HORIZON NUCLEAR POWER

WYLFA NEWYDD

ENERGY WORKING FOR BRITAIN

Wylfa Newydd Project

6.2.13 ES Volume B - Introduction to the environmental assessments B13 - Marine environment

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Contents

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13 The marine environment

13.1 Introduction

13.1.1 This chapter provides an introduction to the technical basis for the marine environment assessment for the Wylfa Newydd Project. It includes a summary of legislation, policy and guidance; key points arising in consultation that have guided the marine environment assessment; and assessment methodologies and criteria.

13.1.2 The assessment of effects for the marine environment is included in chapter D13 (the marine environment) (Application Reference Number: 6.4.13) for the Wylfa Newydd Development Area and Disposal Site.

13.1.3 The term marine environment refers to water quality and to marine ecology (which includes sediment quality). The marine ecology that could potentially be affected includes plankton, benthic habitats and species, marine fish, marine mammals and seabirds.

13.1.4 The marine environment has close links with other topics including surface water and groundwater (chapter D8, Application Reference Number: 6.4.8), terrestrial and freshwater ecology (chapter D9, Application Reference Number: 6.4.9) and coastal processes and coastal geomorphology (chapter D12, Application Reference Number: 6.4.12).

13.1.5 The chapter is supported by the following appendices, which present the environmental baseline data, and which are cross-referenced in the text where relevant:

- D13-1 (Water Quality and Plankton Surveys Report) (Application Reference Number: 6.4.83);
- D13-2 (Benthic Ecology Report) (Application Reference Number: 6.4.84);
- D13-3 (Porth-y-pistyll Biotope Surveys Report) (Application Reference Number: 6.4.85);
- D13-4 (Fish Surveys Report) (Application Reference Number: 6.4.86);
- D13-5 (Subtidal Dive Surveys at the Cooling Water Outfall for the Existing Power Station) (Application Reference Number: 6.4.87);
- D13-6 (Marine Mammal Baseline Review) (Application Reference Number: 6.4.88);
- D13-7 (Seabird Baseline Review) (Application Reference Number: 6.4.89);
- D13-8 (Marine Hydrodynamic Modelling Report - Wylfa Newydd Development Area) (Application Reference Number: 6.4.90);
- D13-9 (Underwater Noise Baseline and Modelling) (Application Reference Number: 6.4.91);
- D13-10 (Entrapment of Marine Organisms at the Existing Power Station) (Application Reference Number: 6.4.92);

- D13-11 (Marine Modelling of the Operational Discharge) (Application Reference Number: 6.4.93);
- D13-12 (Marine Hydrodynamic Modelling Report - Disposal Site) (Application Reference Number: 6.4.94);
- D13-13 (Noise at Marine Ecological Receptors) (Application Reference Number: 6.4.95); and
- D13-14 (Marine Modelling of the Construction Discharge) (Application Reference Number: 6.4.96).

13.2 Legislation, policy and guidance

13.2.1 The following legislation, policy and guidance have been used to inform the scope and content of the marine environment assessment; assist in the identification of potential effects and mitigation; and influence the design of the Wylfa Newydd Project to reduce the significance of effects.

Key legislation

13.2.2 The relevant legislation and how it relates to the marine environment assessment are set out in table B13-1.

Table B13-1 Summary of key legislation

Legislation	Description
Salmon and Freshwater Fisheries Act 1975 (as amended)	The Act is aimed at the protection of freshwater fish, with a particularly strong focus on salmon and trout (which have life stages in the marine environment). It sets out activities that could constitute an offence including causing direct mortality, barriers to migration between freshwater and marine habitats and degradation of habitats. All activities that could constitute an offence under this act would be included within the marine environment assessment.
Wildlife and Countryside Act 1981 (as amended)	This Act allows for the designation of Sites of Special Scientific Interest (SSSIs) due to features of conservation interest related to flora, fauna, physiography or geology (including features adjacent to the marine environment). The Act makes it an offence to kill, injure, take, possess or trade in many wild animal species and to pick, uproot, possess or trade in a number of wild plants. Measures are outlined to prevent the establishment of non-native species that could adversely affect native wildlife. This Act also implements certain provisions of the Birds Directive (2009/147/EC) which is relevant to seabirds. This legislation is relevant to the marine environment assessment owing to the risk of mortality and

Legislation	Description
	disturbance to marine flora and fauna, and the spread and establishment of non-native species.
Countryside and Rights of Way Act 2000	This Act clarifies the purpose of designating Areas of Outstanding Natural Beauty (AONBs) and consolidates the provisions of previous legislation. It requires local authorities to produce management plans for each AONB and to have regard to the purpose of conserving and enhancing the natural beauty of AONBs when performing their functions. It also provides for better management of AONBs (which can be located adjacent to the marine environment), for public access on foot to certain types of land and increased measures for the management and protection of SSSIs. This legislation is relevant to the marine assessment as the Wylfa Newydd Development Area overlaps with the Anglesey AONB.
The Eels (England and Wales) Regulations 2009	These Regulations have granted new powers to regulators to implement measures for the recovery of European eel (*Anguilla anguilla*) stocks and have important implications for operators of abstractions and discharges. These regulations are relevant to the marine assessment due to the recorded presence of European eel in watercourses within the Wylfa Newydd Development Area.
Marine and Coastal Access Act 2009	This Act provides the legal mechanism to help ensure clean, healthy, safe, productive and biologically diverse oceans and seas by putting in place a system for improved management and protection of the marine and coastal environment. It established a strategic Marine Planning System which includes production of a Marine Policy Statement and streamlines the marine licensing system.
The Conservation of Habitats and Species Regulations 2010 (as amended)	These Regulations implement the provisions of the Habitats Directive (92/43/EEC) and the Birds Directive (2009/147/EC). They provide for the designation and protection of European Designated Sites and species within the marine environment and the adaptation of planning and other controls for the protection of European Designated Sites. These regulations are relevant to the marine environment assessment as the Wylfa Newydd Development Area is encompassed within a number of European Designated Sites, with species designated under these regulations, also known to be present.

Legislation	Description
The Environmental Permitting (England and Wales) Regulations 2016	These Regulations consolidate and replace the Environmental Permitting (England and Wales) Regulations 2010 (as amended). These Regulations seek to ensure that authorised activities and their discharges do not endanger the environment (terrestrial and marine) or human health; Environmental Permits must be sought from Natural Resources Wales (NRW) and the Environment Agency. The regulations combine the requirements for an integrated waste management approach and for hazardous waste management. This provides a framework for regulation that enables NRW and the Environment Agency to assess permitting and compliance with a common approach. These regulations are relevant to the marine assessment owing to the requirement to discharge into the marine environment.
The Marine Strategy Regulations 2010	These Regulations transpose the Marine Strategy Framework Directive (2008/56/EC) into UK law. They require competent authorities to carry out their obligations as required by the Directive and provide them with the necessary powers to do so.
The Waste (England and Wales) Regulations 2011	These Regulations set out the duty of care requirements in respect of waste. They transpose part of the Waste Framework Directive (2008/98/EC) which is implemented in England and Wales principally through amendments to the Environmental Protection Act 1990 and through the Waste (England and Wales) Regulations 2011. These regulations are relevant to the marine assessment as waste would be produced during construction and operation of the Wylfa Newydd Project.
The Bathing Water Regulations 2013 (as amended)	These Regulations transpose the Bathing Water Directive (2006/7/EC) into UK law. It sets out the requirement to monitor bathing waters and to ensure they achieve minimum standards of bacteriological quality. These regulations are relevant to the marine assessment as the Wylfa Newydd Development Area is located in close proximity to the Cemaes Bay bathing water.
Environment (Wales) Act 2016	This Act introduces a new approach to sustainable management of natural resources at a national and local level. It introduces a new, enhanced Biodiversity and Resilience of Ecosystem Duty on public bodies to ensure that biodiversity is an integral part of decision making. Public authorities will be required to report on the actions

Legislation	Description
	they are taking to improve biodiversity and promote ecosystem resilience.
The Convention on the Conservation of Migratory Species of Wild Animals (the 'Bonn Convention') 1985	This Convention provides protection for endangered migratory species. The UK ratified the convention in 1985; protection is provided through the Wildlife and Countryside Act 1981 (as amended) and the Countryside and Rights of Way Act 2000. This legislation is relevant to the marine assessment as several marine species listed under the Convention are known to be presented within the Wylfa Newydd Development Area.
Convention on Biological Diversity 1992	This Convention provides a legal framework for biodiversity conservation and has three main aims: the conservation of biological diversity; the sustainable use of its components; and the fair and equitable sharing of the benefits arising from the use of genetic resources. The UK's delivery of the Convention and Strategic Plan is guided by the UK Post-2010 Biodiversity Framework.
The Oslo and Paris Convention for the Protection of the Marine Environment of the North-East Atlantic (the 'OSPAR Convention') 1998	This Convention is key in co-ordinating Member States to meet their obligations under the EU Marine Strategy Framework Directive. The Convention requires parties to take all possible steps to prevent and eliminate pollution and take the necessary measures to protect the maritime area against the adverse effects of human activities to safeguard human health and to conserve marine ecosystems and, when practicable, restore marine areas which have been adversely affected.
The Water Environment (Water Framework Directive (WFD)) (England and Wales) Regulations 2017	These Regulations revoke and replace the Water Environment (WFD) (England and Wales) Regulations 2003 which have been amended by several instruments. They continue to transpose Directive 2000/60/EC. The Directive sets out a series of objectives for fluvial, lacustrine, groundwater and coastal water bodies within Wales. These include improving the water environment to achieve good/high status, maintaining existing good/high status and implementing mitigation to support the water environment at a catchment and water body scale. New modifications have to be assessed in line with the legislation and the water body objectives.
International Convention for the Control and Management of Ships' Ballast	The Convention requires all ships to implement a Ballast Water and Sediments Management Plan with the aim of preventing the spread of Invasive Non-Native Species (INNS). All new ships will have to carry a Ballast Water Record Book and carry out ballast water management

Legislation	Description
Water and Sediments (adopted in 2004; entry into force in 2017)	procedures to a given standard. Existing ships will be required to do the same, but after a phase-in period. This legislation is relevant to the marine assessment owing to the requirement to transport bulk materials and Abnormal Indivisible Loads via sea and Deep Disposal.
Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter 1972 (the 'London Convention') 1972	The objective of this Convention is to promote the effective control of all sources of marine pollution and to take all practicable steps to prevent pollution of the sea by disposal of wastes and other matter.

Key policy

13.2.3 The relevant national and local plans and policies, and how these relate to the marine environment assessment, are described in table B13-2.

