ABWP Phase I Decommissioning

Coastal Processes, Water and Sediment Quality

Volume 2, Chapter 4

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Project name ABWP Phase I Decommissioning

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Ramboll
240 Blackfriars Road
London
SE1 8NW
United Kingdom
https://ramboll.com

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Statement of Authority

Author	Qualifications	Relevant Experience
César Jesus	Master Equivalent in Biology and Geology (Portugal) Master's in Applied Geology (Portugal) PhD in Marine Geosciences (Portugal and The Netherlands)	Background in marine geomorphology, with experience in coastal and seabed processes across research and applied projects. Hydrodynamic modelling has been a core component of his work, developed during his Master's thesis and further advanced in his post-doctoral research. In addition, he has followed up and integrated hydrodynamic modelling studies within several EIAs focused on offshore and marine environments over the past 15 years.
Elena Henning	BSc (Hons) Geography, University of Edinburgh (UK)	4 years of experience in assessing risk associated with contamination to various offshore and terrestrial receptors. Experienced in authoring marine Environmental Impact Assessment chapters assessing water and sediment quality, including in offshore wind projects. Experienced in assessing projects against marine plans, policies and strategies.
Oriol Sot Olivet	BSc Biology, University of Girona (Spain) MSc Environment, Sustainability and Sustainable Development Goals (SDGs) (Spain)	Experience in permitting and environmental impact assessment for a wide range of renewable energy projects.
Sara Méndez Roldán	BSc Environmental Sciences, University of Salamanca (Spain) MSc Coastal and Marine Resources Management, University of Portsmouth (UK)	Over 11 years' international experience in permitting and environmental impact assessment for a wide range of coastal and marine developments, including offshore wind farms and subsea cables across a number of geographies, including Spain, the UK, Ireland, Poland and Denmark, among others.
Carys Lloyd	MSc Marine Science, Policy and Law, Southampton University. BSc Joint Honours Marine Biology and Oceanography, University of Wales, Bangor.	Over 16 years' experience in marine environmental assessment and consenting for large-scale offshore infrastructure, with a particular focus on offshore wind. Extensive experience leading EIAR chapters and coordinating multidisciplinary inputs. Has acted in lead author and reviewer roles on multiple offshore wind projects, providing technical assurance.

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:

Term	Meaning
	– 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.
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 Profesionals (ISEP).
Alternatives	A description of other options that have been considered during the conception of the Proposed Works (Environmental Protection Agency (EPA), 2022). Article 5(1) and Annex IV of the Environmental Impact Assessment (EIA) Directive) require "a description of the reasonable alternatives studied by the developer, which are relevant to the project and its specific characteristics, and an indication of the main reasons for the option chosen, including a comparison of the environmental effects" (EIA Directive 2011/92/EU (as amended)).
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).
Bathing waters	All elements of surface water where the competent authority expects a large number of people to bathe and has not imposed a permanent bathing prohibition, or issued permanent advice against bathing (Bathing Water Directive 2006/7/EC).
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).
Conservation Objective (CO)	A specified population size and distribution objective for a species, or a specified area and quality objective for a habitat, to ensure that a site contributes as best as possible to achieving favourable conservation status at national, biogeographical or European level (Article 1(k) of the Habitats Directive (92/43/EEC)).
Cumulative effect	The addition of many minor or insignificant effects, including effects of other projects, to create larger, more significant effects (EPA, 2022). Cumulative effects within this EIAR comprise those arising from the Proposed Works with other developments, i.e. plans and projects that are 'reasonably foreseeable' (Planning Inspectorate (PINS), 2024).

Term	Meaning
Cumulative effects assessment	Assessment of potential environmental effects resulting from the Proposed Works cumulatively with other plans, projects or reasonably foreseeable activities.
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).
Dredged material	Seabed material arising from localised dredging potentially required to facilitate safe vessel access during Proposed Works Offshore, and / or extraction of seabed material located inside monopile (MP) foundations, as part of MP decommissioning.
Dumping	Any deliberate disposal in the maritime area (including side-cast dredging, plough dredging, water injection dredging and other such dredging techniques of a substance or material from or in conjunction with a vessel or aircraft or offshore installation (Dumping at Sea Act 1996 (as amended)).
Dynamic plume	The initial, high-concentration sediment plume formed at the point of discharge of dredged material, driven by density differences between sediment-laden water and ambient seawater.
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).
EIA Scoping	The scoping stage provides an opportunity for both developers and the Competent Authority to determine those key environmental impacts and issues of concern that are likely to be of the utmost importance to the Project proposal's decision-making and eliminates those that are less of a concern (European Commission (EC,) 2017).
EIA Scoping Presentation	Presentation scoping the likely environmental impacts of the Proposed Works to be further considered in the Environmental Impact Assessment Report (EIAR). The EIA Scoping Presentation is included in **Volume 3, Appendix 1.1** of the EIAR.
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 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.).
Favourable Conservation Status (FCS)	Refers to an approach to habitat/species conservation through a system based on functioning ecological networks, provision of ecosystem services and resilience to the impacts of climate change
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)),

Term	Meaning
	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)	Area reached by the sea level at high tide.
Impact	A change brought about by the Proposed Works Offshore.
Indirect impact	Impacts on the environment, which are not a direct result of the Proposed Works, often produced away from (the Offshore / Onshore Site) or as a result of a complex pathway (EPA, 2022).
Intertidal	The area between the HWM and the Low Water Mark (LWM).
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.
Landfall	The point where the offshore export cable transitions from the offshore marine environment to the onshore terrestrial environment.
Magnitude	A combination of the spatial extent, duration, frequency and reversibility of an impact
Maximum design scenario (MDS)	Represents 'realistic worst case' assessment parameters for each impact.
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.
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.).
Natura 2000 network	Network EU-wide network of nature conservation areas established under the 1992 Habitats Directive (and 1979 Birds Directive). The aim of the network is to assure the long-term survival of Europe's most valuable and threatened species and habitats. It includes Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) (Office of the Planning Regulator, n.d.).
Natura Impact Statement (NIS)	A statement, for the purposes of Article 4 of the Habitats Directive, of the implications of a proposed development, on its own or in combination with other plans or projects, for one or more than one European site, in view of the conservation objectives of the site or sites. This is prepared by the applicant (Office of the Planning Regulator, n.d.).
Nautical mile (nm)	A standard unit of distance used at sea, equal to 1,852 metres.
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

Term	Meaning
	connecting WTG T4 to the landfall at high water mark (HWM) near Arklow Harbour.
Passive plume	The phase of a sediment plume that is transported by ambient currents after initial dynamic plume collapse.
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.
Polyaromatic hydrocarbons (PAHs)	A class of chemicals that occur naturally in coal, crude oil, and gasoline.
Pathway	The route by which a pressure arising from an activity acts on a receptor to produce an environmental impact.
Polychlorinated biphenyls (PCB)	A class of chemicals that belong to a broad family of human-created organic chemicals known as chlorinated hydrocarbons. Although most were banned in 1986, they linger on in detectable levels in animals, fish and humans.
Precautionary principle	The approach aims at ensuring a higher level of environmental protection through preventative decision-taking in the case of risk. The general principles of risk management remain applicable when the precautionary principle is invoked. These are proportionality between the measures taken and the chosen level of protection; non-discrimination in application of the measures; consistency of the measures with similar measures already taken in similar situations or using similar approaches; examination of the benefits and costs of action or lack of action; review of the measures in the light of scientific developments (MDB, 2017).
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).
Receptor	Any element in the environment which is subject to impacts (EPA, 2022).
Recycling	Subjection of waste to any process or treatment to make it re-usable in whole or in part (Waste Management Act 1996 (as amended)).
Residual effect	The final predicted effect / impact remaining after mitigation (EPA, 2022).
River Basin Management Plan (RBMP)	Launched in 2018, the RBMP set out a national approach to protecting Ireland's water bodies. Key actions such as wastewater treatment, agriculture, resource management and source protection are highlighted. It is hoped the plan will achieve the improvement of water quality in 726 water bodies, with improvement in Water Framework Directive water quality status in 152 water bodies in Ireland by 2021 (Office of the Planning Regulator, n.d.).
Scour protection	Engineered barrier typically placed on the seabed around WTG foundations and subsea cables to prevents sediment erosion caused by accelerated water currents and waves, safeguarding the WTG's stability and protecting subsea cables. In ABWP Phase I, scour protection was originally introduced in the form of rock armour, however, this proved ineffective, and was removed in 2005. Since then, scour protection has been introduced through sandbags.
Sensitivity	The potential of a receptor to be significantly affected (EPA, 2022).
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)
Special Areas of Conservation (SACs)	Sites designated under the Habitats Directive (92/43/EEC). This requires the conservation of important, rare or threatened habitats and species (not birds, which are protected by Special Protection Areas (SPAs)) across Europe (Office of the Planning Regulator, n.d.).
Special Protection Areas (SPAs)	Sites designated under the Birds Directive (79/409/EEC), to conserve the habitats of certain migratory or rare birds (Office of the Planning Regulator, n.d.).

Term	Meaning
Statutory consultee	An organisation or authority stipulated by legislation to be notified by a competent authority or developer if an application is made which might give that organisation a cause for concern. These are specified in the applicable legislation, e.g. Article 28 of the Planning and Development Regulations, 2001 (as amended) (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.
Surface water	Surface waters include rivers, lakes, transitional and coastal waters.
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).
The Coastal Processes, Water and Sediment Quality Study Area	Area covered in the characterisation of the baseline environment and considered in the assessment of potential environmental effects relevant to Coastal Processes, Water and Sediment Quality, defined as a buffer distance of approximately 20 km in the north-south direction and of 4 km distance in a west-east direction around the Offshore Site, see **Section 4.4.3** and Figure 4.1 in this document.
Transboundary effects	Potential environmental effects that may occur across jurisdictional boundaries (MDB, 2017).
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)).
Waste Hierarchy	The order of preference for managing waste, prioritising prevention, reuse, recycling and recovery ahead of disposal.
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. The ZoI for Coastal Processes, Water and Sediment Quality is defined as defined as 20 km from the Offshore Site, corresponding to approximately two tidal excursions during a mean spring tide, see **Section 4.8**.

Acronyms

Acronym	Meaning
AA	Appropriate Assessment
ABWP	Arklow Bank Wind Park
ACP	An Coimisiún Pleanála
ASU	Aquatic Services Unit
BAC	Background Assessment Concentrations
CEA	Cumulative Effect Assessment
DBT	Dibutyltin
DCEE	Department of Climate, Energy and the Environment
DEMP	Decommissioning Environmental Management Plan

Acronym	Meaning
DHPLG	Department of Housing, Planning and Local Government
EAC	Environmental Assessment Criteria
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
EQSD	Environmental Quality Standards Directive
EQSs	Environmental Quality Standards
ERL	Effects Range Low
EU	European Union
EVMP	Ecological Vessel Management Plan
GES	Good Environmental Status
HOOW	Harnessing Our Ocean Wealth
IEMA	Institute of Environmental Management and Assessment
IMO	International Maritime Organisation
IMP	Integrated Marine Plan
INFOMAR	Integrated Mapping for the sustainable development of Ireland's marine resource
LAT	Low Astronomical Tide
LSBL	Lowest Seabed Level
MAC	Maritime Area Consents
MAC-EQS	Maximum Allowable Concentration – Environmental Quality Standards
MARA	Maritime Area Regulatory Authority
MARPOL	International Convention for the Prevention of Pollution from Ships
MDS	Maximum Design Scenario
MHWS	Mean High Water Springs
MLWS	Mean Low Water Springs
MP	Monopile
MSFD	Marine Strategy Framework Directive
NIS	Natura Impact Statement
NMPF	National Marine Planning Framework
NRW	National Resource Wales
NVZs	Nitrate Vulnerable Zones
O&M	Operations and Maintenance
OMF	Operations and Maintenance Facility
OPW	Office of Public Works
OREDP	Offshore Renewable Energy Development Plan
OREDP II	Offshore Renewable Energy Development Plan II
OSP	Offshore Substation Platform

Acronym	Meaning
OSPAR Convention	Convention for the Protection of the Marine Environment of the North-East Atlantic
PAH	Polycyclic aromatic hydrocarbons
PCB	Polychlorinated biphenyls
PSA	Particle Size Analysis
PSD	Particle Size Distribution
RBMP	River Basin Management Plan
SAC	Special Area of Conservation
SEA	Strategic Environmental Assessment
SFWs	Shellfish Waters
SPA	Special Protection Area
SSC	Suspended sediment concentrations
TBT	Tributyltin
TEH	Total Extractable Hydrocarbon
THC	Total hydrocarbon content
TOC	Total Organic Carbon
TPHCWG	Total Petroleum Hydrocarbon Criteria Working Group
UNCLOS	United Nations Convention on the Law of the Sea
USEPA	United Sates Environmental Protection Agency
UWWTD	Urban Waste -Water Treatment Directive
WFD	Water Framework Directive
WTG	Wind Turbine Generators
ZoI	Zone of Influence

Units

Unit	Meaning
%	Per cent
cm	Centimetre
km	Kilometre
km^2	Square kilometre
m	Metre
mg/kg	Milligram per kilogram
mg/l	Milligram per litre
mm	Millimetre
m/s	Metres per second
m^3	Cubic metre
nm	Nautical mile
s	Second
µm	Micrometre

4 COASTAL PROCESSES, WATER AND SEDIMENT QUALITY

4.1 Introduction

4.1.1.1 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).

4.1.1.2 This chapter of the Environmental Impact Assessment Report (EIAR) presents the findings of the Environmental Impact Assessment (EIA) work undertaken to date for the Proposed Works Offshore as described in **Volume 2, Chapter 3: Proposed Works Description**.

4.1.1.3 The Proposed Works Offshore will be undertaken within the Offshore Site (see **Volume 2, Chapter 3**), 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).

4.1.1.4 This chapter considers the potential impacts and effects on coastal processes, water and sediment quality that could result from the Proposed Works Offshore.

4.1.1.5 This chapter describes the methodology, datasets that have informed the EIA, baseline conditions, including future baseline, mitigation measures and the residual significant effects on coastal processes, water and sediment quality that could result from the Proposed Works Offshore.

4.1.1.6 The assessment is informed by the following chapters:

- **Volume 2, Chapter 1: Introduction**; and
- **Volume 2, Chapter 3: Proposed Works Description;**

4.1.1.7 The chapter also draws on information contained within the following appendices:

- **Volume 3, Appendix 1.2: Cumulative Screening**
- **Volume 3, Appendix 1.3: Transboundary Screening**
- **Volume 3, Appendix 4.1: Seabed Mobility Assessment;**
- **Volume 3, Appendix 4.2: Coastal Processes Modelling;**
- **Volume 3, Appendix 4.3: Scour Assessment;**
- **Volume 3, Appendix 4.4: Sediment Sampling Results;** and
- **Volume 3, Appendix 4.5: Water Framework Directive Assessment.**

4.2 Legislative and Policy Context

4.2.1 Overview

4.2.1.1 The full relevant legislation and policy context for the Proposed Works has been detailed in **Volume 2, Chapter 1**. This section sets out the legislation and planning policy that is relevant to the coastal processes, water and sediment quality assessment.

4.2.2 Legislation

International

United Nations Convention on the Law of the Sea and Agreement relating to the Implementation of Part XI of the United Nations Convention on the Law of the Sea (UNCLOS) of 10 December 1982

4.2.2.1 UNCLOS provides the international legal framework governing the use and protection of the marine environment, including coastal processes, water quality, and seabed resources. The 1994 Agreement on the Implementation of Part XI complements the Convention by establishing rules for activities on the seabed beyond national jurisdiction. With regard to the Proposed Works Offshore, UNCLOS sets out the obligations to prevent marine pollution, protect the water column and seabed, and ensure that offshore activities do not cause undue harm to coastal processes or sediment quality within Ireland’s maritime zones.

The London Convention and Protocol

4.2.2.2 The Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter 1972 (“London Convention”), in force since 1975, is one of the earliest global agreements aimed at protecting the marine environment by regulating the deliberate disposal of materials at sea. Its primary objective is to ensure effective control over dumping activities and to prevent pollution arising from such practices. In the context of the Proposed Works Offshore, the Convention is relevant where decommissioning operations could involve the handling, relocation, or offshore disposal of materials, requiring that any such actions comply with international standards intended to safeguard the marine environment.

International Convention for the Prevention of Pollution from Ships (MARPOL)

4.2.2.3 MARPOL is the main international convention covering prevention of pollution of the marine environment by ships from operational or accidental causes. The MARPOL Convention was adopted on 2 November 1973 at International Maritime Organisation (IMO). The Protocol of 1978 was adopted in response to a spate of tanker accidents in 1976-1977. As the 1973 MARPOL Convention had not yet entered into force, the 1978 MARPOL Protocol absorbed the parent Convention. The combined instrument entered into force on 2 October 1983 and has been updated by amendments through the years.

4.2.2.4 The Convention includes regulations aimed at preventing and minimising pollution from ships (both accidental pollution and that from routine operations) and currently includes six technical Annexes.

Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR Convention, 1992)

4.2.2.5 OSPAR Decision 98/3 (1998), as amended by Decision 2024/21, is a legally binding instrument that prohibits the dumping or leaving in place of disused offshore installations within the OSPAR Maritime Area and is introduced in Chapter 1 of this study.

4.2.2.6 OSPAR’s work is organised into thematic strategies that are highly relevant to water and sediment quality and coastal processes, including: Hazardous Substances (aiming to prevent pollution from toxic and persistent substances, with a goal of concentrations in marine waters and sediments being near natural background levels for naturally occurring substances and close to zero for synthetic substances); Offshore Industry (addressing pollution from marine activities, including the regulation of oil discharges, chemical use, and the decommissioning of installations); and Biological Diversity and Ecosystems (protecting marine habitats and species, which contributes to maintaining healthy coastal processes and seafloor integrity). As an example, OSPAR has established Environmental Assessment Criteria (EACs) and Background Concentrations (BACs) to assess contaminant levels in water and sediments. These science-based thresholds help determine whether pollutant concentrations may cause ecological harm.

European Union

EU Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Flora and Fauna (Habitats Directive) and EU Council Birds Directive 2009/147/EC (Birds Directive)

4.2.2.7 The Habitats and Birds Directives establish a legal framework for the protection of habitats and species of European conservation importance through the designation and management of the Natura 2000 network, as set out in Articles 3 and 4 of the Habitats Directive. In the context of coastal processes, water and sediment quality, the Directives are relevant wherever the Offshore Site is located in proximity to designated Natura 2000 areas, as any alterations to coastal processes, water quality, or sediment dynamics resulting from Proposed Works Offshore may influence the integrity or conservation objectives of these protected sites. Accordingly, potential changes such as seabed disturbance, variations in suspended sediment concentrations, or hydrodynamic modifications must be assessed to ensure that the Proposed Works Offshore do not adversely affect qualifying habitats or species.

Marine Strategy Framework Directive (MSFD), European Commission, 2008:

4.2.2.8 The MSFD establishes the overarching framework for achieving Good Environmental Status (GES) in EU marine waters through a series of qualitative descriptors. In the context of the Proposed Works Offshore, the MSFD is relevant as several GES descriptors directly relate to potential changes in coastal processes, water and sediment quality at the Offshore Site:

- Descriptor 6 requires seafloor integrity to be maintained so that ecosystem structure and functions are safeguarded and benthic communities are not adversely affected, is directly applicable where decommissioning activities may disturb seabed sediments or modify benthic habitats;
- Descriptor 7 requires that permanent alterations to hydrographical conditions must not adversely impact marine ecosystems, is pertinent where the Proposed Offshore Works could influence local hydrodynamics, sediment transport pathways, or water column characteristics;
- Descriptor 8 requires that concentrations of contaminants are at levels not giving rise to pollution effects; and
- Descriptor 10 requires that properties and quantities of marine litter do not cause harm to the coastal and marine environment.

EU directive covering the management of bathing waters 2006/7/EC

4.2.2.9 The Bathing Water Directive (2006/7/EC) establishes the framework for the management, monitoring and classification of bathing waters across the EU, with the objective of protecting public health and preserving, protecting and improving environmental quality in designated natural bathing areas. Any changes to coastal processes, sediment mobilisation or water quality arising from the Proposed Works Offshore must not adversely influence conditions at nearby designated bathing waters.

EU Water Framework Directive (WFD) (2000/60/EC)

4.2.2.10 The WFD requires all EU Member States to achieve good ecological and good chemical status in inland and coastal waters, with the original target set for 2015 and possible extensions up to 2027 up to 1 nautical mile (nm) from land. The WFD is relevant to the Proposed Works Offshore where activities at the Offshore Site may influence water quality or suspended sediment concentrations within WFD-designated water bodies. Any disturbance to the seabed, increases in turbidity, or release of contaminants during decommissioning must therefore be assessed to ensure that these operations do not hinder the attainment or maintenance of good status under the Directive.

Environmental Quality Standards Directive (Directive 2008/105/EC)

4.2.2.11 The Environmental Quality Standards Directive establishes environmental quality standards (EQS) for priority substances and certain other pollutants in surface waters to protect aquatic ecosystems, human health and water uses. It applies across EU Member States for listed substances and forms part of EU water protection legislation, working alongside the Water Framework Directive and other related directives.

4.2.2.12 These prescribed measurements include:

- The Annual Average – Environmental Quality Standards which is an arithmetic mean; and
- The Maximum Allowable Concentration – Environmental Quality Standards (MAC-EQS) which is an upper threshold which should not be breached.

National

Sea Pollution Act 1991

4.2.2.13 The Sea Pollution Act 1991 provides the primary national framework for preventing and controlling marine pollution in Ireland, enabling the State to give effect to the International Convention for the Prevention of Pollution from Ships (MARPOL) 73/78 Convention and related international obligations. The Act regulates discharges of oil and other harmful substances from ships and offshore activities, and establishes powers for intervention in cases where pollution poses a risk to the marine environment. In the context of the Proposed Works Offshore, the Act is relevant as it governs the management of pollutants, accidental releases, and any activities with the potential to impact the marine environment during decommissioning operations, ensuring that offshore activities are carried out in compliance with Ireland's marine pollution prevention standards. Any pollution-prevention requirements arising under this Act will be implemented through the Detailed Offshore Decommissioning Environmental Management Plan (DEMP) (see outline version in **Volume 3, Appendix 3.4**).

European Communities (Marine Strategy Framework) Regulations 2011 (S.I. No. 249 of 2011), as amended:

4.2.2.14 Transposes EU Directive 2008/56/EC (MSFD) into Irish law. The MSFD is implemented in cycles of 6 years, with member state being obliged to report to the EU every 2 years. Ireland has reached the end of cycle 2, and cycle 3 (2023 – 2028) is underway. The purpose of the Marine Strategy Framework Regulations is to help develop Ireland's ocean economy whilst protecting and preserving the marine environment. The Marine Strategy Framework Regulations require an initial assessment of marine waters, including:

- Physical and chemical characteristics, such as seabed topography and bathymetry, temperature regime, hydrodynamics (currents, waves, mixing, residence time), turbidity, salinity, and water chemistry (including nutrients and oxygen).
- Biological and ecological characteristics, including habitat types and the distribution, abundance and condition of marine species and communities.
- Pressures and impacts from human activities, including (inter alia):
  - contamination by hazardous substances (synthetic and non-synthetic substances such as pesticides, antifoulants, heavy metals and hydrocarbons);
  - nutrient and organic matter enrichment from point and diffuse sources; and
  - physical disturbance, habitat loss, hydrological alteration, marine litter, underwater noise and biological disturbance.

European Communities (Water Policy) Regulations 2003 (S.I. No. 722 of 2003), as amended:

4.2.2.15 Gives further effect to EU Directive 2000/60/EC WFD into Irish law. In Ireland, coastal waters between the coast and one nautical mile offshore are designated for ecological status under the WFD. The ecological status is assigned by considering the biological, hydromorphological, chemical and specific contaminants. The different ecological statuses are high, good, moderate, poor or bad.

4.2.2.16 In Ireland, the WFD requires that management plans are prepared on a river basin basis of which the second River Basin Management Plan (RBMP) for Ireland (DHPLG, 2018) was published in 2018, to cover the period of 2018 to 2021. The third-cycle RBMP, covering 2022–2027, has since been published in final form as the 'Water Action Plan 2024: A River Basin

Management Plan for Ireland' by the Department of Housing, Local Government and Heritage in 2024. The RBMPs outline the approach to protect waters in Ireland, identifies the water bodies which are 'at risk' of not achieving their status objective and sets out actions required to achieve 'good' ecological status.

4.2.2.17 The regulations work alongside later and related statutory instruments that refine or update specific requirements (for example the Environmental Objectives (Surface Waters) Regulations 2009). While the 2003 Regulations provide the overarching transposition of the WFD into Irish law, later instruments refine and implement specific requirements relevant to water quality classification and compliance.

European Communities Environmental Objectives (Surface Waters) Regulations 2009 (S.I. No. 272 of 2009), as amended:

4.2.2.18 These Regulations give statutory effect to the Environmental Quality Standards Directive to Directive 2008/105/EC on EQS in the field of water policy. The Regulations also give further effect to the WFD establishing a framework for Community action in the field of water policy and Directive 2006/11/EC on pollution caused by certain dangerous substances discharged into the aquatic environment of the Community. The Regulations apply to all surface waters and provide, inter alia, for:

- The establishment of legally binding quality objectives for all surface waters and environmental quality standards for pollutants;
- The examination and where appropriate, review of existing discharge authorisations by Public Authorities to ensure that the emission limits laid down in authorisations support compliance with the new water quality objectives/standards;
- The classification of surface water bodies by the Environmental Protection Agency (EPA) for the purpose of the WFD;
- The establishment of inventories of priority substances by the EPA; and
- The drawing up of pollution reduction plans by coordinating local authorities (in consultation with EPA) to reduce pollution by priority substances and to cease and/or phase out discharges, emissions or losses of priority hazardous substances.

European Communities (Bathing Water Quality) Regulations 2008 (S.I. No. 79 of 2008), as amended:

4.2.2.19 Transposes EU Directive 2006/7/EC (revised Bathing Water Directive) into Irish law. The revised Bathing Water Directive was transposed into Irish law by means of the Bathing Water Quality Regulations 2008 (S.I. No. 79 of 2008) and subsequently, the Bathing Water Quality (Amendment) Regulations 2011 (S.I. No. 351 of 2011) (hereafter referred to as the Bathing Water Regulations). Under the Bathing Water Regulations, local authorities measure, and monitor the number of certain types of bacteria which may indicate the presence of pollution, mainly from sewage or animal faeces, these are Escherichia coli and intestinal enterococci. An increase in the concentrations of these bacteria indicates a decrease in water quality. The EPA is responsible for compiling this Bathing Waters information and its submission to the European Commission.

European Communities (Quality of Shellfish Waters) Regulations 2006 (S.I. No. 268 of 2006),as amended:

4.2.2.20 Transposes EU Directive 2006/113/EC (Shellfish Water Directive) into Irish law. These Regulations prescribe quality standards for Shellfish Waters (SFWs) and designate the waters to which they apply, together with sampling and analysis procedures to be used to determine compliance with the standards.

4.2.2.21 The Shellfish Water Regulations applied to 12 designated shellfish waters. The Shellfish Water Regulations were amended in 2009 to include the addition of a further 49 Shellfish Waters by the European Communities (Quality of Shellfish Waters) (Amendment) Regulation 2009 (S.I. No. 55 of 2009). A further Shellfish Water (in Cork Harbour at Rostellan) was protected under European Communities (Quality of Shellfish Waters) (Amendment) (No.2) Regulation 2009 (S.I. No. 464 of 2009).

European Communities (Environmental Liability) (Amendment) Regulations 2015 (S.I. No. 293 of 2015), as amended:

4.2.2.22 These Regulations amend the European Communities (Environmental Liability) Regulations 2008 so as to transpose Article 38 of Directive 2013/30/EU of the European Parliament and of the Council 2013 on safety of offshore oil and gas operations and amending Directive 2004/35/EC. Article 38 of Directive 2013/30/EU requires that the definition of water damage in Directive 2004/35/EC be replaced so that the definition is extended to include damage that significantly adversely affects the environmental status of marine waters as defined in Directive 2008/56/EC establishing a framework for community action in the field of marine environmental policy (the Marine Strategy Framework Directive).

