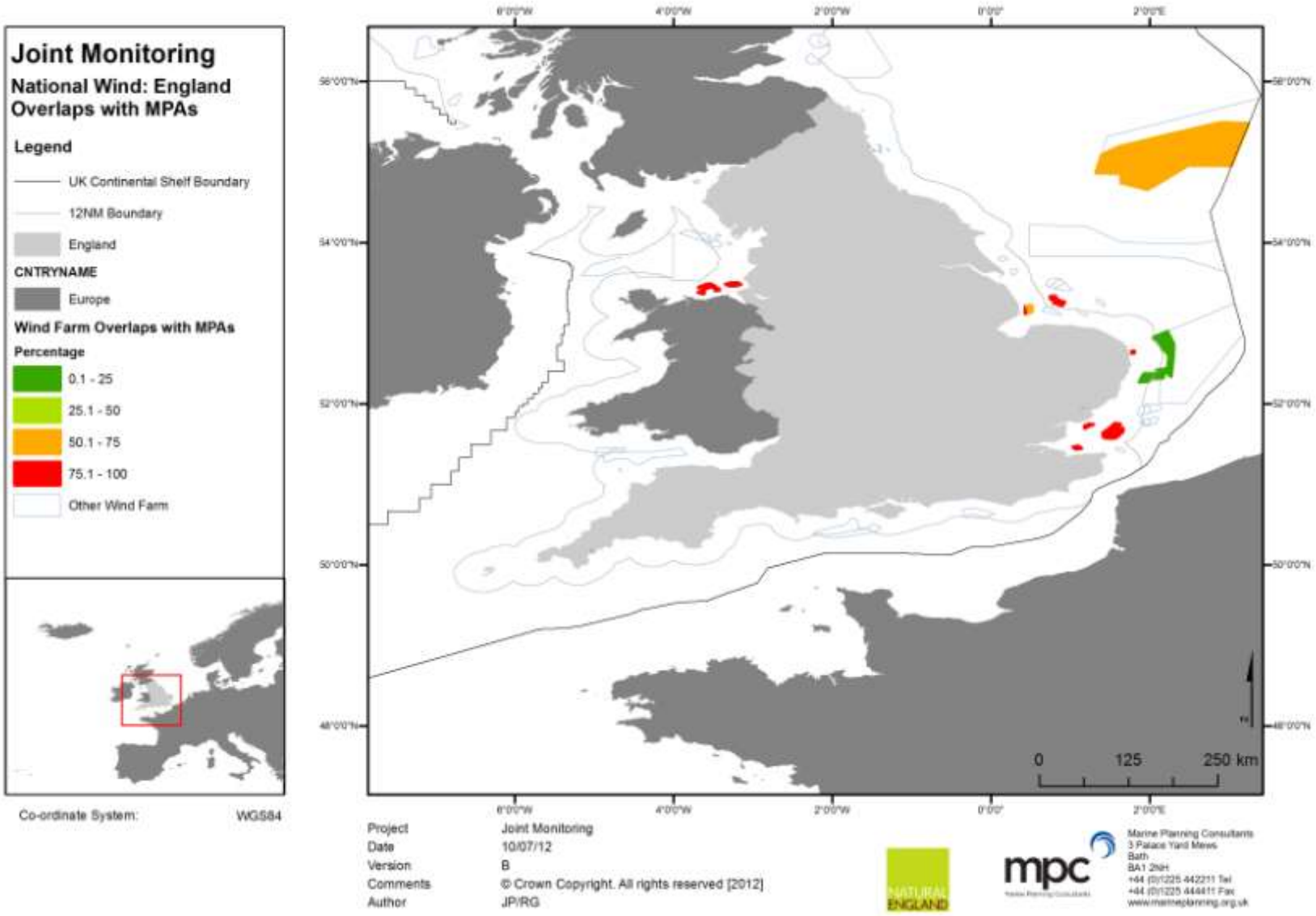



Joint Monitoring
National Cables: England
Overlaps with MPAs
Legend
UK Continental Shelf Boundary
12NM Boundary
Cable Overlaps with MPAs
Percentage
0.1 - 25
25.1 - 50
50.1 - 75
75.1 - 100
Other Cable
Base Mapping
England
Europe
Co-ordinate System: WGS84
8°0'0"W
6°0'0"W
4°0'0"W
2°0'0"W
0°0'0"
2°0'0"E
56°0'0"N
54°0'0"N
52°0'0"N
50°0'0"N
48°0'0"N
0
125
250 km
Project Joint Monitoring
Date 10/07/12
Version B
Comments
Author JP
NATURAL ENGLAND
mpc
Marine Planning Consultants
3 Palace Yard Mews
Bath
BA1 2NH
+44 (0)1225 442211 Tel
+44 (0)1225 444411 Fax
www.marineplanning.org.uk