Table B13-2 Summary of key policy

Policy	Description
Overarching National Policy Statement for Energy (EN-1) (NPS EN-1) [RD1]	NPS EN-1 states that: *"...where the development is subject to EIA [Environmental Impact Assessment] the applicant should ensure that the ES [Environmental Statement] clearly sets out any effects on internationally, nationally and locally designated sites of ecological or geological conservation importance, on protected species and on habitats and other species identified as being of principal importance for the conservation of biodiversity*…" (paragraph 5.3.3). NPS EN-1 (paragraph 5.5.7) requires applications to include an assessment of the impacts on coastal processes and geomorphology, marine ecology, biodiversity and protected sites, water quality and an assessment of the vulnerability of the proposed development to coastal change. NPS EN-1 (paragraph 5.3.4) requires applicants to show how they have taken advantage of opportunities to conserve and enhance biodiversity and geological conservation interests. NPS EN-1 outlines that the decision maker "*must have regard to the appropriate marine policy documents*" (paragraph 5.5.15) but, for the purpose of decision making, *"in the event of a conflict between marine planning documents and an NPS, the NPS prevails"*

Policy	Description
	(paragraph 4.1.6) given the national significance of the infrastructure.
National Policy Statement for Nuclear Power Generation (EN-6) (NPS EN-6) [RD2]	NPS EN-6 states the requirement for the applicant to consider the effects of climate change adaptation measures; assess specific implications of Cooling Water characteristics on the marine environment; assess the impacts on coastal processes and intertidal deposition; and the effects on the groundwater regime and its effects on coastal habitats. Section 3.9 of NPS EN-6 goes on to state *"…baseline studies on nationally and internationally important habitats and species that may be affected as a result of the development should be undertaken by the applicant to inform the assessment of the cumulative ecological effects"* (paragraph 3.9.4).
Planning Policy Wales (Edition 9) [RD3]	This document sets out the land use planning policies of the Welsh Government, forming a strategic framework to guide development. The particular chapters relevant to the marine environment assessment are listed below. • Chapter 5 (Conserving and Improving Natural Heritage and the Coast) sets out the Welsh Government's objectives for promoting conservation of the landscape and biodiversity. This includes policy for managing habitats, caring for biodiversity and related protection measures, protected species and development plans and management relating to landward and seaward pressures. • Chapter 13 (Minimising and Managing Environmental Risks and Pollution) sets out the Welsh Government's objectives for avoiding or minimising the adverse effects of any environmental risks on present or future land use.
Technical Advice Notes (TANs)	TANs provide planning advice on various subjects. The TANs relevant to the marine environment assessment are as follows. • TAN 5 [RD4] covers nature conservation and planning, whilst also being relevant to terrestrial and freshwater ecology, providing guidance on the key principles of positive planning for nature conservation. • TAN 14 [RD5] provides guidance on key issues for planning for the coastal zone and provides information on the topic of waste. It explains the background which helps to identify the issues, objectives, options and the preferred strategy for the Joint Local Development Plan. It outlines the national planning policy context and identifies the main trends in waste planning and management.

Policy	Description
UK Marine Policy Statement (MPS) [RD6]	The MPS applies to all UK waters and has been adopted by the UK Government, the Scottish Government, the Welsh Assembly Government and the Northern Ireland Executive. The function of the MPS is to provide the framework for preparing Marine Plans and taking decisions affecting the marine environment. This is relevant to the marine environment assessment because any application to the Secretary of State *"must have regard to the MPS and applicable marine plans"* determined in accordance with section 59 of the Marine and Coastal Access Act 2009.
The Welsh National Marine Plan Initial Draft [RD7]	In March 2011, the Welsh Government adopted the UK MPS through which they are committed to develop and implement a Marine Plan for Wales. The Welsh National Marine Plan is currently being drafted, drawing upon the framework and high level objectives for Marine Planning outlined in the MPS. The purpose of the Plan is to manage marine activities in a sustainable way, taking into account economic, social and environmental priorities. The goals and principles of the Well-being of Future Generations (Wales) Act 2015 are a key focus in developing the Plan.
Anglesey and Gwynedd Joint Local Development Plan (JLDP) *2011 - 2026 – Written Statement* [RD8]	The JLDP covers the local authorities of the Isle of Anglesey County Council (IACC) and Gwynedd Council and forms the basis for land use planning in these areas. The JLDP covers the period 2011 to 2026. This includes Strategic Policy PS 19 on Conserving and Enhancing the Natural Environment and AMG 4 on Coastal Protection. PS 19 states that the Councils will manage development so as to conserve and where appropriate enhance the Plan area's distinctive natural environment, countryside and coastline. AMG 4 states that any proposal for developments on the coast, including the Heritage Coast, must: • have explored suitable alternative locations; • have an overriding economic and social benefit; • be sited close to current buildings or existing structures where practicable; • not cause unacceptable harm to water quality, public access, landscape or seascape character, the areas biodiversity interests; and • be consistent with the policies within the Plan including policy ARNA1.

Key guidance

13.2.4 The marine environment assessment has been undertaken in line with a number of key technical guidance documents. These guidance documents are widely used across the UK and represent standard good practice for the assessment for the various consenting regimes. These are summarised in table B13-3.

Table B13-3 Summary of key guidance

Guidance	Description
Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal [RD9]	Guidelines published by the Chartered Institute of Ecology and Environmental Management (CIEEM) on the approach to take for an EIA within the coastal environment, providing guidance on the assessment of value, magnitude and significance.
Guidelines for Ecological Impact Assessment in Britain and Ireland: Marine and Coastal [RD10]	These guidelines published by CIEEM overlap with the *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal* [RD9] and also promote good practice in the field of Ecological Impact Assessment in the UK. They acknowledge and promote the importance of a scientifically rigorous approach, whilst recognising the need for using professional judgement.
Coastal and marine environmental site guide (second edition) (C744) [RD11]	This guidance concerns the control of environmental impacts relating to construction in the coastal and marine environment.
Cooling Water Options for the New Generation of Nuclear Power Stations in the UK [RD12]	This guidance is aimed at informing the regulatory process for nuclear new build in England and Wales. It provides details on Cooling Water System (CWS) design and considers how different designs affect performance and environmental issues. It also assesses the best CWS options for use in different types of water environment.
Screening for intake and outfalls: a best practice guide [RD13]	This provides guidance on best practice on fish screening at intakes and outfalls. It sets out requirements, design criteria and technical solutions for fish screening and Fish (and invertebrate) Return and Recovery Systems.
Screening at Intakes and	In 2011, the Environment Agency published a series of advisory documents known collectively as 'The Eel

Guidance	Description
Outfalls: Measures to Protect Eel [RD14]	Manual' to assist water users with understanding and fulfilling their obligations under the Eels (England and Wales) Regulations 2009. These guidelines provide advice on screening of eels and elver.
British Energy Estuarine and Marine Studies Group Advisory Reports, 2009 onwards	The British Energy Estuarine and Marine Studies Expert Panel, comprising leading industry experts, regulators (Environment Agency) and research scientists (Centre for Environment Fisheries and Aquaculture Science (Cefas)), has produced several scientific advisory reports. These present the current science behind effects of power stations on the marine environment and are based on expertise, scientific literature, the British Energy Estuarine and Marine Studies Data Centre and inputs from invited scientists.
WFD monitoring guidance (UK Technical Advisory Group (UKTAG)) (various publications)	The UKTAG is a partnership of the UK environment and conservation agencies that was set up by the UK-wide WFD policy group consisting of UK government administrations. It was created to provide coordinated advice on the science and technical aspects of the WFD.
Cefas Chemical Action Levels [RD15]	Chemical Action Levels for sediments to be disposed of at sea were proposed by Cefas in 1995. Sediments with levels below Action Level 1 are generally considered acceptable for disposal whereas those with levels above Action Level 2 are considered unacceptable for uncontrolled disposal at sea. Although the Marine Management Organisation has recommended a review of Action Levels at present these still represent the latest standards for comparison.
Canadian sediment quality guidelines [RD16]	The Canadian guidelines provide information on levels of chemicals in sediments that ensure the protection of aquatic life. As the UK does not have this species-specific information the Canadian guidelines are referred to. Levels include threshold effect levels and probable effect levels.
Marine Monitoring Handbook [RD17]	The handbook addresses the principles behind and provides guidance on the monitoring of Annex I habitats and selected Annex II species.

13.3 Consultation

13.3.1 This section provides a topic-specific account of scoping, statutory and non-statutory consultation undertaken to support the assessment. For a full overview of the environmental consultation activities undertaken for the Wylfa Newydd Project, refer to chapter A6 (EIA Scoping Report and Addendum) (Application Reference Number: 6.1.6) and chapter A7 (consultation with environmental stakeholders) (Application Reference Number: 6.1.7).

13.3.2 Consultees have included the IACC, NRW, the National Trust, the North Wales Wildlife Trust, the Royal Society for the Protection of Birds and the Marine Management Organisation.

Planning Inspectorate Scoping Opinion

13.3.3 In March 2016, Horizon submitted an updated Wylfa Newydd Project EIA Scoping Report to the Planning Inspectorate. In May 2017, Horizon submitted an Addendum to the March 2016 Wylfa Newydd Project EIA Scoping Report to the Planning Inspectorate and NRW. Following a period of consultation with stakeholders, a further Scoping Opinion was received from the Secretary of State (via the Planning Inspectorate) on 14 June 2017.

13.3.4 The Wylfa Newydd Project EIA Scoping Report, Addendum and the subsequent Scoping Opinions inform the approach to the assessment. Table B13-4 provides an account of how comments raised by stakeholders in the Scoping Opinion have been considered in the marine environment assessment.

Table B13-4 Key issues raised through Scoping

Key issue raised	Action taken
The IACC outlined a requirement to consider the intra-development effects upon receptors, particularly seabirds and cumulative impacts.	Intra-development effects are considered in chapter D16 (combined topic effects) (Application Reference Number: 6.4.16). Also, see chapter I4 (intra-project cumulative effects) (Application Reference Number: 6.9.4) and chapter I5 (inter-project cumulative effects) (Application Reference Number: 6.9.5).
The IACC suggested that equal weight should be given to proposed and existing Special Area of Conservation (SAC) and Special Protection Area (SPA) designations in Wales.	Proposed SACs and SPAs are given equal weighting to European Designated Sites throughout the assessment as required by Government policy.
The IACC, the Planning Inspectorate and NRW identified that the Scoping Opinion did not consider the potential impacts on Cemaes Bay as a	An assessment of effects on the bathing water at Cemaes has been included within this Environmental Statement (see chapter D13,

Key issue raised	Action taken
European designated Bathing Water. The IACC stated that mitigation measures need to be in place to maintain and, if possible, enhance water quality of the bay.	Application Reference Number: 6.4.13) and in the accompanying Water Framework Directive Compliance Assessment (Application Reference Number: 8.26) and mitigation has been outlined where appropriate.
The Planning Inspectorate found it unclear whether the proposed study area of 5km is only to inform the survey effort or whether the Applicant is proposing that this forms the assessment area for the EIA. The Secretary of State considers that the zone of impact of the proposed development (in terms of hydrodynamics and sediment transport) may be greater than 5km when considering all of the proposed offshore structures.	The 5km study area describes the area within which surveys were focused. The extent of the study area was originally defined based on the maximum extent of the area where there could be an effect (referred to here as the 'zone of influence'). The widest ranging effect was considered likely to be the extent of the potential changes to hydrodynamic processes. The 5km study area is still applicable as the updated modelling shows that the effects on hydrodynamics would not extend beyond 5km. The zones of influence for all other effects are also within the 5km extent. The zones of influence have been refined throughout the assessment process and are specific to the pathways and respective receptors. These zones of influence are detailed within the assessment where relevant.
The Planning Inspectorate would expect to see technical justification of the defined study areas and survey methodologies with particular reference to designated sites and agreement with the statutory nature conservation bodies. The Applicant should explain any variations in study areas across the different aspects of the marine environment that are being considered.	Prior to commencing survey work, procedures were agreed with the relevant consultees including Cefas and NRW. Ongoing consultation has been undertaken regarding survey work with amendments and additions to survey locations and methodologies made as appropriate. The locations and methodologies of each baseline survey are detailed in the relevant appendices as detailed in chapter