European Communities (Urban Waste-Water Treatment) Regulations 2001 (S.I. No. 254 of 2001):

4.2.2.23 Transposes EU Directive 91/271/EC (Urban Waste -Water Treatment Directive (UWWTD)) into Irish law and updated the Environmental Protection Agency Act, 1992 (Urban Waste Water Treatment) Regulations, 1994 (as amended in 1999) to list nutrient sensitive waters.

4.2.2.24 EU member states are required under the UWWTD (91/271/EEC) to identify nutrient-sensitive areas. These have been defined as "natural freshwater lakes, other freshwater bodies, estuaries and coastal waters which are found to be eutrophic or which in the near future may become eutrophic if protective action is not taken".

Chemicals Act 2008 (Rotterdam Regulation) Regulations 2019 (S.I. No. 213 of 2019):

4.2.2.25 The Chemicals Act 2008 (Rotterdam Regulation) Regulations 2019 bring the 2012 EU Rotterdam Regulation under the Chemicals Act enforcement framework by amending the reference to EU Rotterdam Regulation in the definition of "chemical" in the 2008 and 2010 Act.

4.2.2.26 The Chemicals Acts 2008 and 2010 outlined the enforcement of certain EU Regulations and Directives (including the Rotterdam Regulations). The Act was used to regulate and control the manufacture, use, placing on the market, export, import, transport, testing, storage, classification, labelling and packaging of chemicals; to make provision in relation to major accident hazards, and the prevention of accidents, involving chemicals.

4.2.3 Policy Context

National Policy Context

National Marine Planning Framework (NMPF)

4.2.3.1 The NMPF (The Department of Housing, Planning and Local Government (DHPLG, 2021) is the overarching policy framework for the sustainable management of Ireland's marine areas. This framework provides a suite of National Marine Planning Policies, and it implements commitments under the Marine Planning and Development Management Act (and international obligations) to support economic activity while safeguarding the marine environment in Ireland. **Table 4.1** provides details of the NMPF policies relevant to coastal processes, water and sediment quality and how and where they are covered in the EIAR.

Table 4.1: Summary of the NMPF relevant to coastal processes, water and sediment quality

Summary of relevant NMPF provisions	How and where considered in the EIAR
Water Quality	
Water Quality Policy 1 Proposals that may have significant adverse impacts upon water quality, including upon habitats and species beneficial to water quality, must demonstrate that they will, in order of preference and in accordance with legal requirements: a) avoid, b) minimise, or c) mitigate significant adverse impacts.	Assessment relevant to this policy to Coastal Processes, Water and Sediment Quality is provided in **Section 4.6** of this EIAR Chapter, supported by numerical modelling exercises and specific technical assessments undertaken to inform the understanding of seabed processes, sediment behaviour and water column dynamics for the Proposed Works Offshore. An assessment of impacts upon habitats and species is presented in **Volume 2, Chapter 5: Marine Biodiversity.**
Sea floor and Water Column Integrity	
Sea floor and Water Column Integrity Policy 1 Proposals that incorporate measures to support the resilience of marine habitats 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 which may have significant adverse impacts on marine, particularly deep sea, habitats must demonstrate that they will, in order of preference and in accordance with legal requirements: a) avoid, b) minimise, or c) mitigate significant adverse impacts on marine habitats, or d) if it is not possible to mitigate significant adverse impacts on marine habitats must set out the reasons for proceeding	Assessment of the relevance of these policies to Coastal Processes, Water and Sediment Quality is provided in **Section 4.6** of this EIAR Chapter, supported by numerical modelling exercises and specific technical assessments undertaken to inform the understanding of seabed processes, sediment behaviour and water column dynamics for the Proposed Works Offshore. In relation to ecosystem functions and services that may be affected by the Proposed Works, and as required under Policy 3, further assessment has been undertaken to consider how potential impacts are being, in order of preference, avoided, minimised or mitigated to prevent net loss of coastal habitats. This assessment is presented in **Volume 3, Appendix 1.5: Ecosystem Services Screening**.
Sea Floor and Water Column Integrity Policy 3 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 habitats.	

<table>
<tr><th>Summary of relevant NMPF provisions</th><th>How and where considered in the EIAR</th></tr>
<tr><td colspan="2">Marine Litter</td></tr>
<tr><td><u>Marine Litter Policy 1</u>
Proposals that facilitate waste re-use or recycling, or that reduce marine and coastal litter will be supported, where they contribute to the policies and objectives of the NMPF. Proposals that could potentially increase the amount of litter that is discharged into the maritime area, either intentionally or accidentally, must include measures (such as development of a waste management plan) to, in order of preference and in accordance with legal requirements:
a) Avoid,
b) Minimise, or
c) Mitigate
the litter. Demonstration of these measures must provide satisfactory evidence that the proposal is able to manage all waste without the creation of litter.</td><td>Assessment of the relevance of this policy to coastal processes, water and sediment quality is provided in Section 4.6 of this EIAR Chapter.
Relevant management plans or policy-specific implementation measures will be considered, where applicable, as part of the Onshore and Offshore Waste Management Plans (WMP) (see outline versions in Volume 3, Appendix 3.3 and 3.8 respectively).</td></tr>
<tr><td colspan="2">Ports, Harbours and Shipping</td></tr>
<tr><td><u>Ports, Harbours and Shipping Policy 9</u>
Proposals for the management of dredged material must demonstrate that they have been assessed against the waste hierarchy.</td><td rowspan="2">Assessment of the relevance of this policy to Coastal Processes, Water and Sediment Quality is provided in Section 4.6 of this EIAR Chapter.
Management of dredging and disposal activities, and the measures implemented to minimise adverse impacts and contribute to the objectives of the NMPF are outlined on Section 4.6.</td></tr>
<tr><td><u>Ports, Harbours and Shipping Policy 10</u>
Proposals identifying new dredge disposal sites which are subject to best practice and guidance from previous studies should be supported where:
• competent authority decisions incorporate necessary compliance assessments associated with authorisations; and
• they contribute to the policies and objectives of this NMPF.
Proposals must include an adequate characterisation study, be assessed against the waste hierarchy and must be informed by consultation with all relevant stakeholders.</td></tr>
</table>

<u>Offshore Renewable Energy Development Plan (OREDP) (DCCAE, 2014)</u>

4.2.3.2 The OREDP identifies the opportunity for the following:

- The sustainable development of Ireland's abundant offshore renewable energy resources;
- To increase indigenous production of renewable electricity;
- To contribute to reductions in our greenhouse gas emissions; and
- To improve the security of our energy supply creating jobs in the green economy

4.2.3.3 The OREDP sets out key principles, policy actions and enablers for delivery of Ireland's significant potential in this area. In this way, the OREDP provides a framework for the sustainable development of Ireland's offshore renewable energy resources.

4.2.3.4 The OREDP includes a series of Suggested Project Level Mitigation Measures that consider potential impacts associated with the decommissioning devices. None of the measures outlined are specifically recommended for the decommissioning phase applicable to the current project, however, some Suggested Project-Level Mitigation Measures may nonetheless be relevant to the assessment of coastal processes, water and sediment quality. These measures include, but are not limited to, the following topics:

- Changes in hydrodynamic/ coastal processes and seabed morphology;
- Disturbance of contaminated sediments; and
- Suspended sediment and increased turbidity.

4.2.3.5 It is also noted that the OREDP was developed long after the original construction of the current project, and as the Proposed Works Offshore relate to the decommissioning of ABWP Phase I rather than a new development, the applicability of this plan is limited. Nonetheless, its considerations have been reviewed for completeness.

Offshore Renewable Energy Development Plan II (OREDP II): Strategic Environmental Assessment Report (DECC, 2022):

4.2.3.6 The OREDP II is subject to a series of environmental assessments, including a Strategic Environmental Assessment (SEA) and an Appropriate Assessment (AA), to evaluate potential impacts and guide the development of the plan. These assessments are accompanied by statutory public consultations which, at the time of writing, have been completed, and OREDP II is currently in the post-consultation phase.

4.2.3.7 This resource provides valuable information on existing baseline conditions within the maritime area and can be consulted to support the preparation of the Coastal Processes, Water and Sediment Quality chapter. The document includes a series of indicative impact pathways, targets and potential indicators, drawing on GES descriptors and relevant legislation and policy frameworks across multiple topics, including physical environment, water, marine pollution and biodiversity.

4.2.3.8 As part of the SEA for OREDP II, mitigation commitments developed under OREDP I have been reviewed, with many remaining applicable and therefore retained. Some of these proposed mitigation measures are relevant to coastal processes, water and sediment quality; however, it should be noted that none specifically address decommissioning activities.

4.2.3.9 It is also noted that OREDP II was published long after the original construction of the current project. As the Proposed Works Offshore relate to the decommissioning of ABWP Phase I rather than the development of new infrastructure, the applicability of this plan is limited. Nonetheless, its guidance and considerations have been reviewed for completeness.

4.2.3.10 This report presents the outcomes of scoping work undertaken to inform the development of a National Coastal Change Management Strategy, including initial recommendations. It identifies that Ireland is facing both ongoing and urgent coastal change challenges, which require consideration alongside the development of a medium- to long-term management framework. The work was undertaken to inform a coordinated, whole-of-government approach to managing coastal change, and to provide initial findings and recommendations to Government.

4.2.3.11 A key objective of the scoping report is to establish a roadmap that enables a structured and coordinated response to coastal change, forming the basis for a long-term, integrated national strategy for coastal change management.

4.2.3.12 The report's recommendations include actions relating to:

- coastal monitoring and data collection;
- the development of a coastal asset database;
- the establishment of a coastal change research programme; and
- a national assessment of coastal change risk.

Local Policy Context

4.2.3.13 The Proposed Works Offshore lie within the jurisdiction of Wicklow County Council, whose coastal zone policies recognise the county's coastline as environmentally sensitive and increasingly vulnerable to pressures such as coastal erosion, changing hydrodynamics, and climate-related impacts. Local policy, as set out in Chapter 19: Marine Planning & Coastal Zone Management of the Wicklow County Development Plan 2022–2028, emphasises the protection of coastal ecosystems, the need to manage offshore activities that may influence the land–sea interface, and the importance of integrated coastal zone management.

4.2.3.14 It includes a set of development objectives and standards, which set out where land is to be developed, and for what purposes. For example, to ensure that there is no removal of sand dunes, beach sands or gravels and to ensure the County's natural coastal defences (beaches, sand dunes, salt marshes and estuary lands) are protected and ensure they are not put at risk by inappropriate works or development.

4.3 Consultation and Engagement

4.3.1.1 The EIA Scoping Presentation was issued to prescribed bodies in March 2026 (see **Volume 2, Appendix 1.1: EIA Scoping Presentation**). **Table 4.2** sets out the key comments raised specific to coastal processes, water and sediment quality in response to the EIA Scoping Presentation and/or at meetings with relevant stakeholders held during the preparation of this EIAR, with details of how these comments have been addressed within the EIAR. See **Stakeholder Engagement and Consultation Report** prepared in support of the application for planning permission.

Table 4.2: Summary of consultation and engagement feedback relevant to coastal processes, water and sediment quality

Comment	How and where considered in the EIAR
ACP, Inspector's Report (ACP 321635-25) – Matters arising, 7th May 2026	
Potential impact on coastal processes including coastal erosion and deposition	**Volume 2, Chapter 4** includes the assessment of potential impacts associated with coastal processes and water quality (e.g. temporary increase in suspended sediment concentrations (SSC) and deposition) and indirect impacts along the coastline, such as potential coastal erosion, see **Section 4.7.**
Potential impacts on water quality and the importance of providing a robust waste management plan for both the onshore and offshore elements of the proposed development. It was noted that a Dumping-at-Sea licence may be required for the proposed works.	**Volume 2, Chapter 4** includes the assessment of potential impacts on water quality (e.g. temporary increase in suspended sediment concentrations (SSC) and deposition), see **Section 4.7.** Waste generated during Proposed Works Onshore and Offshore will be managed in line with the Onshore and Offshore Waste Management Plans (WMPs) to be implemented by the Principal Decommissioning Contractor (see outline versions of these in **Volume 3, Appendices 3.3 and 3.8** respectively). Arklow Energy will secure a Dumping at Sea (DaS) permit for relevant Proposed Works Offshore.

4.4 Impact Assessment Methodology

4.4.1 Overview

4.4.1.1 **Volume 2, Chapter 1** sets out the overarching approach that has been used in this EIAR. This section describes the assessment scope, baseline characterisation method and criteria used to determine the sensitivity of the receptors and magnitude of effects and sets out the significance criteria that have been used for the coastal processes, water and sediment quality assessment.

4.4.1.2 Coastal Processes are not generally considered receptors in their own right, but instead function as pathways through which impacts may affect other environmental receptors. Such interactions are described, where relevant, within the corresponding topic chapters. For example, changes to coastal processes may result in the formation of sediment plumes, which can lead to deposition on benthic habitats; the potential significance of this effect is assessed in **Volume 2, Chapter 5: Marine Biodiversity**.

4.4.2 Relevant Guidance

4.4.2.1 This chapter has been prepared in accordance with the following guidance documents, see **Volume 2, Chapter 1** for guidance consulted to inform the wider EIAR:

- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA, 2022);
- Guidance on Environmental Impact Statement (EIS) and Natura Impact Statement (NIS) Preparation for Offshore Renewable Energy Projects (MDB, 2017); and

- Addendum to 2006 Guidelines for the Assessment of Dredged material in Irish Waters (Marine Institute, 2019).

4.4.3 Assessment Scope

Technical Scope

4.4.3.1 The approach to assessment was presented in the EIA Scoping presentation (see **Volume 3, Appendix 1.1**) and has been refined during the preparation of this EIAR (see **Volume 2, Chapter 1**).

4.4.3.2 Effects that are not considered likely to be of moderate/major significance been scoped out of the assessment and these impacts will not be considered further. **Table 4.3** summarises the impacts considered as part of the assessment, while a summary of the effects scoped out of the assessment is presented in **Table 4.4**.

Table 4.3: Impacts scoped into the assessment (coastal processes, water and sediment quality)

Impact	Potential effects scoped into the assessment
Impact to water quality from increased suspended sediment concentrations (SSC)	Potential for effects of decreased water quality due to increased SSC from Proposed Works Offshore, including from dredging / disposal and cable removal works.
Impact to water quality from disturbance /remobilisation of sediment bound contaminants	Potential for effects of decreased water quality due to disturbance / remobilisation of sediment bound contaminants from where Proposed Works Offshore activities interact with the seabed, including dredging / disposal and cable removal works.
Impacts to the Arklow Bank morphology and stability (including bank erosion) and to the coastline (including coastal profile change and beach erosion) due to changes in seabed morphology	Potential for effects of changes in seabed morphology due to disturbance of the seafloor, removal of structures, and changes in physical processes (e.g. tidal currents), leading to: • Alterations in the morphology and stability of the Arklow Bank (including potential erosion); and • Changes to coastal processes, beach profiles and shoreline position (including erosion / accretion patterns).
Post decommissioning monopile (MP) exposure causing scour impacts on the Arklow Bank	Potential exposure of MPs following decommissioning could lead to the development of scour on the bank around the MPs.

Table 4.4: Impacts scoped out of the assessment (coastal processes, water and sediment quality)

Impact	Potential effects scoped out of the assessment
Introduction of marine litter	A limited number of sandbags used for scour protection may remain on the seabed following Proposed Works Offshore where complete removal is not practicable. These materials are localised, inert, and confined to the Sub Lease Area, and do not constitute a dispersed or accumulating source of marine litter. In the context of MSFD Descriptor 10, the relevant assessment criterion (D10C1) relates to the composition, quantity, and spatial distribution of litter and whether these result in harm to the marine environment. The residual sandbags are not expected to result in ingestion, entanglement, or other adverse biological interactions, nor do they contribute to widespread litter distribution. Furthermore, these materials are already present as part of the baseline conditions associated with the operational phase of ABWP Phase I. The Proposed Works Offshore will therefore not result in any measurable increase in marine litter or deterioration in environmental status. On this basis, the presence of residual sandbags is not considered to result in harm to marine ecosystems, and therefore the effect is considered negligible and compliant with the requirements of MSFD Descriptor 10, and scoped out from this assessment.

Impact	Potential effects scoped out of the assessment
Accidental release of pollutants	The Outline Offshore DEMP (see **Volume 3, Appendix 3.4: Outline Offshore DEMP**) and Vessel Management Plan (VMP) (see **Volume 3, Appendix 3.5: Outline VMP**) will include management measures and controls for accidental spills, minimising the likelihood and magnitude of any potential impacts, considered unlikely to become significant.
Release of carbon through sediment disturbance	High energy sandy seabed sediments such as mobile sandbanks typically exhibit low organic carbon stocks and low burial efficiency whereas significant carbon stocks are associated with fine-grained muddy sediments and low energy depositional environments (Graves *et al*., 2002). The majority of the Offshore Site is on Arklow Bank which is a high energy sandy seabed environment and therefore not likely to be a significant carbon sink. Proposed Works Offshore interacting with sediments considered to be carbon sinks, such as muddy sediments, are limited in scale to the offshore export cable corridor only which is 10 m wide. It is considered that the potential to significantly release carbon through sediment disturbance during the Proposed Works Offshore is unlikely.
Impact to sediment quality from associated deposition associated with increased SSC	The modelling presented in **Volume 3, Appendix 4.2: Coastal Processes Modelling** predicts that dredging and cable removal activities are expected to result in the following deposition levels: • Access dredging: Maximum deposition thicknesses of 14 cm in very localised and isolated pockets around the dredge release locations. Outside of these isolated pockets, a maximum of 5 cm or lower is predicted. • Maintenance dredging: Maximum deposition thicknesses of 5 cm within the Sub Lease Area and 1 cm outside the boundary of the Sub Lease Area, which continuously decreases up to 7 km from the area of disturbance (maximum extent of sediment deposition); • Internal monopile dredge disposal: Negligible deposition thicknesses, with a maximum deposition of 0.03 cm in the Sub Lease Area. • Offshore export cable removal: Any increase in SSC and deposition is not expected to be discernible above background sediment disturbance. The deposition thickness is minimal compared to the changing background processes of the bank and will be quickly reworked. Additionally, the material that will be deposited from the SSC plume associated with the Proposed Works Offshore will be of similar composition as the seabed. Therefore, an impact to the bank and seabed is not anticipated. However, impacts from settlement of sediment on marine ecological receptors are considered in **Volume 2, Chapter 5.**

Marine Strategy Framework Directive (MSFD) Designation

4.4.3.3 Part of the Offshore Site falls beyond the WFD jurisdiction (beyond 1 nm) is within the OSPAR Subregion of the Irish Sea (Department of Housing, Local Government and Heritage, 2024) within the MSFD jurisdiction and referenced for the purposes of assessing GES.

4.4.3.4 Compliance with MSFD Descriptor 6 (Seafloor Integrity) requires demonstrating that project-induced physical loss and disturbance of the seabed are spatially limited, do not exceed defined thresholds for habitat loss or degradation, and do not result in adverse effects on the structure, function, or ecological condition of benthic habitats.

4.4.3.5 Compliance with MSFD Descriptor 7 (Hydrographical Conditions) requires demonstrating that any permanent, project-induced changes to hydrographical conditions (including currents, waves, and sediment transport) are spatially limited and do not result in significant adverse effects on benthic habitats, ecosystem structure, or ecological function, taking into account cumulative pressures and applicable regional thresholds.

4.4.3.6 While the assessment of coastal processes identifies that seabed disturbance and changes to hydrographical conditions may occur during decommissioning, these changes are spatially limited and do not, in themselves, constitute an assessment of habitat condition or ecological impact. MSFD Descriptor 6 and 7 are defined with respect to the potential for adverse effects on marine ecosystems, including changes to habitat structure, function, and ecological integrity. These descriptors therefore require an assessment framework that explicitly considers biological receptors and habitat condition, rather than physical processes alone. Furthermore, the results of this chapter demonstrate that both seabed disturbance and hydrographical changes are highly localised and of limited magnitude, with no indication of system-scale alteration or pathways leading to adverse ecological effects. On this basis, there is no evidence to suggest that the project would result in habitat loss, degradation, or ecosystem-level impacts relevant to Descriptor 6 or Descriptor 7. The consideration of potential effects on benthic habitats and ecosystem structure is instead addressed within **Volume 2, Chapter 5**, where these descriptors are more appropriately evaluated. Accordingly, Descriptor 6 and Descriptor 7 are not assessed within this chapter.

Spatial Scope

4.4.3.7 This description of the existing (baseline) environment provides a regional overview prior to focusing on the coastal processes, water and sediment quality study area and in recognition of the different elements of the Proposed Works Offshore. As such descriptions are provided for the following areas:

- Sub Lease Area, which includes Wind Turbine Generators (WTGs), met mast, inter-array cables, and working area for Proposed Works Offshore;
- Offshore export cable corridor and working area, which includes one offshore export cable connecting WTG turbine 4 (T4) to the landfall point at High Water Mark (HWM).

4.4.3.8 The Coastal Processes, Water and Sediment Quality Study Area has been defined using a precautionary and process-based approach that reflects both regional coastal dynamics and the likely physical extent of influence of the Proposed Works Offshore.

4.4.3.9 The Coastal Processes, Water and Sediment Quality Study Area encompasses a buffer distance of approximately 20 km in the north-south direction and of 4 km distance in a west-east direction around the Offshore Site. These distances are defined based on the direction and relative magnitude of the tidal flow. They correspond to the equivalent of two tidal excursions during a mean spring tide in these two main directions, providing a scientifically robust proxy for the maximum potential offshore transport of suspended sediments and hydrodynamic alterations. According with data collected by Fugro (2021) and interpreted by Partrac (2022) tidal currents across the Sub Lease Area are highly rectilinear along the north-northeast to south southwest axis and so suspended sediments will be transported along these axes. The use of tidal excursions to define a zone of influence (ZoI) is recommended by guidance provided by National Resource Wales (NRW) (Brooks et al., 2018).

4.4.3.10 In terms of other potential impact pathways, seabed mobility assessment modelling results from **Volume 3, Appendix 4.1: Seabed Mobility Assessment** clearly demonstrates that effects of the infrastructure in terms of sediment dynamics do not extend to the overall morphodynamic system in the wider or regional area, including those that are present to the eastern edge of Arklow Bank. Results from the referred modelling study show that short and long-term changes to the sediment patterns (erosion and deposition) are anticipated to be localised, relatively small, and limited to areas within or immediately adjacent to the Arklow Bank. For this reason, the above ZoI based on magnitude of the tidal flow is sufficiently robust to consider all potential impacts within the topic of Coastal Processes, Water and Sediment Quality.

4.4.3.11 In addition to the offshore ZoI defined above, a section of coastline between Mizen Head and Kilmichael Head has been included within the spatial scope to account for potential interactions with longshore sediment transport processes. This coastal stretch is referred to as the Coastal Longshore Process ZoI. This section of coastline represents a discrete coastal cell or sub-cell, with the bounding headlands acting as natural controls that typically limit longshore sediment transport beyond these points. As a result, sediment movement within this frontage is considered to be relatively self-contained compared with adjacent coastal sections. Given the nature, scale and location of the Offshore Site, any effects on longshore coastal processes are expected to be limited and localised. The extent of this Coastal Processes, Water and Sediment Quality Study Area has been defined using professional judgement and expert knowledge of the local coastal geomorphology, sediment dynamics and shoreline behaviour.

4.4.3.12 The Coastal Processes, Water and Sediment Quality Study Area is shown on **Figure 4.1**.

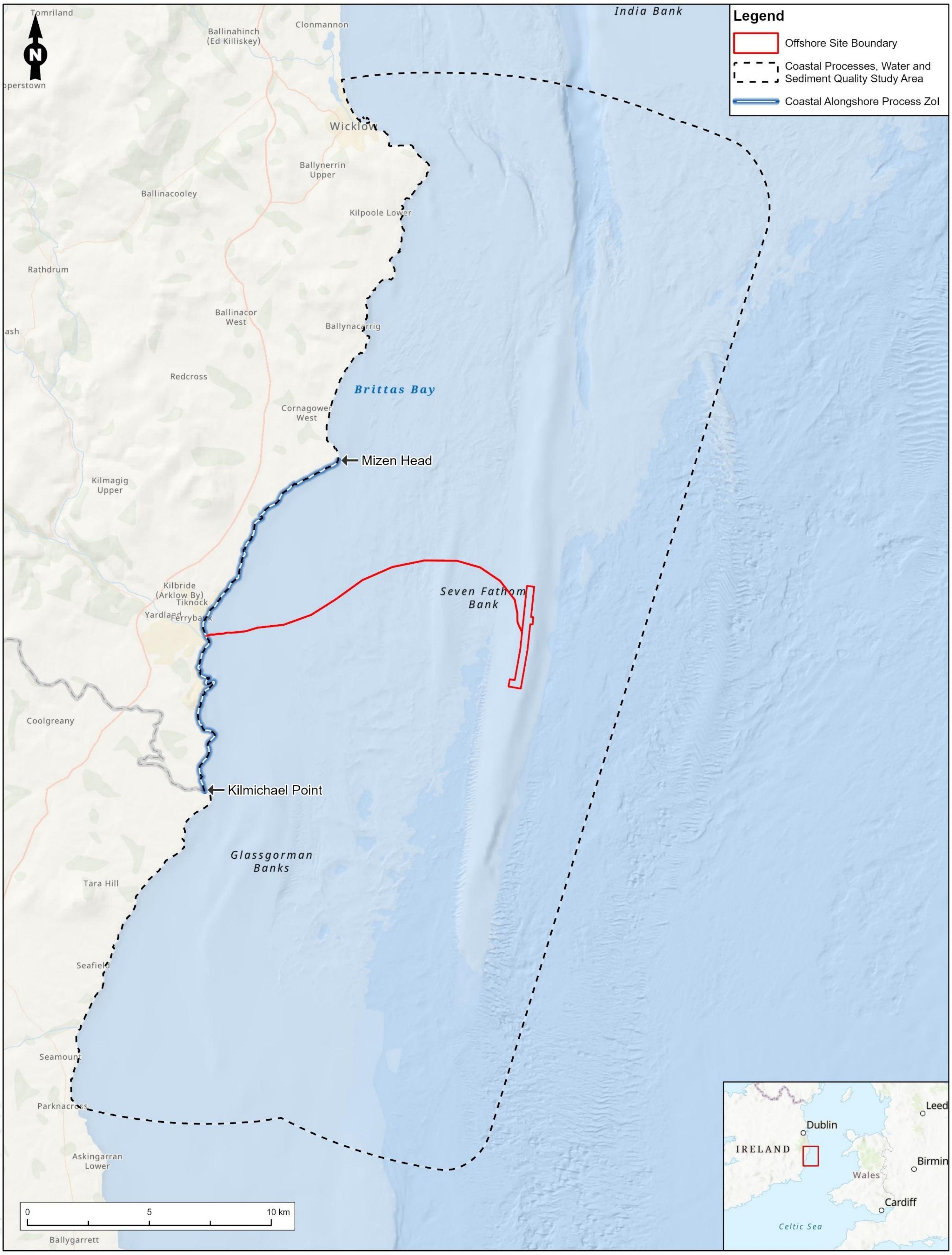

Figure Title	Project No./Filery ID		Client
Coastal Processes, Water and Sediment Quality Study Area	1620011606-002 / REH2024N01993		Arklow Energy Limited
Project Name	Date: June 2026	Prepared By: AB	RAMBOLL
ABWP Phase I Decommissioning	Scale: 1:140,000 @A3	Figure No.: 4.1 / Revision: 1.0	

1620011606-002-RAM-MA-IA-00016_Fig4.1CPWSQStudyArea_04.pagx

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Coordinate System: IRENET95 Irish Transverse Mercator. Projection: Transverse Mercator. Datum: IRENET95.

