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Environmental impact assessment for offshore renewable energy projects – Guide

Innovate UK
Technology Strategy Board

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Foreword

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The PD process enables a guide to be rapidly developed in order to fulfil an immediate need in industry. A PD can be considered for further development as a British Standard, or constitute part of the UK input into the development of a European or International Standard.

Use of this document

As a guide, this PD takes the form of guidance and recommendations. It should not be quoted as if it were a standard and claims of compliance cannot be made to it.

Presentational conventions

The guidance in this standard is presented in roman (i.e. upright) type. Any recommendations are expressed in sentences in which the principal auxiliary verb is "should".

Spelling conforms to *The Shorter Oxford English Dictionary.* If a word has more than one spelling, the first spelling in the dictionary is used.

Contractual and legal considerations

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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Innovate UK statement

Innovate UK – the new name for the Technology Strategy Board – is the UK's innovation agency. We fund, support and connect innovative businesses to accelerate sustainable economic growth.

Timely, consensus-based use of standards plays a vital role in ensuring that the knowledge created in the UK's research base is commercialized and brought to market as well as playing an important role in driving innovation.

Innovate UK is working with BSI, the Research Councils and Catapults to establish new standards earlier in the development of new technologies. We are collaborating in four areas of innovation to define standards that will accelerate the development of technologies and services to provide UK businesses with a competitive "first mover advantage" including the subject of this document; offshore renewable energy.

The UK offshore renewable energy sector (ORE) is rightly recognized as a centre for expertise but, with only a small number of original equipment manufacturers (OEMs), installations thus far have been designed to meet the bespoke needs of these OEMs. If the sector is to act as a platform for the UK to provide global leadership in ORE manufacturing and services, it needs to be more open. This will in turn boost the security of supply, stimulate further innovation, create UK jobs, and attract further inward investment. Realising this potential is crucial to meeting the UK government's 2020 renewable energy targets and delivering low-carbon future at the lowest price to consumers.

In 2011, the UK government published the first national Renewable Energy Roadmap which sought to unlock this vast potential, and specifically recognized that one of the barriers to increased deployment of renewable energy is the high cost of market entry. In 2012 the Offshore Wind Cost Reduction Task Force specifically recommended the creation of standards as an important step towards reducing the cost of offshore energy.

Creating the appropriate offshore renewable energy knowledge infrastructure – based on the development of industry-led codification of good practice – will help drive down the costs of market entry and foster an environment of collaboration which can secure the UK's global dominance both in terms of technological innovation and deployment.

Through its energy programme, Innovate UK is working to help UK industry profit from the changes the world will have to make to address the "trilemma" of energy security, affordability and sustainability.

Read more about our plans in offshore renewable energy and other energy areas here: **https://www.gov.uk/government/publications/energy-strategy-2012-to-2015**.

Innovate UK also established the Offshore Renewable Energy Catapult to accelerate innovation in the sector - find out more here: **https://ore.catapult.org.uk/**.

Read more about Innovate UK and our plans in energy and other areas here: **www.innovateuk.gov.uk or contact support@innovateuk.gov.uk**.

Introduction

The UK Government and devolved administrations are committed to a significant expansion in electricity generation from renewable energy sources, including offshore renewable energy (ORE). This will be dependent on the implementation of a large number of ORE schemes within the marine environment. All of these schemes will be subject to rigorous consenting regimes as established by national legislation in the UK devolved administrations including the requirement to undertake environmental impact assessment (EIA) for their individual projects, where required.

The requirement to carry out EIA, a process to predict the environmental consequences of proposed works prior to consenting, stems from the EC Environmental Impact Assessment Directive (2011/92/EU) [1]. The directive was recently amended – (2014/52/EU) [2] – and entered into force on 15 May 2014 with a requirement for member states to implement the revised directive by 16 May 2017. The revised directive is designed to reduce the level of administrative burden and improve the level of environmental protection, with a view to making business decisions on public and private investments more sound, more predictable and sustainable in the longer term.

The EIA process requires a number of steps to be undertaken to assess the potentially significant effects associated with a particular project (and the effects that might occur cumulatively with other plans and projects). These steps include screening, scoping and the preparation of an environmental statement (ES). In England and Wales, for nationally significant infrastructure projects (NSIPs) granted permission under the Planning Act 2008, there is an additional step: the preparation of preliminary environmental information (PEI) prior to the submission of the formal ES. It is worth emphasizing that EIA is not simply a legislative requirement in order to gain consent, but an iterative and interactive process which can influence project design and delivery to secure sustainable development.

A number of issues have been experienced by developers throughout the EIA process for ORE projects in recent years. This has been attributed to processes associated with obtaining consents and inherent challenges and uncertainties associated with understanding the environmental effects of emerging technologies operating in the marine environment. Particular challenges related to ORE projects include the often large-scale nature of such schemes and the extensive data needed to inform the assessment process.

The aim of this Published Document (PD) is to provide advice that will improve the quality and cost-efficiency of future EIAs for ORE projects (specifically for offshore wind, wave and tidal stream renewable energy projects) whilst remaining consistent with legal and policy requirements. The recommendations are also designed to be future-proof, as far as possible, in the context of emerging policies such as marine planning. The PD acknowledges the differing requirements across the UK-devolved administrations where appropriate. Many of the principles contained within this PD are also applicable to EIA across all marine sectors.

The PD considers both process and topic/receptor issues and is focussed on issues where it can add most value. Key information sources that have been used to develop the PD, including the development of recommendations for best practice, include:

a) Existing EIA and ORE guidance documents (Annex A);
b) The ES and associated planning documents for previous and on-going EIAs for ORE developments. A range of projects were selected to incorporate a number of technologies, proposers and geographic locations;
c) Telephone interviews with a number of stakeholders that have had direct involvement with the consenting of ORE projects; and
d) A workshop with industry stakeholders (representatives from BSI Standards Limited, ABP Marine Environmental Research Ltd (ABPmer), 2 competent authorities, 10 developers (proposers), 1 UK government technical advisory body, 1 academic institute and 1 research centre) to discuss issues of concern and explore the degree of consensus on these issues.

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1 Scope

This Published Document (PD) gives guidance on undertaking environmental impact assessments (EIAs) for offshore wind, wave and tidal stream renewable energy projects.

The PD focusses on the main component of the offshore renewable energy (ORE) project (as opposed to the supporting infrastructure) and covers all elements of the EIA process:

a) screening;
b) scoping;
c) preliminary environmental information (PEI);
d) determining environmental impacts;
e) environmental statement (ES);
f) mitigation and monitoring plans; and
g) consultation and communication.

The PD identifies linkages to wider consenting requirements associated with offshore wind, wave and tidal stream renewable energy projects. The PD does not provide specific guidance on the processes associated with each of these additional requirements.

The intended audience of the PD is all those that have a role in the consenting of ORE projects (e.g. competent authorities, proposers and consultation bodies).

2 Terms, definitions and abbreviations

2.1 Terms and definitions

For the purposes of this PD, the following terms and definitions apply.

2.1.1 competent authority

authority which determines the application for consent, permission, licence or other authorization to proceed with a proposal

NOTE *It is the authority that must consider the environmental information before granting any kind of authorization.*

2.1.2 proposer

parties which have a role in preparing and submitting the required documentation to the **competent authority** (see **2.1.1**) at all stages in the EIA process

NOTE *This includes both developers and their consultants.*

2.1.3 statutory consultation body

any recognized body specified in the relevant EIA regulations with which the **competent authority** (see **2.1.1**) must consult in respect of an ES, and having a duty to provide information and advice during the EIA process

2.2 Abbreviations

For the purposes of this PD, the following terms and definitions apply.

ABPmer	ABP Marine Environmental Research Ltd
AONB	area of outstanding natural beauty
BMAPA	British Marine Aggregate Producers Association
Cefas	Centre for Environment, Fisheries and Aquaculture Science
CIA	cumulative impact assessment
DCLG	Department for Communities and Local Government
DCO	development consent order
DECC	Department of Energy and Climate Change
Defra	Department for Environment, Food and Rural Affairs

DETI	Department of Enterprise, Trade and Investment (Northern Ireland)
DML	deemed marine licence
DoENI	Department of the Environment Northern Ireland
EIA	environmental impact assessment
EMMP	environmental management and monitoring plan
EPS	European protected species
EQS	environmental quality standard
ES	environmental statement
ESC	environmental steering committee
HRA	habitats regulations assessment
JNCC	Joint Nature Conservation Committee
MCA	Maritime and Coastguard Agency
MEDIN	Marine Environmental Data and Information Network
MFOWDG	Moray Firth Offshore Wind Developers Group
MMO	Marine Management Organisation
MPA	marine protected area
MSFD	Marine Strategy Framework Directive [3]
MS-LOT	Marine Scotland Licence and Operations Team
NGO	non-governmental organization
nm	nautical mile
NRW	Natural Resources Wales
NSA	national scenic area
NSIP	nationally significant infrastructure project
ORE	offshore renewable energy
OWF	offshore wind farm
PD	published document
PEI	preliminary environmental information
PINS	The Planning Inspectorate
RUK	RenewableUK
SAC	special area of conservation
SEA	strategic environmental assessment
SEAD	Strategic Environmental Assessment Directive [4]
SEPA	Scottish Environment Protection Agency
SOCC	statement of community consultation
SPA	special protection area
SNH	Scottish Natural Heritage
WFD	Water Framework Directive [5]

3 Overview of the environmental impact assessment (EIA) process and linkages to consenting requirements

3.1 EIA legislation

The 2011/92/EU EIA Directive [1] sets out the procedure that must be followed before approval is granted for a range of plans and projects, defined in Annexes I and II of the Directive. Annex I projects are considered to have significant effects on the environment and EIA is mandatory. However, the potential for significant effects on the environment as a result of Annex II projects, and thus whether an EIA is required, is at the discretion of the competent authority, having regard to criteria set out in Annex III of the Directive. ORE projects are likely to fall within Annex II.

The EIA Directive is transposed into UK law through a series of regulations. The EIA regulations which apply to a particular development are dependent on project type and location. Those regulations that are most likely to apply to ORE schemes are summarized in Table 1. In circumstances where more than one set of EIA regulations apply to an ORE development the most stringent requirements should be adhered to. The requirements of each of the respective regulations are sufficiently similar that the recommendations made throughout this PD are applicable across all ORE projects that require an EIA (regardless of the specific regulations that apply). The main exception to this is nationally significant infrastructure projects (NSIPs) in England and Wales which are subject to a different approval process. Despite the difference in the overall consenting regime, the key steps in the EIA process for NSIPs still remain largely the same and differences have been described separately where applicable.

A revised EIA Directive (2014/52/EU [2]) came into force on 15 May 2014. Member states are required to transpose the Directive into national laws by 16 May 2017. The revised Directive introduced a number of changes to the existing EIA Directive. Where relevant, these changes are highlighted in this PD.

Table 1 – EIA Regulations

Regulations	Application
The Marine Works (EIA) Regulations 2007 (as amended) [6].	Scotland, England, Wales, Northern Ireland.
The Town and Country Planning (EIA) Regulations 2011 [7].	England.
The Town and Country Planning (EIA) (England and Wales) Regulations 1999 [8].	Wales.
The Town and Country Planning (EIA) (Scotland) Regulations 2011 [9].	Scotland.
The Planning (EIA) Regulations (Northern Ireland) 2012 [10].	Northern Ireland.
The Electricity Works (EIA) (England and Wales) Regulations 2000 [11].	England, Wales.
The Electricity Works (EIA) (Scotland) Regulations 2000 (as amended) [12].	Scotland.
The Offshore Electricity Development (Environmental Impact Assessment) Regulations (Northern Ireland) 2008 [13].	Northern Ireland.
The Harbour Works (EIA) Regulations 1999 [14].	Scotland, England, Wales.
The Harbour Works (EIA) Regulations (Northern Ireland) 2003 [15].	Northern Ireland.
Infrastructure Planning (Environmental Impact Assessment) Regulations 2009 (as amended) [16].	England, Wales (NSIPs).

3.2 EIA process

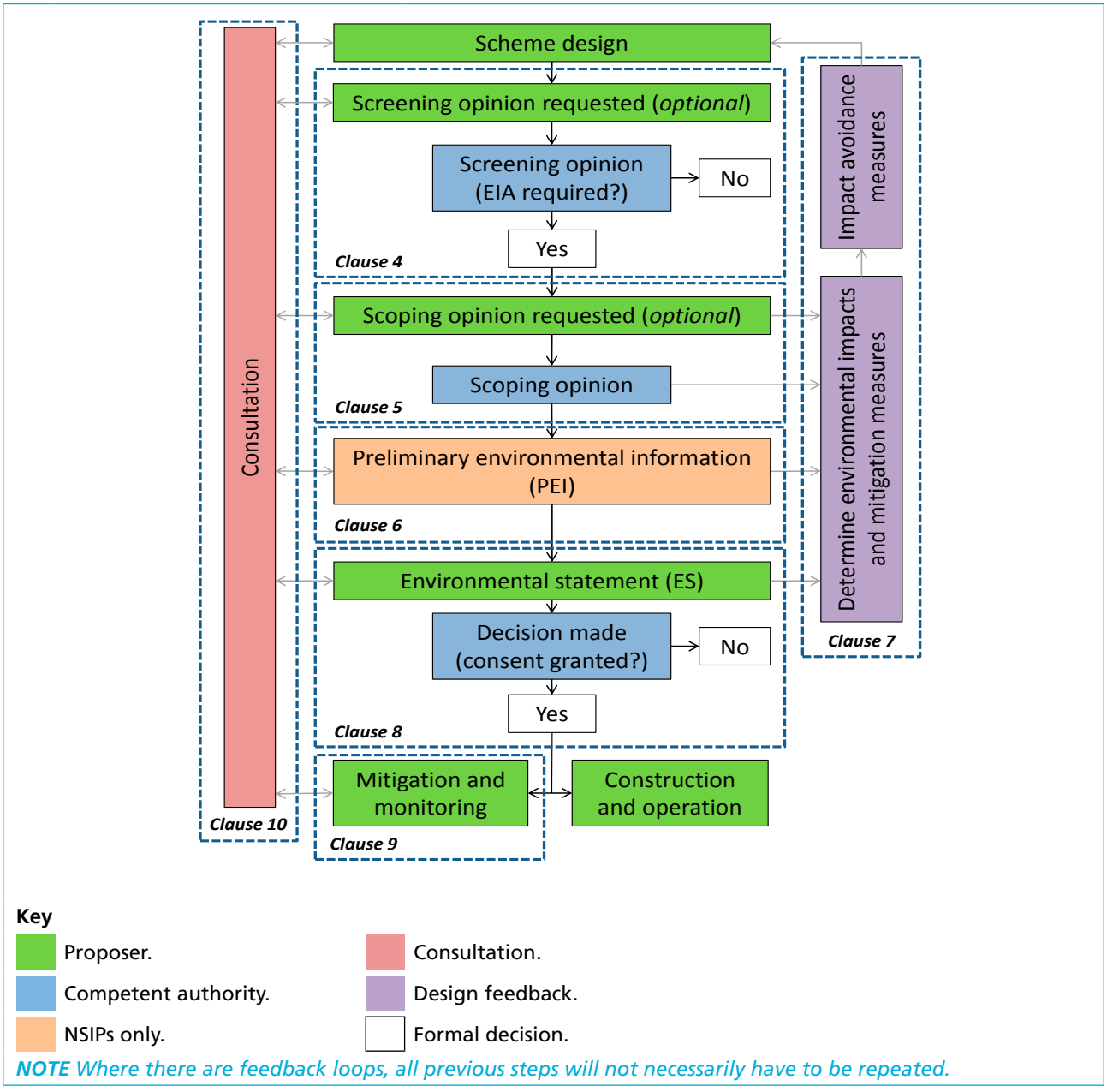
A wide range of EIA guidance, including guidance specifically for ORE projects, is already available. Such guidance includes guidance on the overall EIA process as well as on specific aspects (see Annex A). Scottish Natural Heritage (SNH), for example, has produced a comprehensive handbook on EIA which aims to provide competent authorities, statutory consultation bodies and any other interested party with guidance about the whole process [17].