Key issue raised	Action taken
	D13, section 13.6 (Application Reference Number: 6.4.13).
The Planning Inspectorate expects to see evidence of agreement with the IACC and/or NRW as to survey methodologies; survey currency and modelling methodologies relied upon as part of the EIA evidence base.	Survey methodologies were agreed in consultation with relevant stakeholders including NRW and Cefas. As the design work has progressed, surveys have been subject to modification, in consultation with regulators, to target specific locations and habitats. At the request of NRW further surveys were carried out for terns and marine mammals in 2016 and meetings have been held to discuss the methodologies and findings of these surveys.
The Planning Inspectorate expects to see sufficient detail in the description of the Wylfa Newydd Project in respect of the key marine elements of the scheme. Where uncertainty remains, this should be clearly presented and there should be a clear explanation of how a 'worst case' approach to the assessment has been adopted.	A full description of key marine elements of the Wylfa Newydd Project is provided in volume D (Application Reference Number: 6.4) of the Environmental Statement. Chapter D1 (proposed development) (Application Reference Number: 6.4.1) describes the proposed development on a Rochdale Envelope (worst case) basis, and chapter D13 (Application Reference Number: 6.4.13) provides the concomitant design basis for assessment. Where work on the design is currently ongoing or options remain, a worst case scenario has been identified as the basis of this assessment.
The Planning Inspectorate and NRW requested that the Environmental Statement should clearly differentiate direct and indirect effects on the marine environment, particularly in the context of habitat loss and/or disturbance.	Direct and indirect effects on the marine environment have been assessed as separate pathways in chapter D13, sections 13.6 and 13.7 (Application Reference Number: 6.4.13).
NRW recommends that The Welsh National Marine Plan [RD7] is considered by the Applicant.	The objectives of the emerging Welsh National Marine Plan are outlined in table B13-2. The purpose of the plan is to manage

Key issue raised	Action taken
	marine activities in a sustainable way and the assessment has taken into account this objective, in particular the environmental priorities. These objectives have been taken into consideration within the assessment of effects.
NRW identified a requirement to discuss modelling methodologies further, specifically the hydrodynamic modelling and calibration/validation of this.	The hydrodynamic modelling methodology has been discussed in detail with NRW and their recommendations have been taken into account. The model has been subject to a third-party audit which scrutinised the validation exercise and determined that it was acceptable, and this report has been shared with NRW [RD18].
NRW noted that the Cooling Water volume is still to be confirmed and that further modelling work is to be undertaken. NRW advised that the study area should adequately cover the area expected to be impacted by the work (during construction and operation).	The Cooling Water volume has been confirmed; modelling has been carried out in line with up to date information covering a sufficient study area, the assessment of which is presented in chapter D13, section 13.6 (Application Reference Number: 6.4.13).
NRW advised that it should be ensured that any possible reef locations within the benthic impact zone have been fully investigated and impacts clearly set out in the Environmental Statement.	Additional surveys have been carried out to assess the potential presence of reef structures within the footprint of the Marine Works and the Disposal Site. The results of these studies (see appendix D13-2, Application Reference Number: 6.4.84) have been included within the assessment of effects on benthic habitats and species outlined in chapter D13, section 13.7 (Application Reference Number: 6.4.13).
NRW noted that Annex 1 Rocky reef (including intertidal rocky reef if contiguous with the subtidal) has not been considered as part of the current assessment and ought to be assigned a value of medium along-	The occurrence of 'rocky reef' habitat has been set out in the baseline (see appendix D13-3, Application Reference Number: 6.4.85). It has been assigned a value of medium and is included in the assessment as appropriate

Key issue raised	Action taken
side Rock pool 'special interest' features.	(see chapter D13, section 13.6, Application Reference Number: 6.4.13).
NRW requested figures to show the extent of seabed impacted by the development.	Figure D13-27 (Application Reference Number: 6.4.101) provides this information as part of the assessment.
NRW recommended early discussions with the Applicant on the breakwater design in terms of biodiversity enhancement measures and identified that post-application can be more costly than incorporation of such measures during the design phase.	Enhancement of the breakwater structure to encourage colonisation by native habitats and species has been identified as additional mitigation as outlined in chapter D13, section 13.8 (Application Reference Number: 6.4.13). This would not preclude it being incorporated into the design at a later stage.
NRW recommend that the Environmental Statement include detail on the proposed screening and fish protection systems (including fish deterrents and return systems). NRW advised that impacts on all Section 7 listed fish species and migratory fish as well as other marine receptors including marine mammals are considered in the Environmental Statement. As mobile features, impacts on fish and mammals linked to SACs should be assessed in order to inform the Habitats Regulations Assessment (HRA).	A study has been undertaken to determine the Best Available Techniques for screening and fish protection measures have been shared with NRW. The outcome of this study has informed the design of the Cooling Water intake system. An assessment of the potential effects on fish species and indirect effects on other marine receptors is outlined in chapter D13, section 13.6 (Application Reference Number: 6.4.13), and is considered within the Shadow HRA Report (Application Reference Number: 5.2).
NRW requested an evidence-based assessment of likely effects on marine mammals from the Wylfa Newydd Project and advised that incidental sighting information does not provide sufficient quantitative baseline data.	Additional quantitative surveys have been carried out (see appendix D13-6, Application Reference Number: 6.4.88) to provide an evidence base to support the assessments presented within chapter D13, sections 13.6 and 13.7 (Application Reference Number: 6.4.13).
NRW recognised that the proposed Marine Works have the potential to generate significant noise and/or	Underwater noise modelling has been undertaken and used to assess the effects to marine

Key issue raised	Action taken
vibrations that have the potential to disturb marine mammals and welcomes further questions with regards to underwater noise modelling and assessment methodology. Where appropriate, standard noise mitigation as per Joint Nature Conservation Committee (JNCC) guidelines [RD19] on mitigation for piling should be utilised.	mammals and other marine receptors (see chapter D13, section 13.6 and 13.7, Application Reference Number: 6.4.13). Mitigation has been identified and applied within the assessment as appropriate including use of the relevant JNCC guidelines (see chapter D13, section 13.5, Application Reference Number: 6.4.13).
NRW identified that the Wylfa Newydd Development Area is located in the vicinity of the Ynys Feurig, Cemlyn Bay and The Skerries SPA and SSSI and emphasised the importance of fully assessing the impacts on the four tern species which are features of the SPA. Appropriate mitigation should also be proposed. NRW requested sufficient baseline data to support this assessment and that mitigation measures are identified where appropriate.	Additional seabird surveys have been undertaken to provide a robust evidence-base for the assessment of effects on seabirds including species that are features of SPAs. This information is reported in appendix D13-7 (Application Reference Number: 6.4.89). The assessment of effects is presented in chapter D13, section 13.6 (Application Reference Number: 6.4.13) and has been used to inform the Shadow HRA Report (Application Reference Number: 5.2).
NRW identified the Applicant's intention to use Porth-y-pistyll for freight delivery from sea which, in combination with the new breakwaters, would provide a high-risk pathway for marine INNS. It was recommended that risks should be carefully assessed and mitigation measures provided.	The risks of the introduction and spread of INNS due to construction and operation of the Power Station have been assessed and appropriate mitigation proposed within chapter D13, section 13.6 (Application Reference Number: 6.4.13). In addition, a biosecurity risk assessment will be produced.

Statutory consultation

Pre-Application Consultation Stage One

13.3.5 The aim of Pre-Application Consultation Stage One, undertaken in late 2014, was to share information available at the time with Horizon's key consultees and stakeholders, in order to consider feedback in ongoing design development. Table B13-5 outlines how key issues raised during Pre-Application Consultation Stage One have been considered in the assessment.

Table B13-5 Key issues raised during Pre-Application Consultation Stage One

Key issue raised	Action taken
The IACC raised concerns regarding the requirement for biocide dosing of the CWS to prevent biofouling.	It is considered essential to use biocide to prevent biofouling of the CWS. An assessment of effects of biocide on relevant marine receptors is provided within chapter D13, section 13.6 (Application Reference Number: 6.4.13).
The IACC requested formal verification of the presence of seals (nursing mothers and pups) in the area to the west of Cemlyn.	Throughout the marine environment baseline survey period from 2010 to 2015, there have been no sightings of breeding seals or pups within the vicinity of the Wylfa Newydd Development Area. Additional surveys carried out in 2016/17 during the seal breeding season along the coastline from Cemlyn to Porth-y-pistyll further confirm no sightings of breeding seals or pups.
The IACC felt it was unclear whether there is also a need to consider radioactive effluent.	The effects of radioisotopes in the marine environment are considered in chapter D14 (radiological effects, Application Reference Number: 6.4.14).
The IACC raised concerns regarding the noise disturbance to recreational divers and swimmers in the Cemaes area caused by acoustic fish deterrents.	Based on experience at other power stations, the sound field of acoustic fish deterrent systems is localised and sound is only detectable in the immediate vicinity of the intake. The acoustic fish deterrent system will be located within Porth-y-pistyll, adjacent to the Marine Off-Loading Facility and recreational diving or swimming would not be possible within this area. It is therefore very unlikely that recreational divers or swimmers would be able to hear the acoustic fish deterrent.
NRW requested clarification on the geophysical survey methodology, results and interpretation with regards to identifying suitable benthic survey sites, creation of seabed	The geophysical survey methodology for the Wylfa Newydd Development Area, results and interpretation are outlined in appendix D12-2 (Application Reference Number: 6.4.81) of the

Key issue raised	Action taken
habitat maps and identification of biogenic reef features.	coastal processes and coastal geomorphology chapter. Its use to inform the selection of benthic survey sites is outlined in appendix D13-2 (Application Reference Number: 6.4.84). The presence of biogenic reef features has been determined using a multi-method approach which has included benthic grab, drop-down camera and dive surveys. A synthesis of these findings can be found in appendix D13-2 (Application Reference Number: 6.4.84).
NRW identified a requirement to clearly identify habitats and species of conservation importance that may be affected by all stages of the development both inside and outside of protected sites, specifically referencing subtidal *Sabellaria spinulosa* reef.	Species and habitats of conservation importance have been identified within chapter D13, section 13.3 (Application Reference Number: 6.4.13) and further detail is provided in appendix D13-3 (Application Reference Number: 6.4.85). The presence of *S. spinulosa* biogenic reef has been investigated through a number of surveys and some sites have been identified which would qualify as biogenic reef. However, no reef structures have been recorded within or near the footprint of the Marine Works within the Wylfa Newydd Development Area or in or near the footprint of the rock disposal.
NRW stated that "*the Preliminary Environmental Information (PEI) Report appears to infer that impact assessments made for the old outfall could be used as a proxy for likely impacts at the new outfall*". A request was made for a more detailed assessment of the impacts of the Existing Power Station Cooling Water outfall and justification for the proposed Cooling Water intake design including potential impacts in	A detailed assessment of the spatial impacts of the new outfall on relevant receptors (including intertidal and subtidal habitats and species) has been presented in chapter D13, section 13.6 (Application Reference Number: 6.4.13). This has not only drawn upon an assessment of impacts of the Existing Power Station outfall but also predictions based on hydrodynamic modelling for the new outfall design.

