ABWP Phase I Decommissioning

Ecosystem Services Assessment

Volume 3, Appendix 1.5



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Project name ABWP Phase I Decommissioning

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Statement of Authority

Author	Qualifications	Relevant Experience
Jordan Noble	MSci Marine Biology	Jordan is a marine environmental consultant with a strong grounding in marine ecology and a proven track record of providing scientific advice on the potential ecological effects of marine and coastal developments. She has extensive experience supporting and coordinating Ecological Impact Assessments and Environmental Impact Assessments (EIAs) for a wide range of tidal, coastal and offshore projects, including river and coastal defences, port and harbour developments, subsea cables and offshore wind infrastructure. Jordan regularly liaises with statutory bodies including the Environment Agency, Marine Management Organisation (MMO) and Port of London Authority, providing clear, environmental advice to support consenting and post consent compliance.
Emily Whiting	BSc Marine Biology MSc Marine Conservation	Emily is a senior marine environmental consultant with a strong technical background in marine ecology and a broad portfolio of work across UK offshore, coastal and intertidal environments. She has significant experience delivering Marine Environmental Appraisals, EIAs and a range of statutory marine assessments, applying detailed ecological understanding to evaluate effects on benthic, intertidal and wider marine receptors. Her work spans early-stage feasibility through to licensing, consent and post-consent support, with a focus on producing clear, evidence-led assessments and proportionate mitigation. She works closely with key regulatory bodies including the MMO, Natural England, Marine Directorate Licensing and Operations Team, Natural Resources Wales and the Government of Jersey, providing well-reasoned environmental advice to support decision-making.
Kim Bridge	Master of Oceanography (MOcean), University of Southampton (UK)	Over 13 years' experience in permitting, consenting and environmental assessment for a wide range of coastal and marine projects including offshore wind farms, subsea cables, ports and harbours and coastal development in geographies of UK and Ireland.

Glossary

Term	Meaning
Arklow Bank Wind Park (ABWP) Phase I	Arklow Bank Wind Park (ABWP) Phase I comprises: • Offshore infrastructure seaward of High Water Mark (HWM), including: – Seven Wind Turbine Generators (WTG) with a combined capacity of 25.2 MW; – One meteorological (met) mast; – Inter-array cables connecting the WTGs and met mast; and – One offshore export cable connecting WTG T4 with landfall at HWM; • Onshore infrastructure landward of HWM including: – One onshore cable connecting landfall at HWM with the onshore substation; and – One onshore substation compound, where the onshore substation and ancillary infrastructure are located.
ABWP Phase II	ABWP Phase II comprises: • Offshore Infrastructure, including: – 53 or 47 WTGs and two Offshore Substation Platforms (OSPs) located within the "Array Area"; – Inter-array cables connecting WTGs with the OSPs; and – Two offshore export cables; • Onshore grid connection infrastructure, including a 220 kV substation at Shelton Abbey with an associated connection to the existing National Electricity Transmission Network; • Operations and Maintenance Facility (OMF) at South Dock, Arklow Harbour; and • EirGrid Upgrade Works.

Term	Meaning
Additional mitigation	Actions that will be required to reduce the significance of environmental effects of the Proposed Works, which will be dependent on the significance of effects assessed in the EIAR. Also referred to as secondary mitigation in Institute of Environmental Management and Assessment (IEMA) (2024). IEMA is now the Institute of Sustainability and Environmental Professionals (ISEP).
Archaeological Exclusion Zone (AEZ)	Area around a known or suspected archaeological feature within which specified activities or works are prohibited.
Archaeology Management Plan (AMP)	Document that sets out clear protocols to follow in the course of a project to ensure compliance with archaeological legislation by all parties, and mitigation of works in accordance with existing national monuments legislation.
Arklow Energy	Arklow Energy Limited, the entity seeking planning permission for the Proposed Works, i.e. the applicant.
Baseline	A description of the relevant aspects of the current state of the environment (baseline scenario) (EIA Directive 2014/52/EU).
Competent authority	Are those authorities that are entitled to give authorisation or consent to a plan or project. In the planning system, this means planning authorities and An Coimisiún Pleanála. There are, however, a wide range of other competent authorities in respect of other consent regimes e.g. EPA (environmental licencing), Minister for Agriculture, Food and the Marine (forestry, aquaculture and foreshore management), and various state bodies that have authority to undertake development under Part 9 of the Planning and Development Regulations (e.g. An Garda Síochána, defence forces, the courts service). The competent authority for this planning application is An Coimisiún Pleanála (ACP).
Cooperation Agreement	A formal agreement – which may also be referred to as a disruption agreement - between Arklow Energy and a fisher, intended to reduce disturbance or displacement to a fishery caused by the Proposed Works Offshore. Such agreements may be supported by monetary payment only where loss or access results from Proposed Works Offshore activities and that loss of access results in an evidenced financial loss, or a demonstrable risk of financial loss, to active fishing vessels.
Cultural Services	Cultural services encompass the physical, psychological and spiritual benefits people derive from interacting with the marine and coastal environment. These include recreational activities such as walking along beaches, surfing and other water-based activities, as well as the contribution of coastal and sea views to human wellbeing and quality of life (Socio-Economic Marine Research Unit (SEMRU), 2018).
Decommissioning	The final closing down and putting into a state of safety of a development, project or process when it has come to the end of its useful life (EPA, 2022).
Designated sites	Unless otherwise specified, the term 'designated' is used to refer to international sites, European sites and national sites (that are legally designated, or are going through the process of designation (MDB, 2017).
Detailed Lighting and Marking Plan (LMP)	The contractor-developed version of the Outline LMP (see **Volume 3, Appendix 3.7**), to be prepared before Proposed Works Offshore commence and maintained as a live document until completion.
Detailed Marine Mammal Mitigation Protocol (MMMP)	The contractor-developed version of the MMMP (see **Volume 3, Appendix 5.3**), to be prepared before Proposed Works Offshore commence and maintained as a live document until completion.
Detailed Offshore Decommissioning Environmental Management Plan (DEMP)	The contractor-developed version of the Outline Offshore DEMP (see **Volume 3, Appendix 3.4**), to be prepared before Proposed Works Offshore commence and maintained as a live document until completion.
Detailed Offshore Waste Management Plan (WMP)	The contractor-developed version of the Outline Offshore WMP (see **Volume 3, Appendix 3.8**), to be prepared before Proposed Works Offshore commence and maintained as a live document until completion.
Detailed Vessel Management Plan (VMP)	The contractor-developed version of the Outline VMP (see **Volume 3, Appendix 3.5**), to be prepared before Proposed Works Offshore commence and maintained as a live document until completion.

Term	Meaning
Ecosystem	Dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit (United Nations, 1992).
Ecosystem Services	The benefits that humans derive from marine ecosystems through their processes, functions and structures (SEMRU, 2018).
Effect	The consequence of an impact on a receptor. For example, in the offshore environment, vessel activity (activity) results in increased levels of underwater noise (impact), with the potential to disturb marine mammals (effect).
Embedded mitigation	Mitigation measures included as part of the Proposed Works. Include modifications arising through the iterative design process; and standard industry practice that would occur even without input from the EIA process, e.g. actions undertaken to meet other existing legislative requirements, or actions that are standard practices used to manage commonly occurring environmental effects. Correspond to primary and tertiary mitigation defined in Institute of Environmental Management and Assessment (IEMA) (now Institute of Sustainability and Environmental Professionals (ISEP)) (2024).
Environmental factor	Refers to environmental factors used to present the characteristics of the environment (EPA, 2022) that are used to organise the description of the environment in the EIAR.
Environmental Impact Assessment (EIA)	Process of assessment of the effects of a project or development proposal on the environment. In the planning area, it is undertaken by a planning authority or An Coimisiún Pleanála during the consideration of applications for planning permission, taking account of an Environmental Impact Assessment Report (EIAR). The projects which require EIA are listed in Annex I and Annex II of the EIA Directive, as amended (Office of the Planning Regulator, n.d.).
Environmental Impact Assessment Report (EIAR)	A report or statement of the effects, if any, that Proposed Works, if carried out, would have on the environment. It is prepared by the developer to inform the EIA process (Office of the Planning Regulator, n.d.).
Exclusive Economic Zone (EEZ)	Area beyond and adjacent to the territorial sea, subject to the specific legal regime established in this Part (UNCLOS, 1982). The EEZ in Ireland extends up to 200 nautical miles (nm) from the outer edge of the territorial sea.
Foreshore	The bed and shore, below the line of high water of ordinary or medium tides, of the sea and of every tidal river and tidal estuary and of every channel, creek, and bay of the sea or of any such river or estuary. Its outer limit is coterminous with the seaward limit of the territorial sea (Foreshore Act 1933 (as amended)), which is at a distance of 12 nm from the nearest point of the baseline or otherwise prescribed (Maritime Jurisdiction Act 2021 (as amended)).
Good Environmental Status (GES)	Environmental status of marine waters where these provide ecologically diverse and dynamic oceans and seas which are clean, healthy and productive within their intrinsic conditions, and the use of the marine environment is at a level that is sustainable, thus safeguarding the potential for uses and activities by current and future generations (Marine Strategy Framework Directive (MSFD) (2008/56/EC)).
High Water Mark (HWM)	Level reached by the sea at high tide, measured as the mean of high tides.
Impact	A change brought about by the Proposed Works.
Inter-array cables	Subsea power lines that link individual wind turbine generators (WTGs) together in an offshore wind farm, forming an electrical network. In ABWP Phase I, inter-array cables connect WTGs and the met mast to each other and have an overall length of 7.4 km.
Intertidal	The area between the HWM and the Low Water Mark (LWM).
Landfall	The point where the offshore export cable transitions from the offshore marine environment to the onshore terrestrial environment.
Meteorological (Met) mast	A mast with a number of meteorological sensors located at different heights to record meteorological and sea condition data
Mitigation measures	Measures to avoid, prevent or reduce impacts (EPA, 2022), which comprise both embedded and additional mitigation, see separate definitions for these.