Marine Scotland has produced a *Licensing and Consents Manual* (draft) [18] which provides guidance on the stages and levels of assessment required in support of marine licences and section 36 consents [19] in Scotland.

An online resource providing a range of planning practice guidance, including considerations for EIA which should be complied with, is available as part of the National Planning Policy Framework for England (*http://planningguidance.planningportal.gov.uk*). In addition, the Planning Inspectorate (PINS) has prepared guidance on the requirements and preparation of screening, scoping and preliminary environmental information (PEI) within the EIA process [20].

***NOTE** A schematic of how each of the elements of an EIA fit together is provided in Figure 1.*

Figure 1 – EIA process



***NOTE** Where there are feedback loops, all previous steps will not necessarily have to be repeated.*

3.3 EIA and consenting

The various consenting regimes for ORE projects across the UK devolved administrations establish a number of competent authorities for authorizing ORE developments (see Figure 2). These competent authorities also have responsibility for ensuring that the requirements of the EIA Directive are met prior to granting authorization for ORE projects.

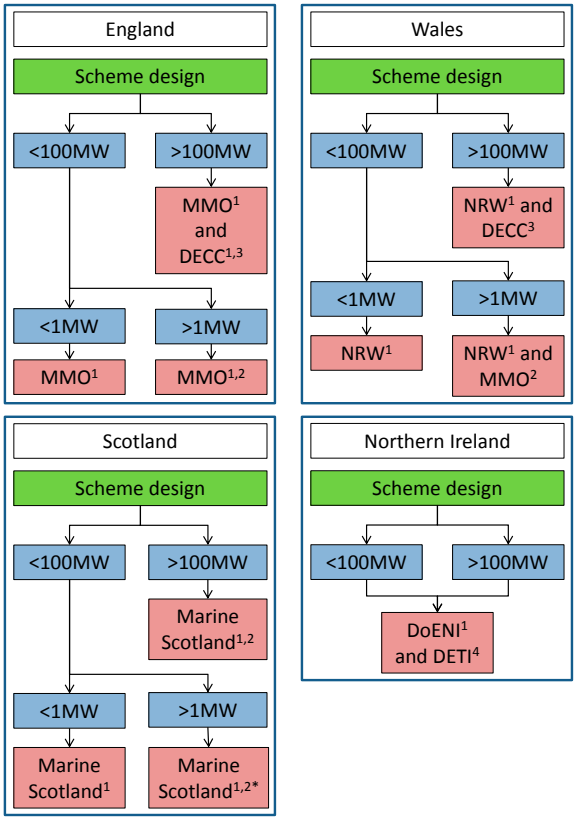
The Coastal Concordat is a formal mechanism in the consenting of coastal developments in England where, due to the adjacent terrestrial and marine elements of a project, several regulatory bodies are deemed to have a functioning role. The concordat facilitates the identification of the lead competent authority, forming an agreement between the relevant regulatory bodies and coastal local planning authorities.

***NOTE** Not all local planning authorities are signed up to the Coastal Concordat but where the Marine Management Organisation (MMO) are the competent authority their aim is to work to its principles.*

A marine licence is required under the Marine and Coastal Access Act 2009 [21], the Marine (Scotland) Act 2010 [22] and the Marine Act (Northern Ireland) 2013 [23]. Section 36 consents are a requirement under the Electricity Act 1989 [19] for projects >1 MW capacity, except for projects <50 MW when >12 nm from the coast within Scottish offshore waters (see Figure 2). Development Consent Orders (DCOs) were introduced in the Planning Act 2008 [24] to replace Section 36 consents for major infrastructure projects in England and Wales, which includes offshore generating stations >100 MW, and these can include a deemed marine licence (DML). Article 39 consent is a pre-construction requirement for certain developments in Northern Ireland, including generating stations, under The Electricity (Northern Ireland) Order 1992 [25].

***NOTE** A schematic of competent authorities for the main works is provided in Figure 2. This includes the MMO, Department of Energy and Climate Change ("DECC"), Natural Resources Wales ("NRW"), Marine Scotland, Department of the Environment Northern Ireland ("DoENI") and the Northern Ireland Department of Enterprise, Trade and Investment ("DETI"). However, associated works may fall under different governance.*

Figure 2 – Competent authorities and consenting requirements



Key

1 Marine license.

2 Section 36 consent.

3 Development consent order.

4 Article 39 consent.

* Only projects >50 MW require section 36 consent when >12 nm from the coast within Scottish offshore waters.

3.4 EIA consenting and other EU Directives

The consenting of ORE projects is subject not only to the requirements of the EIA EU Directive [1], but also to the requirements of a number of other EU Directives. Where there is some overlap in the requirements of these Directives, these should be co-ordinated to avoid the duplication of resources. Of most relevance are the Habitats Directive (92/43/EEC) [26] and Wild Birds Directive (2009/147/EC) [27] (where there is likely to be significant overlap in terms of data and survey requirements), Water Framework Directive (WFD) (2000/60/EC) [5], Marine Strategy Framework Directive (MSFD) (2008/56/EC) [3] and the Strategic Environmental Assessment (SEAD) Directive (2001/42/EC) [4].

The Habitats Directive [26] (on the conservation of natural habitats and of wild fauna and flora) aims to promote the conservation of biodiversity by requiring EU Member States to preserve or improve (restore) natural habitats and wild species, listed in Annexes, at a "favourable conservation status". It also affords protection to those habitats and species of European importance.

The Wild Birds Directive [27] provides a framework for the conservation and management of, and human interactions with, wild birds in Europe. It sets broad objectives for a wide range of activities, although the precise legal mechanisms for their achievement are at the discretion of each member state.

The WFD [5] establishes a framework for the management and protection of Europe's water resources. The overall objective of the WFD is to achieve "good ecological and good chemical status" in all inland and coastal waters by 2015 unless alternative objectives are set or there are grounds for time limited derogations. There is also a general "no deterioration" provision to prevent decline in status. The WFD specifically relates to improving and protecting the chemical and biological status of water bodies to one nautical mile (nm) from the territorial baseline in England, Wales and Northern Ireland and three nms in Scotland.

The MSFD [3] aims to protect more effectively the marine environment across Europe. It aims to achieve "good environmental status" of marine waters by 2020 and to protect the resource base upon which marine-related economic and social activities depend. It enshrines in a legislative framework the ecosystem approach to the management of human activities having an effect on the marine environment, integrating the concepts of environmental protection and sustainable use. The MSFD [3] constitutes the vital environmental component of future maritime policy, designed to achieve the full economic potential of oceans and seas in harmony with the marine environment.

The SEAD [4] applies to a wide range of public plans and programmes (e.g. on land use, transport, energy, waste, agriculture, etc.) and assesses the environmental effect of that plan/programme. The objectives of the SEAD [4], as set out in Article 1, are to provide a high level of protection to the environment and to contribute to the integration of environmental considerations into the preparation and adoption of plans and programmes with a view to promoting sustainable development.

NOTE *Linkages to the wider requirements of these directives have been provided within the PD where appropriate.*

4 Screening

4.1 General

Screening is an optional process whereby the proposer can seek to confirm whether or not an EIA is required for a proposed development. It allows the proposer to consider, and document through preparation of a screening report, the anticipated potentially significant effects of the development. Subsequently, the proposer can request a screening opinion from the competent authority as to whether an EIA will be required before submitting an application for consent. Therefore, screening represents the first formal consultation stage in the EIA process. If a screening request is not submitted the competent authority still screens any submitted application to ensure that the EIA Directive [1] has been complied with. If a proposer wrongly assumes that an EIA is not required the respective competent authority requests that screening is undertaken prior to further considering any submitted application.

4.2 Screening report and screening opinion

The proposer should provide sufficient information in the screening report to enable the competent authority to make a well informed judgement as to whether a proposed development requires EIA. The consensus from available ORE guidance and relevant EIA regulations suggests the following information should be presented in the screening report:

a) description of the development, including device design, mooring method and foundation type;
b) size of the development (offshore and onshore requirements), including potential worst case size of individual components if known at this stage (e.g. monopole size, blade length);
c) area(s) under consideration for development;
d) an indication of potentially significant effects on the environment (acknowledging that only high level information likely to be available at this stage);
e) relevant maps, plans, charts and/or site drawings;
f) an idea of timescale and duration of the development;
g) summary of all discussions already held with advisors, consultees and stakeholders;
h) any other information that the proposer may wish to provide; and
i) any specific queries.

Based on the information presented in the screening report, it is the responsibility of the competent authority to consider the applicant's proposal and determine whether or not an EIA is required. Once a decision has been made, it is also the competent authority's responsibility to provide the proposer with the following information, by way of a written screening opinion within an agreed timeframe:

a) whether or not an EIA is required;
b) information on any specific sensitivity at the planned site(s); and
c) any other information deemed appropriate.

If the screening opinion concludes that an EIA is required, the proposer should progress to scoping (see **Clause 5**).

If the screening opinion concludes that an EIA is not required, the proposer should be advised by the competent authority if or what information/studies will be required to support consent applications for the proposed development.

4.3 Recommendations

Only a limited number of issues have been identified with the screening phase of ORE projects and, as such, existing guidance is considered adequate to define the requirements of this stage. In practice, a formal screening process is not frequently undertaken as the requirement for EIA is already recognized by the proposer, particularly for large-scale developments. However, for smaller developments, determining whether EIA is required can be unclear and is ultimately based on a judgement made by the competent authority. It is therefore important that the competent authority provides a clear rationale and consistency when considering whether or not an EIA is required for a particular development.

When presenting information on the project at the screening stage it is unlikely that the scheme design and the associated construction methodology will have been finalized. In such instances, a design envelope can

be used to consider the worst case scenario (see **5.3.3** for more details). A comprehensive audit trail should therefore be maintained, which includes the basis (and assumptions) on which decisions have been made.

This PD focusses on the main component of the ORE project (as opposed to the supporting infrastructure). This presents issues for ORE projects which often include terrestrial components (where they link to the electricity grid) that can be licensed separately and are beyond the control of the ORE proposer. Uncertainty surrounding the export cable route and landfall has resulted in some projects submitting a separate and subsequent application for these works. In such instances, the proposer should be clear on what permissions are being applied for, and which are not. These wider project elements can result in delays to the overall consenting process.

***NOTE** This does not preclude the requirement (attention is drawn to the EIA Directive [2]) to treat the project as a whole, so that all related works or activities are considered together as a single project.*

The proposer should begin to consider the wider contextual requirements of the development site at this stage, such as the WFD [5], habitats regulations assessment (HRA) and the proximity of nationally and internationally-designated marine protected areas (MPAs) as well as scenic designations such as areas of outstanding natural beauty (AONBs) and national scenic areas (NSAs). In addition, early consideration should be made for trans-boundary issues, where applicable. There are also typically a wider range of permissions and licences that will be required to support an ORE development. Where possible, the proposer should seek agreement on these requirements with the competent authorities at this early stage which can assist with the identification of overlapping requirements. This can ultimately help to avoid delays to the programme and potentially result in cost savings.

***NOTE** HRA is typically referred to as habitats regulations appraisal in Scotland.*

The proposer should begin communication with the competent authority, associated statutory consultation bodies and other interested parties at an early stage (see **Clause 10** for details on the consultation process). In particular, the proposer should engage in consultation with the competent authority to establish and agree the main issues associated with the development and expectations in relation to the screening report; this exercise is commonly referred to as pre-screening. A clear audit trail should be maintained by both the competent authority and the proposer to ensure that the project is founded on a common understanding.

5 Scoping

5.1 General

As with screening, scoping is an optional phase in the EIA process but is strongly encouraged by the competent authorities. However, unlike screening, scoping assumes an EIA is required prior to consent being granted for a proposed development. The requirement for an EIA will have been determined by either a screening opinion that has been issued by the respective competent authority (where requested) or the previous experience and understanding of the proposer.

The proposer should submit a scoping request typically in the form of a scoping report, and subsequently request a scoping opinion from the competent authority. The competent authority should consider the suitability of the proposed assessment methodology and quantity/quality of data to be collected. Scoping also provides the opportunity to document any held/planned engagement with consultees and stakeholders as part of a wider project audit trail. The key benefit of undertaking scoping is an early understanding of the potential requirements associated with a particular scheme by all parties.

5.2 Scoping report and scoping opinion

5.2.1 General

Scoping is a key phase of the EIA process, providing an opportunity for the proposer to identify those potentially significant environmental effects that should be considered for further assessment. The scoping reports should clearly state, i.e. provide robust evidence to demonstrate, why a particular impact will be scoped in or out of the EIA where possible; this should also be summarized in the ES.

5.2.2 Data requirements

The scoping phase should confirm the data and information sources (including survey requirements) and assessment methods that will be used, determined through consultation between the proposer and the competent authority. In practice, there is rarely enough marine wildlife data available (e.g. birds, mammals and fish) to enable determination of potential environmental effects and, therefore, surveys are likely to be required. Surveys are typically required to cover extended periods, making it essential that project planning factors in these time and cost implications. Scoping should also include consideration of whether there are any specific data standards (e.g. Marine Environmental Data and Information Network (MEDIN) standards) that need to be complied with.

The Marine Scotland Licence and Operations Team (MS-LOT) have produced a Survey, Deploy and Monitor Policy Guidance (draft) for offshore wave and tidal devices [28]. The aim of this policy guidance is to provide regulators and proposers with an efficient risk-based approach tool for wave and tidal energy projects. It provides guidance on the level of survey effort required for site characterization based on:

a) environmental sensitivity, of the proposed location;
b) scale of development; and
c) device classification.

Additional recommendations on surveys are contained in a series of guidance documents commissioned by SNH and Marine Scotland. The different receptor groups have been spilt up and the guidance is presented in five volumes:

a) context and general principles;
b) cetaceans and basking sharks;
c) seals;
d) birds; and
e) benthic habitats.

The documents can be found online (*http://www.snh.gov.uk/docs/B925810.pdf*).

NOTE *Some users of these documents have found them to be insufficiently deterministic and, therefore, considerable uncertainty remains about what would be required for individual projects.*

The scoping phase can be used to consider opportunities to integrate data and information requirements for different purposes (i.e. the wider consenting regime), whilst also considering the potential cumulative effects and agreeing assessment approaches with the competent authority. The extent to which each of these elements has already been progressed by this stage will be dependent on when consultation was initiated and whether a formal screening opinion was requested.

5.2.3 Scoping request content

A considerable volume of guidance already exists as to what should be captured within the scoping phase (e.g. Marine Scotland, 2012 [18]; PINS, 2013 [20]). In particular, the Marine Scotland *Licensing and Consents Manual* (draft) [18] outlines four key questions that should be covered during scoping:

a) What potential effects might the project have on the environment?
b) Which of these potential effects are likely to be significant and, therefore, need particular attention during the EIA?
c) What level of data/evidence is needed to answer the consenting questions with confidence?
d) What alternatives and mitigating strategies ought to be considered when outlining proposals for the project?