Key issue raised	Action taken
terms of loss of intertidal/subtidal habitats as a result.	
NRW welcomed early discussion on the breakwater design in terms of biodiversity enhancement measures and reducing the likelihood of colonisation by INNS.	Additional mitigation measures relating to effects within the marine environment have been outlined in chapter D13, section 13.8 (Application Reference Number: 6.4.13).
NRW emphasised that there *"is a high degree of connectivity around the Welsh coast and bottlenose dolphins and grey seals from Welsh SACs are regularly sighted off the north Anglesey coast"*. Consideration of the relevant Marine Mammal Management Unit (MMU) with the HRA was recommended.	Consideration is given in the baseline and assessment of effects sections of this Environmental Statement (see chapter D13, Application Reference Number: 6.4.13) and the Shadow HRA Report (Application Reference Number: 5.2) to the Celtic and Irish Sea MMU for harbour porpoise, Irish Sea MMU for bottlenose dolphin and also to the relevant area (sometimes referred to as an MMU) for grey seals (the west of England and Wales).
NRW identified that the PEI Report did not provide detailed information on the likely noise levels during construction works and recognised the need to assess impacts of noise and appropriate mitigation as per JNCC guidelines [RD19].	Underwater noise modelling has since been carried out and the results used to inform the assessment of effects on marine receptors (see chapter D13, section 13.6, Application Reference Number: 6.4.13).
NRW advises that an assessment of impacts on bird colonies which have mean maximum foraging ranges that overlap with the Wylfa Newydd Development Area as well as the locations of Associated Development should be included to inform the decision to scope designated sites in and out of the assessment.	The assessment has considered all bird species that were recorded within the baseline surveys which include species that have foraging ranges that overlap with the Wylfa Newydd Development Area (see chapter D13, section 13.6, Application Reference Number: 6.4.13).

Pre-Application Consultation Stage Two

13.3.6 In September 2016, Horizon shared a PEI Report as part of Pre-Application Consultation Stage Two. This presented preliminary details of the predicted environmental effects and mitigation measures for any adverse effects identified. Table B13-6 outlines how key issues raised during Pre-Application Consultation Stage Two have been considered in the assessment.

Table B13-6 Key issues raised during Pre-Application Consultation Stage Two

Key issue raised	Action taken
Coastal processes: consultees requested further modelling and/or baseline information is provided with respect to coastal processes and coastal modelling and that clarity is provided over some elements of the assessments.	The assessment in the Pre-Application Consultation Stage Two was based on early modelling results. A number of scenarios have now been modelled based on different phases of construction of the breakwater and locations of dredging. Further modelling has been carried out to consider the effect of marine structures on coastal processes in the area (see chapter D12, Application Reference Number: 6.4.12). All consultee comments have been noted and clarity will be provided in response to queries raised in this Environmental Statement and technical appendix.
Consultees advised further efforts should be undertaken to validate hydrodynamic models.	Consultation with NRW on the hydrodynamic modelling (modelling of temperature and Total Residual Oxidants) has been carried out. The external audit report [RD18], which discusses model validation, has now been provided and discussed with NRW.
Consultees raised concerns about an apparent lack of investment in future monitoring in the coastal environment.	Monitoring of entrapment, and non-natives and ecological enhancement mitigation measures will be undertaken (see chapter D13, Application Reference Number: 6.4.13) and it is likely that further programmes would be developed in consultation with NRW.
Consultation: consultees highlighted a need for further pre-application engagement on various aspects of the marine assessments, including with respect to Zones of Influence, modelling approaches, details of mitigation, compensation and with respect to the HRA.	Since Pre-Application Consultation Stage Two, further meetings have been held with NRW to discuss the approach to and results of modelling and fish to explain the basis of assessments and the conclusions drawn. These were identified as particular areas of concern.

Key issue raised	Action taken
Marine Structures: consultees identified that the second PEI Report did not provide detailed information on design detail and construction methods, in particular in relation to the proposed marine structures.	Pre-Application Consultation Stage Two provided an early indication of the assessment. The project description now provides detail on the design and construction methods (see chapter D1, Application Reference Number: 6.4.1). Further information specific to the Marine Works can be found in chapter D13, section 13.5 (Application Reference Number: 6.4.13). The assessments have been based on the final design, or, if these details are yet to be confirmed, on a worst case.
Consultees considered, in particular in relation to the proposed marine structures, that the PEI Report did not provide sufficiently detailed information on mitigation required for coastal effects.	Details of embedded mitigation, including that for fish (e.g. acoustic deterrents, low approach velocity and a recovery and return system); and additional mitigation is described fully in the Environmental Statement for all coastal effects (see chapter D13, Application Reference Number: 6.4.13). A full picture of the hydrodynamic modelling output relating to flow around structures has been presented and discussed with NRW (see appendix D13-11, Application Reference Number: 6.4.93).
Consultees expressed concerns over marine habitat loss, due to direct loss, changes in coastal processes (storm waves), construction impacts and in-combination with climate change and the need to consider compensation measures.	Horizon acknowledges these comments. Measures including breakwater habitat enhancement, potential for recolonisation and additional mitigation have been presented fully in this Environmental Statement (see chapter D13, Application Reference Number: 6.4.13).
Cumulative Impact Assessment: consultees suggested some additional elements for consideration were required within the cumulative impact assessment, including all projects or plans within the MMU, the	Pre-Application Consultation Stage Two presented an early stage of the cumulative assessment. Horizon acknowledges all comments on the scope of the cumulative assessment.

Key issue raised	Action taken
predicted effects of climate change (with the effects on coastal processes) and effects on Holy Island.	Consideration will be given to cumulative effects at the appropriate temporal and geographical scale for the receptor. The effects of climate change have been considered within the topic chapters D12 (Application Reference Number: 6.4.12) and D13 (Application Reference Number: 6.4.13), and will be addressed in the cumulative assessment.
Benthic, plankton and fish: with respect to the assessments of potential effects on the benthic environment, plankton and fish losses, NRW requested further clarification on, and development of aspects of, the baseline survey, assessment rationales, methods and results and their presentation.	Details of the baseline surveys are provided in the following appendices: • D13-1 (Application Reference Number: 6.4.83); • D13-2 (Application Reference Number: 6.4.84); • D13-3 (Application Reference Number: 6.4.85); and • D13-4 (Application Reference Number: 6.4.86). In these appendices, the resolution and statistical analyses of the datasets give a robust basis on which assessments have been made. Clarity has been provided in response to specific comments raised. The assessment methodology is provided in section 13.4 below. The rationale for the assessment of effects is provided in chapter D13 (Application Reference Number: 6.4.13).
Birds: consultees advised that birds of conservation concern (including SPA terns) need more attention in the assessments, including consideration of a broader set of pathways and development of the baseline.	Further work has been carried out (including surveys and data gathering) to provide information on the value of particular areas of the sea for tern foraging and feeding as well as their use of the area for commuting and other behaviours. The potential effects, both direct and indirect to seabirds

Key issue raised	Action taken
	from loss of habitat and loss of prey species, and effects on water quality (turbidity, temperature, etc.) has been fully assessed within this Environmental Statement (see chapter D13, Application Reference Number: 6.4.13). The potential effect of visual, noise and lighting disturbance to birds (from both land and marine-based activities) is assessed for operation as well as for construction (see chapter D13, Application Reference Number: 6.4.13). Turbidity and sediment effects on marine benthic communities and seabird feeding have been addressed, as have other pressures on the terns designated within the SPA (and any wider effects) (see chapter D13, Application Reference Number: 6.4.13). The Shadow HRA Report (Application Reference Number: 5.2) also considers potential effects on the tern colony, concluding no adverse effect to the integrity of the SPA.
Marine mammals: NRW advised that the assessment of impacts on marine mammals should apply the appropriate MMU for effects both alone and in combination. Consultees also identified improvements to aspects of the baseline, methods and presentation of the assessment and data, in particular in relation to loss of prey calculations.	Species-specific MMUs and all marine mammal SACs around Wales has been considered in this Environmental Statement (Pembrokeshire Marine, Cardigan Bay and Lleyn Peninsula SACs and Bristol Channel Approaches, West Wales Marine and North Anglesey Marine cSACs). These details are provided within the marine mammal appendix D13-6 (Application Reference Number: 6.4.88). This includes information on seal haul-outs and recent surveys of pupping areas. Potential effects on seals and an assessment of losses of fish from entrapment in the CWS is provided

Key issue raised	Action taken
	in chapter D13 (Application Reference Number: 6.4.13).
INNS: consultees requested the inclusion of a Marine Non-native Species Strategy/biosecurity risk assessment for all marine activities, with reference to Marine Biosecurity Planning Guidance and the spread of non-plant species. NRW advised that *Didemnum vexillum* presents a higher risk as an INNS than indicated by Horizon.	A Biodiversity Risk Assessment Method Statement has been provided (as part of the Marine Licence application) and chapter D13 (Application Reference Number: 6.4.13) considers the potential risks and effects associated with non-native species. *Didemnum vexillum* is acknowledged within the Biodiversity Risk Assessment Method Statement and this Environmental Statement as representing a significant risk to biodiversity and socio-economic assets.
Cemlyn Lagoon: consultees raised concerns for Cemlyn Lagoon with respect to nutrient releases from topsoil strip (the potential for algal blooms). Erosion from storm waves and lack of consideration of aquatic plants were central themes, as well as suggestions for the development of the baseline (modelling) and plans for mitigation, compensation and monitoring. NRW do not agree that there would be no operational changes to coastal processes affecting the lagoon.	The PEI Report was a high-level presentation of the information gathered compared to what has been presented in this Environmental Statement. Several hydrodynamic scenarios in relation to coastal processes have been modelled (see appendix D13-11, Application Reference Number: 6.4.93). These and the outputs relating to wave modelling, the design of the breakwater and subsequent effects on Esgair Cemlyn (Cemlyn shingle ridge) have been addressed in chapters D12 (Application Reference Number: 6.4.12) and D13 (Application Reference Number: 6.4.13). Aspects relating to lagoonal species have been considered. Horizon does not anticipate that high levels of nutrients would be released to Cemlyn Lagoon as the drainage design would mean that the discharge is treated to meet acceptable standards.

Key issue raised	Action taken
Plankton: a request was made for a more detailed assessment of the potential impacts on plankton and guidance was provided on aspects of the analysis.	The impacts of construction upon plankton communities has been fully considered in chapter D13 (Application Reference Number: 6.4.13), taking into account consultees' comments.
CWS: consultees requested further clarification from the assessment of the CWS. In particular, with respect to plume modelling (foam slicks), embedded mitigation measures and potential impacts to fish.	Horizon recognises that the new Cooling Water discharge could result in more extensive effects on intertidal and subtidal habitats compared to the Existing Power Station. The effects of the discharge on benthic and other receptors, in particular from an increase in temperature and discharge of Total Residual Oxidants, has been assessed, utilising data gathered from observations at the Existing Power Station and literature reviews. The effects of the discharge on receptors have been based on a worst case scenario, as appropriate. Pre-Application Consultation Stage Two presented an early stage of the assessment. Further reasoning and justification for the assignment of effects has been provided in this Environmental Statement (see chapter D13, section 13.6, Application Reference Number: 6.4.13).
WFD: NRW noted that there are some assessments outstanding with respect to the WFD assessment and to this end, the Zone of Influence cannot be agreed. NRW also highlighted some technical errors and new 'Clearing the Waters' guidance.	A Preliminary WFD Assessment for the Wylfa Newydd Project was submitted to NRW for comment and there have been regular meetings on WFD. The new 'Clearing the Waters' guidance and draft NRW guidance has informed the methodology for the assessment.

Pre-Application Consultation Stage Three

13.3.7 Table B13-7 outlines how key issues raised during Pre-Application Consultation Stage Three have been considered in the assessment.