Term	Meaning
Monitoring	The periodic or continuous observation of biodiversity indicators and of other parameters that may affect biodiversity for any changes that may occur over time, so as to confirm predictions made with respect to likely effects and identify adverse changes that may require remedial action (Office of the Planning Regulator, n.d.).
Monopile (MP)	Hollow steel cylinder driven into the seabed typically used to anchor an offshore wind turbine generator (WTG). In ABWP Phase I, MPs support the seven WTGs as well as the meteorological (met) mast.
Offshore export cable	Subsea power cable that transports the total generated power from an offshore wind farm to the onshore power grid. In ABWP Phase I, the offshore export cable connects the wind turbine generator (WTG) T4 to landfall with an approximate overall length of 15.6 km. At landfall, the offshore export cable transitions to the onshore cable connecting to the onshore substation.
Offshore Site	Part of the Site where Proposed Works Offshore are proposed to take place. In this application for planning permission, the Offshore Site comprises the Sub Lease Area, where the ABWP Phase I wind turbine generators (WTGs), met mast and inter-array cables are located, and the offshore export cable 10 m corridor connecting WTG T4 to the landfall at high water mark (HWM) near Arklow Harbour.
Pathway	The route by which an effect is conveyed between a source and a receptor (EPA, 2022).
Planning application	The application for consent submitted to An Coimisiún Pleanála (ACP) under s291 of the Planning and Development Act 2000, as amended.
Planning permission	Formal, legal approval required from a local planning authority or An Coimisiún Pleanála (ACP) to carry out development. The Proposed Works require planning permission submitted from ACP under Section 291 of the Planning and Development Act 2000, as amended.
Proposed Works	The Proposed Works include decommissioning of ABWP Phase I offshore infrastructure (Proposed Works Offshore) and decommissioning of ABWP Phase I onshore infrastructure (Proposed Works Onshore).
Provisioning Services	Ecosystem services that provide tangible goods and are often directly linked to ecosystem processes. In the Irish marine and coastal environment, these services include the harvesting of fish and seaweed, as well as aquaculture production along the coast (SEMRU, 2018).
Qualifying Features	In Ireland, habitats and/or species which are the reason(s) for the designation of an SAC are referred to as 'Qualifying Interests' (QIs). For SPAs, bird species and their habitats which are the reason for a particular site designation are referred to as 'Special Conservation Interests' (SCIs). In this AA Screening Report, QIs and SCIs are together referred to as qualifying features.
Receptor	Any element in the environment which is subject to impacts (EPA, 2022).
Regulating and maintenance services	Services that regulate environmental conditions and are typically experienced indirectly. Examples include carbon sequestration, which contributes to climate change mitigation, the natural treatment and assimilation of wastewater before its return to the hydrological cycle, and flood and storm protection provided by features such as sand dunes and saltmarshes, which reduce damage during severe weather events (SEMRU, 2018).
Significance	The importance of the outcome of the impact (or the consequence of change) for the receiving environment (EPA, 2022).
Source	The activity or place from which an effect originates (EPA, 2022)
Sub Lease Area	Area where the ABWP Phase I WTGs, met mast and inter-array cables are located, as defined in the Sub Lease granted by Sure Partners Limited (SPL) to Arklow Energy Limited (Arklow Energy) to construct and operate ABWP Phase I.
Territorial sea	Belt of sea adjacent to a coastal State's land territory and internal waters, over which the State has sovereignty. A coastal State may claim up to 12 nautical miles from its baseline (usually the low-water line along the coast) (UNCLOS, 1982).

Term	Meaning
Transition Piece	The steel connection structure between the tower and the monopile (MP) foundation.
Waste	Any substance or object belonging to a category of waste specified in the First Schedule or for the time being included in the European Waste Catalogue which the holder discards or intends or is required to discard, and anything which is discarded or otherwise dealt with as if it were waste shall be presumed to be waste until the contrary is proved (Waste Management Act 1996 (as amended)).
Wind Turbine Generator (WTG)	Structure that converts the kinetic energy of ocean winds into electrical energy. ABWP Phase I includes seven GE Energy 3.6s WTGs with a rated capacity of 3.6 megawatts (MW) per WTG.
Zone Of Influence (ZoI)	The potential geographic area that could be affected by the implementation of the Proposed Works, having regard to the source-pathway-target risk assessment concept.

Acronyms

Acronym	Meaning
ABWP	Arklow Bank Wind Park
ACP	An Coimisiún Pleanála
AEZs	Archaeological Exclusion Zones
BIM	Bord Iascaigh Mhara
DCEE	Department of Climate, Energy and the Environment
DEMP	Decommissioning Environmental Management Plan
DHLGH	Department of Housing, Local Government and Heritage
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EPA	Environmental Protection Agency
EU	European Union
EVMP	Ecological Vessel Management Plan
FMMS	Fisheries Management and Mitigation Strategy
GES	Good Environmental Status
HWM	High Water Mark
IFI	Inland Fisheries Ireland
INNS	Invasive Non-Native Species
MEA	Millennium Ecosystem Assessment
MMMP	Marine Mammal Mitigation Protocol
MP	Monopile
MSFD	Marine Strategy Framework Directive
MSPD	The Maritime Spatial Planning Directive
NMPF	National Marine Planning Framework
PAD	Protocol for Archaeological Discoveries
SAC	Special Area of Conservation
SEMRU	Socio-Economic Marine Research Unit

Acronym	Meaning
SNCB	Statutory Nature Conservation Body
SPA	Special Protection Area
SPL	Sure Partners Limited
STEEM	Ship Traffic, Energy and Environment Model
TPs	Transition Pieces
UKERC	United Kingdom Energy Research Centre
VMP	Detailed Vessel Management Plan
WMP	Waste Management Plan
WTG	Wind Turbine Generators
WWTP	Wastewater Treatment Plant

Units

Unit	Meaning
animals/km²	Animals per kilometre squared
km	Kilometres
MW	Megawatt
m/s	Metres per second

EXECUTIVE SUMMARY

Arklow Energy Limited (Arklow Energy) is seeking planning permission to decommission Arklow Bank Wind Park (ABWP) Phase I, located approximately 10 km offshore of Arklow, County Wicklow. This Ecosystem Services Assessment has been prepared as part of the Environmental Impact Assessment Report (EIAR) to determine whether the Proposed Works Offshore have the potential to result in any beneficial or adverse effects on marine and coastal ecosystem services.

The ABWP Phase I Decommissioning EIA Scoping Presentation (**Volume 3, Appendix 1.1**) was submitted to the An Coimisiún Pleanála (ACP) and prescribed bodies in March 2026 to seek informal, non-statutory feedback on the proposed EIAR scope and assessment approach for scoped-in topics. This did not constitute a formal scoping request under Article 117 of the 2001 Regulations, the provision that governs how a developer may formally seek a scoping opinion from the competent authority on the required scope, content and level of detail of an EIAR. Feedback received, together with wider stakeholder engagement, is summarised in the **Stakeholder Consultation and Engagement Report** accompanying the planning application, with topic specific responses set out in the relevant EIAR chapters.

All topics proposed to be scoped in were Offshore, with all Onshore topics proposed to be scoped out (see **Volume 3, Appendix 1.1** for further details). Accordingly, this assessment focuses solely on marine and coastal ecosystem services associated with the offshore environment and is aligned with the ecosystem-based approach of the National Marine Planning Framework (NMPF) and the Marine Strategy Framework Directive (MSFD).

A proportionate, two-stage assessment has been undertaken. Stage 1 screened ecosystem services based on plausible source–pathway–receptor linkages between the Proposed Works Offshore and ecosystem services, informed by Valuing Ireland's Blue Ecosystem Services (SEMRU, 2018). Ecosystem services with no interaction pathway or no anticipated adverse effects were screened out. Stage 2 involved a qualitative assessment of services screened in, drawing directly on baseline information, the outcomes of the EIAR chapters (**Volume 2, Chapters 4 – 8**) and evidence from the United Kingdom Energy Research Centre (UKERC) database, in the absence of an Irish equivalent.

The assessment concludes that, due to the temporary and localised nature of the Proposed Works Offshore, the dynamic baseline environment, and the implementation of standard mitigation and best-practice measures, no adverse effects are predicted on marine ecosystem services.

A minor beneficial effect is identified for scientific and educational services, reflecting the collection of project-specific environmental data through surveys undertaken to inform the Proposed Works Offshore, which may provide some additional information on the receiving environment. Additionally, as the first large scale monopile offshore wind decommissioning project in Europe, the Proposed Works Offshore will generate valuable learning to inform future offshore wind decommissioning activities.

Overall, the Proposed Works Offshore will not result in adverse effects on ecosystem services and will deliver beneficial outcomes where relevant. This assessment demonstrates that ecosystem services have been appropriately and transparently considered within the EIAR, in line with national and EU marine policy objectives.

1 INTRODUCTION

1.1 Overview

1.1.1.1 Arklow Energy Limited (Arklow Energy) is seeking planning permission to decommission Arklow Bank Wind Park (ABWP) Phase I (referred to hereafter as 'the Proposed Works'). The Proposed Works include decommissioning of ABWP Phase I offshore infrastructure (Proposed Works Offshore) and decommissioning of ABWP Phase I onshore infrastructure (Proposed Works Onshore).

1.1.1.2 The Proposed Works Offshore will be undertaken within the Offshore Site (see **Volume 2, Chapter 3: Proposed Works Description**), which includes:

- The Sub Lease Area, located on the long narrow Arklow Bank sand bank, situated approximately 10 km off the coast of Arklow, south-east Ireland, where seven wind turbine generators (WTGs) and foundations, associated scour protection, 7.4 km of inter-array cables and one met mast are located; and
- A 10 m wide cable corridor along the 15.6 km offshore export cable route connecting WTG T4 to the landfall point at High Water Mark (HWM).

1.1.1.1 This Ecosystem Services Assessment aims to identify the ecosystem services associated with the Offshore Site, and assess the likelihood of both beneficial and adverse effects from the Proposed Works Offshore on relevant ecosystem services.