The requirements of the scoping report are similar to the screening report (see **4.2**) and detailed within the respective regulations; however, additional detail should be presented by the proposer to enable the potential for significant environmental impacts to be assessed. For wave and tide projects, for example, the IMPACT Assessment Tool (*http://www.scotland.gov.uk/Topics/marine/Licensing/marine/tool*) *commissioned by Marine Scotland* is widely used throughout the wave and tidal industry to scope the key environmental effects of a potential development. The consensus from available ORE guidance and relevant EIA regulations suggests the following information should be presented in the scoping report (dependent on the stage at which scoping takes place):

a) a description of the development, including device design, mooring method and foundation type;
b) suggested alternatives to the development;
c) a description of the baseline environment, including known information/data sources;
d) any known data gaps;
e) details of site characterization surveys and monitoring being proposed (including survey methodologies);
f) a description of the EIA methodology including approaches and specific studies to the assessment of specific effects;
g) identification of potentially significant environmental effects, with an estimation of their likelihood and potential severity (as far as is known at this stage);
h) a description of mitigating measures including the rationale as to why they will reduce/eliminate environmental impacts;
i) identification of issues which should be scoped out of the assessment along with the supporting rationale;
j) consideration of potential cumulative effects including activities, plans and projects to be captured within the assessment and the associated methodology;
k) anticipated post-consent requirements should a licence be granted;
l) the suggested structure and content of the Environmental Statement (ES); and
m) the proposed consultation strategy, including a potential list of consultees and details of any consultation that has been undertaken to date.

While these requirements are broadly similar to the screening report, a clear emphasis should be placed on using a systematic approach to identifying where and how the environment could be affected, as opposed to providing an equal consideration to all potential receptors. This facilitates the identification of the most important/relevant environmental issues at an early stage and allows those that are irrelevant to be scoped out. It also helps to determine data requirements, survey preparations and potential mitigation plans.

The provision of a scoping opinion allows the proposer to be clear about what the competent authority considers the main effects of the proposal are likely to be and, therefore, the topics on which the ES should focus. The competent authority can require the proposer to submit any further information needed to adopt a scoping opinion (SNH, 2013 [17]).

Case study: St David's Head Tidal Stream Energy Demonstration Array

St David's Head Tidal Stream Energy Demonstration Array is a proposed development off the Pembrokeshire coast in South West Wales (10 MW capacity). It provides an example of a scoping report that has captured all of the best practice elements described within this clause (submitted in August 2012) [29]. The development is considered a "demonstration array", anticipated to continue operation for up to 25 years, and involves the placement of nine units on the seabed using gravity based tidal turbine structures. The project will form a continuation of the Ramsey Sound Tidal Stream demonstration development in the area.

The scoping report introduces the site location, albeit a slightly larger area than ultimately foreseen to allow for alteration in the final plans, highlights the legislative context of the works and characterizes the receiving environment in terms of the key marine parameters. It also outlines the likely survey requirements, provides a suggested structure of the ES and discusses how the mitigation and monitoring associated with the Ramsey Sound development will feed into the project.

5.3 Recommendations

5.3.1 General

Despite the current guidance a number of issues have been identified within the scoping phase of previous and current EIAs for ORE developments. These issues have resulted in delays to programme and the unnecessary duplication of resources. The issues that have been raised can be clearly attributed to the viewpoints of either competent authorities/consultees or proposers. These contrasting views provide the opportunity to identify recommendations that aligns the requirements of both parties. These include recommendations with respect to:

a) the level of detail that is required within a scoping report;
b) the design envelope which is used to describe a proposed scheme;
c) potential data requirements associated with a project;
d) determining the impact assessment methodology;
e) identifying potential impact pathways; and
f) timing at which scoping is undertaken.

NOTE *It should be noted that a number of the issues that have been identified through the development of this PD are inter-related.*

5.3.2 Level of detail within scoping report

Competent authorities have highlighted that there is frequently a lack of sufficient detail provided within scoping reports for them to be able to provide a fully informed scoping opinion. This includes the scheme design and details of the construction, operational and decommissioning phases of the development as well as the impact assessment methodology (including data, assessment approach and determination of significance) that will be applied. A lack of detail in both of these respects results in a high degree of uncertainty with respect to potential environmental effects that could arise from a development. It therefore remains difficult to scope out environmental effects from requiring further assessment at this stage potentially resulting in the unnecessary expenditure of resources (both time and money) during the assessment phase. Proposers should therefore provide as much detail as possible within scoping reports to enable the competent authority to provide an informed scoping opinion. However, it is acknowledged that timescales and financial constraints often do not permit the (engineering) design to be more developed during scoping and, therefore, proposers are encouraged to provide as much information as is available.

Assuming this level of detail is provided by the proposer the competent authority should provide a fully informed scoping opinion that allows subsequent phases of the EIA process to be tailored to the key issues that have been identified.

5.3.3 Design envelope

Proposers frequently apply the principles of the "Rochdale Envelope" when describing their proposed development within a scoping report. The Rochdale Envelope is used in determining environmental effects where there is a greater need for flexibility in the future evolution of the detailed project proposal, within clearly defined parameters (the so-called project design envelope). While this approach is valid, issues with its use have been raised by regulators in instances where it has been perceived to be an excuse to provide limited detail with respect to the scheme design. This results in regulators providing a necessarily generic scoping opinion and can result in greater demands in terms of data requirements.

Where the Rochdale Envelope is applied, the level of detail of the proposals should therefore be sufficient to enable a proper assessment of the likely environmental effects and the determination of any mitigation measures that can be embedded into the scheme design. All assumptions should also be clearly stated and reflect projected available technologies and supply chain. It can be useful to differentiate

between "a realistic worst case" and "the most likely case or scenario" where reasonable assumptions and justifications are clearly set out. Where a scoping opinion has been provided on the basis of worst case assumptions any subsequent changes, provided these are within the design envelope should still be considered valid within the EIA undertaken.

***NOTE** The Rochdale Envelope is an approach to consenting which has arisen from two specific legal cases regarding a business park development in Rochdale: R. v Rochdale Metropolitan Borough Council (MBC) ex parte Milne (No. 1) and R. v Rochdale MBC ex parte Tew [1999] and R. v Rochdale MBC ex parte Milne (No. 2) [2000]. Existing guidance on the use of the Rochdale Envelope can be found in PINS's Advice note nine [30].*

There are several examples of large-scale projects incorporating the Rochdale Envelope into their EIA. Within the Triton Knoll Offshore Wind Farm scoping report, for example, the proposer highlights the need for flexibility in their application as "project elements and infrastructure will be refined continually throughout the development process" [31]. This approach is justified against the PINS guidance [30], with a view to identifying the "worst case scenario" for assessment of Triton Knoll in terms of final project design and the potential for effects on the environment. It is also worth referring to the projects subsequent ES, which provides greater detail as to the project envelope used (Volume 1: Chapter 7 – The "Rochdale Envelope" Approach [32]).

5.3.4 Data requirements

It is necessary to provide a description characterizing each of the potential parameters that might be affected by a development/scheme within the scoping report. This should capture details of the type of information/data that is known to be available as well as the temporal and spatial extent of the data in the context of the potential impact zone. Where this level of detail is not captured at this stage it results in the failure to recognize and agree gaps/ uncertainty in the evidence base. This has further consequences for identifying the requirements for the collection of field data. Proposers should therefore provide details of all the available information that will be used to inform the assessments. The adequacy of this information can then be determined by the competent authority and their advisors (consultees).

Failure to agree the required characterization survey requirements at an early stage in a project can result in delays to the overall programme. In this context, there are specific survey windows that should be adhered to for certain receptors and as such it is important not to miss these opportunities. Similarly, survey specifications should be defined on the basis of all known requirements to ensure maximum cost efficiencies, particularly where a single monitoring campaign can capture multiple parameters and satisfy all requirements (including WFD/HRA/European protected species (EPS)). Proposers, in consultation with the competent authority, should therefore ensure that all potential survey requirements, along with the underlying rationale, are identified at the earliest stage possible.

Where possible, the proposer and competent authority should also agree the details of the recommended survey methods (including sampling techniques, numbers of samples/replicates, required duration and extent) as well as how the data should be analysed and presented. This can form the basis of a sampling strategy that meets the requirements for all stages of the project lifecycle (see **Clause 9**). If it is not possible to be this prescriptive (based on the information that is available at this stage) then recommendations from the competent authority as to who should be consulted further with respect to all of these aspects would be beneficial.

An example mechanism where this is currently employed is in evidence plans for NSIPs (Defra, 2012 [33]). An evidence plan is a formal mechanism to agree upfront what information the proposer needs to supply to the PINS as part of a DCO application. This is primarily designed to help ensure compliance with the Habitats Regulations but can be used to capture all overlapping consenting requirements.

5.3.5 Determining the impact assessment methodology

The proposed assessment methodology, including for cumulative effects, should be defined at this stage. Proposers should therefore include a detailed description within their scoping reports which can be reviewed by the competent authority. The competent authority should provide the details of any known plans or projects that could result in cumulative effects whilst acknowledging that this list may change prior to submission of the respective ES.

***NOTE** Further details on undertaking cumulative assessments are provided in **7.3**.*

5.3.6 Identifying potential impact pathways

The identification of potential impact pathways should be based on the specifics of the individual project (including the technology type) and site specific considerations. In this respect it should focus

on the receptors that could be affected by the scheme including both near and far-field effects. It should also be evidence-based and make use of lessons that have been learnt from previous schemes, of all technology types, particularly where impact verification monitoring data has been collected. In addition, consideration should be given to trans-boundary issues where applicable.

The competent authority should apply the precautionary principle, although a proportionate and risk based approach to uncertainty is requested by proposers. The precautionary principle is one of the key elements for policy decisions concerning environmental protection and management. It is applied in the circumstances where there are reasonable grounds for concern that an activity is, or could, cause harm but where there is uncertainty about the probability of the risk and the degree of harm.

Ultimately, the scoping process should form part of a robust audit trail which outlines those impact pathways that have been scoped in or out from requiring further detailed assessment. The audit trail should include details of the rationale for any such decisions that have been made and, where it is not possible to be this prescriptive, then competent authorities should provide further information as to what is required to enable such decisions to be made. This will serve to ensure that all parties have a clear understanding of what is required going forward. The proposer also has a responsibility to inform the competent authority of changes to the project.

5.3.7 Timing of scoping

Consultation should occur at the scoping phase, by the proposer and the competent authority, to enable the full range of permitting requirements to be determined (see **Clause 10**). This again ensures that all linkages are fully defined and can be co-ordinated from an early stage in the project. The scoping report should also outline the communications strategy for the remainder of the consenting process.

In practice the time-lag between scoping and submission of a final ES (at the application stage) can be quite considerable (several years) for large schemes. It is unavoidable that things will change during this period. This is not only from a proposer's perspective, where greater detail about a scheme and potential effects evolve, but also in terms of the advice provided by competent authorities and statutory consultation bodies. In this context, competent authorities (and their advisors) have a responsibility to update their scoping opinion where a change in scale or approach could affect the determination of impacts (i.e. the degree of certainty, etc.). The proposer and the competent authority should therefore maintain effective and on-going communication with each other throughout all stages of the EIA process (see **Clause 10**).

However, changes in advice from the competent authority and the statutory consultation bodies should still be limited to those that result in a change to the assessed significance, in line with the principles of better regulation and the regulators code (Department for Business, Innovation and Skills, 2014 [34]).

The timing of the submission of a scoping report is therefore important. In order to gain the most from a scoping opinion, proposers should consider requesting the opinion once there is sufficient certainty about the description of the proposed development and the main elements of the proposed development likely to have a significant environmental effect. If there are substantive changes to the main parameters surrounding a particular project a competent authority may request submission of a second scoping report.

NOTE *An example scoping report template with recommendations for both proposers and the competent authority is shown in Table 2.*

Table 2 – Scoping template

Topic	Scoping report (proposer)	Scoping opinion (competent authority)
Project description.	Should include all phases of the project (construction, operational and decommissioning). Include sufficient detail to enable competent authority to provide clear scoping advice. State where principles of the Rochdale Envelope have been applied.	Response should be tailored to reflect the project type and location.
Alternatives.	Present a summary of the alternative options that have been considered to determine the scheme design and location.	Assess whether all reasonable alternatives have been considered. Provide corresponding advice including rationale for the need for wider consideration of alternatives if applicable.
Need for the project.	Describe the underlying rationale for the need for the project.	Consider whether the need for the project has been described in sufficient detail to understand the overall objectives of the proposed scheme.
Summary of the installation and decommissioning methods.	Provide a description of the installation and decommissioning methods that will be used for the scheme. Identify areas of uncertainty with respect to what is proposed.	Review proposed methods. Response should be tailored to reflect the project type and location. If information is deemed insufficient to inform a scoping opinion, consult with developer at the earliest opportunity.
Project location.	Include a description of the scheme location along with charts/maps or plans. Provide as much detail as is known at this stage, highlighting areas of uncertainty.	Ensure focussed on site specifics. Provide details of known environmental constraints within this location.
Characterization of receiving environment.	Provide a list of the receptors that could be affected and a summary of the best available data/evidence that is known to exist (with confidence assessment and MEDIN format metadata). Signpost existing information sources including providing details on the type of information/ date/spatial extent. Detail surveys, if required, that have been or plan to be conducted.	Ensure all receptors have been identified. Outline whether existing information sources are sufficient to inform impact assessment, and identify survey requirements where necessary. Provide details of any known data sources that have not been identified.
Proposed assessment methodology.	Detail the assessment methodology that will be used to determine the significance of environmental effects.	Ensure that the proposed approach is robust and will result in a transparent assessment of potential impacts.
Identification of potential environmental impacts.	Outline potential impact pathways for each receptor. This should include direct and indirect effects. Outline any key areas of uncertainty in determining the significance of potential impacts.	Determine that the full list of impact pathways has been provided based on the best available information at this point.

Table 2 – Scoping template *(continued)*

Topic	Scoping report (proposer)	Scoping opinion (competent authority)
Potential cumulative effects.	Identify known plans/projects/ongoing activities that need to be considered alongside the proposed development in determining cumulative/in-combination effects. Outline the assessment methodology that will be used to determine the significance of cumulative impacts.	Ensure full list of plans/projects/on-going activities has been captured, considering any SEA as appropriate. Advise whether the proposed assessment methodology will be fit for purpose.
Identification of aspects to be excluded from further consideration in the EIA (scoped out).	Specifically state which potential environmental effects have been scoped out from requiring further assessment. This should include the rationale for their exclusion. Where these effects have been scoped out due to the implementation of mitigation measures, such measures need to be clearly stated.	Confirm (or otherwise) that the issues identified can be scoped out from requiring further consideration (based on current understanding). Clearly state the assumptions that these decisions have been made on. Ensure sufficient certainty/confidence surrounds any mitigation measures that have been proposed.
Assessment of need for studies under other legislation.	Identify wider consenting requirements associated with the proposed development. Ensure that any data/information requirements are cross-referenced.	Confirm that all wider consenting requirements have been identified.
Details/plans for work that will be undertaken to complete the ES.	Outline content of ES and the process that will be followed in preparing it, including the strategy for further consultation.	Ensure that the ES will include all of the necessary detail to ensure compliance with the EIA Directive.
Overarching considerations.	Need to maintain an audit trail detailing decisions. If a scoping request is submitted, the ES should not be submitted until the scoping opinion has been completed (and considered by the proposer). Ensure pre-application consultation requirements are met.	A summary of consultation and associated outcomes. Identify any key potential issues that it is advisable for the proposer to consider further prior to proceeding any further with the project. Need to maintain an audit trail detailing decisions. If it is not possible to be this prescriptive (based on the information that is available at this stage) then recommendations as to what further information is required and who should be consulted further should be provided.

6 Preliminary environmental information (PEI)

6.1 General

Following the conclusion of the scoping phase and prior to submission of the ES, NSIPs in England and Wales are required to provide preliminary environmental information (PEI) in accordance with the Planning Act 2008 (as amended) [24]. This involves the preparation of a statement of community consultation (SoCC) which sets out how the local community and interested parties will be consulted about the proposed development.

The overall aim of PEI is to provide those consulted on the project, particularly the local community, with sufficient awareness of the project design and environmental issues to be able to develop a good understanding of the proposed scheme before the application is submitted. This ensures that the public can offer well-informed responses as part of the development's pre-application consultation. In providing PEI, the proposer should be able to largely outline the potential significant effects and how these can, if necessary, be mitigated within the design.

