



Marine
Management
Organisation

Marine Licence Review

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Introduction

The Marine Management Organisation (MMO) is responsible for Marine Licensing in English inshore and offshore areas. Since 2009 the MMO has issued on average 400 to 500 Marine Licences per year. As part of the licensing process the MMO may impose environmental mitigation measures/restrictions (i.e. licence conditions) on any Marine Licence that is issued.

These conditions can result in significant time and cost burdens on industry. It is therefore important that maximum benefit is derived from the vast amounts of data and information that are generated through this process. This is in accordance with the principles of implementing the policies of proportionate licensing and better regulation whilst continuing to protect the marine environment, human health and legitimate sea users.

The MMO has therefore commissioned a study to identify, through a review of existing evidence, where it may be appropriate to amend the MMO's approach to the imposition of Marine Licence conditions. This includes cataloguing evidence, improving the understanding of the burden mitigation/restrictions places on industry and making recommendations as how to take this area of work forward in the future.

The specific objectives of the project were to:

- Understand the evidence that is generated through the Marine Licensing process and whether the current system does an optimal job of making this information useable;
- Catalogue the suite of mitigation that is commonly used in licensing conditions and discuss the adequacy of the supporting evidence it is based on;
- Gain an understanding of those mitigation measures/restrictions imposed through Marine Licence conditions that lead to the most significant impacts/costs to industry;
- Review the existing evidence base to understand if current practices (i.e. commonly requested information or applied mitigation measures/restrictions) are appropriate, should continue, or should be amended; and
- Suggest how to ensure a consistent mechanism for reviewing and updating this evidence base, sharing updated knowledge and updating processes and advice, including the potential for dedicated working groups.

To provide this information the report has been structured into the following sections:

- Introduction – to provide context and objectives of the project;
- Method – an outline of the approach taken to inform the project objectives;
- Results – the main findings of the project with recommendations of how things can be improved; and
- Conclusions – a summary of the key project findings and recommendations.

A geodatabase of Marine Licence conditions has also been developed as part of this project and is available as a separate deliverable.

Method

The project has included a number of key components which can be summarised as:

- A review of Marine Licences and the respective conditions;
- Understanding the drivers and evidence supporting the requirements for Marine Licence conditions;
- Understanding which Marine Licence conditions have the greatest impact on industry; and
- A review of current practice and recommendations.

Review of Marine Licences

The review of Marine Licences was subdivided into two main tasks:

- A high level review of a 700 Marine Licences; and
- A more detailed review of 35 Marine Licences.

High level review

A high level review of 700 Marine Licences that have been issued by the MMO has been undertaken for Marine Licence applications submitted between 2013 and 2016. These licences are held within the Marine Case Management System (MCMS) public register. This excluded legacy and fast track licence applications and exemptions. It also only included those applications where a Marine Licence has been issued (with an assigned completion date). The information, which has been captured for each licence using standardised wording, is presented in Table 1. This has subsequently been transferred into a geodatabase to allow the spatial display of the collated information within a GIS framework.

The inventory of Marine Licence conditions has primarily been based on the standardised list of bespoke Marine Licence conditions maintained by the MMO. In the cases of older licences, where the wording was less standardised it has been assigned to the current most similar standardised licence condition. Where an older licence condition had no current equivalent licence condition it has been included separately in the inventory. A number of the conditions relate to specific receptors or distinct project phases and as such it was possible to categorise them according to set parameters (e.g. receptor type, pre-construction, construction, operational and decommissioning). Similarly where the condition specifically required the monitoring of a particular receptor this was also captured.

Table 1: Marine Licence review parameters.

Parameter	Description
Case Reference	The unique identifier in the MCMS
Status	Status of the Licence application (completed)
Submitted Date	Date of licence application
Completion Date	Date of licence decision
Project Type	Based on definition in MCMS
Project Band	Project category
Location	Grid reference to allow spatial mapping (based on translation of co-ordinates from MCMS to Eastings and Northings)
Marine Plan Area	Marine Plan Area in which the project falls (automated based on grid reference)
EIA	Whether an Environmental Impact Assessment (EIA) was completed in support of the licence application (based on direct output from MCMS)
HRA	Whether a Habitats Regulations Assessment (HRA) was completed in support of the licence application (based on MCMS records) (based on direct output from MCMS)
WFD	Whether a Water Framework Directive (WFD) Assessment was completed in support of the licence application (based on direct output from MCMS)
Additional Application Type	Have any related applications been made? (based on MCMS records) (based on direct output from MCMS)
Marine Licence Number	Marine Licence Number
Licence Expiry Date	Date of licence expiry
Cost of Project	Cost as entered into MCMS to provide a proxy for project scale
Conditions	An inventory of conditions attached to the Marine Licence.

Detailed review

A detailed review has been undertaken of 35 Marine Licences that have been issued by the MMO since 2009. This was based on a sub-set of activity types from which it was possible to draw representative examples. The selected activities were based on a review of the main types of activities that require a Marine Licence as well as the activities listed in the Joint Nature Conservation Committee (JNCC) activities-pressure matrix. This resulted in the following list of activities:

- Coastal defence and flood protection;
- Coastal docks, ports and marinas;
- Extraction – marine aggregates;
- Extraction – navigational dredging (capital and maintenance);
- Dredge and spoil disposal;
- Offshore wind energy; and
- Submarine cables and pipelines.

Five example Marine Licences were reviewed for each activity type. These were selected on the basis of the most recently completed licences and incorporated a range of project scales and geographic locations. This information has been captured within a standardised template as summarised in Table 2.

Table 2: Marine Licence detailed review parameters.

Parameter	Description
Activity Type - MMO	Based on definition in MCMS
Activity Type	Based on specifics of proposed activity
Case Reference	The unique identifier in the MCMS
Marine Licence Number	Marine Licence Number
Completed Date	Date of licence decision (most current)
Fee Band	Fee band as allocated by the MMO (as a proxy for the scale of the project).
EIA	Whether an EIA was completed in support of the licence application. If not, was EIA formally screened out?
Appraisal	Was an Environmental Appraisal completed in support of the licence application (where an EIA was not required)?
HRA	Whether an HRA was completed in support of the licence application.
WFD	Whether a WFD Assessment was completed in support of the licence application
MCZ	Whether a Marine Conservation Zone (MCZ) Assessment was completed in support of the licence application.
NRA	Whether a Navigational Risk Assessment (NRA) was completed in support of the licence application.
WaFD	Whether a Waste Framework Directive (WaFD) was completed in support of the licence application.
Scientific review (published and grey literature)	Whether scientific review was included within the supporting studies. Where relevant a list of receptors has been provided.
Numerical modelling	Whether numerical modelling was included within the supporting studies. Where relevant a list of receptors has been provided.
Ecological modelling	Whether ecological modelling was included within the supporting studies. Where relevant a list of receptors has been provided.
Lessons learnt from previous projects	Demonstration of lessons learnt from previous projects within the supporting studies (where this is clearly stated). Where relevant a list of receptors has been provided.
Information supplied with conservation advice and packages	Whether citations/conservation advice was included within the supporting studies. Where relevant a list of receptors has been provided.
Expert judgement	Whether expert judgement was included within the supporting studies. Where relevant a list of receptors has been provided.
Condition*	Marine Licence condition

Parameter	Description
Receptor*	Receptor which relates to the Marine Licence condition
Driver*	Reason for condition
Main consultee*	Main consultee for specific condition (if known)
Adequacy/Relevance*	Reflection on driver for condition
PCM*	Whether the condition sets a requirement for Post Consent Monitoring (PCM)
PCM Evidence*	Evidence of completion of PCM related tasks within the MCMS public register
* Repeated for all conditions on the Marine Licence	

Understanding the drivers for Marine Licence conditions

To gain an understanding of the evidence base that is used to inform the setting of Marine Licence conditions the following information sources have been reviewed:

- The outputs of the detailed Marine Licence review (as described above);
- Published resources (e.g. sectoral reviews, the evidence base collated to substantiate the JNCC activities pressures matrix (ME5218 – ABPmer, 2015a), latest conservation advice packages and the standardised list of bespoke Marine Licence conditions maintained by the MMO); and
- Stakeholder engagement (via a targeted questionnaire, see below).

This allowed the identification of knowledge/evidence gaps which limits the ability of project specific conditions to be applied.

Understanding conditions with the greatest impact on industry

To understand the implications of Marine Licence conditions to industry (both from a time and cost perspective) the following information sources have been reviewed:

- Project team experiences;
- Published sources including a number of socio-economic impact assessments, for example for Marine Protected Areas (MPAs) including Scottish Nature Conservation MPAs, Scottish and Welsh marine SPAs and proposed dSACs for harbour porpoise; and
- Stakeholder engagement – A targeted questionnaire was sent to members of the Seabed User and Developer Group to gain their views on the implications of Marine Licence conditions (see Appendix A).

The review considered the implications of developing acceptable measures as well as undertaking the measures themselves and any associated monitoring and reporting.

Review of current practice and recommendations

The review of current practice and associated recommendations has been structured according to the following topics:

- Setting of conditions;
- Survey and monitoring;
- Usability/accessibility of MCMS public register;
- Maintenance of the evidence base; and
- Knowledge sharing.

This has been based on the outputs of the review of Marine Licence conditions, stakeholder responses, a wider literature review and discussions with the MMO. As part of reviewing the completed Marine Licences the accessibility and usability of the MCMS public register has also been reviewed. This has been done in the context of the potential to maintain and inform the evidence base for use in future environmental assessments.

Results

The results of each of the project tasks are presented below, structured according to the following subject headings:

- A review of Marine Licence conditions;
- Drivers for Marine Licence conditions;
- A review of the conditions with the greatest impact on industry; and
- A review of current practice and associated recommendations.

Review of Marine Licences

A high level review of 700 Marine Licences was completed to determine the types of conditions that they include as well as the accessibility of the associated information within the MCMS public register. These 700 Marine Licences were all issued for applications submitted between 2013 and 2016 inclusive. The locations of the projects to which these Marine Licences relate is shown in Figure 1. Of the 700 Marine Licences reviewed a total of 50 Marine Licences were issued in 2013, 173 in 2014, 256 in 2015, 210 in 2016 and 11 in 2017 (up to 25 January 2017).

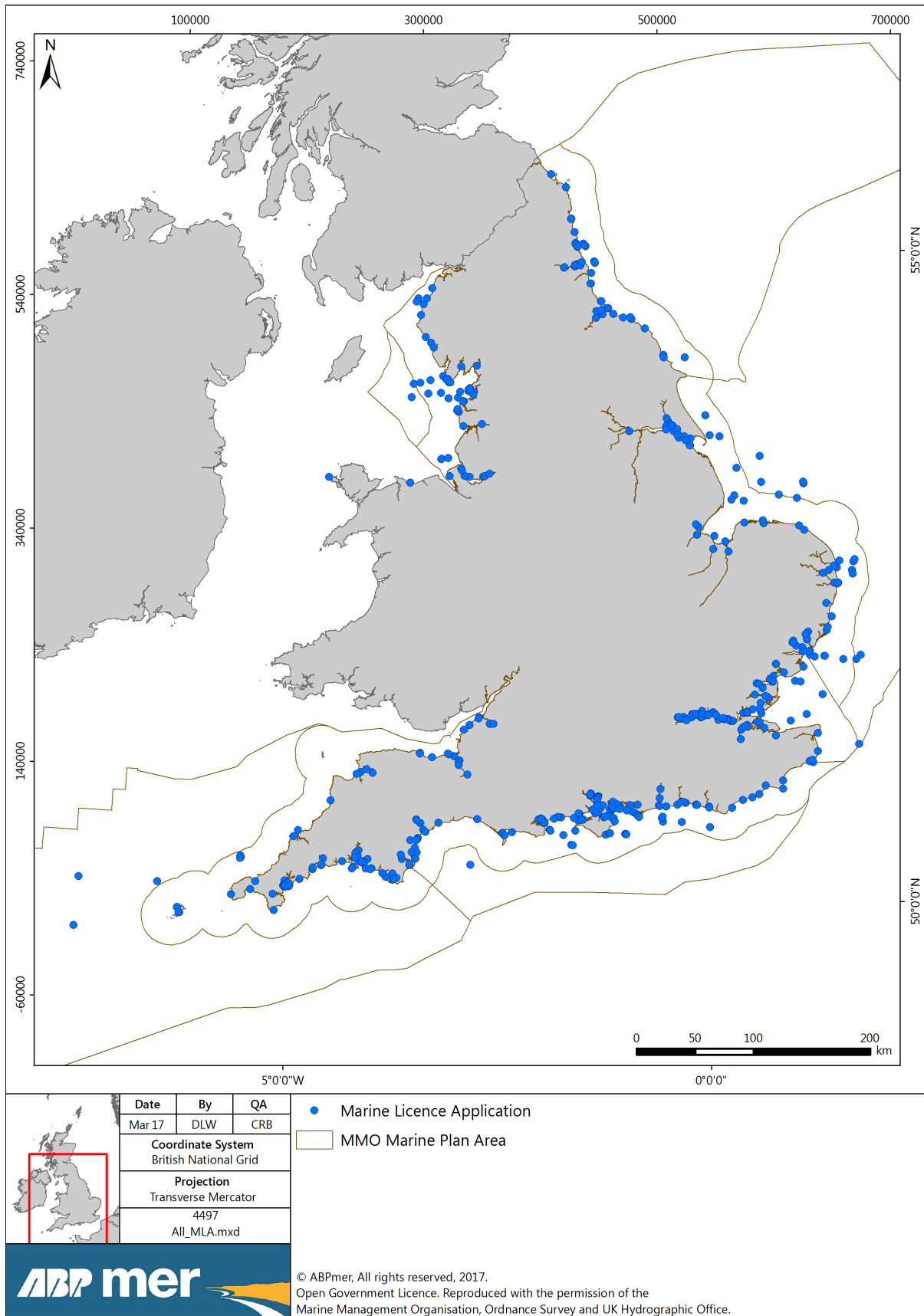
A total of 479 different conditions were identified from the 700 Marine Licences reviewed (these can be found in the accompanying spreadsheet). To avoid the duplication of conditions, where the meaning was effectively the same (e.g. they had the same requirement but referred to a specific location or consultee) they were considered to be the same condition. The 479 conditions have been assigned to a relevant project phase (Table 3); receptor (Table 4); and the requirement for post consent monitoring (and relevant receptor where known) (Table 5). The use of these categories enables an understanding of how the conditions are allocated as well as the types and volumes of information/data that is generated through the Marine Licensing process. It should be noted that some of the conditions are applicable to a number of project phases and receptors hence the total numbers in the tables below will exceed the total number of conditions.

The majority of Marine Licence conditions encountered were applicable to the construction phase with very few relating to decommissioning. It should be noted that for Marine Licences covering aggregate dredging or maintenance dredging, the activity, and thus associated conditions, have been assumed to be occurring during the operational phase. For capital dredging as part of construction works, the activity and associated conditions have been assumed to occur during the construction phase.