Joint Monitoring
National Oil & Gas: England
Overlaps with MPAs
Legend
UK Continental Shelf Boundary
12NM Boundary
Oil and Gas Overlaps with MPAs
Percentage
0.1 - 25
25.1 - 50
50.1 - 75
75.1 - 100
Other Lease Area - Gas
Other Licence Area - Oil
Base Mapping
England
Europe
Co-ordinate System: WGS84
8°0'0"W
6°0'0"W
4°0'0"W
2°0'0"W
0°0'0"
2°0'0"E
56°0'0"N
54°0'0"N
52°0'0"N
50°0'0"N
48°0'0"N
0
125
250 km
Project Joint Monitoring
Date 10/07/12
Version B
Comments
Author JP
NATURAL ENGLAND
mpc
Marine Planning Consultants
3 Palace Yard Mews
Bath
BA1 2NH
+44 (0)1225 442211 Tel
+44 (0)1225 444411 Fax
www.marineplanning.org.uk


Joint Monitoring
National Pipelines: England
Overlaps with MPAs
Legend
UK Continental Shelf Boundary
12NM Boundary
Pipeline Overlaps with MPAs
Percentage
0.1 - 25
25.1 - 50
50.1 - 75
75.1 - 100
Other Pipeline
Base Mapping
England
Europe
Co-ordinate System: WGS84
8°0'0"W
6°0'0"W
4°0'0"W
2°0'0"W
0°0'0"
2°0'0"E
56°0'0"N
54°0'0"N
52°0'0"N
50°0'0"N
48°0'0"N
0
125
250 km
Project Joint Monitoring
Date 10/07/12
Version B
Comments UK DEAL Oil and Gas Data 2012
Author JP
NATURAL ENGLAND
mpc
Marine Planning Consultants
3 Palace Yard Mews
Bath
BA1 2NH
+44 (0)1225 442211 Tel
+44 (0)1225 444411 Fax
www.marineplanning.org.uk


Joint Monitoring
National Ports: England
Overlaps with MPAs
Legend
UK Continental Shelf Boundary
12NM Boundary
Port Overlaps with MPAs
Percentage
0.1 - 25
25.1 - 50
50.1 - 75
75.1 - 100
Other Port
Base Mapping
England
Europe
Co-ordinate System: WGS84
8°0'0"W
6°0'0"W
4°0'0"W
2°0'0"W
0°0'0"
2°0'0"E
56°0'0"N
54°0'0"N
52°0'0"N
50°0'0"N
48°0'0"N
0
125
250 km
Project Joint Monitoring
Date 10/07/12
Version B
Comments DfT Ports dataset 2012
Author JP
NATURAL ENGLAND
mpc
Marine Planning Consultants
3 Palace Yard Mews
Bath
BA1 2NH
+44 (0)1225 442211 Tel
+44 (0)1225 444411 Fax
www.marineplanning.org.uk


Joint Monitoring
National Wind: England
Overlaps with MPAs
Legend
UK Continental Shelf Boundary
12NM Boundary
England
CNTRYNAME
Europe
Wind Farm Overlaps with MPAs
Percentage
0.1 - 25
25.1 - 50
50.1 - 75
75.1 - 100
Other Wind Farm
Co-ordinate System:
WGS84
6°0'0"W
4°0'0"W
2°0'0"W
0°0'0"
2°0'0"E
58°0'0"N
54°0'0"N
52°0'0"N
50°0'0"N
48°0'0"N
0
125
250 km
Project
Joint Monitoring
Date
10/07/12
Version
B
Comments
© Crown Copyright. All rights reserved [2012]
Author
JP/RG
NATURAL ENGLAND
mpc
Marine Planning Consultants
3 Palace Yard Mews
Bath
BA1 2NH
+44 (0)1225 442211 Tel
+44 (0)1225 444411 Fax
www.marineplanning.org.uk

