Arklow Bank Wind Park 2

Environmental Impact Assessment Report

Volume II, Chapter 6: Coastal Processes (Revised March 2026)

sse Renewables

Version	Date	Status	Author	Reviewed by	Approved by
1.0	13/05/2024	Final (External)	GoBe Consultants	GoBe Consultants	Sure Partners Limited
2.0	16/03/2026	Final External (Revised March 2026)	GoBe Consultants	GoBe Consultants	Sure Partners Limited

Statement of Authority

Experts	Qualifications	Experience
GoBe/ APEM: Claire Hinton (Author)	BSc (Hons) Marine Sciences at Southampton University, Southampton (1996) Doctorate on the 'Decadal morphodynamic behaviour of the Holland shoreface' from the Flood Hazard Research Centre, Middlesex University (2000)	Dr Claire Hinton has over 18 years' experience in marine environmental consultancy, specifically in the field of physical processes and numerical modelling. As a Principal Consultant, she has acted as Project Director, Project Manager and Technical Expert for a wide range of projects within the Offshore Wind and Oil & Gas sectors. Within commercial projects, she has contributed to Environmental Impact Assessments and associated requirements, from conception through to decommissioning. She has also contributed to guidance for regulators and decision-makers.
GoBe/ APEM: Sammy Sheldon (2024 Technical Reviewer)	MSci (Hons) Oceanography at University of Southampton (2011)	Sammy is an environmental consultant with thirteen years commercial experience, including project management, with a background in oceanography. Sammy has practical experience of field work, statistical analysis of data, report writing and mapping in ArcGIS. She has worked extensively across a range of marine sectors include renewables, oil and gas, ports and harbours and marine water quality. She has also contributed to technical chapters and reports for incorporation into Environmental Statements including physical processes, marine water and sediment quality and Water Framework Directive assessments. Furthermore, her experience of the production of post-consent compliance documentation includes drafting of pre-construction documents and environmental appraisals of revised construction methods to gain regulatory approval. In her previous employment she specialised as a numerical modeller in marine and coastal settings. This entailed the construction, calibration and application of hydrodynamic and wave models. These models were used for a range of applications including quantifying changes to physical process regimes and water quality. In

		addition, Sammy has undertaken numerous metocean studies for a range of marine sectors, including simple weather downtime assessments through to extreme value analysis of winds and waves.
GoBe/ APEM: Anna Kalish (Technical Reviewer)	BSc (Hons) Geography, Newcastle University, First Class MSc Oceanography, University of Southampton, Distinction	Anna joined GoBe having graduated from the University of Southampton in September 2021 with a Distinction in MSc Oceanography, specialising in Physical Oceanography and Climate. Throughout her studies she has developed a comprehensive understanding of the interaction of oceanographic and sedimentary processes occurring in coastal regions, as well as the risks posed to these systems from anthropogenic impacts. She has experience in statistical analysis, climate modelling, GIS, and the processing and interpretation of marine and geophysical datasets. At GoBe, Anna has contributed to a number of offshore wind farm Physical Processes studies, including the preparation of scoping reports, technical appendices, and PEIR and EIA chapters across English, Scottish and Irish jurisdictions. She also has experience writing and contributing to technical assessments for incorporation into Environmental Statements for Marine Water & Sediment Quality and Infrastructure & Other Marine Users.

Contents

Figures

Tables

Glossary

Term	Meaning
Amphidromic point	A geographical location where the tidal range is zero, i.e. the harmonic constituents of the tide has zero amplitude. So, the tidal range increases with distance from this location. An amphidromic point is said to be degenerate when its centre appears to be located over land rather than water.
An Bord Pleanála (ABP)	The independent statutory body that decides on appeals from planning decisions made by local authorities in Ireland. An Bord Pleanála also decides major strategic infrastructural projects under the provisions of the Planning and Development (Strategic Infrastructure) Act 2006 and will have responsibility for determining planning permission for certain classes of development within the maritime area and for the generality of offshore development beyond the nearshore.
Arklow Bank Wind Park 1 (ABWP1)	Arklow Bank Wind Park 1 consists of seven wind turbines, offshore export cable and inter-array cables. Arklow Bank Wind Park 1 has a capacity of 25.2 MW. Arklow Bank Wind Park 1 was constructed in 2003/04 and is owned and operated by Arklow Energy Limited. It remains the first and only operational offshore wind farm in Ireland.
Arklow Bank Wind Park 2 – Offshore Infrastructure	"The Proposed Development", Arklow Bank Wind Park 2 Offshore Infrastructure: This includes all elements under the existing Maritime Area Consent.
Arklow Bank Wind Park 2 (ABWP2) (the Project)	Arklow Bank Wind Park 2 (ABWP2) (The Project) is the onshore and offshore infrastructure. This EIAR is being prepared for the Offshore Infrastructure. Consents for the Onshore Grid Infrastructure (Planning Reference 310090) and Operations Maintenance Facility (Planning Reference 211316) has been granted on 26th May 2022 and 20th July 2022, respectively. • Arklow Bank Wind Park 2 Offshore Infrastructure: This includes all elements to be consented in accordance with the Maritime Area Consent. This is the subject of this EIAR and will be referred to as 'the Proposed Development' in the EIAR. • Arklow Bank Wind Park 2 Onshore Grid Infrastructure: This relates to the onshore grid infrastructure for which planning permission has been granted. • Arklow Bank Wind Park 2 Operational and Maintenance Facility (OMF): This includes the onshore and nearshore infrastructure at the OMF, for which planning permission has been granted. • Arklow Bank Wind Park 2 EirGrid Upgrade Works: any non-contestable grid upgrade works, consent to be sought and works to be completed by EirGrid.
Array Area	The Array Area is the area within which the Wind Turbine Generators (WTGs), the Offshore Substation Platforms (OSPs), and associated cables (export, inter- array and interconnector cabling) and foundations will be installed.
Array Scale	Referring to spatial patterns, processes, or effects that extend over distances comparable in size to the Array Area.

Term	Meaning
Cable Corridor and Working Area	The Cable Corridor and Working Area is the area where cabling will be installed and will link the Array Area to the Landfall north of Arklow.. This area will also facilitate vessel jacking operations associated with installation of WTG structures and associated foundations within the Array Area.
Cable protection	External armouring applied to exposed cables or used at cable crossings, typically comprised of rock (berms or bags), ducting (polyurethane, steel, High Density Polyethylene (HDPE), cast iron or plastic) or concrete mattresses.
Concrete mattressing	A solution for providing protection to cables from dropped objects, fishing trawl boards and scour (Subsea Protection Systems, 2020). Typically, several metres wide and long, cast of articulated concrete blocks which are linked by a polypropylene rope lattice which are placed on and/or around structures to stabilise the seabed and inhibit erosion.
Coastal Processes	Marine processes, below the High-Water Mark (HWM) which include the following elements: • Morphology, including bathymetry, geology, surficial sediments and seabed form; • Hydrodynamics, including tidal, non-tidal influences and waves; and • Sediment transport, including bedload, littoral and suspended sediment transport.
Coastal Processes Study Area	The MAC area with an additional buffer zone (known as the Zone of Influence) defined by tidal ellipses and sediment plume modelling.
Environmental Impact Assessment (EIA)	An Environmental Impact Assessment (EIA) is a statutory process by which certain planned projects must be assessed before a formal decision to proceed can be made. It involves the collection and consideration of environmental information, which fulfils the assessment requirements of the Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment as amended by Directive 2014/52/EU of the European Parliament and of the Council (EIA Directive).
Environmental Impact Assessment Report (EIAR)	An Environmental Impact Assessment Report (EIAR) is a report of the effects, if any, which the proposed project, if carried out, would have on the environment. It is prepared by the developer to inform the EIA process.
EIAR Scoping Report	The EIAR Scoping Report sets out the proposed scope of work and methods to be applied in the development of an Environmental Impact Assessment Report (EIAR).
Foundation	The load carrying support structure for the wind turbine generator tower or offshore substation platform topside. The foundation is the part of the structure from the interfacing flange with the turbine tower or topside-foundation interface, down to below seabed. This includes any secondary steel items associated with the structure. For the purposes of the EIAR the term 'foundation' includes the structure from the WTG tower or topside interface down to the lower end of the monopile commonly known as the 'substructure' and encompasses monopiles and transition pieces.

Term	Meaning
Landfall	The area in which the offshore export cables make landfall and is the transitional area between the offshore cabling and the onshore cabling.
Large-scale	Referring to spatial patterns, processes, or effects that extend over distances of several to tens of kilometres.
Maritime Area Consent (MAC)	A consent to occupy a specific part of the maritime area on a non-exclusive basis for the purpose of carrying out a Permitted Maritime Usage strictly in accordance with the conditions attached to the MAC granted on 22nd December 2022 with reference number 2022-MAC-002.
Megaripples	Flow-transverse bed forms with a typical length of 5 m to 20 m and crest heights of 0.2 m to 1.5 m (definition aligned with that presented in Partrac (2022)).
Mitigation measure	Measure which would avoid, reduce, or offset an impact.
Permitted Maritime Usage	The construction and operation of an offshore wind farm and associated infrastructure (including decommissioning and other works required on foot of any permission for such offshore wind farm).
Regional Scale	Referring to spatial patterns, processes, or effects that extend over distances of tens to hundreds of kilometres.
Sandwaves	Flow-transverse marine subaqueous dunes, often with superimposed megaripples, with a typical length of 100 m to 800 m and crest heights of several metres (definition aligned with that presented in Partrac (2022)).
Scour protection	A solution for preventing scour around subsea structures, typically comprised of rock or concrete mattresses.
Semi-diurnal	Two high and two low tides each day, with both highs and both lows of roughly equal height
Small-scale	Referring to spatial patterns, processes, or effects that extend over distances of tens to metres up to several kilometres.
Permitted Maritime Usage	The construction and operation of an offshore wind farm and associated infrastructure (including decommissioning and other works required on foot of any permission for such offshore wind farm).
The Application	The full set of documents that will be submitted to An Bord Pleanála in support of the consent.
The Developer	Sure Partners Ltd.
Trenchless techniques	Trenchless techniques include steerable direct pipe thrusting and Horizontal Directional Drilling (HDD)which allow cable ducts to be installed underground without the need to excavate trenches.
Zone of Influence (ZoI)	Area within which an environmental impact upon Coastal Processes may occur – defined using tidal ellipses and sediment plume modelling.

Acronyms

Term	Meaning
AA	Appropriate Assessment
ABP	An Bord Pleanála
ABS	Acoustic Backscatter
ABWP1	Arklow Bank Wind Park 1
ABWP2	Arklow Bank Wind Park 2
ADCP	Acoustic Doppler Current Profiler
BSI	British Standards Institution
CD	Chart Datum
Cefas	Centre for Environment, Fisheries and Aquaculture Sciences
CFE	Controlled Flow Excavator
CIA	Cumulative Impact Assessment
CPT	Cone Penetration Test
DCCAE	Department of Communications, Climate Action and Environment
DECC	Department of the Environment, Climate, and Communications
DECC	Department of Energy and Climate Change
DHPLG	Department of Housing, Planning and Local Government
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
HAT	Highest Astronomical Tide
HDD	Horizontal Directional Drilling
Hs	Significant wave height
HWM	High-Water Mark
INFOMAR	Integrated Mapping for the Sustainable Development of Ireland's Marine Resource
LAT	Lowest Astronomical Tide
MAC	Maritime Area Consent
MHW	Mean High Water
MHWN	Mean High Water Neaps
MHWS	Mean High Water Springs

Term	Meaning
MLWN	Mean Low Water Neaps
MLWS	Mean Low Water Springs
MMO	Marine Management Organisation
MSFD	Marine Strategy Framework Directive
MSL	Mean Sea Level
NAO	North Atlantic Oscillation
NIS	Natura Impact Statement
NPWS	National Parks and Wildlife Service
NRW	Natural Resources Wales
OBS	Optical Backscatter
OGI	Onshore Grid Infrastructure
OMF	Operational and Maintenance Facility
OPW	Office of Public Works
OREDP	Offshore Renewable Energy Development Plan
ORESG	Offshore Renewable Energy Steering Group
OSP	Offshore Substation Platform
OWF	Offshore Wind Farm
RCP	Representative Concentration Pathway
RFI	Request for Information
SAC	Special Area of Conservation
SEA	Strategic Environmental Assessment
SECPA	South East Coastal Protection Alliance
SPM	Suspended Particulate Matter
SSC	Suspended Sediment Concentration
Tp	Peak wave period
TSHD	Trailing Suction Hopper Dredger
Tz	Zero-peak wave crossing period
UKHO	United Kingdom Hydrographic Office
WTG	Wind Turbine Generator
ZoI	Zone of Influence

Units

Unit	Description
km	Kilometres
m	Metres
m^2	square metres
m/s	metres per second
m/y	Metres per year
mm	Millimetres
nm	nautical miles
μm	micrometre

6 Coastal Processes

Summary of Changes

This Chapter has been updated to reflect changes since submission of the planning application to An Bord Pleanála (ABP) (now An Coimisiún Pleanála (ACP)) in June 2024. All references to ABP, should be considered ACP throughout the document.

The changes that have been made are in response to the Request for Information (RFI) that was received and matters that have been raised therein. The Developer confirms that this chapter has been based on up-to-date survey reports and data and that that the information submitted is relevant and appropriate at the point of submission (i.e. March 2026). In summary, the following sections of this Chapter have been amended (please note that this is non-exhaustive):

- Section 6.1 (Introduction) has been updated to identify any new or revised documentation of relevance to the amended chapter;
- Section 6.2 (Regulatory Context) has considered the latest policy and legislation of relevance to the assessment;
- Section 6.4 (Study Area) has provided clarification on the rationale for choosing the Study Area where this has been raised via the RFI, so as to clearly demonstrate the logic and spatial appropriateness for the assessment boundary.
- Section 6.5 (Methodology) has been updated to reflect appropriate and relevant data that has been published and/or gathered since the original submission was made.
- Section 6.6 (Baseline) has been updated to reflect appropriate and relevant data that has been published and/or gathered since the original submission was made
- Section 6.7 (Impact Assessment Methodology) has considered the latest project design (as detailed in Volume II, Chapter 4: Description of Development (Revised March 2026)) as well as provided clarification in response to the RFI on the impacts scoped in/out where requested, so as to clearly demonstrate the logic and appropriateness of the assessment that has been undertaken.
- Section 6.8 (Methodology for Significance of Effects) has been updated where relevant to reflect the latest guidance and criteria as well as clarification on the Factored In Measures where this has been raised via the RFI and/or updated following additional modelling which has been undertaken.
- Section 6.9, 6.10 and 6.11 (Assessment subsections) represents the updated assessment which has been amended to reflect the latest information (i.e. as described above) and any updates required in line with matters raised via the RFI;
- Sections 6.12 and 6.13 (Cumulative Assessment subsections) have been updated to reflect the latest information and to align with NSIP (2024) guidance as requested via the RFI.
- Section 6.15 (Summary of Effects) has been updated to reflect the updates that have been made throughout the chapter.

In addition to those changes above, all other sections of this chapter have been adjusted to ensure consideration of the latest information as appropriate to ensure consistency and accuracy. Clarification and/or further detail has also been provided where this has been requested via the RFI, relevant figures and tables have been updated as required and it is confirmed that all cross-references have been updated throughout to ensure accuracy.

Additionally, in support of the necessary changes to the chapter, it is noted that the following updates have been made to the appendices supporting this chapter:

- Revised Appendices:
  - Volume III, Appendix 6.1: Marine Physical Processes Numerical Modelling (Revised March 2026) – This is an updated appendix that supersedes the previous version.
- New Appendices:
  - Volume III, Appendix 6.2: Arklow Bank Sediment Mobility Assessment (RFI March 2026) - This is a new appendix.
  - Volume III, Appendix 6.3: Quantitative Assessment of the Influence of In-place Infrastructure on the Local Sediment Transport System (RFI March 2026) - This is a new appendix.
- Additionally, as requested via the RFI, relevant documents have been submitted in Volume IV.

6.1 Introduction

6.1.1.1 This chapter of the EIAR presents the assessment of the potential impacts of the Arklow Bank Wind Park 2 (ABWP2) Offshore Infrastructure (hereafter referred to as 'the Proposed Development') on Coastal Processes. Specifically, this chapter considers the potential impact of the Proposed Development below the High-Water Mark (HWM) during the construction, operational and maintenance, and decommissioning phases.

6.1.1.2 For the purposes of both this EIAR chapter and the associated Technical Report, Coastal Processes includes the following elements:

- Morphology, including bathymetry, geology, surficial sediments and seabed form;
- Hydrodynamics, including tidal and non-tidal influences, and waves; and
- Sediment transport, including bedload, littoral and suspended sediment transport.

6.1.1.3 This chapter should be read in conjunction with the following chapters from Volume II:

- Chapter 4: Description of Development (Revised March 2026);
- Chapter 7: Marine Water and Sediment Quality (Revised March 2026);
- Chapter 9: Benthic Subtidal and Intertidal Ecology (Revised March 2026);
- Chapter 10: Fish, Shellfish and Sea Turtle Ecology (Revised March 2026);
- Chapter 11: Marine Mammals (Revised March 2026); and
- Chapter 18: Marine Archaeology and Cultural Heritage (Revised March 2026).

6.1.1.4 This chapter draws upon information contained within Volume III, Appendix 6.1: Marine Physical Processes Numerical Modelling (Revised March 2026), Volume III, Appendix 6.2: Arklow Bank Sediment Mobility Assessment (RFI March 2026), and Volume III, Appendix 6.3: Arklow Bank – Quantitative Assessment of the Influence of In-place Infrastructure on the Local Sediment Transport System (RFI March 2026), in addition to supporting documentation as presented in Volume IV: Appendices to Support the Response to the Request for Information.

6.2 Regulatory background

6.2.1.1 The assessment of potential impacts upon Coastal Processes has been made with specific reference to the relevant legislation, plans and policies (Table 6.1). Full details are provided in Volume II, Chapter 2: Policy and Legislation (Revised March 2026).

6.2.1.2 In addition, a number of other guidance documents specific to the consideration of Coastal Processes are available from jurisdictions with established offshore renewable energy sectors where comprehensive guidance has been developed. This guidance will be used to inform the assessment of the potential impacts.

Table 6.1: Summary of regulatory background

Publisher	Name of document incl. reference	Key provisions
Statutory		
Legislation		
European Commission, 2011	European Communities (Marine Strategy Framework) Regulations 2011 (S.I. No. 249 of 2011) (as amended);	Transposes EU Directive 2008/56/EC (Marine Strategy Framework Directive) into Irish law. The regulations were most recently amended August 2025 to transfer ministerial function to the Minister for Housing, Local Government and Heritage.
Minister for Housing, Local Government and Heritage, 2000	Planning and Development Act 2000 (as amended)	The Planning and Development Act 2000 (as amended) establishes the foundation for planning in Ireland and combines a wide range of legislation relating to different sectors in one place. The Act sets out the process for applying for and attaining planning permission which includes the requirements for an Environmental Impact Assessment (EIA). The main regulations that underpin the Act are the Planning and Development Regulations 2001 (S.I. No. 600 of 2001). The Regulations have been amended and are collectively called the Planning and Development Regulations 2001 to 2025.
UK Government 2017	Conservation of Habitats and Species Regulations 2017	Maintain or, where appropriate, restore habitats and species listed in Annexes I and II of the Habitats Directive to a favourable conservation status.
European Commission, 1992	European Union (EU) Council Directive 92/43/EEC on the conservation of natural habitats and of wild flora and fauna (the 'Habitats Directive')	Protects habitats and species of European nature conservation importance through the establishment of a network of designated sites.
European Commission, 2008	Marine Strategy Framework Directive (MSFD) (EU, 2008)	Descriptors of Good Environmental Status, Descriptor 6: Seafloor integrity is at a level that ensures that the structure and functions of the ecosystems are safeguarded and benthic ecosystems, in particular, are not adversely affected. Descriptors of Good Environmental Status, Descriptor 7: Permanent alteration of hydrographical conditions does not adversely affect marine ecosystems.
Planning Policy and Development Control		
DECC, 2024	South Coast Designated Maritime Area Plan for Offshore Renewable Energy	Contains the AA screening process and SEA scoping report of the South Coast Maritime area associated with offshore renewable energy (ORE). This

Publisher	Name of document incl. reference	Key provisions
	(SC-DMAP) https://assets.gov.ie/static/documents/south-coast-designated-maritime-area-plan-for-offshore-renewable-energy-october-2024.pdf	resource has some important information on existing baseline conditions in the maritime area including benthic habitats.
The Department of Housing, Planning and Local Government (DHPLG), 2021	National Marine Planning Framework https://www.gov.ie/en/publication/60e57-national-marine-planning-framework/	Provides a suite of National Marine Planning Policies, which are aligned with descriptors provided within the Marine Strategy Framework Directive (MSFD 2008/56/EC).Those with relevance to coastal processes Include: • *Sea-floor and water column integrity* (An assessment of the Proposed Development upon these descriptors is provided in Section's 6.10.1,6.10.2,6.11.1 and 6.11.2 of this EIAR Chapter)*:* – *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 National Marine Planning Framework. 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;* • *Climate change* (An assessment of the Proposed Development upon these descriptors is provided in Sections 6.10.2 and 6.11.2 of this EIAR Chapter, in addition to Volume II, Chapter 9: Benthic Subtidal and Intertidal Ecology (Revised March 2026) of this EIAR document); – *Policy 1 - Proposals should demonstrate how they:* *• avoid contribution to adverse changes to physical features of the coast;* *• enhance, restore or recreate habitats that provide a flood defence or carbon sequestration ecosystem services where possible.*

Publisher	Name of document incl. reference	Key provisions
		Where potential significant adverse impacts upon habitats that provide a flood defence or carbon sequestration ecosystem services are identified, these must be in order of preference and in accordance with legal requirements: *a) avoided,* *b) minimised,* *c) mitigated,* *d) if it is not possible to mitigate significant adverse impacts, the reasons for proceeding must be set out.* *This policy should be included as part of statutory environmental assessments where such assessments are required.*
Department of Communications, Climate Action and Environment (DCCAE), 2018.	Offshore Renewable Energy Development Plan (OREDP) Interim Review https://www.gov.ie/en/publication/71e36-offshore-renewable-energy-development-plan-ii-oredp-ii/	Providing an assessment of progress on the key policy actions set out in the 2014 OREDP. Including Action 9: Environmental Monitoring.
DHPLG and Office of Public Works (OPW), 2023.	Coastal Change Management Strategy Report https://www.gov.ie/en/publication/9a967-report-of-the-inter-departmental-group-on-national-coastal-change-management-strategy/	Report detailing the outcome from scoping a National Coastal Change Management Strategy, which included a suit of recommendations. These included recommendations for: • coastal monitoring and data collection; • coastal asset database; • coastal change research programme; and • national assessment of coastal change risk.
Guidelines and technical standards		
Environmental Protection Agency (EPA), 2022	Guidelines on the Information to be Contained in Environmental Impact Assessment Reports https://www.epa.ie/publications/monitoring--assessment/assessment/EIAR_Guidelines_2022_Web.pdf	These Guidelines apply to the preparation of all Environmental Impact Assessment Reports undertaken in the State (Ireland). Guidance is provided on the expected scope of the Baseline Scenario.