Across all of the Marine Licences reviewed the most commonly occurring conditions were in relation to protecting water and sediment quality and included:

- The requirement for reporting oil, fuel or chemical spills to the MMO (present in 642 of the 700 Marine Licences reviewed);
- Providing bunding and/or storage facilities to prevent the release of oil, fuel or chemicals into the marine environment (present in 611 of the 700 Marine Licences reviewed); and
- Ensuring coatings and/or treatments are suitable for use in the marine environment (present in 407 licences).

Figure 1: Location of completed Marine Licence applications.



Other commonly occurring conditions relate to navigational safety and included the provision of notice to mariners (present in 448 licences) and the requirement to inform the UK Hydrographic Office (UKHO) of the details of the consented activity (present in 304 licences).

These conditions are largely driven by health and safety or risk control factors during the licenced activity and appear to be applied as standard regardless of the project type, scale of the project and or date of Marine Licence issue.

A number of conditions also specifically relate to benthic habitats and species and nature conservation and ecology. These conditions relate to a range of parameters from excluding licenced activities from a certain area (e.g. to avoid sensitive receptors), excluding or limiting activities to a certain timeframe (e.g. to avoid disturbance to protected bird or fish species), specifying particular design and/or methodology requirements (e.g. ensuring a maximum dredge depth of 5 m) and ensuring baseline and/or post activity data is collected.

Table 3: Inventory of Marine Licence conditions by project phase.

Project phase	Number of conditions
Pre-construction	124
Construction	329
Operational	169
Decommissioning	6

Table 4: Inventory of Marine Licence conditions by receptor type.

Receptor	Number of conditions
Project description	28
Physical processes	45
Water and sediment quality	107
Nature conservation and ecology	88
Terrestrial ecology	17
Benthic habitats and species	99
Fish and shellfish ecology	50
Marine and coastal ornithology	46
Marine mammals and turtles	15
Commercial and recreational fisheries	27
Commercial and recreational navigation	98
Marine archaeology/Cultural heritage	30
Coastal protection and flood defence	3
Air quality	0
Climate Change	0
Airborne noise and vibration	5
Human health	2
Traffic and transport	2
Infrastructure and other existing marine users	65
Landscape and visual	2
Future baseline	23
Not stated	31

Of the 479 different conditions, 99 related to a requirements for survey and monitoring. However, the receptor for which post consent monitoring was required was often not identifiable from the wording of the condition. For example, where a monitoring report had been requested as part of a licence condition the specific receptors included within this monitoring were not stated.

In relation to the 700 Marine Licences reviewed, 465 included a requirement for post consent monitoring. The receptors to which the post consent monitoring related are summarised in Table 6. For example, physical processes data collected as part of post consent monitoring should exist for 279 Marine Licences (assuming the projects have been implemented). However, it should be noted that this information is based on the wording of the 479 conditions identified which may cover numerous receptors. For example, a condition requiring the presence of an Ecological Clerk of Works (ECoW) to monitor and report during the licenced activity might relate to birds for one Marine Licence and marine mammals for another licence. Both receptors have been captured in Table 6 (and the supporting geodatabase) which means that post consent monitoring data for both birds and mammals has been identified for a specific licence when in fact data may only exist for one of the receptors.

Therefore, it was not possible to fully identify what data might ultimately be available for a particular Marine Licence. This is important in the context of the future development of the evidence base in support of Marine Licensing.

Table 5: Inventory of Marine Licence conditions according to post consent monitoring requirements.

Post consent monitoring	Number of conditions
Not required	380
Project description	0
Physical processes	21
Water and sediment quality	13
Nature conservation and ecology	4
Terrestrial ecology	3
Benthic habitats and species	14
Fish and shellfish ecology	4
Marine and coastal ornithology	6
Marine mammals and turtles	2
Commercial and recreational fisheries	0
Commercial and recreational navigation	1
Marine archaeology/Cultural Heritage	7
Coastal protection and flood defence	0
Air quality	0
Climate Change	0
Airborne noise and vibration	1
Human health	0
Traffic and Transport	0
Infrastructure and other existing marine users	1
Landscape and visual	0
Future baseline	0
Receptor not stated	36

Table 6: Inventory of post consent monitoring requirements for Marine Licences.

Post consent monitoring	Number of Marine Licences
Not required	257
Project description	0
Physical processes	279
Water and sediment quality	101
Nature conservation and ecology	16
Terrestrial ecology	187
Benthic habitats and species	136
Fish and shellfish ecology	4
Marine and coastal ornithology	16
Marine mammals and turtles	22
Commercial and recreational fisheries	0
Commercial and recreational navigation	1
Marine archaeology/Cultural Heritage	8
Coastal protection and flood defence	0
Air quality	0
Climate Change	0
Airborne noise and vibration	2
Human health	0
Traffic and Transport	0
Infrastructure and other existing marine users	1
Landscape and visual	0
Future baseline	0
Receptor not stated	174

Drivers for Marine Licence conditions

A more detailed review of 35 Marine Licences (Figure 2) across a range of activity types was undertaken to help determine some of the key drivers for the setting of Marine Licence conditions (see Table 7). This was supplemented with a review of published resources and the outputs of the stakeholder engagement.

The drivers for Marine Licence conditions can be summarised as:

- Notification;
- Detailed plan submission;
- Mitigation; and
- Survey and monitoring.

Further information relating to these drivers, including examples, is provided below.

Figure 2: Location of completed Marine Licence applications reviewed in detail.

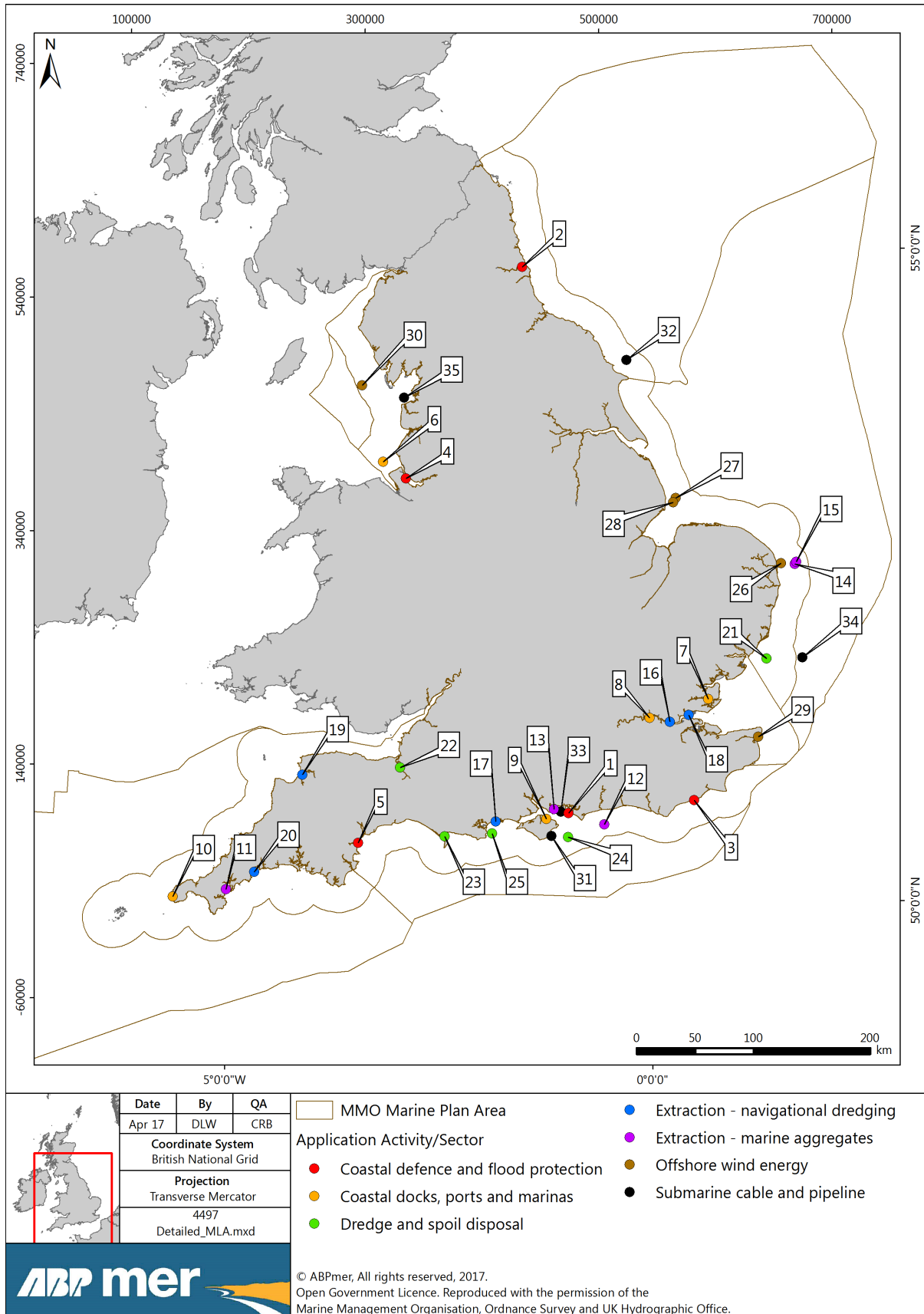


Table 7: Summary of Marine Licences reviewed in detail over a range of activities/sectors.

Detailed review	Activity/Sector	Case reference	Licence Number	Description	Fee band	Location
1	Coastal defence and flood defence	MLA/2016/00293	L/2016/00383	Beach re-charge of Eastoke Point	3	Hayling Island
2		MLA/2013/00187	L/2013/00282	Replacement of existing seawall at Rossall	3	Fleetwood
3		MLA/2016/00138	L/2016/00239	Construction of new rock groyne, raising level of an existing rock groyne and repairs to the Harbour Arm at Hastings	2e	Hastings
4		MLA/2015/00072	L/2015/00178	Repairs to Coastal Defences, Stoney Ditch and Pig Pail Sluice at Orford Ness	3	Orford Ness, Ipswich
5		MLA/2016/00262	L/2016/00319	Coastal defence wall replacement at The Point in Teignmouth	2e	Teignmouth
6	Coastal docks, ports and marinas	MLA/2015/00232	L/2016/00045	Installation of a new Leisure Marina and Commercial Moorings at Sutton Bridge	2e	The Wash
7		MLA/2015/00036	L/2016/00149	Newhaven East Quay and Port Expansion Area to support requirements for offshore wind	3	Newhaven
8		MLA/2016/00292	L/2017/00004	Installation of free standing piles to provide temporary mooring facilities	2e	Woolwich, Thames
9		MLA/2015/00429	L/2016/00100	Planned improvements to Wightlink Ltd car ferry service between Fishbourne and Portsmouth	3	Fishbourne, Isle of Wight
10		MLA/2016/00036	L/2016/00101	Dredging and construction works associated with Portsmouth Heritage Pontoon and HMS Warrior	3	Portsmouth
11	Extraction - marine aggregates	MLA/2014/00304	L/2015/00049	Marine aggregate extraction from Area 484	3	Humber
12		MLA/2014/00307	L/2015/00220	Marine aggregate extraction from Area 435	3	East Isle of Wight
13		MLA/2015/00431	L/2016/00349	Marine aggregate extraction from Area 488	3	Littlehampton
14		MLA/2014/00346	L/2015/00173	Marine aggregate extraction from Area 296	3	East Anglia
15		MLA/2014/00354	L/2015/00253	Marine aggregate extraction from Area 494	3	Norfolk
16	Extraction - navigational dredging (capital and maintenance)	MLA/2014/00478	L/2015/00145	Capital dredge at Halls Wharf, Northfleet to restore the full operational time slot for vessels	3	Thames
17		MLA/2015/00272	L/2015/00338	Water Injection Dredge works at the Ormonde Pontoon located adjacent to the Walney Channel	3	Barrow-in-Furness
18		MLA/2015/00291	L/2015/00349	Capital dredge of OSL Jetty 1 on Canvey Island	2d	Thames
19		MLA/2013/00129	L/2014/00005	Maintenance dredging and disposal in Bristol Harbour Area	3	Severn
20		MLA/2014/00546	L/2015/00046	Annual spot dredging on the Ribble Link canal	3	Ribble

Detailed review	Activity/Sector	Case reference	Licence Number	Description	Fee band	Location
21	Dredge and spoil disposal	MLA/2015/00487	L/2016/00181	Disposal of maintenance dredging material from the Harwich/Felixstowe Outer Channel	3	Felixstowe
22		MLA/2016/00023	L/2016/00153	Placement of maintenance dredge material from Wells Harbour (beneficially) adjacent to the channel	3	The Wash
23		MLA/2015/00111	L/2016/00316	Dredge material disposal at Maldon Saltings	2d	Maldon
24		MLA/2016/00355	L/2016/00347	Aggregate washing silt disposal from Kendalls Wharf to Nab Tower	3	Langstone Harbour
25		MLA/2016/00180	L/2016/00365	Disposal of material from Weymouth Harbour	2e	Weymouth
26	Offshore wind energy	MLA/2014/00273	L/2015/00055	Installing tyre filled nets at the base of turbine foundations (scour protection) at Scroby Sands	3	Norfolk
27		MLA/2014/00276	L/2015/00094	Lincs Offshore Wind Farm contingency planning and on-going management of the site	3	Lincolnshire
28		MLA/2014/00291	L/2015/00082	Routine and potential reactive operation and maintenance activities associated with the Lynn offshore wind farm	3	Skegness
29		MLA/2015/00120	L/2015/00100	Thanet Offshore Wind Farm export cable repair works (recovery/cable lay/re-burial)	2e	Thanet
30		MLA/2016/00151	L/2016/00298	Walney 1 and 2 Offshore Wind Farm operational and maintenance activities	3	Barrow-in-Furness
31	Submarine cable and pipeline	MLA/2015/00286	L/2015/00358	Ulysses 1 (South) submarine telecommunications cable recovery	2e	Dover
32		MLA/2016/00029	L/2016/00124	UK – Germany No. 6 submarine cable removal	2d	Flamborough
33		MLA/2014/00201	L/2014/00188	Isle of Man interconnector cable protection remedial works	2e	Isle of Man
34		MLA/2015/00478	L/2016/00190	Removal of telecommunications cables to support Galloper Wind Farm development	3	Suffolk
35		MLA/2015/00077	L/2015/00281	Barrow Offshore Wind Farm export cable remedial works	2e	Barrow-in-Furness