In order to clarify the role of PEI to consultees, PINS recommends that the proposer clearly explains that the information is preliminary and that the proposer is actively seeking their comments on this information. It provides the opportunity for both the EIA and project design to take into consideration any comments received through this pre-application consultation (PINS, 2013 [19]).

Case study: East Anglia ONE Offshore Wind Farm

East Anglia ONE is a Round 3 offshore wind farm located in the southern North Sea which was consented for development in June 2014. East Anglia Offshore Wind Ltd (EAOW) provided a PEI report part way through their EIA process, in February 2012 [35]. This report presented information about the onshore and offshore elements of the proposed development, including the wind farm site, the offshore cable corridor, the landfall at Bawdesy, the preferred onshore cable corridor and the preferred converter station location. This enabled informed and meaningful consultation with key technical consultees which helped shape the project design and tailor the ES assessment chapters [36]. In response to comments received on the PEI Report, EAOW undertook a range of actions including:

- establishing in-principle cable crossing agreements with cable operators;
- forming subtopic groups to discuss specific onshore EIA matters in further detail prior to the development consent order (DCO) application submission;
- commissioning additional invertebrate specialists to inform the assessment of potential impacts on ecology and ornithology; and
- providing additional photomontages to inform the landscape and visual amenity assessment.

6.2 Recommendations

Some proposers have expressed the view that the PEI does not provide additional value to the assessment process and, therefore, the key issues identified for the scoping phase are also largely applicable to PEI. In some instances, the evidence base will not have significantly advanced at this stage beyond that presented/available during scoping and as such this stage can be seen to result in the unnecessary duplication of information. The proposer should therefore consider at what point in the process they feel consultation on the PEI will be most effective.

NOTE *It is acknowledged that scoping is not a formal requirement, however, it is a recommended process and it can be assumed that it will have been undertaken for the vast majority of NSIPs.*

Proposers should be aware that the level of detail provided in the PEI may affect the level of detail provided in the consultees' responses and how useful this is to inform the EIA and the design of the proposed development. Proposers should consider whether taking forward PEI at a more advanced stage in the design process of the NSIP, where more detailed information is known about the proposed development and its environmental effects, may generate more detailed responses and provide a more effective consultation exercise (PINS, 2013 [20]). This phase can also serve to bridge the gap between the scoping phase and the submission of the ES, particularly where there is a considerable time lag between these stages. Nevertheless, there is no limit on the number of stages of consultation that a project may undertake; with good planning, multiple stages of consultation can be built into programmes.

Proposers should consider the most appropriate form in which to present the PEI. Proposers may find it useful to provide more than one version of the PEI depending on whom they are consulting, although it is recognized that this would require considerable additional effort. The PEI does not have to be in the form of the draft ES, although the use of a draft ES may be appropriate when consulting with the statutory consultees later in the pre-application stage (PINS, 2013 [20]).

There are no strict controls over the duration of the pre-application phase and its associated consultation during the PINS process. The Department for Communities and Local Government (DCLG) Guidance [37] sets out a minimum of 28 days for stakeholder consultation (e.g. on the PEI), however, there is nothing to say what the maximum is. While it might be "standard" practice to allow 28 days for consultation phases many developers often choose to give their stakeholders additional time to provide responses, where programme requirements allow.

NOTE *One component of the PINS process that might offer some advantages, particularly with respect to determining overall project programme, is the strict timescales which are imposed on all parties throughout the final examination phase of an NSIP application.*

7 Determining environmental impacts

7.1 General

The EIA Directive [1] requires that the EIA considers the significance of the effects of the development on the environment and should be a clear and transparent process, documented in the ES. Predicting environmental impacts involves two main elements of work (SNH [38]):

1) anticipating, modelling, predicting or forecasting the changes that would be brought about by the project at all of its life stages, often compared to baseline, and/or predicted changes without the project; and
2) explaining in a rational, consistent, impartial and transparent way, the significance of the changes.

The Institute of Environmental Management and Assessment (IEMA) and the Institute of Ecology and Environmental Management (IEEM) have also produced guidance on determining environmental impacts (IEMA, 2004 [39]; IEEM, 2010 [40]).

The impact assessment must assess the effects of the development through all stages of the project including construction, operation and maintenance, repowering (including the design life of the different elements) and decommissioning. Similarly, the assessment must consider both direct and indirect effects of the development. The full spatial and temporal extent of all impact pathways including trans-boundary effects must be considered. The Espoo (EIA) Convention sets out the obligations of parties to assess the environmental impact of certain activities at an early stage of planning. It also lays down the general obligation of states to notify and consult each other on all major projects under consideration that are likely to have a significant adverse environmental impact across boundaries. Further guidance on the assessment of trans-boundary effects has been published by the European Commission [41] and by DECC [42].

There are a number of approaches that are used to determine the significance of environmental effects. However, while the actual methodology may vary between proposers they all tend to follow a standard approach. This typically follows four iterative stages as shown in Figure 3.

The four main steps that are used to determine the significance of environmental effects are summarized below:

a) Step 1 – Identify both the environmental changes from the proposal activities and the features of interest that could be affected.

   The first stage identifies the potential environmental changes resulting from the proposed activity and the features of interest (receptors) that are likely to be affected (which are together referred to as the impact pathway).

b) Step 2 – Understand the nature of the environmental changes in terms of: their exposure characteristics, the natural conditions of the system and the sensitivity of the specific receptors (i.e. predict the impact).

   The second stage involves understanding the nature of the environmental changes to provide a benchmark against which the changes and levels of exposure can be compared. Where a design envelope approach is used, there should be clear justification of the selection of the worst case scenario.

c) Step 3 – Evaluate the vulnerability of the features as a basis for assessing the nature of the impact and its significance.

   The likelihood of a feature being vulnerable to an impact pathway is then evaluated as a basis for assessing the level of the impact and its significance.

   The key significance levels for either beneficial or adverse impacts are described as follows:

   1) Negligible – negligible change not having a discernible effect;
   2) Minor – effects tending to be discernible but tolerable and unlikely to require mitigation;
   3) Moderate – where these changes are adverse they might require mitigation which can include changes to the project design; and
   4) Major – effects are highest in magnitude and reflect the high vulnerability and importance of the receptor (e.g. to nature conservation). Where these changes are adverse they will require mitigation.

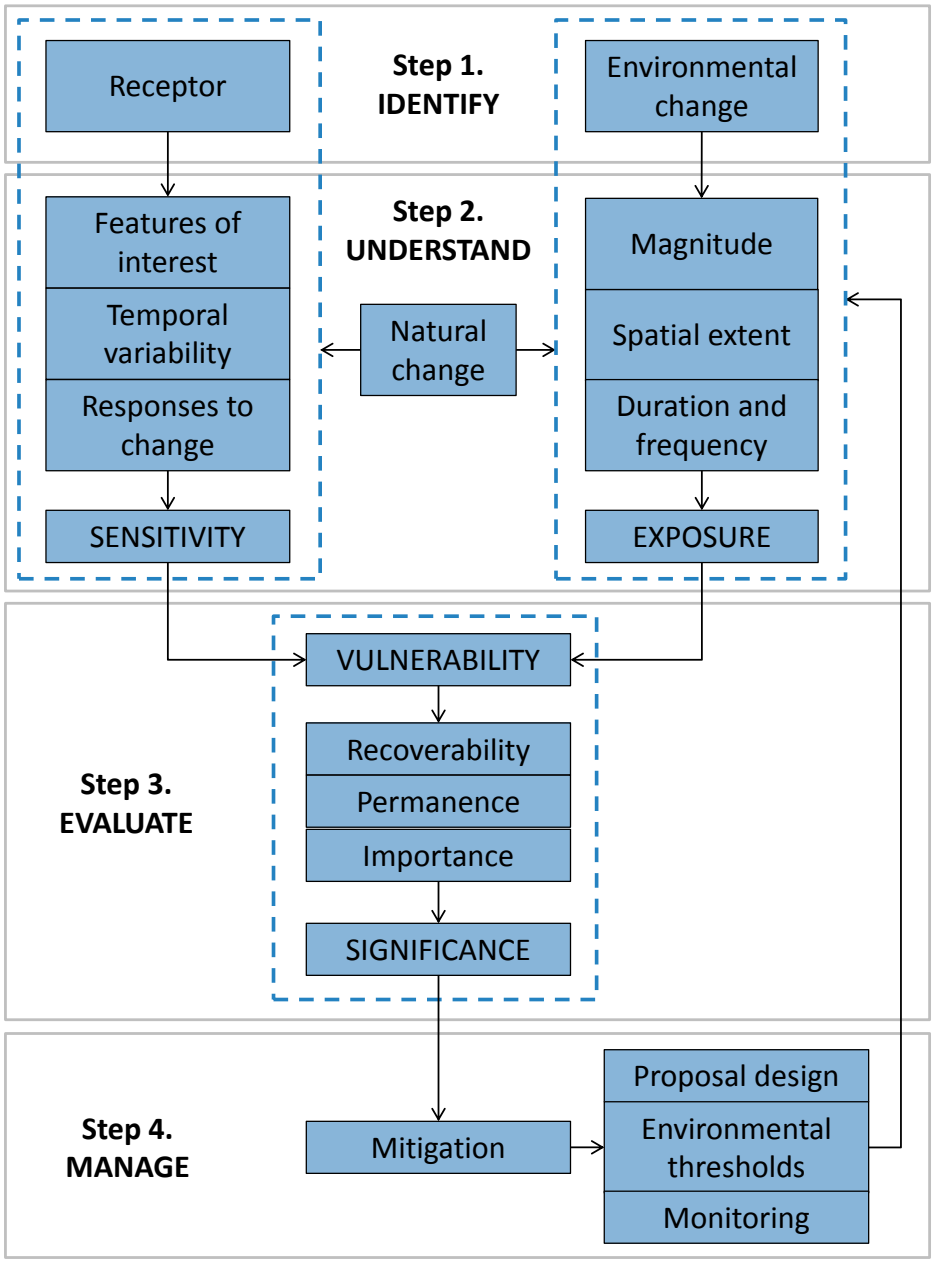
   Those impacts that are identified as being moderate or above are considered to be significant.

d) Step 4 – Manage any impacts which are found to be significant and require the implementation of impact reduction/mitigation measures; identify the significance of the residual impact.

The final stage is to identify any impacts that are found to be of moderate and/or major adverse significance and require mitigation measures to reduce residual impacts, as far as possible, to environmentally acceptable levels. Within the assessment procedure, the use of mitigation measures will alter the risk of exposure and hence will require significance to be re-assessed and thus the residual impact identified. If the level of significance is deemed to be too great it might be necessary to consider whether the project can be pursued further.

In practice, the determination of significance is typically undertaken through expert judgement, sometimes supported by the application of a series of matrices. An example of the types of matrices that are applied is presented in Annex B. The use of such matrices is not a mandatory requirement but they do provide a useful mechanism by which decisions can be justified and documented thereby providing a robust audit trail. It should be noted, however, that even where such matrices are applied, an element of expert judgement is still necessary in determining the potential significance of environmental effects. Either way, proposers, and competent authorities in reviewing the proposal, should provide sound evidence which can stand up to scrutiny.

Figure 3 – Determining the significance of environmental effects



NOTE *Figure 3 is adapted from Marine Scotland Licensing and Consents Manual (draft) [18], Figure 4.*

Case study: Rampion Offshore Wind Farm

The Rampion Offshore Wind Farm is a consented Round 3 offshore wind farm development proposed for construction in the English Channel off the Sussex coast [43]. An assessment of potential changes to coastal processes was undertaken, following a systematic process comprising four steps. These steps are described below, using the assessment of impact significance of changes to the Sussex coast as a case example.

Step 1 – Identify environmental change and receptors

One aspect of the coastal processes EIA involved considering how the presence of wind farm turbine foundations (i.e. the initiator event) could introduce change to the wave regime (i.e. the impact pathway), potentially resulting in morphological change to the adjacent Sussex coastline (i.e. the receptor).

Step 2 – Understand the nature of the environmental changes

The magnitude of potential effect was defined in terms of "extent", "duration" and "frequency." These assessments were made using expert judgment, informed by detailed numerical modelling outputs (based on the Rochdale Envelope approach to defining the realistic worst case) and the existing evidence base from other offshore wind farm developments.

For the Sussex coastline, the magnitude of effect in terms of changes to the wave regime was assessed as "low" (i.e. "noticeable, temporary change for any length of time, to key characteristics or features of the particular environmental aspect's character or distinctiveness").

Three variables were used to characterize receptor sensitivity, namely "tolerance", "recoverability" and "importance". These three parameters were assessed using expert judgement and described with a standard semantic scale using the terms "very low", "low", "medium" and "high". The expert judgements were closely guided by the conceptual understanding of regional scale marine physical processes, developed during the baseline characterization process.

For the Sussex coastline, a sensitivity rating of "medium" was assigned. This means the receptor has "moderate to low capacity to accommodate the proposed form of change." This judgement reflected the fact that, although this coastline is of high importance, it also has some ability to recover from and tolerate modifications to the wave regime.

Step 3 – Evaluate significance

The "level of impact significance" was determined by taking into account the "sensitivity of the receptor "and the "magnitude of the effect" including confidence in the predictions made. This was achieved using a look-up matrix.

It was considered that the level of impact significance on the Sussex coast in terms of changes to coastal morphology would be minor (in the context of the EIA process, this is defined "a small change in site/asset conditions, which may be raised as a local issue but is unlikely to be important in the decision making process"). This judgement was made on the basis of a medium level of sensitivity, combined with a low magnitude of effect rating.

Step 4 – Manage any impacts

In order to manage uncertainty (which is inherent in an assessment of this type), monitoring of shoreline sediment and morphology will be required, once the wind farm becomes operational.

7.2 Topic-specific methods

The parameters that are included within an EIA are dependent on the nature of the project and a number of site-specific parameters. The parameters considered relate to both onshore and offshore environments and typically include:

a) coastal marine processes/geology;
b) water and sediment quality;
c) ecology;
    1) terrestrial ecology;
    2) marine ecology including benthic habitats and species;
    3) fish, migratory fish and shellfish;
    4) marine mammals and turtles;
    5) ornithology;
d) nature conservation, protected areas and species;
e) commercial and recreational fisheries;
f) commercial and recreational navigation;
g) marine archaeology and cultural heritage;
h) coast protection and flood defence;
i) landscape/seascape and visual;
j) other sea users (e.g. oil and gas; subsea pipelines; dredging and marine aggregate extraction, tourism and recreation, aviation, military activity, munitions)
k) traffic and transport;
l) air quality;
m) noise and vibration (in-air and underwater); and
n) socio-economics.

Under the revised EIA Directive (2014/52/EU) [2], greater emphasis will be placed on human health, land, biodiversity and climate change.

There are a number of tools and guidance documents that are available to help determine the significance of potential impacts for individual receptors. These along with the key impact pathways that are typically considered for each receptor are summarized in Annex C. This Annex has been provided for guidance purposes only and does not alleviate the need for the identification of site/project specific receptors or impact pathways. It is important to understand the inter-linkages between each of the receptors as this can influence the sequencing of the assessments that are undertaken. It is important, for example, to understand the nature of the changes to the physical environment before determining the significance of potential effects on ecological features. In this context the inter-relationships where multiple environmental effects arising from the proposed project are impacting on a particular receptor/receptor group should also be considered.

The types of tools that are available for each receptor typically include a range of techniques. For example, the determination of environmental effects on the physical environment typically includes the use of numerical hydrodynamic models, a conceptual understanding of the study area and a review of the evidence base and lessons learnt from previous schemes.