Figure 4.1: Proposed works Coastal Processes, Water and Sediment Quality Study Area

Temporal Scope

4.4.3.13 The assessment has considered impacts arising during the Proposed Works Offshore which would be temporary and short-term (up to weeks / months) in nature, as well as any long-term residual impacts that may continue / arise following the completion of Proposed Works Offshore.

4.4.4 Baseline Characterisation Method

Desk Study

4.4.4.1 Information on the baseline environment within the Coastal Processes, Water and Sediment Quality Study Area was compiled through a detailed desktop review of existing datasets, surveys, monitoring reports and technical studies relevant to the Offshore Site and wider Arklow Bank sandbank.

4.4.4.2 This review incorporates the substantial body of information generated during the original development of ABWP Phase I, data collected during its operational monitoring period, and relevant recent studies undertaken for the proposed ABWP Phase II, all of which contribute to the current understanding of the physical marine environment in which the Proposed Works Offshore will take place.

Coastal Processes

4.4.4.3 The key sources informing the assessment of Coastal Processes include:

- Data from national marine information portals, including high-resolution bathymetry, seabed substrate mapping and metocean datasets available from the Integrated Mapping for the Sustainable Development of Ireland's Marine Resource (INFOMAR), the Marine Institute, and other public marine data repositories;
- Historical and contemporary marine process studies completed for ABWP Phase I, including environmental surveys, pre-construction investigations, construction-phase observations and operational monitoring datasets;
- Supporting technical documentation and investigations associated with ABWP Phase II, where relevant to the current Coastal Processes, Water and Sediment Quality Study Area; and
- Numerical modelling of hydrodynamic, wave and sediment transport processes developed as part of the EIAR and to inform this assessment:

Volume 3, Appendix 4.1: Seabed Mobility Assessment. The Seabed Mobility Assessment undertaken for the Proposed Works Offshore has been informed by the ABWP Phase II Seabed Mobility Assessment (Deltares, 2025). In addition, the Marine Physical Processes Numerical Modelling study (MetOceanWorks, SPL, 2024) provides valuable regional insight into hydrodynamics, sediment transport and seabed morphology across the Arklow Bank system. The model consists of a hydrodynamic and sediment transport model, coupled to a wave model. The model and data used to inform this has been used to better understand historic seabed dynamics observed and future trends within the Offshore Site and the wider context of the Arklow Bank sandbank, noting that, overall, the sandbank has been subject to alternating phases of relative stability and rapid adjustment, and implications of the Proposed Works Offshore on seabed dynamics. The report highlights the wave breaking action performed by Arklow Bank sand bank, which reduces the wave energy reaching the coastline, exerting relevant influence in the adjacent coastal dynamics, and notes that the decommissioning of WTGs will introduce a negligible change in wave height (less than 1%).
While the ABWP Phase II outputs offer a useful reference framework, the Seabed Mobility Assessment prepared for this EIAR constitutes a separate and independent evaluation tailored specifically to the circumstances of the Proposed Works Offshore.

Volume 3, Appendix 4.2: Coastal Processes Modelling. This appendix presents a coastal processes and sediment transport modelling assessment undertaken for the Proposed Works Offshore. Using an existing validated MIKE 21 hydrodynamic and sediment transport model, the study evaluates how dredging and cable recovery activities could temporarily disturb seabed sediments and generate suspended sediment

plumes. The modelling covers vessel access channel dredging, maintenance plough dredging, internal monopile dredge disposal, and grapnel runs for cable recovery, with the aim of predicting suspended sediment concentrations, depositional footprints, and sediment dispersion patterns.
The study concludes that sediment plumes generated during the Proposed Works Offshore would be temporary and largely localised around the dredging and cable recovery areas. Conservative modelling assumptions were adopted throughout, including worst-case dredging volumes and full release of fine sediment into the passive plume. The report also assesses natural backfilling rates of dredged access channels and estimates potential maintenance dredging requirements during Proposed Works Offshore. In addition, it includes a cumulative assessment considering overlap with the proposed ABWP Phase II development, concluding that the overall sedimentary effects remain spatially limited and transient.

- **Volume 3, Appendix 4.3: Scour Assessment**. This appendix examines what could happen to the seabed around residual monopiles, once these are cut below seabed level. Specifically, it investigates the unlikely scenario in which residual monopiles later become exposed because of long-term seabed movement on the morphologically active Arklow Bank sandbank.

  The study uses Deltares' Dynamic Scour Prediction Model (DSPM), which simulates how waves, currents, sediment characteristics, and pile geometry interact over time to create local seabed erosion ("scour") around theoretical residual monopile exposed sections. The report compares two scenarios: (1) full-length monopiles left exposed without scour protection, used as a conservative upper-bound case, and (2) short residual monopiles that may protrude above the seabed after decommissioning. Using 20 years of metocean data and 5,000 Monte Carlo simulations per case, the study predicts possible scour depths, scour-hole extents, and the timescales over which they may develop. It concludes that scour around residual monopiles would generally be significantly smaller than around full-height monopiles because much less of the structure protrudes into the flow.

  The broader purpose of the study is to determine whether any future scour associated with residual monopiles could materially affect seabed stability or coastal processes, and it ultimately concludes that even in the unlikely event that residual MPs become exposed, the predicted scour holes would remain relatively localised and small compared with the much larger natural seabed movements occurring on Arklow Bank. The report further suggests that ongoing sandbank migration and sediment transport could naturally refill scour holes and re-bury any exposed residual monopiles over time.

Water and Sediment quality

4.4.4.4 The key sources informing the assessment of water and sediment quality include:

- Data from national information portals, such as the Environmental Protection Agency Map service, the Marine Institute, seabed substrate mapping and metocean datasets available from INFOMAR and other public marine data repositories;
- Historical and contemporary sediment sampling surveys completed for ABWP Phase I;
- Supporting technical documentation and sediment sampling surveys associated with ABWP Phase II, where relevant to the current Coastal Processes, Water and Sediment Quality Study Area; and
- Numerical modelling of sediment transport processes developed as part of the EIAR and to inform this assessment (see **Volume 3, Appendix 4.2**).

Site-specific Surveys

4.4.4.5 No site-specific surveys relevant to Coastal Processes, Water and Sediment Quality have been undertaken for the Proposed Works Offshore to inform this EIAR. However, site-specific surveys for ABWP Phase II works and previous site-specific surveys for Arklow Bank were undertaken which have informed this EIAR Chapter.

4.4.4.6 A summary of the survey datasets that inform the Coastal Processes, Water and Sediment Quality chapter is provided below.

Water and Sediment quality

4.4.4.7 Relevant surveys from ABWP Phase II works and previous site-specific surveys for Arklow Bank have been used to characterise the baseline sediment quality conditions within the Coastal Processes, Water and Sediment Quality Study Area. Sediment sample locations that are relevant to sediment and water quality are presented in **Figure 4.2,** and discussed below.

Ramboll Environ UK Ltd (2016) for Arklow Bank Dumping at Sea Permit Application

4.4.4.8 In May 2016, Ramboll Environ UK Ltd undertook sediment sampling and chemical analysis of sediments from three locations in the Array Area of Arklow Bank in order to support a dumping at sea permit application to undertake seabed levelling works along Arklow Bank.

4.4.4.9 All three samples underwent physico-chemical characterisation, including Particle Size Analysis (PSA), and were tested for metals. One location (Site 2) was also tested for organochlorines, Tributyltin (TBT), Dibutyltin (DBT), Polychlorinated biphenyls (PCBs) and Polycyclic aromatic (PAHs).

AQUAFACT (2024) sediment sampling for Arklow Bank Wind Park Phase II - Environmental Impact Assessment Technical Reports

4.4.4.10 In October 2024, associated with the ABWP Phase II EIAR technical reporting, grab samples were collected across the ABWP Phase II Array Area, Cable Corridor and Working Area. Nine of these sediment samples (St01, St02, St03, St06, St07, St09, St10, St11 and St13) were scheduled for chemical testing and physico-chemical characterisation, including Particle Size Analysis (PSA).

4.4.4.11 Of these sample locations, ST01, ST03, ST10 and ST11 are considered to be relevant to the ABWP Phase I Proposed Works Offshore boundary; others are some distance from the ABWP Phase I boundary however they provide a good characterisation of the wider area so they have been considered in the assessment in **Section 4.6.**

4.4.4.12 The following suite of testing was undertaken on the samples:

- Metals (arsenic, cadmium, chromium III, chromium VI, copper, lead, mercury, nickel, zinc, aluminium, lithium);
- Total extractable hydrocarbon (TEH) and total hydrocarbon content (THC);
- PAHs (USEPA speciated 16);
- Organotin compounds TBT and DBT;
- PCBs; and
- Organochlorine pesticides.

4.4.4.13 A physico-chemical water quality survey was also undertaken, with measurements collected at 30 stations across the ABWP Phase II Array Area, Cable Corridor and Working Area Study Area using AQUAFACT's YSI EXO2 multiparameter sonde (GoBe, 2026).

Ramboll (2025) Monopile Sediment Sampling

4.4.4.14 Sediment samples were obtained from one of the monopiles (T1) within the Offshore Site in 2025.

4.4.4.15 In total four sediment samples (S1, S2, S3 & S4) were collected by the Client appointed contractor and sent to an MCERT accredited laboratory. The following suite of testing was undertaken on the samples:

- Metals (arsenic, cadmium, chromium III, chromium VI, copper, lead, mercury, nickel, zinc);
- Speciated total petroleum hydrocarbons with TPHCWG carbon fractions including aromatic and aliphatic split; and
- PAHs (USEPA speciated 16).

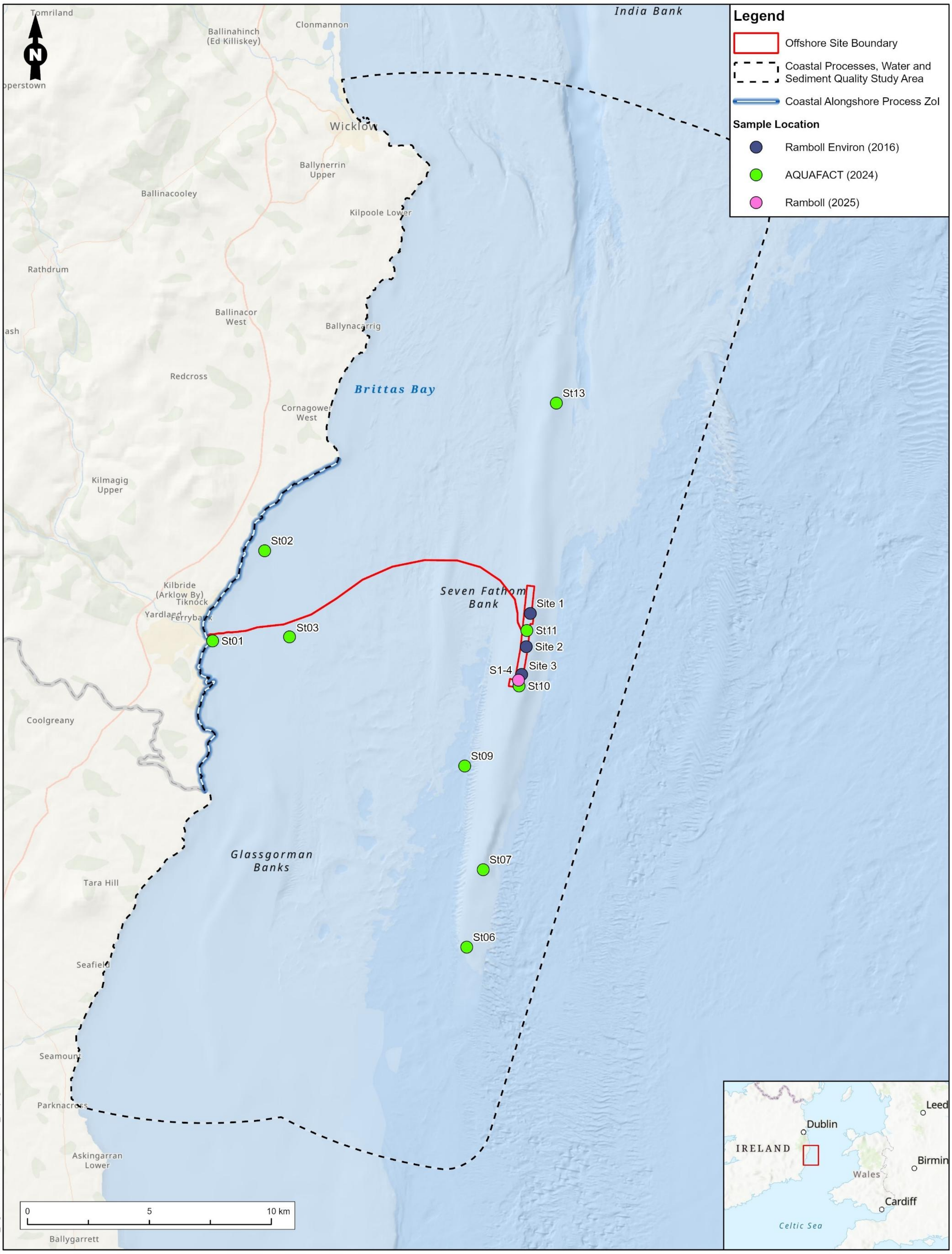

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Figure Title	Project No./Filery ID		Client
Sample Locations Relevant to Offshore Water and Sediment Quality	1620011606-002 / REH2024N01993		Arklow Energy Limited
	Date: June 2026	Prepared By: AB	
Project Name: ABWP Phase I Decommissioning	Scale: 1:140,000 @A3	Figure No.: 4.2 / Revision: 1.0	RAMBOLL

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Coordinate System: IRENET95 Irish Transverse Mercator. Projection: Transverse Mercator. Datum: IRENET95.

Figure 4.2: Sediment sample locations relevant to Water and Sediment Quality

Baseline Data Limitations and Assumptions

4.4.4.16 The spatial coverage of surveys undertaken for ABWP Phase II does not always coincide precisely with the smaller footprint of the Offshore Site, meaning that not all datasets characterise site-specific conditions with the same level of detail. Nevertheless, these surveys offer valuable regional context and a broader understanding of the physical processes and sediment chemistry in the vicinity of the Offshore Site.

4.4.4.17 This chapter has relied on data and from third-parties. The surveys were undertaken during discrete periods of time. The surveys were restricted to a level of detail necessary to meet the stated objectives of the surveys. The results of any measurements taken may vary spatially or with time and further confirmatory measurements should be made after any significant period of time has elapsed since the sampling took place. The interpretation of the geological and environmental quality conditions is based on extrapolation from point-source data in a heterogeneous environment.

4.4.4.18 Surveys informing the baseline were carried out over different years; some during the construction of ABWP Phase I, others during operational monitoring campaigns, as well as programmes linked to ABWP Phase II. Natural evolution of seabed features, hydrodynamic conditions and sediment pathways may therefore have occurred between survey periods.

4.4.4.19 Numerical modelling prepared for this EIAR (**Volume 3, Appendices 4.1, 4.2 and 4.3**) relies on assumptions regarding boundary conditions, sediment characteristics and model calibration datasets. These assumptions are considered acceptable within the context of an EIAR, provided the outputs are interpreted as conservative indications of potential behaviour rather than precise predictions. Assumptions relevant to each assessment or modelling are set out within the associated technical documentation.

4.4.4.20 Uncertainty exists regarding the characterisation of the future baseline with respect to global climate change. Key areas of uncertainty include actual future rates of sea level rise and the extent to which future changes in the wave regime may occur. There is also related uncertainty regarding how the coastline may respond to a future wave climate acting in combination with higher than present sea levels.

4.4.5 Assessment Criteria

Receptor Sensitivity

4.4.5.1 When defining sensitivity, reference has been made to the criteria levels set out in **Volume 2, Chapter 1**. To determine sensitivity of the receptor specific to coastal processes, water and sediment quality, the susceptibility of the receptor to change, its ability to recover and adapt, and its inherent value have also been considered, as presented in **Table 4.5.**

Table 4.5: Definition of terms relating to the sensitivity of the receptor specific to Coastal Processes, Water and Sediment Quality

Key: CP – Coastal Processes; WSQ - Water and Sediment Quality

Sensitivity	Definition
Very high	**Adaptability:** The receptor cannot avoid or adapt to change. **Tolerance:** The environment has no capacity to accommodate the proposed form of change. Even small, temporary deviations from baseline can result in non-compliance or irreversible effects. **Recoverability:** Effects are permanent or effectively irreversible, or recovery would take >60 years, well beyond project and natural recovery timescales. **Value:** • CP: The receptor is designated for international importance, legally protected, and/or very high socio-economic value. • WSQ: The water quality of the receptor is fundamental to the designation of an internationally or nationally important feature, legally protected, or directly underpins statutory objectives (e.g. WFD status, bathing water standards, MSFD GES).

Sensitivity	Definition
High	**Adaptability**: The receptor very limited ability to adapt or avoid impacts. **Tolerance**: The environment has low capacity for change; only very small, short-term variations may be acceptable. **Recoverability**: The effect on the receptor is anticipated to be long-term (15 – 60 years). **Value**: • CP: The receptor is designated for international importance and/or very high socio-economic value. • WSQ: The water quality of the receptor supports or contributes towards the designation of an internationally or nationally important feature; or contributes directly to the achievement of regulatory objectives.
Medium	**Adaptability**: The receptor has a limited to moderate capacity to avoid or adapt change. **Tolerance**: The environment has a moderate to low capacity to accommodate the proposed form of change. **Recoverability**: The receptor is anticipated to recover fully within the medium term (i.e. seven to 15 years). **Value:** • CP: The receptor is designated for country importance and/or moderate socio-economic value. • WSQ: The water quality of the receptor supports or contributes towards the designation of a nationally important feature.
Low	**Adaptability**: The receptor has a reasonable capacity to avoid or adapt to an impact. **Tolerance**: The environment has a high capacity to accommodate the proposed form of change. **Recoverability**: The receptor is anticipated to recover fully within the short-term (i.e. one to seven years). **Value:** • CP: The receptor is not designated but of local level importance and/or low socio-economic value. • WSQ: The water quality of the receptor is of local importance and not critical to statutory designations or regulatory thresholds.
Negligible	**Adaptability**: The receptor has a high capacity to avoid or adapt to change. **Tolerance**: The environment can accommodate change with little or no detectable effect on baseline conditions. Specific water quality conditions of the receptor are likely to be able to tolerate change with very little or no impact upon the baseline conditions detectable. **Recoverability**: The receptor is anticipated to recover fully and will be temporary (i.e. lasting less than one year). **Value:** • CP and WSQ: The receptor has very low environmental or socio-economic value, with no statutory or policy relevance

Magnitude of Impact

4.4.5.2 When defining magnitude of impact, reference has been made to the criteria levels set out in **Volume 2, Chapter 1**. To determine the magnitude of impact specific to coastal processes, water and sediment quality, the scale, extent, duration and frequency, and severity of the change have also been considered, as presented in **Table 4.6**.

Table 4.6: Definition of terms relating to the magnitude of an impact in relation to Coastal Processes, Water and Sediment Quality

Magnitude of impact	Definition
High	Extent: Impact across the near-field and far-field areas beyond the Coastal Processes, Water and Sediment Quality Study Area. Duration: The impact is anticipated to be permanent (i.e. over 60 years). Frequency: The impact will occur constantly throughout the relevant project phase. Probability: The impact can reasonably be expected to occur. Consequences: Permanent changes across the near- and far-field environment to key characteristics or features of the particular environmental aspect's character or distinctiveness.
Medium	Extent: The maximum extent of the impact is restricted to the far-field (i.e. the defined Coastal Processes, Water and Sediment Quality Study Area). Duration: The impact is anticipated to medium-term (i.e. seven to 15 years) to long-term (i.e. 15 to 60 years). Frequency: The impact will occur constantly throughout a relevant project phase. Probability: The impact can reasonably be expected to occur. Consequences: Noticeable change to key characteristics or features of the particular environmental aspect's character or distinctiveness.
Low	Extent: The maximum extent is restricted to the near-field and adjacent far-field areas. Duration: The impact is anticipated to be temporary (i.e. lasting less than one year) to short term (i.e. one to seven years). Frequency: The impact will occur frequently throughout a relevant project phase. Probability: The impact can reasonably be expected to occur. Consequences: Barely discernible/ noticeable change to key characteristics or features of the particular environmental aspect's character or distinctiveness
Negligible	Extent: The maximum extent of the impact is restricted to the near -field and immediately adjacent far-field areas. Duration: The impact is anticipated to be brief (i.e. days). Frequency: The impact will occur once or infrequently throughout a relevant project phase Probability: The impact can reasonably be expected to occur. Consequences: No discernible/ barely discernible change to key characteristics or features of the particular environmental aspects or distinctiveness.
No change	Extent: The maximum extent of the impact is restricted to the immediate footprint of the activity. Duration: The impact is anticipated to be momentary (i.e. minutes). Frequency: The impact will not occur throughout a relevant project phase Probability: The impact can reasonably be expected to occur. Consequences: No change to key characteristics or features of the particular environmental aspects or distinctiveness.

Significance of Effect

4.4.5.3 The significance of the effect upon coastal processes, water and sediment quality is determined by correlating the magnitude of the impact and the sensitivity of the receptor. The method employed for this assessment is presented in **Table 4.7.**

Table 4.7: Matrix used for the assessment of the significance of the effect in relation to coastal processes, water and sediment quality

Sensitivity of receptor	Magnitude of impact				
	No change	**Negligible**	**Low**	**Medium**	**High**
Negligible	Neutral	Negligible	Negligible or minor	Negligible or minor	Minor
Low	Neutral	Negligible or minor	Negligible or minor	Minor	Minor or moderate
Medium	Neutral	Negligible or minor	Minor	Moderate	Moderate or major
High	Neutral	Minor	Minor or moderate	Moderate or major	Major
Very high	Neutral	Minor	Moderate or major	Major	Major

4.4.5.4 Following the classification of an effect using this methodology, a clear statement will then be made as to whether that effect is significant or not significant. Major and moderate effects are considered to be significant, whilst minor and negligible effects are considered to be not significant in EIA terms. However, professional judgement will also be applied in reaching conclusions as to the significance of effects. Typical definitions for the classification of effects are shown in **Table 4.8.**

Table 4.8: Significance definitions relevant to Coastal Processes, Water and Sediment Quality

Significance classification	Definition	Significant effect
Major	A large and detrimental change to a valuable/sensitive receptor, likely exceeding an accepted threshold. A large and beneficial change, resulting in enhancements in baseline conditions, transitioning from previously poor conditions to new legal compliance, or making a major contribution to national goals These effects may represent key factors in the decision-making process. Potentially associated with sites and features of national importance or likely to be important considerations at a regional scale. Major effects may relate to features that are unique and irreplaceable.	Significant
Moderate	A medium scale change that, although not beyond an accepted threshold, is still considered to be generally unacceptable, unless offset by significant positive benefits of the project. If adverse, these effects are likely to be important at a regional or local scale and on their own could influence on decision making. A positive moderate effect is a medium scale change that is improves baseline conditions sufficiently to contribute to guideline targets.	Significant
Minor	A minor adverse change that remains within legal and planning policy limits. minor positive change that is unlikely to significantly impact the overall balance of considerations. These effects might be raised as local issues and could be relevant to the detailed design of a project, but they are unlikely to be critical in the decision-making process.	Not significant
Negligible	A very small change that is so inconsequential it can be considered acceptable to disregard. These effects fall below perceptible limits, lie within normal variations, or fall within the margin of forecasting error. They are unlikely to influence decision-making.	Not significant

Significance classification	Definition	Significant effect
Neutral	No noticeable change or effects within normal bounds of variation.	Not significant

4.4.6 Key Parameters for Assessment

Maximum Design Scenario

4.4.6.1 The maximum design scenario (MDS) for each impact identified in **Section 4.4.3** has been selected as that having the potential to result in the greatest effect on an identified receptor or receptor group. The MDS presented in **Table 4.9** has been selected from the parameters provided in **Volume 2, Chapter 3** and methodology outlined in **Volume 2, Chapter 1.**

Table 4.9: MDS relevant for the assessment of potential impacts on Coastal Processes, Water and Sediment Quality

Impact	MDS	Explanation
Increased suspended sediment concentrations (SSC) and associated deposition	Increased SSC to be produced by: • Maintenance dredging for vessel access to Sub Lease Area, maximum area of 0.287 km^2 (which represents 21.3% of the total Sub Lease Area); – Total volume of dredged material for -4.5 m LAT = 38,139.75 m^3 – Total volume of dredged material for -6.0 m LAT = 86,000 m^3 • Disposal of dredged material within the Sub Lease Area • A Jack-Up Barge (JUB) will also be required for works. Based on a standard diameter of 2 m per spud leg, there is expected to be approximately 12.57 m^2 (12.57 $x10^{-5}$ km^2) of habitat disturbance per jack-up event, with eight jack-up events expected in total. Therefore, a total area of 0.0001 km^2; • All exposed hard infrastructure (WTG foundations, met mast, inter-array and offshore export cable) will be removed across an area of 0.07 km^2: – Removal of seven wind turbine generator foundations: ○ Each foundation is 5.1 m in diameter, total area for seven WTG foundations is 0.000143km^2 in area; ○ The met mast is 1.8 m in diameter and 0.000002 km^2 in area; ○ Seabed material inside foundation to be removed using internal dredge pump fitted with water jets or cutter head to remove material which has become compacted over time – up to 171 m^3 in each foundation; ○ Target dredging depth of 3 m below target cutting depth; ○ Dredged material from within foundation to be released via pipeline within 100 m of foundation location during dredging activity; – Removal of residual scour protection and release of material back onto the seabed: ○ Use of grab dredger to grab sandbags; ○ Recovery of sandbags and release of material back onto seabed via casting; – Removal of inter-array cables:	The maximum distance over which sediment could be transported is based on Coastal Processes Modelling found in **Volume 3, Appendix 4.2: Coastal Processes Modelling**.

Impact	MDS	Explanation
	○ Total length of 7.4 km and maximum footprint of 3 m width for running method, total seabed disturbance of 0.02 km^2; ○ Unburial of the cables using grapnel run or similar; ○ Pulled out using clamps and cable puller towed slowly across seafloor – Removal of offshore export cable: ○ Total length of 15.6 km and maximum footprint of 3 m width for running method, total seabed disturbance of 0.05 km^2; ○ Disconnection / cut of the export cable within the vicinity of the landfall, with some localised excavation potentially required if the export cable is buried within this area, and grabbed from the multicat vessel; and ○ Unburial of cable with a running method using a grapnel run or similar, pulled out using clamps and a cable puller.	
Disturbance /remobilisation of sediment bound contaminants	The MDS, as described above, for changes to SSC and associated deposition during the decommissioning phase.	The maximum distance over which sediment and therefore sediment bound contaminants could be transported is based on Coastal Processes Modelling found in **Volume 3, Appendix 4.2.**
Changes in seabed morphology	The MDS, as described above, for changes to sedimentary cover and dynamics during and after the decommissioning phase.	Changes in physical processes and seabed morphology during construction is based on seabed mobility modelling found in **Volume 3, Appendix 4.1: Seabed Mobility Assessment**.
Scour development in the Arklow Bank around MP exposure post-decommissioning	The MDS, as described above, for changes to sedimentary cover and dynamics due to removal of residual scour protection during and after the decommissioning phase.	The maximum scour depth and extension is based on scour assessment modelling found in **Volume 3, Appendix 4.3: Scour Assessment**.

Embedded Mitigation

4.4.6.2 As set out in **Volume 2, Chapter 1: Introduction** several embedded mitigation measures have been adopted as part of the Proposed Works Offshore to reduce the potential for impacts on Coastal Processes, Water and Sediment Quality.