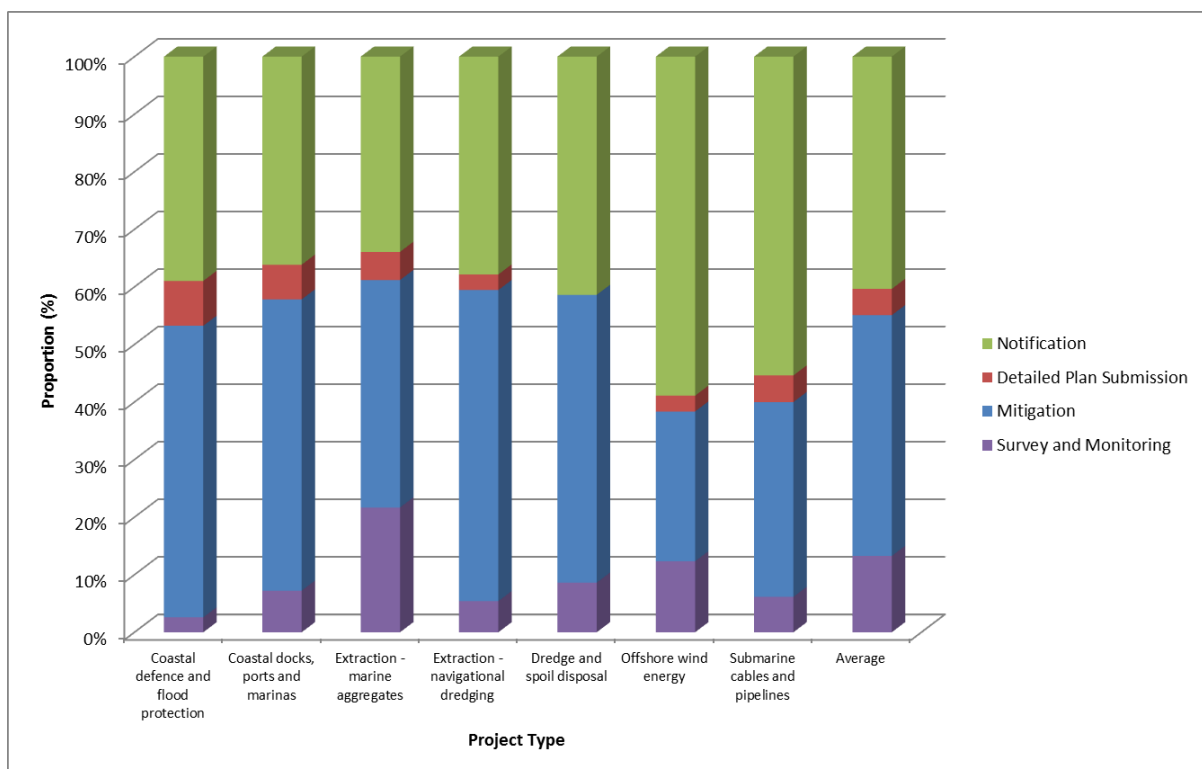
Table 8 summarises the types of driver that were present within the 35 Marine Licences reviewed in detail. Notification and mitigation measures were consistently included across the Marine Licences, with these two drivers representing greater than 70% of the conditions for each project type.

Table 8: Drivers for conditions based on project type.

Driver	Project type (Number of conditions)						
	Coastal defence and flood protection	Coastal docks, ports and marinas	Extraction - marine aggregates	Extraction - navigational dredging	Dredge and spoil disposal	Offshore wind energy	Submarine cables and pipelines
Notification	30	30	97	14	24	43	36
Detailed Plan Submission	6	5	14	1	0	2	3
Mitigation	39	42	113	20	29	19	22
Survey and Monitoring	2	6	62	2	5	9	4

There were no obvious discrepancies in the spread of drivers between the seven project types, apart from a slightly smaller proportion of conditions attributed to mitigation measures for offshore wind energy and submarine cables and pipelines (Figure 3).

Figure 3: Proportion of Marine Licence conditions according to drivers based on activity type.



The nature of Marine Licences reviewed for these two project types, primarily (export) cable removal/ repairs and remedial works during the operational phase of offshore wind farms, suggests that many of the proposed activities formed part of a larger ongoing development (and as such additional Marine Licence conditions would have applied to earlier project phases). Marine aggregate extraction projects included the highest proportion of conditions associated with survey and monitoring (~22%).

To gain an idea of the types of conditions applied to projects of different scales further analysis was undertaken. The projects for which the 35 detailed Marine Licences have been reviewed were assigned a score based on the scale of the project as follows:

- Large: Projects subject to EIA;
- Medium: Projects not subject to EIA but which cover a long timescale (i.e. activity occurs (or re-occurs) for more than one year) and/or large spatial extent (anticipated impacts extend outside immediate locality of the activity); or
- Small: Projects not subject to EIA and which cover a relatively short timescale (i.e. activity occurs for less than one year) and/or small spatial extent (anticipated impacts restricted to locality of activity).

Table 9 shows the average number of conditions per driver per project relating to the four main drivers based on project scale. Small and medium scale project conditions included a similar proportion of each driver, while large scale projects indicated a higher proportion of conditions across all driver categories. Given the scale of these projects, it is likely that a greater level of pre-, during and post activity data would be required to address any regulator/stakeholder concerns.

Table 9: Drivers for conditions based on project scale.

Driver	Project scale (Average number of conditions per driver per project)		
	Small	Medium	Large
Notification	5	7	15
Detailed Plan Submission	1	0	2
Mitigation	5	6	17
Survey and Monitoring	1	1	8

Notification

There is an element of regulator notification required as part of all Marine Licences that are issued. This provides an important mechanism for the MMO and wider stakeholders (where applicable) to understand when a particular activity will be undertaken and/or vessels/equipment that will be used. This enables the maintenance of an audit trail to ensure that the conditions of a licence are complied with as well as avoiding any potential conflicts/hazards.

Conditions relating to notification include, amongst others:

- Commencement of activity;
- Completion of activity;
- Provision of navigational communications (e.g. notice to mariners);
- Confirmation of completed works (e.g. quantities dredged) ; and
- Detail of post-works location of installations (e.g. cables).

Detailed plan submission

There is also typically a requirement to provide a detailed construction, monitoring and/or decommissioning plan (where applicable). This again provides a mechanism for ensuring the works will be undertaken in a format that is consistent with the assessments that have been completed in support of the application. Similarly the agreement of monitoring plans enables all parties to be satisfied that any data collected will be suitable for its intended purpose. This could be, for example, for impact verification, to facilitate adaptive management (if required), or reviewing a particular objective associated with a project.

Conditions relating to detailed plan submission include, amongst others:

- Method statement for proposed activity;
- Pre-, during and post activity survey and/or monitoring schedule; and
- Provision of waste management plans.

There is a balance between requiring absolute detail at the pre-consent stage, which could potentially delay the activity commencing, and having sufficient detail to be able to issue a licence. Where greater flexibility is employed it is important that the activities undertaken are within the boundaries of any assessment undertaken and a Marine Licence that is subsequently issued. Therefore, the stage at which detailed information is provided/required can leave the developer open to risk.

Mitigation

Marine Licence conditions can include the requirement for project specific mitigation measures. The types of evidence that supported these conditions ranged from the provision of an EIA, HRA and/or WFD assessment, supplementary discussions with SNCBs and other stakeholders, or were considered industry good practice for the relevant activity.

Table 10 provides a summary of mitigation measures included in the 35 Marine Licences reviewed in detail. Mitigation measures were largely divided into the following categories:

- General risk control; and
- Project specific risk controls.

The majority of 'general risk control' conditions related to pollution prevention and waste disposal/debris. These generic conditions were included to avoid harmful introductions to the marine environment (e.g. oil/fuel) and were applied to a wide

range of activities/sectors. For example, the requirement to use appropriate bunding and/or storage facilities to contain/prevent the release of potential pollutants featured in 28 of the 35 Marine Licences reviewed in detail. These mitigation measures are considered good practice given the licence holder's legal obligation to avoid polluting the marine environment.

In contrast, 'project specific risk controls', as the term suggests, were more tailored conditions based on the nature of the Marine Licence in question. Conditions relating to the permitted timings of an activity, specifically the time of year (e.g. works to be completed between two specific dates) and/or a specific phase of the tide (e.g. works to be completed during the ebb/flood tide; or 3 hours either side of high tide), were regularly present. These conditions were included to protect sensitive features such as overwintering birds, migratory fish or specific habitats/designated sites in the vicinity of the project site (e.g. saltmarsh, shellfish waters and bathing waters).

Similarly, the specific techniques to be employed as part of the project were often restricted/explicitly stated as part of any project specific risk control' conditions. These measures limited the scale of the project and enabled the regulator to be confident in the impact validation, based on well-established evidence regarding the potential sensitivity of marine features to certain techniques. For example, a range of techniques are available to remove sediment from the seabed as part of navigational dredging and marine aggregate extraction activities. Therefore, the reviewed Marine Licences for dredging activities often referred to the particular technique, such as trailer suction, backhoe and water injection dredging, amongst others. Each of these dredging techniques have different associated impacts on the marine environment and thus have been included as a condition to ensure any potential impacts are in line with those assessed.

Table 10: Conditions from Marine Licences reviewed in detail which provide mitigation requirement.

Sub-activity	Detailed review Marine Licence number as defined in Table 7	Mitigation	Reason	Underlying evidence/Relevance
Pollution Prevention	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 17, 18, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35	Bunding and/or storage facilities must contain/prevent release of fuel, oils and chemicals associated with plant, refuelling and construction equipment, into the marine environment	To minimise the risk of marine pollution incidents	These conditions are considered good practice given the licence holder's legal obligation to avoid polluting the marine environment; there is a well-established evidence base regarding pollution events, use of chemicals and associated harm to the marine environment
	2	Every effort must be made not to pollute the watercourse or area around the works	In order to reduce the impact of the works on the marine environment	
	2, 3, 4, 5	No re-fuelling of plant must take place on the beach/foreshore/inter-tidal area and should be at least 10 m away from MHWS	To minimise the risk of fuels/other contaminants entering the marine environment	
	2, 4, 6, 7, 8, 9, 10, 27, 28, 29, 30, 31, 33, 35	Any coatings/treatments must be suitable for use in the marine environment and are used in accordance with best environmental practice	To ensure hazardous chemicals that may be toxic, persistent or bio-accumulative are not released into the marine environment and to prevent marine pollution incidents by adopting best practice techniques	
	2, 3, 5, 7	If concrete is to be sprayed suitable protective sheeting must be provided to prevent rebounded or windblown concrete from entering the water environment; rebounded material must be cleared away before the sheeting is removed	To minimise risk of damage to the marine environment by wet concrete contamination which is highly alkaline and contains high levels of suspended sediment	
	2, 5, 7	Waste concrete, slurry or wash water from concrete or cement works must not be discharged, intentionally or unintentionally, into the marine environment; concrete and cement	To avoid damage to the marine environment by concrete wash water contamination which is highly alkaline and contains high levels of suspended sediment	

Sub-activity	Detailed review Marine Licence number as defined in Table 7	Mitigation	Reason	Underlying evidence/Relevance
		mixing and washing areas must be contained and sited at least 10 m from any watercourse or surface water drain		
	2, 7	All rock material used on the project must be inert, free from fines and from a recognised source	To ensure there is prevention of contamination of the marine environment and to prevent pollution caused by material that may come from a polluted area or potentially change the chemical balance, pH of the environment in which it is placed; also to minimise any risk of filter feeding organisms being smothered	
	3, 4	Spill kits must be available on site for any oil/ fuel spill from plant vehicles	To minimise the risk of fuel/oil entering the marine environment	
	27, 28	All chemicals utilised are selected from the list of notified chemicals assessed for use by the offshore oil and gas industry under the Offshore Chemicals Regulations 2002 or has gone through a similar level of ecotoxicological hazard/risk assessment; the MMO will need to be notified as to the amount of chemical to be used	To ensure that hazardous chemicals that may be toxic, persistent or bio-accumulative are not released in to the marine environment and used appropriately (e.g. in suitable amounts)	
Waste Disposal/ Debris	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 16, 17, 22, 29, 31, 32, 35	All equipment, temporary structures, waste and/or debris associated with the licensed activities must be removed within specific timeframe or upon completion of licensed activity	To minimise impacts to the marine environment and other users of the sea/ seabed	These conditions are considered good practice given the licence holder's legal obligation to avoid polluting the marine environment; there is a well-established evidence base regarding waste/debris and associated harm to the marine environment
	7, 10, 19, 21, 22, 23, 25	All reasonable precautions must be taken to prevent the disposal of man-made debris at sea; any man-made material must be separated and disposed of to land	To minimise the amount of man-made materials disposed of at sea	

Sub-activity	Detailed review Marine Licence number as defined in Table 7	Mitigation	Reason	Underlying evidence/Relevance
	35	The licence holder must ensure that during licensed activities all wastes are stored in designated areas that are isolated from any pathway to open water	To prevent materials being washed away by unfavourable weather conditions and tides, and increasing the risk of environmental damage	
Dredging (navigational and aggregate extraction)	10, 11, 12, 13, 14, 15	All dredging in the licence area must be undertaken using the specified dredging technique only (e.g. trailer suction, backhoe)	To ensure overspill of dredged material and water from the hopper barge is minimised and/or to comply with the submitted application	Developed in collaboration with the dredging/ aggregate industry, these conditions are based on project/location specific considerations of dredging activity in the marine environment; there is a well-established evidence base regarding the potential impacts associated with these techniques and marine features (e.g. physical processes, benthic habitats, water/sediment quality)
	11, 12, 13, 14, 15	Hopper washing is not permitted within the area	To protect the marine and historic environment and prevent the deposit of material in unlicensed areas	
	11, 12, 13, 14, 15	The licence holder is permitted to undertake hopper washing, where necessary, to remove small amounts of residual material (less than 50 m ³) that remain in the hopper prior to vessel maintenance or extraction of a different grade of cargo	To allow the hopper to be cleaned	
	11, 12, 14, 15	On-board screening is permitted/not permitted	To allow the licence holder to preferentially load certain cargoes; or to protect the marine environment from excessive suspended solids and/or turbidity and to ensure dredging operations are within limits assessed	
	13, 16, 20	Licensed activities must not be undertaken within the site during a specified time of year (e.g. winter/summer)	To minimise the effects of noise, vibration, disturbance and sediment (suspended and deposited sediment resulting from the sediment plume) and thus to avoid any detrimental impacts on	

Sub-activity	Detailed review Marine Licence number as defined in Table 7	Mitigation	Reason	Underlying evidence/Relevance
			migratory fish populations during the specified period	regarding the timing of species distributions and sensitivities to human pressures
	18, 23	All licensed activities must/must not be undertaken during a specified tidal period (e.g. hours either side of high water or on the ebb/flood phase of the tide)	The reason varies on a site specific basis such as to minimise the transport of material downstream and potential smothering of designated features or to provide maximum dispersion and minimise sedimentation on designated sites	
	11, 12, 13, 14, 15	The licence holder must cease dredging whilst substantive reviews are being considered if: (i) the data collected or analysis undertaken to inform the substantive review fails to conform to the agreed specifications which as a consequence results in insufficient evidence to determine whether or not unacceptable impacts have occurred; and/or (ii) the MMO has outstanding concerns during the substantive review process that unacceptable effects on the environment have occurred that were not originally predicted in the ES; and/or (iii) the MMO confirms in writing to the licence holder that unacceptable environmental damage has occurred as a result of aggregate dredging	To ensure that unacceptable impacts to the marine environment do not occur	Precautionary principle applied by the regulator to encompass instances where protection of the marine environment is not assured
	11, 12, 13, 14, 15	The licence holder must ensure that appropriate mitigation measures are developed with archaeological curators, as defined in the guidance note 'Marine Aggregate Dredging and the Historic Environment' (BMAPA and English	To protect wrecks, war graves and archaeology	These conditions are considered industry good practice given the licence holder's legal obligation to protect marine archaeological features