1.1.1.2 This Ecosystem Services Assessment draws on the outcomes of the EIAR for the Proposed Works. As such, this appendix is informed by:

- **Volume 2, Chapter 1: Introduction;**
- **Volume 2, Chapter 3: Proposed Works Description;**
- **Volume 2, Chapter 4: Coastal Processes, Water and Sediment Quality;**
- **Volume 2, Chapter 5: Marine Biodiversity;**
- **Volume 2, Chapter 6: Commercial Fisheries and Aquaculture;**
- **Volume 2, Chapter 7: Shipping and Navigation;**
- **Volume 2, Chapter 8: Marine Archaeology;**
- **Volume 3, Appendix 1.1: Environmental Impact Assessment Scoping Presentation;**
- **Volume 3, Appendix 1.4: Marine Strategy Framework Directive Assessment.**
- **Volume 3, Appendix 3.5: Outline Vessel Management Plan;** and
- **Volume 3, Appendix 3.7: Outline Lighting and Marking Plan.**

1.1.1.3 The specific objectives of this Ecosystem Services Assessment are to:

- Identify ecosystem services provided by the marine environment within and surrounding the Offshore Site; and
- Assess whether these ecosystem services are likely to be adversely affected by the Proposed Works Offshore.

1.2 Purpose of the Assessment

1.2.1.1 This Ecosystem Services Assessment identifies whether the Proposed Works Offshore could result in beneficial or adverse effects on ecosystem services, which are defined as the benefits that humans derive from marine ecosystems through their processes, functions and structures (Socio-Economic Marine Research Unit (SEMRU), 2018).

1.2.1.2 The relevance of ecosystem services and potential impacts on these from Proposed Works Offshore are considered taking into account the temporary and spatial scale of Proposed Works Offshore, which is relatively limited.

1.3 Scope of Assessment

1.3.1.1 Consideration of ecosystem services has been informed by the NMPF, which operates as Ireland's statutory marine spatial planning document and provides policy direction for activities, uses and environmental protection within the marine area (DHLGH, 2021). The NMPF is intrinsically marine focused and does not set out a standalone definition of ecosystem services beyond those associated with the functioning, protection and sustainable use of marine and

coastal ecosystems, including fisheries resources, coastal protection, climate regulation, recreation and biodiversity.

1.3.1.2 As previously outlined, the Proposed Works Onshore are limited, and as such these have been identified as minor in nature and not likely to give rise to significant environmental effects. As a result, no onshore topic chapters have been progressed to EIAR stage. In the absence of significant effects on terrestrial receptors and noting that terrestrial ecosystem services fall outside the primary remit of the NMPF, this Ecosystem Services Assessment therefore considers marine and coastal ecosystem services only. This approach is considered proportionate, consistent with the EIA scoping outcome, and aligned with the policy intent of the NMPF.

1.3.1.3 This approach is also aligned with:

- The MSFD ecosystem based approach (DCEE, 2016 (updated 2025)); and
- The Ecosystem Services Assessment principles outlined by SEMRU (2018).

1.3.1.4 This Ecosystem Services Assessment does not attempt to quantify ecosystem service values. Instead, it identifies the services that may be affected by the Proposed Works Offshore and ensures that their potential effects on societal benefits are transparently considered within the EIAR. Where appropriate, effects on ecosystem services are assessed qualitatively through potential environmental impact pathways.

1.4 Overview of Proposed Works Offshore

1.4.1.1 ABWP Phase I was constructed between 2003 and 2004 and is located approximately 10 kilometres (km) offshore of Arklow, County Wicklow (see **Volume 2, Chapter 3** of the EIAR). ABWP Phase I has a combined installed capacity of 25.2 Megawatts (MW).

1.4.1.2 In line with **Section 1.3**, this assessment is confined to marine and coastal ecosystem services, therefore, only the Proposed Works Offshore are summarised below. Further details regarding the Proposed Works Onshore, can be found in **Volume 2, Chapter 3** of the EIAR.

1.4.1.3 Offshore infrastructure within the Offshore Site boundary includes:

- Seven wind turbine generators (WTGs) on monopile (MP) foundations;
- Meteorological (met) mast;
- Inter-array cables; and
- Offshore export cable connecting to the landfall at High Water Mark (HWM).

1.4.1.4 The Proposed Works Offshore, will consist of:

- Potential dredging that may be required to facilitate safe vessel access to the Sub Lease Area and decommission WTGs and TPs/MPs respectively;
- Full removal of the seven WTGs and the met mast and associated transition pieces (TPs);
- Partial removal of MP foundations, cut below seabed level to a depth that minimises the risk of post-decommissioning exposure of residual MPs;
- Removal of inter-array cables, the offshore export cable and any remaining scour protection (as possible);
- Pre- and post-decommissioning surveys; and
- Transfer of components between ports, either Rosslare, Waterford, Greenore or Dublin.

1.5 Policy and Legislative Context

1.5.1 Maritime Spatial Planning Directive

1.5.1.1 The Maritime Spatial Planning Directive (MSPD) (2014/89/EU) establishes a common framework for maritime spatial planning across EU coastal states. Its purpose is to help countries organise human activities at sea in a coordinated and sustainable way, balancing economic development, environmental protection, and social interests, and requires EU member states to develop and maintain maritime spatial plans. The MSPD is mainly implemented in Ireland through the NMPF (see **Section 1.5.3**).

1.5.1.2 Although the concept of ecosystem services is not central in the MSPD, there is reference to the multiple services and benefits that healthy marine ecosystems can provide, and notes how pressures on marine ecosystems can lead to degradation of ecosystem services. The MSPD also highlights that maritime spatial plans should apply an ecosystem-based approach while

contributing to the sustainable use of marine "goods and services" by present and future generations.

1.5.2 Marine Strategy Framework Directive

1.5.2.1 The MSFD (2008/56/EC) is the principal EU legislative instrument for protecting the marine environment and is implemented in Ireland through a National Marine Strategy led by the Department of Housing, Local Government and Heritage (DCEE, 2016 (updated 2025)). Ireland's Marine Strategy under Article 5(1) of the MSFD requires the application of an ecosystem-based approach to the management of human activities in order to achieve and maintain GES, defined as marine waters that are ecologically diverse, clean, healthy and productive, and capable of supporting the sustainable use of marine goods and services for present and future generations (DCEE, 2016 (updated 2025)).

1.5.2.2 Although ecosystem services are not assessed as a standalone element under the MSFD, the Directive explicitly links environmental status to the capacity of marine ecosystems to deliver benefits such as fisheries productivity, waste assimilation, climate regulation and cultural uses. These benefits are reflected across the 11 GES descriptors, including biodiversity, food webs, commercial fish populations, seafloor integrity, eutrophication and contaminants, which collectively underpin the delivery of ecosystem services in Irish waters. Further detail can be found within **Volume 3, Appendix 4.5: MSFD Assessment**.

1.5.2.3 As such, this Ecosystem Services Assessment provides a complementary mechanism for demonstrating how project level assessments as reported within the EIAR align with the MSFD's ecosystem based framework by linking pressures and impacts on marine habitats and species to changes in the services and benefits they provide to society.

1.5.3 National Marine Planning Framework

1.5.3.1 The NMPF is Ireland's statutory marine spatial plan. It sets the strategic direction for how Ireland manages, uses, and protects its marine area, balancing economic development with environmental protection (DHLGH, 2021). Adopted by Government and published in July 2021, it fulfils Ireland's obligations under the European Union (EU) Maritime Spatial Planning Directive (2014/89/EU) and sets out the framework and proposed approach to managing Ireland's maritime activities to ensure the sustainable use of marine resources up to 2040. The plan covers Ireland's maritime area, including internal waters, territorial seas, exclusive economic zone and continental shelf.

1.5.3.2 Environment policies in the NMPF have been split into nine categories largely aligned to the MSFD Good Environmental Status (GES) descriptors as well as addressing air quality and climate change. The NMPF explicitly adopts an ecosystem-based approach, with Environmental - Ocean Healh Policy 1 requiring overall compliance with NMPF policies relating to biodiversity and other MSFD GES descriptors, and repeatedly frames environmental protection in terms of the delivery and maintenance of ecosystem goods and services, particularly within Chapter 5: Environmental – Ocean Health, of the framework (DHLGH, 2021).

1.5.3.3 Specific reference to ecosystem services is made in Climate Change Policy 1, which states:

> *"Proposals should demonstrate how they:*
>
> - *avoid contribution to adverse changes to physical features of the coast;*
> - *enhance, restore or recreate habitats that provide a flood defence or carbon sequestration ecosystem services where possible.*
>
> *Where potential significant adverse impacts upon habitats that provide a flood defence or carbon sequestration ecosystem services are identified, these must be in order of preference and in accordance with legal requirements:*
>
> *a) Avoided;*
> *b) Minimised;*
> *c) Mitigated; and*
> *d) If it is not possible to mitigate significant adverse impacts, the reasons for proceeding must be set out.*
>
> *This policy should be included as part of statutory environmental assessments where such assessments are required."*

1.5.3.4 The NMPF also sets out Sea-floor and Water Column Integrity Policy 3, which states that:

"Proposals that protect, maintain, restore and enhance coastal habitats for ecosystem functioning and provision of ecosystem services will be supported, subject to the outcome of statutory environmental assessment processes and subsequent decision by the competent authority, and where they contribute to the policies and objectives of this NMPF. Proposals must take account of the space required for coastal habitats, for ecosystem functioning and provision of ecosystem services, and demonstrate that they will, in order of preference and in accordance with legal requirements:

a) Avoid;
b) Minimise; or
c) *mitigate for net loss of coastal habitat*."

1.5.3.5 This Ecosystem Services Assessment summarises the outcomes of the EIA process reported in the EIAR which identifies those ecosystem services that may be affected by the Proposed Works Offshore and ensures that potential impacts on habitats supporting flood defence, carbon sequestration and wider ecosystem functioning are considered and, where relevant, addressed through the mitigation hierarchy of avoidance, minimisation and mitigation. In doing so, this assessment will ensure that these NMPF policies are proportionately integrated within the EIAR.

1.6 Relevant Guidance

1.6.1 Valuing Ireland's Blue Ecosystem Services

1.6.1.1 The SEMRU at the Whitaker Institute, National University of Ireland Galway, undertakes research on the economic and ecological value of Ireland's marine environment, including activities such as fisheries, aquaculture, transport and recreation. SEMRU's non-technical report 'Valuing Ireland's Blue Ecosystem Services' provides an overview of the ecosystem service benefits derived from Ireland's marine environment and complements earlier assessments of the Irish ocean economy (SEMRU, 2018).