Appendix C. Table Showing Overlap between Industry and MPAs at a National Scale

Sector	TYPE	ID		Original Length Whole	Length Within MPA	Percentage Overlap
Cable	TELECOM	71		740	162	22
Cable	TELECOM	138		546	118	22
Cable	TELECOM	158		552	111	20
Cable	TELECOM	146		277	66	24
Cable	POWER	7		244	50	20
Cable	TELECOM	111		164	42	26
Cable	TELECOM	157		204	35	17
Cable	TELECOM	80		204	31	15
Cable	TELECOM	84		205	28	13
Cable	TELECOM	23		204	25	12
Sector	**Type**	**Name**		**Original Site Area**	**Area Within MPA**	**Percentage Overlap**
Wind	Search Area Exclusivity - Round 3	Dogger Bank		8644	6144	71
Wind	Search Area Exclusivity - Round 3	East Anglia		6027	587	10
Wind	Lease - Round 2	London Array 1		122	122	100
Wind	Lease - Round 2	London Array 2		104	104	100
Wind	Agreement for Lease - Round 2	Race Bank		74	74	100
Wind	Lease - Round 2	Gwynt y Mor		68	57	83
Wind	Agreement for Lease - Extension	Burbo Bank Extension		40	34	86
Wind	Lease - Round 2	Lincs		38	28	73
Wind	Lease - Round 1	Gunfleet Sands I		10	10	100
Wind	Lease - Round 1	Kentish Flats		10	10	100
Sector	**Mineral Option**	**Mineral Application**	**Mineral Provision**	**Original Site Area**	**Area Within MPA**	**Percentage Overlap**
Aggregates	Humber 3			125	118	95
Aggregates	Humber 5			113	87	77
Aggregates	Benacre			73	55	76
Aggregates	Lowestoft Extension	Lowestoft Extension		49	45	92
Aggregates			Off Great Yarmouth	48	35	72
Aggregates	Humber 5	Humber 5		28	28	100
Aggregates		Longsand	Longsand	26	26	100
Aggregates		Longsand	Longsand	26	26	100
Aggregates		Longsand	Longsand	26	26	100

Aggregates		Coal Pit/Sole Pit	31	23	75
Sector	**NAME**	**OPERATOR**	**Original Site Area**	**Area Within MPA**	**Percentage Overlap**
Nuclear	HEYSHAM 1	BRITISH ENERGY	28	18	63
Nuclear	HEYSHAM 2	BRITISH ENERGY	28	18	63
Nuclear	HINKLEY POINT B	BRITISH ENERGY	28	17	61
Nuclear	SIZEWELL B	BRITISH ENERGY	28	16	57
Nuclear	OLDBURY	BRITISH NUCLEAR GROUP (MAGNOX)	28	14	51
Nuclear	DUNGENESS B	BRITISH ENERGY	28	11	40
Nuclear	HARTLEPOOL	BRITISH ENERGY	28	8	28
Sector	**LICENCE NO**	**ROUND NO**	**Original Site Area**	**Area Within MPA**	**Percentage Overlap**
Oil and gas	1730	25	714	239	33
Oil and gas	1730	25	714	239	33
Oil and gas	1730	25	714	239	33
Oil and gas	7	1	612	214	35
Oil and gas	1738	25	694	210	30
Oil and gas	33	1	524	187	36
Oil and gas	33	1	481	172	36
Oil and gas	130	4	520	171	33
Oil and gas	1055	20	498	168	34
Oil and gas	16	1	411	147	36
Sector	**DESCRIPTION**	**PIPE ID**	**Original Length Whole**	**Length Within MPA**	**Percentage Overlap**
Pipes	SHEARWATER TO BACTON (SEAL) 34IN GAS LINE	409	480	78	16
Pipes	BACTON TO ZEEBRUGE GAS LINE	502	233	61	26
Pipes	ESMOND TO BACTON 24IN GAS EXPORT LINE	602	206	55	27
Pipes	CLIPPER PR TO CARRACK QA 4IN MEG LINE	848	81	54	67
Pipes	CARRACK QA TO CLIPPER PR 20IN GAS EXPORT	845	81	54	67
Pipes	CAVENDISH FIBRE OPTIC CABLE	1356	47	47	100
Pipes	CAVENDISH METHANOL SUPPLY LINE	1355	47	47	100
Pipes	CAVENDISH EXPORT PIPELINE	1354	47	47	100
Pipes	VIKING AR TO THEDDLETHORPE 28IN GAS LINE	564	135	47	35

Pipes	VIKING AR TO THEDDLETHORPE 3IN MEOH LINE	916	135	47	35

Sector	Name	Usage	Original Site Area	Area Within MPA	Percentage Overlap
Ports	Carn Near		28	28	98
Ports	Hughtown (St Mary's)	Leisure_Fishing_Commercial_FerryTerminal	28	27	94
Ports	Lindisfarne	Leisure_Fishing	28	26	93
Ports	Orford	Leisure_Fishing	28	23	82
Ports	Slaughden Quay	Leisure_Fishing	28	23	81
Ports	Walberswick	Leisure_Fishing	28	22	79
Ports	Southwold	Leisure_Fishing	28	21	75
Ports	Beadnell	Fishing	28	21	74
Ports	Lowestoft	Fishing_Commercial	28	21	73
Ports	Lyme Regis	Leisure_Fishing	28	20	72