Sub-activity	Detailed review Marine Licence number as defined in Table 7	Mitigation	Reason	Underlying evidence/Relevance
		Heritage, 2003), to protect features of archaeological interest prior to the commencement of dredging		
	11, 12, 13, 14, 15, 19	The licence holder must abide by the best practice principles within the 'Guidance Note, Marine Aggregate Dredging and the Historic Environment' (BMAPA and English Heritage, 2003), the related 'Protocol for Reporting Finds of Archaeological Interest' (BMAPA and English Heritage 2005) and any subsequent replacement of those documents	To protect wrecks, war graves and archaeology and to ensure the protection of the historic environment	
	11, 12, 13, 14, 15	Should any previously unreported wrecks (vessel or aircraft) or other sites of archaeological interest become apparent within the Marine Licence area, during either dredging operations or monitoring, Exclusion Zones (EZs) must be instituted around them as soon as they are discovered in accordance with the procedures set out in the 'Protocol for Reporting Finds of Archaeological Interest' (BMAPA and English Heritage 2005)	To protect wrecks, war graves and archaeology	
	11, 12, 13, 14, 15	The licence holder must ensure that any additional areas of sensitive nature conservation features within the Marine Licence area identified during either dredging operations or monitoring are excluded from future extraction upon identification	To protect areas of known sensitive nature conservation features	Developed in collaboration with the dredging/ aggregate industry, these conditions are based on project specific considerations of dredging activity in the marine environment; precautionary principle applied by the regulator to ensure the future baseline of the site (e.g. sediment type)
	11, 12, 13, 14, 15	The licence holder must ensure that a specified average depth of aggregate	To ensure that sufficient habitat is retained to allow benthic re-	

Sub-activity	Detailed review Marine Licence number as defined in Table 7	Mitigation	Reason	Underlying evidence/Relevance
		resource remains as substrate in those parts of the licence area from which material has been dredged; this will be measured over a specified area; no licensed activity is permitted until isopachyte charts, detailing the location of any areas where the resource thickness is equal to or less than the specified depth as averaged over the area, are provided to the MMO and The Crown Estate	colonisation of the active dredge zone (ADZ) upon cessation of dredging activity	
	11, 12, 13, 14, 15	Dredging must be restricted to a maximum specified depth below the modelled baseline seabed level as averaged over a specified area	To ensure that dredging operations are within the limits assessed	
	11, 12, 13, 14, 15	The licence holder must ensure that all areas where extraction has reached the maximum specified depth below the modelled baseline seabed level in the Marine Licence area (as averaged over a specified area) are excluded from future extraction	To ensure that the licence holder is operating within the limits assessed	
	11, 12, 13, 14, 15	The licence holder must ensure that any additional areas of veneer thickness within the Marine Licence area identified during either dredging operations or monitoring are excluded from future extraction upon identification	To ensure that sufficient habitat is left so that benthic re-colonisation of the licence area upon cessation of dredging activity	
	11, 12, 14, 15	When the licence holder begins extraction in the new ADZ, dredging must cease in at least an equal portion of the existing ADZ	To allow re-colonisation of the seabed	
	18	The undertaker must ensure that if temperatures of zero degrees Celsius	To minimise disturbance to wintering birds during this period	This condition is included to provide protection of potentially

Sub-activity	Detailed review Marine Licence number as defined in Table 7	Mitigation	Reason	Underlying evidence/Relevance
		(or lower) occur on the site for seven consecutive days leading up to or during any instance of the licenced activities then works must cease; once temperatures have been above zero degrees Celsius for three consecutive days then works can be restarted		vulnerable bird species; evidence suggests lengthy spells of cold weather can lead to many birds changing their behaviour, with higher energetic demands during periods of low temperature and difficulty obtaining enough food
	20	The Licence holder must ensure measures are in place to avoid the spread of Japanese Knotweed in the dredge area; this includes limiting the amount of soil movement when undertaking dredge activities	To prevent the spread of Japanese Knotweed in the area	This condition provides a project specific consideration of an invasive non-native plant which, if present and without careful planning, can result in significant ecological disturbance (reduce plant diversity through competition and the formation of dense monospecific stands)
Dredge Disposal	7, 10, 19, 21, 22, 24, 25	During the course of disposal, material must be distributed evenly over the specified disposal site	To ensure an even spread of material is achieved over the area of the disposal site in order to avoid shoaling and minimise risk to navigational safety	Developed in collaboration with the dredging/ aggregate industry, these conditions are based on a general understanding of physical process impacts of dredging activity in the marine environment; precautionary principle applied by the regulator to ensure the future baseline of the site (i.e. evenly distributed sediment) and ensure navigational safety
	22	The licence holder must ensure that the height of the disposal site does not exceed a specified thickness above ordnance datum at any time	To ensure safety of navigation and access to sites for recreational users	
	22	The licence holder must ensure that no clay material is removed from the seabed or disposed of within the marine environment	The lifting of clay would indicate a deepening of the channel which is not permitted within this maintenance dredge material disposal licence	
	23	The licence holder must ensure that no dredged material is placed on existing	To maintain the saltmarsh at existing levels, and prevent any	

Sub-activity	Detailed review Marine Licence number as defined in Table 7	Mitigation	Reason	Underlying evidence/Relevance
		areas of saltmarsh, to avoid any damage to established saltmarsh through placement of dredged materials	loss of habitat	those assessed
	22	The licence holder must ensure that no material is disposed onto the (beneficial) site during a specified time period, except with the written permission of the MMO	To allow the berm to denude and allow access to the site during peak sailing activity	These conditions provide project specific temporal restrictions to protect sensitive features (e.g. shellfish beds), consider general flow direction and limit project scale; there is a well-established evidence base regarding the sensitivity of shellfish beds to human pressure
	23	The licence holder must ensure that disposal operations only occur on specific stages of the tide (e.g. ebb/flood) during specified period of the year	The reason varies on a site specific basis (e.g. to ensure that any suspended sediment disturbed which contains harmful bacteria, is pushed up river by the incoming tide and away from designated shellfish beds	
	23	The Licence Holder must ensure that possible impacts on breeding or overwintering wildfowl are fully taken into account throughout disposal operations; no works shall take place during any periods of freezing weather conditions, whilst the ground remains frozen, or during heavy storms, in order to minimise the risk of disturbance and thus to avoid causing additional stress to birds during periods when they are already subject to high levels of stress due to adverse weather conditions	To avoid disturbance to overwintering birds that use the protected areas	This condition is included to provide protection of potentially vulnerable bird species; evidence suggests lengthy spells of cold weather can lead to many birds changing their behaviour, with higher energetic demands during periods of low temperature and difficulty obtaining enough food
Navigation/Vehicle Movements	1	Installations as part of licensed activity must not encroach on recognised anchorage, either charted or noted in nautical publications within the area of the activities	To prevent interference with other users of the sea and to ensure safety of navigation	These conditions provide project specific considerations to limit project scale and ensure potential impacts are in line with those assessed

Sub-activity	Detailed review Marine Licence number as defined in Table 7	Mitigation	Reason	Underlying evidence/Relevance
	1	Vehicle access to the works area must only be from public highways via recognised vehicular access points	To minimise impacts caused by vehicle access to the works area	
	2, 3, 6, 8	The licence holder must ensure that the structure is appropriately lit by means of fixed red/green lights (conical/can shaped; project specific), at least 2 meters above MHWS	To ensure safety of navigation	These conditions are considered industry good practice given the licence holder's legal obligation to ensure appropriate signage and lighting of objects placed in the marine environment
	7, 9, 16, 30, 35	Any jack-up barges/vessels utilised during the licensed activities, when jacked-up, must exhibit signals in accordance with the UK Standard Marking Schedule for Offshore Installations (however, the main light exhibited should have a range of 5 nautical miles and not 15 nautical miles that is the standard requirement)	To ensure safety of navigation	
	6	The licence holder must establish a voluntary code of conduct to be applied at all times for commercial and recreational boat users regarding vessel movements in the vicinity of seals and birds	To minimise disturbance to the sensitive species (e.g. seals and birds) at all times	Despite the voluntary nature of this measure (for commercial and recreational boat users), this condition provides a project specific consideration to reduce the potential for significant in-combination/cumulative impacts on sensitive features in the vicinity of the works; the condition typically specifies a range of information to be provided such as a map of sensitive feature locations to be avoided and proposed speed limits when approaching or transiting these sites

Sub-activity	Detailed review Marine Licence number as defined in Table 7	Mitigation	Reason	Underlying evidence/Relevance
	9	The licence holder must ensure that specified vessel speeds within the project site comply with certain restrictions	To reduce the risk of impact from coastal erosion due to larger vessels using the ferry terminal	Agreed on a precautionary basis, this project specific condition was developed in discussion with the applicant based on a general understanding of the impacts of vessel movement/speed on adjacent coastal habitats
	13	Vessels may only approach the site following a specified direction/within the designated tracks	To minimise disturbance to the designated sites and to maintain the integrity of the licensed site	This condition provides a project specific consideration of nearby nature conservation designations to protect potentially vulnerable features from vessel movements within the site; precautionary principle applied by the regulator to ensure disturbance of designated features is minimised
Coastal Defence/Beach Replenishment	1	No works are to be undertaken within specified distance of bathing water during the bathing season	To ensure compliance with bacteriological standards required by the Bathing Waters Directive	These conditions provide project specific temporal restrictions to protect designated sites/sensitive features and limit project scale; there is a well-established evidence base regarding the timing of species distributions (i.e. birds) and sensitivities to human pressures
	1	Works carried out in the winter must be supervised by an ecologist	To minimise impacts to the overwintering bird population	
	4	The licence holder must ensure works are conducted as per the application methodology and within specified timeframes	To minimise disturbance to various bird species	
	1, 3	Beach replenishment material must be consistent with that on the existing beach and contains minimal fines	To prevent potential smothering of adjacent habitats	
				This condition provides a project specific consideration of beach replenishment activity in the marine environment; precautionary principle applied by the regulator to ensure the future baseline of the site (e.g. sediment type)

Sub-activity	Detailed review Marine Licence number as defined in Table 7	Mitigation	Reason	Underlying evidence/Relevance
	3	The licence holder must ensure that measures are put in place sufficient to keep disturbance of any vegetation on the shingle to an absolute minimum	To minimise damage and disturbance to sensitive habitat or species from construction, plant and personnel	These conditions provide project specific considerations to limit project scale and ensure potential impacts are in line with those assessed; precautionary principle applied by the regulator to ensure the future baseline of the site
	4	The licence holder shall ensure appropriate steps are taken to minimise damage to the shoreline resulting from the works and that navigational aids and the topography are returned to the original profile, or as close as reasonably practicable, following the completion of the works	To ensure the seabed is returned to a similar state as possible after works to promote recovery	
Access to Site/ Signage	3, 4, 9, 17	The site must only be accessed within a defined and marked out area thereby limiting personnel and plant access to the site	To minimise damage and disturbance to sensitive habitats or species from construction plant and personnel	These conditions provide project specific health and safety requirements to protect members of the project team and the general public, as well as avoiding disturbance to sensitive habitats or species
	6	The licence holder must ensure that signage and appropriate guidance is positioned around the location to educate all sea users from the leisure marina to the code of conduct	To ensure that commercial and recreational boat users are made aware of and understand the code of conduct that must be followed	
	1	The works must have clearly marked, appropriate signage and banksmen must be in place throughout the licensed activity	To protect the health and safety of other users of the site	
Piling	5	All piling work must be undertaken at low tide, outside of the waterbody	To avoid disturbance to sensitive fish species (e.g. Atlantic salmon <i>Salmo Salar</i>)	These conditions provide project specific temporal and spatial restrictions to protect sensitive species from the effects of noisy (piling) activities; there is a well-established evidence base regarding the use of piling in the marine environment and associated noise impacts on
	6, 9	Piling must not be undertaken during a specified time period	The reason will vary on a site specific basis dependent on the sensitive receptor (e.g. to reduce the risk of injury and disturbance to salmon during the spawning period)	

Sub-activity	Detailed review Marine Licence number as defined in Table 7	Mitigation	Reason	Underlying evidence/Relevance
	6	All hammer piling must be undertaken at low tide or, if construction takes place at higher states of tide during sensitive seal pupping and moulting period, then a qualified marine mammal observer should be present to ensure that no seals are present within a specified distance of the works 30 minutes prior to each individual pile event	Removes adverse effect on sensitive species (e.g. Harbour seal)	sensitive species (e.g. fish, mammals and birds)
	7	Piling must not exceed 12 consecutive hours during every 24 hour period	To allow migratory movement of fish	
	6, 7, 9, 10	Soft-start procedures must be used to ensure incremental increase in pile power over a set time period until full operational power is achieved; the soft-start duration must be a period of not less than 20 minutes and should piling cease for a period greater than 10 minutes, then the soft start procedure must be repeated	To allow mobile sensitive receptors to move away from the source of acoustic disturbance in order to reduce the risk of injury and to reduce the risk of injury and disturbance to migratory, spawning or juvenile fish	
	7	As part of the demolition works, where piles cannot be completely removed, they must be removed to at least a specified depth below seabed level and works undertaken within specified timeframe	To minimise the risk to navigational safety, other users of the sea, seabed and/or the dynamic marine environment	This condition provides a project specific consideration of pile decommissioning to protect a range of receptors; impacts of decommissioning typically considered the same (or less) compared to those assessed for construction (installation); precautionary principle applied by the regulator to ensure the future baseline of the site
Dock/Port/ Marina Development	6	All construction and decommissioning activities must only occur during a specified time of year or if an Ecological	To ensure that any impacts are within acceptable levels to remove any adverse effect on integrity of	This condition provides a project specific temporal restriction to protect sensitive features and limit

Sub-activity	Detailed review Marine Licence number as defined in Table 7	Mitigation	Reason	Underlying evidence/Relevance
		Clerk of Works is present during all construction and decommissioning activities to monitor direct disturbance to flocks of roosting birds or supporting habitats; if disturbance reaches a pre-determined threshold then works must cease	the site from the disturbance to migratory and over wintering birds	project scale; there is a well-established evidence base regarding the timing of species distributions (i.e. birds) and sensitivities to human pressures
Cables	27, 28, 32	If cable or scour protection is moved in the process of cable repair or replacement, evidence must be provided to the MMO demonstrating that it has been replaced within its original footprint; any movement and subsequent relocation of cable or scour protection must not lead to a reduction in water depth of more than 5% measured against chart datum	To ensure that replacement of cable and scour protection causes minimal environmental impacts, and to ensure cables are adequately buried and to prevent navigational risk	These conditions provide project specific temporal and spatial restrictions to protect sensitive species from the effects of cable burial, consider general flow directions and limit project scale; there is a well-established evidence base regarding the sensitivities of shellfish beds and the timing of species distributions (i.e. birds) to human pressures
	29	The licence holder must ensure that any operations that can lead to re-suspension of marine sediments are undertaken when the tidal flows are directed away from the adjacent shellfish waters	To avoid a direct negative impact on the shellfish beds due to smothering or increased turbidity levels	
	31	All licensed activities must/must not be undertaken during a specified tidal period (e.g. hours either side of high water or on the ebb/flood phase of the tide), during sensitive period for specific overwintering bird species; unless a mitigation plan (to address potential disturbance of overwintering birds) is agreed with the MMO following consultation with Natural England	The reason varies on a site specific basis (e.g. to minimise the transport of material downstream and potential smothering of designated shellfish beds; to provide maximum dispersion and minimise sedimentation on designated sites; to minimise disturbance to over-wintering, feeding and roosting birds on intertidal mudflats; to reduce	

Sub-activity	Detailed review Marine Licence number as defined in Table 7	Mitigation	Reason	Underlying evidence/Relevance
			impact to beach users, including bathers	
	29	The licence holder must avoid any impacts to moderate and dense areas of biogenic reef	To minimise the environmental impacts of the works	These conditions provide project specific spatial restrictions to protect sensitive species from the effects of cable burial and limit project scale; there is a well-established evidence base regarding the sensitivities of biogenic reefs and other features to human pressure
	31	The licence holder must not deploy the grapnel hook inside specified designated sites to locate the cable	To ensure the interest features within the designated site are protected	
	34	The licence holder must ensure that clump weights, rather than chains, are used at the two cable removal points to minimise the potential erosion and abrasion of the seabed	To protect sensitive features	
	35	Any repaired/replaced cable must be installed within a specified distance of the original cable position	To minimise disturbance to the seabed	

Survey and monitoring

There are different types of survey and monitoring that may be required to support a Marine Licence. Table 11 provides a summary of survey and monitoring requirements included in the 35 Marine Licences reviewed in detail. The primary reasons for survey and monitoring requirements were considered as follows:

- To inform detailed plans/methodologies;
- To provide pre-construction baseline information;
- To validate potential impacts during the construction phase;
- To provide post-construction validation and safety confirmation; and
- To provide control measures/stop thresholds.