1.6.1.2 The report aims to support policymaking and stakeholder understanding of Ireland's blue economy as well as promoting sustainable marine activities aligned with 'blue growth'. While the report uses the overarching term ecosystem services, it recognises that these services are underpinned by ecosystem structure, processes and functions that directly or indirectly contribute to social wellbeing, health and economic activity.

1.6.1.3 The report has been used to establish the classification categories and definitions of relevant marine ecosystem services used in this Ecosystem Services Assessment, as presented in **Section 2**.

1.6.2 United Kingdom Energy Research Centre – Database of Evidence

1.6.2.1 This Ecosystem Services Assessment has been informed by the United Kingdom Energy Research Centre's (UKERC's) Phase 4 Research Programme, which developed a database of evidence on the impacts of offshore wind farm developments on marine ecosystem services. The database is based on a review of international peer reviewed literature and UK grey literature and maps evidence of impacts across project phases, pressures, and marine ecosystem components using recognised ecosystem service classification systems (including the Millennium Ecosystem Assessment (MEA)).

1.6.2.2 Although not developed specifically for Ireland, in the absence of an Irish equivalent, the database is considered to provide a relevant and comprehensive evidence base on offshore wind interactions with ecosystem functions and services.

1.6.2.3 The database was filtered to decommissioning projects to identify relevant examples and review how ecosystem services were affected, as well as the studies used to justify the project assessment outcomes. This information has informed Stage 2 of this Ecosystem Services Assessment as presented in **Section 5**.

2 ECOSYSTEM SERVICES CLASSIFICATION

2.1.1.1 Ecosystems comprise of interconnected communities of living organisms that interact with each other and with their physical environment. An ecosystem is defined as a "*dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit*" (United Nations, 1992).

2.1.1.2 In the marine context, ecosystem services arise from the processes, functions and structure of the marine environment that directly or indirectly support social welfare, human health and economic activity. While ecosystem functioning occurs naturally, ecosystem services only arise when people interact with these functions.

2.1.1.3 The MEA (MEA, 2005) established a widely used classification of ecosystem services, provisioning, regulating and maintenance, and cultural services, underpinned by supporting services that maintain ecosystem integrity. As ecosystem services operate along a cascade from processes to functions, services, benefits and values, distinguishing between these stages is essential to avoid double counting and to ensure robust assessment.

2.1.1.4 For the purposes of this Ecosystem Services Assessment, ecosystem services are defined as "*the benefits that humans derive from marine ecosystems through their processes, functions and structures*" (SEMRU, 2018). The ecosystem service classification follows Valuing Ireland's Blue Ecosystem Services (SEMRU, 2018) and includes three main categories:

- Provisioning ecosystem services;
- Regulating and maintenance ecosystem services; and
- Cultural ecosystem services.

2.1.1.5 Supporting services are recognised as underpinning ecosystem functioning but are not assessed to avoid double counting.

2.2 Provisioning Services

2.2.1.1 Provisioning services are ecosystem services that provide tangible goods and are often directly linked to ecosystem processes. In the Irish marine and coastal environment, these services include the harvesting of fish and seaweed, as well as aquaculture production along the coast (SEMRU, 2018). This Ecosystem Services Assessment considers the following provisioning services:

- **Offshore capture fisheries**[1]: The provision of wild fish and shellfish harvested from offshore marine waters for human consumption or commercial use, supported by healthy marine habitats and food webs;
- **Inshore capture fisheries**[2]: The supply of fish and shellfish from coastal and nearshore waters, typically supporting small scale commercial and recreational fisheries that rely on the condition of inshore habitats;
- **Aquaculture**: The cultivation of marine organisms such as finfish and shellfish in coastal or marine waters, dependent on suitable water quality, ecosystem functioning and environmental conditions;
- **Algae / seaweed harvesting**: The collection of marine algae and seaweeds for food, industrial, agricultural or pharmaceutical uses, relying on the productivity and quality of coastal and marine ecosystems;
- **Genetic material**: The extraction or potential use of genetic material from marine organisms for scientific, industrial or medical applications, including biotechnological research and innovation; and
- **Water for non-drinking purposes**: The use of seawater for industrial processes, cooling, desalination, navigation, or other non-potable purposes, supported by the availability and quality of marine waters.

[1] Offshore capture fisheries operate in waters beyond 12 nautical miles from the coast.
[2] Inshore capture fisheries are based in the territorial waters that extend out to 12 nautical miles from the coast and are mainly composed of boats less than 15 m in length (SEMRU, 2018).

2.3 Regulating and Maintenance Services

2.3.1.1 Regulating and maintenance services are services that regulate environmental conditions and are typically experienced indirectly. Examples include carbon sequestration, which contributes to climate change mitigation, the natural treatment and assimilation of wastewater before its return to the hydrological cycle, and flood and storm protection provided by features such as sand dunes and saltmarshes, which reduce damage during severe weather events (SEMRU, 2018). This assessment considers the following regulating and maintenance services:

- **Waste services**: The natural assimilation, dilution, transformation and breakdown of nutrients, organic matter and contaminants by marine ecosystems, contributing to the maintenance of water quality;
- **Coastal defence**: The reduction of wave energy, erosion and flood risk provided by natural marine and coastal features such as sandbanks, reefs, saltmarshes and seabed morphology;
- **Lifecycle and habitat services**: The provision of habitats that support key life stages of marine species, including spawning, nursery, feeding, and migration areas essential to population sustainability;
- **Pest and disease control**: The regulation of species populations and pathogens through balanced ecosystem interactions, supporting ecosystem resilience, and reducing the proliferation of pests or disease; and
- **Climate regulation**: The uptake, storage and cycling of carbon and other climate relevant gases by marine ecosystems, contributing to climate regulation and mitigation of climate change effects.

2.4 Cultural Services

2.4.1.1 Cultural services encompass the physical, psychological and spiritual benefits people derive from interacting with the marine and coastal environment. These include recreational activities such as walking along beaches, surfing and other water based activities, as well as the contribution of coastal and sea views to human wellbeing and quality of life (SEMRU, 2018). This assessment considers the following cultural services:

- **Recreational services**: The opportunities for leisure and recreational activities such as angling, boating, wildlife watching and water sports that depend on the quality and accessibility of the marine environment;
- **Scientific and educational services**: The use of marine ecosystems for research, monitoring, education and knowledge generation, contributing to scientific understanding and environmental stewardship;
- **Marine heritage, culture and entertainment:** The contribution of the marine environment to cultural identity, traditions, heritage, tourism and entertainment, including historically and culturally important seascapes and seascape uses;
- **Aesthetic services**: The visual, sensory, and experiential value of marine and coastal landscapes and seascapes that contribute to human wellbeing, place making and quality of life;
- **Spiritual and emblematic values**: The symbolic, spiritual, or emotional significance of the marine environment to individuals or communities, independent of direct physical use; and
- **Non-use values**: The value placed on marine ecosystems and biodiversity purely for their existence or for future generations, including existence value and bequest value, regardless of direct use.

2.5 Supporting Services

2.5.1.1 Supporting services underpin and enable the delivery of all other ecosystem service categories by maintaining fundamental ecosystem processes and functions. To avoid double counting, supporting services are not assessed separately in ecosystem service assessments, as changes in these processes are reflected through final impacts on human wellbeing, such as effects on provisioning services or cultural services (SEMRU, 2018).

2.5.1.2 An example of a supporting ecosystem service is nutrient cycling within marine sediments and the water column, which maintains ecosystem productivity but does not directly deliver a benefit to people. This supporting service would not be assessed separately; instead, its effects

are captured through final ecosystem services, such as changes in offshore capture fisheries, which directly reflect impacts on fish abundance and human welfare. Therefore, the contribution of nutrient cycling is accounted for once, through the provisioning service it underpins.

3 METHODOLOGY

3.1.1.1 At the time of writing, no project specific methodology has been published on the assessment of ecosystem functions and ecosystem services in Irish waters. Accordingly, the assessment has been informed by relevant guidance, as outlined in **Section 1.6.2**.

3.1.1.2 The Ecosystem Services Assessment will be delivered through a staged approach, as described in **Section 3.1** and **Section 3.2**.

3.1 Stage 1: Screening of Ecosystem Services

3.1.1.1 A staged screening approach will be applied to determine potential effects on ecosystem services. Initially, the presence and relevance of each ecosystem service within the Offshore Site and its 50 km Zone of Influence (ZoI) (the maximum ZoI across all environmental aspects) will be established. Where an ecosystem service is not present or relevant, it will be screened out with justification.

3.1.1.2 For ecosystem services identified as present, potential interaction pathways with the Proposed Works Offshore will then be considered. Where no pathways exist, the ecosystem service will be screened out with supporting evidence. Where potential pathways are identified, these ecosystem service will be taken forward to Stage 2: Ecosystem Services Assessment.

3.1.1.3 The screening exercise for the Proposed Works Offshore is presented in **Section 4**.

3.2 Stage 2: Ecosystem Services Assessment

3.2.1.1 Each ecosystem service that is screened in during Stage 1 (**Section 4**), undergoes further assessment and considers how the Proposed Works Offshore activities could influence:

- Ecosystem structure (e.g. habitats, seabed features);
- Ecosystem processes and functions (e.g. sediment dynamics, food webs); and/or
- The delivery of services to people.

3.2.1.2 The ecosystem service is also mapped to relevant EIAR chapters ensuring that ecosystem services are not assessed in isolation but addressed through specific impact assessments. Beneficial or adverse effects are then concluded for each ecosystem service using baseline data, the UKERC database, the outcomes of the EIAR assessments and any relevant mitigation measures.

4 STAGE 1: SCREENING OF ECOSYSTEM SERVICES

4.1.1.1 This section comprises Stage 1 of the Ecosystem Services Assessment, the Screening of Ecosystem Services. Each ecosystem service, as listed in SEMRU (2018), has been screened based on whether the ecosystem service is present and potential interaction pathways with the Proposed Works Offshore. The Screening of Ecosystem Services is presented in **Table 4.1**.