For a number of receptors there are a series of thresholds that can be applied to assist in the determination of the significance of environmental effects. When considering water quality, for example, there are a series of environmental quality standards (EQS) against which levels of contamination can be compared. Similarly it is possible to determine the potential effects of noise generated by ORE schemes by comparing source levels with the damage thresholds of marine mammals and fish. Any such thresholds should be established with the competent authority on a case-by-case basis as scientific advice and evidence continues to evolve.

A number of tools have been specifically developed to help in the assessment of the impacts that could arise through ORE projects. For example, collision risk models, for both birds and marine mammals, are available (or under development) which predict potential encounter rates and the associated impacts on populations that occur within the vicinity of a proposed scheme. Similarly navigational risk assessment tools have been developed for the ORE industry. It should also be noted that in many instances the tools that are applied in other sectors are transferable to ORE projects.

7.3 Cumulative effects

The potential for cumulative effects with other plans or projects also needs to be addressed within the EIA process. A cumulative impact is defined in the RenewableUK (RUK) guidance study [44]:

> "as those that result from additive effects caused by other past, present or reasonably foreseeable actions together with the plan, programme or project itself and synergistic effects (in-combination) which arise from the reaction between effects of a development plan, programme or project on different aspects of the environment".

NOTE *The RUK guidance [44] is focussed on offshore wind farms, but the guidance is relevant to all ORE developments.*

In terms of nature conservation, plans or projects for which there is a likely significant effect on a Natura 2000 site (Special Area of Conservation (SAC) designated under the Habitats Directive [26] or Special Protection Area (SPA) classified under the Wild Birds Directive [27]) should consider in-combination effects on the relevant site features (habitats and species). Cumulative and in-combination effects should be addressed within the same chapter of an ES because the assessments, whether for EIA or for HRA, should demonstrate an understanding of the combined influence of all environmental pressures acting upon the relevant receptors in seeking to assess the significance of environmental effects.

Cumulative effects can be additive or synergistic. Many small effects on one sensitive receptor could add up to a significant overall effect even if these are considered not significant individually. Synergistic effects are assessed in relation to a specific receptor, but here the impact could be caused by the interactions of different impacts from project activities even if individually these are not significant.

The multidisciplinary nature of cumulative impact assessment (CIA) makes it a challenging part of the EIA process. The use of multiple design envelopes further complicates the assessment of cumulative effects. In the past, application of CIA methods has been weak. As described in the RUK guidance study [44], CIA in the renewable sector is particularly challenging due to the following reasons:

a) there is a lack of certainty over the process of undertaking a CIA, with inconclusive guidance and inconsistent definition of scopes and what should be considered "reasonably foreseeable";
b) uncertainty over project-level effects, including bird collision and displacement, which are compounded by a number of projects potentially contributing to the same impact (in addition, assessment methods vary making cumulative assessment difficult);
c) very few definitive significance thresholds currently exist under which the cumulative impacts of projects can be managed (although it is noted that work in this field is ongoing); and
d) there is potential for projects with larger environmental effects to be consented before projects that may have lower environmental effects, thus using up important environmental carrying capacities and potentially reducing the total capacity of projects that can gain consent. This is particularly difficult for project-level assessments to account for.

The main principles of CIA, as set out in the RUK guidance [44], are as follows:

a) developers, regulators and stakeholders will collaborate on the CIA;
b) clear and transparent requirements for the CIA are to be provided by regulators and their advisers;
c) boundaries for spatial and temporal interactions for CIA work should be set in consultation with regulators, advisers and other key stakeholders, in line with best available data;
d) developers will utilize a realistic project design envelope;
e) developers will consider projects, plans and activities that have sufficient information available in order to undertake the assessment (the volume of information available will determine whether the CIA is qualitative or quantitative);
f) the sharing and common analysis of compatible data will enhance the CIA process;
g) CIAs should be proportionate to the environmental risk of the projects and focussed on key impacts and sensitive receptors;
h) uncertainty should be addressed and where practicable quantified; and
i) mitigation and monitoring plans should be informed by the results of the CIA.

In recognition of the issues surrounding CIA, a comprehensive standardized framework has also been developed by Natural England [45] to aid case officers advising on CIA of human activities affecting MPA features, however, it has been developed in such a way that it is applicable across all sectors, including ORE.

The framework has been developed in such a way that it is not overly prescriptive, recognizing the flexibility required for marine developments, but has built on what is considered best practice in project level EIAs and incorporates the key criteria for CIA. The framework is designed to ensure that a clear audit trail of the evidence and assumptions of the assessment are followed while encouraging a quantitative, systematic and predictive approach to CIA. Note is also made of the fact that the CIA should be viewed as an iterative process, especially where there may be a degree of uncertainty surrounding the project design.

Specific topic based approaches to CIA have also been developed. These include, for example, guidance on ornithological CIA for offshore wind farm developers (King et al. 2009 [46]; Searle et al. 2014 [47]). An approach to cumulative impacts on herring and sandeel, as a result of aggregate extraction, has been developed by British Marine Aggregate Producers

Association (BMAPA) [48] [49]. Similarly, recent project specific guidance which has transferable lessons for wider ORE projects includes the Pentland Firth and Orkney Waters enabling report (AMEC, 2013 [50]).

7.4 Confidence assessments

When documenting environmental effects it is also important to describe the degree of confidence in the assessments that have been made. The MMO has developed a process of quality assurance (QA) to assess whether the evidence presented in an application is fit for purpose and to highlight any limitations that should be considered in decision making (*http://webarchive.nationalarchives.gov.uk/20140108121958/http://www.marinemanagement.org.uk/evidence/quality.htm).* The assessment of quality is measured in terms of confidence, i.e. whether a piece of evidence is robust enough and fit for purpose to be used to inform the decision. In determining confidence in the quality of the evidence, the following questions are scored (0 = N/A; 1 = low or unknown; 2 = medium; 3 = high):

a) Has the evidence provider given details of their quality standards?
b) Is the methodology used to prepare the evidence recognized standard practice?
c) Is the evidence appropriate and best available (proportionate, targeted) for its intended use?
d) Timelines assessment – is this the most up to date version; knowledge of when data was collected (metadata about underpinning data should be in the MEDIN format)?
e) Is the evidence complete for its intended use?
f) Is the evidence consistent across applications of a similar nature?
g) Are there any details of independent peer review?
h) Has an accuracy assessment been completed on modelled results?

In addition, the process evaluates whether the evidence presented is fit for use in its current format and whether there are any caveats required for its use (e.g. limitations).

To avoid delays and the potential for increased costs (e.g. additional data collection) a QA procedure of this type should be employed to review the evidence base by both the proposer and the competent authority.

7.5 Recommendations

Key issues with determining the significance of environmental impacts are centred around the lack of a consistent, transparent and auditable assessment methodology and a lack of clarity on how to deal with residual uncertainty. When undertaking EIAs there are a number of assessment methodologies that can be used to define the potential significance of environmental effects. While there is no formal requirement to use a particular approach, this can lead to discrepancies between assessments and a lack of clarity/understanding where terminology is used interchangeably. In this respect, Marine Scotland [18] recommends standard terminology to describe impact significance (as replicated in **7.1**). Consistent terminology should therefore be applied throughout an EIA and all terms should be fully defined to enable the reader to determine how the significance of potential impacts has been determined.

It is also evident that a detailed audit trail outlining how impact significance has been assigned (for all impact pathways) is not always provided in ESs. This results in a lack of clarity as to how conclusions have been reached. The rationale for each of the decisions that have been made throughout the application of the assessment methodology should therefore be fully documented for all impact pathways. This can be presented in a number of ways but should as a minimum capture a fully qualified statement relating to each of the following:

a) exposure to change (based on magnitude of change and probability of occurrence);
b) estimation of vulnerability (based on sensitivity and exposure to change);
c) estimation of significance (based on the importance of the feature and vulnerability);
d) conclusion; and
e) confidence in the assessment (based on the available data, assessment methodology, available evidence from monitoring studies and scientific literature).

As described in **7.2**, a number of receptor specific tools have been developed to facilitate the determination of environmental impacts. In contrast, for some receptors, there are less well-defined methods available for determining the significance of environmental impacts. This ultimately results in the application of a more judgement based approach. Where no such guidance is available it is equally important that the approach that has been used to determine the potential significance of environmental effects is fully documented. The identification of this issue highlights that there may be a requirement to develop guidance for these receptors in the future.

In determining environmental effects there should be a greater recognition of specifics for individual projects. The documenting of the evidence used to make each of the judgements described above should help to ensure that the assessment of impact pathways is tailored to address site and development specific issues. Similarly, the competent authority and consultees should be able to explain why particular decisions or judgements have been reached in response to the information that has been provided.

The same principles apply to cumulative assessments where the detailed rationale of all impact determinations, including the associated confidence, should be documented. The full scope of cumulative and in-combination impact assessments should be agreed with the competent authority prior to undertaking the assessments. In this context there are good examples of developers working together, e.g. Moray Firth Offshore Wind Developers Group (MFOWDG), to understand potential cumulative effects. These groups also ensure that the collective knowledge base, including lessons learnt from existing ORE schemes, are factored in to the design and assessment of future schemes.

A failure to identify the level of uncertainty and the associated confidence in the evidence base used to define impact significance can result in a lack of regulator confidence and as such, may result in disproportionate mitigation and monitoring measures being applied to a particular development.

8 Environmental statement (ES)

8.1 General

8.1.1 Reporting

An EIA is reported within an ES and is submitted by the proposer as part of a consent application. The competent authority must ensure that the ES adequately reflects the environmental aspects of the proposals and that all regulatory requirements have been met. They must also ensure that the information is clear and presented in an unbiased manner.

There is no set format for how an ES should be structured; however, there are a number of elements that are required to be documented. These are all described in existing guidance documents such as the European Commission (EC) Guidance on EIA and Review of ESs [51] and on the online Planning Practice Portal (*http://planningguidance.planningportal.gov.uk)*. This guidance has also informed the SNH EIA handbook [17] and the Marine Scotland *Licensing and Consents Manual (draft) [18].* An outline of the information that is required to be presented within an ES is summarized in **8.1.2**. The qualities of a good ES as outlined by the European Commission [51] are further provided in Annex D.

NOTE *Attention is drawn to the EIA Directive [2] with regard to elements required to be presented in the ES.*

8.1.2 Description of the project and of the regulated activity

There shoeuld be a clear project description and design in order for the proposer, competent authority and key consultees to understand the nature of the project effects. A good example of what this description should entail is provided in the Marine Scotland *Licensing and Consents Manual* (draft) [18].

In summary, details of the following scheme components should be provided:

a) project location;
b) project programme
c) device structure and operation;
d) mooring or foundation system;
e) power requirements;
f) navigational requirements;
g) materials;
h) installation requirements;
i) operation/maintenance requirements; and
j) decommissioning.

The design statement should provide full details of all of the working methods being proposed during the lifespan of the project. The ORE industry is developing and new technologies are evolving and so it is recognized that there will be some uncertainties regarding the construction materials and methodologies. However, sufficient information should be provided in order to understand the potential effects. As described in **5.3.3**, the principles of the Rochdale Envelope can be applied when supplying the scheme information. In this context both the worst case and most likely scenario should be presented.

Case study: Inch Cape Offshore Wind Farm

The ES for the proposed Inch Cape Offshore Wind Farm, located off the East Coast of Scotland around 15 km off the Angus coastline, provides a good example of a project description. From the outset, the report emphasizes the necessity to describe the development, for which the final design remains uncertain, within the context of the design envelope by evaluating the worst case scenario (Inch Cape Offshore Limited, 2013 [52]).

The report details the (wider) area proposed for development, including co-ordinates of the array and cable corridor, and the initial project design. As the type/model of wind turbine to be installed and the foundation options for the turbines and offshore substation(s) were uncertain, the project description provides a range of possible considerations. The proposer (a joint venture company formed by Repsol Nuevas Energías UK Limited and EDP Renewables UK Limited) provides an evaluation of each feature, such as pile diameter, the depth to which the foundation will need to be penetrated into the seabed and the height of the structure above the sea surface.

8.1.3 Legislative context

A description should be provided of the legislative context and relevant national, regional and local terrestrial and marine planning policy and guidance that is relevant to the proposed development. If

transboundary issues are expected all relevant EU legislation should be described.

8.1.4 Outline of alternatives

This section should include an outline of the main alternatives considered and the reasons why the preferred option was selected, taking into account the effects of the project on the environment. Specific guidance on the consideration of alternatives can be found in National Policy Statement for Renewable Energy Infrastructure (EN-3) [53].

Case study: Burbo Bank Extension Offshore Wind Farm

The proposed Burbo Bank Extension Offshore Wind Farm, located in Liverpool Bay in Northwest England, provides a comprehensive description of the project alternatives and the process of determining the final site selection (DONG Energy, 2013 [54]). This includes consideration of the following locational aspects of the project:

a) offshore array;
b) offshore cable route;
c) landfall;
d) onshore cable route; and
e) onshore substation.

Through consultation between the proposer and The Crown Estate, an agreement for lease of the offshore wind farm site was reached based on a reduced site boundary (from approximately 90 km2 to 40 km2). The proposer outlined the original, larger boundary and acknowledged the benefits of the revised scheme despite reduced capacity (e.g. through reduced visual impact and avoidance of an anchoring area). The remaining selections were primarily based on discussions with National Grid to establish the grid connection location and provide an "optimal solution from an economic, environmental and technical point of view" (DONG Energy, 2013 [54]). In contrast to the fully-operational Burbo Bank Offshore Wind Farm, which is connected to a substation in Birkenhead (England), it was agreed that the optimal location for the Extension's grid connection was at Bodelwyddan (Wales). Subsequently, the proposer provided evidence and justification for the terrestrial elements (landfall and onshore cable route) alongside various alternative options.

8.2 Assessment methodology and likely significant effects

8.2.1 General

As discussed in **Clause 7**, the impact assessment methodology should be fully detailed within the ES. This should be in a format that is accessible to a non-technical expert so that the determination of impacts is a transparent process.

8.2.2 Environment likely to be significantly affected

Each receptor group should have its own section within an ES considering, in turn, each of the following:

a) current conditions to provide the benchmark against which the changes and levels of exposure should be compared. It should consider both the current and future baseline (with respect to how the feature might be expected to change in the absence of the development over the intended lifespan of the project). It should be noted that it may be necessary to supplement existing information sources with additional field data (see **Clause 5**);
b) impact pathways by which the receptor could be affected (see Clause 7);
c) assessment of the significance of the potential impact (see Clause 7);
d) how to mitigate for significant adverse effect;
e) where predicted, report the residual significance of the impacts; and
f) recognition of uncertainty, data gaps and the overall confidence in the assessment.

The receptors that are considered within an ES are dependent on the nature of a project and a number of site specific parameters (see **7.2**). In this context the inter-relationships where multiple environmental effects arising from the proposed project are affecting a receptor/receptor group should also be considered.

The potential cumulative effects associated with a proposed development are most commonly reported in a separate section within the ES; however, it is useful if they are contained within the individual receptor chapters.

8.2.3 Mitigation measures

Mitigation refers to methods or actions that will be implemented to reduce/avoid significant adverse environmental effects. Mitigation measures are most successful when they are considered from the outset of the project rather than as a late stage solution (see **Clause 9** for further details). Therefore, in some cases,

mitigation can be incorporated into the project design through embedded impact avoidance measures.

Mitigation required during the construction, operational and decommissioning phases of a project should be precisely defined to ensure proposers understand their commitments (i.e. they should not be generalized) and in order to give confidence and certainty to competent authorities. Where mitigation is to be relied upon to reduce the effects of the development, this should be deliverable and based on proven evidence. It is considered to be of benefit that all of the mitigation measures that have been identified throughout the ES should be summarized in a dedicated chapter. The impact verification and adaptive management monitoring requirements are also typically captured within this chapter of the ES. In the NSIP process, the competent authority may request a specific mitigation register as part of their examination.