4.4.6.3 Embedded mitigation includes the following measures as identified in the Institute of Environmental Management and Assessment (Institute of Sustainability and Environmental Professionals (ISEP) (formerly IEMA) Impact Assessment Guidelines (IEMA, 2024):

- "measures included as part of the project design" (also referred to as primary mitigation in IEMA, 2015); and
- "actions that would occur with or without input from the EIA feeding into the design process. These include actions that will be undertaken to meet other existing legislative requirements, or actions that are considered to be standard practices used to manage commonly occurring environmental effects" (also referred to as tertiary mitigation in IEMA, 2015).

4.4.6.4 Embedded mitigation measures have been taken into account as part of the initial assessment presented in **Section 4.7** (i.e., the initial determination of impact magnitude and significance of effects assumes implementation of these measures). This ensures that the measures that the Arklow Energy is committed to are considered in the assessment of effects. This approach is in line with EPA guidance, which states that 'in an EIAR, it may be useful to describe avoidance measures that have been integrated into the project proposal' (EPA, 2022).

4.4.6.5 Where an assessment identifies likely significant adverse effects, additional mitigation measures may be applied. These are "actions that will require further activity to achieve the anticipated outcome", also referred to as secondary mitigation measures in IEMA (2024).

4.4.6.6 The embedded mitigation measures relevant to coastal processes, water and sediment quality are outlined in

4.4.6.7 **Table 4.10** and will be implemented in accordance with the requirements of the planning permission issued under Section 291 of the Planning and Development Act 2000, as amended.

Table 4.10: Embedded mitigation relevant to Coastal Processes, Water and Sediment Quality implemented as part of the Proposed Works.

Embedded mitigation reference	Description
Measures included as part of the design of Proposed Works Offshore (see **Volume 2, Chapter 3**)	MPs will be cut below the seabed. The second probability percentile (P2) LSBL has been selected as the MP target cutting depth, considered to represent a very low and rare seabed level value that will minimise post-decommissioning residual MP exposure risks.
	If dredging for vessel access is required, disposal of dredged material will only be undertaken within the Sub Lease Area updrift from the dredge location.
	If dredging is required, pre-dredging surveys will be undertaken to refine and minimise dredging/disposal areas, where possible.
Development and adherence to the Detailed Offshore Decommissioning Environmental Management Plan (DEMP)	**Volume 3, Appendix 3.4: Outline Offshore DEMP** presents standard industry practice and legal requirements for environmental management and mitigation that will be implemented as part of the Proposed Works Offshore. The Outline Offshore DEMP also summarises any required additional mitigation identified in relevant EIAR chapters, serving as a framework for the future decommissioning contractor(s) to develop in detail before decommissioning works commence.
Development and adherence to the Detailed Vessel Management Plan (VMP)	**Volume 3, Appendix 3.5: Outline VMP** defines best-practice vessel management measures, including transit routes, speed restrictions, timing of activities, pollution prevention, and crew environmental awareness, to minimise disturbance, collision risk, and ecological harm.

Embedded mitigation reference	Description
Development and adherence to the Detailed Offshore Waste Management Plan (WMP)	**Volume 3, Appendix 3.8: Outline Offshore WMP** establishes a clear framework for the identification, handling, and management of wastes arising from Proposed Works Offshore, ensuring compliance with standard industry practice and relevant waste legislation, and the principles of the waste hierarchy.
Post-decommissioning monitoring	Post-decommissioning monitoring will comprise (noting sub lease ends 19 June 2033): • A post-decommissioning survey within three months of completion of all decommissioning works to verify resulting seabed condition and inform the Close Out Report; • Annual bathymetric surveys within the Sub Lease Area during years 1 – 4; and • Final bathymetric survey within the Sub Lease Area at year 5. • If monitoring confirms any observed residual MP exposure, then the relevant authorities will be informed.

4.4.7 Assumptions and Limitations of the Assessment

4.4.7.1 The assessment is based on a number of assumptions to enable the evaluation of potential impacts. These include the use of a MDS to represent a realistic worst case, and the application of representative hydrodynamic and sediment transport conditions where site-specific variability exists.

4.4.7.2 It is also assumed that standard decommissioning methods and embedded mitigation measures will be implemented as described in **Volume 2, Chapter 3**.

4.4.7.3 These assumptions are considered appropriate for the purposes of a precautionary assessment and are consistent with established guidance.

4.5 Baseline Characterisation

4.5.1 Overview

4.5.1.1 This section describes the existing baseline characteristics as well as the future baseline relevant to coastal processes, water and sediment quality.

4.5.1.2 This section firstly describes the coastal processes baseline characteristics, then separately describes the water and sediment quality baseline characteristics, as per the information sources outlined in **Section 4.4.4.**

4.5.2 Coastal Processes

Sub Lease Area and Offshore Export Cable Corridor

<u>Hydrodynamics</u>

Tidal Regime

4.5.2.1 Tides in the Irish Sea are semi-diurnal. While the tidal range varies along the Irish Sea, in the Irish Coast it is approximately 2 m. Tidal dynamics in the Irish Sea are governed by the rotation of tidal waves around amphidromic points, including a degenerate amphidrome whose position varies through the spring–neap cycle. This results in a mobile zone of very low tidal range along the Irish east coast, where tidal ranges increase outward from a semi-diurnal tidal node, and reflects the broader interaction of tidal waves that controls both tidal range variability and regional hydrodynamics (Pugh, 1981; Creane *et al.*, 2023).

4.5.2.2 The Arklow Bank area experiences a semidiurnal tidal regime with two tidal cycles per day, dominated by the principal lunar (M2) constituent. Tidal ranges are moderate in this region of the western Irish Sea: spring tides typically reach on the order of a few meters in height (mesotidal), whereas neap tides have smaller ranges. Semidiurnal tidal waves propagate into the Irish Sea from the Atlantic through St. George's Channel in the south, causing high water at Arklow Bank to occur slightly after high tide at the Celtic Sea entrance.

4.5.2.3 Over the proposed ABWP Phase II array area (which surrounds the Sub Lease Area), the Highest Astronomical Tide (HAT) shows a gradual spatial variation, decreasing from approximately 2.42 m in the northern part of the array area to about 1.83 m in the southern part. As the Sub Lease Area is located within this broader region and does not extend beyond these latitudinal limits, the HAT expected at the Offshore Site are also considered to fall within this same range.

4.5.2.4 Over and around Arklow Bank, the tidal currents are strong and generally align with the bank's north–south orientation. Flow is typically bidirectional along the bank: flood tides stream northward and ebb tides to the south, with peak spring current velocities on the order of ~1 m/s (occasionally higher over the bank crest during spring tides). Shallow bathymetry at the Bank causes some acceleration of tidal streams over the crest and slight flow separation or eddies on the lee sides, contributing to localised spatial variability in current strength. Studies indicate that tidal currents at Arklow Bank are somewhat stronger over the shallow ridge and weaker in the deeper waters to either side, a factor relevant for offshore development design and sediment transport assessments.

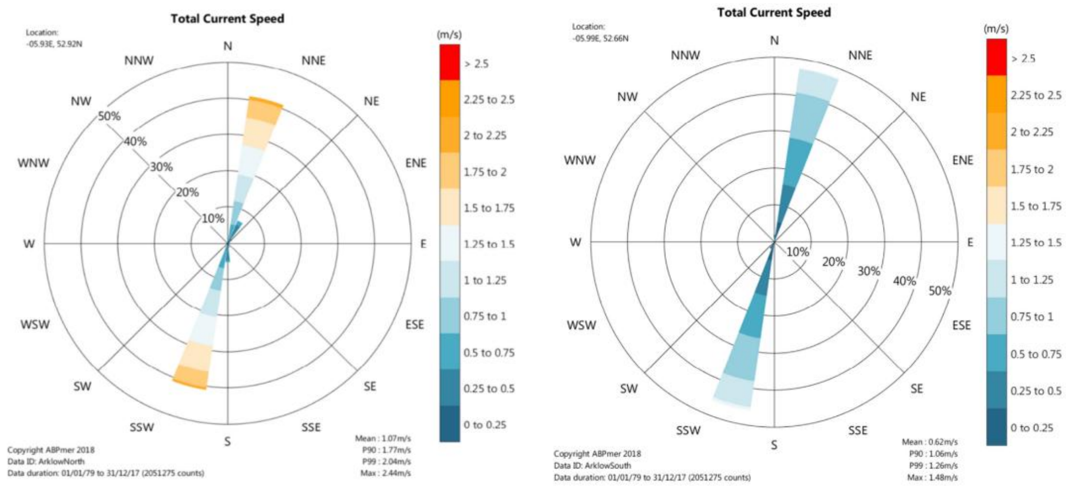

Figure 4.3: Arklow north (left panel) and south (right panel) all-year surface average current speed rose. Source: ABPmer (2018)

Wave Regime

4.5.2.5 The Irish Sea is a semi-enclosed basin, which restricts the penetration of swell waves from the open Atlantic. As a result, the local wave climate is predominantly controlled by locally generated wind waves, although two limited fetch corridors allow larger swell waves to enter through the North Channel and St George's Channel. At Arklow Bank, the prevailing wave directions are from the south-southwest (75% of the waves come from this quadrant) and the northeast (7%) (Panigrahi et al., 2009). Wave action represents a potential driver of sediment transport, particularly across the crest of Arklow Bank. Additionally, this dominant direction of waves will also be crucial to the general net southward longshore drift of sands in the near-shore area.

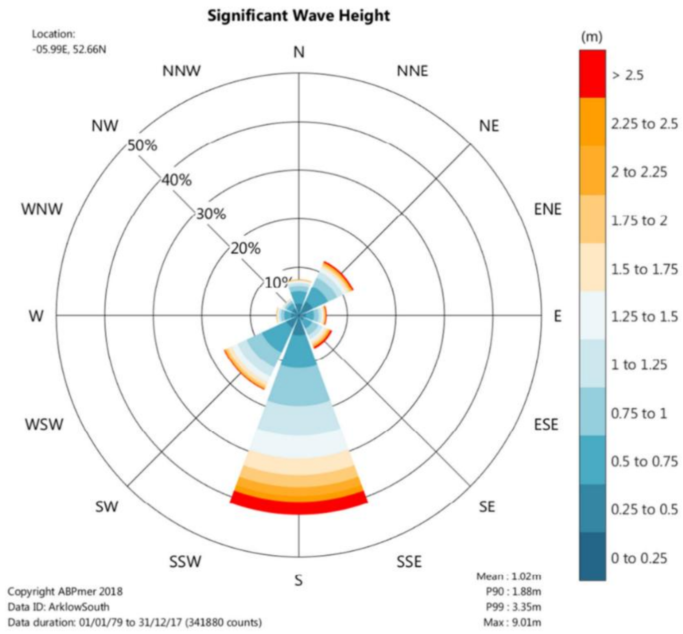

Figure 4.4: Arlow all-year significant wave height rose. Source: ABPmer (2018)

Wind Regime

4.5.2.6 The dominant wind directions are from the quadrant south to west, as indicated by Panigrahi *et al.* (2009) based on long-term climatic wind data for the period 1957–1999 and detailed wind measurements for 1997–2001 obtained in a station located approximately 60 km south of Arklow. Within the referred quadrant, winds from the south-west direction are the most frequent, accounting for more than 15% of occurrences. The wind speed at the 10% exceedance level for south-westerly winds is approximately 9.2 m/s.

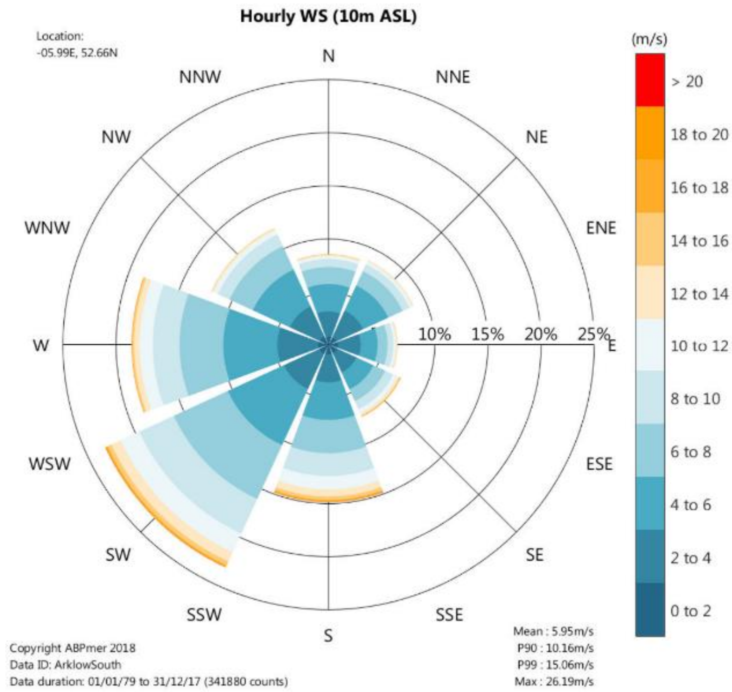

Figure 4.5: Arklow all-year hourly mean wind rose at 10 m above sea level. Source: ABPmer (2018)

Sedimentological Regime

4.5.2.7 Arklow Bank's seabed is predominantly composed of medium to coarse sand with minor gravel content. Project-specific surveys (Sure Partners, 2000; Aquatic Services Unit (ASU), 2012 & 2021) confirm that surficial sediments are heterogeneous sandy deposits, ranging from mobile fine-medium sands to slightly gravelly sands and gravelly sands in places. Generally, sand fractions exceed 80% in the top layer, with median grain sizes (d50) around 0.2–0.7 mm in the array area. At shallow depths (e.g. on the bank crest and upper flanks, <15 m below seabed), sediments are mainly well-sorted medium sand, whereas towards the deeper flanks and base of the bank (>15 m depth) the sediment becomes coarser, gravelly sand (up to ~70% gravel fraction). This indicates a winnowed coarse lag in some deeper areas. Overall, no bedrock or reef outcrops at the seabed – the Arklow Bank surface is an unconsolidated sand/gravel seabed across the Sub Lease Area.

4.5.2.8 Within the Sub Lease Area and along the offshore export cable corridor, the seabed composition is essentially the same: clean sand with little to no hard substrate. Baseline benthic surveys recorded no exposed rock or reef; the seabed is entirely sedimentary (sand with some shell and minor gravel). Notably, artificial scour protection was installed around each WTG (sand-filled geotextile bags) to prevent local erosion. These sandbags form small stable sand mounds at the base of each MP. Aside from these engineered features, the Sub Lease Area's natural seabed is a sand-dominated environment continuous with the surrounding bank. No unique sediment types are present in the Sub Lease Area versus the broader bank; it is representative of the Arklow Bank crest sediments (medium sands).

4.5.2.9 Arklow Bank's sandy seabed is underlain by Quaternary glacial deposits that form the shallow geology. Beneath the mobile Holocene sand layer lies a coarse lag and glacial till sequence identified as the "Upper Till Member" and a Chaotic Glacial Facies. These units consist of firm gravelly clay and dense re-worked glacial sediments with cobbles/boulders in places (remnants of Pleistocene glacial drift). Arklow Bank is a Holocene sandbank formed during post Last Glacial Maximum sea level rise, with mobile sands reworking and overlying Pleistocene glacial deposits (Creane *et al.*, 2021; SSE Renewables, 2026). Project-specific geotechnical investigations (Sure Partners, 2022; Deltares, 2025) indicate that the present seabed typically comprises 1–3 m of non-cohesive sand, underlain by gravelly layers and stiff glacial clay. A notable horizon is a gravel-rich layer at the base of the sand (identified in ground models by Cathie, 2022), which likely represents a residual gravel lag. This coarse layer and the underlying till act as a relatively non-erodible substrate, effectively anchoring the bank. Studies find that while the sand above shifts constantly, the base of Arklow Bank has remained stable over decades. Creane et al. (2021) note the bank's foundation (glacial sediment platform) shows no significant long-term erosion, meaning the sand is not being scoured away down to bedrock. Actually, the bank's vertical extent is constrained by the glacial layer. There is no bedrock outcrop on the bank itself; bedrock (Ordovician schist) is only encountered nearshore at the coastline, well landward of the array.

4.5.2.10 The thickness of the mobile sand layer varies across the bank. It is thinner toward the edges and over high points of the till. Geophysical profiles and seismic interpretation show the sand thickness ranges from a few meters on the shallow crest to >10 m in some flank areas where sand has accumulated in troughs. Below the sand, the Upper Till is a stiff, reddish-brown slightly sandy gravelly clay (glacial diamict) with occasional large clasts. This forms the seabed "basement" that the sand moves over. Its presence explains the limited depth of scour observed; once local erosion reaches the till or gravel layer, further scour is naturally arrested. In summary, the stratigraphy is a two-layer system: an upper Holocene sand unit (mobile, non-cohesive) overlying Pleistocene glacial deposits (relatively immobile), and this stratification is regionally typical of the western Irish Sea.

4.5.2.11 The Sub Lease Area shares the same subsurface profile as the one described in the previous paragraph for the whole bank in general. Boreholes from the Offshore Site (2000 and 2020 investigations) encountered medium sand to a few meters' depth, then glacial till/clay similar to elsewhere on the bank. There is no unique geologic unit beneath Phase 1 turbines; the MPs were driven into the glacial till layer, confirming its presence. The sand depth around the Phase 1 MPs is on the order of 2–4 m before hitting stiff glacial clay (per Geoquip 2020 site investigation). This matches the broader bank's stratigraphy. Notably, the Phase 1 MPs had a filter layer of rock/sand scour protection added in their immediate vicinity (to ~1–2 m radius) which now sits on the till surface. That material is not "native" geology but was placed to mitigate scour. However, part of it was removed in 2005 (see **Volume 2, Chapter 3**). Aside from this, no differences in shallow geology are observed in the Sub Lease Area versus the general bank. The glacial till beneath the Sub Lease Area has proven effective in limiting scour hole depth; post-installation monitoring showed that scour did not penetrate beyond the sand into the clay, reinforcing that the till forms a hard bottom.

Seabed Morphology

4.5.2.12 Arklow Bank is a prominent elongated sandbank approximately 27.5 km long and 1–2 km wide running NNE–SSW parallel to the County Wicklow coastline. It is part of a series of coast-parallel offshore sandbanks in the Irish Sea.

4.5.2.13 The bank's shallow crest lies just 1–5 m below Chart Datum at its highest points, with water depths increasing to ~20–30 m at the edges and >50 m in the adjacent seabed basins. The northern end of Arklow Bank terminates near a deep channel called the Wicklow Trough, while to the south the bank tapers off toward the coastal shallows near Glassgorman Bank (a smaller sandbank ~10 km west of Arklow Bank's southern tip).

4.5.2.14 The Wicklow Trough (depth ~50–60 m) is believed to dictate the bank's northern limit and serve as a primary sediment source for Arklow Bank. Essentially, tidal currents transport sediment from the trough up onto the bank (SSE Renewables, 2026; **Volume 3, Appendix 4.1**), consistent with regional interpretations of Irish Sea bedload parting zones (Creane *et al.*, 2021; Creane *et al.*, 2023).

4.5.2.15 Overall, Arklow Bank's planform and location have remained relatively stable over decades. Analysis of historical charts (1870s to present) shows the bank in roughly the same position, with only modest elongation or lateral shifts. Recent publications (e.g. Coughlan, 2021; Creane *et al*., 2023) concur that the long-term bank footprint has not dramatically changed, even as its surface is dynamic.

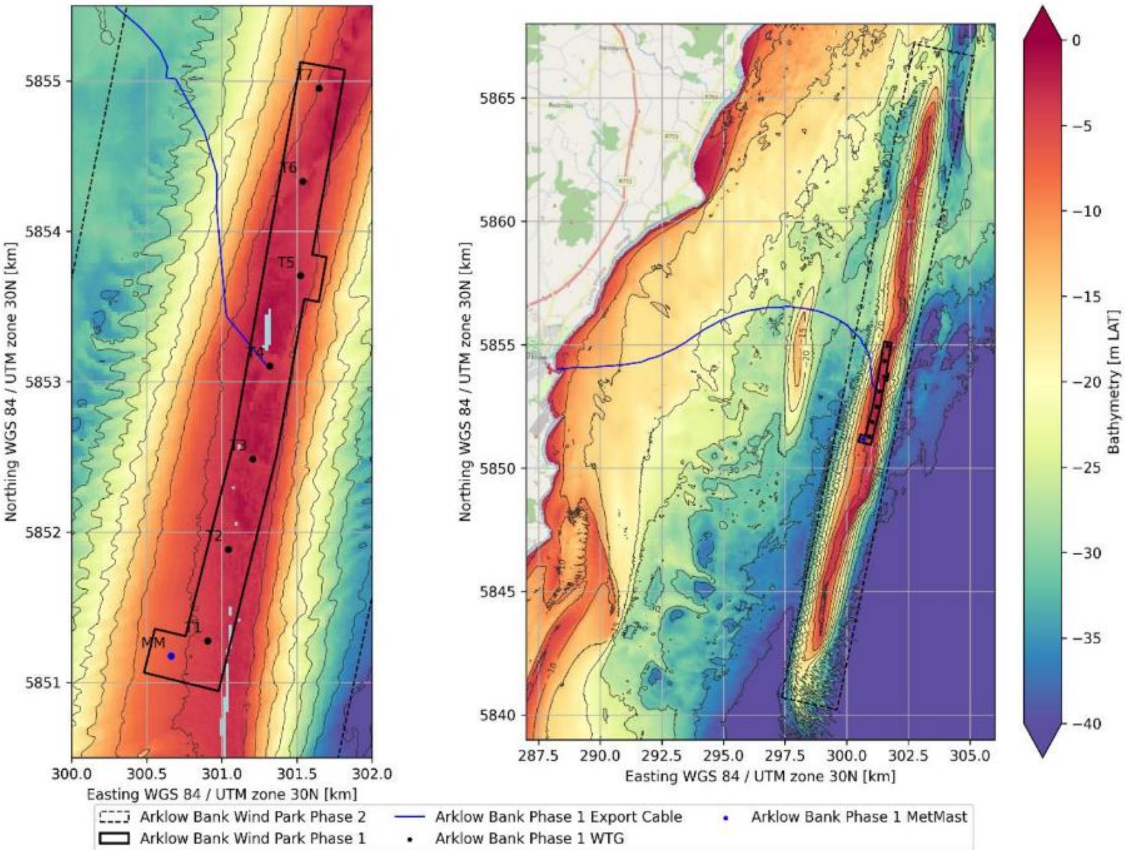

Figure 4.6: Overview of the Arklow Bank Wind Park Phase I including foundation locations (left panel) and within the larger physical system (right panel) as presented in Volume 3 – Appendix 4.1 (Seabed Mobility Assessment)

4.5.2.16 In profile, the bank has a classic sand ridge morphology: a broad, flat crest plateau and steeper flanks. The western flank slopes into a trough (~30–40 m deep) that separates the bank from the inshore zone; the eastern flank slopes into the Wicklow Trough to the northeast and open seabed (~50 m deep) to the east. Tidal currents strongly shape the morphology. Arklow Bank lies in a bedload parting zone, meaning tidal flows diverge around it: the flood tide (northward) is stronger on the western side, whereas the ebb tide (southward) dominates on the eastern side. This results in net sediment transport away from the bank's centre along both flanks (northward on the west, southward on the east). Consequently, the bank's crest tends to be a zone of divergence where sediment is supplied from both sides but overall remains in place, while the flanks experience sediment fluxes along their length.

4.5.2.17 The seabed on and around Arklow Bank features a range of sandy bedforms from small ripples to large sand waves. Megaripples (5–20 m wavelength, ~0.5–1 m height) are common on the bank crest and shallow flanks, indicating active near-bed transport under typical currents. More prominently, the flanks and troughs are covered by sand waves – sizable subaqueous dunes. Surveys and analyses (Partrac 2022; Creane et al. 2023b) have characterized two fields of sand waves on Arklow Bank's flanks:

- On the south-eastern flank, sand waves average ~3 m in height and ~140 m wavelength, migrating southwards (~23 m/year) under dominant ebb currents.
- On the south-western flank, sand waves average ~2.3 m in height with ~123 m wavelength, migrating northwards (~33 m/year) driven by flood-dominant flow.

4.5.2.18 These migration rates, on the order of tens of meters per year, are exceptionally high, reflecting very active sediment mobility. Indeed, Arklow Bank's sand waves are among the fastest-moving in the Irish Sea. Some sand waves at the southern margin reach heights up to ~14 m from trough to crest. Generally, sand wave crests on the western side lean northward (indicating net north transport) and those on the eastern side lean southward, consistent with the tidal asymmetry. Smaller secondary bedforms (megaripples) often superimpose on these larger sand waves.

4.5.2.19 The crest of Arklow Bank itself is dynamic. Analysis of multi-year satellite imagery and bathymetry reveals that segments of the crestline shift laterally over time in response to storm events and sustained tidal flows. Creane *et al.* (2023) documented alternating periods of eastward and westward crest migration. In some locations, the bank crest migrated over 1 km in ~15 years (notably, an eastward shift observed between 1984–1999). However, these changes are not uniform along the bank and different sections oscillate differently, often in a cyclic or self-correcting pattern. For example, the northern tip has shown slight westward migration in recent years, whereas the central part oscillated and the southern extension lengthened a bit to the south. Despite this internal reworking, the overall mass of the bank is conserved (eroded sand from one flank tends to accrete on the opposite flank or nearby).

4.5.2.20 Sediment budget studies show modest net gains/losses: e.g. a slight net loss along the east flank (-46% of sediment flux) balanced by gains on the west flank and north end. In essence, the sandbank undergoes cyclical redistribution of sediment (gain/loss) without net long-term displacement of its core structure.

4.5.2.21 The Arklow Bank provides a defence protection function in relation to the adjacent coastline. As referred above, the bank's shallow crest lies just 1–5 m below Chart Datum. Its shallow crest acts like a submerged breakwater, even during relatively low swell, reducing wave heights (dissipating energy) landward of the bank. In storm conditions, this effect reduces the height and force of waves that propagate landward, shielding the Wicklow–Wexford coastline from the full storm impact. This function as coastal defence is highlighted in studies such as Panigrahi *et al.* (2009) and Creane *et al.* (2023).