Publisher	Name of document incl. reference	Key provisions
(Environmental Working Group of the Offshore Renewable Energy Steering Group (ORESG) and the Department of Communications, Climate Action and Environment (DCCAE), 2017)	Guidance on Environmental Impact Statement (EIS) and Natura Impact Statement (NIS) Preparation for Offshore Renewable Energy Projects. https://www.gov.ie/en/publication/3d6efb-guidance-documents-for-offshore-renewable-energy-developers/#	Guidance on the EIS processes and documentation, including the requirements for descriptions of the receiving environment, assessment of likely significant effects. Including specific Guidance on Coastal Processes: '*Depending on the location there are potential significant effects from offshore renewable energy projects associated with marine Coastal Processes relating to sedimentation, wave impacts and coastal erosion. In addition to sediment sampling, hydrographic, geophysical and tidal current surveys are often required to support the assessments. A variety of model simulations relating to sediment dispersal, tidal flow and wave impacts can be used in determining the likely significant effects*.'
Non-Statutory		
Guidelines and technical standards		
Lambkin *et al*., 2009	Coastal Process Modelling for Offshore Wind Farm Environmental Impact Assessment: Best Practice Guide	Best practice on the identification, development, calibration, validation and scenarios to be applied for OWF projects. Listed as a relevant guidance document within Appendix II of Guidelines on EIS and NIS Preparation for Offshore Renewable Energy Projects (ORESG and DCCAE, 2017).
Judd, 2012	Guidelines for Data Acquisition to Support Marine Environmental Assessments of Offshore Renewable Energy Projects	Generic advice for the acquisition of data to support environmental assessments for offshore renewable energy developments. Guidance is provided in the design, review and implementation of environmental data collection and analytical activities associated with all stages of offshore renewable energy developments.
Brooks *et al.*, 2018	Natural Resources Wales (NRW) Monitoring Evidence Report No: 243 Guidance on Best Practice for Marine and Coastal Physical Processes Baseline Survey and Monitoring Requirements to inform EIA of Major Development Projects	Guidance on marine, coastal and estuarine physical processes developed from a review of existing published guidance relevant to physical processes EIA studies, consideration of project examples and from the experience gained by the authors during work on large scale marine developments. Information is included on: • EIA baseline survey and monitoring requirements for – hydrodynamics (waves, tidal currents and water levels); – sediments, sediment transport and geology; and – morphology. • pathways for change and potential impacts for each of the development stages; and

Publisher	Name of document incl. reference	Key provisions
		• potential magnitude of these changes, identifying for which development types and development stages they are likely to be greatest. This guidance is considered to be highly comprehensive as a result of the large range of oceanographic conditions within Welsh waters, and provides information relevant to the Irish Sea.
BERR, 2008	Review of Cabling Techniques and Environmental Effects applicable to the Offshore Wind Farm Industry. Department for Business Enterprise and Regulatory Reform in association with Defra	Provides a description of the range of techniques used to install and maintain subsea cables. Information is also provided on a range of commonly applied cable protection measures, in addition to the technical information on cable design and installation. Discussion is also afforded on the physical changes or effects to the seabed and sub-surface sediments expected to occur during cabling activities are also described. This includes consideration of the relative extent/ magnitude of sediment disturbance that is likely to occur during cable burial for each technique as well as potential sediment plume characteristics. The latter is discussed with reference to direct field monitoring during cable installation activities.
Natural England and Joint Nature Conservation Committee, 2022.	Nature conservation considerations and environmental best practice for subsea cables for English Inshore and UK offshore waters	Identifies the main pressures, sensitive habitats, and best practice for the placement, installation and maintenance of subsea cables in English Inshore and UK offshore waters.
Natural England, 2018	Offshore wind cabling: ten years experience and recommendations	Presents Natural England's position with respect to the environmental impacts of power cable installation and highlighting any concern for nature conservation.
Marine Management Organisation (MMO), 2014	Review of environmental data associated with post-consent monitoring of licence conditions of Offshore Wind Farms (OWFs). MMO Project No: 1031	Provides outcomes and conclusions from monitoring campaigns, with specific consideration to physical processes monitoring, with a focus on: • scour; • suspended sediments; • current/wave effects; and • monitoring of coastal morphology.
Natural England, 2022	Best Practice Advice for Evidence and Data Standards for offshore renewables projects	Provision of best practice advice on the use of data and evidence to support OWF development and consenting in English waters. Focus is made on the key ecological receptors which pose a consenting risk for projects, namely seabirds, marine mammals, seafloor habitats and species and fish.
ABPmer *et al.*, 2010	Further review of sediment monitoring data. (COWRIE ScourSed-09)	Provides a review of available physical processes monitoring data, any lessons learnt and recommendations for future sediment monitoring. The review focuses upon:

Publisher	Name of document incl. reference	Key provisions
		• suspended sediments, • seabed morphology; and • scour. Monitoring data available from within built arrays is considered and recommendations are provided for refining monitoring strategies (e.g. that associated with bathymetric survey timing, consistency and extent) to enable robust determination of change between pre- and post-construction survey.
HR Wallingford *et al*., 2007	Dynamics of scour pits and scour protection - Synthesis report and recommendations. (Sed02)	Provides a synthesis of the following: • Identification, collation and review of all available field evidence for scour from Round 1 wind farm projects and other relevant European marine projects; • UK and European research relating to scour and scour protection for the wind farm industry; • Publications and guidance relating to scour and scour protection within other marine industries, including types of scour protection and their potential impact on coastal processes and navigation; • Design and installation of scour protection for Scroby Sands against the performance as recorded by previous Data, Technology and Innovation funded investigations; • Design and installation of scour protection for other UK and European sites, potentially including scour in relation to cabling as well as foundations; and • Gaps in the scour and scour protection knowledge base, especially on mobile sandbanks.
ABPmer and METOC, 2002	Potential effects of offshore wind developments on Coastal Processes.	Identifies, reviews and assesses the potential effects on coastal from UK Round 1 OWF developments, including: • appropriate baseline characterisation to enable robust assessment of potential effects; and • key data requirements for each coastal process parameter, including information on measurement frequency and duration. Listed as a relevant guidance document within Appendix II of Guidelines on EIS and NIS Preparation for Offshore Renewable Energy Projects (ORESG and DCCAE, 2017).

6.3 Consultation

6.3.1.1 Consultation responses received specific to Coastal Processes are provided in Table 6.2.

6.3.1.2 Consultation responses in relation to the potential impacts on specific environmental receptors, arising from the effects of changes to Coastal Processes, are presented in Volume II, Chapter 7: Marine Water and Sediment Quality (Revised March 2026); Volume II, Chapter 9: Benthic Subtidal and Intertidal Ecology (Revised March 2026); Volume II, Chapter 10: Fish, Shellfish and Sea Turtle Ecology (Revised March 2026); Volume II, Chapter 11: Marine Mammals (Revised March 2026); and Volume II, Chapter 12: Offshore Ornithology (Revised March 2026).

Table 6.2: Summary of consultation relating to Coastal Processes

Date	Consultation type	Consultation and key issue raised	Section where provision is addressed
March 2023	Public Event	Concerns raised about the impacts of the development upon the sandbank and nearby beaches.	An assessment of the Proposed Development upon seabed morphology and coastal processes is provided in Sections 6.10.1, 6.10.2, 6.11.1 and 6.11.2 of this EIAR Chapter.
8th April 2023	ABWP2 Pre-Scoping Consultation – South East Coastal Protection Alliance (SECPA)	SECPA consider that an OWF development on the Arklow Sandbank (or any sandbank, for that matter) will inevitably lead to significant, irreversible damage to the natural ecosystems that exists there and on the proximate coastline. SECPA also consider that the presence of a wind farm would cause and accelerate coastal erosion.	Considerations of the ecosystem impacts of the Proposed Development are provided in: • Volume II, Chapter 9: Benthic Subtidal and Intertidal Ecology (Revised March 2026); • Volume II, Chapter 10: Fish, Shellfish and Sea Turtle Ecology(Revised March 2026); • Volume II, Chapter 11: Marine Mammals (Revised March 2026); • Volume II, Chapter 12: Offshore Ornithology (Revised March 2026) An assessment of the Proposed Development upon the proximate coastline, including coastal behaviour, is provided in Sections 6.10.1, 6.10.2, 6.11.1 and 6.11.2 of this EIAR Chapter.
13th June 2023	An Bord Pleanála (ABP) pre application meeting	ABP's representatives stated that coastal processes, stability issues, sediment release or potential changes to tidal patterns and possible erosion need to be addressed in the application.	An assessment of the Proposed Development upon coastal processes is provided in Sections 6.10.1, 6.10.2, 6.11.1 and 6.11.2 of this EIAR Chapter. An assessment of the potential effects upon the hydrodynamic regime, including tides and consequential seabed changes, is provided in Section 6.10.2 and paragraph 6.10.2.26.
8th August 2023	ABWP2 Scoping Consultation – Environmental Health Service	A detailed assessment/ sampling of the current ground stability of the seabed to confirm seabed sediment type, existing contamination status and faunal community type for the proposed	Considerations of the existing seabed sediment regime is provided in paragraph 6.6.1.18 of this EIAR Chapter. A consideration of sediment contamination is provided in Volume II, Chapter 7: Marine Water and Sediment Quality (Revised March

Date	Consultation type	Consultation and key issue raised	Section where provision is addressed
		renewable energy development. The assessment should include the impact construction work may have on the future stability of the seabed, taking into consideration scouring and extreme weather events i.e. waves and the potential erosion.	2026) with faunal communities discussed in Volume II, Chapter 9: Benthic Subtidal and Intertidal Ecology (Revised March 2026). An assessment of the potential impact of the Proposed Development upon seabed receptors is provided in Sections 6.10.1, 6.10.2, 6.11.1 and 6.11.2 of this EIAR Chapter.
8th August 2023	ABWP2 Scoping Consultation. – Environmental Health Service	All proposed mitigation measures should be detailed in the EIAR. Information should be provided on the make and model of the turbines and on construction details for the turbine foundations, including the depth and volume of concrete required in the seabed.	Volume II, Chapter 4, Description of Development (Revised March 2026), provides detail on the characteristics of the Proposed Development, including mitigation measures. Those mitigation measures relevant for Coastal Processes are provided in Section 6.8.3 of this EIAR Chapter.
8th August 2023	ABWP2 Scoping Consultation. – Environmental Health Service	The Environmental Health Service recommends that a detailed Stability/ Seabed Assessment/ Sampling of the proposed site should be undertaken to assess the suitability of the seabed for the Proposed Development. The EIAR should include provision for a stability monitoring programme to identify early signs of potential slides.	A seabed mobility assessment has been undertaken for the Proposed Development: Partrac, 2022. Arklow Bank Wind Park Morphodynamic Study Interpretative Report.
8th August 2023	ABWP2 Scoping Consultation. – Environmental Health Service	All existing or proposed wind farm developments in the vicinity should be clearly identified in the EIAR. The impact on sensitive receptors of the Proposed Development combined with any other wind farm/ renewable energy developments in the vicinity should be considered. The EIAR should include a detailed assessment of any likely significant cumulative impacts of the proposed renewable energy development.	All existing/ proposed wind farm developments within the vicinity of the Proposed Development and relevant to the Cumulative Impacts Assessment (CIA) presented in Section 6.12 of this EIAR Chapter are based upon the results of a screening exercise (Volume III, Appendix 3.2: Cumulative Impact Assessment Screening (Revised March 2026)).

6.4 Study area

6.4.1.1 This description of the existing (baseline) environment provides a regional (far-field) overview prior to focusing on the Coastal Processes Study Area and in recognition of the different elements of the Proposed Development. As such descriptions are provided for the following sub-areas:

- Array Area (including Wind Turbine Generators (WTGs), Offshore Substation Platforms (OSPs) inter-array cables, export cables and interconnectors cables);
- Cable Corridor and Working Area (including export, interconnectors, inter-array cables and Working Area for construction activities), which includes the transition from offshore to nearshore marine process environmental conditions; and
- Landfall.

6.4.1.2 The Coastal Processes Study Area is presented in Figure 6.1 and includes a buffer zones to represent a "Zone of Influence (ZoI)" for potential impacts that might be created within the main areas of activity. Using a precautionary approach, the buffer zones are scaled to conservatively represent the equivalent distance of two tidal excursions on a mean spring tide and comprise a distance of, approximately, 20 km in a north-south direction from the Proposed Development's boundary, and 4 km in a west-east direction corresponding with the direction of the tidal flow (paragraph 6.6.1.4 *et seq*). The use of tidal excursions to define a ZoI is considered standard practice as part of Coastal Processes EIAR and is recommended by guidance provided by Natural Resources Wales (NRW) (Brooks *et al.,* 2018; as detailed in Table 6.1).

6.4.1.3 The ZoI has therefore been defined, using standard EIAR techniques and a technical understanding of foreseeable potential impacts from the Proposed Development, to specifically encapsulate all those impacts which result from the transport and deposition of disturbed sediments. In terms of other potential impact pathways (for example those relating to wider sediment transport pathways), the results from Volume III, Appendix 6.3: Arklow Bank – Quantitative Assessment of the Influence of In-place Infrastructure on the Local Sediment Transport System (RFI March 2026) 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. As shown in Figure 6.2 (Figure 4.8 Volume III, Appendix 6.3: Arklow Bank – Quantitative Assessment of the Influence of In-place Infrastructure on the Local Sediment Transport System (RFI March 2026)), changes to the sediment pathways along the eastern side of the bank are anticipated to be localised, relatively small, and limited to areas within or immediately adjacent to the Arklow Bank. The ZoI as applied to this Coastal Processes EIAR chapter is therefore considered to sufficiently encompass the potential spatial scale that is necessary to identify, describe and assess in an appropriate manner the direct and indirect significant effects of the Proposed Development on coastal processes in accordance with Article 3(1) of the EIA Directive.

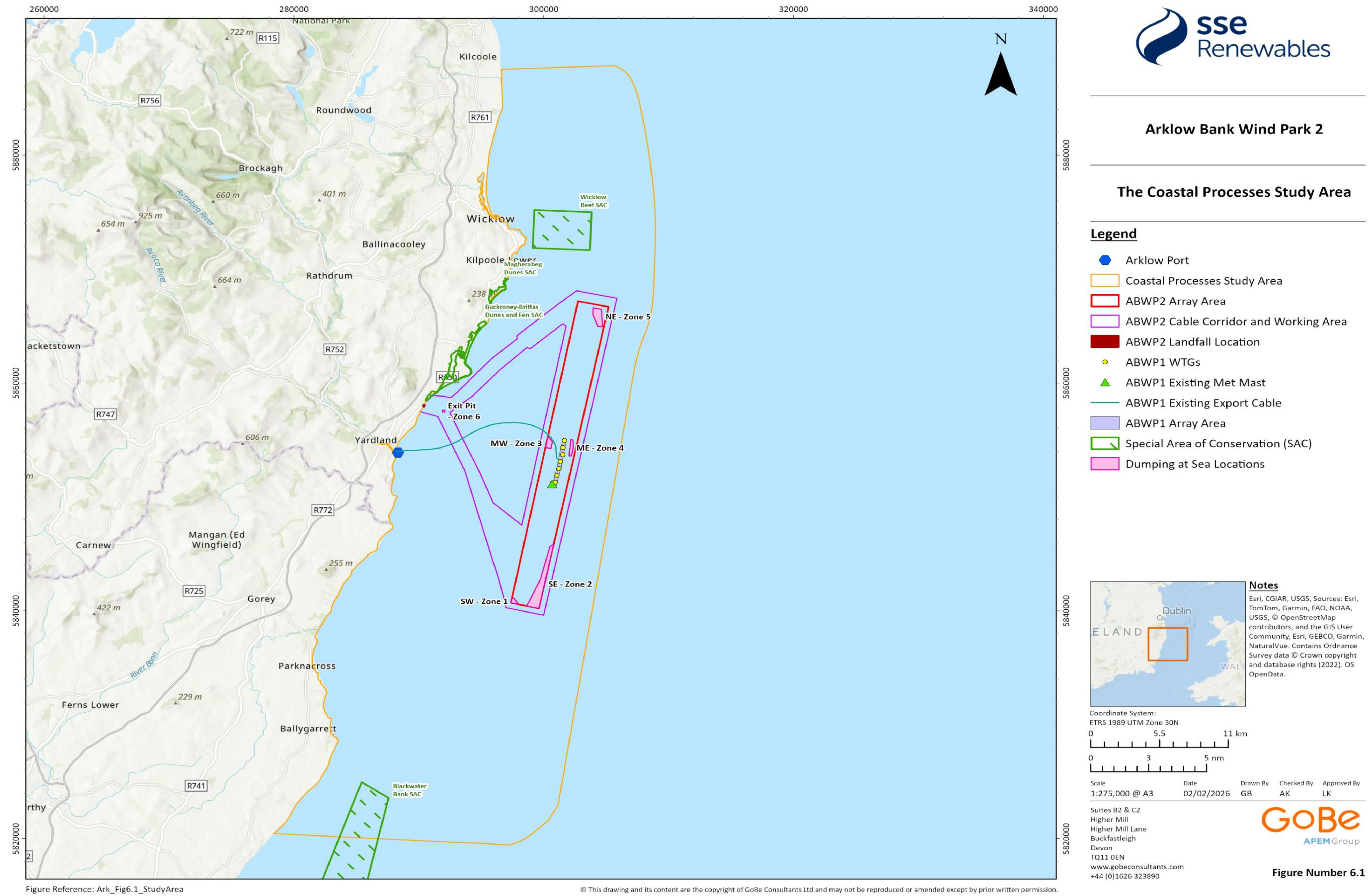

Figure 6.1: The Coastal Processes Study Area

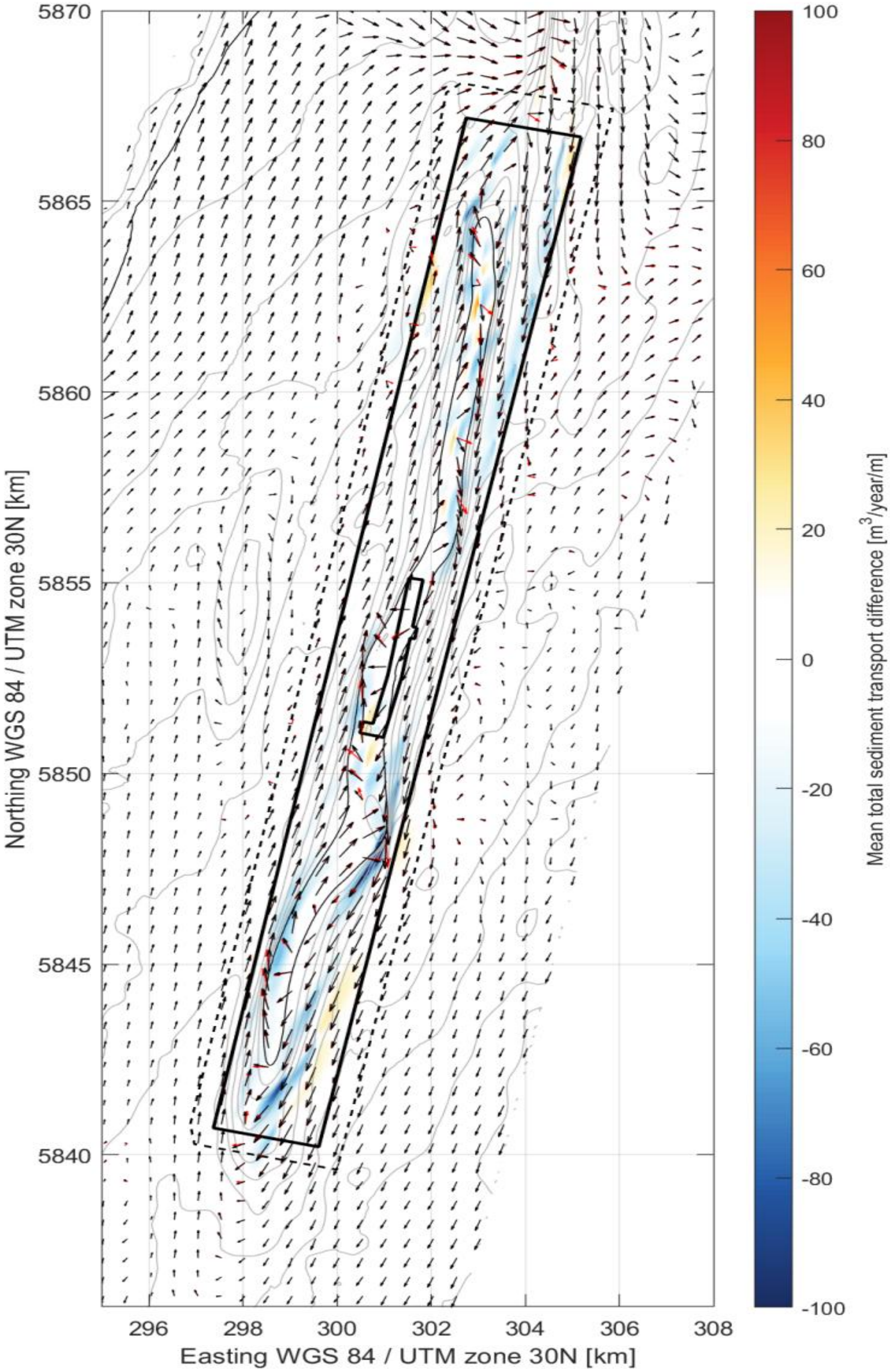

Figure 6.2: Difference between modelled sediment transport pathways within the Coastal Processes Study Area during the baseline (do-nothing) scenario and with Project Design Option 1, as shown in Deltares (2026)

6.5 Methodology

6.5.1 Methodology to inform the baseline

Desktop studies

6.5.1.1 Information on the baseline environment within the Coastal Processes Study Area was collected through a detailed desktop review of existing studies and datasets. Those sources which have been identified as providing useful information regarding Coastal Processes within the study area, including those which provide detail regarding past behaviour, for example historic coastal behaviour, are presented in Table 6.3 and include:

- Data available from a number of marine data portals, including the Integrated Mapping for the Sustainable Development of Ireland's Marine Resource (INFOMAR) (https://www.infomar.ie/ [Accessed January 2026]) and the Marine Institute (http://www.marine.ie [Accessed January 2026]);
- Existing marine process investigations from across the Coastal Processes Study Area, including the EIAR and supporting documentation for Arklow Bank Wind Park 1 (ABWP1), noting that ABWP1 is part of the existing (baseline) environment; and
- Numerical modelling of hydrodynamic, wave and sediment transport processes developed to inform this assessment.