Table 4.1: Screening of Ecosystem Services Screening of Ecosystem Services for the Proposed Works Offshore, as detailed in SEMRU (2018)

Ecosystem Service	Screening assessment	Associated EIAR chapters
Provisioning Services		
Offshore capture fisheries Inshore capture fisheries	**SCREENED IN**: Both the offshore and inshore capture fisheries ecosystem services have been screened into the Stage 2 Ecosystem Services Assessment based on the spatial overlap of the Offshore Site boundary and ZoI with existing commercial fisheries activity, and therefore potential interaction pathways with the Proposed Works Offshore.	• **Volume 2, Chapter 6: Commercial Fisheries and Aquaculture;** • **Volume 2, Chapter 5: Marine Biodiversity.**
Aquaculture	**SCREENED IN**: Aquaculture ecosystem services has been screened into the Stage 2 Ecosystem Services Assessment based on the close vicinity (within the ZoI) of the Offshore Site with existing aquaculture activity, and therefore potential interaction pathways with Proposed Works Offshore.	• **Volume 2, Chapter 6: Commercial Fisheries and Aquaculture;** • **Volume 2, Chapter 5: Marine Biodiversity.**
Algae / seaweed harvesting	**SCREENED OUT**: There are no known commercial or artisanal seaweed harvesting activities on the eastern coast of Ireland. Seaweed harvesting is primarily undertaken along the western seaboard, including the shores of Donegal, Sligo, Mayo, Galway, Clare and Cork (SEMRU, 2018). Baseline information shows the seabed within the Offshore Site is dominated by mobile sands and gravelly sands, which are inherently unstable and does not provide the hard, stable substrate required for macroalgae attachment. Therefore, algae or seaweed harvesting is not considered suitable within the Offshore Site boundary or its ZoI, as the environmental conditions required to support macroalgal growth are absent. This ecosystem service has therefore been screened out of the Ecosystem Services Assessment.	• **Volume 2, Chapter 5: Marine Biodiversity.**
Genetic materials	**SCREENED IN**: Genetic materials has been screened into the Stage 2 Ecosystem Services Assessment based on the availability of genetic material from marine organisms within the Offshore Site and ZoI. Therefore, there is a potential interaction pathway with Proposed Works Offshore.	• **Volume 2, Chapter 5: Marine Biodiversity.**
Water for non-drinking purposes	**SCREENED IN**: Water for non-drinking purposes has been screened into the Stage 2 Ecosystem Services Assessment as several water abstraction points fall within the ZoI. Therefore, there is a potential interaction pathway with Proposed Works Offshore.	• **Volume 2, Chapter 4: Coastal Processes, Water and Sediment Quality.**
Regulating and Maintenance Services		
Waste services	**SCREENED IN**: Waste services has been screened into the Stage 2 Ecosystem Services Assessment based on nutrient recycling organisms being present within the Offshore Site and ZoI. Therefore, there is a potential interaction pathway with Proposed Works Offshore.	• **Volume 2, Chapter 4: Coastal Processes, Water and Sediment Quality;** • **Volume 2, Chapter 5: Marine Biodiversity.**

Ecosystem Service	Screening assessment	Associated EIAR chapters
Coastal defence	**SCREENED IN**: Coastal defence services has been screened into the Stage 2 Ecosystem Services Assessment based on the service being present within the Offshore Site and ZoI. Therefore, there is a potential interaction pathway with Proposed Works Offshore.	• **Volume 2, Chapter 4: Coastal Processes, Water and Sediment Quality.**
Lifecycle and habitat services	**SCREENED IN**: The lifecycle and habitat ecosystem service has been screened into the Stage 2 Ecosystem Services Assessment as there are various marine habitats and species within the Offshore Site and ZoI. Therefore, there is potential for interaction pathways with Proposed Works Offshore.	• **Volume 2, Chapter 4: Coastal Processes, Water and Sediment Quality;** • **Volume 2, Chapter 5: Marine Biodiversity.**
Pest and disease control	**SCREENED IN**: Pest and disease control services has been screened into the into the Stage 2 Ecosystem Services Assessment as fish and other marine fauna providing this biological service are present within the Offshore Site and ZoI. Therefore, there is a potential for interaction pathways with Proposed Works Offshore.	• **Volume 2, Chapter 5: Marine Biodiversity.**
Climate regulation	**SCREENED IN**: Climate regulation services has been screened into the Stage 2 Ecosystem Services Assessment based on the service being present within the Offshore Site and ZoI. Therefore, there is a potential interaction pathway with Proposed Works Offshore.	• **Volume 2, Chapter 4: Coastal Processes, Water and Sediment Quality.**
Cultural Services		
Recreational services	**SCREENED IN**: Recreational services has been screened into the Stage 2 Ecosystem Services Assessment based on the service being present within the Offshore Site and ZoI. Therefore, there is a potential interaction pathway with Proposed Works Offshore.	N/A
Scientific and educational services	**SCREENED IN**: The scientific and education ecosystem service has been screened into the Stage 2 Ecosystem Services Assessment based on the service being present within the Offshore Site and ZoI. Therefore, there is a potential interaction pathway with Proposed Works Offshore.	• **Volume 2, Chapter 4: Coastal Processes, Water and Sediment Quality;** • **Volume 2, Chapter 5: Marine Biodiversity.**
Marine heritage, culture and entertainment	**SCREENED IN**: The marine heritage, culture and entertainment ecosystem service has been screened into the Sateg 2 Ecosystem Services Assessment based on the presence of marine archaeology within the ZoI. Therefore, there is potential interaction pathways with Proposed Works Offshore.	• **Volume 2, Chapter 8: Marine Archaeology.**
Aesthetic services	**SCREENED OUT**: The Proposed Works Offshore are not anticipated to interfere with visual seascape amenity. Given the small scale and temporary nature, adverse effects on the aesthetics services are unlikely and can therefore be screened out of futher assessment at Stage 2. Due to the Offshore Site's distance from shore (approximately 10 km) and the limited visibility of offshore structures, baseline aesthetic and seascape values are considered low (SPL, 2024). No new permanent or visually intrusive offshore infrastructure will be introduced, with the receiving environment expected to revert to pre-construction baseline conditions following completion of the works. While the Proposed Works Offshore will result in a temporary increase in offshore vessel activity, this will be short-term, localised and reversible, and is not anticipated to result in adverse	N/A

Ecosystem Service	Screening assessment	Associated EIAR chapters
	effects on visual amenity. Therefore, this ecosystem service has been screened out of the Stage 2 Ecosystem Services Assessment.	
Spiritual and emblematic values	**SCREENED OUT**: As no marine features or areas of recognised spiritual, symbolic or emblematic importance have been identified within the Offshore Site or ZoI, and cultural associations are generally regional rather than site-specific, this ecosystem service is not considered relevant. Accordingly, spiritual and emblematic values has been screened out of the Stage 2 Ecosystem Services Assessment.	N/A
Non-use values	**SCREENED OUT**: Non-use values (e.g. the value placed on marine ecosystems and biodiversity purely for their existence or for future generations, including existence value and bequest value, regardless of direct use) is one of the ecosystem services which is provided by the marine environment, this aspect has not been directly assessed as part of the Proposed Works Offshore. However, by ensuring the other services and functions are considered (see above rows and the subsequent Ecosystem Services Assessment in **Section 5**), these non-use values are also assumed to be considered. Therefore, this ecosystem service has been screened out of the Stage 2 Ecosystem Services Assessment.	N/A

4.1.1.2 Based on the Stage 1 Screening of Ecosystem Services for the Proposed Works Offshore in **Table 4.1**, the following ecosystem services have been screened into the Ecosystem Services Assessment in **Section 5**:

- Offshore and inshore capture fisheries;
- Aquaculture;
- Genetic materials;
- Waste services;
- Coastal defence;
- Lifecycle and habitat services;
- Pest and disease control;
- Climate regulation;
- Recreational services;
- Scientific and educational services; and
- Marine heritage, culture and entertainment.

5 STAGE 2: ECOSYSTEM SERVICES ASSESSMENT

5.1.1.1 The Stage 2 Ecosystem Services Assessment considers those services screened in (**Table 4.1**), outlining how the Proposed Offshore Works may influence each. **Table 5.1** presents relevant baseline conditions alongside a summary of potential impacts, drawing directly on the significance conclusions reported in the EIAR.

5.1.1.2 As ecosystem services are underpinned by environmental receptors, the assessment relies on the information presented in the EIAR. Where no significant adverse effects are identified for a receptor, no associated impact on the supporting ecosystem service is anticipated. The Stage 2 Ecosystem Services Assessment also takes account of relevant mitigation measures, best practice, and references studies from the UKERC database (Szostek, 2022), presenting the EIAR conclusions within the context of ecosystem service provision.