Sector	Name	REC_ID	Original Site Area	Area Within MPA	Percentage Overlap
RECs	Humber	2	10880	2683	25
RECs	East Coast	1	3642	1832	50
RECs	Outer Thames	3	3829	1369	36
RECs	English Channel Synthesis	5	12753	286	2
RECs	South Coast	4	5665	239	4

See separate electronic file for Case Study Appendices:

Appendix D. Humber Port Estuary Case Study

Appendix E. Outer Wash Aggregate Site 481 Case Study

Appendix F. Thames Estuary Wind Farm Site Gunfleet Case Study

Appendix G. Bristol Channel Hinkley Nuclear Power Station Case Study

Appendix H. Northwest Oil and Gas Case Study

Appendix I. Consultee List for Interviews and Workshop

Type	Organisation	Name	Workshop	Interview
SNCB	Natural England	Alex Fawcett	Workshop	Interviewed
SNCB	Natural England	Chris Pirie	Workshop	Interviewed
SNCB	Natural England	James Bussell	Workshop	Interviewed
SNCB	Natural England	Sharon Denham	Workshop	Interviewed
Agency	Cefas	Paul Whormersley	Workshop	
Agency	EA	Alison Miles	Workshop	Interviewed
Agency	EA	Karen Williams	Workshop	
Agency	EA	Sue Manson	Workshop	Interviewed
Govt	DECC	Owen Jenkins	Workshop	
Govt	Defra	Richard Moxon	Workshop	
Govt	MMO	Dickon Howell	Workshop	
Industry	British Marine Aggregates Producers Association (BMPA)	Mark Russell	Workshop	Interviewed
Industry	British Ports Association	David Whitehead	Workshop	Interviewed
Industry	Centrica Renewables	Kit Hawkins	Workshop	
Industry	Crown Estate	Anne Savage	Workshop	Interviewed
Industry	DONG	David Garner	Workshop	
Industry	EDF Energy - Nuclear New Build	Stephen Roast	Workshop	
Industry	Oil and Gas UK	Mick Borwell	Workshop	Interviewed
Industry	Renewables Wave & Tidal	Steff Merry	Workshop	Interviewed
Industry	Scottish Power Renewables	Marcus Cross	Workshop	
Industry	Shell	Mark Downes	Workshop	
Industry	Subsea Cables UK	Alasdair Wilkie	Workshop	
Industry	Tarmac	Andrew Bellamy	Workshop	Interviewed
NGO	English Heritage	Ed Salter	Workshop	Interviewed
Project Team	ABPmer	Stephen Hull	Workshop	
Project Team	MPC	Caroline Chambers	Workshop	
Project Team	MPC	Liam McAleese	Workshop	
Project Team	MPC	Rob Goodchild	Workshop	
Project Team	Peter Barham Environment Ltd	Peter Barham	Workshop	
Agency	Cefas	Ed McManus		Interviewed
Agency	IFCAS	Stephen Bolt		Interviewed
Industry	British Marine Federation	Brian Clarke		Interviewed
Industry	CCS	Judith Shapiro		Interviewed
Industry	CMACS	Dr Ian Gloyne-Phillips		Interviewed
Industry	CMACS	Dr Seran Davies		Interviewed
Industry	Crown Estate	Andrew Finlay		Interviewed
Industry	Crown Estate	Peter Redmunds		Interviewed
Industry	EFD Energy	Collin Taylor		Interviewed

Type	Organisation	Name	Workshop	Interview
Industry	Gateway	Chris Mckerrow		Interviewed
Industry	Marine Space	Stewart Lowe		Interviewed
Industry	Renewable UK	Paul Reynolds		Interviewed
Industry	UKMPG (UK Major Ports Group)	Richard Bird		Interviewed
NGO	MEDIN	David Cotton		Interviewed
SNCB	JNCC	Francesca Marubini		Interviewed
SNCB	JNCC	Helen Ellwood		Interviewed
SNCB	Natural England	Fiona Neale		Interviewed
SNCB	Natural England	Ian Saunders		Interviewed
SNCB	Natural England	Mark Johnston		Interviewed
SNCB	Natural England	Miriam Knollys		Interviewed
SNCB	Natural England	Roger Covey		Interviewed

Appendix J. Interview questions

1. Current Monitoring by Industry

- What experience is there of monitoring at any stage of development – pre-, during or post-development?
- Was monitoring considered an essential part of EIA by SNCBs?
  - Was monitoring required pre-, during and post-development?
  - Did they help design the monitoring programme – were standard approaches suggested?
  - Were there any opportunities for data sharing discussed or considered?
  - If so was there any discussion on standardising data collection?
- How useful was monitoring in the licensing process?
- What happened to the data? Was it shared?