8.2.4 Non-technical summary

The non-technical summary is a clear summary of the ES and is frequently used as the primary consultation tool. Therefore, it should be presented in a non-technical format and not contain any technical terminology (Marine Scotland *Licensing and Consents Manual* (draft) [18]). The non-technical summary, presented as a stand-alone document, should incorporate all aspects of the ES including a summary of the environmental effects of the project and proposed mitigation and monitoring requirements.

Case study: MeyGen Tidal Stream Array, Inner Sound

The MeyGen tidal stream array is an 86 MW development off the North Coast of Scotland, between Caithness and the island of Stroma. Submitted in July 2012 along with the ES, the Non-Technical Summary [55] provides a consolidated overview of the proposed development.

The non-technical summary includes a description of the site location (and map), a summary of consultation procedures, how the EIA was conducted and the potential effect on each receptor, along with the need for mitigation measures and monitoring where required. Therefore, it can function as a stand-alone document and provides a useful, initial tool for regulatory bodies and other interested parties.

8.3 Recommendations

The main issue that has been raised with respect to the production and review of ESs is a lack of guidance with respect to the structure and contents of an ES. This is particularly related to balancing the level of detail that is required with the desire to produce concise documents which meet all of the legislative requirements. In some instances, for example, proposers have been criticized for the use of cross-referencing where consultees tend to review individual sections as opposed to the entire ES. There is therefore little that can be done to address this issue within the confines of the current ES review process. The following over-arching recommendations do, however, have the potential to result in more concise ESs.

The ES should be focussed and targeted on those receptors and impact pathways that have the potential to result in significant environmental effects. This should be related back to the respective scoping opinion whilst being mindful of whether the details (and any associated assumptions) of the scheme have changed through this period. Correspondingly the competent authority and statutory consultation bodies should be satisfied that all of the potential environmental effects have been adequately addressed and not request the provision of information with respect to irrelevant pathways.

The information provided within the main body of the ES should be supported by technical appendices to avoid the unnecessary duplication of detail that is not required to understand how impact significance has been determined. The details of any consultation, which provides an audit trail of how specific issues have been addressed, can for example be presented as an appendix. Under certain consenting regimes, it is necessary to document the consultation process as part of the application and as such this should be determined on a case by case basis. For example, applications submitted to PINS in order to obtain a DCO should be accompanied by a consultation report.

NOTE *Attention is drawn to the Planning Act 2008 [24].*

Similarly, detailed survey reports and the associated data analyses can be provided as an appendix to the main document.

As described in **7.5**, there can be a lack of clarity in reporting making it difficult for the reader to understand how conclusions have been reached. The conclusions from the respective assessments should therefore be summarized at the end of each receptor-based chapter. This should include a clear description of how the assessment methodology has been applied along with the corresponding determination of significance and the associated confidence/uncertainty.

There is also merit in the integrated consideration of inter-relationships and cumulative effects within each of the receptor based chapters as opposed to a separate standalone chapter. This has the benefit of reporting the CIA alongside all of the receptor specific baseline and impact pathway information. It does, however, require a degree of cross-referencing to an over-arching chapter which contains the necessary details of all of the plans and projects that are required to be included within the assessment.

Proposed mitigation and monitoring measures (for implementation during the construction, operational and decommissioning phases of a project) should be reported within the respective receptor chapters as these are required to provide the final determination of impact significance. Residual impacts should be determined and reported following the adoption of the specified mitigation measures). All of these measures along with any monitoring requirements should be captured in a final chapter at the end of the ES for ease of reference.

An outline ES template has been provided in Annex D along with the qualities of a good ES as outlined by the European Commission [51]. It is, however, recognized that there should be a degree of flexibility when developing an ES as every project is different. It should also be noted that in consultation with the competent authority it is possible (and in some cases necessary) to submit a draft ES in what is called a "pre-application" stage. This provides the opportunity for the clarification of any outstanding issues prior to submission of the final application. However, it is important to note that there is the potential for the proposer to be required to submit further information to support their application after submitting the ES, even on occasions where the draft ES has been reviewed by the competent authority during pre-application or gate-checked upon submission.

Discussions should be held with the competent authority to determine whether it is appropriate for any of the materials that are submitted as part of an application to be provided in digital format.

9 Mitigation and monitoring plans

9.1 General

Mitigation is the method or action(s) that will be implemented by the proposer as part of the project programme to reduce and/or avoid any significant environmental effects and is a statutory component of the EIA. This includes both embedded mitigation measures which will ultimately form part of the scheme design/placement as well as those measures that will be specifically implemented during the construction, operational and decommissioning phases of a project.

As described in the SNH *Environmental Assessment Handbook* [38] and the Marine Scotland *Licensing and Consents Manual* (draft) [18], mitigation can be achieved in a variety of ways, including the following:

a) locating the project so as not to affect environmentally sensitive locations;
b) using construction, operation and restoration methods or processes which reduce environmental effects;
c) designing the project carefully to avoid or minimize environmental effects; and
d) introducing specific measures into the project design, construction, decommissioning and restoration that will reduce or compensate for adverse effects.

Mitigation measures should be considered from the start of the project design to allow for integrated solutions to any potential environmental effects and assessment of residual impacts. As described by Marine Scotland [18], the proposer should provide detailed information about each of the mitigation measures including:

a) what is proposed;
b) where and when it will be implemented;
c) duration of the measure;
d) how effective the measures will be; and
e) responsibilities for monitoring the measure.

The mitigation measures themselves should be assessed for environmental impact (and in some instances will be subject to consenting) and any uncertainty in the effectiveness of the measures should be noted in the ES. A section should be provided that summarizes all proposed mitigation measures for each of the potentially significant impacts.

Case study: Neart na Gaoithe Offshore Wind Farm

The consented Neart na Gaoithe Offshore Wind Farm is located in the outer Firth of Forth off the East Coast of Scotland, covering an area of approximately 83 km^2. Chapter 25 of the ES (EMU Limited, 2012 [56]) provided a summary of pledged mitigation and monitoring should the application be granted consent.

The proposer (Mainstream Renewable Power) suggested a range of anticipated licence conditions based on the preparation of the ES. These included, amongst others, the marking or lighting of installed structures, informing the United Kingdom Hydrographic Office ("UKHO") of the location of the works, notifying local mariner's and fishermen's organizations of the works and construction vessels complying with the Colregs (e.g. the displaying of lights, shapes and signals). It could be argued that, at this pre-consent stage of the EIA process, it is excessive/detrimental for the proposer to identify licence conditions that may arise. However, this forward-thinking approach should be taken as it can feed back into the project design and, potentially, help to avoid delays

***NOTE** The PINS process in England considers a similar approach, with proposers required to draft DCO and marine licence conditions from the outset.*

Subsequently, the mitigation and monitoring requirements of each individual receptor assessed in the ES were discussed. For example, the main environmental concern of the development on marine mammals was noise during the construction phase and mitigation measures were suggested to reduce the risk of permanent or temporary hearing loss (e.g. "soft-start" piling techniques). In terms of monitoring, the proposer suggested the recording of actual noise produced during installation; although confirmation of such monitoring plans would need to be agreed in consultation with the competent authority and its advisors.

The chapter concluded with a summary table to consolidate the mitigation and monitoring plans for all receptors.

Monitoring of environmental parameters can occur at a number of stages within the EIA process. The purpose of any monitoring that is undertaken should be fully understood and documented. Collection of appropriate data to allow characterization of a site in terms of the presence, nature and extent of potential receptors is a key aspect of the EIA process. The type of data for characterization and the methods by which they are collected will generally be determined during scoping and associated consultation with the competent authority, consultees and other stakeholders (see **Clause 5**). However, assuming consent is granted for development, a condition may be the monitoring of features considered to be potentially at risk from the development (Trendall et al. 2011 [57]). Under the revised EIA Directive there are clearer requirements on the proposer to identify and implement monitoring arrangements. However, such practices are already largely adopted within the UK and the revisions are unlikely to give rise to the need for any changes in practice.

Mitigation and monitoring that is required to minimize environmental effects and for impact verification purposes is typically reported within the ES (see **Clause 8**). It is also frequently documented within environmental management and monitoring plans (EMMPs). It is known, for example, that a management and monitoring plan is currently being developed for the East Anglia One Offshore Wind Farm (OWF) development. These documents provide a useful mechanism by which on-going monitoring requirements can be identified and reported against.

9.2 Recommendations

The main issue that has been identified by proposers with regard to mitigation and monitoring is that requirements are often not tailored to an individual project. In this context it is suggested that lessons are not being learnt from schemes that have already been implemented. It could be possible, for example, to develop a sufficient knowledge base and level of certainty to alleviate the need for some mitigation measures to be requested uniformly for all schemes. This again relates back to considering the project and site specific details when determining potential environmental effects and how these should be addressed.

Similarly, where a lot of site characterization, baseline and impact verification monitoring data has already been collected for a particular location or development type, further data requests should be targeted and proportionate to reflect the levels of uncertainty. One limiting factor for this is that there is currently no formal mechanism to make all monitoring results public, which can then restrict further lesson learning as part of future EIAs. Where data is made available there will be a time lag as monitoring data can take several months to collect and publish in a format that can be shared with others. Data-sharing mechanisms also require the expenditure of resources for which someone needs to take ownership. In addition they also need to be respectful of commercial sensitivities.

Initiatives such as The Crown Estate's online Marine Data Exchange (MDE), which provides access to survey data and reports collated during the planning, building and operating of offshore renewable energy projects, and MEDIN are, however, starting to address data sharing issues. In addition, reports such as those commissioned by RUK (2011 [58]) and the MMO (2014 [59]) have sought to identify lessons learnt to date. The MMO report [59] specifically provides a review of post-consent offshore wind farm monitoring data associated with licence conditions. It concludes that monitoring should focus on receptors for which the development is most likely to have a significant impact and where there are uncertainties over the impact assessment, with less emphasis on monitoring impacts which already have a degree of certainty (mitigation measures should protect the environment in such cases). It also supports the notion of formulating expert working groups to discuss and inform best practice for post-consent monitoring. In Scotland the use of monitoring advisory groups has become an established practice.

Overall it is recognized that all of the available evidence base should be used to ensure that mitigation and monitoring requirements are fully rationalized, recognizing that site-specific issues will always require particular scrutiny. Mitigation measures should be proportionate to the severity of the potential environmental effects and the associated level of uncertainty. They should also reflect the specific environment and time periods in which they will be required, for example whether they are required for specific times or applicable all year round. Mitigation measures that can be embedded in to the scheme design and construction plan to ensure that potential adverse effects are avoided altogether should be considered throughout the design and assessment process.

The data required to inform the site characterization of a particular location will have been defined at the scoping stage. As described in **Clause 5**, this data collection should be targeted and be capable of meeting all of the associated project consenting requirements. Baseline surveys (undertaken post-consent prior to construction) and impact verification monitoring should be similarly targeted towards significant environmental effects. It should be hypothesis-driven and provide a feedback mechanism for adaptive management if required. The methods of data collection should also, as far as possible, be consistent through all stages of a project, recognizing that each will need to be tailored to answer the specific questions posed at each stage. This will ensure consistency between datasets wherever possible. In this context industry-wide standardized approaches to data collection and analysis could enhance the overall value that can be gained from the data that is collected from such projects. This includes the use of such data in cumulative impact assessments. There is also potential value in considering a more strategic approach to post consent monitoring and as such this should be investigated further.

There are potential benefits of agreeing, at least in principle, the post-consent monitoring requirements of a scheme in advance of permissions being granted. The use of this approach is becoming more common, particularly for NSIPs. It demonstrates a level of commitment by all parties and streamlines the process of discharging planning conditions that are attached to a particular development once consent has been given. As described in **9.1**, this can be in the form of EMMPs which tend to be produced in an iterative process through the later stages of project consenting and the commencement of construction. A process of adaptive management can be employed through the finalization and implementation of an EMMP or an in-principle monitoring plan.

The requirement for an EMMP and what it is expected to contain would however need to be recorded as a licence condition in order to be enforceable.

An additional issue relates to the process for ensuring mitigation and monitoring objectives have been met, which is currently poorly defined. Therefore, there is the potential to develop a formal mechanism to ensure that this process is achieved. This could, for example, be best achieved through the role of environmental steering committees (ESCs) (see **10.2**). Members of ESCs could also have a role in ensuring that the maximum benefit is gained from all data and evidence that is gathered through the implementation of a project. It is also recognized that under the revised EIA Directive there will be a requirement to ensure that design and actionable mitigation measures related to significant adverse effects are implemented by the developer.

10 Communication

10.1 General

Communication is a fundamental aspect throughout all phases of an EIA. The Public Participation Directive (PPD) (2003/35/EC), which came in to force in June 2005 [60], aims to provide greater scope for the involvement of interested parties, including the general public, in environmental assessment procedures. Not only is there a legal requirement to consult on potential environmental effects of a development, but effective communication can also help to streamline the process and support effective decision making. Written assessments describe, consolidate and demonstrate the key project information and form the final deliverables of the EIA process, but communication should also facilitate a means of open (formal and informal) dialogue, liaison and discussion with the relevant bodies.

Clear communication between the proposer, the competent authority and consultees will generally improve understanding of the project and the environmental issues and effects of the project (SNH, 2013 [17]; PINS, 2013 [20]). It may also help to inform/amend the project design, potentially reducing the need to mitigate for certain effects or providing an earlier indication of the mitigation measures required, both of which are beneficial outcomes for the proposer. Stakeholder engagement can also help to reduce opposition to proposed projects, again reducing potential delays and additional costs being incurred throughout the project lifecycle. Therefore, early and on-going dialogue between the proposer and the competent authority should be undertaken, as well as with relevant consultees to discuss overlap with specific topics. Where communication is made between the proposer and consultees, all correspondence should be copied to the competent authority. As described in the SNH *Environmental Handbook* [17], EIA at its best is an interactive process with each of the main parties informing and influencing the others.

10.2 Recommendations

The majority of issues associated with the EIA process can be linked, in some form, to communication, or lack of communication. This is most evident where consultation is not undertaken in a timely manner, resulting in delays to the decision making process. Similarly, if the full list of consultees is not identified at an early stage in the project, this can result in issues initially being neglected and ultimately delay to the project programme. Proposers have also reported variable experiences dependent on the location/individuals that they have dealt with. In addition, there is frequently a failure to complete clear audit trails throughout all phases of the EIA process.

Overall communication should be clear, timely and fully auditable, but that does not mean it should be confined to formal settings. Informal conversations can be valuable in guiding proposers in their assessment, ensuring a detailed understanding of the project and its progression is maintained. The proposer should therefore talk to all relevant bodies and stakeholders outside of the formal consultation regime where new information becomes available. It should also be recognized by both parties that experience in this sector is continuously growing and that the on-going sharing of knowledge is critical to overall project success.

The proposer should understand who should be consulted, what information is needed to make the consultation effective and when in the process this should occur. The key stages of communication throughout the lifecycle of a project is provided in Table 3. This also makes recommendations as to who should be consulted and what information should be presented at each stage. It should also be noted that a number of competent authorities now charge for the provision of advice and the implications of this will need to be considered by the proposer on a case-by-case basis.