Table 5.1: Marine ecosystem services assessment for the Proposed Works Offshore

Ecosystem service	Baseline summary	Impact assessment summary
Provisioning services		
Offshore and inshore capture fisheries	The Irish Sea supports typical fish assemblages, including pelagic, demersal, elasmobranch and shellfish species. However, commercial fishing is limited within the Offshore Site and is primarily undertaken by Irish potting vessels targeting whelk, lobster, and crab within the offshore export cable corridor. Inshore waters along the Arklow coastline support higher fishing effort, including seasonal herring and sprat fisheries. While no spawning grounds for herring or sandeel occur within the Offshore Site, the wider area forms part of key migratory pathways for diadromous species associated with the Slaney River Valley Special Area of Conservation (SAC) and the River Barrow and River Nore SAC. For further baseline information see **Volume 2, Chapter 6: Commercial Fisheries and Aquaculture** and **Volume 2, Chapter 5: Marine Biodiversity.**	The Proposed Works Offshore have the potential to result in temporary disruption to fishing activity and temporary restricted access to fishing grounds, particularly along the offshore export cable corridor, due to the presence and movement of project vessels, active works areas and associated navigational safety requirements (**Volume 2, Chapter 6: Commercial Fisheries and Aquaculture**). Overall, any potential interaction with fishing activity, accidental spills, and navigational safety risks will be managed through several mitigation measures, such as adherence to the Detailed Offshore Decommissioning Environmental Management Plan (DEMP) (see outline version in **Volume 3, Appendix 3.4**), Fisheries Management and Mitigation Strategy (FMMS) (see **Volume 3, Appendix 3.6**) and Detailed Vessel Management Plan (VMP) (see outline version in **Volume 3, Appendix 3.5**). Marine Notices advising the location, nature and timing of activities will ensure that fishing activities can be planned accordingly. While potential biological effects on commercially important fish and shellfish may arise, including through increases in suspended sediment concentrations and underwater noise, the impact assessment presented in **Volume 2, Chapter 5: Marine Biodiversity** concludes that these effects are not significant. The impact assessment in **Volume 2, Chapter 6: Commercial Fisheries and Aquaculture** also identifies no significant adverse residual effects on fisheries resulting from loss of fishing grounds, restricted access, displacement of fishing activity, interference with fishing activity or increased fishing gear snagging risk. Given the temporary nature of the Proposed Works Offshore, the limited spatial extent of effects, the short-term nature of any displacement, the adoption of mitigation such as adherence to management plans and publishing marine notices, and the absence of significant adverse residual effects on commercial fish and shellfish resources as per **Volume 2, Chapter 6: Commercial Fisheries and Aquaculture**, the Proposed Works Offshore are **not expected to give rise to adverse effects** on the offshore and inshore capture fisheries ecosystem service.
Aquaculture	An aquaculture site is located off the coast of Arklow, Co. Wicklow, approximately 4.5 km from the closest point of the offshore export cable corridor. The site is owned by the Irish Mussel Seed Company and is a mussel farm focused on harvesting mussel seed. The farm was granted a licence from the Department of Agriculture, Food and the Marine, which is valid until June 2029. For further baseline information see **Volume 2, Chapter 6: Commercial Fisheries and Aquaculture.**	As noted in **Volume 2, Chapter 6: Commercial Fisheries and Aquaculture,** there are no aquaculture farms are present within the Offshore Site, and no classified shellfish waters overlap the Offshore Site (BIM; SPL, 2024). Mobile sands, high energy tidal conditions and limited suitable substrate restrict the suitability of the Offshore Site for aquaculture. However, a mussel spat collection site is located approximately 4.5 km south of the offshore export cable corridor, beyond the Offshore Site (BIM; SPL, 2024). Therefore, there is a potential indirect impact through temporary changes in suspended sediment concentrations or water quality. However, with changes in suspended sediment predicted to be temporary and rapidly dispersing, effects on commercially important species are predicted to be minor, reflecting the localised, short-term and reversible nature of works (**Volume 2, Chapter 5: Marine Biodiversity**).

Ecosystem service	Baseline summary	Impact assessment summary
		Overall, the Proposed Works Offshore are **not expected to give rise to adverse effects** on the aquaculture ecosystem service.
Genetic materials	Marine and coastal environments host high levels of biodiversity, providing a valuable source of genetic material with a wide range of applications. This includes the use of genes associated with desirable traits to support the development of improved farmed species, enhancing yield, increasing disease resistance, and facilitating adaptation to changing environmental conditions (SEMRU, 2018). For further baseline information regarding the biodiversity within the Offshore Site boundary, see **Volume 2, Chapter 5: Marine Biodiversity.**	The Irish marine and coastal environment supports genetic diversity that may have potential future applications (SEMRU, 2018). **Volume 2, Chapter 5: Marine Biodiversity** concludes no significant adverse effects on marine biodiversity as a result of the Proposed Works Offshore. Therefore, the availability or future provision of genetic resources will not be affected. For detail regarding the specific impacts on marine ecological receptors from the Proposed Works Offshore, please refer to **Volume 2, Chapter 5: Marine Biodiversity.** Additionally, the Proposed Works Offshore do not involve bioprospecting or the use of marine genetic resources, and no such activities are known to be undertaken within the Offshore Site or its immediate vicinity. Overall, the Proposed Works Offshore are **not expected to give rise to adverse effects** on the provision of genetic materials.
Water for non-drinking purposes	The primary non-drinking use of marine water in Ireland relates to abstraction for cooling at electricity-generating stations (SEMRU, 2018). There are approximately 51 licenced abstraction licences in place for non-drinking purposes within the 50 km ZoI of the Offshore Site, all of which are for agriculture, industry, mining or recreational activities (EPA, n.d.). Abstraction from coastal waters does not currently require registration or licensing which is reflected in the Environment Protection Agency (EPA) abstraction register, as it covers freshwater and transitional waters only and excludes coastal/marine environments. Therefore, marine abstraction infrastructure would instead be captured through the foreshore consenting regime (DCEE, 2026; Maritime Area Regulatory Authority, 2026). A review of foreshore licensing records indicates that there are no marine water extraction (e.g. seawater intake) licences within 50 km of the Offshore Site (DCEE, 2026; Maritime Area Regulatory Authority, 2026). No abstraction points are located within the Offshore Site itself.	There are no water abstractions associated with cooling water, agriculture, mining, recreation or industrial uses within the Offshore Site, however, several abstraction points are located within the 50 km ZoI onshore (freshwater) and/or transitional waters. However, the implementation of mitigation measures including adherence to the Detailed Offshore DEMP, Detailed VMP, and Detailed Offshore Waste Management Plan (WMP) (see outline version in **Volume 3, Appendix 3.8**) will ensure that potential pollution and waste risks are minimised. These measures will include, but are not limited to, the appropriate storage and segregation of hazardous materials, and the implementation of strict waste handling, transfer and disposal procedures in line with relevant legislation. In addition, vessel management controls will reduce the risk of spills through adherence to standard operating procedures, regular equipment maintenance, and emergency response planning (e.g. spill kits and incident response protocols). Furthermore, **Volume 2, Chapter 4: Coastal Processes, Water and Sediment Quality** concludes no significant adverse effects on water quality from the Proposed Works Offshore. Overall, the Proposed Works are **not expected to give rise to adverse effects** on the provision of water for non-drinking purposes.
Regulating and maintenance services		
Waste services	The Offshore Site supports natural waste assimilation functions primarily through dilution and	Baseline conditions within the Offshore Site Boundary indicate the presence of the highly dynamic Arklow Bank sandbank (**Volume 2, Chapter 4: Coastal Processes, Water and**

Ecosystem service	Baseline summary	Impact assessment summary
	dispersion, facilitated by strong tidal currents and high energy hydrodynamic conditions. However, because the seabed is domined by mobile sandy substrates with limited fine sediment content, its capacity to provide long-term retention is limited. Blue mussels have been recorded colonising the existing wind turbine structures, where they contribute to the removal of excess nutrients and organic matter through filter-feeding, resulting in a localised water quality regulating function (Timmermann *et al*., 2009). Habitats are dominated by disturbance-tolerant species with limited natural capacity for water purification. However, existing wind turbine structures support blue mussel assemblages, which provide a localised waste regulation function through filter feeding, nutrient removal, and the transfer of organic matter to the seabed, enhancing benthic recycling in the immediate vicinity. It should be noted there is a Wastewater Treatment Plant (WWTP) outfall pipeline located 200 m from the offshore export cable corridor, within the inshore waters. For further baseline information regarding the presence of blue mussels and biodiversity within the Offshore Site Boundary, see **Volume 2, Chapter 5: Marine Biodiversity.**	**Sediment Quality**), and sandbanks are generally considered ineffective long-term sinks for nutrients and contaminants compared to mud dominated seabed (Robbins *et al*., 2022).The natural substrate therefore limits the waste regulation potential. The proposed removal of hard offshore infrastructure would reduce habitat availability within the Offshore Site as the surrounding mobile sandy seabed does not provide suitable natural substrate for blue mussel attachment or recolonisation. Consequently, the waste removal service currently provided through blue mussel filtration associated with artificial structures would be lost following decommissioning. In addition, ongoing monitoring of the wind farm infrastructure has involved the regular removal of colonising species, including blue mussels, from hard surfaces such as turbine foundations and inter-array cables (**Volume 2, Chapter 5: Marine Biodiversity**). As a result, colonised assemblages have been periodically managed under baseline conditions. Consequently, any change in blue mussel abundance associated with the Proposed Works Offshore is unlikely to result in an adverse alteration to waste regulation ecosystem services or local water quality relative to the established baseline. Although the Offshore Site has a limited baseline capacity for waste regulation due to its mobile sandy substrate, and localised nutrient removal is currently provided by blue mussel colonisation of artificial structures, the managed baseline condition, uncertainty over complete substrate removal, and small, localised scale of change means that effects will be limited. Additonally, the Detailed Offshore WMP will set out the anticipated quantities of materials arising from the decommissioning of offshore structures, informed by relevant industry guidance and will identify appropriate offshore waste management options. All offshore waste materials will be managed by authorised waste contractors and transferred to licensed treatment or recycling facilities in accordance with applicable waste management legislation and appropriate disposal routes for each waste type. Based on the effective implementation of the Detailed Offshore WMP and the scale of the Proposed Works Offshore, waste generation has been been scoped out as an impact pathway (see **Volume 3, Appendix 1.1** and **Volume 2, Chapter 1)** and adverse impacts associated with waste generation are considered unlikely. Overall, the Proposed Works Offshore are **not expected to give rise to adverse effects** on the waste services ecosystem service.
Coastal defence	Coastal protection for Arklow town and the adjacent coastline is provided primarily by engineered structures, including harbour infrastructure, breakwaters and revetments (Uisce Éireann, 2018). Arklow Bank is a prominent, elongated sandbank extending approximately 27.5 km in length and 1 km to 2 km in width, aligned parallel to the County Wicklow coastline. It forms part of a broader system of coast parallel offshore sandbanks within the Irish Sea that have the potential to function as natural coastal defence. The bank's form and position have	The available evidence demonstrates that the Proposed Offshore Works will not adversely affect the Arklow Bank sandbank, the surrounding seabed morphology, or their role in providing natural coastal defence, nor will they impact the engineered coastal defences along the coastline. The Arklow Bank sandbank is dynamically stable, with cyclical sediment redistribution and no long term displacement of its core structure. Any disturbance from the works will be low in magnitude and temporary, with natural hydrodynamic processes, such as sediment transport, bedform migration and infilling, facilitating recovery (**Volume 2, Chapter 4: Coastal Processes, Water and Sediment Quality**). The nearshore and offshore export cable corridor environments similarly demonstrate resilience and equilibrium conditions. As a result, the form and function of the sandbank