Site specific surveys

6.5.1.2 In order to inform the EIAR, site-specific surveys were undertaken. A summary of the surveys used to inform the Coastal Processes impact assessment is outlined in Table 6.4.

Table 6.3: Summary of key desktop reports and data resources

Title	Source	Year	Author
Coastal morphological modelling to assess the dynamics of Arklow Bank, Ireland	International Journal of Science Research	2009	Panigrahi J.K., Ananth P.N. and Umesh P.A.
Strategic Environmental Assessment (SEA) of the Offshore Renewable Energy Development Plan (OREDPI and OREDPII) in the Republic of Ireland	Department of the Environment, Climate and Communication (DECC)	2010	DECC
Irish Coastal Protection Strategy Study and Catchment Flood Risk Assessment Management Studies	Office of Public Works (OPW)	2010	RPS Group Ltd
Morphological Modelling to Investigate the Role of External Sediment Sources and Wind and Wave-Induced Flow on Sandbank Sustainability: An Arklow Bank Case Study	Journal of Marine Science and Engineering	2023	Creane, S., O'Shea, M., Coughlan., Murphy, J.
Development and Dynamics of Sediment Waves in a Complex Morphological and Tidal Dominant System: Southern Irish Sea.	Journal of Geosciences	2022	Creane, S., Coughlan, M., O'Shea, M., Murphy, J.
Dumping at Sea Permit Application: Material Analysis Report	EPA	2016	Arklow Energy Limited
Arklow Bank Wind Farm 1: monitoring survey 2004 - 2022	Arklow Energy Limited	Multiple	GE Wind Energy
Stratigraphic model of the Quaternary sediments of the Western Irish Sea Mud Belt from core, geotechnical and acoustic data	Geo-Marine Letters	2019	Coughlan, M,. Wheeler, A.J., Dorschel, B., Long, M., Doherty, P. and Morz, T.
Seabed Mapping Programme	Integrated Mapping for the Sustainable Development of Ireland's Marine Resource (INFOMAR)	Multiple	INFOMAR

Table 6.4: Site specific information

Data source	Date(s) of survey	Overview of survey/ report	Survey contractor
Arklow Bank - Quantitative Assessment of the Influence of In-place Infrastructure on the Local Sediment Transport System (RFI March 2026)	2026	Updates to previous morphodynamic modelling carried out by Deltares, in order to address key items identified during the RFI. Document appended in Volume III, Appendix 6.3: Arklow Bank - Quantitative Assessment of the Influence of In-place Infrastructure on the Local Sediment Transport System (RFI March 2026) .	Deltares
Arklow Bank Sediment Mobility Assessment (RFI March 2026).	2025	Detailed sediment mobility study to provide information on potential future seabed dynamics, including review of existing data and results of a morphodynamic model. Document as appended in Volume III, Appendix 6.2: Arklow Bank Sediment Mobility Assessment (RFI March 2026). In terms of future bed-level changes this document is considered to present the most up-to-date predictions for the purposes of EIAR.	Deltares
Arklow Environmental Survey	2025	Information regarding the survey details and associated analysis of a project specific benthic survey.	Aquafact
Geophysics and Hydrographic Data Processing and Interpretation Report.	2023	Information regarding the survey details and associated analysis of the project specific geophysical survey.	Green Rebel Ltd
Arklow Bank Wind Park Morphodynamic Study Interpretative Report.	2022	Detailed assessment report on sediment transport and morphological change within the Array Area, Cable Corridor and Working Area and wider region. Based on historical data, project specific survey results and numerical models.	Partrac
Field Operations and Preliminary Results Report (ISO Part 1) Arklow Bank Wind Park – Geotechnical Borehole Survey 2022	2022	Results from the project -specific borehole survey.	Fugro GB Marine

Data source	Date(s) of survey	Overview of survey/ report	Survey contractor
Arklow Bank Wind Park: LF2 Landfall Feasibility Study	2022	Feasibility Study to demonstrate a cable Landfall by using a Horizontal Directional Drilling technique at a site located to the north of Arklow	Waterman Infrastructure & Environment Limited
Arklow Bank Offshore Wind Farm Environmental Monitoring. Benthic Ecology Survey Report	2021	Information regarding the survey details and associated analysis of the project specific benthic survey.	Aquatic Services Unit MS210201
Arklow Offshore Wind Farm Metocean Study, Final Data Report.	2021	Half hourly data, for temperature, conductivity, salinity, density, turbidity, waves, water level, currents, at five locations on Arklow Bank.	Fugro GB Marine
Arklow Bank Wind Park II. Cable Landfall: Feasibility Study	2020	Feasibility Study to determine suitable cable Landfall methods, and the preferred Landfall site, through a process of Options Appraisal.	Waterman Infrastructure & Environment Limited
Arklow Bank Wind Park Export cable route: Results Report	2019	Information regarding the survey details and associated analysis of the project specific geophysical survey. For a Cable Corridor and Working Area defined prior to refinement.	Ultrabeam Hydrographic Ltd
Arklow Bank Wind Park Array Area: Results Report	2019	Information regarding the survey details and associated analysis of the project specific geophysical survey. For an Array Area defined prior to refinement.	Ultrabeam Hydrographic Ltd
Geological and Geotechnical Desk Top Study	2018	Presentation of a geological and geotechnical understanding of the Array Area and Cable Corridor and Working Area, prior to the collection of project specific data.	Cathie Associates Ltd

Identification of designated sites

6.5.1.3 All designated sites within the Coastal Processes Study Area and qualifying interests that could be affected by the construction, operational and maintenance, and decommissioning phases of the Proposed Development were identified using the three-step process described below:

- *Step 1: All designated sites of international, national and local importance within the Coastal Processes Study Area were identified using a number of sources. These included the Environmental Protection Agency (EPA) and National Parks and Wildlife Service (NPWS) websites.*
- *Step 2: Information was compiled on the relevant qualifying interest for each of these sites which may make them a sensitive receptor in terms of Coastal Processes. For example, wave blockage effects may result in coastline changes*
- *Step 3: Using the above information and expert judgement, sites were included for further consideration if:*
  - *A designated site directly overlaps with the Proposed Development; or*
  - *Sites and associated qualifying interests were located within the ZoI for potential impacts associated with the Proposed Development.*

6.5.1.4 Those designated sites that are considered within this Coastal Processes EIAR are presented in Table 6.5 and shown in Figure 6.3.

Table 6.5: Designated sites for the Coastal Processes

Designated Site	Closest Distance to (km)		Relevant Qualifying Interest
	Array Area	Cable Corridor and Working Area	
Marine: below the High Water Mark			
Wicklow Reef SAC	4.5	3.6	• Reefs (formation on areas subject to scour) • *Reefs are unable to recover morphologically from physical impacts i.e. cable activities that damage or physically change rock features (Natural England and JNCC, 2022)*
Blackwater Bank SAC	19.7	19.1	• Annex I habitat 'Sandbanks which are slightly covered by sea water all the time'. • *Sandbanks are sensitive to activities which alter the processes required to maintain the features' 'form and function'.*
Terrestrial: above the High Water Mark			
Magherabeg Dunes SAC	5.9	3.4	• Dunes • *Dunes are naturally dynamic systems that require continuous supply and circulation of sand. The construction of physical barriers such as sea defences can interrupt longshore drift, leading to beach starvation and increased rates of erosion. Sediment circulation and erosion also has a role to play in the more stabilised dune habitats. Cycles of erosion and stabilisation are part of a naturally functioning dune system (NPWS, 2017a).*
Buckroney-Brittas Dunes and Fen SAC	6.8	0.1	• Dunes; shingle beaches; saltmarshes; alkaline fens • *The health and on-going development of this habitat relies on a continuing supply of shingle sediment. This may occur sporadically as a response to storm events rather than continuously. Interference with the natural coastal processes, through offshore extraction or coastal defence structures in particular, can interrupt the supply of sediment and lead to beach starvation (NPWS, 2017b).* • *Accretion and erosion are natural elements of saltmarsh systems. Maintaining the sediment supply is vital for the continued development and natural functioning of a saltmarsh system. Interruption to the sediment circulation through physical structures can starve the system and lead to accelerated erosion rates (NPWS, 2017b).* • *Dunes are naturally dynamic systems that require continuous supply and circulation of sand. The construction of physical barriers such as sea defences can interrupt longshore drift, leading to beach starvation and increased rates of erosion. Sediment circulation and erosion also has a role to play in the more stabilised dune habitats. Cycles of erosion and stabilisation are part of a naturally functioning dune system (NPWS, 2017b).*

6.5.1.5 In addition to the identification of designated sites, a number of features have been identified which, whilst undesignated, can be considered Coastal Process receptors. These are presented in Table 6.6.

6.5.1.6 The sites listed in Table 6.6 are not designated as Annex I habitat under the Habitats Directive or as European sites under the Habitats Directive or transposing EC (Birds and Natural Habitat) Regulations 2011, as amended, nor are they being considered as candidate European sites. Designation requires national implementation and site-specific assessment, the sites in Table 6.6 have not been designated as a Special Area of Conservation (SAC) or a candidate SAC.

Table 6.6: Coastal Processes receptors (undesignated)

Relevant feature	Closest Distance to (km)		Relevant Qualifying Interest (undesignated)
	Array Area	Cable Corridor and Working Area	
Offshore sandbanks:	0		• *Sandbanks are sensitive to activities which alter the processes required to maintain the features' 'form and function'.*
• Arklow Bank	2.0	0	
• Seven Fathom Bank	7.8	0	
• Glassgorman Bank		4.3	
Offshore depressions:			• *Offshore depressions may be sensitive to activities which change the hydrodynamic conditions (waves; tides) on approach to, and within, the feature. This in turn can alter the sedimentation/ erosion which occurs within the feature.*
• Wicklow Trough	6.9	5.7	
Coastline below High-Water Mark	5.9	0	• *The coastal zone is sensitive to activities which change the hydrodynamic forcing (waves; tides) at the shoreline. This in turn can alter the erosive/ accretive tendencies of the coast in addition to littoral transport.*

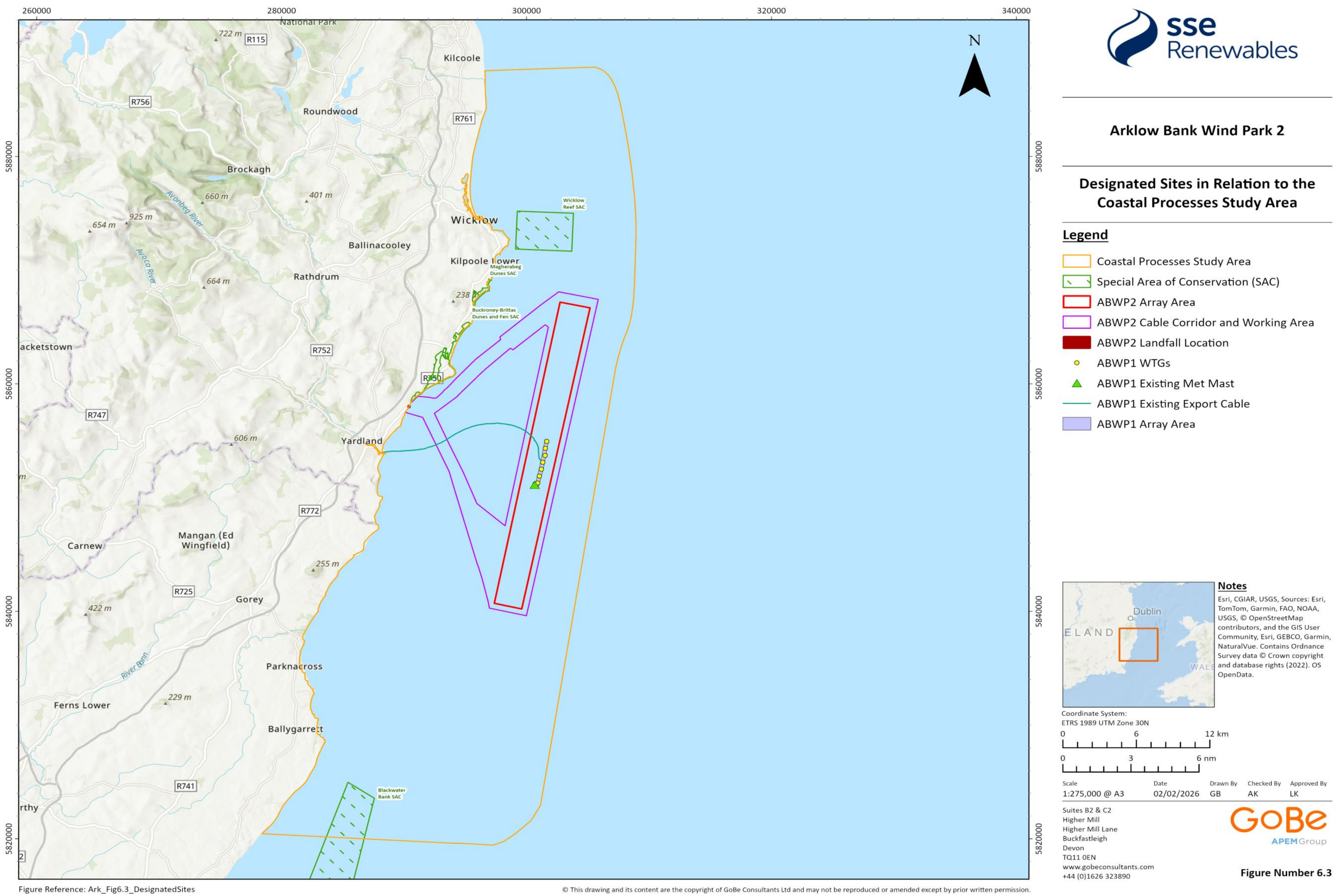

Figure 6.3: Designated sites in relation to the Coastal Processes Study Area

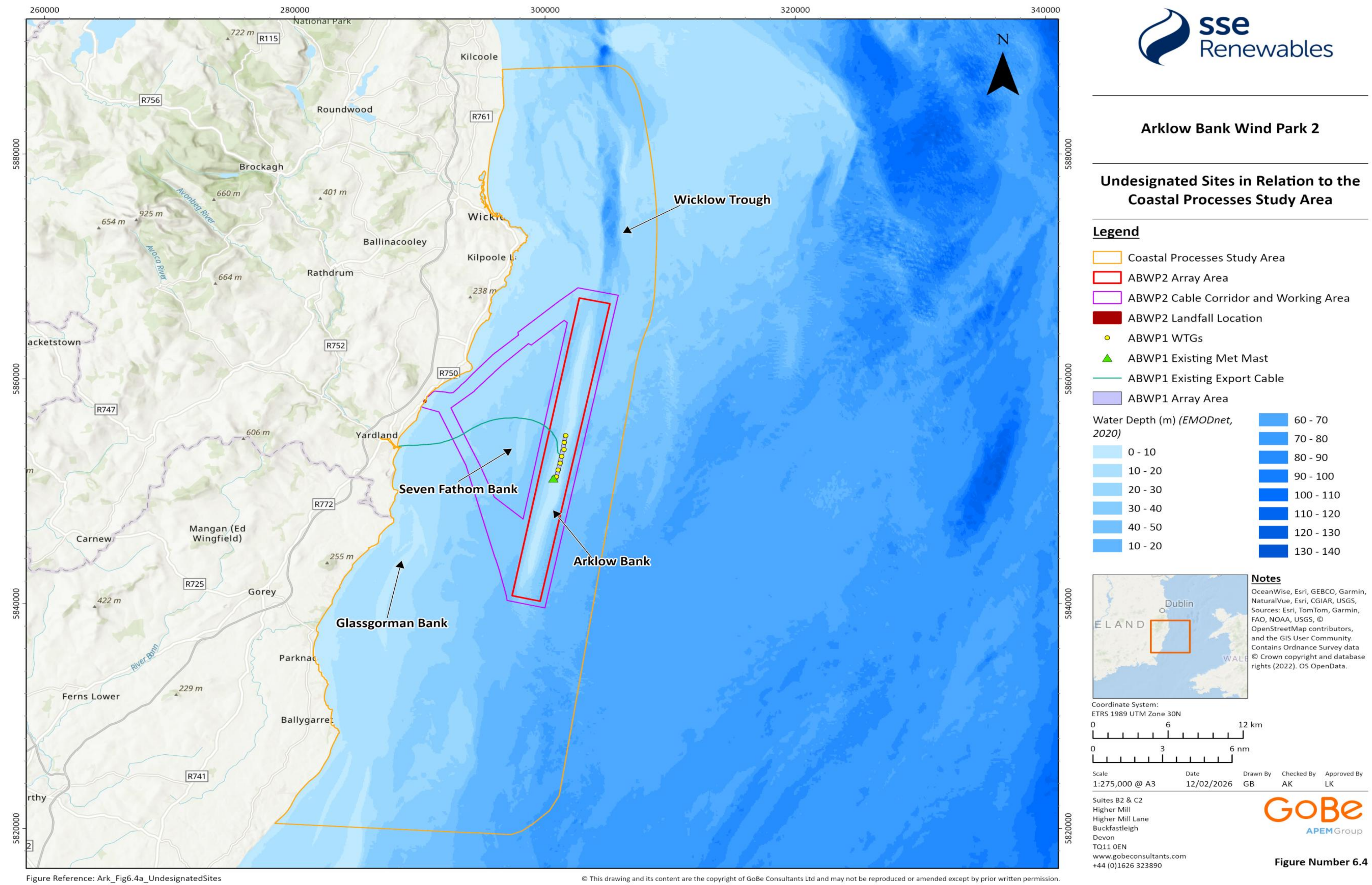

Figure 6.4: Undesignated sites in relation to the Coastal Processes Study Area

6.6 Baseline environment

6.6.1 The Array Area

Hydrodynamics

TIDAL REGIME

6.6.1.1 The Irish Sea tides are semi-diurnal. The tidal range varies in the Irish Sea from large tidal ranges (such as in Liverpool Bay, UK) to a very small tidal range near the degenerate amphidromic point near Co.Wicklow and Co.Wexford (Howarth, 2005). The mean spring tidal range is between 4 and 5 m near the median line of Ireland/ UK, decreasing to the Irish Coast to, approximately 2 m.

6.6.1.2 The tidal range at the Proposed Development is influenced by the presence of a degenerate amphidromic point located in the eastern Irish coast at Courtown, resulting in a near-zero tidal range (Creane *et al.*, 2022), classified as a micro-tidal setting.

6.6.1.3 Metocean surveys undertaken for the Proposed Development between 2019 and 2021 have shown that the tidal range within the Array Area, Cable Corridor and Working Area are greatest at the northern tip of Arklow Bank, where a range of 2.71 m was recorded (Fugro GB Marine, 2021). The influence of the amphidromic point upon tidal range has been observed from the data collected at the five locations (shown on Figure 6.5), with the closest measurements exhibiting more obvious double high water' effects (Partrac, 2022). Tide levels within the Array Area are presented in Table 6.7.

Table 6.7: Tidal level information for within the Array Area

Parameter	Tide level, referenced to LAT (m) North Array Area	South Array Area
Lowest Astronomical Tide (LAT)	0.0	0.0
Mean Low Water Springs (MLWS)	0.58	0.46
Mean Low Water Neaps (MLWN)	0.95	0.79
Mean Sea Level (MSL)	1.34	0.89
Mean High Water Neaps (MHWN)	1.73	0.99
Mean High Water Springs (MHWS)	2.1	1.32
Highest Astronomical Tide (HAT)	2.42	1.83

6.6.1.4 Peak spring tidal currents can exceed 2 m/s to the northwest of Anglesey, whilst weak tidal currents occur to the southwest of the Isle of Man, towards Dundrum and Dundalk Bays (less than 0.25 m/s at spring tides) and between the Isle of Man and the Cumbrian coast (approximately 0.5 m/s) as a consequence of the standing wave that occurs here (where two tidal waves meet) (Howarth, 2005). Slack water typically occurs at high and low water in the Irish Sea as a consequence of the standing wave phenomena.

6.6.1.5 Strong tidal currents are experienced within the Coastal Processes Study Area and coincide with the presence of the Arklow Bank sandbank feature. The general flow direction is towards the north-northeast during the flood tide and towards the south-southwest during the ebb (Creane *et al.*, 2022; Panigrahi *et al.*, 2009). Spring tidal current speeds are in excess of 2 m/s towards the north end of the sandbank on both flood and ebb tides, whilst to the south the peak tidal currents are of the order of 1.4 m/s (Fugro, 2021). The greater speeds to the north of the Array Area have been hypothesised to be a function of the local bathymetry, specifically Wicklow Trough to the north focussing flows to the south towards Arklow Bank (Partrac, 2022). As would be expected, the metocean survey showed that current speeds are greater at the water surface than near-bed (Fugro, 2021).

6.6.1.6 Current direction recorded within the metocean survey clearly show that the tides are recti-linear[1], along a north northeast (flood tide) to south southwest (ebb tide) (Fugro, 2021). This is further supported by the results of coupled modelling presented in Volume III, Appendix 6.2: Arklow Bank Sediment Mobility Assessment (RFI March 2026), which identifies regional current patterns generally directed from south to north during flood tides, and from north to south during ebb.

6.6.1.7 The residual tidal current on the Arklow Bank has been found by Horrillo-Caraballo *et al.* (2021) to have a, generally, clockwise circulation, with a residual flow northward on the western flank and a southward direction of the residual flow on the eastern flank. Modelling results by Creane *et al.* (2023b) and Partrac (2022) identified a flood and ebb tidal current dominance on the west and east side of the bank, respectively. Further, numerical modelling has also shown a net cross-bank flow in an easterly direction over the central portion of the bank (Partrac, 2022). Of note is that it is suggested that the strength and direction of the tidal current residuals vary on a monthly basis (with implications on Arklow Bank's morphodynamic behaviour – see paragraph 6.6.1.24 *et seq.*) (Creane *et al.*, 2023b). High values of vorticity maxima in the tidal residual flow (an indicator of sediment transport and water movement) within the Array Area are predicted and align with the presence of the sandbank (Horrillo-Caraballo *et al.,* 2021), corroborated by distortion of the tidal flow direction due to the presence of Arklow Bank identified in the results of coupled modelling (Volume III, Appendix 6.2: Arklow Bank Sediment Mobility Assessment (RFI March 2026)).