Table 3 – Key stages of communication

Project Stage	Format of information	Competent authority/ statutory consultation bodies	Wider stakeholders
Project inception.	Outline of proposals.	Preliminary advice on consenting requirements. Key considerations for development of the scheme design.	Proposer to consider benefits of initiating early engagement.
Screening.	Screening request.	Screening opinion.	
Scoping.	Scoping request.	Scoping opinion.	Role will be dependent on the level of engagement by the proposer and competent authority at this stage.
PEI and pre-application consultation.	PEI and statement of community consultation (England and Wales only). Pre-application consultation report (Scotland) (if required).	Provide comments within specified time-period.	Provide comments within specified time period.
Final design envelope.	Provide details of the final scheme design/proposed construction methodology. Ensure scoping opinion remains valid.	Ensure scoping opinion remains valid.	
Environmental statement.	Assess significant effects. Identify required mitigation and monitoring. Discuss areas of uncertainty in determining the significance of potential environmental effects. Submit draft ES for review.	Gate-check application to determine suitability and adequacy to enable consent determination. Provide advice, information sources and outline any further requirements. Review draft ES and advise on whether there are any outstanding issues to be addressed prior to submission of the final ES.	Proposer to consider benefits of engagement on specific technical issues. Role will be dependent on the level of engagement by the proposer and competent authority at this stage.

Table 3 – Key stages of communication *(continued)*

Project Stage	Format of information	Competent authority/ statutory consultation bodies	Wider stakeholders
Application.	Submit final ES and other associated planning documentation.	Review ES to ensure that the requirements of the EIA Directive have been met. Request further information where required. Where further information is provided the implications for the EIA and the validity of the findings of the ES should be reviewed. Publicize application for formal consultation.	Will have the opportunity to comment on application as part of formal consultation.
Determination.	Provide details of consent decision.	Provide formal response. Publicize decision.	Consider decision and respond if required.
Post consent.	Provide details of impact verification monitoring.	Review of monitoring data. Advise on the need for adaptive management measures if required.	Proposer to consider involving relevant parties as appropriate.
Throughout.	Notification of any changes to the proposed scheme. Problems encountered with obtaining data/surveys. On-going issues that require clarification. Maintain an audit trail as to how all issues have been addressed.	Remain responsive to both formal and informal requests for information. Maintain an audit trail as to how all issues have been addressed (gap analysis).	Large schemes may require multiple public exhibitions. Timing of comment provision/discussions will be dependent on when details of the project are supplied by the proposer/competent authority. Early consultation is recommended to identify all potential issues as soon as is practicable.

The competent authority should be the initial point of contact for the proposer (see **3.3**). Each of these organizations will also be advised by statutory consultation bodies, other statutory bodies (for example, navigation authorities and heritage bodies) and technical advisors (e.g. Centre for Environment, Fisheries and Aquaculture Science (Cefas) in England). Proposers should also bear in mind the need to consult widely on their proposals, particularly including environmental non-governmental organization (NGOs) and other sea users that might be affected by development proposals. Where transboundary effects have been identified there will also be a requirement for international consultation. Communication between competent authorities, statutory bodies and their technical advisors should be fully co-ordinated. This is particularly apparent where multiple competent authorities have responsibilities for the consenting of a project.

In developing a communication strategy for a project, timescales should be agreed, set and adhered to by all parties. It is recognized, however, that there will need to be some flexibility in this approach where any potential delays (again from all parties) should be notified as soon as possible. This will serve to ensure that appropriate staffing resources can be available when required. The implications of any time delays should be fully understood, particularly where there are specific windows of opportunity or deadlines to be met. It is worth noting that within the determination of NSIPs there are set timelines which must be adhered to.

For larger projects there has been an increasing tendency for the use of ESCs where key consultees meet regularly with the proposer as part of an on-going project review process. These groups can be established at the point of project inception, meet throughout the scheme assessment phase and have continued involvement throughout the construction and operational phases of the project. In the latter stages, the ESC review impact verification monitoring and can facilitate adaptive management as required. Such groups also have the added advantage of maintaining the continuity of project understanding throughout all of these project stages.

During the application phase public notices, which clearly define the consultation periods, are to be advertised.

NOTE *Attention is drawn to the EIA Directive [2].*

Similarly, as part of this process, submitted application documents are held in a public building during the consultation period. Competent authorities frequently instruct the proposer to ensure that these documents are available and that such public notices are issued. The publication/advertising strategy, including any associated templates, should therefore be agreed between the competent authority and the proposer prior to submission of the application.

Annex A (informative)
Offshore renewable energy (ORE) guidance documents

Table A.1 – Offshore renewable energy (ORE) guidance documents

Date published	Title	Reference
General guidance		
2014.	IMPACT Assessment Tool (online) - Potential Impacts of Marine Energy Development on Scotland's Marine Ecological Environment.	Aquatera (http://www.scotland.gov.uk/Topics/marine/Licensing/marine/tool)
2014.	Guidance on Marine Licensable Activities subject to Pre-Application Consultation	Marine Scotland (http://www.scotland.gov.uk/Resource/0043/00439649.pdf)
January 2014.	Marine Scotland Guidance Review for Marine Renewables.	ABP Marine Environmental Research Ltd (ABPmer). 2014. Marine Scotland Guidance Review for Marine Renewables. Report R.2201. January 2014. Prepared for Marine Scotland.
July 2013.	EIA Consultation and Notification	The Planning Inspectorate. 2013. EIA Consultation and Notification. Advice note three. July 2013.
July 2013.	Screening, Scoping and Preliminary Environmental Information.	The Planning Inspectorate. 2013. Screening, Scoping and Preliminary Environmental Information. Advice note seven. July 2013.
April 2013.	Marine Licensing in Scotland's Seas Under the Marine (Scotland) Act 2010 and the Marine and Coastal Access Act 2009.	Marine Scotland. 2013. Marine Licensing in Scotland's Seas Under the Marine (Scotland) Act 2010 and the Marine and Coastal Access Act 2009. Revised April 2013.
2013.	A Handbook on Environmental Impact Assessment	Scottish Natural Heritage (SNH). 2013. A handbook on environmental impact assessment. Guidance for Competent Authorities, Consultees and others involved in the Environmental Impact Assessment Process in Scotland. 4th Edition.
October 2012.	Marine Scotland Licensing and Consent Manual.	Marine Scotland. 2012. Marine Scotland Licensing and Consents Manual. Covering Marine Renewables and Offshore Wind Energy Development. Draft Report R.1957. October 2012.
September 2012.	Evidence plans for Nationally Significant Infrastructure Projects.	Department for Environment, Food and Rural Affairs (Defra). 2012. Habitats Regulations. Evidence plans for Nationally Significant Infrastructure Projects. September 2012.

Table A.1 – Offshore renewable energy (ORE) guidance documents *(continued)*

Date published	Title	Reference
May 2012.	Guidelines for data acquisition to support marine environmental assessments of offshore renewable energy projects.	Centre for Environment, Fisheries and Aquaculture Science (Cefas). 2012. Guidelines for data acquisition to support marine environmental assessments for offshore renewable energy projects. Cefas contract report: ME5403 – Module 15. Issue date: 2nd May 2012.
April 2012.	Using the "Rochdale Envelope".	The Planning Inspectorate. 2011. Using the "Rochdale Envelope". Advice note nine. April 2012.
November 2011.	Guidance on the Electricity (Environmental Impact Assessment) (Scotland) Amendment Regulations 2008.	Marine Scotland (http://www.scotland.gov.uk/Resource/Doc/917/0122729.pdf)
January 2011.	Decommissioning of offshore renewable energy installations under the Energy Act 2004.	Department of Energy and Climate Change (DECC). 2011. Decommissioning of offshore renewable energy installations under the Energy Act 2004. Guidance notes for industry. January 2011 (revised).
2008.	OSPAR Guidance on Environmental Considerations for Offshore Wind Farm Development.	OSPAR. 2008. OSPAR Guidance on Environmental Considerations for Offshore Wind Farm Development. Reference number: 2008-3.
2008.	Assessment of the environmental impact of offshore wind-farms.	OSPAR Commission. 2008. Assessment of the environmental impact of offshore wind-farms. Biodiversity Series.
June 2006.	Guidelines for Ecological Impact Assessment in the United Kingdom.	IEEM. 2006. Guidelines for Ecological Impact Assessment in the United Kingdom.
2006.	Review of the Current State of Knowledge on the Environmental Impacts of the Location, Operation and Removal/Disposal of Offshore Wind-Farms.	OSPAR. 2006. Review of the Current State of Knowledge on the Environmental Impacts of the Location, Operation and Removal/Disposal of Offshore Wind-Farms. Biodiversity Series. Status Report April 2006.
2004.	Guidelines for Environmental Impact Assessment.	Institute of Environmental Management and Assessment (IEMA). 2004. Guidelines for Environmental Impact Assessment.
2002.	Natura 2000 in UK Offshore Waters: Advice to support the implementation of the EC Habitats and Birds Directives in UK offshore waters.	Johnston, C.M., Turnbull, C.G. and Tasker, M.L. 2002. Natura 2000 in UK Offshore Waters: Advice to support the implementation of the EC Habitats and Birds Directives in UK offshore waters. JNCC Report 325.

Table A.1 – Offshore renewable energy (ORE) guidance documents *(continued)*

Date published	Title	Reference
Undated.	Guidance on the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2000.	Marine Scotland (http://www.scotland.gov.uk/Topics/Business-Industry/Energy/Infrastructure/Energy-Consents/Guidance/EIA-Guidance)
Cumulative/in-combination effects		
December 2014	A Strategic Framework for Scoping Cumulative Effects.	Marine Management Organisation (MMO). 2014. A Strategic Framework for Scoping Cumulative Effects. A report produced for the Marine Management Organisation, pp 224. MMO Project No: 1055. December 2014.
April 2014.	Development of a generic framework for informing Cumulative Impact Assessments (CIA) related to Marine Protected Areas through evaluation of best practice.	Natural England. 2014. Development of a generic framework for informing Cumulative Impact Assessments (CIA) related to Marine Protected Areas through evaluation of best practice. Natural England Commissioned Report NECR147, prepared by ABP Marine Environmental Research Ltd (ABPmer) supported by Wildfowl & Wetlands Trust Consulting. First published 14 April 2014.
June 2013.	Guiding Principles For Cumulative Impacts Assessment In Offshore Wind Farms.	RenewableUK (RUK). 2013. Cumulative Impact Assessment Guidelines Guiding Principles For Cumulative Impacts Assessment In Offshore Wind Farms. June 2013.
Survey, Mitigation, Management and Monitoring		
2012.	Survey, Deploy and Monitor Licensing Policy Guidance (draft).	Marine Scotland. Survey, Deploy and Monitor Licensing Policy Guidance (draft). 5pp.
2011.	Guidance on survey and monitoring in relation to marine renewables deployments in Scotland. Volume 1. Context and General Principles.	Trendall, J.R., Fortune, F. and Bedford, G.S. 2011. Guidance on survey and monitoring in relation to marine renewables deployments in Scotland. Volume 1. Context and General Principles. Unpublished report to Scottish Natural Heritage and Marine Scotland.
2011.	Guidance on survey and monitoring in relation to marine renewables deployments in Scotland. Volume 2. Cetaceans and Basking Sharks.	Macleod, K., Lacey, C., Quick, N., Hastie, G. and Wilson J. 2011. Guidance on survey and monitoring in relation to marine renewables deployments in Scotland. Volume 2. Cetaceans and Basking Sharks. Unpublished report to Scottish Natural Heritage and Marine Scotland.

Table A.1 – Offshore renewable energy (ORE) guidance documents *(continued)*

Date published	Title	Reference
2011.	Guidance on survey and monitoring in relation to marine renewables deployments in Scotland. Volume 3. Seals.	Sparling, C., Grellier, K., Philpott, E., Macleod, K., and Wilson, J. 2011. Guidance on survey and monitoring in relation to marine renewables deployments in Scotland. Volume 3. Seals. Unpublished report to Scottish Natural Heritage and Marine Scotland.
2011.	Guidance on survey and monitoring in relation to marine renewables deployments in Scotland. Volume 4. Birds.	Jackson, D., and Whitfield, P. 2011. Guidance on survey and monitoring in relation to marine renewables deployments in Scotland. Volume 4. Birds. Unpublished report to Scottish Natural Heritage and Marine Scotland.
2011.	Guidance on survey and monitoring in relation to marine renewables deployments in Scotland. Volume 5. Benthic Habitats.	Saunders, G., Bedford, G.S., Trendall, J.R., and Sotheran, I. 2011. Guidance on survey and monitoring in relation to marine renewables deployments in Scotland. Volume 5. Benthic Habitats. Unpublished report to Scottish Natural Heritage and Marine Scotland.
2001.	Marine Monitoring Handbook.	Davies, J., Baxter, J., Bradley, M., Connor, D., Khan, J., Murray, E., Sanderson, W., Turnbull, C. and Vincent, M. 2001. Marine Monitoring Handbook. Joint Nature Conservation Committee (JNCC).

Annex B (informative)
Impact assessment matrices

B.1 General

The assessment of significance is typically undertaken through the progression of a series of matrices. An example of the type of matrices that can be applied is contained within this Appendix.

B.2 Determining exposure

Exposure is determined through consideration of the predicted magnitude of change and the probability of occurrence (see **Table B.1**). Magnitude of change needs to be considered in spatial and temporal terms (including duration, frequency and seasonality), and against the background environmental conditions in a study area. Once a magnitude has been assessed, this should be combined with the probability of occurrence to arrive at an exposure score which can then be used for the next step of the assessment, which is detailed in **Table B.2**. For example, an impact pathway with a medium magnitude of change and a high probability of occurrence would result in a medium exposure to change.

B.3 Determining vulnerability

Vulnerability of the features of interest is based on the sensitivity of those features and their exposure to a given change. Where the exposure and sensitivity characteristics overlap then vulnerability exists and an adverse effect may occur. For example, if the impact pathway previously assessed with a medium exposure to change acted on a receptor which had a high sensitivity, this would result in an assessment of high vulnerability. Sensitivity can be described as the intolerance of a habitat, community or individual of a species to an environmental change and essentially considers the response characteristics of the feature. Thus, if a single or combination of environmental changes is likely to elicit a response then the feature under assessment can be considered to be sensitive. Where an exposure or change occurs for which the receptor is not sensitive, then no vulnerability can occur. Similarly, where a negligible exposure is identified during an impact assessment, vulnerability will always be "none", no matter how sensitive the feature is, the change had been assessed as "negligible".

Table B.1 – Exposure to change, combining magnitude and probability of change

Probability of occurrence	Magnitude of change			
	Large	Medium	Small	Negligible
High	High.	Medium.	Low.	Negligible.
Medium	Medium.	Medium/low.	Low/negligible.	Negligible.
Low	Low.	Low/negligible.	Negligible.	Negligible.
Negligible	Negligible.	Negligible.	Negligible.	Negligible.

Table B.2 – Estimation of vulnerability based on sensitivity and exposure to change

Sensitivity of feature	Exposure to change			
	High	Medium	Low	Negligible
High	High.	High.	Moderate.	None.
Moderate	High.	Moderate.	Low.	None.
Low	Moderate.	Low.	Low.	None.
None	None.	None.	None.	None.

B.4 Determining significance

The vulnerability is then combined with the importance of the feature of interest using **Table B.3** to generate an initial level of significance. The importance of a feature is based on its value and rarity such as the levels of protection. For example, if a high vulnerability was previously given to a feature of low importance an initial level of significance of minor would be given.

Table B.3 – Estimation of significance based on vulnerability and importance

Importance of feature	Vulnerability of feature to impact			
	High	Moderate	Low	None
High	Major.	Moderate.	Minor.	Insignificant.
Moderate	Moderate.	Moderate/minor.	Minor/insignificant.	Insignificant.
Low	Minor.	Minor/insignificant.	Insignificant.	Insignificant.
None	Insignificant.	Insignificant.	Insignificant.	Insignificant.