Table B13-7 Key issues raised during Pre-Application Consultation Stage Three

Key issue raised	Action taken
Proposal changes: consultees highlighted that there had been numerous changes in the marine environment since the Pre-Application Consultation Stage Two and recommended that the Environmental Statement should fully assess the impacts of the up-to-date proposals (including the changes consulted on in Pre-Application Consultation Stage Three and the use of the Disposal Site at Holyhead North), as a result of the construction, operation and decommissioning of the Wylfa Newydd Project.	An updated assessment of the effects to marine ecological receptors in relation to the Wylfa Newydd Development Area and Disposal Site is presented in chapter D13, sections 13.6 and 13.7 (Application Reference Number: 6.4.13). This assessment is based upon the latest design information as well as baseline and modelling data for the Wylfa Newydd Project.
Disposal Site: consultees expected Horizon would consult on the use of the Disposal Site at Holyhead North and the assessment of effects to marine environment receptors in this Pre-Application Consultation Stage Three.	Whilst no formal consultation has been carried out through Pre-Application Consultation Stage Two or Three, consultation with NRW with regards to the use of the Disposal Site at Holyhead North has been ongoing. This included a letter sent to NRW dated 14 October 2016 which outlined Horizon's initial plans to utilise the Disposal Site. This was followed by a kick off meeting on 17 February 2017 to discuss Horizon's intention to carry out additional surveys (subtidal habitats and water quality) and modelling of rock disposal. A follow up meeting took place on 27 March 2017 to present early modelling outputs to NRW and an additional call was held on 16 June to discuss specific details relating to the siting of rock disposal within the Disposal Site.
Designated sites: consultees expressed concerns about the recognition and potential impacts to designated sites of international, national and local importance,	Detailed evidence, reasoning and justification of the predicted effects to designated sites is provided in chapter D13, section 13.6 (Application Reference Number: 6.4.13). The assessment of effects to designated sites from changes to

Key issue raised	Action taken
particularly from changes to coastal geomorphology and processes.	coastal geomorphology and processes draws upon information presented in chapter D12, section 12.5 (Application Reference Number: 6.4.12), with additional information presented in the supporting appendices.
Cemaes Bay bathing water: consultees do not consider that the impacts on Cemaes Bay as a European designated bathing water have been sufficiently addressed.	Detailed evidence (including hydrodynamic and discharge modelling), reasoning and justification of the predicted effects on Cemaes Bay bathing water is provided in chapter D13, section 13.6 (Application Reference Number: 6.4.13), with additional information presented in the supporting appendices. The assessment takes into consideration embedded and good practice mitigation outlined in chapter D13, section 13.5 (Application Reference Number: 6.4.13). Additional mitigation considered necessary to reduce effects on Cemaes Bay bathing water is presented in chapter D13, section 13.8 (Application Reference Number: 6.4.13).
Cemlyn Bay SAC: consultees emphasised the importance of this receptor and the intrinsic relationship between the geomorphology of the lagoon and the shingle ridge, and the persistence of the tern breeding colony. Impacts to the SAC features and its conservation objectives, could act synergistically leading to detrimental effects to the breeding tern colony.	The importance of this receptor and its associated features is acknowledged in chapter D12, section 12.3 (Application Reference Number: 6.4.12) and chapter D13, section 13.3 (Application Reference Number: 6.4.13). The potential effect arising from a number of impact pathways during construction, operation and decommissioning of the Wylfa Newydd Project have been assessed separately. Consideration has been given to intra-development effects (i.e. significant residual effects identified in the assessment chapters of the Environmental Statement) in chapter D16

Key issue raised	Action taken
Consultees also outlined a number of expectations with regards to mitigation of effects to the breeding tern colony in Cemlyn including a programme of monitoring, resilience building measures under the Section 106 fund and remediation bonds.	(Application Reference Number: 6.4.16). Intra-project and inter-project effects are considered in chapters I4 (Application Reference Number: 6.9.4) and I5 (Application Reference Number: 6.9.5), respectively. As no significant effect on the breeding tern colony has been concluded in chapter D13 (Application Reference Number: 6.4.13) and no adverse effects on integrity of the SPA in the Shadow HRA Report (Application Reference Number: 5.2), there is no requirement to provide resilience measures or to consider remediation bonds. The draft Development Consent Order (DCO) provides legally enforceable mechanisms for implementation of all mitigation measures described within the Environmental Statement and Shadow HRA Report (Application Reference Number: 5.2). Details of any additional mitigation measures (e.g. a programme of monitoring) would be finalised through a Statement of Common Ground to be agreed with the relevant stakeholders, but would be secured through provisions within the DCO.
Feeding resources in Porth-y-pistyll: consultees did not consider the feeding resource in Porth-y-pistyll to be well understood from current baseline information.	Baseline information regarding habitats and species in Porth-y-pistyll is presented in chapter D13, section 13.3 (Application Reference Number: 6.4.13), with further information provided in the supporting appendices D13-2 (Application Reference Number: 6.4.84), D13-3 (Application Reference Number: 6.4.85) and D13-4 (Application Reference Number: 6.4.86). Additional studies have been

Key issue raised	Action taken
	undertaken (e.g. tern tracking and transect surveys) to understand the use of Porth-y-pistyll as a feeding ground for seabirds. The results of these surveys are summarised in chapter D13, section 13.3 (Application Reference Number: 6.4.13) with further information presented in appendix D13-7 (Application Reference Number: 6.4.89).
Marine structures: consultees advised that any changes to the design of the marine structures would need to be remodelled to inform the assessment of effects to benthic habitats and species. The conclusions of the Water Framework Directive Compliance Assessment cannot be verified until consultees have seen the latest modelling outputs.	The assessment of effects to marine habitats and species presented in chapter D13, section 13.6 (Application Reference Number: 6.4.13) is based on the latest design information for the Marine Off-Loading Facility and breakwaters. This design information is detailed in chapter D1 (Application Reference Number: 6.4.1) and in chapter D13, section 13.5 (Application Reference Number: 6.4.13). Where design parameters have changed since Pre-Application Consultation Stage Three, sensitivity runs have been undertaken to demonstrate the resilience of modelling outputs in supporting the assessments presented in chapter D13, section 13.6 (Application Reference Number: 6.4.13). Consultation with NRW regarding the Water Framework Directive Compliance Assessment (Application Reference Number: 8.26) has been ongoing and clarity has been provided in response to specific comments raised.
Ecological enhancement of breakwater structures: consultees requested clarification on the inclusion of biodiversity enhancement measures within the breakwater	Horizon can confirm that ecological enhancement measures are being considered as additional mitigation for the loss of habitats and species within the marine environment. Details of this mitigation measure

Key issue raised	Action taken
design, specifically with regards to benefits to seabirds.	can be found in chapter D13, section 13.8 (Application Reference Number: 6.4.13).
CWS: consultees expressed concerns about the impact of CWS construction and operation, including chlorine and thermal effects, fish entrapment and indirect effects to seabirds and marine mammals.	Potential effects to marine environment receptors from the construction and operation of the CWS has been fully assessed in chapter D13, section 13.6 (Application Reference Number: 6.4.13). Hydrodynamic modelling has been carried out to understand the dispersion of temperature and Total Residual Oxidants throughout the water column. This information, which can be found in appendix D13-8 (Application Reference Number: 6.4.90), has been used to inform the assessment of effects (including indirect effects to seabirds and marine mammals) presented in chapter D13, section 13.6 (Application Reference Number: 6.4.13).
Harbour environment: The Royal Society for the Protection of Birds (RSPB) consider that the creation of a harbour environment will have significant potential to compound impacts and increase the levels of uncertainty of those impacts and outcomes in combination with those of climate change. In addition, there is loss of habitats within the new harbour's footprint.	Horizon acknowledges this comment. Potential effects arising from the Marine Off-Loading Facility harbour and flood defence structures (including habitat loss) have been fully assessed in chapter D13, section 13.6 (Application Reference Number: 6.4.13), taking into consideration potential interaction with climate change.
Site Campus: consultees requested that effects to marine environmental receptors be scoped into the environmental assessment for construction, operation and decommissioning of the Site Campus.	The assessment of effects to marine environment receptors presented in chapter D13 (Application Reference Number: 6.4.13) also considers potential effects that may arise from construction, operation and decommissioning of the Site Campus.

Consultation on Additional Land

13.3.8 In February 2018, Horizon undertook consultation on additional land that had not been consulted on previously. The additional land was required to:

- accommodate proposals to create or enhance wetland sites across Anglesey as Ecological Compensation Sites;
- create two new ecological mitigation areas, and minor changes to the connection to the national grid at the Wylfa Newydd Development Area; and
- update the order limits for the A5025 Off-Line Highway Improvements, and minor refinements to the boundaries of the Off-Site Power Station Facilities and Logistics Centre.

13.3.9 The feedback from the consultation has been reviewed and there were no marine environment issues raised.

Non-statutory consultation

EIA Progress Report

13.3.10 An EIA Progress Report was provided to the IACC and NRW in 2016 with updated information on the design development and associated environmental assessment. Table B13-8 outlines how key issues raised in feedback from these stakeholders have been considered in the assessment.

Table B13-8 Key issues raised in response to the EIA Progress Report

Key issue raised	Action taken
Water quality: consultees highlighted the need for consideration of the bathing water in Cemaes Bay in assessments. Requests for further information and clarification on the baseline data presented.	Further information on the baseline data has been provided in the assessment. Specific consideration has also been made for potential effects on the bathing water within Cemaes Bay (see chapter D13, sections 13.3 and 13.6, Application Reference Number: 6.4.13).
Marine modelling: Consultees requested that further information on the modelling input parameters be provided along with results of validation. Requests were also made for clarification of the thermal standards used in the assessment.	Further meetings have been held with NRW to discuss hydrodynamic modelling and thermal standards. The external audit report [RD18], which discusses model validation, has now been provided and discussed with NRW. Details of modelling inputs and parameters can be found in appendix D13-8 (Application Reference Number: 6.4.90). Reference to thermal standards is made in chapter 13,

Key issue raised	Action taken
	section 13.6 (Application Reference Number: 6.4.13).
CWS: consultees requested further information regarding the specifics of the CWS including biocide usage and locations, and volumes.	More detailed modelling of the CWS has been completed and the approach has been discussed with NRW. Further details are also provided in chapter D13, section 13.6 (Application Reference Number: 6.4.13).
Plankton: consultees requested more detail on some of the assessments of plankton and the modelling and provided guidance on areas to consider. Additional requests for more detail on mitigation options that would benefit plankton were made.	More detailed modelling of the CWS has been completed and is reported in chapter D13 (Application Reference Number: 6.4.13). The assessments on plankton have taken account of the comments and suggestions made.
Benthic communities: consultees provided some guidance on the assessment of benthic communities and asked for consideration of wider impacts around land-based activities. Further detail on modelling results with respect to benthic communities was requested. Specific queries over the presence of *Sabellaria spinulosa* reefs within the impact zone were raised.	More detailed assessments have been made in chapter D13 with consideration for both direct and indirect impacts on benthic communities. Additional modelling has been completed and used in the assessments. The baseline for *S. spinulosa* is set out in appendix D13-2 (Application Reference Number: 6.4.84). Specific consideration has been made of *S. spinulosa* within the assessment, with detail on the structures that are present.
INNS: consultees requested further information regarding biosecurity assessments, and specifically *Didemnum vexillum*.	INNS, specifically *Didemnum vexillum,* have been considered within the assessment and biosecurity strategies are being developed for the Wylfa Newydd Project.
Fish: consultees requested clarification and more detail surrounding the assessment and monitoring. Specific information was requested around the mitigation options for fish protection and detail for modelling. Advice was provided around the structure and content of	Meetings have been held with NRW to discuss the mitigation measures for fish and the assessment of effects. A full assessment of the impacts on fish species has been provided in chapter D13, section 13.6 (Application Reference Number:

Key issue raised	Action taken
the Environmental Statement, around inclusion of certain species, and the approach to assessment.	6.4.13). This includes consideration of entrapment, noise and vibration, temperature and Total Residual Oxidants. Assessments have accounted for both direct and indirect impacts to fish, and also to those species that utilise fish as a food resource.
Marine mammals: consultees raised concerns over the lack of detail with respect to the assessment on marine mammals. Requests were made for consideration of all pathways of effect, how mammals are addressed within the cumulative assessments and for more detailed modelling.	The potential for effect on marine mammals has been considered within each of the pathways either as a direct or indirect effect (table D13-7 in chapter D13, Application Reference Number: 6.4.13). For the key pathways relating to underwater noise and loss of food resource more detailed modelling of both underwater noise and the CWS have been completed (see appendix D13-9, Application Reference Number: 6.4.91) and have been used in the assessment (see chapter D13, section 13.6, Application Reference Number: 6.4.13). The assessment includes direct impacts to marine mammals as well as indirect effects through loss of prey species.
Seabirds: consultees made recommendations for additional monitoring to enhance the baseline, for pathways that should be considered within the assessment (construction of specific structures, indirect effect from loss of food resource). Requests were made for consultation around mitigation options for seabirds and information around future monitoring.	Additional baseline survey work has been completed specific to seabirds (see appendix D13-7, Application Reference Number: 6.4.89). Detailed assessments on seabirds have been included in this Environmental Statement to include both direct and indirect effects as well as additional mitigation (see chapter D13, sections 13.6 and 13.7, Application Reference Number: 6.4.13). No commitment to future monitoring of seabirds has been made at this stage.

Draft Environmental Statement

13.3.11 During September 2017, draft Environmental Statement chapters were provided to statutory and key non-statutory stakeholders. Table B13-9 outlines key issues raised and how these have been addressed within the Environmental Statement.

Table B13-9 Key issues raised in response to the Draft Environmental Statement

Key issue raised	Action taken
Construction programme: NRW requested further information regarding the duration and sequencing of construction phases to better understand the affects to marine ecology receptors.	Further information regarding the construction programme has been provided in chapters D1 (Application Reference Number: 6.4.1) and D13, section 13.5 (Application Reference Number: 6.4.13).
Habitat Loss: NRW felt that the extent of indirect effects to subtidal and intertidal habitats during the operational phase had not been made clear within the assessment.	The text related to indirect effects to benthic habitats has been reviewed and the assessment of extent made clearer in chapter D13, sections 13.6 and 13.7 (Application Reference Number: 6.4.13).
Ecological enhancement mitigation: NRW did not agree that the ecological enhancement mitigation proposed was sufficient to downgrade the residual impact from 'moderate' to 'minor adverse' and requested further consultation on these measures.	Further information regarding this element of additional mitigation can be found in chapter D13, section 13.8 (Application Reference Number: 6.4.13). Ecological enhancement mitigation is being developed through consultation with engineers and NRW. Further consultation has been undertaken to provide an overview of where we are at in this process, and to highlight that development of this mitigation is ongoing.
Monitoring: NRW suggested that monitoring of the following mitigation measures should be undertaken: ecological enhancements; biosecurity risk assessment; fish entrapment and fish protection systems (including fish deterrents and return systems). A wider programme of monitoring to test the assumptions made as part of the Environmental Statement was also proposed.	Further information regarding monitoring of mitigation measures is provided in chapter D13, section 13.8 (Application Reference Number: 6.4.13). Monitoring programmes are being developed further in consultation with NRW and Horizon; further detail will be provided within the Marine Works sub-Code of Construction Practice (Application Reference Number: 8.8).

Key issue raised	Action taken
Suspended sediment concentration threshold for discharge: NRW requested that evidence should be provided within the Environmental Statement to support a threshold of 70mg/l.	Additional modelling has been undertaken to demonstrate that suspended sediment thresholds for discharge into the marine environment which have been used in the assessment are appropriate. The results of this modelling work can be found in chapter D13, section 13.6 (Application Reference Number: 6.4.13), with further information provided in appendix D13-8 (Application Reference Number: 6.4.90).
Impact of suspended sediments on benthic receptors: NRW requested to see more information related to the potential impacts of suspended sediments and sensitivities of benthic receptors.	The discharge of suspended sediments is not considered to result in a significant effect on marine water quality (see chapter D13, section 13.6, Application Reference Number: 6.4.13) and therefore no assessment of effects to habitats and species has been made.
Sewage modelling: NRW requested further information on sewage discharge modelling	Further information related to the modelling of sewage discharge in the marine environment is provided in chapter D13, section 13.6 (Application Reference Number: 6.4.13), with further information presented in appendix D13-14 (Application Reference Number: 6.4.96).
Bed shear stress modelling: NRW requested that further modelling work be undertaken to better understand maximum bed shear stress levels under wave and current extreme storm conditions to inform the assessment of effects to Cemlyn Bay and specifically, Esgair Gemlyn shingle ridge.	Further modelling is not considered necessary. The current Delft3D hydrodynamic model used a 98-percentile high wave from the north modelled over a spring-neap-spring tidal cycle (i.e. a storm event lasting two weeks). This is considered to represent a very extreme condition and therefore an appropriate worst case scenario for the assessment. The modelling work undertaken is described fully in appendix D12-3 (Wylfa Newydd Main Site Wave Modelling Report) (Application Reference Number: 6.4.82). The

Key issue raised	Action taken
	assessment of effects to bed shear stress and subsequent geomorphological receptors is outlined in chapter D12, section 12.5 (Application Reference Number: 6.4.12).
Biosecurity risk assessment: NRW requested that a biosecurity risk assessment is undertaken for all marine activities, plant and vessels associated with all stages of the development.	A biosecurity risk assessment has been produced for the relevant marine activities, plant and vessels were possible. This document can be found appended to the Marine Licence application.
Airborne noise disturbance to seabirds: NRW requested clarification on the assessment of airborne noise disturbance effect to seabirds, with specific consideration given to the uniqueness of noise as well as noise level and the possible effect on habituation. NRW also requested that potential abandonment of the colony as a result of airborne noise disturbance should be recognised within the Environmental Statement.	The evidence supporting the assessment of effects to seabirds from airborne noise disturbance has been reviewed and further information, particularly with regard to the uniqueness of noise, has been provided where possible. Potential abandonment of the colony has now been considered within the Environmental Statement; see chapter D13, section 13.6 (Application Reference Number: 6.4.13) for this information.
Airborne noise modelling with wind: NRW requested clarification on whether wind had been included within the noise model and if so, what scenario had been used to reflect worst case.	It can be confirmed that wind was included within the noise model. Clarification on the wind scenarios used within the noise model has been provided within chapter D13, section 13.6 (Application Reference Number: 6.4.13). More detailed information can be found in appendix D13-13 (Application Reference Number: 6.4.95).
Seabird SSSIs: NRW suggested that in addition to SPAs, the Environmental Statement should also consider effects to SSSIs (e.g. Cemlyn Bay SSSI) and other sites designated for seabirds.	All sites designated for seabirds which are located within the Zone of Influence surrounding the Wylfa Newydd Development Area and the Disposal Site have been considered within the assessment (see chapter D13, sections 13.6 and 13.7, Application Reference Number: 6.4.13).

Key issue raised	Action taken
Indirect effects from increased recreational use: The National Trust and the North Wales Wildlife Trust expressed concern about potential secondary effects to marine ecological receptors arising from increased recreational use of the sea area adjacent to the Wylfa Newydd Development Area by construction workers.	The public access and recreation assessment (chapter D4, public access and recreation, Application Reference Number: 6.4.4) has undertaken an assessment of the effects of construction and operation on recreational activities including sailing and boating, kayaking, jet skiing and rowing. The chapter has concluded that the number of people using the waters in the area is negligible and therefore effects in marine receptors is also considered negligible. Whilst it is acknowledged that there is the potential for increased recreational fishing from construction workers the effect on fish populations is considered to be negligible. The marine chapter has assessed the significance of abstraction of 126m^3/s of water assuming 100% loss of biota as not significant for the area, therefore numbers lost through a potential increase in angling are also not considered significant.

Topic-specific stakeholder engagement

13.3.12 In addition to the three formal stages of consultation outlined above, topic-specific consultation has been undertaken with relevant stakeholders. Table B13-10 summarises the details of the consultation that has taken place with respect to the marine environment assessment.

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Table B13-10 Summary of topic-specific consultation

Date	Stakeholder	Title and format	Issues arising	Action taken
22 February 2010	Countryside Council for Wales (CCW), now NRW	Kick-off meeting	Discussion held around survey methods and survey extent to inform the EIA	None
30 March 2010	Cefas	Meeting on hydrodynamic surveys and modelling of the Cooling Water discharge	Initial discussions around methodology, baseline surveys and design	Ongoing consultation with no specific actions taken
1 July 2010	Cefas	Letter response on proposed marine ecology survey specification		
8 September 2010	Environment Agency Wales	Meeting on Cooling Water options and marine investigation for the Wylfa Newydd Project		
21 October 2010	Environment Agency Wales	Meeting on Cooling Water modelling and marine environment EIA		
7 December 2010	CCW	Meeting on seabirds		
8 December 2010	Environment Agency Wales	Cooling Water discharge modelling		

Date	Stakeholder	Title and format	Issues arising	Action taken
7 June 2011	Environment Agency Wales	Meeting on seabirds		
29 July 2011	Environment Agency Wales and CCW	Meeting on CWS optimisation		
16 February 2012	CCW	Meeting on seabirds	Meetings to discuss ongoing monitoring	Ongoing consultation and implementation of additional monitoring
11 September 2012	CCW and the IACC	Meeting on aquatic ecology surveys		
Various dates	CCW (subsequently NRW)	Letters and memorandums		
12 February 2013	CCW, Environment Agency Wales, Marine Management Organisation, Cefas and the IACC	Update on marine modelling and ecology	Meeting to run through progress in baseline data collection and modelling	Progress meeting – no actions
7 January 2015	NRW and the IACC	Meeting to update consultees on marine baseline environment surveys		
22 January 2015	NRW and the IACC	Marine modelling workshop	NRW requested further detail on the marine modelling	To continue to share ongoing work with NRW and the IACC
2 April 2015	NRW and the IACC	Marine modelling workshop	NRW requested further detail on the marine modelling methodology and results	To continue to share ongoing work with NRW and the IACC

Date	Stakeholder	Title and format	Issues arising	Action taken
15 April 2015	NRW and the IACC	Workshop on benthic ecology and marine mammals	Discussions between Horizon and NRW specialists on survey procedures and adequacy of baseline data for EIA	No change to baseline monitoring following meeting. Action to continue to share ongoing work with NRW and the IACC
16 April 2015	NRW and the IACC	Workshop on marine fish		
23 April 2015	NRW and the IACC	Workshop on phytoplankton, zooplankton and seabirds		
21 May 2015	NRW and the IACC	Design and construction of marine elements workshop	Presentation of marine options and further modelling approaches	To continue to share ongoing work with NRW and the IACC
13 November 2015	NRW	Hydrodynamic modelling workshop	Presentation of modelling progress	To continue to consult with NRW on methodology and results
31 October 2016	NRW	Marine and coastal process modelling update workshop	Presentation of progress with marine modelling programme for the Wylfa Newydd Development Area	To provide additional information on technical aspects of the marine modelling work to include input data
9 December 2016	NRW	Marine and coastal process modelling update workshop	Presentation of continued progress with marine modelling programme for the	To provide additional information on technical aspects of the marine modelling