Based on the Marine Licences reviewed in detail, a relatively small proportion of monitoring requirements were included compared to the wide range of mitigation measures (see Table 10 and Figure 3). In simple terms, this could be likened to the 'prevention is better than cure' philosophy, whereby it is better to avoid detrimental consequences by taking action/imposing restrictions in advance (mitigation). However, monitoring can provide a pre-, during and/or post works insight into effects on specific features and thus can act as a means of 'impact validation'. While mitigation measures reduce/avoid the likelihood of an impact from occurring based on prior knowledge and understanding of the activity, monitoring ensures the conditions are fit-for-purpose and can help improve/refine future iterations.

The range of monitoring requirements in the reviewed Marine Licences were typically dependent on the nature/scale of works, or simply as a result of the location of the project site (e.g. overlapping a nature conservation designated site). Detailed resource characterisation surveys for marine aggregate dredging are typically used to inform the dredging plan, while pre-construction surveys for benthos and archaeology, amongst other receptors, can also provide key planning information. Although these surveys are not validation monitoring, they can provide baseline information for some validation at a later stage.

Examples of 'impact validation' requirements were noted for several marine aggregate dredging and cable installation projects, specifically requiring post-activity monitoring of the seabed. This included monitoring the condition of the seabed after completion of the activity, while protecting benthic habitats and associated species as well as ensuring navigational safety. In terms of noisy activities, such as piling, validation monitoring during the activity can be used to check levels do not exceed known thresholds which cause adverse impacts on marine organisms (e.g. fish, mammals and birds). Therefore, such monitoring can facilitate sustainable activity in the marine environment within acceptable levels.

There are also a number of known monitoring conditions which are included as 'control measures/stop thresholds', albeit relatively few were noted within the 35 Marine Licences reviewed in detail. For example, no piling activity during construction works should be commenced if marine mammals are observed within a specific distance from or within the project site. Similarly, construction works should not continue while cold weather conditions persist to protect vulnerable bird features

(specifically waders). Other examples (not present within the 35 Mariner Licences reviewed in detail) include real-time monitoring of physical parameters (e.g. dissolved oxygen and suspended sediment concentration) and acoustic cameras to monitor fish in cooling water intakes.

Table 11: Conditions from Marine Licences reviewed in detail which provide survey and monitoring requirement.

Sub-activity	Detailed review Marine Licence number as defined in Table 7	Monitoring	Reason	Underlying evidence/Relevance
Coastal defence and land claim	3	The licence holder must ensure that an appropriate post works high-resolution bathymetric survey is undertaken to International Hydrographic Organisation Order IA standard and that a side-scan survey of the area in which the rock trans-shipment and transiting of the barge has been undertaken, including a specified buffer area around the site vessel rendezvous point and the barge transshipment route	To ensure navigational safety is maintained	This post-construction validation condition provides a project specific consideration of navigational risk associated with the (accidental) placement of rock material to support the coastal defence works; precautionary principle applied by the regulator to ensure navigational safety is maintained
Coastal docks, ports and marinas	6	The licence holder must undertake the silt monitoring plan to monitor possible changes in the river bed level due to silt accretion at the facility	To ensure navigational safety for vessels	This post-construction validation condition provides a project specific consideration of navigational risk associated with the levels of silt which build up within the (adjacent) site; specific management plan/ methodology submitted by applicant; precautionary principle applied by the regulator to ensure navigational safety is maintained
	9	Backfill operations must return the intertidal area to its original profile; to verify this, a baseline (photographic or other method) survey must be undertaken prior to the licenced activities commencing and following completion of backfill operations	To ensure the seabed is returned to a similar state after the licensed activities to promote recovery	This post-construction validation condition provides project specific considerations to limit project scale and ensure potential impacts are in line with those assessed; precautionary principle applied by the regulator to ensure the future condition of the site

Sub-activity	Detailed review Marine Licence number as defined in Table 7	Monitoring	Reason	Underlying evidence/Relevance
Dredging (navigational and aggregate extraction)	10, 16, 20	The licence holder must submit pre and post dredge surveys, together with an interpretation of the difference between the survey results and a volume calculation within a specified time on completion of each dredge campaign	To evidence the location and volume of material removed from pre-construction baseline surveys and as part of post-construction validation	This condition provides a project specific consideration of seabed resource, to limit the scale of the project and to ensure the future condition of the site
	11, 12, 13, 14, 15	<p>The baseline survey report must include provision for the following surveys to cover the Marine Licence area and reference sites/ surrounding areas as specified below; the specifications for such surveys (may) include the following:</p> <ul style="list-style-type: none"> • Bathymetry: a multibeam bathymetric survey of the licence area, plus a specified perimeter around the licence area, must be undertaken; charts showing likely future bathymetry and suspended sediment levels must also be produced; • Seabed features: a sidescan sonar survey must be undertaken in conjunction with the bathymetric survey defined above, and must ensure full seabed coverage at high resolution; the data must be interpreted to produce baseline seabed features maps; • Resource assessment: a detailed review of existing resource data must be undertaken comprising seismic profiles and vibrocore samples; both unaveraged charts 	To support dredge planning and set a baseline to validate the predictions made in the assessment and allow the identification of any unforeseen environmental impacts	Developed in collaboration with the dredging/aggregate industry, these conditions are based on project/ location specific considerations of dredging activity in the marine environment; there is a well-established evidence base regarding the value of these monitoring techniques to support the future condition of the site

Sub-activity	Detailed review Marine Licence number as defined in Table 7	Monitoring	Reason	Underlying evidence/Relevance
		<p>and charts showing resource averaged over a specified area must be produced; data must be interpreted to confirm the limits and thickness of the sand and gravel deposits;</p> <ul style="list-style-type: none"> • Seabed sediment sampling: a baseline survey must be undertaken to confirm seabed composition, using grab samples; the grab sampling employed during the baseline benthic sampling may be used for this purpose; • Benthic: a benthic macro faunal survey must be undertaken to establish the benthic communities both within the Marine Licence area and beyond; the specifications for this survey must be prepared in consultation with the MMO; • Sensitive habitats and/or species: data from the baseline geophysical data and video survey must be reviewed in order to confirm the presence or absence of any potential sensitive habitats/species, in particular <i>Sabellaria spinulosa</i> reef, in the licence area and wider study area; and • Archaeology: side scan sonar and bathymetry data to confirm the location, extent, morphology and stability of known wrecks and archaeological features 		

Sub-activity	Detailed review Marine Licence number as defined in Table 7	Monitoring	Reason	Underlying evidence/Relevance
	11, 12, 13, 14, 15	<p>Should sampling be necessary to comply with any of these conditions (including sampling that is required outside the licensed area), the licence holder is permitted to undertake such sampling so long as the survey specification has been approved by the MMO and The Crown Estate has been notified; the licence holder is permitted to undertake the following sampling within and around the licence area:</p> <ul style="list-style-type: none"> • Benthic grab samples using Hamon grab or similar apparatus; • Sediment samples using clamshell grab or similar apparatus; and • Vibrocores using a vibrocorer 	To allow environmental monitoring to take place and validate predictions made in the assessment	
	11, 12, 13, 14, 15	The licence holder must ensure that upon cessation of dredging the sediment substrate must be of a similar grade to the conditions that existed before dredging commenced with due allowance being made for natural sediment movement; a specification as to how this will be demonstrated must be agreed in writing with the MMO prior to any surveys taking place	To allow re-colonisation of the seabed upon cessation of dredging activity	This condition provides a project specific consideration of seabed resource to limit the scale of the project and to ensure the future condition of the site; there is a well-established evidence base regarding the potential impacts associated with changing habitat type on sensitive benthic species
Dredge and spoil disposal	7	A bathymetry survey of the disposal site must be taken before and following the completion of the disposal operations, and interpreted with a difference plot	To ensure that the material has been evenly distributed in line with the disposal strategy and that there is no shoaling that could present a hazard to navigation	These conditions provide project specific considerations of seabed resource to limit the scale of the project; precautionary principle applied by the regulator to ensure navigational safety is maintained and to ensure the future condition of the site
	22	The licence holder must submit a topographical survey methodology for approval by the MMO within a specified	To ensure the adequate survey of the topography of the disposal area	

Sub-activity	Detailed review Marine Licence number as defined in Table 7	Monitoring	Reason	Underlying evidence/Relevance
		time period of the issue date of the Marine Licence		
	21	The licence holder must ensure that a program for future sampling is designed in consultation with CEFAS in order to allow assessment and confirmation that the dredge material is of acceptable quality for sea disposal from the dredge site listed	In order to comply with the guidance set out by OSPAR relating to frequency of assessment	These conditions are considered good practice given the licence holder's legal obligation to avoid polluting the marine environment; there is a well-established evidence base regarding sediment contamination and associated harm to the marine environment
	22	The licence holder must submit a sediment sampling plan request; the sediment sampling and analysis must be completed by a laboratory validated by the MMO	To ensure only suitable material is disposed of at sea	
	23	The licence holder must continue to undertake an annual monitoring program to evaluate the effects of the beneficial use scheme; the monitoring program must include an assessment and/or comments on any possible impacts of the scheme on the environment further downstream of the site	To ensure there are no detrimental effects associated with the beneficial use scheme and to continue to monitor the effectiveness of the scheme in recharging the saltmarsh	
Renewable wind energy	26	The licence holder must provide a detailed monitoring plan to the licensing authority a specified time prior to the commencement of licensed activities; this plan must contain, as a minimum: <ul style="list-style-type: none"> • Weekly sonar surveys of the scour protection at the wind turbine generator foundations; • Annual bathymetric surveys for the duration of the project; and 	To ensure that the installed objects (TFNs) remain buried/secure	This condition provides a project specific consideration of installed objects to verify the assessed impacts of the works and to ensure navigational safety is maintained

Sub-activity	Detailed review Marine Licence number as defined in Table 7	Monitoring	Reason	Underlying evidence/Relevance
		<ul style="list-style-type: none"> Annual inspections (by divers or drop down cameras) of the tyre filled net (TFN) ropes and nets for as long as the they remain exposed 		
	26	If a greater than 1 in 10 year storm event occurs between installation of the TFNs and the commencement of decommissioning, the licence holder must undertake a high resolution survey of the foundations where TFNs have been installed in order to demonstrate that TFNs remain in secure	To ensure that the installed objects (TFNs) remain buried/secure	Precautionary principle applied by the regulator to verify the assessed impacts of the works and to ensure navigational safety is maintained
Submarine cable and pipeline	27, 28, 29	The licence holder must undertake a post-installation survey along the section of cable that has undergone repair or replacement to demonstrate the successful burial and depth of the cable	To ensure that the repaired or replaced cable is adequately buried in order to ensure navigational safety	Precautionary principle applied by the regulator to verify the assessed impacts of the works and to ensure navigational safety is maintained
	33	The licence holder must ensure that a side scan sonar survey of the site is obtained prior to the commencement of work	To satisfy the MMO that no rock has been lost during the transshipment operation that would pose an obstruction/hazard to other sea/sea-bed users	

Evidence behind conditions

The underpinning evidence base for conditions comes from a number of sources including:

- Published and grey literature;
- Citations and conservation advice packages;
- Learning from past case examples e.g. post consent monitoring;
- Collated evidence (e.g. sectoral reviews); and
- Expert judgement.

The detailed review of 35 Marine Licences indicated that all conditions were based on appropriate evidence, with no apparent gaps on the basis of those licences reviewed. For example, temporal restrictions to protect overwintering birds and noise thresholds to protect sensitive features from piling activities are linked to well-established evidence bases regarding the potential impacts associated with specific activities and marine features.

More generally it is possible that some ecological impact pathways are supported by less evidence which could have implications on the adequacy of conditions imposed. This could include the impact of water quality changes (e.g. microbiological) on shellfish waters, the recovery time for sensitive benthic species (e.g. maerl, seagrass), the long-term consequences of noise disturbance/displacement on fish, birds and marine mammals and site-specific impacts for migratory fish. In addition, there are many non-ecological receptors which may receive less focus, such as the impacts on fisheries (e.g. displacement, productivity) and in-combination/cumulative effects. It should be noted that the severity of all such impacts would be highly dependent on the pressures resulting from the proposed activities and the sensitivity of the receptors in the receiving environment.

Impacts on industry

The potential impacts to industry associated with Marine Licence conditions have been identified from stakeholder feedback (eight completed questionnaires) and the experience of the project team. It should be noted that this aspect of the report does not provide any comment on the adequacy of the conditions, rather it presents information on the associated implications for industry when they are applied..

General observations

The impacts of conditions relating to notifications and the preparation of plans are generally considered to be small and accepted as being necessary. Deferral of the preparation of detailed plans until after the Marine Licence has been issued can be a proportionate way of dealing with inevitable uncertainties in project design and the pre-consent stage.