6.6.1.8 Superimposed upon regular tidal behaviours are various non-tidal influences, which mainly originate from meteorological effects. An example is surges, formed by rapid changes in atmospheric pressure causing the water levels to fluctuate considerably above or below the tidal level. This effect can be further impacted by the wind strength and direction. Moving low pressure systems and associated strong and persistent wind fields may generate strong positive surges, often referred to as a 'storm surge'. Storm surges may cause short-term modification of astronomically driven tidal currents. The 1 in 50-year return period storm surge at the site is of the order of 1.0 m (Flather *et al.*,1998). Under an extreme (1 in 50-year return period) storm surge, current speeds may be more than twice that encountered under normal peak spring tide conditions (Flather *et al.*,1998).

[1] Tidal currents that ebb and flood in opposite directions

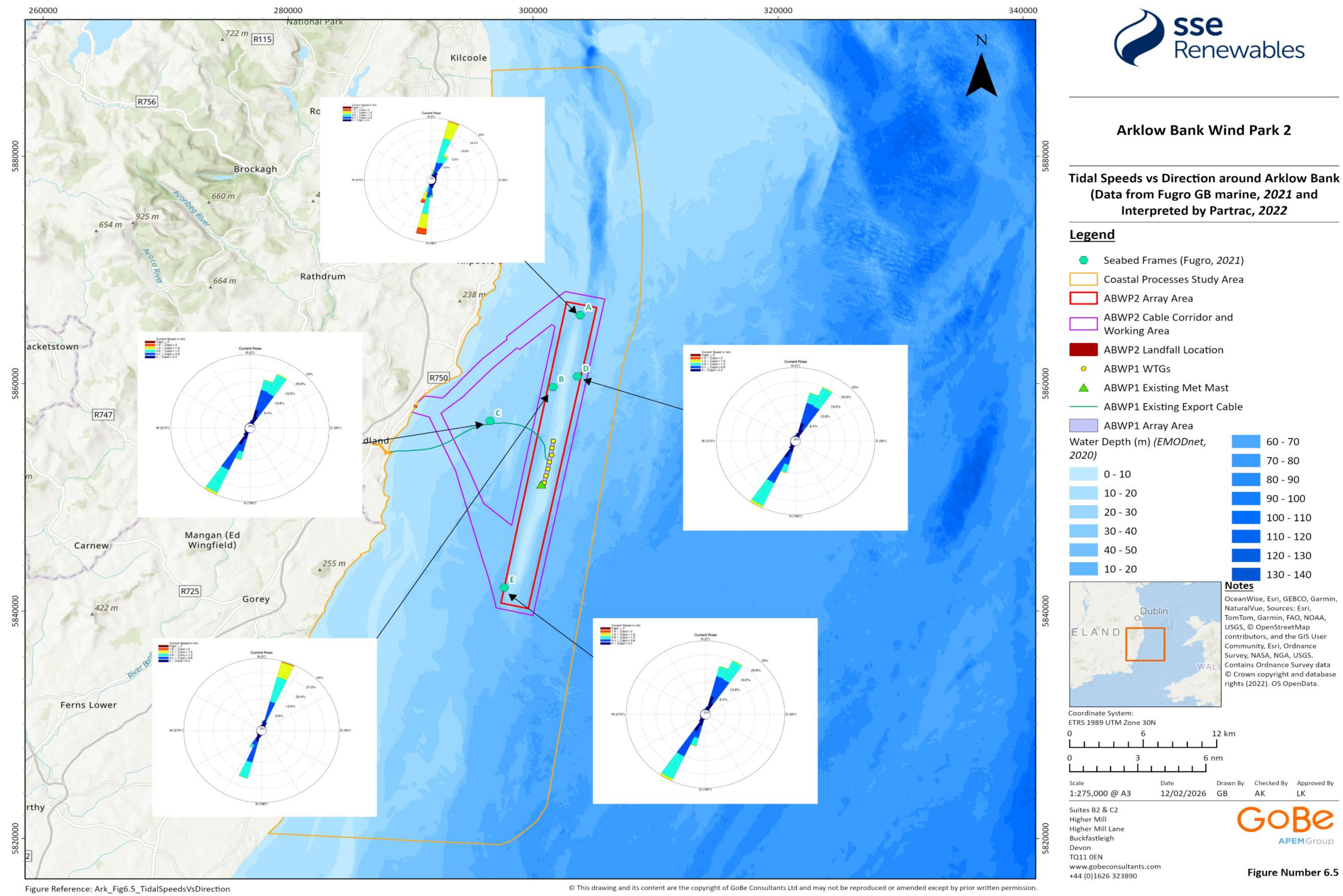

Figure 6.5: Tidal speeds vs direction around Arklow Bank (data from Fugro (2021) and interpretated by Partrac (2022))

WAVE REGIME

6.6.1.9 The wave regime consists of a combination of swell waves moving into, and propagating through, the Coastal Processes Study Area, in addition to more locally generated wind-waves. Swell waves are long-crested, uniformly symmetrical waves which are generated remotely from the Coastal Processes Study Area, whilst wind-waves result from the transfer of wind energy to the water surface. The Irish Sea is constrained by two narrow channels (the Northern Channel and the St. George's Channel), and as such waves are predominantly locally generated (Howarth, 1999). Swell waves are present near the entrances and southern end of the St. George's Channel, and can propagate inwards (Howarth, 2005; Horrillo-Caraballo *et al.*, 2021). Due to the relative proximity of the Proposed Development to the St. George's Channel, a proportion of the wave regime experienced at the site is under the influence of North Atlantic swell waves.

6.6.1.10 Ireland is positioned on the path of major North Atlantic storms. This greatly influences wind directions and wave heights in Irish coastal waters which are exposed to strong wave energy and regular low-pressure systems. Consequently, storm surges in the Irish Sea are associated with major Atlantic depressions, usually from a westerly direction (Sweeney, 2000). Storms are experienced mostly during the winter months, with the most common directions of storms being southwest and northwest.

6.6.1.11 As waves enter the Irish Sea, they are influenced by shallowing water depths and are refracted towards the coast, with most waves coming from the south-southwest, southwest and south-southeast sectors. A secondary peak in the wave direction, as recorded during the metocean campaign, was for waves originating from the north-east (Fugro, 2021).

6.6.1.12 This information is supported by the results of coupled modelling carried out in Volume III, Appendix 6.2: Arklow Bank Sediment Mobility Assessment (RFI March 2026)), with results presented for waves from the south-southwest and northeast. Due to smaller fetches, waves from the northeast are generally found to be smaller than waves from the south-southwest (as shown in Figure 6.6 from the metocean deployment). Smaller waves can propagate fairly undisturbed over Arklow Bank, with no noticeable change in wave direction observed, although wave heights slightly decrease to the west of the crest. During summer months significant wave heights of up to 2 m are observed, whereas winter storms occurring during the winter months (primarily from a south-southwesterly direction) result in significant wave heights up to around 4 m.

6.6.1.13 Data collected during the metocean survey undertaken for the Proposed Development, recorded the maximum wave height of 6.83 m at the south of Arklow Bank (Deployment Site E on Figure 6.5) (Fugro GB Marine, 2021). Further, the largest significant wave height was also recorded at the south of Arklow Bank at 4.62 m (Fugro GB Marine, 2021). The primary wave parameters at each of the five metocean deployment locations has been calculated by Partrac (2022) and is shown in Table 6.8 and Figure 6.6 for completeness.

Table 6.8: Wave parameters calculated from the metocean campaign (collected by Fugro GB Marine (2021), calculated by Partrac (2022).

Wave Parameter	Statistic	Frame[2]				
		A	**B**	**C[3]**	**D**	**E**
Significant wave height[4] (Hs; m)	Minimum	0.19	0.09	0.15	0.17	0.12
	Mean	1.09	0.91	0.95	0.96	1.03
	Maximum	3.74	3.23	3.24	3.67	4.62
Mean wave period[5] (Tp; s)	Minimum	1.07	1.38	1.47	1.04	1.73
	Mean	5.24	5.11	5.69	5.34	6.50
	Maximum	15.43	14.23	18.21	16.67	16.02
Zero-crossing wave period[6] (Tz; s)	Minimum	1.61	1.77	1.75	1.68	2.04
	Mean	3.57	3.53	3.69	3.73	4.07
	Maximum	7.88	6.20	6.42	7.18	8.29

[2] Location of frame shown in Figure 6.6.

[3] Noting frame C is located within the Cable Corridor and Working Area

[4] the average of the highest one-third (33%) of waves (measured from trough to crest) that occur in a given period.

[5] the mean of all wave periods that occur in a given period.

[6] the time in seconds between one zero up-crossing of the average water level line and the next

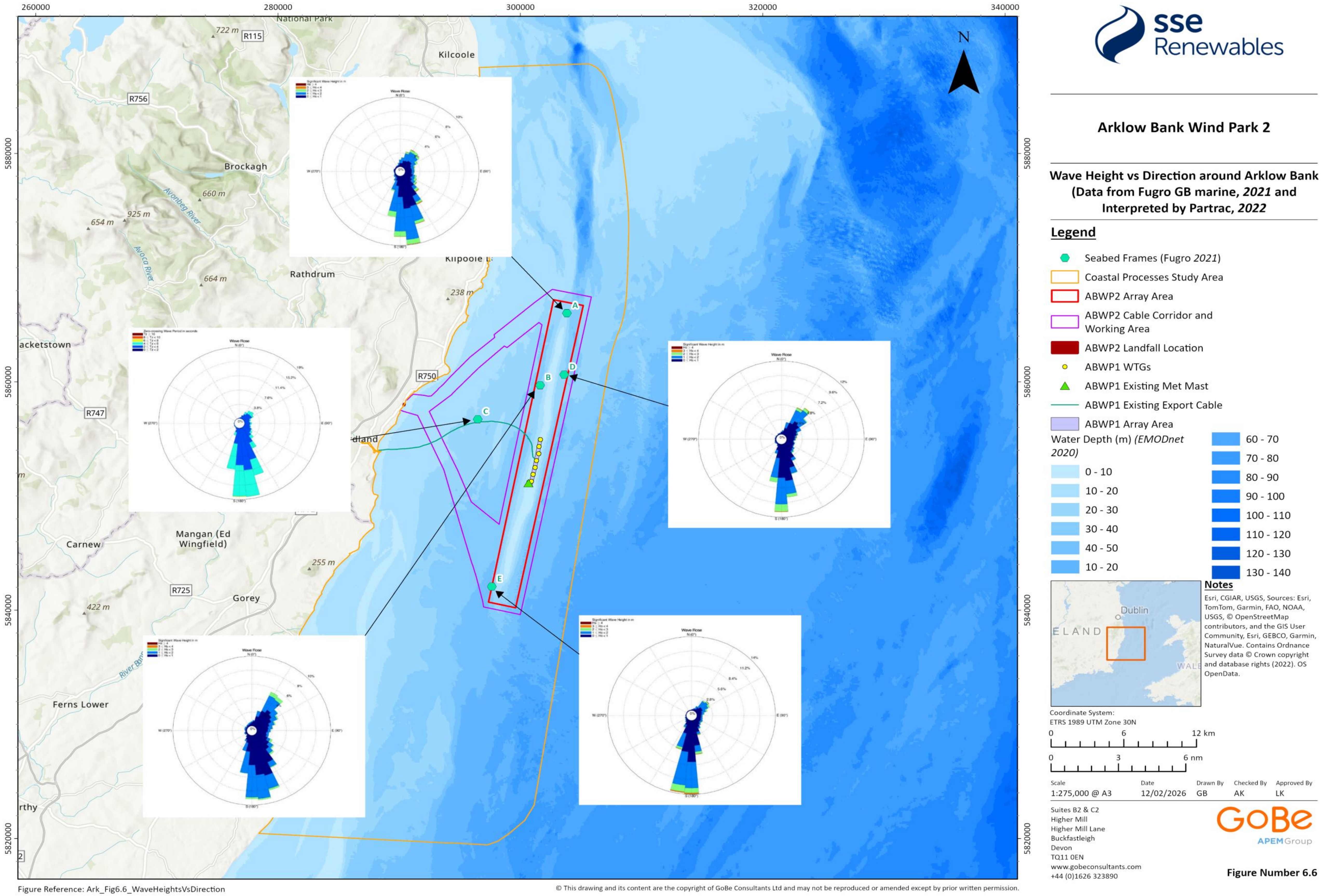

Figure 6.6: Wave height vs direction around Arklow Bank (data from Fugro GB Marine (2021) and interpreted by Partrac (2022))

WIND REGIME

6.6.1.14 Superimposed on regular tidal behaviour are various non-tidal influences, which typically originate from meteorological effects. An example is surges, formed by rapid changes in atmospheric pressure causing the water levels to fluctuate considerably above or below the tidal level.

6.6.1.15 Wind data was collected between 2001 and 2019 in the centre of the Array Area by the ABWP1 Met Mast (Figure 6.1; MetOceanWorks, 2021a). Results show that wind predominately originates from the southwest (20%), south (17%) and west (12%) (Figure 6.7; MetOceanWorks, 2021a). The main wind direction explains the in-situ data collected within the Array Area on waves coming essentially from the south (Figure 6.7; Fugro, 2021; Partrac, 2022). The wind speed is mostly predicted below 10 m/s (approximately 85% of the year) but can exceed 15 m/s for, approximately, 6% of the year Figure 6.7; MetOceanWorks, 2021a). The Global Wind Atlas hindcast model (Davis *et al.*, 2023) indicates that the mean wind speed, at 10 m height, is 7.8 m/s within the Array Area, which correlates the site specific data. Gallagher *et al.* (2016) showed, using a 14-year model hindcast, that the wind regime presents a seasonal pattern coming mostly from the southwest during autumn and winter, with a southerly shift in spring and summer.

6.6.1.16 The discrepancy observed between the wind and the wave direction can be explained by the wind fetch, which is defined as the uninterrupted distance over water that wind blow in a consistent direction. A longer fetch allows more energy transfer to the water leading to larger waves, while a short fetch results in a smaller waves, even during strong winds events. Due to the close distance of the Array Area to the Irish coast on its west side, approximately between 6.5 km and 13 km, the wind fetch coming from the southwest and west is minimal, whereas wind coming from the south and northeast present the longest fetch, which explain why waves were mostly recorded coming from the south and northeast (Figure 6.6).

6.6.1.17 Extreme water levels, i.e., exceptional high or low water surface height, are caused by a combination of short-term weather events (e.g., storms, waves and tides) and long-term changes driven by climate change (see section 6.6.4). Previous studies calculated an increase of water level of 3.5 m for 1:50 return period storm surge event at Arklow Bank (PMSS, 2004; Voudouskas *et al.*, 2017). Extreme water levels can be associated with the influence of wind as MetOceanWorks (2021b) showed the correlation between:

- Wave height and wind speed;
- Wave direction and wind direction;
- Near-surface tidal current speed and wind speed;
- Near-surface tidal current speed and wind direction; and
- Extreme waves and increase of water levels.

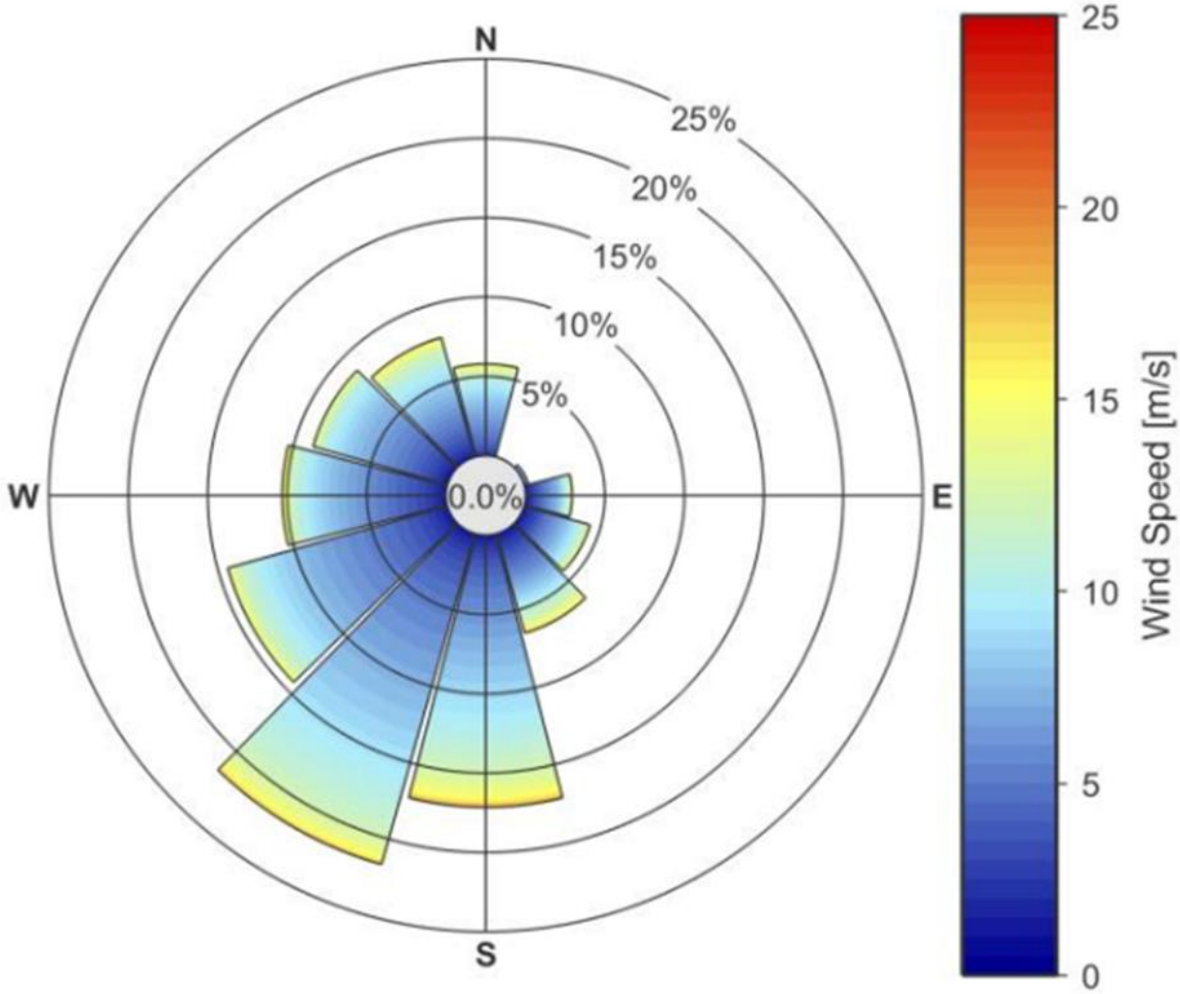

Figure 6.7: Wind speed and direction in the Array Area (MetOcean Works, 2021a)

Sedimentological Regime

6.6.1.18 The geology of the site can be generally characterised (Coughlan *et al*., 2020) by:

- Coarse-lag sediments, comprised of re-worked glacial sediments. The sediments are typically Holocene, with the underlying units classified as the Upper Till member and Chaotic Facies; and
- Mobile sediments, identified by mobile sandwaves and the presence of sandbanks, such as Arklow Bank.

6.6.1.19 Site-specific surveys and studies (as outlined in Table 6.4) undertaken for the Proposed Development also indicate that below the bank core, quaternary soils predominantly consist of very dense sand, gravel and gravelly sand. A thin clay layer was encountered in one borehole at the north end of the bank. A series of boreholes (as per the surveys described in Table 6.4) undertaken within the Array Area indicate the presence of four key geological strata, which include several layers of sands, gravel and till sediments overlaying a series of Lower Palaeozoic Rocks.

6.6.1.20 The surficial seabed sediments within the regional area are characterised by sand and gravel material, as illustrated in Figure 6.8. Project specific surveys indicate that sediments are heterogenous, composed of mobile sands, slightly gravelly sands and gravelly sands present on Arklow Bank (Sure Partners Ltd., 2000; Aquatic Services Unit, 2012; 2021; Aquafact, 2025). Medium sand is mainly located at upper levels (less than 15 m water depth) with a gravel-sand with gravel fractions located at greater depths. The substratum ranges from sandy shell to gravel to the west, north and south of the bank to coarse shell and gravel and some rock to the east of the bank. The bank itself consists of mainly sand, cobbles with shells and pebbles at the northern end of the bank and fine sand at the southern end.

6.6.1.21 Sediment in the Array Area is dominated by sand, gravelly sand, and sandy gravel. Early sampling campaigns (Arklow Energy Ltd., 2016) in the area confirm that the bank is comprised of sandy sediments with around 90% of the sediment composition being between 2 mm and 63 µm. The significant proportion of relatively fine material coupled with the high energy environment in the region would indicate an area with high sediment mobility.

6.6.1.22 The Centre for Environment, Fisheries and Aquaculture Sciences (Cefas) Climatology Report 2016 (Cefas, 2016) shows the spatial distribution of average, surface, non-algal Suspended Particulate Matter (SPM) for the majority of the UK continental shelf. Using this study, it is estimated that the average surface SPM associated with the Arklow Bank over this period is approximately less than 2.5 mg/l (Figure 6.9). The higher levels are experienced more commonly in the winter months. Superimposed on the inter-annual variability is year-to-year variability, where Suspended Sediment Concentrations (SSC) are shown to indicate a correlation between changes in the mean annual regional wind strength and the storm index across the Irish Sea (White *et al*., 2003).

6.6.1.23 A metocean measurement campaign was conducted at the ABWP Array Area variously between November 2019 and March 2021 (Fugro GB Marine, 2021). In total, five seabed frames were deployed, with locations marked on Figure 6.9. Turbidity data was collected using Optical Backscatter (OBS) and Acoustic Backscatter (ABS) data, with 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. Concentrations are highest closest to the bed, with a description of the near-bed characteristics as identified from the ABS data provided in Table 6.9. The average values identified from the ABS data have been used to provide a reference point of baseline average (31.7 mg/l) and maximum (74.6 mg/l) near-bed turbidity values across the Study Area for the purposes of assessment.

Table 6.9: Summary of near-bed turbidity from Acoustic Backscatter (ABS) data collected across five locations. N/A indicated that ABS data was not captured at these sites.