Date	Stakeholder	Title and format	Issues arising	Action taken
			Wylfa Newydd Development Area	work to include input data
9 December 2016	NRW	Fish technical workshop 1	Presentation of baseline work undertaken and an outline of approaches to the assessment	To provide additional information on technical aspects
16 March 2017	NRW	Fish technical workshop 2	Update on outline of approaches to the assessment and on modelling results. NRW requested clarification on a number of assessment approaches to be provided via technical memos	To provide additional information on technical aspects in the form of memos covering extrapolation of entrapment data, dietary equivalent assessments and the thermal tolerance of fish
23 May 2017	NRW	Fish technical workshop 3	Discussion of embedded mitigation concept design and the assessment outcomes relating to fish.	Topic update on approach – no action taken
11 December 2017	NRW	Marine ecological enhancement mitigation workshop	Presentation of work done to date including, a literature review and high level discussions with engineers regarding ecological	To provide additional information on the feasibility of ecological enhancement options

Date	Stakeholder	Title and format	Issues arising	Action taken
			enhancement options and engineering constraints	To continue to consult with NRW on the design of ecological enhancement options
12 December 2017	NRW, National Trust, North Wales Wildlife Trust, RSPB and the IACC.	Marine effects technical workshop	Open discussion on the marine environment assessments	To provide additional information on a number of aspects of the assessment

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13.4 Topic-specific methodologies and assessment criteria

Introduction

13.4.1 The overarching approach to the EIA, including the approach to the assessment of cumulative effects, is provided in chapter B1 (introduction to the assessment process) (Application Reference Number: 6.2.1). This section outlines the specific methodology used to assess the effects of the Wylfa Newydd Project on the marine environment. It outlines the methods and criteria used to:

- define the study area and identify topic receptors;
- establish the environmental baseline for topic receptors; and
- determine the value/sensitivity of receptors, the magnitude of change and significance of effect.

Assessment of parameters

13.4.2 As outlined in chapter B1 (Application Reference Number: 6.2.1), the approach adopted for the design of the WNDA Development, Off-Site Power Station Facilities and Associated Development is to set parameters, where necessary, for the extent of the development and key aspects of that development. The final design and construction methodology would be limited to these parameters and limits of deviation. The approach to assessment of effects on the marine environment within the context of the parameters and limits of deviation for the WNDA Development is outlined in chapter 13 within volume D (Application Reference Number: 6.4.13).

Identification of study areas

13.4.3 Taking into account all potential pathways of effect, it was considered that the Cooling Water discharge could result in the furthest extent of an effect on the marine environment. The hydrodynamic modelling was therefore used to help define the study area (see appendix D13-8, Application Reference Number: 6.4.90). Based on early modelling of the Cooling Water discharge, a 5km radius from the Cooling Water outfall was originally defined as an appropriate study area, and updated hydrodynamic modelling has confirmed this is still appropriate. The study area describes the area surveyed and it is considered that this fully covers the area where potential significant effects may occur.

13.4.4 Data on all receptors have been collected in the marine environment out to 5km from the Wylfa Newydd Development Area. Acknowledging connectivity between marine receptors, additional data have been collected from beyond 5km. This includes collecting data on mobile receptors (marine mammals, seabirds and fish), and their potential prey sources to allow the effects on wider populations to be effectively assessed. The study areas are further defined for each receptor within chapter D13 (Application Reference Number: 6.4.13).

13.4.5 The Disposal Site represents a rectangular area off the north-west coast of Anglesey in the Irish Sea; Holyhead North (IS043). The north-western corner of the Disposal Site is the furthest point from shore at approximately 12.5km. The Disposal Site study area encompasses the spatial extent of all baseline survey data and information considered within the assessment of effects. The spatial extent of the Disposal Site study area is receptor-specific and encompasses the area over which suspended sediment would increase above the annual average background levels.

Identification of receptors

13.4.6 The main receptors for the marine environment cover all trophic (food chain) levels. The receptors were selected based on desk studies and an understanding of the potential for direct or indirect effects from construction, operation or decommissioning.

13.4.7 The groups of receptors are as follows:

- designated sites of national/international importance;
- marine water quality;
- phytoplankton and zooplankton;
- habitats and species;
- marine fish;
- marine mammals; and
- seabirds.

Within these groups, specific receptors are identified as appropriate, for example where receptor groups have different values or if their response to an effect could differ.

Identification of baseline conditions

13.4.8 Baseline data collection has evolved with development of the Wylfa Newydd Project and stakeholder consultation. Table B13-11 summarises the baseline data collected for each receptor group and their data sources.

Table B13-11 Marine environment baseline characterisation

Receptor group	Data collection (including duration)
Water quality	Physico-chemical, chemical and biochemical determinands were sampled between May 2010 and November 2014 at six sites (figure D13-2, Application Reference Number: 6.4.101). Two additional water quality surveys were carried out in December 2015 and then in February 2016 to gather data following shutdown of the Existing Power Station on 30 December 2015. This study focused on eight sites: six from the original programme and an additional two

Receptor group	Data collection (including duration)
	close to the outfall structure of the Existing Power Station. Four long-term, fixed-point mooring buoys were deployed between July 2010 and August 2011 (figure D13-2, Application Reference Number: 6.4.101). Three loggers were deployed in Cemlyn Lagoon to monitor temperature and salinity between June 2012 and April 2013. Data collected by NRW have been used to provide information on WFD water bodies and bathing water quality [RD20]. Water quality samples were collected from six sites at the Disposal Site in October 2016. Water quality samples were collected from coastal waters in Cemlyn Bay, Porth-y-pistyll, Cemaes Bay and within Cemlyn Lagoon from May 2017 to August 2017.
Plankton (phytoplankton and zooplankton)	Five sites were monitored on a monthly basis from May 2010 to April 2012 (figure D13-2, Application Reference Number: 6.4.101). An additional site, located in Porth-y-pistyll, was added to the programme in August 2011 and was monitored monthly until October 2012 (figure D13-2, Application Reference Number: 6.4.101). In March 2014, a revised selection of the original sites was monitored, together with two additional locations, one in Porth-y-pistyll and one in Cemlyn Bay. Sampling locations were the same as for the water quality surveys.
Benthic habitats and species	**Sediment quality** In 2010 and 2011, sediment grab samples were collected from 25 and 28 sites respectively, from within 5km of the Wylfa Newydd Development Area (figure D13-4, Application Reference Number: 6.4.101). In 2011 and 2014, divers collected sediment samples in Porth-y-pistyll for faunal and particle size analysis. Sediment samples were collected annually in summer between 2011 and 2014 from two sites in Porth-y-pistyll. In September 2016, sediment was collected for chemical analysis as part of the Detailed Offshore Ground Investigations from 20 sites in Porth-y-pistyll. In December 2016, sediment samples were collected from the Disposal Site.

Receptor group	Data collection (including duration)
	Intertidal benthic ecology Quadrat surveys of the rocky shore habitats and species assemblages were carried out in summer from 2010 to 2014 covering upper, mid and lower shore heights at 12 sites (figure D13-4, Application Reference Number: 6.4.101). An intertidal biotope validation mapping and rock pool survey was carried out in and around Porth-y-pistyll to update the 2003 NRW survey (figure D13-5, Application Reference Number: 6.4.101). **Subtidal benthic ecology** Geophysical investigations including swathe bathymetry, side-scan sonar, sub-bottom profiling and magnetometry were carried out in October 2009 and May 2010. In 2010 and 2011, quantitative benthic invertebrate sampling was carried out at 25 sites, with an additional three sites in 2011 sampled. In 2015, 11 of these sites were sampled to assess the ongoing validity of earlier data (figure D13-4, Application Reference Number: 6.4.101). Drop-down camera images from benthic invertebrate grab locations and other non-grab locations were acquired from 68 and 54 sites sampled in June 2010 and 2011 respectively (figure D13-7, Application Reference Number: 6.4.101). Diver biotope mapping of habitats in Porth-y-pistyll was carried out in June 2014 (figure D13-6, Application Reference Number: 6.4.101). Subtidal cores were taken from several locations in the bay where feasible. Diver surveys of the immediate receiving waters of the Existing Power Station's Cooling Water outfall were carried out in 2011, 2012 and 2015. In October 2016, drop-down camera images were obtained from 17 sites at the Disposal Site alongside samples for faunal and physical analysis.
Fish	**Ichthyoplankton** Sampled from 2010 to 2014 (Gulf plankton sampler). During the first full year, surveys were carried out monthly with samples collected at five sites. The sampling programme was subsequently revised to include additional sites (figure D13-9, Application Reference Number: 6.4.101).

Receptor group	Data collection (including duration)
	Intertidal fish communities Sampled quarterly between 2010 and 2014. Seine netting was completed at 11 target sites. Baited fish traps were set at two sites and were left for up to 24 hours before retrieval (figure D13-9, Application Reference Number: 6.4.101). **Subtidal fish communities** Sampled on a quarterly basis using otter and beam trawls at five sites around north Anglesey between 2010 and 2014 (figure D13-9, Application Reference Number: 6.4.101). **Entrapment at the intake (referring to the impingement and entrainment collectively)** Impingement (material retained on the Cooling Water screens) and entrainment (material passing thorough the screens) surveys were carried out at the drum screens of the Cooling Water intake of the Existing Power Station at a rate of 40 surveys per annum, with 55 surveys completed in total between March 2011 and July 2012.
Marine mammals	From 2011 to 2014 data were collected by marine mammal observers from land-based Vantage Point surveys between Cemlyn Bay and Cemaes Bay (figure D13-12, Application Reference Number: 6.4.101). Monthly boat-based transect surveys for marine mammals in 2016 and 2017 (figure D13-12, Application Reference Number: 6.4.101). Opportunistic/casual sightings records from marine surveys collected from 2010 to 2015. Additional abundance and density data were gathered from Passive Acoustic Monitoring surveys (undertaken in 2016/2017) and external organisations (e.g. Sea Watch Foundation and NRW) to build a comprehensive picture of the distribution in the study area. This has been supplemented by information from autonomous underwater noise cetacean click detector surveys and dedicated land-based seal surveys undertaken since 2016.
Seabirds	Vantage Point surveys were carried out over a 3.5km² study area, intertidal zone surveys at Porth-y-pistyll and Cemlyn Bay and specific surveys of Cemlyn Lagoon (figure D13-12, Application Reference Number: 6.4.101).

Receptor group	Data collection (including duration)
	Vantage Point surveys were initially carried out over a 36-month sampling programme between September 2010 and August 2013, followed by a six-month validation sampling programme in 2014 (from April to September). Intertidal zone seabird surveys at Porth-y-pistyll were carried out over 36 months between April 2012 and March 2015. Intertidal zone seabird surveys at Cemlyn Bay were carried out over six months between October 2014 and March 2015. Specific surveys of Cemlyn Lagoon were carried out in order to record the seabirds present within the Cemlyn Bay section of Ynys Feurig, Cemlyn Bay and The Skerries SPA. The surveys were carried out from September 2012 to April 2013. Surveys of the gull colony at Porth Wnal to the north of the Existing Power Station were carried out twice in April 2013. Monthly boat-based transect surveys for seabirds were carried out in 2016 and 2017 (figure D13-12, Application Reference Number: 6.4.101). Tern-tracking surveys were carried out in June and July 2016.