One stakeholder commented that notification to MMO in relation to contractors could be onerous and could slow planned work down or even halt it altogether. It was suggested that a developer's own internal procurement procedures should provide sufficient assurance of contractors and that it shouldn't therefore be necessary for

the MMO to demand such information. Some comments were also made in relation to delays in the sign off of some plans (particularly Environmental Management and Monitoring Plans (EMMPs)) which have the potential to cause delay to a developer's programme. This issue is discussed in more detail below.

The main impacts on industry generally arise from conditions that impose mitigation measures or survey and monitoring obligations. These obligations can impose costs directly or indirectly (as a result of extensions to construction, maintenance or decommissioning programmes).

Extensions to programme

Those conditions which have the greatest potential to cause extensions to programme include:

- Controls on the timing of activity;
- Mitigation measures which extend the duration of activities;
- Requirement for additional licences/variations; and
- Sign off procedures (including the development of EMMPs).

Controls on timing of activities

Timing restrictions can affect both the programming of environmental surveys as well as determining when construction/operational/decommissioning activities are undertaken.

Industry noted that a requirement to undertake seasonally dependent pre-construction surveys can delay the start of construction if a particular survey window is missed. The problems associated with this can be exacerbated where baseline monitoring conditions are seen as excessive from an industry perspective. Specific examples within the marine environment include migratory fish data, marine mammals, and overwintering /passage birds. Similarly there may be a requirement to collect physical and/or chemical data within certain seasons to capture a wider range of environmental conditions. These datasets do, however, typically inform the engineering scheme design as well as the assessment of environmental effects. Where a project overlaps with the terrestrial environment this may result in additional restrictions where a different range of protected species can be encountered.

Timing restrictions (seasonal, tidal or day/night restrictions) may also be enforced during the construction, operational and decommissioning phases of a project to avoid disturbance to sensitive features. This could include, for example, the avoidance of over-wintering periods to avoid bird disturbance or ceasing activities during the main migration periods for fish. Similarly restrictions may also be enforced to avoid peak tourism season, for example, when laying cables across beaches. Such restrictions have the potential to prolong construction periods across years which can have significant cost consequences for projects.

Other types of condition may include a variable restriction, for example, to cease piling when marine mammals are present or to cease activities disturbing to birds during cold weather periods. These conditions cannot be planned for and can have a material impact on project programme. Additional examples include where

something unexpected is encountered such as unexploded ordnance or an archaeological feature.

In contrast, where real time monitoring is undertaken, this can lead to an acceleration to an anticipated construction programme. The real time monitoring of fish migration within Southampton Water, for example, resulted in an extension to the window in which piling could be undertaken. This was due to the migratory period being shorter than that typically experienced in the estuary and as such the piling restrictions were relaxed. Close communication between the Environment Agency and Associated British Ports facilitated this process.

Mitigation measures

Some mitigation measures can extend construction programmes because they require developers to limit the level of pressure arising from an activity resulting in more time being required to complete the activity (such as limiting the rate or method of dredging) or involve implementation of mitigation measures that extend the duration of an activity (such as marine mammal observation and soft start procedures for impact piling).

Requirement for additional licences/variations

In addition to environmental drivers such as those mentioned above, conditions may also be applied that result in requirements for additional licences to be gained to undertake the associated monitoring. This can result in further delays to programme depending on how long it takes to obtain such permissions. In practice, however, these additional requirements can be captured as part of the original Marine Licence which also allows a more complete assessment of potential impacts. An example of where this is already practiced is the aggregates sector where Marine Licence applications typically includes permissions to undertake the associated sampling/survey. More general inclusion of post-consent monitoring within Marine Licence permissions could help to avoid delays post-consent. Similarly the inclusion of future maintenance requirements within a Marine Licence can remove the need for additional assessments and licensing post the original consent.

Sign off procedures

The formal agreement of post-consent monitoring and management plans can take several months causing delays in establishing the required protocols or procedures to enable a project to commence. This problem can be further exacerbated if the post monitoring work is required to influence how pre and construction monitoring is planned and agreed.

The use of Environmental Steering Committees (ESC) can, however, facilitate this process, particularly for large and complex projects and if established early enough (particularly before consents are granted). A significant advantage of these forums is that they can be used to both agree initial requirements as well as promote adaptive management where there is an ongoing review of monitoring data.

In addition to providing adaptive management through applying the findings of monitoring, active ESCs can also examine the ongoing commitments for monitoring over time to determine whether the scale of monitoring is still necessary. Such an

approach was applied to developments on the Humber Estuary where the ESC successfully reviewed monitoring requirements and reduced them where results showed that work was not having an impact on the estuary.

Such advantages have also been observed by the offshore wind sector – conditions are largely agreed in principle prior to the issue of the Marine Licence.

It should also be noted that the length of time required to develop Environmental Management and Monitoring Plans (EMMPs) is directly influenced by the applicant. Some developers are more or less pro-active in developing these plans during the application process presumably dependent on the level of expenditure/risk they want to carry in each project phase.

Cost impacts

Those conditions which have the biggest impact on project costs include:

- Extensions to programme;
- Mitigation measures; and
- Survey and monitoring.

General observations

Overall the costs of mitigation and/or survey and monitoring requirements are typically relatively small in the context of the overall construction costs of a project. One developer noted that whilst the costs are relatively small the timescales have to be factored in to any investment processes and ongoing risk forecasting.

Of those that responded to the questionnaire relatively limited information was supplied with respect to project costs. One respondent estimated their total project costs to be in the region of £1 million with approximately £20,000 of this representing reporting, consultation and negotiation costs and £20,000 associated with mitigation. A second example was provided for a total project cost of approximately £800,000 over five years. The work required to obtain the Marine Licence was estimated to be £150,000, approximately 80% of which was attributed to timing restrictions and 20% to survey and monitoring.

Extensions to programme

Any extensions to programme whether planned or unplanned will have cost impacts on developers. In particular, where seasonal restrictions require construction programmes to extend over several years, this can render projects unviable because it increases the length of time between investment being made and the flow of revenues. Furthermore, for offshore projects, the additional costs associated with mobilization and demobilization of expensive construction plant can also add significantly to project costs (ABPmer, 2011).

Mitigation measures

The cost of mitigation measures can vary considerably and depend on the particular measures required. Some mitigation such as pollution prevention measures for construction works can be implemented easily at low cost and are uncontentious. Other types of mitigation measure, such as noise reduction measures for impact

piling, can be very expensive and there therefore needs to be very clear scientific justification for such measures if they are to be applied. For example, Vattenfall (pers. comm.) cited in ABPmer (2015b) estimated the cost of using bubble curtains for East Anglia One as between €36m - €72m for c200 monopiles and/or jackets. Based on evidence from other windfarms, Vattenfall estimated that the cost of such mitigation measures would be between 10-30% of total foundation costs which in turn may be 20-30% of total project costs. Such measures would therefore represent a significant additional cost and could compromise the viability of a project.

The costs associated with decommissioning and restoration can also be substantial. In addition, there are examples of where developers have been required to pay into wider restoration or improvement schemes. Such examples include contributions to the National Rivers Trust to improve fish passage or to the Environment Agency for the improvement of flood defences.

Survey and monitoring

Survey and monitoring can be expensive particularly where it involves multiple receptors for a prolonged period of time. The post consent monitoring of port developments on the Humber Estuary (including the associated compensation schemes) was estimated to have cost in excess of £1.5 million over a ten year period.

There is general frustration in industry where it is felt that best use is not made of the data that is collected both for informing adaptive management as well as developing the evidence base for future assessment and condition setting. It is therefore important that all monitoring and data collection is specifically targeted to answering a set question or hypothesis. The data generated should also be suitable for as many purposes as possible including the development of the evidence base and adaptive management. This would ideally result in less general reassurance monitoring being required in the future.

Review of current practice and recommendations

The following section provides a synthesis of current practices associated with the imposition of Marine Licence conditions. This has been structured according to the following topics:

- Setting of conditions;
- Survey and monitoring;
- Usability/accessibility of MCMS public register;
- Maintenance of the evidence base; and
- Knowledge sharing.

In the first instance a review of current practice is provided followed by recommendations as to how these processes could be improved going forward.

Setting of conditions

The high level review of Marine Licences identified that a large number of different conditions have been imposed by the MMO over the past four years (479 across 700

licences). The majority of these conditions relate to notifications as well as the enforcement of best practice pollution prevention measures. These are supplemented with project specific mitigation and monitoring requirements related to the proposed activity.

Over time the consistency of the wording of the conditions has been improved and the MMO has now set up a standardised list of bespoke Marine Licence conditions. This list, however, is currently limited and only reflects the most recent licences that have been issued. There is opportunity to enhance the register of conditions building on the work that has been completed within this project. The register could, for example, be structured according to:

- Activity;
- Sub-activity;
- Receptor;
- Condition; and
- Reason for condition.

This would facilitate the standardisation of licence conditions that are issued. Suggestions as to how this can be used to maximise the benefit from the associated supporting information and data are explored below.

Stakeholders that responded to the questionnaire generally considered the MMO to be responsive to discussions on licence conditions and the use of an adaptive management approach. They also suggested that consistency in conditions has improved over time. Similarly it was felt that conditions are generally proportionate and have become more project specific over time. The review of Marine Licences did not identify any obvious evidence of linkages to respective conditions set by the local planning authority/other devolved administrations.

The MMO (and its advisors) should be familiar with the supporting evidence base when considering Marine Licence applications. It is recognised, however, that even where there is a well-defined evidence base, site and case specific parameters are still required to be taken into account when setting Marine Licence conditions including:

- Frequency and/or timing of a particular pressure;
- Scale or magnitude of change;
- The sensitivity of receiving environment; and
- The potential for cumulative/in-combination effects.

Survey and monitoring

The review of Marine Licence conditions identified that there is frequently a requirement for survey and/or monitoring. In total 465 of the 700 Marine Licences reviewed had some form of requirement for survey and monitoring. This could be inferred from a requirement to develop some kind of EMMP or where a condition related to a specific receptor.

The implementation of the monitoring will generate considerable volumes of data. The types of data that are likely be collected include:

- To inform detailed plans/methodologies;
- To provide pre-construction baseline information;
- To validate potential impacts during the construction phase;
- To provide post-construction validation and safety confirmation; and
- To act as control measures/stop thresholds.

As highlighted throughout this report this data has the potential to offer considerable value not least of which to inform future assessments and conditions imposed on future projects. If impact verification monitoring, for example, confirmed that environmental effects were in accordance with what was predicted this may remove the requirement for future monitoring, recognising that site specific factors will always need to be a consideration in setting licence conditions. The re-use of existing data could reduce the burden on new projects to collect data. This could be of use in all stages of a project lifecycle but particularly in the initial stages while the feasibility of a scheme is being established.

When undertaking the detailed review of 35 licences it was not possible to identify where this data is being captured nor to obtain access to the data. Therefore in the absence of readily available information it is unlikely that it is being captured in subsequent assessments and ultimately the setting of future Marine Licence conditions. Any lessons learnt from the data are therefore likely to remain project specific and only known to the case officer, applicant, stakeholders and consultants directly associated with the project. This is therefore limiting the value of the data that is collected through this process.

This concern was also raised by stakeholders in response to the questionnaire. Those respondents that had a requirement for survey and monitoring had supplied the data to the MMO but none were clear on how the data had subsequently been used. Given the vast amount of money that is spent on collecting such data there were concerns that optimal use was not being made of this information. There was a suggestion that it would be helpful for feedback to be provided by the MMO as to how the data is being used and whether this is being fed back in to the licensing process. A concern was also raised that some monitoring requests seem to be too research focused. It is therefore important that the rationale for a monitoring requirement is fully communicated.

It is therefore recommended that better use is made of the data collected to inform Marine Licence conditions. In the first instance this data needs to be made more accessible so that wider use can be made of these information sources. Suggestions as to how this could be achieved are provided below (within the considerations of the usability of the MCMS). The requesting of information to be supplied in a specified format would help to facilitate this process. Similarly, suggestions as to how this can be used to maintain the evidence base for informing Marine Licensing is provided below.

Accessibility and usability of MCMS Public Register

As part of reviewing the completed Marine Licences the accessibility and usability of the MCMS public register has also been reviewed. This has resulted in a number of suggestions of how the system could be improved to maximise knowledge transfer. It should be noted that the ideas and options outlined within this section are based on a wider understanding of data management principles and other operating systems. They have also been informed by non-technical discussions around MCMS and other data management solutions. A detailed IT feasibility study would be required to understand the full implications of implementing any of the following concepts to scope the requirements and functionality required to deliver an enhanced MCMS. This is outside the scope of this study.

In its current format the MCMS public register provides access to a range of information associated with Marine Licence applications. This includes a case reference, project type, project title, locations, applicant name, submission date, latest decision and consultation closing date. It is also possible to view any documents that have been submitted in support of the application. The advanced search functionality provides the opportunity to search the MCMS register according to a number of set headings: case/compliance reference, applicant name, group title, project title, locations, date, status, application/request type (including request activity type).

The MCMS public register therefore provides access to useful information in the context of understanding a specific case, however, this is more limited in terms of maintaining and informing the evidence base to inform environmental assessments. Recommendations as to how this process could be improved to enable greater knowledge exchange are summarised below:

- Improvements to search functionality including;
 - Changes to the licence application format;
 - Cataloguing and storage of application and post consent monitoring data and reports;
 - Use of map driven searches; and
- Greater collaboration between organisations/data hosting systems.

An outline of each of these concepts is provided below, outlining process and technological considerations for each recommendation.

To ensure that potential data sources or information can be easily identified it would be of benefit to expand the search capability within the Public Register. This could be through the use of key words (such as receptor type or activity type), the use of search based facility that allows the subsequent filtering of results or a map based search. To enable this functionality there would need to be either an update to the online licence application process or a post-processing step undertaken by the MMO at the time the application is made and updates made to the Public Register interface.

The on-line application form could, for example, be populated with drop down lists relating to activity type or receptors that have been considered within the respective assessments. This would standardise the input information and improve search

functionality. Alternatively the additional input required could be captured in one or more standardised metadata formats (tailored for data and reports). The MMO could, for example, consider compiling its own controlled keyword vocabularies around topics such as activities, receptors and potentially consider licence case references and conditions and linking these vocabularies to relevant sections of the application process. This would enable key word searching and the subsequent filtering of such results.

If a metadata option is selected this should be based on commonly used standards such as UK GEO-spatial Metadata INteroperability INitiative (GEMINI), Marine Environmental Data and Information Network (MEDIN) or Infrastructure for spatial information in Europe (INSPIRE). This will provide greater opportunities to link to other data hosting platforms such as data.gov.uk and MEDIN. This would enable efficient signposting of the information hosted within the MCMS to the widest audience possible (see below for further information on possible integration with wider data information systems).

In terms of key words the list of activities could be based on those that require a Marine Licence in a consistent format to those in the JNCC activities-pressures matrix. In terms of receptors this could again be in the form of a standardised list from which it is possible to select those that have been considered within the supporting assessments. To help prevent this from being a tick box exercise this could be structured according to sub-lists within the type of assessments that have been completed (e.g. EIA, Environmental Appraisal, HRA, MCZ, NRA, WaFD).