Annex C (informative) Receptor based methodologies

Table C.1 – Guidance summary, impact pathways and assessment methods and tools

Guidance summary	Key impact pathways	Assessment methods and tools
Coastal marine processes/Geology		
ABP Marine Environmental Research Ltd (ABPmer) and Metoc Plc. 2002. Potential effects of offshore wind developments on coastal processes. ABP Marine Environmental Research Ltd (ABPmer) and HR Wallingford. 2009. Coastal Process Modelling for Offshore Wind Farm Environmental Impact Assessment. Topper, M.B.R. 2010. Guidance for Numerical Modelling of Wave and Tidal Energy. SuperGen Marine. The University of Edinburgh. Revision: 729. March 2010.	Changes in bed levels. Changes to the current regime. Changes to the wave regime. Changes to the sediment transport regime. Development of scour around infrastructure. Changes to coastal morphology.	A combination of qualitative and quantitative techniques including: • numerical modelling analyses; • standard empirical equations describing the settling and mobilisation characteristics of released sediment particles; and • review in the context of the existing evidence base.
Water and sediment quality		
Cole, S., Codling, I.D., Parr, W. and Zabel, T. 1999. Guidelines for managing water quality impacts within UK European marine sites. October 1999. Environment Agency, the Environment and Heritage Service for Northern Ireland and Scottish Environment Protection Agency (SEPA). Undated. Pollution Prevention Guidelines (PPGs).		

Table C.1 – Guidance summary, impact pathways and assessment methods and tools *(continued)*

Guidance summary	Key impact pathways	Assessment methods and tools
Nature conservation and aquatic ecology: marine mammals and turtles		
Macleod, K., Lacey, C., Quick, N., Hastie, G. and Wilson J. 2011. Guidance on survey and monitoring in relation to marine renewables deployments in Scotland. Volume 2. Cetaceans and Basking Sharks. Unpublished draft report to Scottish Natural Heritage and Marine Scotland. Sparling, C., Grellier, K., Philpott, E., Macleod, K., and Wilson, J. 2011. Guidance on survey and monitoring in relation to marine renewables deployments in Scotland. Volume 3. Seals. Unpublished draft report to Scottish Natural Heritage and Marine Scotland. Scottish Natural Heritage. 2014. Recommendations for the Presentation and Content of Interim Marine Bird, Mammal and Basking Shark Survey Reports for Marine Renewable Energy Developments. FEAST feature activity sensitivity tool (http://www.marine.scotland.gov.uk/FEAST/Index.aspx). Harwood, J. and King, S.L. The Sensitivity of UK Marine Mammal Populations To Marine Renewables Developments. Report SMRUL-NER-2012-027. (unpublished). Mackenzie, M.L., Scott-Hayward, L.A., Oedekoven, C.S., Skov, H., Humphreys, E. and Rexstad, E. 2014. Statistical Modelling of Seabird and Cetacean Data: Guidance Document. Marine Scotland Science Report 04/14.	Changes in water quality (elevation of suspended sediment concentrations, release of contaminants, changes in dissolved oxygen concentrations). Increased turbulence. Habitat alteration. Underwater collision. Underwater noise. Increased risk of entanglement with underwater infrastructure. Displacement/barrier effects on movements and migration. Changes to prey availability. Increased electromagnetic field (EMF) emissions.	A combination of qualitative and quantitative techniques including: • encounter risk modelling; • acoustic modelling; and • review in the context of the existing evidence base.

Table C.1 – Guidance summary, impact pathways and assessment methods and tools *(continued)*

Guidance summary	Key impact pathways	Assessment methods and tools
Nature conservation and aquatic ecology: ornithology		
King, S., Maclean, I., Norman, T. and Prior, A. 2009. Developing guidance on ornithological Cumulative Impact Assessment for offshore wind farm developers. Scottish Natural Heritage (SNH). 2014. Recommendations for the Presentation and Content of Interim Marine Bird, Mammal and Basking Shark Survey Reports for Marine Renewable Energy Developments. Walls, R., Pendlebury, C., Budgey, R., Brookes, K. and Thompson, P. 2009. Revised best practice guidance for the use of remote techniques for ornithological monitoring at offshore windfarms. Jackson, D. and Whitfield, P. 2011. Guidance on survey and monitoring in relation to marine renewables deployments in Scotland. Volume 4. Birds. Unpublished draft report to Scottish Natural Heritage and Marine Scotland. Furness, R.W., Wade, H.M., Robbins, A.M.C. and Masden, D.A. 2012. Assessing the sensitivity of seabird populations to adverse effects from tidal stream turbines and wave energy devices. ICES Journal of Marine Science 69(8): 1466-1479. Scottish Natural Heritage (SNH). 2000. Windfarms and Birds: Calculating a theoretical collision risk assuming no avoiding action. Band. 2012. Using a collision risk model to assess bird collision risks for offshore windfarms. Mackenzie, M.L., Scott-Haywood, L.A., Oedekoven, C.S., Skov, H., Humphreys E. and Rexstad, E. 2014. Statistical Modelling of seabird and Cetacean Data: Guidance Document. Report for Marine Scotland.	Changes in water quality (elevation of suspended sediment concentrations, release of contaminants, changes in dissolved oxygen concentrations). Increased turbulence. Habitat alteration. Underwater and above water collision. Displacement/barrier effects on movements and migration. Changes to prey availability.	The assessment is typically supported by detailed surveys and data collections including: • collision risk models; • statistical modelling of seabird data; • review in the context of the existing evidence base; and • understanding the ecological importance of site specific impacts.

Table C.1 – Guidance summary, impact pathways and assessment methods and tools *(continued)*

Guidance summary	Key impact pathways	Assessment methods and tools
Furness, B. and Wade, H. 2012. Vulnerability of Scottish seabirds to offshore wind turbines. MacArthur Green Ltd. Report for Marine Scotland. The Crown Estate. 2013. Pentland Firth and Orkney Waters Enabling Actions Report Ornithological Cumulative Impact Assessment Framework. Furness. 2014. Biologically appropriate, species-specific geographic non-breeding season population estimates for seabirds. Report for Natural England. FEAST feature activity sensitivity tool (http://www.marine.scotland.gov.uk/FEAST/Index.aspx). Cook, A.S.C.P., Humphreys, E.M., Masden, E.A. and Burton, N.H.K. 2014. Scottish Marine and Freshwater Science Volume 5 Number 16. The Avoidance Rates of Collision Between Birds and Offshore Turbines. Marine Scotland. Wildfowl and Wetlands Trust (Consulting) Ltd. 2014. Scottish Marine and Freshwater Science Report Vol 5 No 12. Strategic assessment of collision risk of Scottish offshore wind farms to migrating birds. Marine Scotland. Mackenzie, M.L., Scott-Hayward, L.A., Oedekoven, C.S., Skov, H., Humphreys, E. and Rexstad, E. 2014. Statistical Modelling of Seabird and Cetacean Data: Guidance Document. Marine Scotland Science Report 04/14.		

Table C.1 – Guidance summary, impact pathways and assessment methods and tools *(continued)*

Guidance summary	Key impact pathways	Assessment methods and tools
Commercial and recreational fisheries		
Seafish and UKFEN. 2013. Economic impact assessments of spatial interventions on commercial fishing: guidance for practitioners. Second Edition. Based on outputs from UK Fisheries Economics Network technical workshops. Edited by Rod Cappell, Jennifer Russell and Hazel Curtis. Edinburgh: Sea Fish Industry Authority. 53 pages. Cefas and MCEU. 2004. Guidance Note for Environmental Impact Assessment in Respect of FEPA and CPA Requirements. Available from: *http://www.cefas.co.uk/publications/files/windfarm-guidance.pdf* Consultation with fishing interests across a number of UK offshore wind farm projects identified 'displacement of fishing activity into other areas' as a potential impact requiring assessment. Malcolm, I.A. Godfrey, J. and Youngson, A.F. 2010. Scottish Review of migratory routes and behaviour of Atlantic salmon, sea trout and European eel in Scotland's coastal environment: implications for the development of marine renewables, Marine and Freshwater Science Vol 1 No 14. Marine Scotland. ScotMap: *http://www.scotland.gov.uk/Topics/marine/science/MSInteractive/Themes/ScotMap*. Fishing Liaison with Offshore Wind and Wet Renewables Group (FLOWW). Best Practice Guidance for Offshore Renewables Developments: Recommendations for Fisheries Liaison: *http://www.sff.co.uk/sites/default/files/FLOWW%20Best%20Practice%20Guidance%20for%20Offshore%20Renewables%20Developments%20Jan%202014.pdf*		

Table C.1 – Guidance summary, impact pathways and assessment methods and tools *(continued)*

Guidance summary	Key impact pathways	Assessment methods and tools
Commercial and recreational navigation		
Department of Trade and Industry (DTI). 2005. Methodology for Assessing the Marine Navigational Safety Risks of Offshore Wind Farms. Maritime and Coastguard Agency (MCA). Undated. Offshore Renewable Energy Installations (OREIs) - Guidance on UK Navigational Practice, Safety and Emergency Response Issues (MGN 371). Maritime and Coastguard Agency (MCA) Undated. Offshore Renewable Energy Installations (OREIs): Guidance to Mariners Operating in the Vicinity of UK OREIs (MGN 372). NOREL. 2012. Under Keel Clearance – Policy Paper Guidance To Developers in Assessing Minimum Water Depth Over Devices.	Changes to the hydrodynamics of an area. Grounding and stranding. Changes to commercial shipping movement. Collision with devices and moorings. Reduced visibility. Structures and cabling to interfere with navigational equipment. Changes to risk management and emergency response.	Navigational risk assessment. A reference which details the application of this tool is "Methodology for assess marine navigational risk (DECC, 2005)". The assessment can be supported by detailed surveys and data collections including: • AIS data; and • Radar surveys.
Marine archaeology and cultural heritage		
COWRIE. 2007. Guidance for assessment of Cumulative Impacts on the historic environment from offshore renewable energy. Institute for Archaeologists. 2008. Standard and guidance for archaeological desk-based assessment. Scottish Government. 1994. Planning Advice Note PAN 42: Advice on the handling of archaeological matters within the planning process.	Removal/disturbance of sediments. Sediment deposition. Seabed scour. Changes in bed levels. Changes to hydrodynamics.	Review in the context of the existing evidence base Geophysical investigations

Table C.1 – Guidance summary, impact pathways and assessment methods and tools *(continued)*

Guidance summary	Key impact pathways	Assessment methods and tools
Department of Trade and Industry (DTI). 2005. Methodology for Assessing the Marine Navigational Safety Risks of Offshore Wind Farms. Maritime and Coastguard Agency (MCA). Undated. Offshore Renewable Energy Installations (OREIs) - Guidance on UK Navigational Practice, Safety and Emergency Response Issues (MGN 371). Maritime and Coastguard Agency (MCA) Undated. Offshore Renewable Energy Installations (OREIs): Guidance to Mariners Operating in the Vicinity of UK OREIs (MGN 372).	Changes to the hydrodynamics of an area. Grounding and stranding. Changes to commercial shipping movement. Collision with devices and moorings. Reduced visibility. Structures and cabling to interfere with navigational equipment. Changes to risk management and emergency response.	Navigational risk assessment. A reference which details the application of this tool is "Methodology for assess marine navigational risk (DECC, 2005)". The assessment can be supported by detailed surveys and data collections including: • AIS data; and • radar surveys.
Seascape and visual impacts		
NOTE *Department of Trade and Industry (DTI). 2005. Guidance on the assessment of the impact of offshore wind farms – seascape and visual impact report.* Hill, M., Briggs, J., Bagnall, D., Foley, K. and Williams, A. 2001. Guide to Best Practice in Seascape Assessment. The Landscape Institute and the Institute of Environmental Management and Assessment. 2002. Guidelines for Landscape and Visual Impact Assessment. Scottish Natural Heritage (SNH). 2012. Offshore Renewables – guidance on assessing the impact on coastal landscape and seascape: Guidance for Scoping an Environmental Statement. Swanwick, Carys Department of the University of Sheffield and Land Use Consultants. 2002. Landscape Character Assessment: Guidance for England and Scotland. Scottish Natural Heritage (SNH). 2014. Visual Representation of Wind farms. Version 2. ***NOTE*** *Local planning authorities may have prepared their own guidance on visual impact assessment.*		

Annex D (informative) Preparation of the ES

The following list of qualities has been prepared by the European Commission [41] to highlight what makes a good ES (cited in Marine Scotland *Licensing and Consents Manual (draft) [18]):*

a) a clear structure with a logical sequence for example, describing, existing site conditions, predicted effects (nature, extent and magnitude), scope for mitigation, agreed mitigation measures, significance of unavoidable/residual impacts for each environmental topic;
b) a table of contents and list of acronyms/ abbreviations;
c) a clear description of the development consent procedure and how EIA fits within it;
d) reads as a single document with appropriate cross-referencing;
e) is concise, comprehensive and objective;
f) is written in an impartial manner without bias;
g) includes a full description of the development proposals;
h) makes effective use of diagrams, illustrations, photographs and other graphics to support the text;
i) uses consistent terminology with a glossary;
j) references all information sources used;
k) has a clear explanation of complex issues;
l) contains a good description of the methods used for the studies of each environmental topic;
m) covers each environmental topic in a way which is proportionate to its importance;
n) provides evidence of good consultations;
o) includes a clear discussion of alternatives;
p) makes a commitment to mitigation (with a programme) and to monitoring; and
q) has a "non-technical summary" which does not contain technical jargon.

Table D.1 provides a suggested template for the preparation of the ES.

Table D.1 – ES template

Non-technical summary.
Description of the project and of the regulated activity.
Legislative context.
Outline of alternatives.
Assessment methodology and likely significant effects.
Impact assessment
Parameters: • physical processes; • water and sediment quality; • nature conservation and aquatic ecology; – terrestrial ecology; – marine ecology including benthic habitats and species; – fish, migratory fish and shellfish; – marine mammals and turtles; and – ornithology; • nature conservation, protected areas and species; • commercial and recreational fisheries; • commercial and recreational navigation; • marine archaeology and cultural heritage; • coast protection and flood defence; • landscape/seascape and visual; • other sea users (e.g. oil and gas; subsea pipelines; dredging and marine aggregate extraction, tourism and recreation, aviation, military activity, munitions) • traffic and transport; • air quality; • noise and vibration; and • socio-economics.
Each receptor should contain the following: • description of current situation; • description of predicted future status.
Likely significant effects. Construction, operational and decommissioning. Direct and indirect. With and without mitigation (if applicable). Cumulative. Recognition of uncertainty, data gaps.
Cumulative impacts.
Mitigation measures – overall review of mitigation measures. Monitoring requirements.
Conclusions.
Comment log/ audit trail.

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Other publications

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[2] EUROPEAN UNION. Directive 2014/52/EU of the European Parliament and Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment. *Luxembourg: Publications Office of the European Union, 2014.*

[3] EUROPEAN COMMUNITIES. European Parliament and Council Directive 2008/56/EC of 17 June 2008 establishing a framework for community action in the field of marine environmental policy. Luxembourg: Office for Official Publications of the European Communities, 2008.

[4] EUROPEAN COMMUNITIES. Directive 2001/42/EC of the European Parliament and the Council of 27 June 2001 on the assessment of the effects of certain plans and programmes on the environment. Luxembourg: Office for Official Publications of the European Communities, 2001.

[5] EUROPEAN COMMUNITIES. Directive 2000/60/EC of the European Parliament and Council of 23 October 2000 establishing a framework for Community action in the field of water policy. Luxembourg: Office for Official Publications of the European Communities, 2000.

[6] GREAT BRITAIN. The Marine Works (Environmental Impact Assessment) Regulations 2007. London: The Stationery Office.

[7] GREAT BRITAIN. The Town and Country Planning (EIA) Regulations 2011. London: The Stationery Office.

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[14] GREAT BRITAIN. The Harbour Works (Environmental Impact Assessment) Regulations 1999. London: The Stationery Office.

[15] NORTHERN IRELAND. The Harbour Works (Environmental Impact Assessment) Regulations (Northern Ireland) 2003. London: The Stationery Office.

[16] GREAT BRITAIN. The Infrastructure Planning (Environmental Impact Assessment) Regulations 2009. London: The Stationery Office.

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