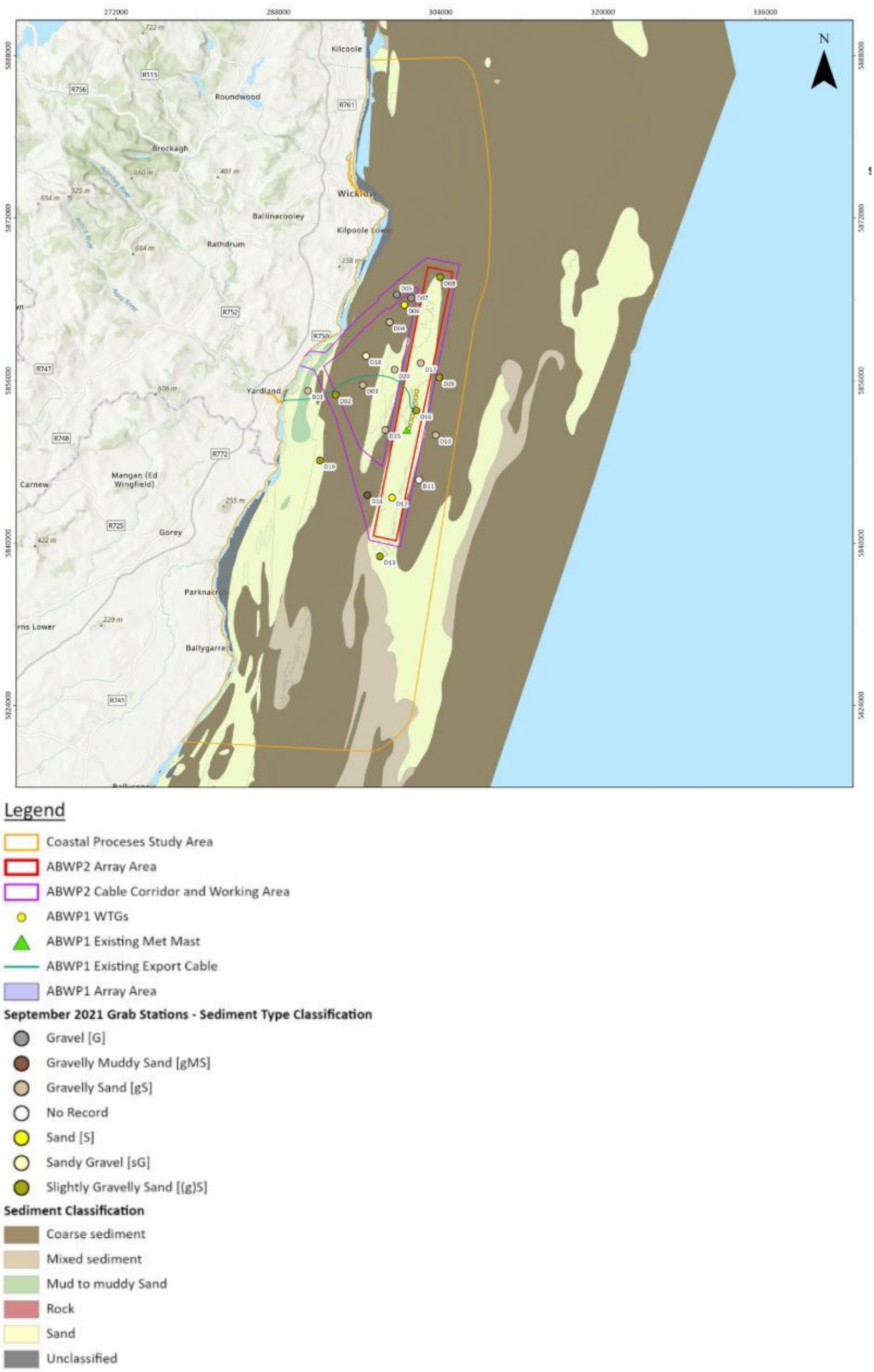

Figure 4.7: Surface seabed deposits and rock outcrops at Arklow Bank Wind Park Phase I and II and within the larger physical system. Source: SSE Renewables (2026)

4.5.2.22 The Sub Lease Area is situated on the central-western crest of Arklow Bank. This area is relatively shallow (turbine locations are in ~5–10 m LAT – lowest astronomical tide - water depth) and fairly flat compared to the flanks. Baseline morphology here shows a broad sand plateau with superimposed small megaripples. No unique seabed features (e.g. no channels or outcrops) exist within the Sub Lease Area – it is representative of the bank crest condition.

4.5.2.23 Monitoring of seabed levels within the Sub Lease Area over ~20 years provides insight into local morphological stability, which showed that the bank crest within the Sub Lease Area remained largely stable in elevation for several years at a time, with fluctuations typically <1–2 m. Periodic storm events caused some transient erosion or deposition, but the area did not experience runaway erosion.

4.5.2.24 As indicated in **Volume 3, Appendix 4.3**, scour around monopiles is a highly localised feature confined to the immediate vicinity of the foundation locations. The seabed profiles indicate that the deepening of the seabed is restricted to the nearfield (order tens to a few hundred metres) and that seabed levels beyond this distance are governed by the larger-scale dynamics of the Arklow Bank sand bank and superimposed sand waves and other bedforms, not considered to have a significant influence on the dynamics of the Arklow Bank sand bank. Inter-array cable corridors within the Sub Lease Area ran through sand wave fields of ~0.5–1 m amplitude; over time, some burial depth changes occurred as those sand waves migrated, but cables generally remained buried as the seabed naturally backfilled troughs. No permanent scours or deep pits formed along the inter-array cables – only the natural troughs of migrating sand waves.

4.5.2.25 Crucially, no hard features or steep bedforms were introduced or exposed in the Sub Lease Area. The presence of the Phase I offshore infrastructure had minimal influence on large-scale morphology: recent analyses (**Volume 3, Appendix 4.1: Seabed Mobility Assessment**) found that any local sediment transport perturbations caused by WTGs were negligible against the background tidal processes. The Phase I MPs did induce minor wake effects (localised eddies), but these did not alter the overall shape of the bank or the path of sand wave migration beyond a few tens of m from each structure. The baseline seabed within the Sub Lease Area can be described as: a sandy, gently undulating seabed at ~−5 m LAT, with minor relief from megaripples; eight MP locations, each surrounded by a small ring-like sand mound (the sandbag scour protection); and shallow sand wave undulations along the offshore export cable route.

4.5.2.26 Overall, Arklow Bank's seabed can be characterised as a highly dynamic sand environment: the entire bank is subject to continuous sediment transport and bedform migration, yet its fundamental form and sediment composition endure in equilibrium. The ABWP Phase II studies – including detailed 2022 geophysical mapping, a 2025 sediment mobility modelling by Deltares, and the revised 2026 Coastal Processes Chapter – all reinforce this understanding of a mobile but resilient seabed system.

4.5.2.27 The offshore export cable was buried during installation. Post-lay burial reports indicate that the trench infilled naturally with seabed sediments shortly after installation. Throughout the operational phase, the cable has remained buried, with only minor sections of exposure observed (see **Volume 3, Appendix 5.1: Benthic Live Habitat Cable Survey and Observations Log**). For example, project documentation notes that even after many years the cable remained covered by seabed sediments, with burial depth largely unchanged apart from minor fluctuations (e.g. seasonal changes or bedform movement), which is a clear indicator of a stable seabed environment along the offshore export cable route.

4.5.2.28 Surveys have identified gentle sand wave or ripple features along parts of the offshore export cable corridor, indicating ongoing sediment mobility. However, these bedforms exhibit only limited vertical relief and migrate gradually. Migration of sand waves has not led to offshore export cable exposure, as the cable was buried below the active layer of sand movement.

Coastal Area

Regional Context

4.5.2.29 The coastline between Mizen Head and Kilmichael Head forms part of Ireland's eastern seaboard, facing the western Irish Sea. Over this reach, the coast is influenced by a semi-diurnal tidal regime, an energetic easterly wave climate during storm events, and a complex offshore bathymetry dominated by tidal sandbanks (including Arklow Bank) and intervening troughs.

4.5.2.30 The coastal system is best understood as a linked coast–nearshore–inner shelf system, in which offshore morphological features influence nearshore hydrodynamics and sediment mobility, while coastal sediments are periodically exchanged with the inner shelf under energetic conditions.

Morphology

Overall Coastal Form

4.5.2.31 The coastline between Mizen Head and Kilmichael Head exhibits pronounced longshore variability in geomorphology, reflecting the interaction between bedrock geology, Quaternary sediment deposits, and active marine processes (GSI, n.d.).

4.5.2.32 The coastal planform is characterised by an alternation of:

- Prominent bedrock headlands, such as Mizen and Kilmichael Heads;
- Embayed sandy coastlines, notably at Brittas Bay and further south into northern County Wexford;
- Mixed sand and gravel beaches, locally backed by low till cliffs or coastal wetlands.

4.5.2.33 This configuration produces a crenulated coastline in which embayments are partly sheltered by up-drift headlands, promoting sediment retention and local morphological stability (GSI, n.d.).

Headlands and Geological Controls

4.5.2.34 Mizen Head and Kilmichael Head are underlain by relatively resistant bedrock and form long-lived geomorphological control points on coastal alignment. These headlands influence nearshore processes by:

- Causing refraction and diffraction of incident wave energy;
- Segmenting the coastline into semi-independent coastal cells;
- Partially interrupting longshore sediment transport pathways (GSI, n.d.).

4.5.2.35 The persistence of these features over Holocene timescales has strongly governed the spatial distribution of sandy embayments along this coast.

Sandy Beaches and Dune Systems

4.5.2.36 Large sections of the coastline support sandy beaches, some of which are backed by well-developed dune systems, particularly at Brittas Bay. These systems indicate sustained long-term sand availability and active marine–aeolian interaction. (GSI, n.d.). Based on Farrell and Connolly (2019), Brittas Bay dune have a proportion of fixed dunes of approximately 80% ± 10% on average, while the rest is characterized by being embryonic dunes (2%) and mobile dunes (5%). These last two types of dunes are highly mobile features, which change size, shape and location in response to modifications of wave erosion, wind conditions and vegetation (Masselink *et al*., 2022).

4.5.2.37 The beaches typically exhibit gently sloping intertidal profiles and wide foreshores, with seasonal and interannual variability in beach width and profile driven by changes in wave energy.

Nearshore and Offshore Morphology

4.5.2.38 Seaward of the coastline, the nearshore seabed deepens gradually into the inner shelf of the Irish Sea. Offshore morphology is dominated by tidally generated sandbanks, including Arklow Bank, separated from the coast by deeper troughs (Coughlan *et al.*, 2021).

4.5.2.39 High-resolution bathymetric mapping demonstrates that these banks are spatially stable features at long timescales, despite active short-term sediment mobility across their surfaces (Coughlan *et al.*, 2021).

Sedimentological Regime

Sediment Sources and Characteristics

4.5.2.40 Sediments along the Wicklow coast are predominantly sandy, with localised gravel and shingle components. The main sediment sources include:

- Reworked post-glacial sediments stored within offshore tidal sandbanks such as Arklow Bank;
- Nearshore sediments redistributed across the inner shelf;
- Localised inputs from erosion of Quaternary glacial tills along parts of the coast (Creane, 2022).

4.5.2.41 Beach sediments generally comprise fine to medium sands in embayed settings, with coarser material occurring where local energy conditions are higher (this can be open coast sections or in areas influenced by headland-controlled wave exposure).

Longshore Sediment Transport

4.5.2.42 At regional scale, net longshore sediment transport along the Wicklow–Wexford coast is predominantly southward, driven by prevailing wave approach directions and shoreline orientation (GSI, n.d.).

4.5.2.43 However, transport rates and directions vary locally due to headland effects, changes in coastal orientation, and spatial variability in wave exposure. Headlands act as partial barriers, encouraging sediment accumulation within embayments and the formation of quasi-closed sediment cells. At the outlet of the Avoca River, there appears to be a reversal of the regional trend, as sediment accretion is observed immediately south of Arklow Pier, while there is no beach immediately north of the pier. This is likely caused by sandbanks (or a river delta) altering locally wave directions and consequently reversing the direction of sediment drift.

Cross-Shore Exchange and Tidal Influence

4.5.2.44 Cross-shore sediment transport is a key element of the sediment regime. Storm conditions promote offshore transport of beach sands into nearshore and inner-shelf storage zones, while post-storm conditions facilitate onshore sediment return and beach recovery (Coughlan *et al.*, 2021).

4.5.2.45 Tidal currents, particularly during spring tides, enhance seabed shear stress in the nearshore zone, increasing sediment mobility and facilitating sediment exchange between beaches and offshore deposits (GSI, n.d.).

Relationship with Offshore Sandbanks

4.5.2.46 Arklow Bank forms part of a wider Irish Sea sediment transport framework, associated with the Irish Sea bedload parting zone and large-scale residual tidal circulation (Coughlan *et al.*, 2021).

4.5.2.47 The bank acts as a major reservoir of mobile sand and is maintained by strong tidal currents rather than net unidirectional migration. Sediment exchange between the bank and the coastline occurs primarily during episodic high-energy events rather than through continuous transport (GSI, n.d.; Coughlan *et al.*, 2021).

Coastal Evolution and Stability

4.5.2.48 Coastal erosion along the south-east coast of Ireland (from Dalkey Island to Carnsore Point) is characterised by strong spatial variability, with generally low erosion rates in urban, defended areas and more significant retreat in rural, sedimentary coastal sections. A strategic assessment (OPW, 2013) based on comparison of aerial photography from the 1970s, 2000 and 2004 indicates mean annual erosion rates of approximately 0.6 m/year, with typical rates generally below 0.5 m/year but locally exceeding 3 m/year, particularly in County Wexford. Ten principal erosion hotspots have been identified, including Bray–Wicklow, Kilpatrick, and extensive sectors of the Wexford coast (e.g. Ardamine, Blackwater–Ballinesker and Rosslare), where soft sediment conditions and exposure to wave action contribute to higher susceptibility to coastal retreat. In the section where Arklow is located, between Wicklow and Wexford, only Kilpatrick (south of Arklow) is highlighted with an erosion rate around 3.75 m/year.

4.5.2.49 Of relevance is the recently (2025) extended, but unpublished, 2024 Wicklow County Council Coastal Erosion Risk Management Study which has the remit to characterise the coastal erosion problem along the Arklow coastline (Office of Public Works (OPW), 2025).

4.5.2.50 While there is a localised tendency for erosion at Arklow North Beach (north from the Avoca River outlet) (**Figure 4.8**), at a regional scale, the coastline between Mizen Head and Kilmichael Head is considered dynamic but broadly stable. Sandy embayments display seasonal and interannual variability, while long-term shoreline position is constrained by geological controls and offshore sediment availability (Creane, 2022).

4.5.2.51 The coastal stretch associated with the landfall, located immediately north of the Avoca River outlet, is protected by a rock revetment that prevents erosion of the onshore deposits. Accordingly, **Figure 4.8** indicates that this section of coastline remained stable between 1984 and 2024.

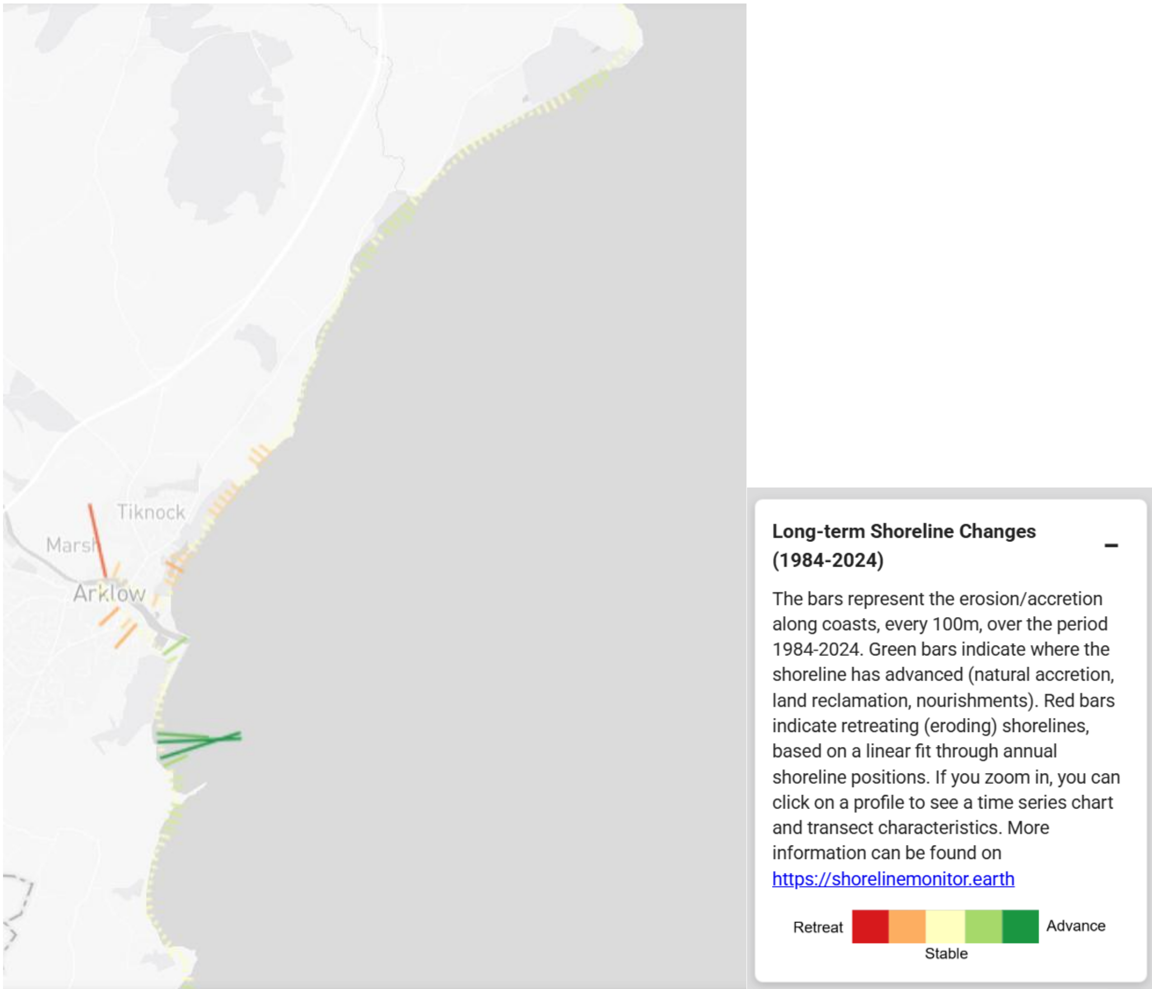

Figure 4.8: Shoreline change rates between 1984 and 2024, presented at an longshore resolution of 100 m. Source: Luijendijk et al. (2018).

4.5.2.52 The combined influence of persistent headlands and offshore tidal sandbanks contributes to the overall resilience of the coastal system under present-day conditions.

4.5.3 Surface Water Quality

4.5.3.1 Surface water quality baseline is considered in relation to existing designations. These are discussed below in relation to Water Framework Directive designated waters (within 1 nme of the coast in Ireland) and the Irish Sea (defined by the EU MSFD) which covers Irish offshore waters outside of the WFD jurisdiction (beyond 1 nm in Irish waters).

Suspended Sediment Concentrations

4.5.3.2 Turbidity is spatially and temporally variable in the Irish Sea. The Climatology Report (Centre for Environment, Fisheries and Aquaculture Sciences, 2016) estimates that the average Suspended Particulate Matter (SPM) near Arklow Bank is less than 2.5 mg/l, with higher concentrations recorded in winter.

4.5.3.3 Previous surveys (Aquatic Services, 2022) describe mixed coarse sediments, indicating low fine sediment availability for suspension. The Assessment and Report on Dispersion Modelling at the Arklow Offshore Disposal Site (Gavin & Doherty Geosolutions, 2024) reports that Arklow is influenced by strong tidal currents which can temporarily elevate turbidity. The report also indicates that resuspension is common, but plumes disperse quickly due to strong flows. The mixed coarse sediment limits long-term turbidity, however, it is highly variable during storm events and tidal cycles.

4.5.3.4 The Arklow Dumping Site - Multi-Year Seabed Monitoring Comparison (2016-2022) Report (Ocean Ecology, 2023) includes particle size distribution (PSD), showing that fine sediments are present but not dominant, again suggesting limited long-term turbidity.

4.5.3.5 At the ABWP Phase II array area between November 2019 and March 2021, a metocean measurement campaign was conducted (Fugro, 2021) from five locations, and turbidity data was collected using Optical Backscatter (OBS) and Acoustic Backscatter (ABS) data. Mean values of 15.9 mg/l to 26.9 mg/l (ABS) and 22.7 mg/l to 44.2 mg/l (OBS) across the five locations were recorded, and concentrations were highest closest to the bed (GoBe, 2026).

4.5.3.6 In October 2024, as a part of the ABWP Phase II EIA, AQUAFACT undertook a physico-chemical survey from 30 stations, including turbidity readings. Turbidity was generally low across the majority of stations, with readings below 10 Nephelometric Turbidity Unit (NTU) in most locations. Turbidity was recorded as above 10 NTU in seven locations, up to a maximum reading of 36.45 NTU (GoBe, 2026).

4.5.3.7 These surveys and assessments indicate that the Offshore Site is naturally dynamic, with turbidity fluctuating but rarely remaining high.

Surface Water Body Designations

4.5.3.8 Designated sites within the Coastal Processes, Water and Sediment Quality Study Area are presented in **Figure 4.9**.

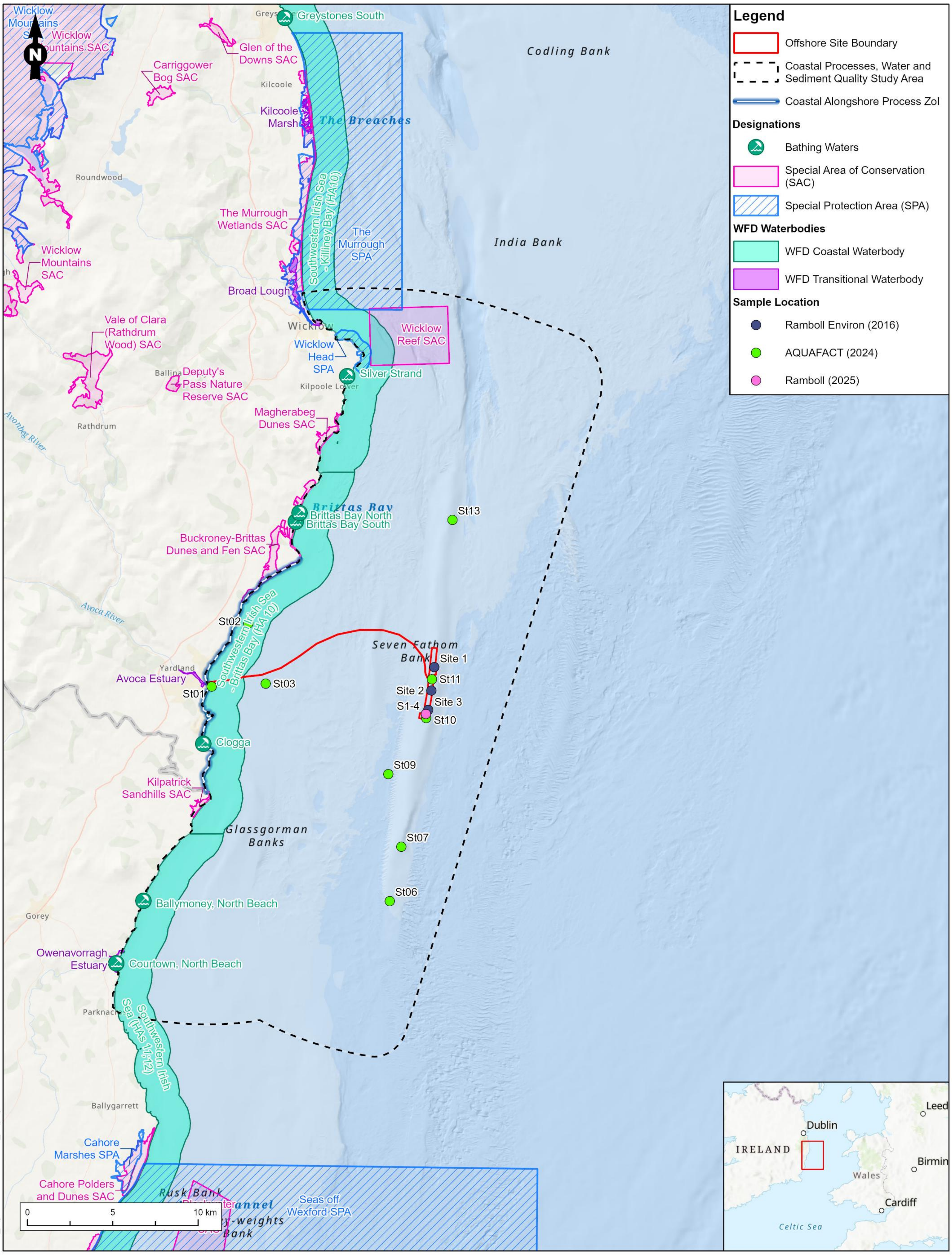

Figure Title	Project No./Filery ID			Client
Designated sites within the Coastal Processes, Water and Sediment Quality Study Area	1620011606-002 / REH2024N01993			Arklow Energy Limited
	Date: June 2026	Prepared By: AB		
Project Name: ABWP Phase I Decommissioning	Scale: 1:200,000 @A3	Figure No.: 4.9	Revision: 1.0	RAMBOLL

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Coordinate System: IRENET95 Irish Transverse Mercator. Projection: Transverse Mercator. Datum: IRENET95.

Figure 4.9: Designated Areas within the Coastal Processes, Water and Sediment Quality Study Area

Water Framework Directive Designations

4.5.3.9 The nearshore surface water body (i.e. within 1 nm of the coast), in which a small section of the offshore export cable corridor is located, is designated under the WFD as the Southwestern Irish Sea - Brittas Bay Coastal waterbody (EPA, 2026). The Southwestern Irish Sea – Brittas Bay water body is classified as having a 'high' ecological and chemical status, and 'not at risk' of not achieving its water quality objectives.

4.5.3.10 The Coastal Processes, Water and Sediment Quality Study Area 20 km buffer extends beyond the boundaries of the Southwestern Irish Sea - Brittas Bay WFD waterbody, and also interacts with other WFD Designated water bodies. All WFD water bodies within the Coastal Processes, Water and Sediment Quality Study Area and their statuses are presented in **Table 4.11**.

Table 4.11: WFD Designated Waterbodies within the Coastal Processes, Water and Sediment Quality Study Area

Bathing Waters	Waterbody type	Distance from project boundary (km)	Status
Southwestern Irish Sea - Brittas Bay	Coastal	Overlapping	High
Avoca Estuary	Transitional	0.07	Moderate
Southwestern Irish Sea	Coastal	8.84	Good
Southwestern Irish Sea - Killiney Bay	Coastal	9.24	Good
Owenavorragh Estuary	Transitional	16.42	Moderate
Broad Lough	Transitional	17.97	Moderate

Designated Bathing Waters

4.5.3.11 There are six designated bathing water sites within the Coastal Processes, Water and Sediment Quality Study Area, as shown in **Figure 4.9** and outlined in **Table 4.12** below.

Table 4.12: Designated bathing waters within the Coastal Processes, Water and Sediment Quality Study Area

Bathing Waters	Distance from project boundary (km)	Classification*
Clogga	3.58	Excellent
Brittas Bay South	7.04	Excellent
Brittas Bay North	7.45	Excellent
Ballymoney, North Beach	13.31	Good
Silver Strand	14.86	Sufficient
Courtown, North Beach	17.25	Excellent
* based on the assessment of bacteriological results for the period 2022 to 2025		

Nutrient Sensitive Areas

4.5.3.12 There are no designated nutrient sensitive areas within the Coastal Processes, Water and Sediment quality Study Area. The closest designated nutrient sensitive area to the Offshore Site is Wexford Harbour, located approximately 50 km to the south.

Protected Shellfish Waters

4.5.3.13 There are no designated protected shellfish waters within the Coastal Processes, Water and Sediment quality Study Area. The closest designated shellfish waters site to the Offshore Site is Wexford Harbour Outer, located approximately 50 km to the south.

MSFD Designation

4.5.3.14 Beyond the WFD jurisdiction (beyond 1 nm), the Offshore Site is located within the OSPAR Subregion the Irish Sea (Department of Housing, Local Government and Heritage, 2024) within the MSFD jurisdiction and referenced for the purposes of assessing GES.

4.5.3.15 For GES Descriptor 8 to be met, concentrations of indicator contaminants in coastal and territorial waters measured in water, sediment or marine biota must comply with appropriate threshold values. In the Irish Sea, the GES objective for Descriptor 8 Contaminants has not been fully met for mercury, and is unknown for Perfluorooctane Sulfonic Acid (PFOS), Hexabromocyclododecane (HBCDD), TBT, cadmium, lead, nickel, and WFD Priority Substances (Department of Climate, Energy and the Environment, 2025). The Department of Climate, Energy and the Environment (2025) state that "GES has been largely achieved for concentrations of most contaminants in seawater, sediments and biota in Irish coastal and marine waters. Concentrations of most parameters assessed re at levels that ensure the protection of the marine environment".

4.5.3.16 GES Descriptor 8 will be used in the assessment of impact to water quality in Irish waters outside of the WFD designated areas in **Section 4.6**.

4.5.3.17 An MSFD assessment is presented in Volume 3, Appendix 1.4: MSFD Assessment.

4.5.4 Sediment Quality

Chemical Quality

4.5.4.1 Sediment quality in the Coastal Processes, Water and Sediment Quality Study Area must be considered to determine the sensitivity of sediments in areas where mobilised sediments may be deposited. Baseline sediment quality within the Coastal Processes, Water and Sediment Quality Study Area buffer zone has been assessed using desk-based information sources and some limited quantitative data from sampling surveys, as detailed below (Ramboll Environ UK Ltd 2016, AQUAFACT 2024, Ramboll 2025).