Ecosystem service	Baseline summary	Impact assessment summary
	remained relatively stable over time indicating its persistence in broadly the same location, subject only to minor elongation and limited lateral movement (**Volume 2, Chapter 4: Coastal Processes, Water and Sediment Quality**).	and adjacent coastal morphology in attenuating wave energy and regulating sediment transport will be maintained, and the coastal protection services they provide will not be adversely affected. Overall, the Proposed Works Offshore are **not expected to give rise to adverse effects** on coastal defence services.
Lifecycle and habitat services	<u>Benthic ecology</u> Habitats within the Offshore Site are dominated by mobile sands with localised gravelly components, supporting relatively low benthic biodiversity compared with more stable or complex seabed types. Long term survey data covering the period 2000 to 2021 indicate that species richness has remained broadly stable between pre- and post-construction ABWP Phase I surveys and Phase II surveys, reflecting adaptation to a naturally dynamic environment (**Volume 2, Chapter 5: Marine Biodiversity**). Artificial hard substrates associated with monopiles, and transition pieces have previously supported marine growth, however, this has been periodically removed to meet operational and maintenance requirements. The nearshore and intertidal environment adjacent to the offshore export cable landfall is strongly influenced by the presence of the Arklow Harbour breakwater, which supports typical rocky shore biota such as algal growth and lichen communities on exposed rock surfaces, as well as adjacent pockets of cobble, pebble and gravel beach material within the estuarine margin (Uisce Éireann, 2018). For further baseline information regarding benthic ecology within the Offshore Site Boundary, see **Volume 2, Chapter 5: Marine Biodiversity.**	It is concluded in **Volume 2, Chapter 5: Marine Biodiversity** that temporary habitat loss and disturbance will not result in a net loss of coastal or marine habitat. Natural recovery through sediment infill and recolonisation is expected following completion of the Proposed Works Offshore. The removal of hard offshore infrastructure will result in the loss of artificial hard substrate that has supported colonising species; however, these features do not represent natural baseline habitat conditions within the Offshore Site. Additionally, within the UKERC database, other projects have shown no impacts to benthic habitat from decommissioning activities (Szostek, 2022). For example, the EIA for the Awel y Môr Offshore Wind Farm concluded no impact on habitat quantity, quality or extant and the regulation of physical, chemical, biological conditions from decommissioning activities, resulting in no significant impact on habitat loss (Szostek, 2022). Removal will not compromise wider seabed integrity (**Volume 2, Chapter 4: Coastal Processes, Water and Sediment Quality**) or ecosystem functioning at a regional scale and is consistent with restoration of the seabed to its baseline soft sediment character. Overall, the Proposed Works Offshore are **not expected to give rise to adverse effects** on the lifecycle and habitat ecosystem services for benthic ecology.
	<u>Fish and shellfish</u> The Arklow Bank and its flanks host characteristic Irish Sea flatfish and demersal assemblages. There are no spawning grounds for herring or sandeel species (demersal spawners) overlapping with the Offshore Site. The wider area also supports pelagic and benthopelagic species, many of which use the region for spawning or nursery functions, and there is potential for connectivity with the nearby Slaney	Spawning and nursery grounds for several fish species are present within the wider area, however, **Volume 2, Chapter 5: Marine Biodiversity** confirms that key demersal spawning habitats (e.g. sandeel) do not directly overlap with the Offshore Site. Pelagic spawning species and highly mobile fish assemblages are expected to exhibit temporary avoidance behaviour, with no long-term restriction on movement or lifecycle completion. Overall, the Proposed Works Offshore are **not expected to give rise to adverse effects** on the lifecycle and habitat ecosystem services for fish and shellfish.

Ecosystem service	Baseline summary	Impact assessment summary
	River Valley SAC and the River Barrow and River Nore SAC. No designated fish SAC overlap with the Offshore Site. For further baseline information regarding fish and shellfish species within the Offshore Site Boundary, see **Volume 2, Chapter 5: Marine Biodiversity.**	
	<u>Marine mammals</u> ABWP Phase I post-construction and ABWP Phase II surveys (2004–2009; 2018–2020, 2023) indicate that Arklow Bank supports a typical Irish Sea marine mammal assemblage, including harbour porpoise, dolphins, minke whale, and seals. Harbour porpoise were most frequently recorded, while other cetaceans occurred less often. No designated marine mammal SAC overlaps the Offshore Site. The closest marine mammal SACs include: Slaney River Valley SAC, within 13.9 km south of the Offshore Site, designated for harbour seal; Blackwater Bank SAC, within 29.2 km, designated for harbour porpoise; and Rockabill to Dalkey Island SAC, within 47.4 km, designated for harbour porpoise. For further marine mammal baseline information see **Volume 2, Chapter 5: Marine Biodiversity.**	Vessel activity associated with the Proposed Works Offshore has the potential to interact with marine mammal lifecycle and habitat ecosystem services, particularly those supporting feeding, movement, and resting. However, **Volume 2, Chapter 5: Marine Biodiversity** concluded that collision risk is primarily associated with large whale species, while smaller cetaceans and pinnipeds typically exhibit strong avoidance behaviour and high mobility in response to slow-moving vessels. Although vessel interactions can result in injury, these are not necessarily lethal, and recovery is possible. Therefore, given the low marine mammal densities, absence of cetacean aggregation areas, and seal activity largely associated with haul-out sites rather than within the Offshore Site boundary, the Proposed Works Offshore are not expected to materially affect marine mammal habitat use or key lifecycle functions. Decommissioning vessels will operate at low speeds of less than 6 knots, which substantially reduces collision risk relative to higher speed vessel activity. As stated in **Volume 2, Chapter 5: Marine Biodiversity**, the scale and duration of the vessel movements are not expected to result in a meaningful change to baseline conditions. As such, the impact on lifecycle and habitat ecosystem services for marine mammals is considered minor. Sandeel and demersal fish species support marine mammal lifecycle and habitat ecosystem services by contributing to prey availability for species such as harbour porpoise, harbour seal, and grey seal. However, marine mammals are highly mobile, with harbour and grey seals recorded foraging up to 273 km and 448 km from haul-out sites, respectively (Carter *et al*., 2022). As such, any localised or temporary reduction in prey availability resulting from the Proposed Works Offshore would be unlikely to constrain foraging, with alternative habitats available within the Irish Sea. The Offshore Site is therefore considered to make a limited contribution to marine mammal lifecycle and habitat ecosystem services. The Proposed Works Offshore will be undertaken in accordance with a Marine Mammal Mitigation Protocol (MMMP) and Detailed VMP, which will set out measures to avoid, minimise, and manage potential effects on marine mammals and the wider marine environment from vessel activity, in line with industry best practice and legal requirements. This coincides with the Sea-floor and Water Column Integrity Policy 3 within the NMFP (**Section 1.5.1**). The MMMP sets out procedures for pre-works assessment, monitoring, and mitigation, while the Detailed VMP establishes best-practice vessel management measures, including routing, speed restrictions, activity timing, pollution prevention and crew environmental awareness, to minimise disturbance, collision risk and wider ecological effects (**Volume 2, Chapter 5: Marine Biodiversity**).

Ecosystem service	Baseline summary	Impact assessment summary
		Overall, the Proposed Works Offshore are **not expected to give rise to adverse effects** on the lifecycle and habitat ecosystem services for marine mammals.
	Marine Ornithology The Arklow Bank sandbank and wider area supports a typical Irish Sea seabird assemblage, including red-throated divers, cormorants, gannets, guillemots, razorbills, puffins, kittiwakes, little tern and several gull species, with seasonal patterns in abundance. ABWP Phase I post-construction bird surveys (2004 to 2009) and ABWP Phase II surveys, undertaken between 2018 and 2020, indicate higher bird presence during autumn, winter, and spring migration periods, particularly for auks, kittiwakes, and divers, while the area is of lower importance during the breeding season (**Volume 2, Chapter 5: Marine Biodiversity**). No Special Protection Areas (SPAs) overlap the Offshore Site; the nearest are Wicklow Head SPA (15 km north, supporting kittiwake) and The Murrough SPA (18 km north, supporting species including red-throated diver and little tern). For further baseline information regarding marine ornithology within the Offshore Site and surrounding area, see **Volume 2, Chapter 5: Marine Biodiversity.**	The Proposed Works Offshore have the potential to interact with lifecycle and habitat ecosystem services that support marine birds, particularly activities associated with foraging, resting, and movement. Red-throated diver is recognised as the most sensitive bird species to disturbance and displacement from offshore activities (JNCC, 2022), with grouping behaviour at sea increasing the potential for temporary disruption to multiple individuals. Whilst Ireland has not published detailed national guidance specifying displacement distances or assessment parameters for seabird displacement arising from offshore wind developments, Statutory Nature Conservation Bodies (SNCB) guidance identifies a precautionary 10 km buffer for potential displacement effects (JNCC, 2022), the nearest designated site for which the species is a qualifying interest (Murrough SPA) lies 18.1 km north from the Offshore Site and therefore beyond the species' maximum foraging range of 9 km (mean range of 4.5 km) (Woodward *et al*., 2019). The Proposed Works Offshore and associated vessel activity will be spatially limited and temporary, with controls in place to maintain baseline lighting conditions (**Volume 3, Appendix 3.7: Outline Lighting and Marking Plan**). Given the high baseline vessel activity in the Irish Sea (ABPmer, 2017) and the low speed of decommissioning vessels, the Proposed Works Offshore are not expected to result in a meaningful disruption to red-throated diver habitat use or key lifecycle functions, as concluded in **Volume 2, Chapter 5: Marine Biodiversity**. In addition, the Detailed Offshore DEMP will include standard industry practice and legal requirements for marine mitigation, including accidental spill prevention and controls and lighting management. Overall, the Proposed Works Offshore are **not expected to give rise to adverse effects** on the lifecycle and habitat ecosystem services for marine ornithology.
Pest and disease control	Pests, diseases and invasive species can result in economic losses by damaging crops, affecting human health and degrading biodiversity. Natural predators and parasitoids help regulate these species, contributing to ecosystem balance through the provision of biological control services (SEMRU, 2018). There are no reports of marine INNS within the ZoI. For further baseline information regarding the marine biodiversity within the Offshore Site and surrounding area, see **Volume 2, Chapter 5: Marine Biodiversity.**	The marine environment within the Offshore Site and its vicinity provides biological control services. Predatory fish and shellfish can provide this biological control function; however, they may also be adversely affected by the introduction of non-native invasive species (INNS) through increased competition for prey and the spread of novel diseases. However, **Volume 2, Chapter 5: Marine Biodiversity** concludes there are no reports of marine INNS within the ZoI, there is a negligible risk of introduction and spread of INNS and there are no significant adverse effects on marine ecological receptors as a result of the Proposed Works Offshore. Therefore, this biological control service will not be adversely impacted. In addition, the EVMP (**Volume 3, Appendix 3.5: Outline Vessel Management Plan**), which includes marine biosecurity measures to minimise and control the risk of introduction and spread of INNS associated with the Proposed Works Offshore, will be adhered to. Overall, the Proposed Works Offshore are **not expected to give rise to adverse effects**, on pest and disease control services.
Climate regulation	High energy sandy seabed sediments such as mobile sandbanks typically exhibit low organic carbon	As indicated in **Volume 2, Chapter 1,** atmospheric emissions, including greenhouse gas emissions that contribute to climate change, generated during the Proposed Works are