	Minimum (mg/l)	Maximum (mg/l)	Mean (mg/l)	Standard Deviation (mg/l)
Frame A (D1-3)	1.63	78.99	40.67	21.33
Frame B1 (D2-3)	10.08	78.99	26.75	10.23
Frame C	10.99	65.76	27.79	8.81
Frame D	N/A	N/A	N/A	N/A
Frame E	N/A	N/A	N/A	N/A
Average	7.57	74.58	31.74	13.46

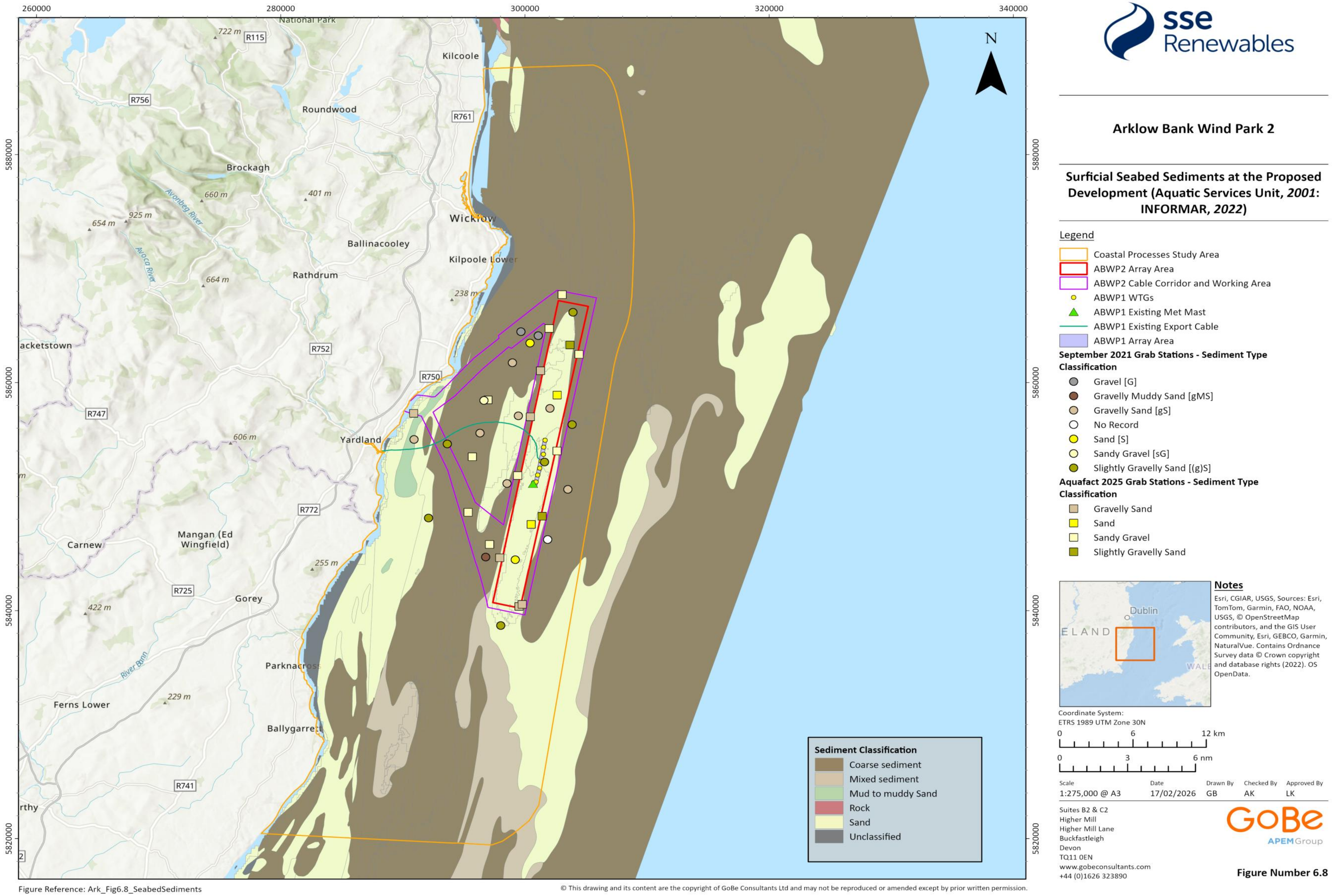

Figure 6.8: Surficial seabed sediments at the Proposed Development (Aquatic Services Unit, 2021; INFOMAR, 2022)

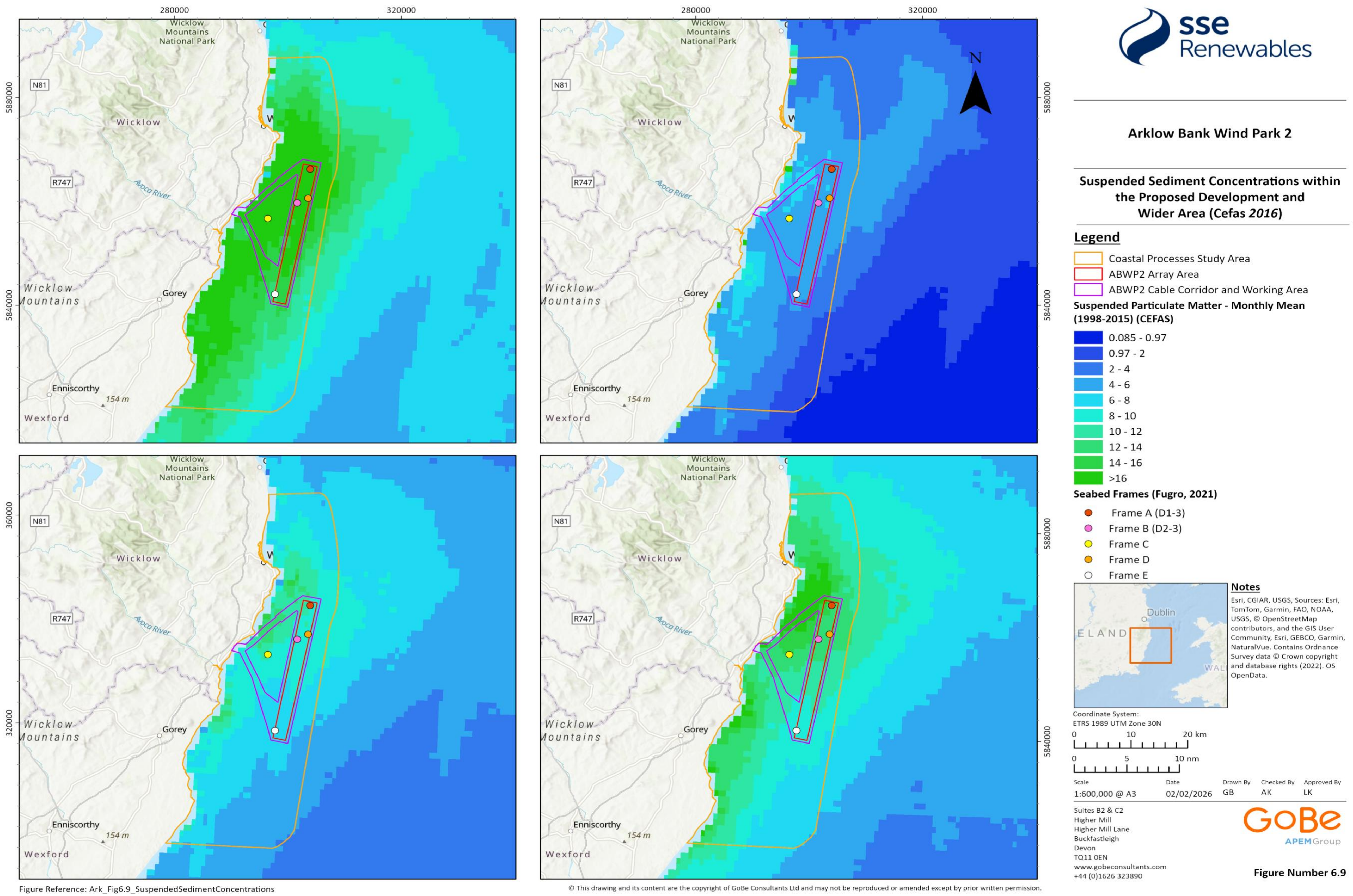

Figure 6.9: Suspended sediment concentrations within the Proposed Development and wider area (Cefas, 2016)

Morphology

6.6.1.24 Across the Array Area, water depths range between 0.6 m and 50 m (relative to Lowest Astronomical Tide (LAT) which is Chart Datum (CD) Arklow), with the shallower depths corresponding to the prominent bathymetric feature, Arklow Bank. At the location of the proposed WTG structures, the water depths are in the range 18.56 m to 41.77 m. This feature is an open-shelf linear sandbank situated, approximately, 6 km to 15 km off the Irish coast near Arklow. The sandbank is, approximately, 25 km long, orientated roughly north-south and experiences strong tidal currents, breaking waves and active sediment transport. Superimposed on both the sandbank flanks and crest are sandwaves, with wavelengths of up to 150 m and amplitudes of 10 m (Ultrabeam Hydrographic Ltd, 2019).

6.6.1.25 The base of the sandbank exhibits long-term stability with mobile bedforms, under the influence of both tidal and wave forcing, present on the upper layers (Creane *et al.*, 2023b). Noting that the wave and wind influence occurs in the shallower water depths (Creane *et al.*, 2023b). This is supported by comparison of the 2019 project specific bathymetric surveys against 2016 INFOMAR data, which indicates that whilst there is active bedform (sandwave) migration on the sandbank, the position and alignment of the underlying bank core have remained stable. This is further evidenced by analysis of bathymetric data from 2000, 2016, 2019, and 2024 as provided in Volume III, Appendix 6.2: Arklow Bank Sediment Mobility Assessment (RFI March 2026). The sandbank crest consists of a smooth seabed with areas of localised bedforms, attributed to the high current regime, which can also be influenced by wind forcing (paragraph 6.6.1.17). Water depths vary along the north-south orientated bank crest varying between 0.6 m and 4.0 m (LAT). Beyond the bank crest, water depths increase, with the angle of the crest slope being more pronounced on the eastern side.

6.6.1.26 Bathymetric analysis suggests the mobile bedform behaviour is such that seabed level changes of the order of +14.5 m to -11 m occur over an annual period. However, this does not include for, potentially larger, morphological changes of the sandbank occurring over shorter timescales, with variation between individual lunar months (Creane *et al.*, 2023b). Confirmation of seabed mobility upon Arklow Bank is provided from ABWP1 bathymetric monitoring surveys (Table 6.3) which clearly show areas of erosion and accretion, resulting from bedform migration throughout the site, in addition to areas of deposition and erosion due to localised flow perturbations around the monopile structures. The highly mobile bedforms and energetic tidal regime present upon Arklow Bank were demonstrated following the installation of the 5 m diameter ABWP1 monopiles, but prior to the installation of scour protection. During this time, scour holes developed around the monopiles due to the tidal flow (Whitehouse *et al.*, 2008), with available data suggesting the scour had developed to 3.2 m (Whitehouse *et al.*, 2011).

6.6.1.27 Further evidence is provided through analysis of the large-scale morphodynamics of Arklow Bank from bathymetric and remote sensing data, as outlined in Volume III, Appendix 6.2: Arklow Bank Sediment Mobility Assessment (RFI March 2026). Analysis of measured bed levels from 2000, 2016, 2019, and 2024 shows that Arklow Bank is highly dynamic, with alternating patterns of eastward and westward migration on the upper part of the bank. Locally, up to 24 m of bed level change was observed, with mobility most significant in the shallowest areas. Satellite imagery analysis tracked the position of the bank crest from 1984 to 2025, revealing periods of both dynamic crest behaviour and stable crest positions. During the dynamic periods, parts of the crest can shift up to 500 m over a period of two years, whereas stable crest positions can occur for several years.

6.6.1.28 Analysis of sandwaves alongside conceptual numerical modelling (hydrodynamic; sedimentological) confirms the presence of an active sediment transport system around Arklow Bank which is predominately under the control of tidal currents (Figure 6.10) (Creane *et al.*, 2022; 2023a and 2023b). A flood and ebb tidal dominance is evident on the west and east side of the bank, respectively, generating a residual clockwise tidal current eddy encompassing the entire bank, facilitating sediment distribution and ultimately recycling sediment material within the bank cell (Creane *et al.*, 2023b; Volume III, Appendix 6.2: Arklow Bank Sediment Mobility Assessment (RFI March 2026)). Water depths at the location of the proposed array structures (paragraph 6.6.1.24) are such that storm events are unlikely to induce sediment transport (the 1 in 50 wave event is shown to be 5.84 m and 7.84 sec (significant wave height and associated wave period, respectively) (Volume III, Appendix 6.1: Marine Physical Processes Numerical Modelling (Revised March 2026))).

6.6.1.29 An assessment of the mobile bedforms (sandwaves) of Arklow Bank confirms the directionality of bedload sediment transport (Creane *et al.*, 2023b):

- *'sandwaves with a mean height and wave length of 3 m and 140 m, respectively, migrate southwards at a mean rate of 23 m/year on the south-eastern side of the bank; and*
- *sandwaves on the south-western side of the bank display a mean height and wave length of 2.3 m and 123.5 m, respectively, and migrate northwards at a rate of 32.7 m/year.'*

6.6.1.30 Arklow Bank has been shown to be divided into eight unique sub-cells with different hydrodynamic and morphological features, although they fit together as one linear sandbank, with high upper slope mobility and long-term bank base stability. The presence of off-bank anticlockwise residual tidal eddies have also been shown not only to control the long-term stability of Arklow Bank, but also sediment transport in and out of the local sediment transport system (Creane *et al.*, 2023b). A high-level comparison has been made between the results of Creane *et al.*, 2023b) and those of morphodynamic modelling carried out by Volume III, Appendix 6.2: Arklow Bank Sediment Mobility Assessment (RFI March 2026), as shown in Figure 6.11. The results are broadly similar, with mean sediment transport directed northward and southward along the western and eastern flanks of Arklow Bank, respectively, attributed to the large, clockwise residual current eddy encompassing the bank.

6.6.1.31 Sediment volume analysis undertaken for Arklow Bank indicates that there is no contemporary sediment supply and that this feature is a semi-closed sediment cell (Partrac, 2022). Sediment is both supplied to the head of the bank from (i) Wicklow Trough (to the north) and (ii) from the south-west and south-east, in addition to being removed from the tail (to the south) (Creane *et al.*, 2023; Partrac *et al.*, 2022[7])). Numerical modelling (Creane *et al.*, 2023b) indicates that, of the total external sediment supply, the sediment exchange:

- to the north of Arklow Bank represents a net gain of 27.64%;
- to the south of the sandbank represents a net gain of 0.77%;
- along the western flank represents a net gain of 18.25%; and
- along the eastern flank represents a net loss of 45.94%.

6.6.1.32 Analysis of bed shear stress indicates that there is a less mobile seabed area between the coast and bank, which in turn supports previous hypotheses that there is no sediment exchange between them (Partrac, 2002).

[7] Of relevance to this discussion is the slight disparity in sediment sources, sinks and pathways relevant to Arklow Bank between the recent publications.

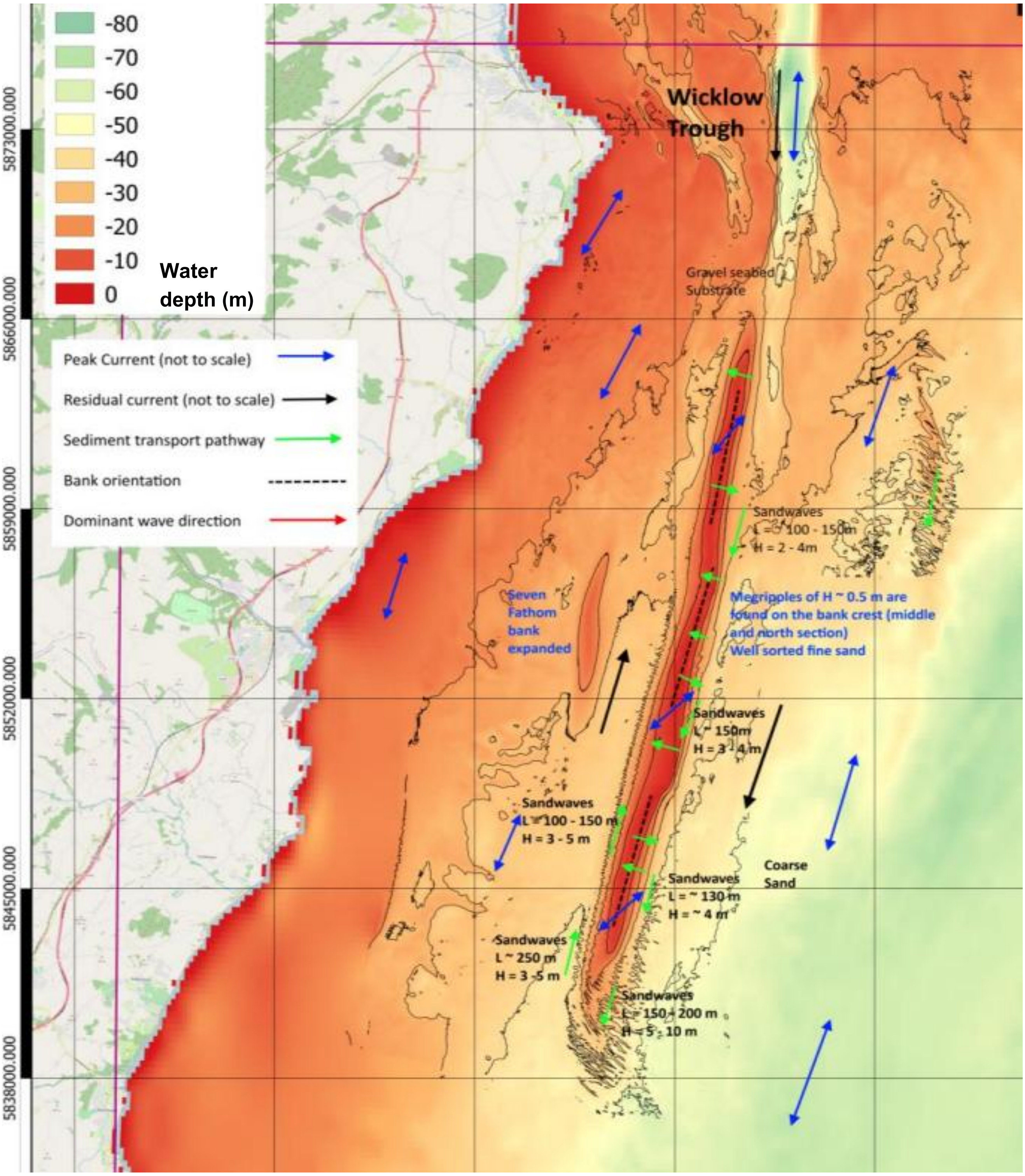

Figure 6.10: Tidal circulation and associated sediment transport pathways around Arklow Bank, the surrounding seabed and within the nearshore (Partrac, 2022).

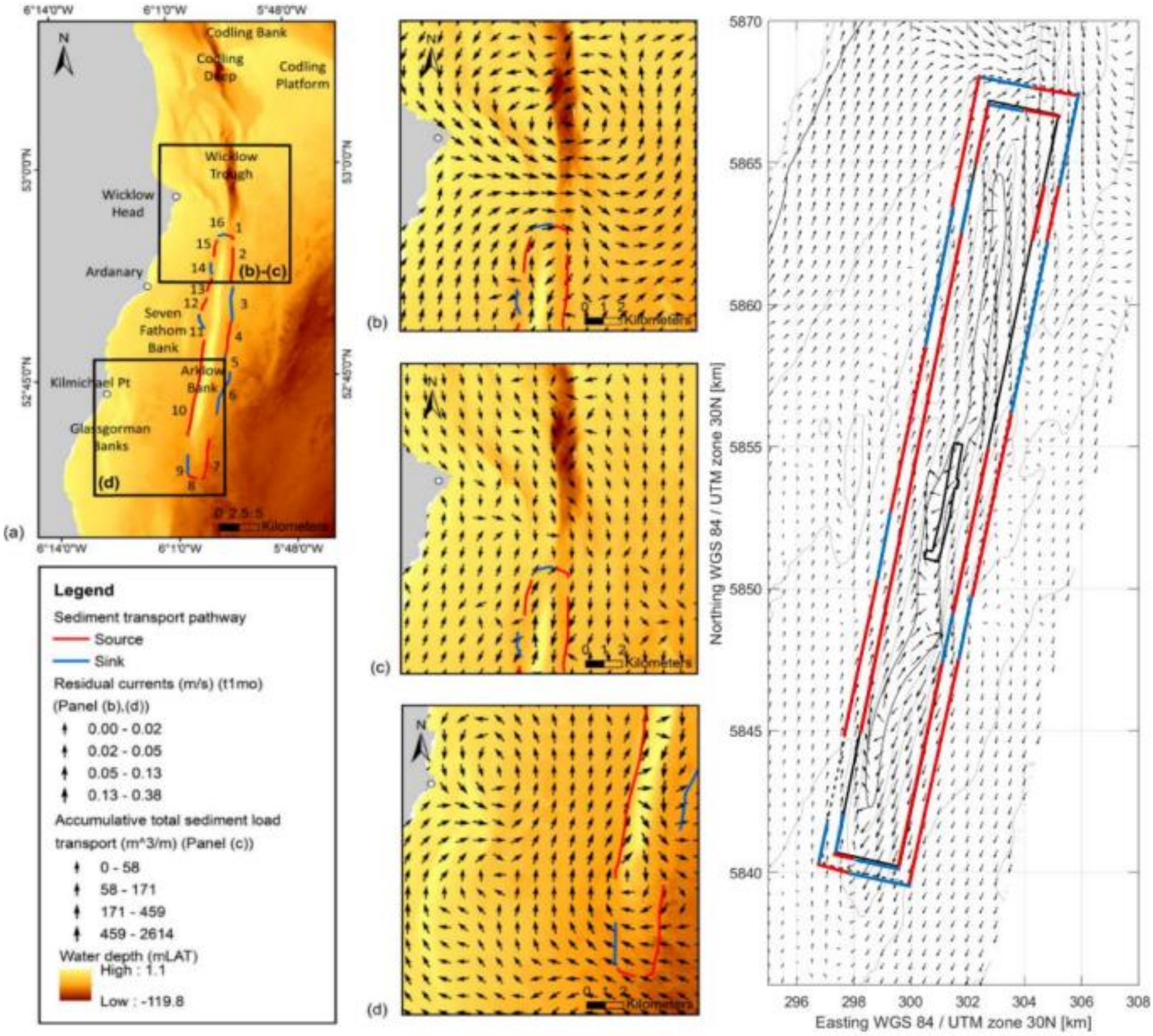

Figure 6.11 Sediment fluxes around Arklow Bank from Creane *et al.* (2023b) (left) and modelled mean total sediment transport from Volume III, Appendix 6.2: Arklow Bank Sediment Mobility Assessment (RFI March 2026) (right), with sources indicated in red and sinks in blue (Volume III, Appendix 6.3: Arklow Bank – Quantitative Assessment of the Influence of In-place Infrastructure on the Local Sediment Transport System (RFI March 2026)).

6.6.2 Cable Corridor and Working Area

Hydrodynamics

6.6.2.1 The tidal range along the Cable Corridor and Working Area and towards the coast is also influenced by the degenerate amphidromic point located in the eastern Irish coast at Courtown; the UK Hydrographic Office (UKHO) tide gauge located within Arklow Port (Figure 6.1) indicates a tidal range of circa 0.5 m (Table 6.10).