4.5.4.2 In order to assess the significance of the concentrations recorded, the measured concentrations have been compared to sediment quality thresholds in accordance with current guidance. Sediment quality thresholds used are:

- Irish Action Levels 1 and 2 outlined in 'Guidelines for The Assessment of Dredge Material for Disposal In Irish Waters' (Cronin *et al.*, 2006) and the 'Addendum to 2006 Guidelines for the Assessment of Dredged Material in Irish Waters' (Marine Institute, 2019), referred to as the Irish Action Levels from this point onwards;
- Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR) Environmental Assessment Criteria (EAC) (OSPAR, 2021);
- United Sates Environmental Protection Agency (USEPA) Effects Range Low (ERLs) (USEPA, 1996); and
- Background Assessment Concentrations (BAC) (OSPAR, 2021).

4.5.4.3 The sediment quality thresholds selected all represent concentrations at which there is considered to be low probability of effects to marine life. Exceedance of a threshold does not indicate unacceptable risk, just a potentially higher probability of measurable effects.

4.5.4.4 Where BAC are higher than the sediment assessment criteria, the assessment is completed relative to BAC only. OSPAR normalise hydrocarbon concentrations in sediment quality data to 2.5% Total Organic Carbon (TOC) to make results comparable between sites and over time, because organic carbon strongly controls how hydrocarbons behave in sediments.

4.5.4.5 The concentrations of contaminants recorded from the various sampling regimes compared with the sediment threshold values are presented in **Volume 3, Appendix 4.4: Sediment Sampling Results**. These threshold values have been used to consider the level of contamination within seabed sediments which may be disturbed.

<u>**Site-specific Survey Data**</u>

Ramboll Environ UK Ltd (2016)

4.5.4.6 In May 2016, Ramboll Environ UK Ltd undertook sediment sampling and chemical analysis of sediments from three locations within the Sub Lease Area in order to support a dumping at sea permit application to undertake seabed levelling works within the Sub Lease Area. All three samples were tested for metals, and one location (Site 2) was also tested for organochlorines, TBT, DBT, PCBs and PAHs. All concentrations were below the sediment threshold values.

AQUAFACT (2024)

4.5.4.7 In October 2024, as a part of the ABWP Phase II EIA, grab samples were collected across the ABWP Phase II array area, cable corridor and working area. Of these, nine samples were scheduled for chemical testing. When screened against the Irish Action Levels, all determinands were below the Irish Action Level 1 value, with the exception of arsenic.

4.5.4.8 Arsenic was recorded in exceedance of the Irish Action Level 1 value (20 mg/kg) in four locations: Station 2, Station 3, Station 6, and Station 7. However, all of the exceedances were only marginally above Action Level 1, with a maximum concentration of 22.5 mg/kg recorded in Station 2, and all concentratinos were significantly below the Action Level 2 value (70 mg/kg). All concentrations were also below the BAC value (25 mg/kg). Therefore, these concentrations are considered to be minor.

Ramboll (2025)

4.5.4.9 In 2025, four samples were obtained from one MP location (WTG T1) to provide an initial indication as to whether disposal of material extracted from MPs could introduce contaminants when disposed within the Sub Lease Area. The testing suite included metals, speciated total petroleum hydrocarbons with TPHCWG carbon fractions including aromatic and aliphatic split; and polycyclic aromatic hydrocarbons (USEPA speciated 16). All concentrations were below the sediment threshold values.

Particle Size Analysis

4.5.4.10 Sediment characteristics such as grain type and size influence contaminant storage and distribution: sediments with a finer particle size, such as clays and muds, can act as adsorption surfaces for contaminants that may be released into the water column if the sediment is disturbed (Cefas, 2001) due to their larger surface area to volume ratios and higher organic carbon content (GoBe, 2026). Sediments consisting of coarser sand and gravel carry a much lower contamination risk.

4.5.4.11 The INFOMAR database shows superficial seabed sediments within the Coastal Processes, Water and Sediment Quality Study Area to be characterised by predominantly sand across the Array Area and a mix of sand, coarse substrate, and occasionally muddy sand across the Cable Corridor and Working Area. Previous surveys (Sure Partners, 2000; ASU, 2012 & 2021) confirm that superficial sediments are heterogeneous sandy deposits, ranging from mobile fine-medium sands to slightly gravelly sands and gravelly sands.

4.5.4.12 Sediment samples taken for both the AQUAFACT (2024) and Ramboll Environ (2016) surveys analysed for particle size. The results from both of these surveys confirm that Arklow Bank is primarily composed of sandy sediments, with 89.60% to 100% of the sediment falling within the 2 mm to 63 µm size range. Very low amounts of fine sediment (less than 63 µm) were recorded, with a percentage range of 0% to 4.75% recorded in the samples obtained from Arklow Bank.

4.5.4.13 Within the offshore export cable corridor, sediment composition is more variable, however the composition is still predominantly sand. St01 and St03 are located closest to the cable corridor, and these locations record a sediment composition of 90.17% and 86.77% of sands and 9.14% and 9.64% of fine sediment respectively.

4.5.4.14 From the survey results, it is shown that the sediment composition in the Coastal Processes, Water and Sediment Quality Study Area is largely comprised of sands, with limited fine sediment, aligning with the INFOMAR database information.

4.5.5 Future Baseline Conditions

4.5.5.1 In the absence of Proposed works Offshore, the coastal processes, water and sediment quality baseline would be expected to evolve both on a natural basis and in response to global trends such as climate change and other anthropogenic activities.

4.5.5.2 An assessment of future baseline conditions, where Proposed Works Offshore are not executed, has been undertaken and is described within this section.

4.5.5.3 It is anticipated that the future baseline conditions in relation to water and sediment quality will be similar to current baseline conditions.

4.5.5.4 In broad terms, the post-decommissioning baseline will see Arklow Bank continuing its natural long-term behaviour as a tidal sand bank. Strong tidal currents will remain the dominant driver of large-scale seabed evolution, causing alternating phases of gentle eastward or westward migration along portions of the bank, while wind-waves and storms contribute only short-lived, local variations at the shallow crest. Historical evidence shows that Arklow Bank's footprint has been remarkably stable over centuries, even as its crest undergoes intermittent adjustments of a few metres in elevation due to natural sediment transport and sand wave activity, with no significant change to its large-scale form or coastal protection function.

4.5.5.5 Future climate change drivers (e.g. sea-level rise, changes in storminess, and wave climate) are expected to act mainly as secondary modifiers rather than primary controls on the evolution of Arklow Bank. Gradual sea-level rise would increase water depths over the crest, which may slightly reduce wave breaking frequency on the shallowest parts of the bank and marginally alter wave-induced sediment mobilisation. However, available evidence indicates that tidal forcing would remain the dominant driver of large-scale bank migration and sediment transport, and no step-change in bank behaviour is anticipated as a result of sea-level rise alone.

4.5.5.6 Potential increases in storm intensity or changes in storm tracks may lead to more frequent short-term seabed reworking at the crest and upper flanks, including temporary lowering or smoothing of bedforms. These effects are expected to be episodic, spatially limited, and reversible, consistent with the historical pattern of rapid but transient adjustment identified in the report. There is no indication that such processes would destabilise the sand bank as a whole or alter its long-established footprint.

4.5.5.7 Overall, in a post-decommissioning scenario, climate change is expected to influence the timing and magnitude of natural variability, but not the fundamental morphodynamic behaviour or long-term stability of Arklow Bank. Any climate-related effects would act on top of existing natural processes and remain subordinate to tidal controls, in line with the system behaviour described in **Volume 3, Appendix 4.1: Seabed Mobility Assessment**.

4.5.5.8 A larger offshore wind farm (ABWP Phase II) is proposed to be built around the Offshore Site, however, this is separately covered in **Section 4.8**.

4.5.6 Summary of Sensitive Receptors

4.5.6.1 The receptors identified as sensitive to the Proposed Works Offshore are summarised in **Table** 4.13**.**

Table 4.13: Summary of Coastal Processes, Water and Sediment Quality Sensitive Receptors

Receptor	Description	Rationale for inclusion
Water quality beyond the WFD designation	Water quality beyond the WFD designation (beyond 1 nm) in the Coastal Processes, Water and Sediment Quality Study Area.	Potential for the water quality beyond the WFD designation to be impacted by Proposed Works Offshore (increased SSC, mobilisation of sediment-bound contaminants) from:

Receptor	Description	Rationale for inclusion
		• Increased SSC and physical effect on water quality in Irish waters from the increased turbidity • Release of sediment-bound contaminants (relevant to GES indicator 8).
Water quality in the designated WFD coastal and transitional waterbodies	Designated WFD coastal and transitional waterbodies that fall within the Coastal Processes, Water and Sediment Quality Study Area.	Potential for the water quality in the WFD coastal and transitional waterbodies that fall within the Coastal Processes, Water and Sediment Quality Study Area to be impacted by Proposed Works Offshore (increased SSC, mobilisation of sediment-bound contaminants).
Water quality in the designated bathing water sites	Designated bathing waters that fall within the Coastal Processes, Water and Sediment Quality Study Area.	Potential for the water quality in the designated bathing waters that fall within the Coastal Processes, Water and Sediment Quality Study Area to be impacted by Proposed Works Offshore (increased SSC, mobilisation of sediment-bound contaminants).
Arklow Bank	Shallow subtidal sandbank (Arklow Bank) underlying the Offshore Site.	Primary offshore geomorphological receptor. Multiple decommissioning activities (e.g. removal of WTG and associated foundations, scour protection retrieval, potential vessel access dredging) occur on this sandbank, which is sensitive to sediment disturbance. It must be assessed to confirm that the MDS does not significantly alter the bank's morphology or sediment transport regime, given its natural dynamism.
Near-shore area adjacent to the landfall, including coastline	The immediate nearshore coastal zone at the landfall (Ferrybank, Arklow), encompassing the shallow subtidal seabed just seaward of the HWM. This is the transitional area where the buried offshore export cable approaches shore and will be cut and pulled out during Proposed Works Offshore.	Considered as a conservative coastal processes receptor due to distance of Proposed Works Offshore to the coastline. This area is within the submarine beach (represents the active nearshore zone where wave-induced sediment movement shapes the seabed and influences beach evolution; portion of a beach profile extending seaward from the shoreline to the closure depth, beyond which sediment transport driven by waves is negligible). While no direct foreshore excavation is planned, the cable's severance and removal near the coast could cause minor, short-term seabed disturbance or turbidity in shallow water. Including this receptor ensures any potential effects on the coastal sediment balance or littoral processes are assessed under the maximum design scenario.

4.5.6.2 The seabed where the offshore export cable is located is itself not considered as a sensitive receptor because this portion of the seabed is characterised by mobile sandy sediments subject to continuous wave and current-driven transport processes. It does not contain any distinct or sensitive geomorphological features, nor does it perform a critical function in the broader coastal system. The area is naturally dynamic, with ongoing erosion and deposition resulting in frequent morphological change. Evidence from post-installation monitoring indicates that the offshore export cable has remained mostly buried since installation, demonstrating the system's capacity for natural recovery and maintenance of equilibrium conditions. As such, any disturbance from Proposed Works Offshore would occur within the range of existing natural variability and would be rapidly reworked by ambient processes.

4.5.6.3 In any case, potential impact pathways arising from changes in the seabed that may affect other sensitive receptors, such as the nearshore area and the Arklow Bank, are assessed in the impact assessment below.

4.6 Summary of Modelling Results

4.6.1 Seabed Mobility Assessment (Volume 3, Appendix 4.1)

4.6.1.1 **Volume 3, Appendix 4.1** demonstrates that the Arklow Bank seabed is highly dynamic, with significant spatial and temporal variability driven primarily by tidal processes, and secondarily by waves and wind. Analysis of bathymetric surveys (2000–2025) and satellite imagery (since 1984) shows that the sandbank undergoes cyclic east–west migration, with crest positions and profile asymmetry capable of changing rapidly over short timescales. Measured seabed level changes reach up to 14.68 m over the study period, confirming substantial natural variability.

4.6.1.2 At the scale of the Offshore Site, observed seabed changes at WTG locations are noted. All foundations have experienced at least ~4 m of vertical change, with maximum variations up to ~7.4 m. Bedforms several metres in height are superimposed on the bank, and localised scour features are evident around foundations, with depressions up to ~10 m deep and extending up to ~150 m. These results indicate that both large-scale morphodynamics and local processes contribute to seabed variability within the Sub Lease Area.

4.6.1.3 Numerical modelling supports the observations, predicting typical seabed changes in the order of several metres, with representative ranges of approximately −6 m to +8 m under typical forcing conditions, and potential local extremes significantly higher. The modelling confirms that the dominant sediment transport processes and overall seabed behaviour are consistent with measured trends, reinforcing confidence in the characterisation of natural variability.

4.6.1.4 Comparative modelling of scenarios with and without ABWP Phase I infrastructure indicates that the presence of MPs, inter-array cables and scour protection have negligible influence on large-scale sediment transport and seabed evolution. Any hydrodynamic or morphological effects are limited to the immediate vicinity of structures (tens of metres), where localised scour features may develop. At the scale of the sandbank, natural processes clearly dominate over infrastructure-induced effects.

4.6.1.5 Probabilistic projections of future seabed levels show a wide envelope of potential change at foundation locations, reflecting inherent natural variability and uncertainty in modelling. These projections define plausible upper and lower bounds rather than deterministic outcomes and do not explicitly account for decommissioning activities. Overall, the results indicate that post-decommissioning, seabed evolution will continue to be governed by natural processes, with no evidence that removal of infrastructure would lead to significant changes beyond the existing range of variability.

4.6.1.6 **Figure 4.10** effectively combines both long-term observed sandbank crest dynamics (left) with modelled erosion/sedimentation patterns (right), providing a clear visual summary of both historical variability and model results.

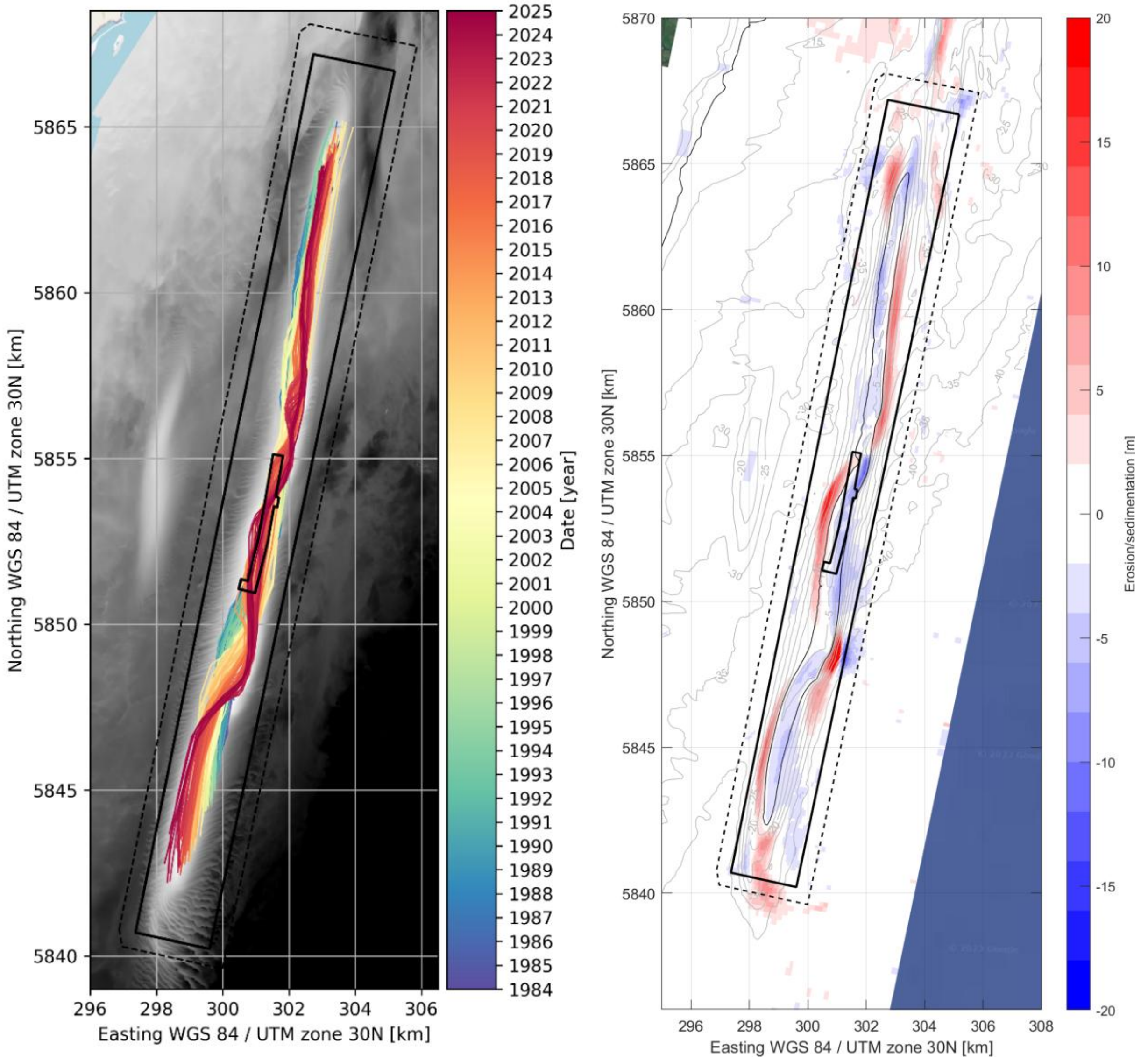


Figure 4.10: Arklow Bank sand bank crest dynamics over the period 1984-2025 based on satellite imagery (left panel). Modelled cumulative erosion/sedimentation over the 20-year simulation (2024-2044) (right panel).

4.6.2 Coastal Processes Modelling (Volume 3, Appendix 4.2)

4.6.2.1 **Volume 3, Appendix 4.2** indicates that main seabed disturbing activities associated with Proposed Works Offshore and modelled, generate increases in SSC, but these effects are consistently localised and transient. For access channel dredging (worst-case −6 m LAT scenarios), sediment plumes are predicted to form in the immediate vicinity of dredging areas and disperse into the surrounding environment, with peak concentrations occurring during active works and declining thereafter. Spatial outputs show that both SSC and associated seabed deposition are confined to a defined footprint around each dredging location, with variability depending on dredging method and release mechanism.

4.6.2.2 The magnitude and extent of impacts scale with dredged volumes and activity type. Access channel dredging produces the largest plumes due to substantially higher sediment release volumes (tens of thousands of cubic metres per channel), whereas smaller-scale activities generate proportionally reduced effects. Model results (summarised in tables and spatial plots) confirm that while plumes can extend beyond the immediate dredging site, the highest SSC values remain close to the source, and deposition thickness decreases rapidly with distance.

4.6.2.3 Maintenance (plough) dredging produces similar but smaller-scale effects. Although total dredged volumes are lower (on the order of ~86,000 m^3 across the campaign), repeated short-duration releases lead to intermittent SSC increases over a defined maintenance period (~9.5 days). As with access channel dredging, the modelling shows that SSC elevations are temporary, with no evidence of sustained or accumulating plume conditions beyond the active dredging periods.

4.6.2.4 Disposal of material extracted from inside MPs generates the smallest sediment plume due to very limited sediment volumes (generally tens to hundreds of cubic metres per location; <1,000 m^3 total). Resulting sediment plumes are correspondingly minor, with highly localised SSC increases and negligible depositional footprints relative to other activities. Across all dredging scenarios, the modelling consistently demonstrates that sediment is rapidly redistributed and settles, with no indication of long-term or large-scale changes to sediment transport patterns.

4.6.2.5 For offshore export cable recovery (grapnel runs), the study adopts a qualitative dispersion assessment due to the very small volumes disturbed. Results indicate that sediment disturbance is shallow and temporary, with rapid settling dominated by the high sand content (~94%) of the seabed. Fine grained fractions are minimal, limiting the potential for extended sediment plume transport. Overall, the combined modelling results show that sediment plumes generated during decommissioning are short-lived, spatially constrained, and governed by natural hydrodynamic processes, with effects diminishing quickly once activities cease.

4.6.2.6 **Figure 4.11** presents the maximum combined SSC and depositional footprint across all modelled activities within the Sub Lease Area, providing a clear, integrated visual of the worst-case spatial extent of sediment plume effects.

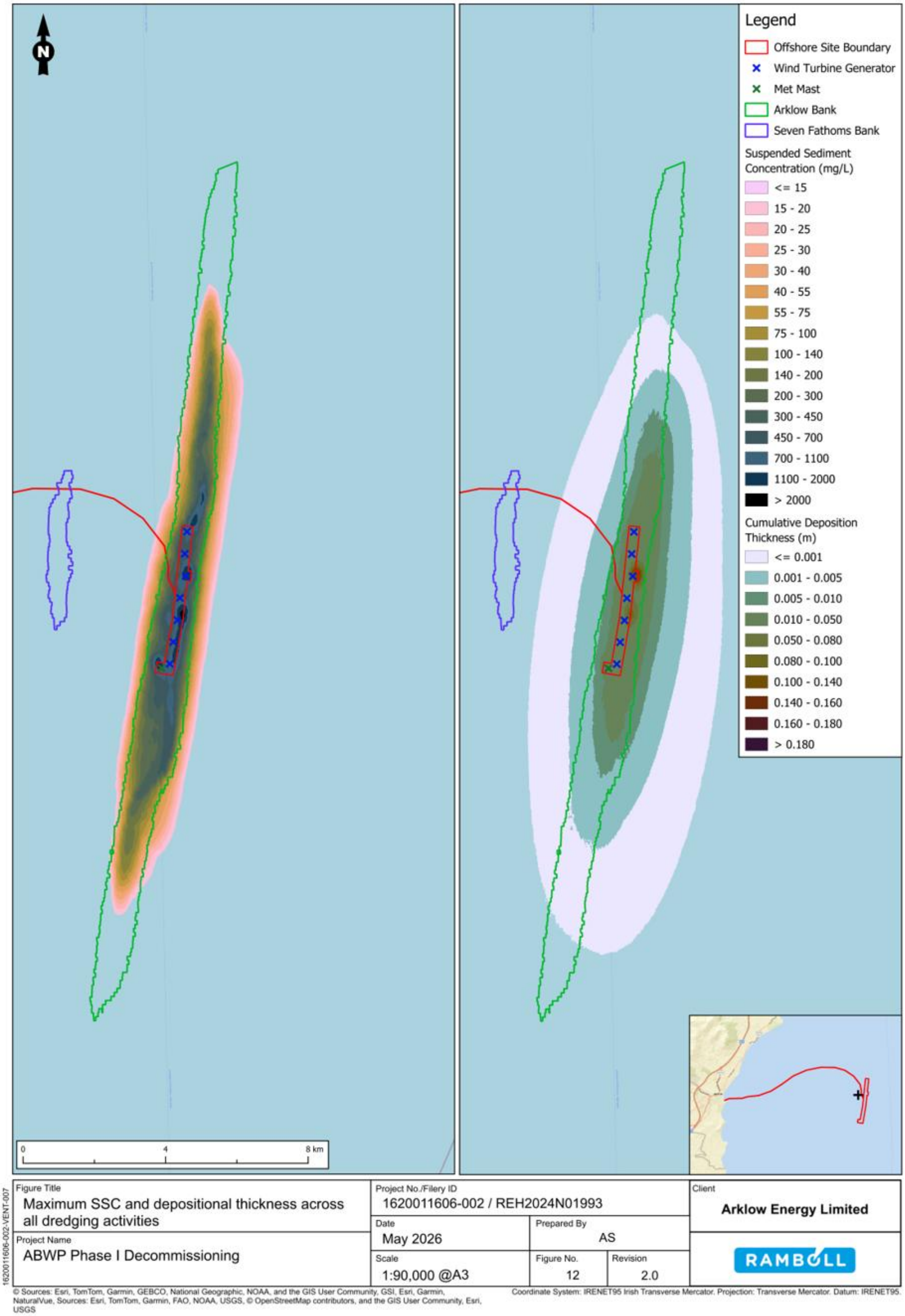


Figure 4.11: Maximum SSC and depositional thickness across the Sub Lease Area

4.6.3 Scour Assessment (Volume 3, Appendix 4.3)

4.6.3.1 **Volume 3, Appendix 4.3** predicts that in the absence of Proposed Works Offshore, i.e. retention of full-length MPs, equilibrium scour depths range between approximately 3.8 m and 7.1 m (5–95% non-exceedance), with median values between 4.8 m and 6.5 m depending on location. Equilibrium conditions are reached rapidly, typically within 0.5 to 2.5 years. The associated scour hole extents are estimated to range from about 10.2 m to 28.3 m. These results represent an upper-bound case, assuming MP remain uncut and unprotected over time.

4.6.3.2 With Proposed Works Offshore, where MPs are cut and only residual sections could become exposed, predicted scour depths are notably smaller, ranging between 1.3 m and 5.8 m (5–95% non-exceedance), with median values between 1.6 m and 5.6 m. The corresponding scour hole extents reduce to approximately 3.4 m to 23.4 m. Scour development occurs over similar timescales (up to ~2 years), indicating that cutting the MPs primarily reduces magnitude rather than rate of scour formation (in the unlikely event of residual MP exposure).

4.6.3.3 Median scour depth reductions range from 0.6 m to 3.1 m, corresponding to decreases of approximately 9.3% to 64.8% relative to the full-length MP case. The largest reductions are associated with locations where only small residual monopile lengths remain exposed above the seabed.

4.6.3.4 The modelling also indicates that predicted scour features are relatively small compared to large-scale seabed dynamics within the Sub Lease Area. While local scour holes may form, their depth and spatial extent are minor relative to observed seabed level changes (up to ~10 m) driven by sandbank migration. As a result, natural morphological processes are expected to progressively infill scour holes and potentially re-bury any exposed residual monopile sections.

4.6.3.5 Overall, the results demonstrate that in the unlikely case of residual MP exposure, post-decommissioning scour is limited in both magnitude and spatial extent, and is unlikely to significantly influence broader seabed evolution. The conservative full-length MP case provides an upper bound, while the more realistic residual MP scenario shows reduced impacts and a strong likelihood of natural recovery through sediment dynamics.

4.6.3.6 **Figure 4.12** show predicted equilibrium scour depth for each decommissioned monopile.

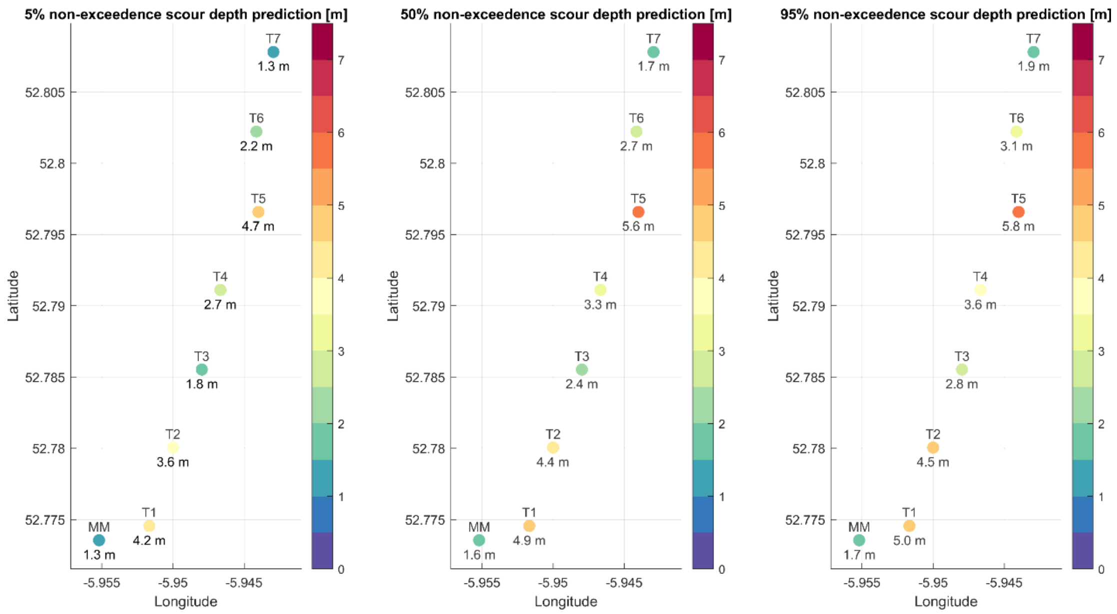


Figure 4.12: Predicted equilibrium scour depth at all eight monopiles assuming decommissioned monopiles. From left to right: 5% non-exceedance depth, 50% non-exceedance depth, and 95% non-exceedance depth.