2. Current Understanding of Joining Up

- **Existing.** What joining up already exists with other operations? Consider:
  - Within v. across sectors;
  - Industry with MPA;
  - Internal v. external to organisation;
  - Current / future / past;
  - Are they effective;
  - Are data consistent between databases;
  - Who holds the information; and
  - Is it used by others.
- **Benefits.** How does the developer gain from any of these enhancements, what is the motivation?
- **Quick Wins**. If there is not any joining up already is there an obvious and easily implemented opportunity for joining up monitoring that is not yet in place, e.g. where same datasets are required with similar spatial / temporal characteristics? Would they be useful? (Consider baseline, development of mitigation / compensation, good practice and any other.)
- **Opportunities**. What might some of the key benefits be of joining up this element of the monitoring programme? Is there an opportunity unique to this industry sector / situation or is it more overarching?
- **Overall**. What are your general views about the joined up working?
- **Challenges**. What are the obvious logistical challenges / barriers and solutions? Consider sensitive issues, misconceptions etc.

- **Concerns**. What are the key concerns that may inhibit joining up for each particular element of the monitoring programme?
- **Blocks**. Are there any barriers perceived as being overriding? I.e. may not practically be resolved?

3. Survey Logistics

- **Spatial**. How adaptable / rigid is the survey spatial resolution and extent?
- **Temporal**. How adaptable / rigid is the survey timing and frequency? E.g. survey timing considerations to overwintering birds that must not be disturbed unless the focus of the MPA survey?

4. Survey Implementation

- **Equipment**. Can equipment (assets) be shared between industry and SNCBs?
- **Equipment**. What are the financial implications of upgrading equipment to meet an agreed approach?
- **Methods / Equipment**. What considerations need to be given to harmonisation of standards and methodologies for equipment and methods? (Is all monitoring carried out according to published monitoring protocols on UKDMOS? Are there any additional standards worked to?)
- ***Methods**. If survey methods are different to SNCB monitoring, how different are the actual results in reality?
- ***Skills**. Are skills transferable if joined up monitoring takes place with less staff from each of SNCB monitoring / industry? (SNCB mostly contracted survey work but may use different types contractors?) Would all staff need to be present either way (i.e. more of a question as to using one instead of two vessels)?

5. Data Handling

- **Processing Standards**. What considerations need to be given to data standards and processing methods? These should conform to UKDMOS but do they apply to others in addition / alter in any way?
- **Delivery Standards**. If industry or SNCB do not currently comply to standards in data delivery e.g. MEDIN standards or carry out a suitable level of quality control is this due to change in the future?
- **Added Value**. Could data collected be used for more than one purpose? Or could data be patched together to form a better product e.g. OLEX multibeam / fishing effort?

6. Dissemination of Data and Information

- **Confidentiality**. Is data commercially confidential and if so, why?
- **Sharing**. Are there any mechanisms for data/information sharing and engagement of relevant stakeholders? E.g. pre-existing licences / agreements already in place (often driven by licensing/leasing processes).
- **Other Stakeholders**. Which other stakeholders are either engaged in monitoring activity or with capability to do so? E.g. NGOs, fishing industry.

7. Survey Management

- **Contractual**. What contractual obligations does the developer work to and what restrictions / opportunities may there be within this structure?
- **H&S / risk assessments**. Is this restricted in any way?
- **Other operations.** What consideration is given to other operations prior to survey design and implementation?
- **Disclosure**. Does the developer disclose plans of monitoring to any organisations other than statutory obligation, if so what is the aim of this?

8. Further Opportunities for Joint Monitoring

- **Co-ordination**. What are the practicalities of co-ordination between SNCBs and industry? Who takes the lead/availability of SNCB staff/development of spec/contractual arrangements/procurement etc?
- **Contractual**. Are there any issues surrounding contractual set up, e.g. if there needed to be co-ordination of 2 contractors and or with SNCBs?
- **Governmental Agreements**. What are the implications of the Pan Government Data Agreement and data sharing between Natural England and (industry?
- **Licensing**. Can licensing conditions / provisions be put in place to: enable proportionate monitoring; adopt good practice (data standards, methods, QA, in line with MEDIN guidance); conform to Government policy and the Marine Policy Statement; to license certain developments across their lifecycle; to allow for more effective information exchange between parties?