It is considered that there is limited additional value to capturing the specific types of assessments that have been completed for each receptor (e.g. numerical modelling, literature review etc.) as these are potentially more susceptible to interpretation. In practice it is assumed that searches are more likely to centre around a particular receptor, activity or geographic location.

It would also be possible to capture the types of post consent monitoring associated with a particular Marine Licence. This could again be according to receptor type (as the project activity type will already have been defined at the point of application). Depending on how this was captured there could be additional benefits for ensuring all Marine Licence conditions have been discharged by providing an audit trail throughout the duration of a project.

There are a number of options for the cataloguing and capture of application and post consent data and reports in MCMS. This could range from signposting available data to hosting the respective data and reports internally. The scale of effort associated with these two options is obviously very different. This would be in terms of ensuring the quality of data held within the system and the hosting of large volumes of data.

The MMO could look to extend the functionality of the MCMS to accommodate the changes proposed above, or alternatively consider a new standalone solution designed to meet the needs of the MCMS. Both options would likely require significant technical IT input.

Generally when undertaking and/or reviewing environmental assessments it is important to understand what baseline information is available for a particular location. It would therefore be of benefit to add map based search functionality to the MCMS. The ability to use a map in conjunction with existing search parameters would allow users to return data and information sources over a given geographic area. This functionality could provide the ability for users to draw their own search area on the map and define whether results are entirely within or intersect the search area in combination with other search parameters selected.

It is acknowledged that the inputting of data in this way to enable these types of searches would be more onerous. This would apply to the applicant at the point of submitting the information (both at the time of the application and/or post consent if applicable), as well as the MMO at the point of checking what has been entered into the system. It also assumes that the applicant has sufficient knowledge to submit the information in an informed way. However, the increased search functionality according to standardised terminology would facilitate increased data awareness and shared learning. The full importance of quality assurance throughout the entire process should not be underestimated if the resulting data is to have any real value.

The provision of a facility that allowed users to save searches in their profile could be another mechanism to assist users. This could, however, have issues for data security and storage capacity. In a more advanced format a system could also be introduced to provide alerts if a new data source is added within a particular location or a certain receptor or activity type.

In time, spatial searches could be extended to signpost academic research and surveys and industry data from sources such as MEDIN and The Crown Estate (TCE) Marine Data Exchange (MDE). This could be achieved by integrating via data Application Programming Interfaces (APIs) with other data discovery sites such as data.gov.uk and MEDIN.

Integration with other systems

As part of any IT feasibility study, looking at extending the functionality of the MCMS public register, consideration should be given to potential linkages to other data management systems. This includes those hosted by the MMO (such as the Marine Information System (MIS)) or more widely such as MEDIN¹ or the MDE². This could help reduce additional technical overhead for the MMO as well as offer cost savings and increased duplication efficiencies. The MDE, for example, already hosts monitoring reports and datasets collected as part of offshore renewables projects.

¹ MEDIN is a partnership of UK organisations committed to improving access to marine data. This is achieved through an agreed use of common standards for metadata and data, which are searchable through the data discovery portal. The MEDIN data discovery portal is a metadata discovery service providing users with a single point of access to individual metadata records submitted to the portal by the Data Archive Centres (DAC) and other public and private sector bodies.

² The TCE MDE provides storage access to survey data and reports collated during the planning, building and operating of offshore renewable energy projects. The system is driven by a standardised structure of information, underpinned by metadata for data series, datasets and reports. This regimented structure ensures that all information within the MDE is optimised for the maximum return on results for users of the system.

It may also be possible to link to wider planning portals to ensure consistency and shared learning between devolved administrations and local planning authorities which have a coastal jurisdiction.

Important considerations for the potential integration of systems includes how information is communicated between them (i.e. integration points). This would need to factor in issues around confidentiality as well as quality assurance. Other aspects that would need consideration are the standardised terminology between the systems and the method and level of url signposting.

MCMS licences and applications, that have passed internal MMO validation checks, are already available as a layer in the MMO MIS. There is therefore potential to provide greater linkage between these systems to enable users to access information held within the MCMS public register via the MIS. This could, for example, provide a mechanism for spatially searching for data held within the MCMS using a map based search (or *vice versa*). The potential for such benefits would also be dependent on the changes to data entry within the Marine Licensing process as outlined above.

To provide maximum benefits this would require better integration/standardisation of data and information sources between the two systems to ensure no duplication of effort. Additional benefits include making the data as accessible as possible to multiple end users (both developers and regulators) for a range of purposes including improving the scientific evidence base in support of Marine Licences.

Summary of IT considerations

There are several options available to the MMO to help deliver better value from the vast amounts of data and information that are collected as part of the Marine Licensing process. These options can ultimately be tailored to a range of different audiences. This could include enhancements to the existing MCMS public register or the creation of a new database specifically tailored to maximise the value that can be derived from the system. The advantage of the latter approach is that it could add value to wider MMO functions as well stakeholder requirements. Pursuing either option would likely require significant investment in IT design and cost.

The level of investment will correlate with the flexibility and effectiveness of the final solution and the ability to integrate with other systems. Existing solutions such as the MDE have already demonstrated that it is possible to deliver a cloud based discovery and data portal that brings both the administrative and search functions together in a coherent solution. The provision of such functionality potentially offers the maximum level of benefit relative to the costs involved with updating the system (assuming associated changes are made to the point of data entry).

The challenges are less about specific technical solutions and more around the way information is identifiable within the MCMS to enable better search mechanisms (i.e. through the use of consistent terminology and stringent quality procedures). Industries such as offshore renewables are already better aligned to such requirements, and changes to MCMS should build on lessons learned from systems such as MDE and MEDIN. A considerable amount of effort would be required to

retrospectively apply such information tagging to information already held within the MCMS.

The opportunities to link to other related systems, including within the MMO, should not be ignored as this has the potential to reduce the administrative burden of hosting such data whilst maximising accessibility and uptake.

Taking any options forward to improve MCMS (or MIS) will need to be considered in context of existing government standards and guidance including:

- The Government Digital Service (GDS) is leading the digital transformation of government on behalf of the cabinet office. The Digital Service Standard (as developed by the GDS) encompasses 18 key points to ensure digital teams build high quality government services.
- The Defra Network Geographic Information (GI) programme is an initiative being implemented to significantly reduce costs and create efficiencies related to the GI capability across the Defra group, with particular focus on infrastructure and applications. This will be achieved primarily through reducing reliance on proprietary software through the increased use of open source solutions, increased interoperability of data/services and through the use of cloud based infrastructure.
- The Defra strategy provides a series of high level objectives (including with respect to the use and sharing of data) for the department for the period 2015 to 2020. Points of relevance include commitments to opening up Defra data for public access and using a more intelligent, risk-based approach to monitoring, regulation and enforcement. The Defra Data programme is looking to transform data management and moving towards more unified IT operating models whilst integrating policy making with delivery activities to minimise duplication.

Table 12 outlines some of the options discussed and their perceived relative cost to implement.

Table 12: Options for developing the usability and functionality of MCMS public register.

Option	Description	Relative cost scale*
1	Updating search capability within existing MCMS public register	1
2	Standardisation of data entry at point of Marine Licence application/Post consent data submission to accommodate defined lists of receptors and/or activities	1
3	Update MCMS to include metadata driven cataloguing process at point of data entry	2-3
4	Update MCMS to include map based search	1
5	Provision of a facility that allowed users to save searches in their profile	1

Option	Description	Relative cost scale*
6	Provide alerts if a new data source is added within a particular location based on user criteria	1
7	Extend MCMS to provide access to data that is collected	2-3
8	Integration of MCMS with MIS	2-4
9	Integration of MCMS with wider planning systems/data holdings	2-4
10	Create specifically tailored data management system to meet multiple requirements	5
* 1 – Least, 5 - Most		

Maintenance of evidence base

As identified throughout this report, the Marine Licensing process generates a considerable amount of data from which it is important to derive as much benefit as possible. In the context of this project, data can be used to improve the evidence base to inform the assessment and consenting process including the setting of Marine Licence conditions.

In order to maximise the value from the data, it would be helpful to make it more accessible. Several previous studies have highlighted the benefits of improving access to industry data (Marine Planning Consultants *et al.*, 2013; ABPmer, 2015c), in particular to make best use of the data. In addition more work needs to be done on reviewing the lessons learnt from survey and monitoring data so that findings can inform Marine Licensing decisions. This could be in the format of sectoral reviews or cross sector initiatives which synthesise the available evidence.

The use of sectoral reviews offers greatest value for activities which are typically undertaken in the same kind of environments and where the respective sub-activities are largely the same. The aggregates sector provides a good example of this, where the potential pressures on the marine environment are generally the same wherever this activity is proposed. Consequently the Marine Licence conditions associated with this sector are relatively standardised and only tailored to factor in site specific issues.

Examples of sectoral reviews include:

- Aggregates: numerous reports produced under the Marine Aggregate Levy Sustainability Fund (ALSF) (BMAPA website <http://www.bmapa.org/downloads/reference.php>);
- Power cables: Subsea Cable Interactions with the Marine Environment: Expert review and Recommendations Report (NIRAS Consulting, 2015);
- Offshore wind farms: Review of environmental data associated with post-consent monitoring of licence conditions of offshore wind farms (MMO, 2014); and
- Ports, NEW! DELTA - Ports and Nature, Striking a New Balance (<http://3b.nweurope.eu/page/projet.php?p=31&id=593>).

In addition, a number of protocols have been established, based on the outputs of formal and/or informal sectoral reviews. This leads to the establishment of good practice measures and a prior understanding of the Marine Licence conditions that are likely to be imposed. Where this understanding is established developers can plan for any associated requirements and the MMO can ensure a consistent approach is applied to condition setting.

Examples of such protocols include the Marine Aggregate Industry Protocol for the Reporting of Finds of Archaeological Interest (BMAPA and English Heritage, 2005); the Protocol for Archaeological Discoveries: Offshore Renewables Projects (The Crown Estate, 2014) and the statutory nature conservation agency protocol for minimising the risk of injury to marine mammals from piling noise (JNCC, 2010).

More widely, projects have been undertaken to substantiate the evidence base across multiple activity types for ecological receptors. Examples include the JNCC activities-pressures matrix³, sensitivity matrices (e.g. Tillin *et al*, 2010; APEM, 2014, FEAST⁴) and conservation advice prepared by Statutory Nature Conservation Bodies (SNCBs). The latter have looked to set thresholds against which levels of pressures are known to be of concern. The potential effects of a particular activity (or sub-activity) can then be better understood which further enables the setting of proportionate Marine Licence conditions, recognising that this will never remove the need for a site/case specific review for an individual project.

These projects have a less sectoral focus and recognise that many sub-activities are common to a number of activities. The pressures associated with these sub-activities are ultimately what are driving the requirement for Marine Licence conditions to protect sensitive ecological features. There is therefore merit in ensuring important lessons are transferred between sectors. In this context the importance of cross sectoral reviews should not be underestimated.

Going forward such cross sectoral reviews should focus on where the evidence base is weakest or where activities are known to have the greatest potential to result in significant adverse effects. In addition, greater effort is warranted where the frequency of occurrence of a particular sub-activity is likely to increase in the future or where technologies are still emerging. Example sub-activity pressure relationships which warrant particular attention therefore include:

- Mechanisms by which NIS are introduced and spread – where there are difficulties in assigning a specific route of transfer and the risks of subsequent environmental effects are potentially large;
- Sources of underwater and aerial collision risk – where there is currently relatively limited data and the frequency of occurrence could be expected to increase;

³ In 2013 the Joint Nature Conservation Committee (JNCC) compiled an activities-pressures matrix which has since been endorsed by the Healthy and Biologically Diverse Seas Evidence Group (HBDSEG) and the UK Marine Monitoring and Assessment Strategy (UKMMAS) pressures sub group.

⁴ <http://www.marine.scotland.gov.uk/FEAST/>

- Sources of underwater noise - where there is currently relatively limited data and the frequency of occurrence could be expected to increase;
- Effects of underwater noise – sensitivity thresholds and long term consequences of sub-lethal impacts (e.g. Temporary Threshold Shift and Permanent Threshold Shift) and effects of disturbance/displacement of birds, mammals and fish;
- Recoverability of sensitive habitats;
- Effects on socio-economic receptors such as fisheries and shellfisheries; and
- Cumulative effects.

The project phase with least information is decommissioning. However, it is not considered that sub-activities associated with this phase would be sufficiently different to other project phases to warrant specific investigation.

It is also important to maintain the evidence base in instances where post consent impact verification monitoring data demonstrates different effects to those predicted within the supporting assessments. It is particularly important to understand why such differences have occurred so that future assessments can be updated accordingly. Similarly if significant variation is observed, for example, if different effects are observed in different types of environment this also informs an important part of the evidence base.

One important aspect of the data that is generated through the Marine Licensing process is that it captures a wide range of receptors. This is particularly important for understanding the linkages between the physical, chemical and ecological environment. A considerable amount of data on the extent and intensity of socio-economic activities is also generated. This has further benefit in the understanding of impact pathways where it is important to understand the distribution of pressures (resulting from activities) in the context of the differing sensitivities of receptors.

The main limitation of such reviews is that they represent a snapshot in time and as such there is a need for ongoing update. It would therefore be appropriate to have defined review periods to keep the evidence base up to date. The timescales of such reviews will very much be dependent on the frequency with which new evidence becomes available.

All of these initiatives require an element of resource or funding. The reviews mentioned above have largely been undertaken by consultants paid for by Government, noting that considerable investment has also been made by SNCBs in the development of the evidence base. There has also been a series of funding initiatives such as Marine Aggregate Levy Sustainability Fund (MALSF), the Offshore Renewables Joint Industry Programme (ORJIP) and the UK Offshore Energy Strategic Environmental Assessment (OESEA) in which developers have subsidised specific research to inform the evidence base relating to their activities. If such funding requirements are met by developers there would need to be a demonstrable benefit over time through the reduction in assessment, mitigation and/or monitoring commitments where it is possible to do so. Where cross sectoral reviews are undertaken this presents additional funding challenges if developers are expected to contribute to these costs. In this context it may be possible to have a more generalised funding mechanism into which developers contribute.

Related to these initiatives, there are also examples of where strategic studies have been undertaken with the view to reducing the burden on individual applications. A recent example of this is the MAREAs where regional assessments of proposed aggregate extraction areas have been undertaken. The greatest advantage of regional assessments is perhaps that a considerable volume of data has already been collated and there is already an understanding of key issues. Similarly the physical processes assessments (including numerical modelling) have already been undertaken. It should be noted, however, that considerable assessment work is still required when aggregate companies apply for individual licences within these regions. There is also still a requirement for the collection of baseline benthic invertebrate data in advance of aggregate extraction.

Ultimately the better maintained the evidence base, the more possible it will be to set proportionate licence conditions recognising that the precautionary principle will always need to be applied where there is uncertainty. It is therefore important that the MMO and its advisors make full use of such evidence sources in the decision making process and setting Marine Licence conditions.