Ecosystem service	Baseline summary	Impact assessment summary
	stocks and low burial efficiency whereas significant carbon stocks are associated with fine-grained muddy sediments and low energy depositional environments (**Volume 2, Chapter 4: Coastal Processes, Water and Sediment Quality**). The majority of the footprint of the Proposed Works Offshore is on Arklow Bank which is a high energy sandy seabed environment therefore not likely to be a significant carbon sink. Works within sediments that function as carbon sinks (e.g. muddy sediments) are limited in extent and confined to the offshore export cable corridor, which is approximately 10 m wide and therefore limited in scale.	anticipated to be negligible within the context of regional and national emissions given the scale and temporary nature of Proposed Works. The release of embodied carbon (greenhouse gas emissions associated with a material across its lifecycle) associated with components to be decommissioned will be minimised by applying the waste hierarchy as part of the Detailed Offshore and Onshore WMPs, which will prioritise reuse and recycling when this is considered technically and economically feasible. Due to the sediment type within the Offshore Site, it is considered that the potential to significantly release carbon through sediment disturbance during the Proposed Works Offshore is unlikely. Additionally, **Volume 2, Chapter 5: Marine Biodiversity** concludes that the Proposed Works Offshore will not result in significant adverse effects on marine biodiversity; therefore, the capacity of marine habitats and species to regulate climate and sequester carbon will not be adversely affected. Overall, the Proposed Works Offshore are **not expected to give rise to adverse effects**, on climate regulation services.
Cultural services		
Recreational services	Recreational boating, diving, fishing, and other marine users currently utilise the wider Arklow Bank and nearshore area, although activity is generally dispersed. Recreational fishing is primarily concentrated in inshore waters, including areas such as Ferrybank on the northern side of the Avoca Estuary, where species such as bass occur (IFI, 2023). Additional fishing locations include Arklow South Beach, Tinahask Lower Bay Beach and Roadstone Pier, which support bottom fishing for species such as whiting, dabs, flounder, plaice, pouting and dogfish (IFI, 2023). Arklow Sailing Club regularly undertakes sailing activities within the Arklow Bank area, including organised events such as the annual 'Turbines Race' (SPL, 2024).	The Proposed Works Offshore may result in temporary access restrictions within the Offshore Site, particularly along the offshore export cable corridor. Seabed disturbance associated with cable removal may cause short-term displacement of fish, potentially leading to temporary disruption to recreational fishing activity. However, these effects will be highly localised and temporary in nature, and alternative fishing locations are readily available. Sailing activities may require minor, temporary adjustments to routes or race marks, and the annual 'Turbines Race' may lose its meaning following the Proposed Works Offshore. However, sailing activities will remain feasible within the surrounding area, and alternative racing routes can be developed. Marine Notices will be issued to inform users of the location, nature and timing of works, allowing recreational activities to be planned accordingly. Given the limited spatial extent of the Offshore Site, the temporary and localised nature of the Proposed Works Offshore, and the availability of alternative areas for recreational use, effects on recreational services are considered to be minor (**Volume 2, Chapter 1: Introduction**). Overall, the Proposed Works Offshore are **not expected to give rise to adverse effects**, on recreational services.
Scientific and educational services	Arklow Bank has been subject to extensive geophysical, benthic ecology, fish, marine mammal, and ornithological surveys undertaken for ABWP Phase I and Phase II (SPL, 2024; INFOMAR, 2026). These datasets contribute to scientific understanding of offshore sandbank dynamics, marine ecology, and interactions with offshore renewable energy	Pre-decommissioning surveys will be undertaken prior to the commencement of the Proposed Works Offshore including geophysical and remotely operated vehicle/diver surveys. These will be used to obtain data on the seabed including bathymetry, seabed morphology, sediment thickness and type and provide a baseline for **Volume 2, Chapter 4: Coastal Processes, Water and Sediment Quality** and **Volume 2, Chapter 5: Marine Biodiversity.** The collection of this data will continue to support scientific understanding of the area.

Ecosystem service	Baseline summary	Impact assessment summary
	infrastructure, providing ongoing scientific and educational value. One published study which uses Arklow Bank as its case study is Creane (2023), titled "Morphological Modelling Investigating How External Sediment Sources and Wind- and Wave-Driven Flows Affect Sand-Bank Sustainability: The Arklow Bank Case Study."	Additionally, the Proposed Works Offshore represent the first large scale monopile offshore wind decommissioning project in Europe. As such, it will provide important technical, environmental and regulatory learning that will help inform best practice and decision making for future offshore wind decommissioning projects. Therefore, the Proposed Works Offshore are expected to result in a positive contribution to scientific and educational ecosystem services through the generation of updated marine data and will generate valuable learning to inform future offshore wind decommissioning activities. Overall, the Proposed Works Offshore are **not expected to give rise to adverse effects,** but instead **a beneficial effect,** on scientific and educational services.
Marine heritage, culture and entertainment	The Arklow Bank seabed is primarily composed of sand and gravel deposited during the last glaciation, with mobile surface sediments shaped by post-glacial sea level rise. While the southeast Irish coast has low potential for prehistoric submerged landscapes, earlier deposits may be present. A total of 115 shipwrecking events and 78 known wrecks have been recorded in the Arklow Bank area, indicating a high concentration of maritime archaeological features. Within the study area, 25 archaeological sites have been identified, predominantly shipwreck-related, with two prehistoric flint findspot. Six sites lie within or adjacent to the project boundary and are considered at risk from decommissioning activities, due to their location within or close to infrastructure footprints. Risks primarily arise from cable removal, which may result in indirect impacts to nearby sites and direct impacts to sites within the offshore export cable corridor. For further baseline information regarding marine heritage and culture within the Offshore Site Boundary and surrounding area, see **Volume 2, Chapter 8: Marine Archaeology and Cultural Heritage**.	The Proposed Works Offshore may result in seabed disturbance that could affect known or unknown marine heritage assets within or near the Offshore Site, including historic shipwrecks or submerged archaeological material. However, potential effects on marine heritage will be managed through the implementation of appropriate archaeological mitigation measures, including, adherence to the Detailed Offshore DEMP which will include standard industry practice and legal requirements for the management of potential impacts on marine archaeology, such as the implementation Archaeological Exclusion Zones (AEZs) around known heritage assets and implementation of an Archaeology Management Plan (AMP) that defines a protocol in the event of heritage asset discovery (**Volume 2, Chapter 8: Marine Archaeology**). The marine environment within the Offshore Site and surrounding area contributes to cultural identity, heritage, recreation, and tourism by supporting valued seascapes and uses, including navigation, commercial and recreational fishing, wildlife watching, coastal and marine based tourism (e.g. boating and scenic views). The Proposed Works Offshore are not anticipated to materially affect these cultural seascape uses, as activities will be temporary, spatially limited, and unlikely to result in noticeable changes to navigation, recreation, tourism activity, or the character of the wider seascape. Recreational services, including marine entertainment, have been assessed within this table above. Overall, the Proposed Works Offshore are **not expected to give rise to adverse effects** on the marine heritage, culture and entertainment ecosystem service.

6 CONCLUSIONS

6.1.1.1 An assessment of effects (both positive and negative) on relevant ecosystem functions and services has been undertaken. Ecosystem services have been screened for possible interaction with the Proposed Works Offshore. With those ecosystem services screened in as relevant being assessed against the outcomes of the assessments undertaken in the EIAR chapters with consideration of relevant mitigation measures.

6.1.1.2 Each of the EIAR chapters referred to included an assessment of the potential for impacts associated with the Proposed Works Offshore both alone and cumulatively with other plans and projects. As such, the ecosystem services conclusions presented above also include consideration of potential cumulative impacts.

6.1.1.3 The continued collection of environmental data associated with the Proposed Works Offshore (namely bathymetry and archaeological data) will support scientific understanding of the Offshore Site. In addition, Proposed Works Offshore will contribute to developing offshore wind decommissioning methods and techniques of benefit to the wider industry. As such, the Proposed Works Offshore are anticipated to result in a **beneficial effect** on scientific and educational services.

6.1.1.4 Overall, the individual receptor assessments detailed in the EIAR and this Stage 2 Ecosystems Services Assessment demonstrates that the Proposed Works Offshore are **not expected to give rise to adverse effects** on any ecosystem services or their ability to function as intended, and aligns the EIAR with the ecosystem based framework supported by the MSPD and MSFD by linking pressures and impacts on marine habitats and species to changes in the services and benefits they provide to society; as well as NMPF policies that require consideration of marine ecosystem services.

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