Table 6.10: Tidal information from the UKHO tide gauge at Arklow Port

Parameter	Tide level, referenced to CD (m)
LAT	0.2
MLWS	0.6
MLWN	0.9
MSL	1.0
MHWN	1.2
MHWS	1.4
HAT	1.6

Admiralty Chart 1787 Carnsore Point to Wicklow Head, UK Hydrographic Office.

6.6.2.2 Current meter data closer to shore and south of the Cable Corridor and Working Area (approximately, 1 km east northeast of Arklow Harbour) indicates a limited slack water period closer to shore and more benign tidal currents in comparison with those on Arklow Bank, with mean spring flood and ebb current speeds of 0.66 m/s and 0.59 m/s (Arup, 2018).

6.6.2.3 Due to the shallow bathymetry at the Arklow Bank, a large proportion of the waves break when reaching the bank, even during low swell conditions. The bank therefore acts as a natural breakwater and influences the wave climate. Whilst the wave direction diverges slightly after passing over the bank, owing to the combined effect of refraction and shoaling, it still continues to propagate inshore. In general, the bank does not significantly alter the wave directionality, however wave heights are significantly reduced by the presence of this feature. This is confirmed by the project specific metocean campaign (Fugro, 2021) which shows that, at measurement location C[8] within the Cable Corridor and Working Area, the significant wave height is much reduced from location on the eastern side and tips of the bank (Table 6.8).

6.6.2.4 The wind regime along the Cable Corridor follows the same trend as within the Array Area, with the main wind direction originating primarily from the southwest followed by the west and south (paragraph 6.6.1.15 and Figure 6.7). Additionally, the Global Wind Atlas data suggests that the mean wind speed, at 10 m height, decreases along the Cable Corridor and Working Area towards the coast from 7.8 m/s offshore to 6.7 m/s near the coast (Davis *et al.*, 2023).

Sedimentological Regime

6.6.2.5 The offshore geology identified within both the Array Area, and at Landfall, can be broadly expected to be present within the Cable Corridor and Working Area. The majority of Cable Corridor lengths are underlain by Ordovician Slate overlain by reworked glacial and post-glacial sediments (Green Rebel, 2023). Towards Landfall, whilst sands and gravels predominant, there is an increased presence of finer sediments (Aquatic Services Unit, 2021) suggesting a more benign tidal regime than experienced further offshore and within the Array Area.

[8] *Location shown in Figure 6.6*

Morphology

6.6.2.6 Along the Cable Corridor and Working Area, depths typically shallow in a landward direction from 40m (CD), with no notable large-scale bathymetric features with the exception of Seven Fathom Bank. Located, approximately, 8.5 km from the coast in water depths of circa 13 m to 16 m, Seven Fathom Bank is non-designated and identified as a sandbank '*permanently covered by water, at depths of less than 20 m below chart datum*' (The Marine Institute, 2020; National Parks and Wildlife Service). Similarities between the alignment and shape of Seven Fathom Bank and Arklow Bank suggests that the former can be considered to a satellite bank to the latter (Partrac, 2022). Numerical modelling indicates current flow connectivity between Seven Fathom Bank and Arklow Bank (Creane *et al.*, 2023b), although Arklow Bank does provide a sheltering effect from the predominant wave directions (Figure 6.6) for Seven Fathom Bank (Partrac, 2022).

6.6.2.7 Geophysical surveys (Green Rebel, 2023) indicate the limited presence of mobile bedforms (sandwaves) within the Cable Corridor and Working Area (Figure 6.12); bathymetric change between 2011 and 2019 has shown that the seabed within the Cable Corridor and Working Area to be relatively minor when compared to the Array Area (Partrac, 2022). However, of note is that the ABWP1 export cable has been shown to be exposed in places; it is assumed that this is within the isolated sandwave areas along the route (Aquatic Services Unit, 2021).

6.6.2.8 Whilst outside the Array Area and Cable Corridor and Working Area, several (undesignated) morphological features are located within the ZoI. These are:

- the Wicklow Trough (Figure 6.10), a seabed depression hypothesised to constrain the position of the north of Arklow Bank and provide the primary sediment source to the bank (Partrac, 2022); and
- Glassgorman Bank, a sandbank located roughly 10 km west of the southern portion of Arklow Bank, approximately 1 km from the coast.

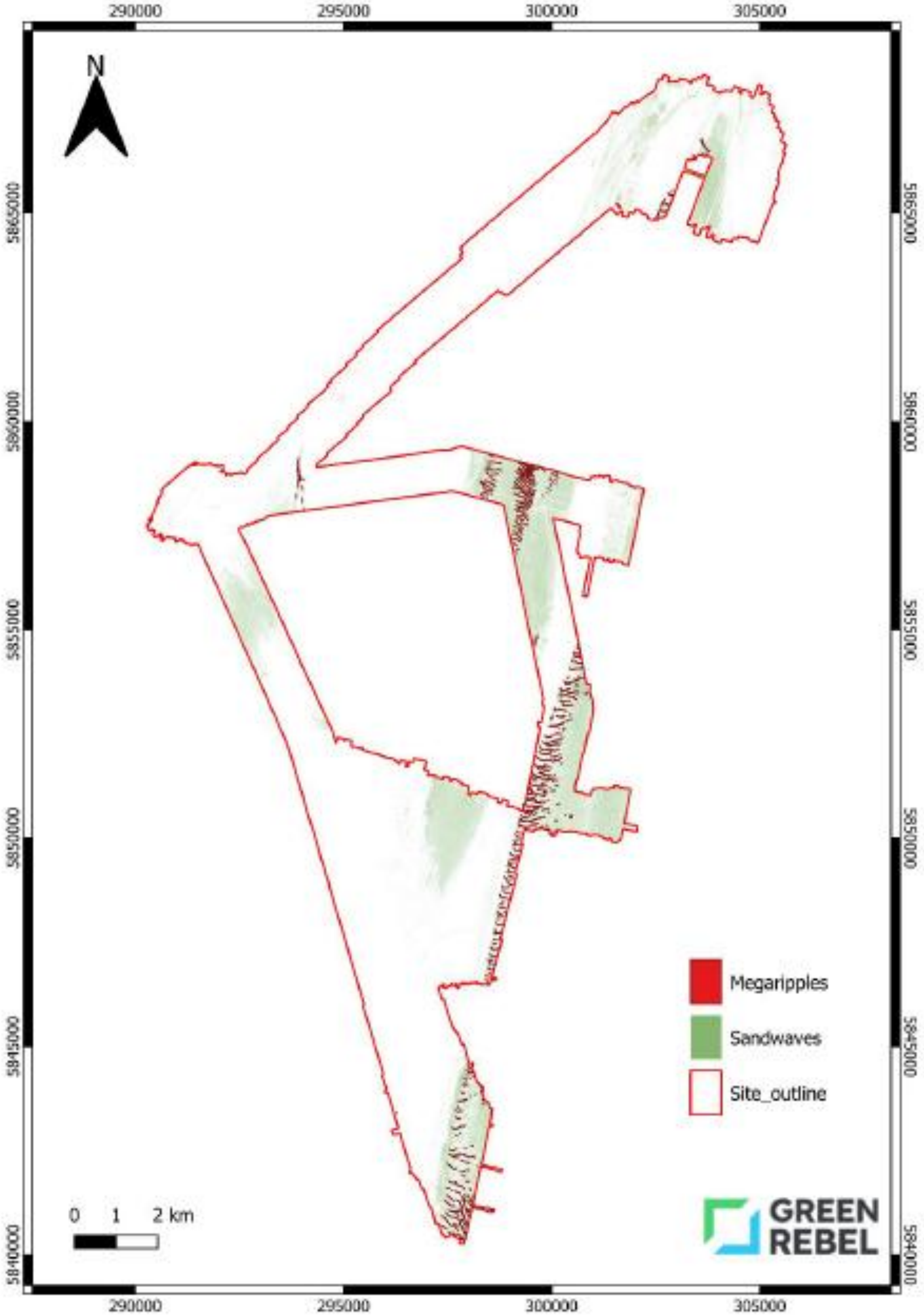

Figure 6.12: Bedforms within the Cable Corridor and Working Area (Green Rebel, 2023)[9]

[9] *Array Area information has been superseded since publication of this figure in 2022 and as such is not relevant for the purposes of this EIAR*

6.6.3 Coastal

Sedimentological Regime

6.6.3.1 The geology experienced at the Landfall consists of marine deposits of silt, sand and gravel over Mudstone, Siltstone, Slate and Volcanoclastic igneous rock. This can be summarised (Waterman Infrastructure and Environmental Ltd, 2020; 2022) as follows:

- A thin layer of topsoil (up to 30 cm) overlying Glacial Till of firm, reddish brown, slightly sandy gravelly Clay with occasional cobbles and boulders overlying bedrock of the Oakland Formation, of predominantly steeply dipping schist.
- A number of quartzite veins are present within the schist at the outcrop exposures. A probable igneous, possibly rhyolite, intrusion was visible in the southern bay.

6.6.3.2 The surficial sediments present at the Landfall can be summarised as sand and shingle storm deposits characterising the foreshore, seaward of isolated rocky cliffs (Waterman Infrastructure and Environmental Ltd, 2020; 2022).

Morphology

6.6.3.3 The Arklow coastline shoreward of the Proposed Development is composed of rocky headlands and sandy beaches (Figure 6.13). A mix of foreshore cliffs, dunes and vegetated marshlands, typically located above the HWM, are found on the shoreward side of the sandy beaches (Waterman Infrastructure and Environmental Ltd, 2020; 2022; EMODnet, 2021)).

6.6.3.4 Dunes, located within the Magherabeg Dunes and Buckroney-Brittas Dunes and Fen SACs, are designated features resulting mostly from sand transport landward from the beach by aeolian processes (Nordstrom, 2015). Both SACs present three types of dunes:

- Embryonic dunes, defined as the youngest, smallest, and most unstable type of sand dune, forming at the upper beach where windblown sand gets trapped by debris (like seaweed or driftwood) or pioneer plants (like sea rocket);
- Mobile dunes are described as coastal sand dunes that are actively shifting and migrating inland, shaped by wind, with vegetation like marram grass trapping sand but still allowing for significant movement; and
- Fixed dunes are located more inland and became stabilized by extensive vegetation allowing a greater biodiversity to develop.

6.6.3.5 Embryonic and mobile 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). Based on Farrell and Connolly (2019)[10], the proportion of fixed dunes is 80% ± 10% on average for both SACs. Magherabeg Dunes SAC showed 15% of embryonic dunes and 15% of mobile dunes, whereas Buckroney-Brittas Dunes and Fen SAC had 2% of embryonic dunes and 5% of mobile dunes (Farell and Connolly, 2019).

6.6.3.6 The depth of closure, which identifies the depth[11] along a beach profile where sediment transport is very small/ non-existent, has been calculated to be between the 5.5 m and 7.0 m water depths (Partrac, 2022).

6.6.3.7 Between Arklow and Ardanary, the southern stretch of the coastline towards Arklow has been classified as being potentially vulnerable to wave overtopping (RPS, 2021). A future consideration

---

[10] *The authors recognise that the proportion of different type of dunes may change over less than decadal scales and will certainly evolve naturally during the lifetime of the Proposed Development.*

[11] *Based on wave height and period*

of coastal behaviour is given in paragraph 6.6.4 *et seq*. Coastal process assessments undertaken for a, now built, wastewater treatment plant at Arklow show that, based on the data available, erosive characteristics of the shoreline have been present since (at least) 1985 (Arup, 2018). Furthermore, evidence was identified from historical photographs and a paper presented at Engineer's Ireland which states that '*the previously existing (Arklow) beach presented continuous erosion of about 1.5 m between 1930 and 1980*' (Arup, 2018).

6.6.3.8 Satellite imagery from Google maps was used to examine shoreline retreat between 1984 and 2017, with some coastline retreat appearing to have taken place between the 1984 and 2005 images (Figure 6.14), while the coastline remains relatively stable from this date forward (potentially due to the presence of a hard defence structure) (Arup, 2018). A comparison of two available bathymetric surveys dating from 1985 and 1996 was carried out in 2017 (Nairn and Southgate, 2017), in which seabed erosion is shown to occur to, approximately, 400 m (approximately 6 m water depth) offshore (Arup, 2018). Seabed lowering in front of the revetment (north of Arklow South Pier) between 1985 and 2016 ranges between 0.5 m and 2 m.

6.6.3.9 The coast at Courtown, south of Arklow, currently protected in places by rock armour, also exhibits erosion and has done so since the mid-1980's such that by 2000 the beach is reported to have 'disappeared' (Philips, 2022; Philips *et al.*, 2022). Satellite derived shoreline trend data from Luijendijk *et al.* (2018) for the period 1984 to 2016 shows that there has been an erosive trend at the southern end of the beach from before 2000. 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).

6.6.3.10 The presence of offshore banks afford some protection to the shoreline, acting as a natural breaker for incoming waves (RPS, 2010). Further, through a detailed assessment of sediment transport pathways along the coast and offshore which has included an assessment of particle tracking pathways, it has been shown (Figure 6.10) that there is limited connectivity between the offshore banks and the coast (Partrac, 2022). This would infer that any littoral sediment transport relies on sediment sources other than the Offshore sandbanks. This is further corroborated by the status of the Arklow Bank as an open-shelf linear sandbank (Creane, 2022), the presence of which '*is not directly linked to a coastal feature*' (Volume III, Appendix 6.2: Arklow Bank Sediment Mobility Assessment (RFI March 2026); Huthnance, 1980).

Figure 6.13: Coastal form: (Waterman Infrastructure and Environmental Ltd, 2020)

Figure 6.14: Shoreline change along the Wicklow Coast, with bars representing erosion/accretion at every 100 m over the period 1984 – 2024 (Luijendijk *et al.*, 2018).

6.6.4 'Do nothing' scenario

6.6.4.1 Annex IV of the EIA Directive sets out the information required to be included in an EIAR. This includes "*a description of the relevant aspects of the current state of the environment (baseline scenario) and an outline of the likely evolution thereof without implementation of the project as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge*".

6.6.4.2 In the event that the Proposed Development does not proceed, an assessment of the future baseline conditions has been carried out in accordance with the EIA Directive and is described within this section. This assessment is presented under the assumption that ABWP1 will be decommissioned.

6.6.4.3 Estimates of future seabed levels (without the Proposed Development) for 2024 to 2029/2030 (representing the installation period) and 2024 to 2069 (representing the estimated lifetime of the Proposed Development) have been presented in Volume III, Appendix 6.2: Arklow Bank Sediment Mobility Assessment (RFI March 2026). This is based on analysis of literature, satellite and geophysical data, and morphological modelling. The total potential future bed level variability (including all uncertainties) for the lifetime of the Proposed Development (2024 to 2070) generally ranges from -6 m to +8 m, but in places can reach up to -20 m and +30 m. For the installation period (2024 to 2029/ 2030), the total potential future bed level variability typically falls within the range of -5 m to +5 m, but in places can reach up to -16 m and +21 m.

6.6.4.4 A consideration of the future baseline, including the associated variation, is provided in the context of the operating lifetime of the Proposed Development. For the current purposes of this EIAR Chapter, the Representative Concentration Pathway (RCP) 8.5 (high emissions) scenario (Palmer *et al*., 2018) has been presented. UKCP18 suggests that an increase in mean sea level (MSL) of 0.6 to 0.8 m at 2100 along the eastern coast of Ireland (Palmer *et al*., 2018). Satellite analysis since the 1990's has shown that Ireland has been subject to rates of sea-level rise between 0.002 and 0.003 m per annum (EPA, 2024). Extreme sea level (RCP 8.5; 100-year event) of 3.28 m at 2100 at the nearest data point (approximately 25 km north from Arklow) has been predicted (Vousdoukas *et al*., 2018).

6.6.4.5 Wave energy is predicted to increase, such that by 2100 an increase of up to 5% of the 100-year return period has been modelled in the Celtic Sea (RCP8.5 scenario; Meucci *et al*., 2020). Of note however, is that there is no significant increase in the frequency of occurrence of these events over the same period (Met Office, 2024; Meucci *et al*., 2020). Assessments of historical wave buoy data has shown a general increase in storminess around Ireland since 2004 (RPS, 2020; EPA, 2024). Storminess has also been linked to the cyclic behaviour of the North Atlantic Oscillation (NAO), with pronounced cyclical frequency changes occurring since the 1940s at a quasi-decadal scale (Devoy, 2009).

6.6.4.6 The coast, specifically between Arklow and 4 km to the north, is predicted to undergo erosion by 2050, based on existing management and climate conditions (OPW, 2023; Vousdoukas *et al*., 2020). An increase of erosion coupled with sea-level rise are expected to impact coastal features such as dunes (paragraph 6.6.3.4) within the Magherabeg Dunes and Buckroney-Brittas Dunes and Fen SACs (Figure 6.3), by reducing the beach width and sediment availability, ultimately leading to a retreat of dunes (Masselink *et al*., 2022).

6.6.5 Data limitations

6.6.5.1 Whilst many of the baseline characteristics are well understood, in some instances, data sources or assumptions are less well studied and/ or quantified for the Coastal Processes Study Area. This section seeks to identify those areas of uncertainty and any potential data gaps.

6.6.5.2 Grab sampling provides detailed information (sediment; fauna) as data points which must be interpretated alongside other relevant datasets. Existing surveys, which included grab samples (Aquatic Services, 2021; Aquafact, 2025), have been conducted in the wider area, and show good validation both against each other and against the regional data (INFOMAR, 2022; Figure 6.8). The seabed morphology and sediments in the area are well studied and surveyed. As such, the available evidence base is considered sufficiently robust to underpin the assessment presented here, and an overall high confidence is placed in the baseline characterisation.

6.6.5.3 The sediment plume and accompanying bed level change assessment is dependent upon a number of factors which determine the exact sediment volume that is entrained into the water column. This includes the:

- type of drilling/ cable installation equipment used;
- variability of the forcing conditions at the installation time (i.e. the waves and tidal conditions); and
- mechanical properties of the geological units.

6.6.5.4 In the absence of this detailed information, a series of potential release scenarios have been considered in the assessments undertaken for this EIAR. Together, these scenarios capture the greatest impacts in terms of the highest concentration and persistent suspended sediment plumes, the maximum and greatest spatial extent of changes in bed level elevation.

6.6.5.5 Where a modelled activity occurs within the resolution of one model cell, the behaviour of the sediment plume can be considered to occur at a sub-grid scale. Therefore, it is not appropriate to draw conclusions for the size or concentration of the plume within the cell in which the activity occurs. Therefore, this has been supplemented with information based on expert judgement and analogous projects to allow meaningful interpretation. Further detail on the numerical modelling, including the representation of the Proposed Development, is provided in Volume III (Appendix 6.1: Marine Physical Processes Numerical Modelling (Revised March 2026), Appendix 6.2: Arklow Bank Sediment Mobility Assessment (RFI March 2026), and Appendix 6.3: Arklow Bank – Quantitative Assessment of the Influence of In-place Infrastructure on the Local Sediment Transport System (RFI March 2026)).

6.6.5.6 Additional numerical modelling (Volume III) was undertaken to assess the potential impacts of Project Design Option 1 upon Coastal Processes. Based on the modelling results submitted within the original EIAR, the differences between Project Design Option 1 and Project Design Option 2 are not considered sufficient to alter the overall significance of the results for Impact 2. The updated modelling has modelled Project Design Option 1 (53 WTGs and 2 OSPs), which is considered representative (although precautionary) of potential impacts arising from Project Design Option 2 (47 WTGs and 2 OSPs) due to the greater number of structures and therefore the greater potential impact on the wave and tidal regimes. Updated modelling has therefore been provided for Project Design Option 1 and is considered to be representative of potential impacts for both scenarios.

6.6.5.7 The availability of robust data, as detailed in Section 6.5.1, relevant for the characterisation and assessment of Coastal Processes is such that it is considered that a thorough and meaningful characterisation for the purposes of EIA can be undertaken. As such, the available evidence base is sufficiently robust to underpin the assessment presented here, and an overall high confidence is placed on the assessment and its findings.

6.7 Impact assessment methodology

6.7.1 Key parameters for assessment

6.7.1.1 The assessment of significance of effects has been carried out on both of the two discrete Project Design Options detailed in Volume II, Chapter 4, Description of Development (Revised March 2026). This approach has allowed for a robust and full assessment of the Proposed Development.

6.7.1.2 The two Project Design Options and parameters relevant to each potential impact are detailed in Table 6.11 and Table 6.12.

Table 6.11: Proposed Development design parameters and impacts assessed - Project Design Option 1

Potential impact	Phase C	Phase O	Phase D	Project Design Option 1
Impact 1: Increased suspended sediment concentrations and associated deposition	✓	✓	✓	**Construction phase** Confirmatory Surveys A suite of site (Array Area, Cable Corridor and Working Area) investigations will be undertaken to confirm on the seabed and geological conditions prior to the installation of the infrastructure. Complete details of the full suite of surveys proposed are provided in Volume II, Chapter 4: Description of Development (Revised March 2026). Those which are relevant to Impact 1 are: Geotechnical survey: boreholes (131); Cone Penetration Test (CPT) (431); vibrocore/ gravity core (300); and grab samples (240); Metocean survey: Floating LiDAR (includes seabed anchor points); Acoustic Doppler Current Profiler (ADCP) (deployed on a seabed frame and includes mooring structure); and Wave buoy (includes seabed mooring); Sediment dynamics survey: Benthic flume; Benthic lander (ballasted structure which requires no mooring/ anchor) Site preparation: Site preparation activities prior to inter-array, interconnector and offshore export cable installation to include boulder clearance and sandwave clearance: For the foundations, seabed preparation will be required: within an area of 100 m in diameter; with 5 m depth of material being relocated; and for, approximately, 20% of the WTG locations. For the offshore export, inter-array and interconnector cabling, boulder clearance will firstly be undertaken by plough along all of the routes: along a corridor of 15 m in width; and

Potential impact	Phase C O D	Project Design Option 1
		to a depth of 0.5 m. Following a period of circa, more than 14 days, sandwave clearance will then occur: along a corridor of 70 m in width (for each cable); with 10 m depth of material being relocated; and for up to 30% of the cable length. <u>Foundation installation:</u> WTGs and OSPs installed on monopile foundations: Drilled installation of: WTGs: Number of structures: 25; Diameter: 11 m (range 7 m to 11 m); Drill depth: 37 m; Drilling duration (per pile): 88 hours; Drill arisings (per pile): 5,280 m^3 Number of concurrent drilling events: 1. OSPs: Number of structures: 2; Diameter: 14 m (range 7 m to 14 m); Drill depth: 45 m; Drilling duration (per pile): 88 hours; Drill arisings (per pile): 13,860 m^3 Number of concurrent drilling events: 1. <u>Cable installation:</u> Cable installation techniques include: Jetting; Ploughing; Mechanical cutting; Simultaneous lay and burial; Controlled Flow Excavator (CFE).