In addition to the evidence base highlighted above the value of the data to wider UK reporting should also be recognised. For the UK as a whole there are a number of requirements to collate and collect spatial data. The data collected as part of the Marine Licensing process could potentially contribute to the following initiatives:

- To inform statutory reporting on the condition of habitats and species (including condition assessments and Biodiversity 2020);
- State of the Environment Reporting (e.g. Marine Strategy Framework Directive, Water Framework Directive, OSPAR and Charting Progress); and
- To inform Marine Spatial Planning for example, through the update of base reference data layers relating to the physical, cultural and biological environment as well as the distribution of marine activities. This can also identify potential constraints and opportunities for future marine uses including development proposals.

To facilitate the use of the data, assuming it can be made more accessible, there would also be a need to increase potential user awareness (see below).

Knowledge sharing

There are already a number of established working groups which have been set up to promote knowledge sharing. These can range from internal mechanisms within organisations to large established working groups. It could be possible, for example, to set up workshops across the MMO licensing team where lessons learnt from individual projects are shared (assuming that this does not already happen). Similar practices are already demonstrated through forums such as conferences and professional membership organisations of which the full range of marine stakeholders are involved.

The importance of making the data collected via Marine Licensing more widely accessible has been highlighted throughout this report. For individual projects ESCs have been set up in which data and information is shared. On the Humber Estuary the remit of a group that was set up to review ongoing port development has now been expanded to encompass lessons learnt from habitat creation initiatives on the estuary. For real benefit to be gained from these processes lessons need to be disseminated more widely.

There are already a number of established industry bodies such as the ORJIP, Marine Aggregates Regulatory Advisory Groups and the British Marine Aggregates Producers Association (BMAPA) the European Subsea Cables Association (ESCA), British Ports Association (BPA), European Marine Energy Centre (EMEC), Renewables UK (RUK) and Marine Strategy Group. These groups have demonstrated success in sharing information and knowledge as well as agreeing working protocols with regulatory bodies. One such example is the RUK Cumulative Impact Assessment guidelines (RUK, 2013). It is important to recognise, however, that these groups operate at the level of industry representatives. It is therefore important that mechanisms are in place to share information more widely to ensure that all organisations have an opportunity to contribute to the evidence base.

One effective knowledge sharing mechanism is the development of detailed guidance through an iterative process. These typically take the format of an initial drafting of position papers which are then discussed at workshops prior to the finalisation of guidance. The RUK Cumulative Impact Assessment guidelines (RUK, 2013), for example, was developed using such an approach.

Those organisations that need to have an involvement in developing and maintaining the evidence base include industry sectors, regulators, technical advisors, SNCBs, NGOs, professional practitioners and academic institutions. The balance of who is involved varies depending on the activity, pressure or receptor, along with the specific gap in the evidence base that requires further exploration. Where specific reviews are undertaken it is recommended that these are progressed by those that have the best understanding of the associated issues and data.

In recent years, industry sectors have worked increasingly closely with MMO and others to examine the potential for applying objective information on the impacts of development to see if better approaches to work and good practices can be identified and applied. Members of SUDG, including ESCA, BMAPA, RUK, British Marine (BM) and others have all been involved in such exercises, but more could be done to collect these in a structured way to determine their wider applicability and to develop further programmes of work. A good example of this is the Green Blue environment programme⁵ which raises awareness, supports practical projects, runs bespoke outreach activities and offers easy to follow advice to make boating in the UK as sustainable as possible. In addition SUDG members are currently working with the MMO Licensing Improvement Programme to assist with the MMOs desire to make licensing more cost effective and a parallel approach with good practice could be extremely useful.

⁵ <http://thegreenblue.org.uk/>

Additionally, Natural England is finalising its conservation advice work to assist developers in scoping work in or near MPAs. This is based on an extensive collection and use of literature across a large range of marine activities to examine their potential impacts on marine habitats and species. It is envisaged that this work will greatly assist NE and developers in preparing and agreeing comprehensive scoping for activity in an objective way. Consequently, this should lead to greater proportionality and agreement on the whole of the assessment process, reducing timescales and the uncertainty mentioned above through raising new issues throughout the process. It is therefore recommended that the MMO seeks greater linkage with both SUDG and Natural England on the application of both the conservation advice work and the development and application of good practice.

All of the activities listed above have costs associated with them. Therefore in order for such initiatives to be successful there will need to be demonstrable benefits through time. Similarly it is important for developers to understand how the data they have collected has been used and as such a feedback or dissemination exercise could be used to demonstrate this.

The review of Marine Licences did not identify any obvious evidence of linkages to respective conditions set by the local planning authority/other devolved administrations. There is therefore the potential for greater knowledge sharing between local planning authorities and the respective marine regulators across the devolved administrations. This recognises the importance of information sharing and learning across administrative boundaries where many of the issues encountered will be the same. This could be best achieved through wider membership of stakeholder working groups or more pro-active dissemination of evidence when it becomes available.

Conclusions and Recommendations

This project has incorporated a review of 700 Marine Licences in which 479 different conditions were identified. A summary of the main findings and recommendations from this review are presented below. The evidence submitted in support of the Marine Licence applications was in a range of formats dependent on the scale of the project and the required supporting assessments.

The conditions could be assigned to a project phase, receptor and the requirement for post consent monitoring. The majority of Marine Licence conditions encountered were applicable to the construction phase with very few relating to decommissioning. The main drivers for Marine Licence conditions can be summarised as:

- Notification;
- Detailed plan submission; and
- Mitigation; and
- Survey and monitoring.

Over time there has been improved consistency in the wording of the Marine Licence conditions. There has also been a greater shift to ensuring proportionality and evidence based decision making in discussion with applicants. The reasons for conditions being set is generally clear and it is acknowledged that the precautionary principle will always need to be applied where uncertainty remains.

To further promote consistency in the setting of licence conditions the following recommendation is made.

- Recommendation (1) – Maintain a standardised register of bespoke Marine Licence conditions according to set parameters (e.g. activity, sub-activity, receptor, condition; and reason for condition. This will allow for greater consistency going forward.

Large volumes of data are generated through survey and monitoring throughout the Marine Licensing process. It is currently unclear where this data is stored and there are concerns that it is not used to feedback into subsequent projects particularly given the often large sums of money that are involved. Concerns have also been raised that monitoring requests are not always warranted and can be too research focused.

- Recommendation (2) – Ensure requests for monitoring are hypothesis driven and that the rationale for monitoring is understood and communicated.
- Recommendation (3) – Ensure data is made more available, the use of a standardised approach for developers to report to the MMO could assist with this.

Overall, the information generated through the marine licensing process is not readily available for updating the evidence base to inform both future assessments and condition setting. To make better use of these information sources a number of

modifications are required. This includes updating how information is handled at the point of data entry (including both applications and post consent) which will facilitate greater search functionality. There also needs to be an update to the search functionality within MCMS to facilitate data retrieval. This could include map based searches and the use of key words and filtering. Wider opportunities also exist to link to other related data management systems

- Recommendation (4) – Undertake an IT feasibility study to consider wider opportunities for developing MCMS and linkages to other systems.

It is important to derive as much benefit as possible from the large body of evidence that is generated through the Marine Licensing process. Greatest benefit may be derived from a combination of sectoral and cross-sectoral reviews where there are similar sub-activities and similar geographic areas/physical conditions.

- Recommendation (5) – Ensure evidence is reviewed to inform future Marine Licensing.
- Recommendation (6) – Collation of the evidence base should centre on both sectoral and cross sectoral learning. Mechanisms for funding initiatives would need to be explored.
- Recommendation (7) – Future effort should focus on gaps in the evidence base, the most notable of which include:
 - Mechanisms by which NIS are introduced and spread – where there are difficulties in assigning a specific route of transfer and the risks of subsequent environmental effects are potentially large;
 - Sources of underwater and aerial collision risk – where there is currently relatively limited data and the frequency of occurrence could be expected to increase;
 - Sources of underwater noise - where there is currently relatively limited data and the frequency of occurrence could be expected to increase;
 - Effects of underwater noise – sensitivity thresholds and long term consequences of sub-lethal impacts (e.g. Temporary Threshold Shift and Permanent Threshold Shift);
 - Effects of disturbance/displacement of birds, mammals and fish;
 - Recoverability of sensitive habitats;
 - Effects on socio-economic receptors such as fisheries and shellfisheries; and
 - Cumulative effects.

It is important that all information that is generated through these processes is shared. This could take the format of internal knowledge sharing within MMO, ESCs for individual projects or more wide ranging industry and/or stakeholder working groups. There are also wider opportunities for linking to cross border planning, both terrestrially and the devolved administrations.

One effective knowledge sharing mechanism is the development of detailed guidance through an iterative process. These typically take the format of an initial drafting of position papers which are then discussed at workshops prior to the

finalisation of guidance. Those organisations that need to have an involvement in developing and maintaining the evidence base include industry sectors, regulators, technical advisors, SNCBs, NGOs, professional practitioners and academic institutions.

- Recommendation (8) – Make best use of, and expand on the principles of, existing working groups, incorporating the full range of stakeholders.

The costs and resources required for such initiatives means that there will need to be demonstrable benefits over time through the reduction in assessment, mitigation and/or monitoring commitments where it is possible to do so.

References

ABPmer (2015a). Validating an Activity-Pressure Matrix. ABP Marine Environmental Research Ltd, Report R. 2435

ABPmer (2015b). Developing the Evidence Base for Impact Assessments for Recommended dSACs and dSPAs Appendix B: Context for Marine Activities and Proposed Assessment Methods for dSACs. ABP Marine Environmental Research Ltd, Report R.2462 for Joint Nature Conservation Committee.

ABPmer, (2015c). A Review of Access to Industry Environmental Data,. A report produced by ABP Marine Environmental Research Ltd for Productive Seas Evidence Group, November 2015.

ABPmer (2011). Quantifying the Potential Impact of a Marine Conservation Zone (MCZ) Network on the Deployment of Offshore Renewables. ABP Marine Environmental Research Ltd, Report R.1763 for Department of Energy and Climate Change.

APEM (2014). Designing and applying a method to assess the sensitivities of highly mobile marine species to anthropogenic pressures. Natural England Commissioned Reports, Number 213.

BMAPA and English Heritage (2005). Protocol for reporting finds of archaeological interest. August 2005.

JNCC (2010). Statutory nature conservation agency protocol for minimising the risk of injury to marine mammals from piling noise. August 2010.

NIRAS Consulting (2015). Subsea cable interactions with the marine environment. Expert review and recommendations report. A report for the Renewables Grid Initiative. December 2015.

Marine Planning Consultants, ABPmer and Peter Barham Environmental (2013). A review of private and public sector marine science and evidence needs, the capability of the UK's private sector marine science and technology sector to meet or support the meeting of those needs, and opportunities for growth.

MMO (2014). Review of post-consent offshore wind farm monitoring data associated with licence conditions. A report produced for the Marine Management Organisation, pp 194. MMO Project No: 1031. ISBN: 978-1-909452-24-4.

RUK (2013). Cumulative Impact Assessment Guidelines – Guiding Principles for Cumulative Impacts Assessment in Offshore Wind Farms.

The Crown Estate (2014). Protocol for Archaeological Discoveries: Offshore Renewables Projects. Published by Wessex Archaeology, Salisbury, on behalf of The Crown Estate.

Tillin, H.M., Hull, S.C., Tyler-Walters, H. (2010). Development of a Sensitivity Matrix (pressures-MCZ/MPA features). Report to the Department of Environment, Food and Rural Affairs from ABPmer, Southampton and the Marine Life Information Network (MarLIN) Plymouth: Marine Biological Association of the UK. .Defra Contract No. MB0102 Task 3A, Report No. 22.

Abbreviations

ALSF	Aggregate Levy Sustainability Fund
API	Application Programming Interface
BM	British Marine
BMAPA	British Marine Aggregate Producers Association
BPA	British Ports Association
DAC	Data Archive Centre
dSAC	Draft Special Area of Conservation
ECoW	Ecological Clerk of Works
EIA	Environmental Impact Assessment
EMEC	European Marine Energy Centre
EMMP	Environmental Management and Monitoring Plan
ESC	Environmental Steering Committees
ESCA	European Subsea Cables Association
FEAST	Food and Environment Assessment Study
GDS	Government Digital Service
GEMINI	GEo-spatial Metadata INteroperability Initiative
GI	Geographic Information
GIS	Geographic Information System
HBDSEG	Healthy and Biologically Diverse Seas Evidence Group
HRA	Habitats Regulations Assessment
INSPIRE	INfrastructure for SPatial InfoRmation in Europe
JNCC	Joint Nature Conservation Committee
MALSF	Marine Aggregate Levy Sustainability Fund
MAREA	Marine Aggregate Regional Environmental Assessment
MCMS	Marine Case Management System
MCZ	Marine Conservation Zone
MDE	Marine Data Exchange
MEDIN	Marine Environmental Data and Information Network
MIS	Marine Information System
MMO	Marine Management Organisation
MPA	Marine Protected Areas
NIS	Non-indigenous species
NRA	Navigational Risk Assessment
OESEA	Offshore Energy Strategic Environmental Assessment
ORJIP	Offshore Renewables Joint Industry Programme
OSPAR	The Convention for the Protection of the Marine Environment of the North-East Atlantic
PCM	Post Consent Monitoring
RUK	Renewables UK
SNCB	Statutory Nature Conservation Body
SPA	Special Protection Areas
SUDG	Seabed users Development Group
TCE	The Crown Estate
UK	United Kingdom
UKHO	UK Hydrographic Office
UKMMAS	UK Marine Monitoring and Assessment Strategy
WaFD	Waste Framework Directive
WFD	Water Framework Directive

Appendix A

1.	Name	
2.	Organisation	
3.	Marine Licence Number (if your feedback is in response to a specific licence)	
4.	What were the main drivers for any conditions that were imposed?	
5.	Was the evidence requested as part of the Marine Licence application process appropriate to the proposal in your view? If not, why not?	
6.	Were the conditions and mitigations applied to the licence, in your view, necessary, appropriate and proportionate?	
7.	If no – why not?	
8.	Were the conditions/ restrictions/ mitigation measures site specific, generic or both?	
9.	Do you feel that commonly applied conditions are not warranted or overly onerous? If yes please provide examples and supporting justification.	
10.	Was there a requirement for Post Consent monitoring and reporting?	
11.	What was the timescale associated with monitoring?	
12.	If monitoring was required, was the data reported back to the MMO?	
13.	What was the overall cost of the project for which a licence was required?	
14.	Are you able to put a cost to the work required to gain the licence – if so, what was the cost?	
15.	What proportion of these costs can be attributed to:	
	a. Mitigation	
	b. Restrictions (including timing)	
	c. Monitoring	
16.	Which of the conditions and / or restrictions imposed had the biggest impact (both financial/time) on your project?	
17.	Do you know if the results of monitoring were used by MMO to provide guidance for other similar applications?	