4.7 Assessment of Impacts

4.7.1 Overview

4.7.1.1 This section includes the assessment of the impacts to coastal processes, water and sediment quality arising from the Proposed Works Offshore. A summary of the effects is presented in **Table 4.16**.

4.7.2 Impact to Water Quality from Increased Suspended Sediment Concentrations (SSC)

Receptor Sensitivity

4.7.2.1 The following receptor is considered to be sensitive to increased SSC:

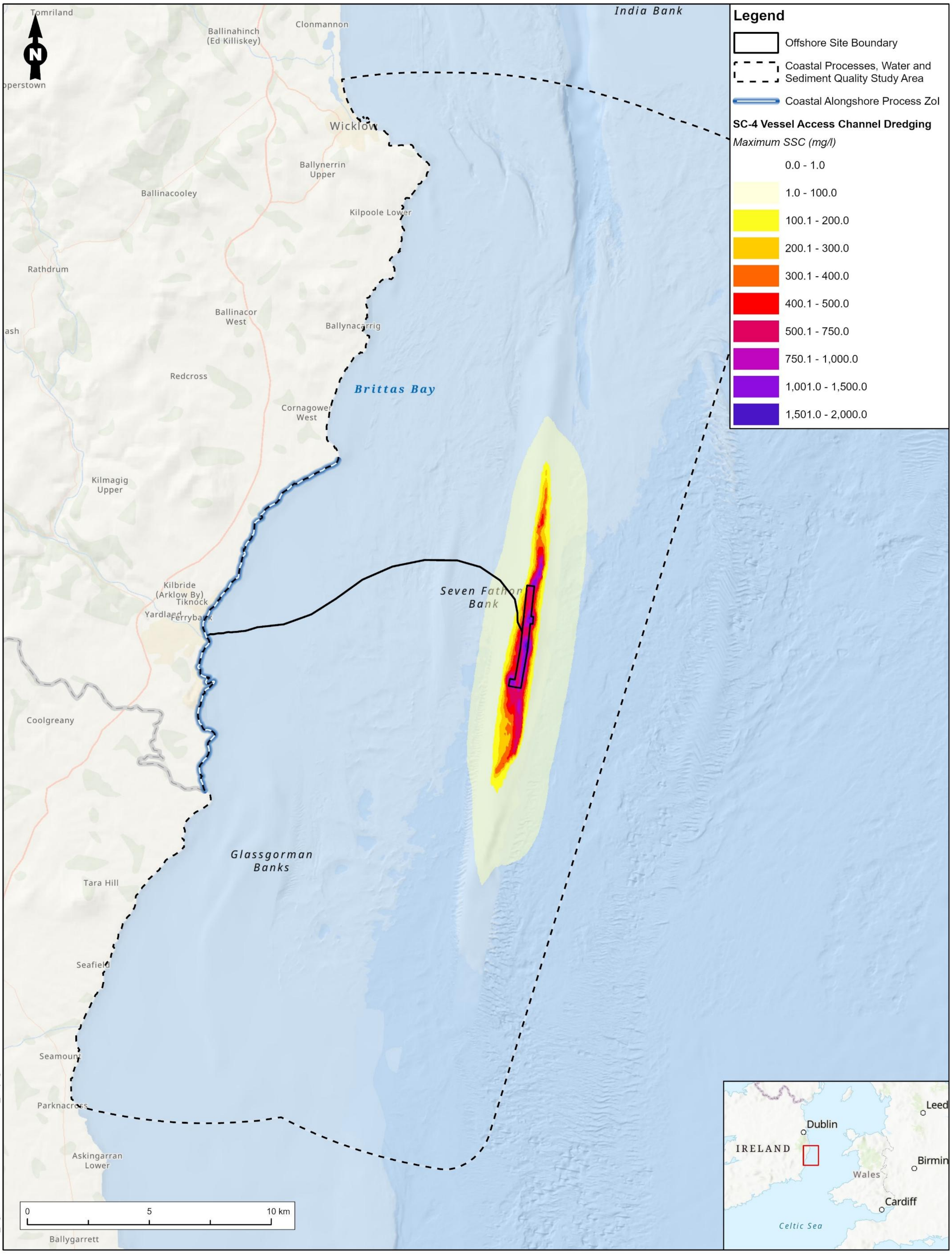
- Water quality within the Coastal Processes, Water and Sediment Quality Study Area from the physical effect caused by the Proposed Works Offshore (**medium** sensitivity).

4.7.2.2 The Irish Sea is a large waterbody, and therefore likely able to accommodate changes due to its relative size and capacity for dilution. Therefore, the receptor sensitivity in terms of its ability to accommodate physical effects caused by the Proposed Works Offshore is considered to be **medium**.

Magnitude of Impact

4.7.2.3 The Coastal Processes Modelling presented in **Volume 3, Appendix 4.2** predicts the maximum extents of suspended sediment which may occur as a worst-case result of the Proposed Works Offshore. The main activity expected to result in increased SSC is dredging and the disposal of dredged material, which will be limited to the Sub Lease Area. The modelling of the sediment plume caused by the different dredging and disposal techniques predicts that the most widespread SSC plume will occur from access dredging with a backhoe dredger and sediment disposal via side casting, representing a worst-case SSC plume.

4.7.2.4 During dredging with a backhoe dredger, SSC (consisting predominantly of sand) are expected to range from approximately 2000 mg/L (in very isolated pockets around dredge release locations) to approximately 30 mg/L. Coarse sand and gravel are likely to deposit on the seabed immediately and adjacent to the area of disturbance, with less coarse sand travelling a maximum distance of 0.048 km and depositing within approximately 23.81 seconds. Fine-grained sediment such as mud is expected to disperse over a distance of 2 km during approximately 16 minutes. Small amounts of fines such as clay and silt are predicted to travel the maximum 7 km from the area of disturbance, returning to background SSC within 42 days. **Figure 4.13** presents the maximum SSC plume from the backhoe dredging and side casting activities. The figure shows the whole area assuming it is all dredged simultaneously, however an individual plume from a single location would be much smaller.



1620011606-002-RAM-MA-IA-00038_Fig4.13SedimentPlumesMaxSSC_02.pagx

Figure Title	Project No./Filery ID	Client
SSC Plume From Dredging with a Backhoe Dredger and Sediment Disposal via Side Casting	1620011606-002 / REH2024N01993	Arklow Energy Limited
Project Name: ABWP Phase I Decommissioning	Date: August 2026; Prepared By: AB; Scale: 1:140,000 @A3; Figure No.: 4.13; Revision: 1.0	RAMBOLL

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Coordinate System: IRENET95 Irish Transverse Mercator. Projection: Transverse Mercator. Datum: IRENET95.

Figure 4.13: SSC plume from dredging with a backhoe dredger and sediment disposal via side casting

4.7.2.5 Along the offshore export cable corridor, **Volume 3, Appendix 4.2** predicts that during grapnel run activities to recover the offshore export cable, maximum extents of sediment mobilisation will be very limited in extent and duration, indicating a settling time of approx. 24 seconds for fine and medium sand and a corresponding maximum horizontal extent of short-lived sediment redistribution of approximately 48 m. Gravel-sized material is expected to deposit immediately adjacent to the disturbance. Finer sediment is predicted to disperse up to 2 km from disturbance, however, they constitute a very small proportion of the sediment, therefore is not indicative of the spatial extent. During offshore export cable removal, any increase in SSC is not expected to be discernible above background sediment disturbance.

4.7.2.6 Therefore, it is considered that the magnitude of increased SSC on water quality within the Coastal Processes, Water and Sediment Quality Study Area from Proposed Works Offshore is considered to be l**ow**.

Significance of Effect

4.7.2.7 Overall, it is considered that the receptor sensitivity is **medium** and the magnitude of the impact from increased SSC is **low**. Therefore, the effect of increased SSC from Proposed Works Offshore is considered to be **Minor Adverse**, which is not significant in EIA terms.

Additional Mitigation and Residual Effect

4.7.2.8 Given that effect of increased SSC from Proposed Works Offshore is considered not significant in EIA terms, no additional mitigation measures are proposed. Therefore, the residual effect of increased SSC from Proposed Works Offshore is considered to be **Minor Adverse**, which is not significant in EIA terms.

4.7.3 Impact to Water Quality from Disturbance / Remobilisation of Sediment Bound Contaminants

4.7.3.1 Impact from the release of sediment-bound contaminants to water quality is assessed in terms of the ability to achieve GES (relevant to GES Indicator 8), WFD designations, and designated bathing waters within the Coastal Processes, Water and Sediment Quality Study Area.

Receptor Sensitivity

4.7.3.2 The following receptors are considered to be sensitive to disturbance /remobilisation of sediment bound contaminants:

- Water quality in the wider marine area (GES Indicator 8) (**medium** sensitivity);
- Water quality in WFD designated waterbodies (**high** sensitivity);
- Water quality in designated bathing waters within the Coastal Processes, Water and Sediment Quality Study Area (**high** sensitivity).

<u>Water quality in the Irish Sea (beyond the Water Framework Directive jurisdiction)</u>

4.7.3.3 In the Irish Sea region, the GES objective for Descriptor 8 Contaminants has not been fully met for mercury, and is unknown for PFOS, HBCDD, TBT, cadmium, lead, nickel, and WFD Priority Substances (Department of Climate, Energy and the Environment, 2025). However, the Department of Climate, Energy and the Environment (2025) state that "Good Environmental Status (GES) has been largely achieved for concentrations of most contaminants in seawater, sediments and biota in Irish coastal and marine waters. Concentrations of most parameters assessed are at levels that ensure the protection of the marine environment".

4.7.3.4 The Irish Sea is a large waterbody and therefore likely able to accommodate changes due to its relative size and capacity for dilution. Therefore, the receptor sensitivity is considered to be **medium**.

<u>Water quality within Water Framework Directive jurisdiction, within 1nm of the coast</u>

4.7.3.5 As detailed in **Table 4.11**, there are six WFD designated water bodies that fall within the Coastal Processes, Water and Sediment Quality Study Area. However, due to the parallel properties of the tidal flow, impacts to onshore water bodies are not anticipated as disturbed sediment will be carried in a north-south direction, as shown in the numerical modelling presented in **Volume 3, Appendix 4.2: Coastal Processes Modelling.** Therefore, the water quality of the transitional waterbodies will not be impacted by the Proposed Works Offshore and are not considered further.

4.7.3.6 Therefore, only the coastal WFD waterbodies have been considered as receptors to the Proposed Works Offshore, namely Southwestern Irish Sea – Brittas Bay which has a high status; Southwestern Irish Sea which has a good status, and Southwestern Irish Sea - Killiney Bay which has a good status. Therefore, the receptor sensitivity is considered to be **high.**

Water quality in designated bathing waters

4.7.3.7 There are six designated Bathing Waters within the Coastal Processes, Water and Sediment Quality Study Area; four of these have an 'excellent' status, one has a 'good' status, and one has a 'sufficient' status, as outlined in **Table 4.12.** Therefore, the receptor may have a very low capacity to accommodate any change to baseline water quality status and the receptor sensitivity is considered to be **high**.

Magnitude of Impact

Water quality in the Irish Sea (beyond the Water Framework Directive jurisdiction)

4.7.3.8 The chemical data for the marine sediment obtained from the sampling locations within Arklow Bank were below the sediment quality thresholds. Therefore, sediment mobilised from the dredging is not anticipated to be contaminated.

4.7.3.9 One sample location (St03) is located in the vicinity of the offshore export cable corridor beyond the WFD jurisdiction. No exceedances of the threshold values were recorded in St03, with the exception of a marginal exceedance of arsenic above Irish Action Level 1 (22.4 mg/kg compared to an Irish Action Level value of 20 mg/kg). However, the concentration was significantly below the Irish Action Level 2 value (70 mg/kg) and below the BAC (25 mg/kg), therefore contaminant concentrations in the marine sediment are considered to be low.

4.7.3.10 Additionally, the nature of the sediments is predominantly coarse with low levels of fines. Any release of contaminants from the fine sediments is likely to be rapidly dispersed with the tide and/ or currents. The levels of contaminants present are comparable to the wider regional background.

4.7.3.11 Along the offshore export cable corridor, **Volume 3, Appendix 4.2** predicts the maximum extents of sediment mobilisation from the removal of the offshore export cable will be very limited in extent and duration, indicating a settling time of approximately 24 seconds and a corresponding maximum horizontal extent of short-lived sediment redistribution of approximately 48 m. Finer sediment is predicted to disperse up to 2 km from disturbance, however they constitute a very small proportion of the sediment composition.

4.7.3.12 Therefore, with the limited spatial and temporal extents of sediment mobilisation from the cable removal, the limited percentage of fine sediment anticipated, plus the low contaminant levels, it is considered that the magnitude of impact to GES in the Irish Sea from the disturbance/remobilisation of sediment bound contaminants from Proposed Works Offshore is considered to be **negligible**.

Water quality within Water Framework Directive jurisdiction, within 1 nm of the coast

4.7.3.13 **Volume 3, Appendix 4.2** predicts the maximum extents of sediment mobilisation from the removal of the offshore export cable will be very limited in extent and duration. Therefore, sediment disturbed as a part of the offshore export cable removal is not anticipated to interact with the Southwestern Irish sea or the Southwestern Irish Sea – Killiney Bay water bodies, and will have a very temporally and spatially limited impact on the Southwestern Irish Sea – Brittas Bay water body.

4.7.3.14 Two locations (St01 and St02) are located within the WFD designation (within 1 nm of the coast). Of these, only St01 is located in the vicinity of the cable corridor, however St02 can be used as an indicative location for the sediment quality in the wider WFD designated area (see **Figure 4.9** for sample locations in relation to the WFD jurisdiction). No exceedances of the threshold values were noted in St01, however St02 recorded a small exceedance of arsenic above Action Level 1 (22.5 mg/kg compared to an Action Level value of 20 mg/kg). However, the concentration was significantly below the Action Level 2 value (70 mg/kg) and below the BAC (25 mg.kg), therefore contaminant concentrations in the marine sediment are considered to be low.

4.7.3.15 Additionally, the nature of the sediments is predominantly coarse with low levels of fines. Any release of contaminants from the fine sediments is likely to be rapidly dispersed with the tide and/ or currents. The levels of contaminants present are comparable to the wider regional background.

4.7.3.16 Therefore, with the limited spatial and temporal extents of sediment mobilisation from the offshore export cable removal, plus the low contaminant levels, it is considered that the magnitude of disturbance /remobilisation of sediment bound contaminants from Proposed Works Offshore on WFD designated water bodies is considered to be **negligible**.

Water quality in designated bathing waters

4.7.3.17 **Volume 3, Appendix 4.2** predicts the maximum extents of sediment mobilisation from the removal of the offshore export cable using grapnel runs to locate and recover sections of the cable where burial has been achieved through natural seabed processes. Grapnel runs are characterised by shallow, linear seabed contact and result in the temporary mobilisation of a limited volume of surface sediment immediately adjacent to the cable alignment.

4.7.3.18 The assessment indicates a settling time of approximately 24 seconds and a corresponding maximum horizontal extent of short-lived sediment redistribution of approximately 48 m under peak tidal conditions. Fine-grained sediment exhibits lower settling velocities, however it constitutes only a very small proportion of the sediment composition and therefore does not control the spatial extent of seabed disturbance. Gravel-sized material is expected to deposit immediately adjacent to the disturbance. The designated bathing water sites located within the Coastal Processes, Water and Sediment Quality Study Area will not interact with the mobilised sediment, and therefore water quality in the bathing water sites will not be impacted by the Proposed Works Offshore.

4.7.3.19 Therefore, it is considered that the magnitude of disturbance /remobilisation of sediment bound contaminants from Proposed Works Offshore on designated bathing waters is considered to be **no change**.

Significance of Effect

4.7.3.20 Overall, it is considered that:

- The water quality receptor sensitivity relating to the achievement of GES is **medium** and the magnitude of disturbance/remobilisation of sediment bound contaminants is **negligible**. Therefore, the effect of disturbance/remobilisation of sediment bound contaminants from Proposed Works Offshore is considered to be **Negligible or Minor Adverse**, which is not significant in EIA terms.
- The water quality receptor sensitivity relating to WFD designations is **high** and the magnitude of disturbance/remobilisation of sediment bound contaminants is **negligible**. Therefore, the effect of disturbance/remobilisation of sediment bound contaminants from Proposed Works Offshore is considered to be **Minor Adverse**, which is not significant in EIA terms.
- The water quality receptor sensitivity relating to bathing waters designations is **high** and the magnitude of disturbance/remobilisation of sediment bound contaminants is **no change**. Therefore, the effect of disturbance/remobilisation of sediment bound contaminants from Proposed Works Offshore is considered to be **Neutral**, which is not significant in EIA terms.

Additional Mitigation and Residual Effect

4.7.3.21 Given that effect of disturbance/remobilisation of sediment bound contaminants from Proposed Works Offshore is considered not significant in EIA terms, no additional mitigation measures are proposed. Therefore, the residual effect of disturbance/remobilisation of sediment bound contaminants from Proposed Works Offshore is considered to be at most **Minor Adverse**, which is not significant in EIA terms.

4.7.4 Impacts to the Arklow Bank Morphology and Stability (including Bank Erosion) and to the Coastline (including Coastal Profile Change and Beach Erosion) due to Changes in Seabed Morphology

Receptor Sensitivity

4.7.4.1 The following receptors are considered to be sensitive to changes in seabed morphology:

- Arklow Bank (**medium** sensitivity)
- Near-shore area adjacent to the landfall, including the coastline (**high** sensitivity)

Arklow Bank

4.7.4.2 In the context of this project, the Arklow Bank has **medium** sensitivity because it has moderate capacity to avoid or adapt change, and moderate capacity to accommodate the proposed form of change. Additionally, the bank is anticipated to recover fully within the medium term (i.e. seven to 15 years).

Near-shore area adjacent to the landfall, including coastline

4.7.4.3 The near-shore area adjacent to the landfall has **high** sensitivity because it is an area with low adaptability considering it is an area morphodynamically constrained, close to dynamic equilibrium (stable coast area in terms of erosion) and with limited spatial flexibility as there is limited lateral migration space due to fixed shoreline and infrastructure constraints.

Magnitude of Impact

Arklow Bank

4.7.4.4 Proposed Works Offshore are generally expected to have minor effects on coastal processes, as the natural dynamics of Arklow Bank dominate the evolution of the Sub Lease Area. The presence of the eight vertical structures caused only very localised changes during operation, so their removal will likewise result in limited effects, primarily around MP locations, with no measurable far-field impacts on wave climate, currents, or large-scale morphology.

4.7.4.5 Changes are not expected to go beyond the near-field and impacts are expected to be temporary (i.e. lasting less than 1 year) to short term (i.e. one to seven years). Additionally, if dredging is required to facilitate safe vessel access, the dredging area will occupy a maximum area of 0.287 km^2 (which represents 21.3% of the total Sub Lease Area within the larger sandbank). While changes in the bank caused by potential dredging within the Sub Lease Area and removal of inter-array cables will be discernible, there will be no change to the key characteristics or features of the character or distinctiveness of the bank.

4.7.4.6 Changes in the seabed from offshore export cable removal works will not constitute a pathway to impact the Arklow bank because changes in the seabed corridor are not expected to go beyond the near-field and they are expected to be temporary (i.e. lasting less than 1 year). "Unburial of cable with a running method using a grapnel run or similar" and mechanical pulling (clamps and cable puller) will lead to localised seabed disturbance, not bulk sediment removal. Once the cable is removed, sediments from adjacent areas (not from the Arklow Bank) are expected to naturally infill any local depressions, restoring the seabed profile such that it will become indistinguishable from the surrounding area.

4.7.4.7 Relevant embedded mitigations considered as part of the Proposed Works Offshore include the development and adherence to the Outline Offshore Decommissioning Environmental Management Plan (DEMP). Disposal of dredged material would also only be undertaken within the Sub Lease Area so that the materials stay within the sedimentary system. Pre-dredging surveys will also be used to refine and minimise, where possible, any dredging/disposal areas.

4.7.4.8 Therefore, it is considered that the magnitude of impact to the morphology of Arklow Bank from Proposed Works Offshore is considered to be **low**.

Near-shore area adjacent to the landfall, including coastline

Pathway 1: Changes to the near-shore area (including coastline) due to morphological changes of the Arklow Bank

4.7.4.9 Arklow as a natural defence against storms: Arklow Bank's shallow sandy crest acts as a partial barrier to storm waves, reducing wave energy at the coastline. Wave-breaking over the bank dissipates a portion of storm wave energy, especially at lower tidal water levels, and where the crest is shallower, which results in lower wave heights reaching the adjacent shore. This natural attenuation lessens the erosive impact of storms on the coastline, providing a measure of coastal protection. In essence, Arklow Bank serves as a natural defence against coastal erosion by functioning like a submerged breakwater during storm events.

4.7.4.10 Natural evolution of the bank and its crest: Historical bathymetric records indicate that the broader Arklow Bank system has maintained a remarkably stable overall position for more than a century. The −20 m contour, often considered representative of the more stable core of the sandbank, has remained largely unchanged, indicating that the large-scale framework of Arklow Bank is persistent despite significant changes occurring on the bank crest and upper flanks. While the overall position of the bank is relatively stable, substantial morphological variability occurs on the crest itself. Bathymetric analyses reveal that the crest can experience several metres of vertical seabed change over relatively short periods. Analysis of Earth Observation (EO) imagery covering the period 1984–2025 shows that the crest position of Arklow Bank has not remained fixed but has undergone repeated shifts both eastward and westward over time. Rather than migrating continuously in one direction, the crest exhibits cyclic and episodic movements, reflecting the complex interaction between tidal forcing, wave action, sediment availability and sandbank-scale morphodynamics.

4.7.4.11 Proposed Works Offshore activities that could potentially affect the near-shore area: The Proposed Works may include localised dredging of the bank for vessel access channels. The vessel channels illustrated in **Volume 2, Chapter 3** are indicative, however, in many cases they do not reach the shallowest areas of the bank, which will aim to be avoided by the Principal Decommissioning Contractor to minimise / avoid dredging. Vessel access channels are based on the bathymetry in 2025 so additional pre-dredging bathymetric surveys within the Sub Lease Area will be undertaken a minimum of three days before dredging works commence to confirm bathymetry conditions and refine dredging / disposal areas. As referred in **Volume 2, Chapter 3**, seabed level depth required to ensure safe vessel access in the referred channels for WTG / met mast decommissioning is -4.5 m LAT and -6 m LAT for TP / MP decommissioning.

4.7.4.12 Dredging associated with the creation of temporary access channels may locally modify crest elevations and, consequently, may locally influence wave attenuation processes where wave breaking occurs over the shallowest parts of the bank. The magnitude of this effect is expected to be limited because dredging would be restricted to discrete areas representing a very small proportion of the overall Arklow Bank system, which extends for approximately 27.5 km alongshore and up to 2 km in width. The large-scale morphology of Arklow Bank has remained broadly stable over more than a century despite ongoing natural crest adjustments and sediment redistribution. Any reduction in wave attenuation would therefore be highly localised and contingent upon the simultaneous occurrence of wave conditions and tidal levels under which wave breaking is influenced by the modified seabed elevations. Consequently, potential effects on wave conditions reaching the coastline are considered **negligible** to **low** and temporary in nature.

Pathway 2: Changes to the near-shore area (including coastline) due to disconnection of the offshore export cable

4.7.4.13 Disconnection of the offshore export cable is expected to occur within the vicinity of the landfall, retrieved using a multicat vessel and pulled from land. For the purposes of this assessment, it is assumed that the cable is buried beneath approximately 1 m of sediment, and that the severance point will be located near the original HDD exit point, at approximately 4 m water depth and 180 m from the coastline.

4.7.4.14 This location falls within the active submarine beach zone. Based on application of the Hallermeier (1981) formulation, the depth of closure in the area is estimated to range between approximately 6–12 m water depth under typical wave conditions and 12–25 m under extreme storm conditions, assuming an extreme significant wave height (He) of 4–5 m and associated wave periods (Te) of 8–12 s. As such, the seabed in the vicinity of the Proposed Works Offshore is naturally highly dynamic.

4.7.4.15 The offshore export cable retrieval process (e.g. grapnel run or similar method, combined with mechanical pulling using clamps and cable pullers) will result in localised disturbance of the seabed along the offshore export cable corridor. This activity does not involve bulk sediment removal, but instead creates a narrow, linear trench associated with the cable extraction. The grapnel used for recovery is typically narrow (approximately 0.9 m width), further limiting the spatial footprint of disturbance.

4.7.4.16 Evidence from comparable activities (e.g. Clare *et al.*, 2025) indicates that sediment resuspension during cable recovery is typically localised and short-term, confined to the immediate vicinity of the offshore export cable route. In contrast, natural coastal processes (waves and currents) regularly mobilise significantly larger volumes of sediment, particularly in open coast environments where longshore transport rates can reach orders of magnitude greater than the volumes affected by such localised activities.

4.7.4.17 Following offshore export cable removal, natural sediment transport processes are expected to rapidly infill any temporary depressions created during retrieval. Given the dynamic nature of the submarine beach system, the seabed profile is anticipated to recover to baseline conditions, becoming indistinguishable from the surrounding area over a short timeframe.

4.7.4.18 Accordingly, changes in seabed morphology associated with offshore export cable removal are expected to remain localised and will not propagate beyond the near-field. As such, they will not constitute a meaningful pathway for impacts on the wider nearshore coastal system, including coastline.

4.7.4.19 Relevant embedded mitigation includes the implementation of an Outline Offshore DEMP, which will govern the execution of Proposed Works Offshore and ensure good practice is followed.

4.7.4.20 On this basis, the magnitude of impacts on physical processes and seabed morphology in the nearshore area adjacent to the landfall is assessed as **negligible**.

Significance of Effect

Arklow Bank

4.7.4.21 As described in **Section 4.5**, megaripples are common on the bank crest and shallow flanks, indicating active near-bed transport under typical currents. Sediment budget studies show modest net gains/losses: e.g. a slight net loss along the east flank (−46% of sediment flux) balanced by gains on the west flank and north end. In essence, the sandbank undergoes cyclical redistribution of sediment (gain/loss) without net long-term displacement of its core structure.

4.7.4.22 Overall, it is considered that the receptor sensitivity is **medium** and the magnitude of changes in seabed morphology on the bank is **low**. Therefore, the impact to the morphology of Arklow Bank from the Proposed Works Offshore is considered to be **Minor Adverse**, which can be considered not significant in EIA terms.

Near-shore area adjacent to the landfall

Pathway 1: Changes to the near-shore area (including coastline) due to morphological changes of the Arklow Bank

4.7.4.23 The crest and higher parts of the bank change naturally and so wave attenuation provided by the bank varies between years according to bank morphology. The Proposed Works Offshore outline that dredging, if needed, will be undertaken in localised areas and to water depths (-4.5 m LAT and -6 m LAT) that still allow wave attenuation of higher waves).