13.4.9 The existing baseline conditions within the study area are considered to be relatively stable for many receptors as there have not been fundamental changes to environmental conditions or in the use of the marine environment in the local area for many years. As a consequence, the existing baseline data remains valid.

13.4.10 In December 2015, the Existing Power Station ceased generating power and it is recognised that the baseline will evolve in response to this change, in particular from the cessation of Cooling Water discharge and the removal of the thermal plume and biocide effects. Where relevant, the evolution of the baseline has been considered in the assessment. For example, the assessment considers that the habitats in the vicinity of the outfall would recover and would be similar to those in the surrounding area by the time construction begins.

Assessment of effects

13.4.11 A multi-method approach has been used to characterise the marine environment. Prior to commencing survey work the procedures were agreed with the Cefas and/or NRW and, where relevant, followed guidance notes for WFD monitoring (e.g. [RD21]) or methods outlined in the *Marine Monitoring Handbook* [RD17].

13.4.12 Horizon has developed a marine hydrodynamic model to aid understanding of the potential influence of the structures and discharges associated with construction and operation of the Power Station on the marine environment (see appendix D13-8, Application Reference Number: 6.4.90). This model is of relevance to both chapter D13 (Application Reference Number: 6.4.13) and chapter D12 (Application Reference Number: 6.4.12).

13.4.13 The overarching methodology adopted for assessing potential environmental effects is set out in chapter B1 (Application Reference Number: 6.2.1). A source-pathway-receptor approach was used to provide a logical approach to identifying potentially significant effects. Each activity was considered in turn to determine the potential sources (origins) of an effect. The pathway (the means by which the effect could reach a receptor) was then determined, for example the pathway could be through air or water.

13.4.14 The specific approach taken to assessing the effects on marine environment receptors is based on the CIEEM Guidelines [RD9]. It should be noted that in this assessment the term 'ecological receptor' is used in preference to 'ecological feature', the latter being used in the CIEEM Guidelines. This is to maintain consistency in terminology in this Environmental Statement between different topic chapters.

13.4.15 Some marine environment receptors are not ecological in nature (e.g. bathing waters and WFD water bodies) and are referred to as 'environmental receptors'. In the absence of alternative guidance, the same assessment methodology has been applied to these receptors. For environmental receptors, the assessment draws on numerical modelling where relevant and specifically considers the effects in relation to defined guidelines and criteria (e.g. an Environmental Quality Standard of a water quality parameter).

13.4.16 Ecological Impact Assessment is a form of EIA used for ecological receptors. In assessing the effects of the Wylfa Newydd Project, it is necessary to define the ecological receptors likely to be affected, the magnitude of change and the significance of the effect on the receiving environment. In making this assessment, the following CIEEM definitions have been used.

I. The ecological receptor is defined as the habitat, species, ecosystem and their functions/processes that may be influenced by the effect.

II. The effect represents the change to the environment, which can then influence a receptor (e.g. degradation of water quality may alter sensory systems of fish).

III. The value of the receptor refers to its importance in terms of 'nature conservation value' or its economic/recreational importance to a community, e.g. commercial or recreational fishery.

IV. The influence of the effect on the receptor is defined as the magnitude of change, e.g. permanent loss of species to environment. The magnitude of change can be positive or adverse and will be quantified where possible (e.g. area, intensity and volume). The level of magnitude is assigned using this information and professional judgement.

V. The significance of effect is a function of the value or sensitivity of the receptor and the predicted magnitude of change.

13.4.17 In summary, adoption of the CIEEM Guidelines has informed effective impact assessment by the following means:

- scoping involving consultation to help define the scope of EIA;
- identification of the likely zone of influence arising from the whole lifespan of the Wylfa Newydd Project;
- identification of the ecological receptors, resources and functions likely to be affected by the Wylfa Newydd Project;
- identification of the biophysical changes which are likely to affect the receptors;
- assessment of whether these biophysical changes are likely to give rise to a significant ecological effect, defined as an effect that either supports or undermines biodiversity conservation for valuable ecological receptors within a given geographical area, including cumulative effects;
- refinement of the Wylfa Newydd Project to avoid, reduce and mitigate ecological effects;
- assessment of the ecological effects of the Wylfa Newydd Project, and definition of the significance of these effects, including cumulative effects;
- provision of advice on the consequences for decision-making of significant ecological effects, based on the value of the resource, feature or function; and
- provision for monitoring and following up the implementation and success of mitigation measures and ecological outcomes, including feedback in relation to predicted outcomes.

Value of receptors

13.4.18 The assessment of potential effects on the topic receptors is led by professional judgement and experience, and is informed by the baseline information. The criteria used to determine the value of receptors specific to the topic are set out in table B13-12. This is based on the generic criteria presented in chapter B1 (Application Reference Number: 6.2.1) of this Environmental Statement but tailored in relation to marine receptors based on the CIEEM Guidelines. If not all criteria are met, then the value is determined based on professional judgement. Where this applies, justification for the assigned value is provided within the text.

Table B13-12 Criteria for determining the value of topic receptors

Value	Topic-specific criteria
High	Receptor is of international/national importance, e.g. it is a WFD water body, a designated feature, or supports a designated feature of an SAC, SPA or SSSI, or is an area that meets the published selection criteria for designation, irrespective of whether or not it has yet been notified. It is a species that has European protection through the provision of the Conservation of Habitats and Species Regulations 2010 (as amended). Receptor is rare or uncommon on an international or national scale. Receptor has a vital role in supporting the wider ecosystem or provides essential ecosystem services. Receptor has high economic value.
Medium	Receptor is of regional/county importance, e.g. it is listed in accordance with the requirements of Section 7 of the Environment (Wales) Act 2016. Receptor is rare or uncommon on a regional/county scale. Receptor has a role in supporting the wider ecosystem or provides regional/county level ecosystem services. Receptor has moderate economic value.
Low	Receptor is of district/local importance, e.g. it is a designated feature of a local wildlife site. Receptor is relatively common. Receptor may support the wider ecosystem or provides local level ecosystem services. Receptor has low economic value.
Negligible	Receptor is not specifically designated in local policies or plans. Receptor is abundant. Receptor has a minor role within the ecosystem or provides few or no ecosystem services. Receptor has very low/no economic value.

Magnitude of change

13.4.19 The magnitude of change is a measure of the scale or extent of the change in the baseline condition, irrespective of the value of the receptor(s) affected. The criteria used to determine the magnitude of change in the marine environmental assessment are set out in table B13-13 with consideration for the generic criteria outlined in chapter B1 (Application Reference Number: 6.2.1) of this Environmental Statement. If not all criteria are met, then the magnitude is determined based on professional judgement.

Table B13-13 Criteria for determining the magnitude of change for topic receptors

Magnitude of change	Topic-specific criteria
Large	The activity is likely to permanently affect the integrity of the receptor in terms of the coherence of its ecological structure and function and may affect the conservation status of the receptor. The receptor is degraded to the extent that populations and habitats are destroyed or sensitive life stages are affected. Receptors experience continuous, irreversible, long-term change. The status of a quality element in a WFD water body could potentially deteriorate. The receptor has low capacity to adapt to change. Recovery, if it occurs, would be expected to be long term, i.e. 10 years after the source of the change has been removed.
Medium	The activity is not likely to permanently affect the integrity of the receptor, but the effect is likely to be substantial in terms of its ecological structure and function and may affect the conservation status of the receptor. The receptor is degraded to the extent that populations and habitats experience a reduction in the number or range in the medium to short term. Receptors experience regular intermittent change that may affect sensitive life stages. The receptor has medium capacity to adapt to change. Recovery would be expected to occur in the medium term, i.e. five years after the source of the change has been removed.
Small	The activity would not permanently affect the integrity of the receptor, but receptors may experience some limited degradation. Disturbance is noticeable but is experienced within the range of natural variability in the medium to short term. Receptors experience intermittent, irregular change, and sensitive life stages are not affected. The receptor has high capacity to adapt to change. Recovery would be expected to occur in the short term, i.e. one year after the source of the change has been removed.
Negligible	The activity would not permanently affect the integrity of the receptor, and there would be little or no degradation. The change to baseline conditions is unnoticeable. Disturbance is experienced within the range of natural variability in the short term. Receptors experience occasional change, and sensitive life stages are not affected.

Magnitude of change	Topic-specific criteria
	The receptor has a high capacity to adapt to change. Recovery would be expected relatively quickly, i.e. less than six months after the source of the change has been removed.

Assessment of significance

13.4.20 For the Wylfa Newydd Project EIA, the general approach adopted is to consider that an environmental effect may be significant if, in the professional judgement of the expert undertaking the assessment, it would meet at least one of the following criteria:

- it leads to an exceedance of defined guidelines or widely recognised levels of acceptable change (which will be different for different topics within the EIA);
- it is likely that the consenting authority will reasonably consider applying a planning condition, requirement or legal agreement to the consent to require specific mitigation to reduce or overcome the effect;
- it threatens or enhances the viability or integrity of a receptor or receptor group of concern; or
- it is likely to be material to the ultimate decision about whether or not the consent application should be approved.

13.4.21 The degree of significance of an effect is determined through an understanding of baseline data and interpretation of the magnitude of change in relation to the value/sensitivity of receptors. Where necessary, the assignment of significance will be guided by the matrix shown in figure B1-2 (see chapter B1, Application Reference Number: 6.2.1). Only those effects assessed as being 'moderate' or 'major', are considered as significant, those assessed as 'negligible' and 'minor' are considered as non-significant effects.

13.4.22 The assessment has been made taking into account embedded and good practice mitigation, as described in chapter B1 (Application Reference Number: 6.2.1). During the assessment process, additional mitigation measures have been identified to reduce the effects. The final part of the assessment considers the application of all these measures to determine residual effects.

Limitations

13.4.23 There are limitations associated with surveys in the marine environment due to the characteristics of receptors, many of which are highly mobile with distributions that vary spatially and temporally. There is natural variability in the distribution of habitats and species, which are influenced by factors such as exposure (e.g. open coastline or sheltered bay), waves and currents. The limitations associated with each survey and the efforts that have been made to reduce the influence of environmental factors on results, are outlined in the

relevant appendices (see appendices D13-1 to D13-7, Application Reference Number: 6.4.83 to 6.4.89).

13.4.24 There are also limitations associated with the hydrodynamic and underwater noise modelling. The hydrodynamic modelling required assumptions to be made about variables, such as the influence of wind or waves on mixing processes (see sections 3 and 6.1 of appendix D13-8, Application Reference Number: 6.4.90). A number of scenarios were modelled to explore the effect of assumptions on the model outputs.

13.4.25 Underwater noise modelling also requires assumptions to be made in relation to the noise source, nature (e.g. continuous or intermittent) and duration (see section 5 of appendix D13-9, Application Reference Number: 6.4.91). A precautionary approach has been taken which could result in an overestimation of the effect.

13.5 References

Table B13-14 Schedule of references

ID	Reference
RD1	Department of Energy and Climate Change. 2011. *Overarching National Policy Statement for Energy (EN-1)*. [Online]. [Accessed: 03 May 2017]. Available from: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/47854/1938-overarching-nps-for-energy-en1.pdf.
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