Potential impact	Phase C	O	D	Project Design Option 1
				Interconnector cables: Length between 25 km and 28 km; Burial depth between 0 m and 2.5 m; Seabed disturbance width 15 m. Inter-array cables: Length between 110 km and 122 km; Burial depth between 0 m and 1.5 m; Seabed disturbance width 15 m. Export cables: Length between 35 m and 40 km; Burial depth between 0 m and 2.5 m; Seabed disturbance width 15 m. Landfall works: Horizontal Directional Drilling (HDD) drilling fluid release. Rate of release: 20 tonnes (per 24 hours)); and Period of release: 4.5 days (initial punch out followed by reaming phase). **Operational and maintenance phase** Cable repair/ reburial activities: Methods include: Rock protection Concrete mattressing Re-burial Interconnector cables: Length requiring protection: 14 km; Repair and replacement: 1 every 3 years; Target burial depth: 10 m; Seabed disturbance width (maximum); 15 m. Inter-array cables: Length requiring repair/ reburial: between 110 km and 122 km;

Potential impact	Phase C	O	D	Project Design Option 1
				Repair and replacement: 1 every 3 years; Target burial depth (maximum): 1.5 m; Seabed disturbance width (maximum): 15 m. Export cables: Length requiring repair/ reburial: between 35 m and 40 km; Repair and replacement: 1 every 5 years; Target burial depth (maximum): 2.5 m; Seabed disturbance width (maximum): 15 m. Operational dredging: Cable length requiring dredging: 12.5 km; Seabed disturbance width: 10 m; Target depth (maximum): 2 m; Repeatability: 1 every 5 years. **Decommissioning phase** All structures above the seabed would be removed with all foundations removed to 2 m below the seabed surface. Scour protection, cables and cable protection would be left in situ; and Decommissioning would be undertaken in the reverse of construction using similar plant and techniques.
Presence of infrastructure may lead to changes to tidal currents, wave climate, sediment transport and seabed morphology	×	✓	×	**Operational and maintenance phase** Installed infrastructure: WTGs: Number of structures: 53 Monopile foundations; Pile diameter: 11 m (range 7 to 11 m); Seabed footprint per structure: 38 to 96 m^2 OSPs: Number of structures: 2 Monopile foundations; Pile diameter: 14 m (range 7 to 14 m); Seabed footprint per structure: 38 to 154 m^2

Potential impact	Phase C O D	Project Design Option 1
		Installed cable protection: Inter-connector cables: Length of protection: 14 km Height of protection: 1.8 m Width of protection: 10 m Proportion of total length: 50%. Inter-array cables: Length of protection: 18 km Height of protection: 1.5 m Width of protection: 8 m Proportion of total length: 15%. Export cables: Length of protection: 8 km Height of protection: 1.5 m Width of protection: 8 m Proportion of total length: 20%. Temporary jack-up presence: Number of occurrences: 14 per annum Spud can area: 1,200 m^2 Annual area: 16,800 m^2

Table 6.12: Proposed Development design parameters and impacts assessed - Project Design Option 2

Potential impact	Phase C	O	D	Project Design Option 2
Impact 1: Increased suspended sediment concentrations and associated deposition	✓	✓	✓	**Construction phase** <u>Confirmatory Surveys</u> A suite of site (Array Area, Cable Corridor and Working Area) investigations will be undertaken to confirm on the seabed and geological conditions prior to the installation of the infrastructure. Complete details of the full suite of surveys proposed are provided in Volume II, Chapter 4: Description of Development (Revised March 2026). Those which are relevant to Impact 1 are: Geotechnical survey: Boreholes (131); CPT (431); vibrocore/ gravity core (300); and grab samples (240); Metocean survey: Floating LiDAR (includes seabed anchor points); Acoustic Doppler Current Profiler (ADCP) (deployed on a seabed frame and includes mooring structure); and Wave buoy (includes seabed mooring); Sediment dynamics survey: Benthic flume; Benthic lander (ballasted structure which requires no mooring/ anchor) <u>Site preparation:</u> Site preparation activities prior to inter-array, interconnector and offshore export cable installation to include boulder and sandwave clearance: For the foundations, seabed preparation will be required: within an area of 100 m in diameter; with 5 m depth of material being relocated; and for, approximately, 20% of the WTG locations. For the offshore export, inter-array and interconnector cabling, boulder clearance will firstly be undertaken by plough along all of the routes: along a corridor of 15 m in width; and to a depth of 0.5 m.

Potential impact	Phase C O D	Project Design Option 2
		Following a period of circa, more than 14 days, sandwave clearance will then occur: along a corridor of 70 m in width (for each cable); with 10 m depth of material being relocated; and for up to 30% of the cable length. <u>Foundation installation:</u> WTGs and OSPs installed on monopile foundations: Drilled installation of: WTGs: Number of structures: 25; Diameter: 11 m (range 7 m to 11 m); Drill depth: 37 m; Drilling duration (per pile): 88 hours; Drill arisings (per pile): 7,040 m^3 Number of concurrent drilling events: 1. OSPs: Number of structures: 2; Diameter: 14 m (range 7 m to 14 m); Drill depth: 45 m; Drilling duration (per pile): 88 hours; Drill arisings (per pile): 13,860 m^3 Number of concurrent drilling events: 1. <u>Cable installation:</u> Cable installation techniques include: Jetting; Ploughing; Mechanical cutting; Simultaneous lay and burial; Controlled Flow Excavator (CFE). Interconnector cables:

Potential impact	Phase C O D	Project Design Option 2
		Length between 25 km and 28 km; Burial depth between 0 m and 2.5 m; Seabed disturbance width 15 m. Inter-array cables: Length between 110 km and 122 km; Burial depth between 0 m and1.5 m; Seabed disturbance width 15 m. Export cables: Length between 35 m and 40 km; Burial depth between 0 m and 2.5 m; Seabed disturbance width 15 m. Landfall works: HDD drilling fluid release. Rate of release: 20 tonnes (per 24 hours bentonite); and Period of release: 4.5 days (initial punch out followed by reaming phase). **Operational and maintenance phase** Cable repair/ reburial activities: Methods include: Rock protection Concrete mattressing Re-burial Interconnector cables: Length requiring protection 14 km; Repair and replacement: 1 every 3 years; Burial depth between 0 m and 10 m; Seabed disturbance width (maximum) 15 m. Inter-array cables: Length between 110 km and 122 km; Repair and replacement: 1 every 3 years;

Potential impact	Phase C	O	D	Project Design Option 2
				Burial depth between 0 m and 1.5 m; Seabed disturbance width (maximum) 15 m. Export cables: Length between 35 m and 40 km; Repair and replacement: 1 every 5 years; Burial depth between 0 m and 2.5 m; Seabed disturbance width (maximum) 15 m. Operational dredging: Seabed disturbance width: 10 m Target depth (maximum): 2 m Repeatability: 1 every 5 years **Decommissioning phase** All structures above the seabed would be removed, foundations will be removed to 2 m below the seabed level, scour protection, cables and cable protection would be left in situ; and Decommissioning would be undertaken in the reverse of construction using similar plant and techniques.
Presence of infrastructure may lead to changes to tidal currents, wave climate, sediment transport and seabed morphology	×	✓	×	**Operational and maintenance phase** Installed infrastructure: WTGs: Number of structures: 47 Monopile foundations; Pile diameter: 11 m (range 7 to 11 m); Seabed footprint per structure: 38 to 154 m^2 OSPs: Number of structures: 2 Monopile foundations; Pile diameter: 14 m (range 7 to 14 m); Seabed footprint per structure: 38 to 154 m^2 Installed cable protection:

Potential impact	Phase C	O	D	Project Design Option 2
				Inter-connector cables: Length of protection: 14 km Height of protection: 1.8 m Width of protection: 10 m Proportion of total length: 50%. Inter-array cables: Length of protection: 18 km Height of protection: 1.5 m Width of protection: 8 m Proportion of total length: 15%. Export cables: Length of protection: 8 km Height of protection: 1.5 m Width of protection: 8 m Proportion of total length: 20%. Temporary jack-up presence: Number of occurrences: 14 per annum Spud can area: 1,200 m^2 Annual area: 16,800 m^2

6.7.2 Impacts scoped out of the assessment

6.7.2.1 On the basis of the baseline environment and the description of development outlined in Volume II, Chapter 4: Description of Development (Revised March 2026), it is proposed to scope out seabed scour. Further detail, including a justification for scoping the impact out, is provided in Table 6.13.

6.7.2.2 On the basis of Appendix 6.3 Arklow Bank – Quantitative Assessment of the Influence of In-place Infrastructure on the Local Sediment Transport systems (RFI March 2026) potential effects arising from wind wake (that do not affect the oceanographic regime) have been scoped out. Further details including a justification for scoping the impact out, is provided in Table 6.13. The potential for wind wake effects to interact with the oceanographic regime is considered within Impact 2.

Table 6.13: Impacts scoped out of the assessment for Coastal Processes

Potential impact	Justification
Scour of seabed sediments	The potential for scour of seabed sediments around the WTG and OSP foundations has been designed out through adopted engineering methods developed through detailed site characterisation and lessons learnt from ABWP1; specifically, a filter layer of scour protection will be laid within the dredged footprint prior to the WTGs and OSPs being installed, preventing the development of scour as soon as the foundation has been installed Further detail is provided in Volume II, Chapter 4: Description of Development (Revised March 2026). Given that the potential for seabed scour has been designed out based on onsite experience, this impact has been scoped out of the assessment. This includes the potential for secondary scour, which is inherently mitigated through the design of the scour protection.
Wind Wake	The potential for wind wake effects (that do not affect the oceanographic regime) has been examined in Appendix 6.3 Arklow Bank – Quantitative Assessment of the Influence of In-place Infrastructure on the Local Sediment Transport systems (RFI March 2026). The results show that the impact of the infrastructure on coastal wind regimes is considered negligible and within the natural variability that has been observed in the absence of the infrastructure (i.e. baseline conditions).

6.8 Methodology for assigning the significance of effect

6.8.1 Overview

6.8.1.1 The Coastal Processes impact assessment has followed the methodology set out in Volume II, Chapter 5: EIA Methodology (Revised March 2026). The ‘source-pathway-receptor’ approach has been applied which allows a Coastal Processes Study Area to be identified which includes all the marine locations of the Proposed Developments’ activities which may create potential sources of effects, in addition to all the pathways which create a linkage between the source and environmental receptors.

6.8.1.2 The baseline and assessment works have been undertaken using an evidence-based approach, supported by the Proposed Developments’ specific surveys and numerical modelling, as appropriate.

6.8.1.3 This Chapter has been updated to integrate the results of numerical modelling carried out in response to the Request for Further Information (7e(i)). Details of the morphodynamic numerical model and baseline simulations are provided Volume III, Appendix 6.2: Arklow Bank Sediment Mobility Assessment (RFI March 2026), with details of the methodology applied to assess the potential changes to the hydrodynamic regime, alongside further details of the results, presented in Volume III, Appendix 6.3: Arklow Bank – Quantitative Assessment of the Influence of In-place Infrastructure on the Local Sediment Transport System (RFI March 2026). The developed numerical model is composed of coupled flow (two-dimensional depth-averaged hydrodynamic model (Delft3D-FM), wave (spectral phase-averaged model), and sediment transport modules. Review of the available literature demonstrates that thermal and density stratification, as well as oceanic currents, do not have a significant effect on the hydrodynamics and corresponding morphodynamics in this area. A two-dimensional modelling approach is therefore justified.

6.8.1.4 For the most part, Coastal Processes are not in themselves receptors but are instead ‘pathways’. However, changes to Coastal Processes have the potential to indirectly impact other environmental receptors (Lambkin *et al.*, 2009). An example is the creation of sediment plumes which may result in material settling onto benthic habitats. The potential significance of this particular change is assessed in Volume II, Chapter 9: Benthic Subtidal and Intertidal Ecology (Revised March 2026) with Volume II, Chapter 23: Interactions (Revised March 2026) considering the environmental interactions between topics.

6.8.2 Impact assessment criteria

Sensitivity

6.8.2.1 This section describes the criteria applied in this chapter to assign values to the sensitivity of the receptors. The terms used to define sensitivity are based on those which are described in further detail in Volume II, Chapter 5: EIA Methodology (Revised March 2026) of the EIAR.

6.8.2.2 The definition of magnitude specific to Coastal Processes is provided in Table 6.14. Where a range of sensitivity criteria are met, the final assessment for each receptor is based upon expert judgement.

Table 6.14: Coastal Processes definitions of sensitivity of the receptor

Receptor sensitivity	Definition
High	Adaptability: The receptor cannot avoid or adapt to an impact. Tolerance: The environment has no capacity to accommodate the proposed form of change. Recoverability: The effect on the receptor is anticipated to be long-term (i.e. over the Proposed Developments’ lifetime). Value: The receptor is designated for international importance and/or very high socio-economic value.
Medium	Adaptability: The receptor has some capacity to avoid or adapt to an impact. Tolerance: The environment has limited capacity to accommodate the proposed form of change. Recoverability: The effect on the receptor is anticipated to be medium-term (i.e. over the Proposed Developments’ operational and maintenance period). Value: The receptor is designated for regional importance and/or moderate socio-economic value.
Low	Adaptability: The receptor has capacity to avoid or adapt to an impact. Tolerance: The environment has moderate to low capacity to accommodate the proposed form of change. Recoverability: The effect on the receptor is anticipated to be short- to medium-term (i.e. over the Proposed Developments’ construction period). Value: The receptor is not designated but of county level importance and/or low socio-economic value.

Receptor sensitivity	Definition
Negligible	Adaptability: The receptor can fully avoid or adapt to an impact. Tolerance: The environment has high capacity to accommodate the proposed form of change. Recoverability: The effect on the receptor is anticipated to be short- term (i.e. duration of the Proposed Developments' individual construction activities). Value: The receptor is not designated but of local level importance.

Magnitude

6.8.2.3 This section describes the criteria applied in this chapter to assign values to the magnitude of potential impacts. The terms used to define magnitude and sensitivity are based on those which are described in further detail in Volume II, Chapter 5: EIA Methodology (Revised March 2026) of the EIAR.

6.8.2.4 The definition of magnitude specific to Coastal Processes is provided in Table 6.15. Where a range of magnitude criteria are met, the final assessment for each impact is based upon expert judgement.

Table 6.15: Coastal Processes definition of terms relating to the magnitude of an impact

Magnitude	Definition
High	Extent: Impact beyond the ZoI. Duration: The impact is anticipated to be long-term (i.e. over the Proposed Developments' lifetime). Frequency: The impact will occur constantly throughout the relevant project phase. Probability: The impact can reasonably be expected to occur. Consequences: Permanent changes to key characteristics or features of the particular environmental aspect's character or distinctiveness.
Medium	Extent: Impact within the ZoI. Duration: The impact is anticipated to be medium-term (i.e. over the Proposed Developments' operational and maintenance period). Frequency: The impact will occur constantly throughout the relevant project phase. Probability: The impact can reasonably be expected to occur. Consequences: Noticeable, but temporary, changes to key characteristics or features of the particular environmental aspect's character or distinctiveness.
Low	Extent: Impact within the Array Area or Cable Corridor and Working Area. Duration: The impact is anticipated to be short- to medium-term (i.e. over the Proposed Developments' construction period). Frequency: The impact will occur intermittently throughout the relevant project phase. Probability: The impact can reasonably be expected to occur. Consequences: Noticeable, but temporary, changes or barely discernible to key characteristics or features of the particular environmental aspect's character or distinctiveness.
Negligible	Extent: Localised impacts within the Array Area or Cable Corridor and Working Area. Duration: The impact is anticipated to be short- term (i.e. duration of the Proposed Developments' individual construction activities). Frequency: The impact will occur intermittently throughout the relevant project phase. Probability: The impact can reasonably be expected to occur. Consequences: Changes which are not discernible out with background variations of key characteristics or features of the particular environmental aspect's character or distinctiveness.

Significance of effect

6.8.2.5 The significance of the effect upon Coastal Processes is determined by correlating the magnitude of the impact and the sensitivity of the receptor. The particular method employed for this assessment is presented in Table 6.16. Where a range of significance of effect is presented in Table 6.16, the final assessment for each effect is based upon expert judgement.

Table 6.16: Significance of effect matrix

Description of Impact - Magnitude			Baseline Environment - Sensitivity			
			High	Medium	Low	Negligible
Adverse Impact		High	Profound or Very Significant (significant)	Significant	Moderate*	Imperceptible
		Medium	Significant	Moderate*	Slight	Imperceptible
		Low	Moderate*	Slight	Slight	Imperceptible
Neutral Impact		Negligible	Not Significant	Not Significant	Not Significant	Imperceptible
Positive Impact		Low	Moderate*	Slight	Slight	Imperceptible
		Medium	Significant	Moderate*	Slight	Imperceptible
		High	Profound or Very Significant (significant)	Significant	Moderate*	Imperceptible

*Moderate levels of effect have the potential, subject to the assessor's professional judgement to be significant or not significant. Moderate will be considered as significant or not significant in EIA terms, depending on the sensitivity and magnitude of change factors evaluated. These evaluations are explained as part of the assessment, where they occur.

6.8.3 Factored in measures

6.8.3.1 The Project Design Options set out in Volume II, Chapter 4: Description of Development (Revised March 2026) include a number of designed-in measures and management measures (or controls) which have been factored into the Proposed Development and are committed to be delivered by the Developer as part of the Proposed Development.

6.8.3.2 These factored-in measures are standard measures applied to offshore wind development, including lighting and marking of the Proposed Development, use of 'soft-starts' for piling operations etc, to reduce the potential for impacts. Factored-in measures relevant to the assessment on Coastal Processes are presented in Table 6.17. These measures are integrated into the description of development and have therefore been considered in the impact assessment (i.e. the determination of magnitude and therefore significance assumes implementation of these measures). These measures are considered standard industry practice for this type of development. 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 proposed proposal*' (EPA, 2022).

Table 6.17 : Factored in measures

Factored in measures	Justification
Scour protection	In the absence of scour protection, there is potential for scour pits to develop around foundations. This may result in the release of sediment into the water column and a change to seabed habitat in the vicinity of the foundation. Scour protection will be installed as described in Volume II, Chapter 4: Description of Development (Revised March 2026).
Definition and implementation of construction methods, Volume II, Chapter 4: Description of Development and Rehabilitation Schedule.	Volume II, Chapter 4: Description of Development (Revised March 2026) provides cable laying plan, including refined cable laying techniques and refined cable burial depths (based on the parameters assessed in the EIAR). Operational and Maintenance activities are set out in Volume II, Chapter 4: Description of Development (Revised March 2026), in addition to a procedure for setting out the refined parameters of any cable repair or reburial activities. The Rehabilitation Schedule presented in Volume III, Appendix 4.1 outlines the measures for the decommissioning of the Proposed Development.
Preparation and implementation of environmental monitoring	Commitments to environmental monitoring. Operational and Maintenance asset monitoring commitments include survey of seabed and assets every six months for the first two years and annually thereafter (Volume II: Chapter 4: Description of Development (Revised March 2026)).This will include monitoring to determine scour development and cable burial.
Cables will be buried where possible and protected where not possible.	The location of areas of cable protection (if cable protection is required) will be communicated to the fishing industry. Cable burial will have direct impacts on receptors through morphology changes and suspended sediments.
Undertaking of post-installation cable burial surveys and periodic monitoring of cables.	This will monitor the impacts of cable burial/protection with respect to seabed features, including sandwave fields, sandbanks and scour development around cable protection.
Design of infrastructure including siting of Wind Turbine Generators (WTGs)	Infrastructure, including WTGs and OSPs, have been located in order to avoid very shallow waters and areas with highest predicted bed level changes/highest uncertainty.
The Developer confirms and commits that it will not carry out any works in respect of the Proposed Development under the planning permission (if granted) at the same time as any activities the subject of the Foreshore Licence for Site Investigations (FS007339).	The Developer was granted a Foreshore Licence (FS007339) for Site Investigations (associated with the Proposed Development) from the Minister for Housing, Local Government and Heritage in May 2022. The Developer confirms and commits that it will not carry out any works in respect of the Proposed Development under the planning permission (if granted) at the same time as any activities the subject of the Foreshore Licence for Site Investigations (FS007339) being carried out. As such there is no temporal overlap between the activities consented in this Foreshore Licence and the Proposed Development and there will be no potential for cumulative effects.
The Developer confirms and commits that it will not carry out any works in respect of the Proposed Development under the planning	The Developer submitted a Foreshore Licence Application for Site Surveys to the Minister for Housing, Local Government and Heritage in April 2023 (FS007555) and this application is pending determination. The Developer confirms and commits that it will not carry out any works in respect of the Proposed Development under the planning permission

Factored in measures	Justification
permission (if granted) at the same time as any activities the subject of the Foreshore Licence Application for Site Surveys FS007555 (should a licence be granted) are being carried out.	(if granted) at the same time as any activities the subject of the Foreshore Licence Application for Site Surveys FS007555 (should a licence be granted) are being carried out. As such there is no temporal overlap between the activities proposed in the Foreshore Licence Application and the Proposed Development.
Undertaking of construction activities during storm events	The Developer confirms and commits that it will not carry out any construction works during storm events. The definition of a storm event is defined in the Beaufort scale as: winds 48-55kn/89-102km/hr or 24.5-28.4m/s and Very high waves with long overhanging crests; resulting foam in great patches is blown in dense white streaks along the direction of the wind; on the whole the surface of the sea takes on a white appearance; rolling of the sea becomes heavy; visibility affected

6.9 Assessment of the significance of effects

6.9.1.1 The impacts of the construction, operational and maintenance and decommissioning phases of both Project Design Options, as presented in Volume II, Chapter 4: Description of Development (Revised March 2026) forming the Proposed Development have been assessed on Coastal Processes. The potential impacts arising from the construction, operational and maintenance and decommissioning phases of the Proposed Development are listed in Table 6.11 and Table 6.12, along with the project parameters against which each impact has been assessed.

6.9.1.2 A description of the potential effect on Coastal Processes caused by each identified impact is provided in Section 6.9.1.2 and Section 6.11. Further studies undertaken in response to the RfI's which are presented separately to this EIAR Chapter include long-term morphodynamic modelling presented in Volume III, Appendix 6.2: Arklow Bank Sediment Mobility Assessment (RFI March 2026) and Volume III, Appendix 6.3: Arklow Bank – Quantitative Assessment of the Influence of In-place Infrastructure on the Local Sediment Transport System (RFI March 2026).