4.7.4.24 Overall, it is considered that the receptor sensitivity is **high** and the magnitude of changes in seabed morphology on the bank is between **negligible and low**. Therefore, the impact to the near-shore area (including coastline) due to morphological changes of the Arklow Bank from the Proposed Works Offshore is considered to be **Minor Adverse**, which can be considered not significant in EIA terms.

Pathway 2: Changes to the near-shore area (including coastline) due to disconnection of the offshore export cable

4.7.4.25 Assuming that the severage will be done in the submarine active part of the beach. This means that interfering with seabed in this area could in theory interfere with other near near-shore areas. At a regional scale, the coastline between Mizen Head and Kilmichael Head is considered dynamic but broadly stable. Sandy embayments display seasonal and interannual variability, while long-term shoreline position is constrained by geological controls and offshore sediment availability. The coastal stretch immediately adjacent to the landfall, located immediately north of the Avoca River outlet, is protected by a rock revetment that prevents erosion of the onshore deposits. Accordingly, this section of coastline remained close to dynamic equilibrium between 1984 and 2024.

4.7.4.26 At the outlet of the Avoca River, there appears to be a reversal of the southwards regional littoral drift trend, as sediment accretion is observed immediately south of Arklow Pier, while there is no beach immediately north of the pier. This is likely caused by sandbanks (or a river delta) altering wave directions, and consequently reversing the direction of sediment drift. The area potentially affected (severage point) is an area normally affected by wave dynamics and so it is an area where seabed grainsize is worked according to the existing energy. Resuspended sediment will likely be transported northwards and surface sediments from adjacent areas are expected to naturally infill any depression created by the offshore export cable severage, restoring the seabed profile such that it will become indistinguishable from the surrounding area.

4.7.4.27 Overall, it is considered that the receptor sensitivity is **high** sensitivity and the magnitude of impact from changes in seabed morphology on the nearshore area (and coastline) is **low**. Therefore, the effect of changes in seabed morphology from Proposed Works Offshore is considered to be **Minor Adverse**, which is not significant in EIA terms.

Additional Mitigation and Residual Effect

4.7.4.28 Given that effect of changes in seabed morphology from Proposed Works Offshore is considered not significant in EIA terms, no additional mitigation measures are proposed. Therefore, the residual effect remains **Minor**, which is not significant in EIA terms.

4.7.5 Post-decommissioning monopile (MP) Exposure Causing Scour Impacts on the Arklow Bank

Receptor Sensitivity

4.7.5.1 The following receptor is considered to be sensitive to scour development around MP exposure post-decommissioning:

- Arklow Bank (**medium** sensitivity)

4.7.5.2 The Arklow Bank has **medium** sensitivity because it has moderate capacity to avoid or adapt change, and moderate capacity to accommodate the proposed form of change. Additionally, the bank is anticipated to recover fully within the medium term (i.e. seven to 15 years).

Magnitude of Impact

4.7.5.3 Following Proposed Works Offshore, near-field impacts will occur at the former MP locations (WTG positions and met mast location). These potential impacts arise because structures (and their protective measures) are removed, leaving the natural seabed to re-adjust to changed conditions. The Sub Lease Area lies on a dynamic shallow sandbank crest (~1–12 m deep over bank crest). It is an active sediment environment where the seabed can shift several metres over decades, and where local strong tides and waves cause continuous sand movement and bedform changes.

4.7.5.4 Scour refers to local erosion pits in the seabed due to strong flows around structures. The removal of scour protection around each monopile base means that if any residual monopile stub becomes exposed (very low probability as seen below), currents and waves can directly erode the surrounding seabed, creating scour holes.

4.7.5.5 The Scour Assessment (**Volume 3, Appendix 4.3**) used a Dynamic Scour Prediction Model to simulate worst-case scour post-decommissioning and key findings include:

- For residual MPs (with MPs cut to ~P2 LSBL depths), predicted scour depths are ~1.3–5.8 m (5–95% range) and scour hole radii ~3.4–23.4 m.
- Time to equilibrium: It may take ~2 years to reach the maximum scour depth.

4.7.5.6 Should the residual MPs be exposed, scour holes of several metres depth (up to ~5.8 m in worst case) represent significant vertical change in the immediate vicinity of each residual MP location. The horizontal extent is limited (tens of metres around each residual MP). Each scour pit (~10–50 m diameter) is very small relative to the 25 km length of Arklow Bank, but would represent a notable local change. However, it should be noted that while the model considers wave activity, it does not take into account erosion and backfilling due to morphological activity.

4.7.5.7 From field observations shown in the Handbook of Scour Protection (Deltares, 2023), it can be concluded that sand waves are not currently hindered by the presence of MP, and the same would apply post-decommissioning. Since the scour holes are relatively shallow, in the unlikely case that residual MPs become exposed, a migrating sand wave (or the migration of the entire Arklow Bank) has the potential to fill the scour holes and (re-)bury the any potential residual MPs exposed. In addition, the proposed cutting depth intends residual MPs to remain buried and so the likelihood of exposure is low.

4.7.5.8 The second probability percentile (P2) LSBL has been selected as the MP target cutting depth, considered to represent a very low and rare seabed level value that will minimise post-decommissioning residual MP exposure risks. In addition, a regime of post-decommissioning monitoring is an integral part of Proposed Works Offshore, which will validate decommissioning assumptions, and demonstrate that any residual risks are considered acceptable. Therefore, it is considered that the magnitude of scour development around residual MP exposure post-decommissioning is considered to be **negligible**.

Significance of Effect

4.7.5.9 Overall, it is considered that the receptor sensitivity is **Medium** and the magnitude of impact from scour development on the Arklow Bank around MP exposure post-decommissioning is **Negligible**. Therefore, the effect is considered to be **Negligible or Minor Adverse**, which is not significant in EIA terms.

Additional Mitigation and Residual Effect

4.7.5.10 Given that effect of scour development in the Arklow Bank around potential residual MP exposure post-decommissioning is considered not significant in EIA terms, no additional mitigation measures are proposed from a geomorphological perspective. Therefore, the residual effect of scour development around residual MP exposure post-decommissioning is considered to be **Negligible or Minor Adverse**, which is not significant in EIA terms.

4.8 Cumulative Effects

4.8.1.1 As indicated in **Volume 2, Chapter 1**, cumulative effects result from the addition of many minor or significant effects, including effects of other projects, to create larger, more significant effects (EPA, 2022).

4.8.1.2 The assessment of cumulative effects on coastal processes, water and sediment quality presented in this section has followed the methodology set out in **Volume 2, Chapter 1**, which, in summary comprises:

- **Stage 1: Establish the long list of other developments to consider**, based on the location of other plans and projects (other developments) located within the cumulative Zone of Influence (ZoI), defined as 20 km from the Offshore Site, corresponding to approximately two tidal excursions during a mean spring tide, providing a scientifically robust proxy for the maximum potential offshore transport of suspended sediments and hydrodynamic alterations that could be introduced by the Proposed Works Offshore either alone or in combination with other plans and projects;
- **Stage 2: Establish the short list of other developments to consider**, gathering key information on the other developments that is publicly available, considering the presence of potential pathways for cumulative effects and applying the Stage 2 screening criteria outlined in **Table 4.14**;

Table 4.14: Stage 2 screening criteria

Stage 2 Screening Criteria	
1	Development expected to be constructed / operational before commencement of Proposed Works is to be included as part of the baseline and hence screened out of the assessment.
2	Development not anticipated to temporally overlap or not anticipated to introduce potential for sequential cumulative effects and hence screened out of the assessment.
3	Development not anticipated to introduce physical effect-receptor pathway overlap and hence screened out of the assessment.
4	Development not anticipated to introduce non-physical effect-receptor pathway overlap and hence screened out of the assessment.
5	Low data confidence / low certainty that development will be realised and hence screened out of the assessment.
6	Potential pathway for cumulative effects exists and hence screened into the assessment.

- **Stage 3: Information gathering**. Gathering additional publicly available information on shortlisted developments to inform the assessment of the potential cumulative effects in more detail; and
- **Stage 4: Assessment**. Applying the same methodology used to assess the potential environmental effects of Proposed Works alone.

4.8.1.3 Stages 1 and 2 are presented in **Volume 3, Appendix 1.2: Cumulative Screening**, and the short list i.e. the other developments screened into the assessment of potential cumulative effects on coastal processes, water and sediment quality are outlined in **Table 4.15**, and are also shown on **Figure 4.14.**

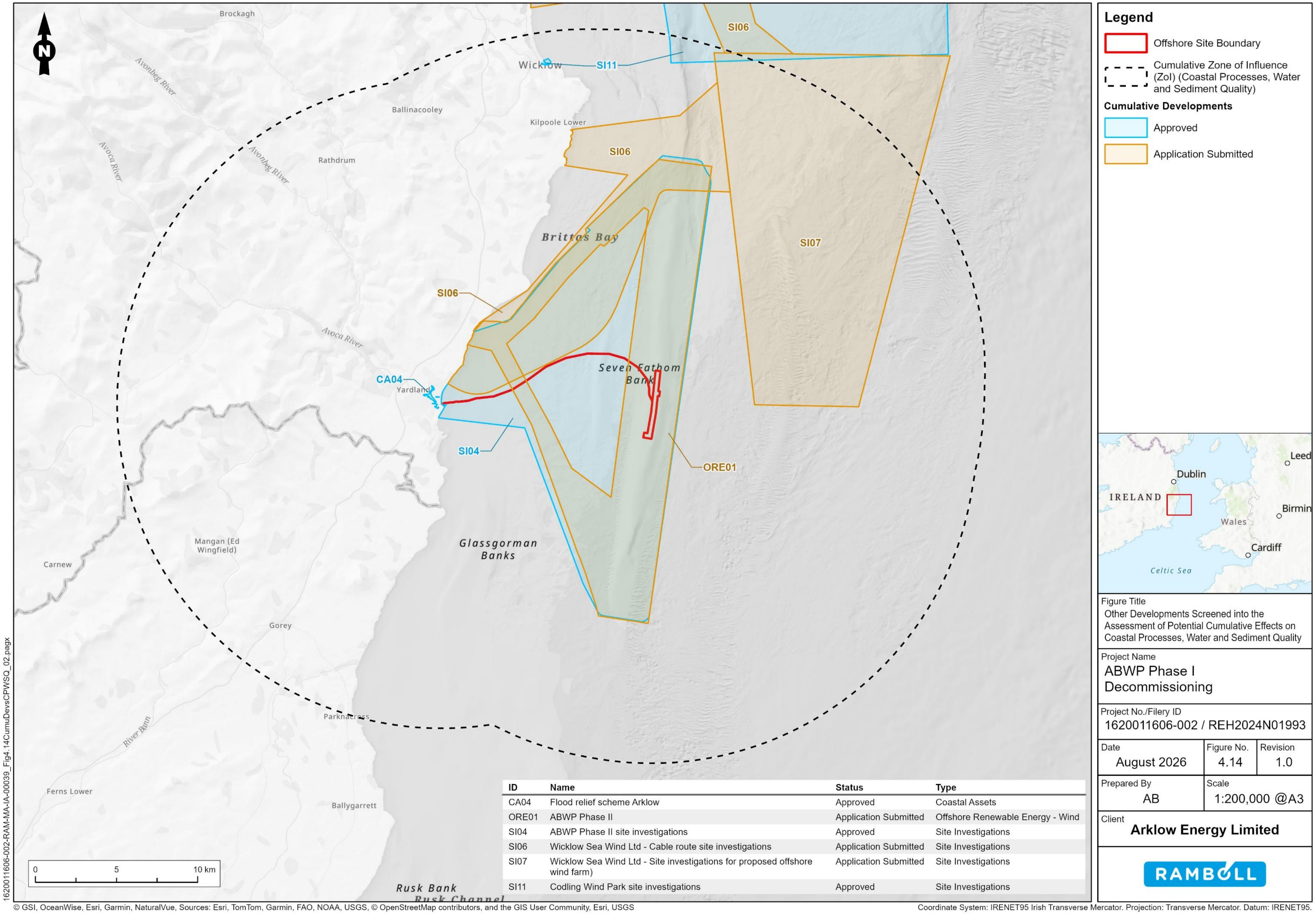
4.8.1.4 A number of the impacts considered for the Proposed Works Offshore alone, as outlined in **Table 4.3**, have not been considered within the CEA due to reasons outlined below:

- Impacts to water quality from the disturbance / remobilisation of sediment-bound contaminants – results from sediment sampling indicate that low concentrations of contamination is present in sediment within the Coastal Processes, Water and Sediment Quality Study Area, with all contaminant concentrations being recorded as below the sediment quality thresholds with the exception of four marginal Irish Action Level 1 exceedances of arsenic. Therefore, cumulative effects beyond natural background variation in the Irish Sea are considered unlikely and have not been considered further in this section.

- Scour development in the Arklow Bank around residual MP exposure post-decommissioning – this is because the exposure of residual MPs due to future seabed lowering represents a low-probability scenario, dependent on long-term local sediment mobility processes. In addition, any scour effects would be highly localised around individual residual MP locations and are not expected to interact spatially or functionally with other nearby projects, including the proposed ABWP Phase II. On this basis, no pathway for cumulative interaction has been identified.

Table 4.15: Other developments screened into the assessment of potential cumulative effects on coastal processes, water and sediment quality

Other developments shortlisted (ID)	Type	Tier and status	Distance (km)	Pathway for Cumulative Effect
Arklow Bank Wind Park Phase II Site Investigations (SI04)	Site investigations	Tier 1 Approved (valid to July 2029)	0	Project falls within cumulative ZoI for several impact pathways including changes in water quality.
ABWP Phase II (ORE01)	Offshore renewable energy	Tier 1 Planning application submitted	0	Project falls within cumulative ZoI for several impact pathways including changes in water quality.
Wicklow Sea Wind Ltd - Cable Route Site Investigations. Site investigations for an export cable corridor from a Celtic Sea offshore windfarm (OWF) to the Wicklow coast (SI06)	Site investigations	Tier 1 Application submitted	0.11	Project falls within cumulative ZoI for several impact pathways including changes in water quality.
Flood relief scheme Arklow (CA04)	Coastal asset	Tier 1 Approved	0.27	Project falls within cumulative ZoI for several impact pathways including changes in water quality.
Wicklow Sea Wind Ltd., Site Investigations for the proposed Wicklow Project offshore wind farm, off County Wicklow (SI07)	Site investigations	Tier 1 Application submitted	5.53	Project falls within cumulative ZoI for several impact pathways including changes in water quality.
Codling Wind Park (CWP) Limited, Site investigations to inform the location and detailed design of the proposed CWP OWF (SI11)	Site investigations	Tier 1 Approved, undergoing Judicial Review	19.89	Project falls within cumulative ZoI for several impact pathways including changes in water quality.



ID	Name	Status	Type
CA04	Flood relief scheme Arklow	Approved	Coastal Assets
ORE01	ABWP Phase II	Application Submitted	Offshore Renewable Energy - Wind
SI04	ABWP Phase II site investigations	Approved	Site Investigations
SI06	Wicklow Sea Wind Ltd - Cable route site investigations	Application Submitted	Site Investigations
SI07	Wicklow Sea Wind Ltd - Site investigations for proposed offshore wind farm)	Application Submitted	Site Investigations
SI11	Codling Wind Park site investigations	Approved	Site Investigations

Figure 4.14: Other developments screened into the assessment of potential cumulative effects on Coastal Processes, Water and Sediment Quality

Impact to Water Quality from Increased Suspended Sediment Concentrations (SSC)

4.8.1.5 There are no Tier 2 or Tier 3 projects which overlap spatially or temporally with the Proposed Works Offshore and therefore Tier 2 and Tier 3 projects have not been considered further.

Receptor Sensitivity

4.8.1.6 The following receptors are considered to be sensitive to increased SSC:

- Water quality within the Coastal Processes, Water and Sediment Quality Study Area from the physical effect caused by the Proposed Works Offshore (**medium** sensitivity);

Water quality within the Coastal Processes, Water and Sediment Quality Study Area

4.8.1.7 The Irish Sea is a large waterbody, and therefore likely able to accommodate changes due to its relative size and capacity for dilution. Therefore, the receptor sensitivity in terms of its ability to accommodate physical effects caused by the Proposed Works Offshore is considered to be **medium** sensitivity.

Magnitude of Cumulative Impact

4.8.1.8 Based on Coastal Processes Modelling, the maximum distance over which disturbed sediment could travel from the Offshore Site as a plume and deposit on the seabed is 48 m for activities occurring along the export cable route and a maximum of 7 km for activities in the Sub Lease Area. Therefore, cumulative effects could occur where another project or development has a sediment dispersion distance that could overlap with the sediment plume from the Proposed Works Offshore.

4.8.1.9 There are two Tier 1 projects which directly overlap with the Proposed Works Offshore which are the construction of ABWP Phase II and site investigations related to ABWP Phase II. The maximum distance travelled by a sediment plume produced during ABWP Phase II construction is 8 km. For ABWP Phase II site investigations, any sediment disturbance is expected to be extremely minor compared to background conditions with any small sediment plume not exceeding 5 km from the disturbance. Any sediment plume produced by the Proposed Works Offshore is expected to settle and deposit on the seabed rapidly, with sediment disturbance in the export cable route predicted to be very minor and settle rapidly. In the Sub Lease Area, disturbed gravel is predicted to deposit on the seabed immediately and adjacent to the area of disturbance. Sand and mud are expected to travel further (up to 7 km) with the majority of sediment settling over several hours following disturbance.

4.8.1.10 The timeframes for these activities are currently not confirmed but it is anticipated that there may be some overlap. However, as ABWP Phase II is being constructed in an area around the Offshore Site, it is anticipated that ABWP Phase II works will not commence until towards the end of the Proposed Works Offshore. Therefore, any overlap in timeframe is expected to be minor, if it occurs at all.

4.8.1.11 Similarly, cable route and site investigations for the Wicklow Project Offshore Wind Farm are also expected to result in very minor, small and localised disturbance of sediment with any resulting sediment plume expected to be negligible compared to natural sediment transport.

4.8.1.12 Coastal Processes Modelling has not been undertaken for the Arklow Flood Relief Scheme. Dredging undertaken as part of the flood relief works is expected to result in some increased SSC and subsequent deposition of sediment. However, dredging for the flood relief works will take place within the Avoca River and be timed so that they do not occur within important migratory periods of lamprey and salmon using the Avoca River (i.e. approximately October to April). It is also expected that any increase in SSC as a result of the flood relief works will be short-lived and in line with baseline turbid conditions of the Avoca River.

4.8.1.13 Finally, the Codling Wind Park site investigations (SI11) include localised seabed-interacting activities, including geotechnical and benthic investigations, which may result in temporary and highly localised and limited sediment disturbance. Potential effects on water quality, including those associated with the survey activities and accidental incidents involving survey vessels, were considered in the supporting documentation describing the site investigations and would be managed through adoption of standard practice emergency plans. However, SI11 is located at the outer extent of the 20 km cumulative ZoI, approximately 19.89 km from the Offshore Site. Given the localised nature of the sediment disturbance and the physical separation from the Proposed Works Offshore, sediment plumes generated by SI11 are not anticipated to spatially interact with those generated by the Proposed Works Offshore.

4.8.1.14 Therefore, it is considered that the cumulative magnitude of increased SSC and associated deposition with Tier 1 projects and plans, from Proposed Works Offshore, is considered to be **low**.

Significance of Cumulative Effect

4.8.1.15 Overall, it is considered that the receptor sensitivity is **medium** and the cumulative magnitude of increased SSC is **low**. Therefore, the cumulative effect of increased SSC and deposition with Tier 1 projects and plans, from Proposed Works Offshore, is considered to be **Minor Adverse**, which is not significant in EIA terms.

Additional Mitigation and Residual Effect

4.8.1.16 Given that the cumulative effect of increased SSC and deposition from Proposed Works Offshore is considered not significant in EIA terms, no additional mitigation measures are proposed.

4.8.1.17 Therefore, the residual cumulative effect of increased SSC and deposition from Proposed Works Offshore and Tier 1 projects, is considered to be **Minor Adverse**, which is not significant in EIA terms.

Changes in Seabed Morphology

4.8.1.18 Any cumulative effects resulting from changes in seabed morphology are limited to developments that either directly overlap with the footprint of the Proposed Offshore Works and/or alter physical processes (currents, waves, or winds) in a way that affects seabed morphology. Therefore, there are two Tier 1 projects which have been considered for changes in seabed morphology, based on their spatial and temporal overlap with the Proposed Works Offshore: Arklow Bank Wind Park Phase II Site Investigations and ABWP Phase II development.

4.8.1.19 There are no Tier 2 or Tier 3 projects which overlap spatially or temporally with the Proposed Works Offshore and therefore Tier 2 and Tier 3 projects have not been considered further.

Receptor Sensitivity

4.8.1.20 The following receptors are considered to be sensitive to changes in seabed morphology:

- Arklow Bank (**medium** sensitivity)

4.8.1.21 Justification for receptor sensitivity to changes in seabed morphology is provided in **Section 4.7.4**.

Magnitude of Cumulative Impact

4.8.1.22 As ABWP Phase II is being constructed in an area around the Offshore Site, it is anticipated that ABWP Phase II works will not commence until towards the end of the Proposed Works Offshore. Therefore, any overlap in timeframe is expected to be small, if it occurs at all.

4.8.1.23 Site investigations like vibrocores, boreholes, CPTs in the sandbank will have a very localised disturbance given the very small footprint (cm to dm scale) and very shallow impact (localised sediment removal). According to the studies done for this project (**Volume 3, Appendices 4.1** and **4.3**), and also to the baseline information, sandbank variability are in the order of metres to >10 m, scour holes are between 1 and 6 m depth to tens of m wide, and the bank is dominated by natural processes. For these reasons, the magnitude of the cumulative impact caused by site investigations is negligible. Thus, the cumulative impact magnitude considered over the Arklow Bank on changes in seabed morphology will be dictated by the ABWP Phase II.

4.8.1.24 ABWP Phase II will introduce changes to hydrodynamics and morphology of the Arklow Bank. For hydrodynamics, ABWP Phase II will introduce new obstacles resulting in a net effect governed by proposed offshore infrastructure. In terms of sediment transport, ABWP Phase II will cause potential localised disruption resulting in possible redistribution of transport patterns. In terms of morphology, the ABWP Phase II will bring new local disturbances and scour, and so the cumulative outcome will be a dynamic re-adjustment of the sandbank. In summary, the cumulative effects brought by ABWP Phase II will not be additive, but rather a replacement of one disturbance by another.

4.8.1.25 Therefore, it is considered that the cumulative magnitude of changes in seabed morphology with Tier 1 projects and plans, from Proposed Works Offshore, after the implementation of embedded mitigation is considered to be **low**.

Significance of Cumulative Effect

4.8.1.26 While the introduction of a new offshore wind farm represents a measurable pressure (moderate magnitude) through localised hydrodynamic disturbance, sediment redistribution, and seabed alteration, these effects remain spatially restricted and do not affect system-scale processes. The Arklow Bank is characterised by a highly dynamic morphodynamic regime, with natural seabed variability significantly exceeding the magnitude of project-induced changes. As a result, the receiving environment is considered to have low sensitivity, with a strong capacity for natural recovery and redistribution of sediments.

4.8.1.27 Furthermore, the cumulative interaction between Proposed Works Offshore and the proposed ABWP Phase II does not lead to an additive or amplifying effect; rather, it represents a transition between two states of localised disturbance. Model results indicate that large-scale hydrodynamics, sediment transport pathways, and morphological evolution remain controlled by natural processes.

4.8.1.28 Overall, it is considered that the receptor sensitivity is medium and the cumulative magnitude of changes in seabed morphology is Low. Therefore, the cumulative effect of with Tier 1 projects and plans, from Proposed Works Offshore, is considered to be **Minor Adverse**, which is not significant in EIA terms.

Additional Mitigation and Residual Effect

4.8.1.29 Given the minor significance of the predicted cumulative impacts on coastal processes and seabed morphology, no additional specific mitigation measures are considered necessary beyond those embedded in the Proposed Works Offshore.

4.9 Transboundary Effects

4.9.1.1 **Volume 3, Appendix 1.3: Transboundary Screening** presents the screening of potential transboundary effects on shipping and navigation using PINS screening criteria (PINS, 2025) using information contained within this EIAR chapter.

4.9.1.2 As stated in **Volume 3, Appendix 1.3**, the approximate distance between the Offshore Site and the nearest maritime boundary is 33 km to the UK (Wales), which is beyond the Coastal Processes, Water and Sediment Quality Study Area / ZoI, which extends 20 km from the Offshore Site. Accordingly, no transboundary effects on coastal processes, water and sediment quality are anticipated to result from Proposed Works Offshore.

4.10 Summary

4.10.1 Summary of Effects

4.10.1.1 This chapter has assessed the potential impacts on coastal processes, water and sediment quality from Proposed Works Offshore. For all impact pathways assessed in **Section 4.7**, it was concluded that residual effects would be Neutral, Minor Adverse or Negligible.

4.10.1.2 **Table 4.16** presents a summary of impacts and confirms the residual effects.

4.10.2 Summary of Additional Mitigation and Monitoring

4.10.2.1 No additional mitigation or monitoring has been proposed in relation to coastal processes, water and sediment quality beyond that embedded to Proposed Works Offshore.

Table 4.16: Summary of potential impacts and residual effects

<table>
<tr><th>Impact</th><th>Embedded mitigation</th><th>Sensitivity of receptor</th><th>Magnitude of impact</th><th>Significance of impact</th><th>Additional mitigation and monitoring</th><th>Residual effect</th></tr>
<tr><td>Impact to water quality from increased SSC</td><td rowspan="8">MPs will be cut below the seabed at a depth that will minimise post-decommissioning residual MP exposure risks.
If dredging for vessel access is required, disposal of dredged material will only be undertaken within the Sub Lease Area updrift from the dredge location.
If dredging is required, pre-dredging surveys will be undertaken to refine and minimise dredging/disposal areas, where possible. Development and adherence to the Detailed Offshore DEMP (see outline version in Volume 3, Appendix 3.4).
Development and adherence to the Detailed VMP (see outline version in Volume 3, Appendix 3.5).
Development and adherence to the Detailed WMP (see outline version in Volume 3, Appendix 3.8).
Post-decommissioning monitoring will be undertaken to verify resulting seabed condition and inform the Close Out Report. If monitoring confirms any observed residual MP exposure, then the relevant authorities will be informed.</td><td>Water quality (medium sensitivity)</td><td>Low</td><td>Minor Adverse (not significant)</td><td>No</td><td>Minor Adverse (not significant)</td></tr>
<tr><td rowspan="3">Impact to water quality from disturbance /remobilisation of sediment bound contaminants</td><td>Water quality in the wider marine area (GES Indicator 8) (medium sensitivity);</td><td>Negligible</td><td>Negligible or Minor Adverse (not significant)</td><td>No</td><td>Negligible or Minor Adverse (not significant)</td></tr>
<tr><td>Water quality in WFD designated waterbodies (high sensitivity);</td><td>Negligible</td><td>Minor Adverse (not significant)</td><td>No</td><td>Minor Adverse (not significant)</td></tr>
<tr><td>Water quality in designated bathing waters within the Study Area (high sensitivity).</td><td>No change</td><td>Neutral (not significant)</td><td>No</td><td>Neutral (not significant)</td></tr>
<tr><td rowspan="2">Impacts to the Arklow Bank morphology and the coastline due to changes in seabed morphology</td><td>Arklow Bank (Medium sensitivity)</td><td>Low</td><td>Minor Adverse (not significant)</td><td>No</td><td>Minor Adverse (not significant)</td></tr>
<tr><td>Near-shore area (high sensitivity)</td><td>Negligible</td><td>Minor Adverse (not significant)</td><td>No</td><td>Minor Adverse (not significant)</td></tr>
<tr><td>Post decommissioning monopile (MP) exposure causing scour impacts on the Arklow Bank</td><td>Arklow Bank (medium sensitivity)</td><td>Negligible</td><td>Negligible or Minor Adverse (not significant)</td><td>No</td><td>Negligible or Minor Adverse (not significant)</td></tr>
</table>

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