6.10 Assessment of Project Design Option 1

6.10.1 Impact 1 – Increased suspended sediment concentrations and associated deposition

6.10.1.1 As stated in paragraph 6.8.1.4, for the most part physical processes, such as the creation of sediment plumes and the associated consequential deposition, are not in themselves receptors but are instead 'pathways'. Therefore, when considering Impact 1, the assessments of potential change to pathways are not at this stage accompanied by a conclusion regarding the significance of effect.

SENSITIVITY OF THE RECEPTOR

6.10.1.2 All the identified Coastal Processes receptors (Section 6.5), including the Blackwater Bank SAC, will be insensitive to localised changes in SSC and bed levels associated with the sediment disturbance activities described in this section. However, the potential for these changes to impact other EIAR receptor groups are considered elsewhere in the EIAR, in particular:

- Volume II, Chapter 7: Marine Sediment and Water Quality (Revised March 2026);
- Volume II, Chapter 9: Benthic Subtidal and Intertidal Ecology (Revised March 2026);
- Volume II, Chapter 10: Fish, Shellfish and Sea Turtle Ecology (Revised March 2026);
- Volume II, Chapter 11: Marine Mammals (Revised March 2026); and
- Volume II, Chapter 14: Commercial Fisheries (Revised March 2026).

Construction phase

6.10.1.3 Proposed Development activities will result in the disturbance of sediments and the consequential release into the water column. In turn, this will give rise to suspended sediment plumes and localised changes in bed levels as the material settles out of suspension. Those construction activities that will result in the greatest seabed sediment disturbance, due to the associated temporal scale, spatial scale and sediment volumes are presented in Table 6.11. These activities (with reference to the relevant sections) are:

- Pre-lay cable trenching using Controlled Flow Excavation (CFE) tools at the seabed for cable installation within the Array Area (paragraph 6.10.1.33 *et seq* .) and along the Cable Corridor and Working Area (paragraph 6.10.1.56 *et seq.*);
- Seabed preparation as:
  - boulder clearance for cable installation within the Array Area (paragraph 6.10.1.32 *et seq.)* and along the Cable Corridor and Working Area (paragraph 6.10.1.55 *et seq.*);
  - sandwave clearance for WTG and OSP foundations (paragraph 6.10.1.17 *et seq.)* and along the Cable Corridor and Working Area (paragraph 6.10.1.47 *et seq.)* including spoil disposal via a Trailer Suction Hopper Dredger (TSHD);
- Foundation installation using drilling techniques (paragraph 6.10.1.40 *et seq.*); and
- Drilling fluid release during HDD, or other trenchless technique, operations (paragraph 6.10.1.65 *et seq.*).

6.10.1.4 The evidence base has been used to assess the potential impacts of these activities upon Coastal Processes using, where available, monitoring results from comparable activities in similar environmental conditions. This has been supplemented by a suite of project specific numerical modelling simulations (Volume III, Appendix 6.1: Marine Physical Processes Numerical Modelling (Revised March 2026)). The release events simulated within the numerical model, as described in Volume III, Appendix 6.1: Marine Physical Processes Numerical Modelling (Revised March

2026), have been specifically designed to capture the full range of realistic precautionary outcomes in terms of:

- Sediment plume concentrations;
- Sediment plume extent;
- Vertical deposition depth (bed level change); and
- Horizontal extent of deposition (spatial extent (area) of bed level change).

6.10.1.5 The methodology applied to assess the characteristics of sediment plumes and associated changes in bed level arising from settling of material is set out in Volume III, Appendix 6.1: Marine Physical Processes Numerical Modelling (Revised March 2026). The sediment type and source modelled in each scenario were based on grab-sample results from Aquafact (2025) and are representative of the baseline sedimentary environment. The findings are presented in the following sections.

6.10.1.6 The approach to sediment plume modelling adopted within this assessment is based on industry best practice and expert judgement, informed by applicable guidance and developed through experience of offshore wind farm EIAs across the UK and in Europe. The particle tracking model is driven by a validated MIKE21FM 2D hydrodynamic model, due to the fact that sediment transport dynamics across Arklow Bank are predominantly tide-dominated (Volume III, Appendix 6.2: Arklow Bank Sediment Mobility Assessment (RFI March 2026)). These processes may be enhanced by waves during energetic events, however as construction activities will not take place during storms (as outlined in Table 6.17) these are not considered realistic to model. Sediment disturbed or released into the environment through the Proposed Development is presented, of note is that this numerical scheme does not resolve ambient turbidity, as per similar particle tracking models used in EIA assessments. The modelling results should therefore be interpreted in the context of the prevailing baseline (do-nothing) conditions, as identified in paragraph 6.6.1.22 *et seq*. and Table 6.9.

6.10.1.7 Similarly, re-erosion of settled material has not been considered relevant for the purpose of understanding the likely significant effects of the Proposed Development on coastal processes; an approach which is in line with best-practice for EIAR. This is in order to ensure that the maximum depth of deposition is determined in order to allow for a robust assessment of potential impacts on ecological receptors. In response to the RFIs, sensitivity testing was carried out which further justified this approach (see Applicant Response to the Request for Further Information document). Due to the highly mobile bedforms and energetic tidal regime presented on Arklow Bank (as outlined in Section 6.6 and supported by Partrac (2022) and Volume III, Appendix 6.2: Arklow Bank Sediment Mobility Assessment (RFI March 2026), material is continually resuspended and transported within the bank cell. Allowing for re-erosion within the model does not therefore provide an improved assessment of an impact relating to the activities associated with the Proposed Development, but instead simply demonstrates the naturally dynamic environment, which has been sufficiently described in Section 6.6. Sediment deposition is therefore presented as static thicknesses in order to support assessment, however in reality it should be noted that deposited sediment will be re-integrated into the sediment transport system (which is highly mobile across Arklow Bank).

CONCEPTUAL UNDERSTANDING OF CHANGE

6.10.1.8 The actual magnitude and extent of change in SSC and bed levels will depend, in practice, on a range of factors, for which there will be a wide range of possible combinations such that it is not possible to predict the specific dimensions with complete certainty. The key factors include the:

- actual total volumes of sediment disturbed;
- rates of sediment disturbance;
- local water depth;

- current speed at the time of the activity;
- local sediment type;
- grain size distribution;
- local seabed morphology;
- local seabed slopes; and
- local sediment mobility.

6.10.1.9 To provide a robust assessment, a range of realistic combinations have been considered, based on conservatively representative locations (environmental) and design information specific to the Proposed Development, including a range of water depths, heights of sediment ejection/ initial resuspension, and sediment types. These details are set out in Volume III, Appendix 6.1: Marine Physical Processes Numerical Modelling (Revised March 2026), informed by grab-sampling from Aquafact (2025).

6.10.1.10 The maximum distance, and as such the overall spatial extent that any resultant plume might be reasonably experienced, can be estimated as the spring tidal excursion distance. Any location beyond the tidal excursion distance[12] is unlikely to experience any measurable change in SSC from a sediment plume. Given the temporary nature of the sediment disturbance, any impacts are also anticipated to be short-lived, with any deposited material likely to be re-worked on subsequent tides. Further discussion on the predicted impacts from each of the seabed disturbance activities is provided in following sections.

6.10.1.11 The tidal excursion distance will vary in relation to the peak current speed on a given tide. Therefore, this distance may be smaller than shown during the smaller than average spring, intermediate and neap conditions, and only very occasionally may be larger than shown during larger than average spring conditions. The high spring and low neap model scenarios provided represent the top and bottom 0.5% of current speeds which are exceeded, approximately, three times per annum.

6.10.1.12 The path followed by a tidal ellipse, whilst comparable, is not exactly the same on every tide. As such, it is unlikely that the same seabed area will be affected by the higher SSC and more localised plume, for more than one or two consecutive tides. Consequently, the associated deposition areas are also unlikely to be affected by deposition from suspended material over more than one or two tides.

6.10.1.13 During spring tidal conditions, any disturbed sediment will be transported away from the activity at a faster rate than during other, for example, neap tidal conditions. Consequently, the sediment mass will be dispersed over a larger area and water volume which therefore results in the plume SSC having a relatively lower concentration than on a comparable neap tide.

6.10.1.14 The plume's limited width/ footprint is such that specific locations will only be affected by an increased SSC for the limited duration it takes for the plume to be advected past by the tide. Discrete areas of larger depths of deposited sediments are considered to be over-predicted in the numerical model given the 75 m spatial resolution within the Array Area and Cable Corridor and Working Area.

6.10.1.15 If multiple activities causing sediment disturbance (such as dredging, drilling or cable installation) are undertaken simultaneously at two or more locations that are aligned in relation to the ambient tidal streams, the areas affected (either by a change in SSC or sediment deposition) may potentially overlap. This change in SSC in areas of overlap will be additive only if the downstream activity occurs within the area of effect from upstream (i.e. sediment is disturbed within the

[12] The tidal excursion distance is the approximate distance over which water (or a section of plume with elevated SSC) is advected during one flood or ebb tide.

sediment plume from the upstream location). The change in SSC will not be additive (i.e. the effects will be as described for single occurrences only) if the affected areas only meet or overlap downstream following the advection or dispersion of the effects. Effects on sediment deposition will be additive only if and where the footprints of the deposits overlap.

ARRAY AREA SEABED PREPARATION AND INSTALLATION ACTIVITIES

6.10.1.16 The following sections present the assessment for the following construction activities within the Array Area:

- Seabed preparation (boulder and sandwave clearance, including spoil disposal via a TSHD for the latter);
- Pre-lay cable trenching using jetting tools at the seabed; and
- Foundation installation using drilling techniques.

SEABED PREPARATION (SANDWAVE CLEARANCE INCLUDING SPOIL DISPOSAL VIA A TRAILER SUCTION HOPPER DREDGER)

6.10.1.17 Seabed preparation may be required prior to the installation of the Proposed Developments' infrastructure. This is likely to include seabed levelling to allow the foundations to be placed onto a flat seabed, as well as for areas of scour protection (where required). The parameters for these activities are presented in Table 6.11.

6.10.1.18 The sediment volume likely to be removed for seabed levelling within the Array Area (excluding export cables) is up to 2,639,200 m^3 and is to be excavated using a TSHD with an assumed hopper volume of 20,000 m^3 over the entire construction period. It should be noted that this is a conservative estimate of hopper volume and it is possible that a smaller vessel may be used, which would consequently result in smaller potential impacts relating to sediment plumes and associated deposition. Whilst the hopper is being filled, overspill is likely to develop a near-surface sediment plume composed primarily of fine sediments. Once each hopper is filled, dredged material (spoil) will be returned to the seabed at a specified disposal site (as per Dumping at Sea permit) as a relatively sudden release from under the vessel. Five discrete disposal sites have been identified within the boundary of the Array Area, the locations of which are shown in Figure 6.1.

6.10.1.19 Numerical modelling (as presented in Volume III, Appendix 6.1: Marine Physical Processes Numerical Modelling (Revised March 2026)) has simulated the filling of a TSHD hopper load in addition to overspill. This was followed by discharge at a specified spoil disposal site defined due to proximity to the activity. Results are presented for disposal at Zone 3 (Figure 6.15 and Figure 6.16), Zone 4 disposal sites (Figure 6.17 and Figure 6.18) and Zone 2 (Figure 6.19 and Figure 6.20) disposal sites. These sites have been selected for the modelling of this activity in order to capture realistic precautionary outcomes and present a representative result, taking into account the following context:

- Modelling has been carried out at both Zone 3 and Zone 4 in order to understand the movement of sediment plumes both to the east and west of Arklow Bank;
- Modelling has been carried out at the Zone 2 disposal site as this location has lower current speeds than in the north of the Array Area (and therefore seabed disturbance here will potentially result in the greatest thickness of sediment deposition);
- Given their proximity to one another, modelling at Zone 2 is considered representative of potential impacts at Zone 1; and
- Modelling at the Zone 5 disposal site has been carried out for seabed preparation for cables, with results presented in paragraph 6.10.1.47.

6.10.1.20 Whilst the hopper is being filled, overspill is likely to develop a near-surface sediment plume composed primarily of fine sediments. The TSHD loading phase, including initial hopper loading, overspilling and manoeuvring, is 10.18 hours at the WTG location. There is then a 13-minute break in discharge during demob and transit to the disposal site, before a 15-minute discharge period at the disposal site. For the overspill phase, the sediment is released at the water surface and for the disposal phase the material is released 10 m below the surface. These timings have been developed based on expert judgment of comparative works, informed by active engagement with the industry and consultation with subject matter experts. For disposal at the Zone 2 disposal site, results have been presented for a model run of 660 hours, consisting of 50 successive dredging cycles. Whilst this goes above and beyond best practice EIAR requirements, the results are presented within this chapter in response to RfI's and to further supplement the impact assessment previously presented.

6.10.1.21 Once the dredger moves to discharge a full hopper load, the majority of the finer sediments are expected to have already been lost to overspill, although this will vary based on the sediment type and filling rate. During spoil disposal, sediments will be discharged as a highly turbid dynamic plume, with the coarser sediment fraction falling quickly to the seabed (on timescales of minutes to tens of minutes) with limited opportunity to be advected away by tidal currents, leading to a correspondingly greater localised depth of accumulation on the seabed. Finer sediments, which form a small proportion of the surficial sediment layer (Section 6.6.1), in the spoil will remain in suspension for longer (up to around a day), forming a passive plume which will then be advected by tidal currents. Should any wave energy be present during the operations, then any plume will be dispersed more quickly than under tidal currents alone.

6.10.1.22 The evidence base with respect to dredging activities is extensive and based on a range of monitoring and numerical modelling studies undertaken within the aggregate industry, as provided within the UK Marine SAC project (http://ukmpa.marinebiodiversity.org) which states:

- *"Dredging activities often generate no more increased suspended sediments than commercial shipping operations, bottom fishing or generated during severe storms (Parr et al., 1998);*
- *Natural events such as storms, floods and large tides can increase suspended sediments over much larger areas, for longer periods than dredging operations (Environment Canada, 1994).*
- *It is often very difficult to distinguish the environmental effects of dredging from those resulting from natural processes or normal navigation activities (Pennekamp et al.,1996)".*

6.10.1.23 As shown in Figure 6.15 to Figure 6.20, the numerical modelling simulations undertaken show the following for the Zone 3, Zone 4, and Zone 2 disposal sites:

- Suspended Sediment Concentrations:
  - For one dredging cycle, within the first five hours of sandwave clearance[13], limited concentrations of fine sediment are observed within 5 km of the seabed works. These concentrations are generally below 5 mg/l, and disperse within a matter of hours (as anticipated given the highly energetic tidal regime).
  - Disposal of the TSHD load at the disposal points in the centre of the Array Area (Zone 3 and Zone 4) initially results in the formation of a plume with maximum concentrations of the order of 2,500 mg/l. The elevated SSC forms a narrow plume extending from the point of disposal, generally between 250 m and 500 m in width (although this can reach up to 1.5 km in certain scenarios) and extending up to 8.5 km away. Simultaneously to being

[13] For a release during high current speeds. During lower current speeds, the plumes' SSC remain of similar orders of magnitude, but its extent is reduced as would be expected due to the reduced dispersive energy of the tidal regime.

advected by the tidal currents along the tidal axis, the plume is also dispersed such that the SSC levels reduce. Rapid dispersion is such that within five hours concentrations in the plume are below 100 mg/l. Elevated SSC above 1 mg/l (which is considered functionally immeasurable), is not predicted after 15 hours following the initial sandwave clearance.
- At the Zone 3 and Zone 4 disposal sites, under all tidal flow simulations (speeds and direction), elevated SSC (above 1 mg/l) are not shown to disperse outside of the Cable Corridor and Working Area that surrounds the Array Area.
- For the results from the Zone 2 disposal site, where 50 successive dredging cycles have been modelled, plumes are formed and then disperse with each dredging cycle. Depending on the tidal state, successive plumes may persist for longer periods of time, resulting in localised additive effects, however these will be short-term and expected to disperse within several tidal cycles of the cessation of works. As shown in Figure 6.15, maximum concentrations of 5,000 mg/l are observed within 1.5 km of the activities, reducing to low hundreds of mg/l within approximately 2 km of the works. Elevated SSC above 1 mg/l is not shown to disperse beyond 9 km from the disposal site. All measurable SSC (above 1 mg/l) is shown to have fully dispersed at 660 hours as shown in Figure 6.19, representing approximately five days after the conclusion of the works.
- These results should be considered in the context of ambient background turbidity occurring across the Study Area, as described in paragraph 6.6.1.23 and Table 6.9. Average values of near-bed turbidity have been identified from ABS data and provide a reference point of baseline average (31.7 mg/l) and maximum (74.6 mg/l) near-bed turbidity, which is presented for context in the legend of Figure 6.15, Figure 6.17, and Figure 6.19.

- Deposited Sediment:
  - For one dredging cycle, sediment deposition is shown to have the following general characteristics:
    - under higher current speeds[14], the resultant deposition is shown to have a greater spatial extent and lower thickness than under lower current speeds. Under lower speeds, the resultant deposition is shown to have a lesser areal extent and relative greater thickness. This pattern is more apparent at the Zone 4 disposal site than the Zone 3.
    - the deposition location aligns with the axis of tidal flow, which are relatively linear to the north and south of the Array Area (Figure 6.5).
  - Sediment deposition is greatest in the vicinity of the installation works, with thicknesses generally between 50 mm and 150 mm, and in places up to over 200 m, occurring within 1 km of the works for the Zone 3 and Zone 4 disposal sites. Beyond this, the thickness of deposited sediment reduces to below 35 mm within several kilometres and continues to reduce such that between 1.5 km (for low current scenarios) and 5 km (for high current scenarios) 6 km from the active disturbance, the deposited thickness is of the order of 1 mm to 2.5 mm. Beyond this, the thickness of deposited sediment becomes immeasurable (less than 1 mm, corresponding to a single grain of coarse sand). Environmental and operational factors which should be considered when interpretating these, and similar results, have previously been presented (para 6.10.1.8 *et seq.).*
  - For the results from the Zone 2 disposal site, where 50 successive dredging cycles have been modelled, thicknesses of up to, approximately, 500 mm are observed within 1 km of the disposal site, reducing to below 10 mm, approximately, 2.5 km away and continuing to

[14] Noting that the peak current speed occurs during the final ten minutes of the overspill phase.

reduce with distance from the site. Deposition thicknesses between 1 mm and 2.5 mm are observed up to 6.5 km from the disposal site. This assumes disposal will take place in the same location for each cycle in order to provide a precautionary assessment, whereas in practice, disposal operations will be more evenly distributed throughout Zone 2.

- In reality, deposited sediment will become re-worked and entrained back into the sediment transport system under the action of both tides and waves, which is not shown within the model results due to the model approach outlined in paragraph 6.10.1.6 *et seq*. The Zone 2 disposal site is located within a highly mobile area, with potential bed elevation changes typically within the range of -6 m to +8 m (Volume III, Appendix 6.2: Arklow Bank Sediment Mobility Assessment (RFI March 2026)).

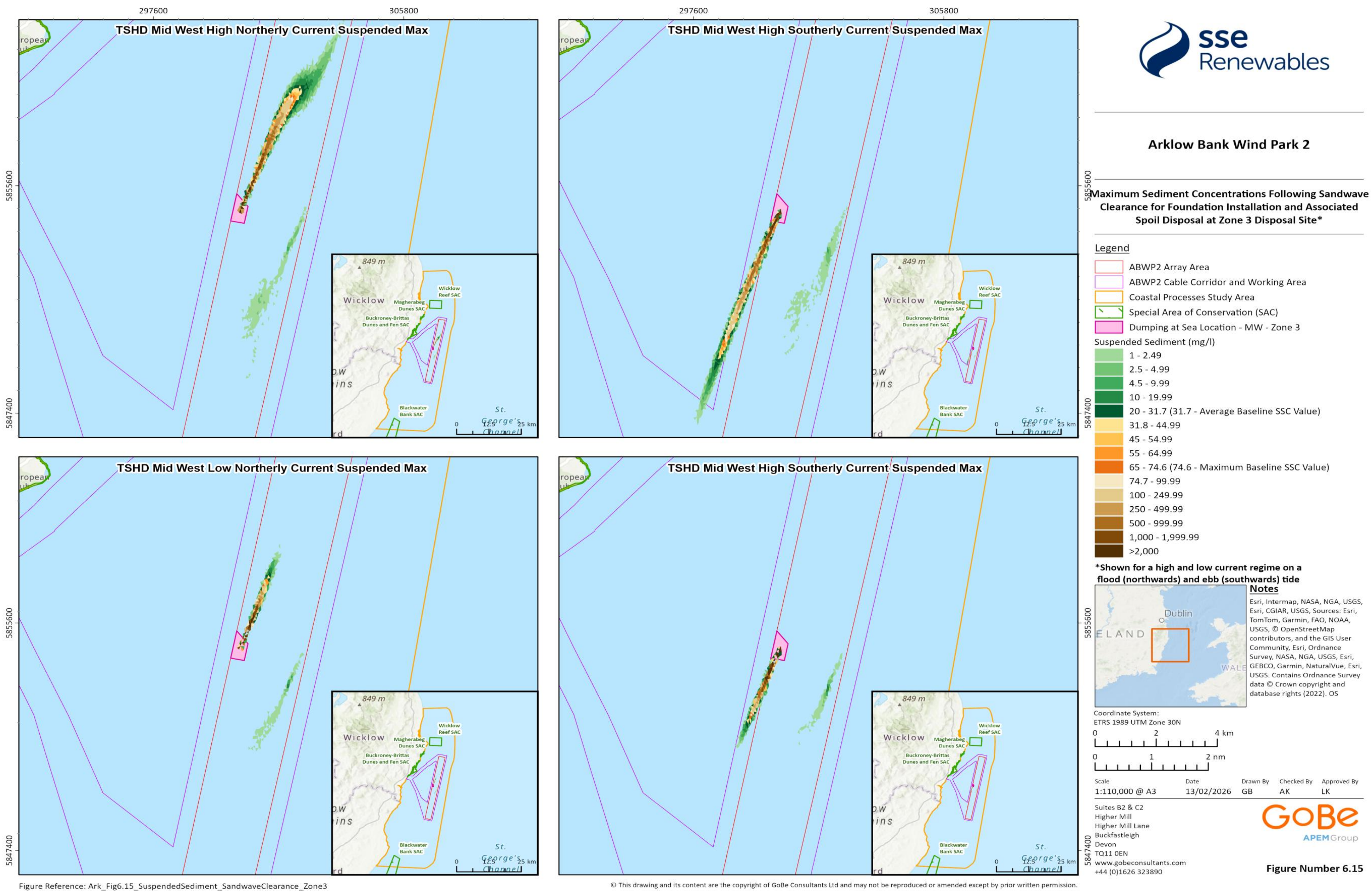

Figure 6.15: Suspended sediment concentrations following sandwave clearance for foundation installation and the associated spoil disposal at the Zone 3 disposal site. Shown for a high and low current regime on a flood (northwards) and ebb (southwards) tide

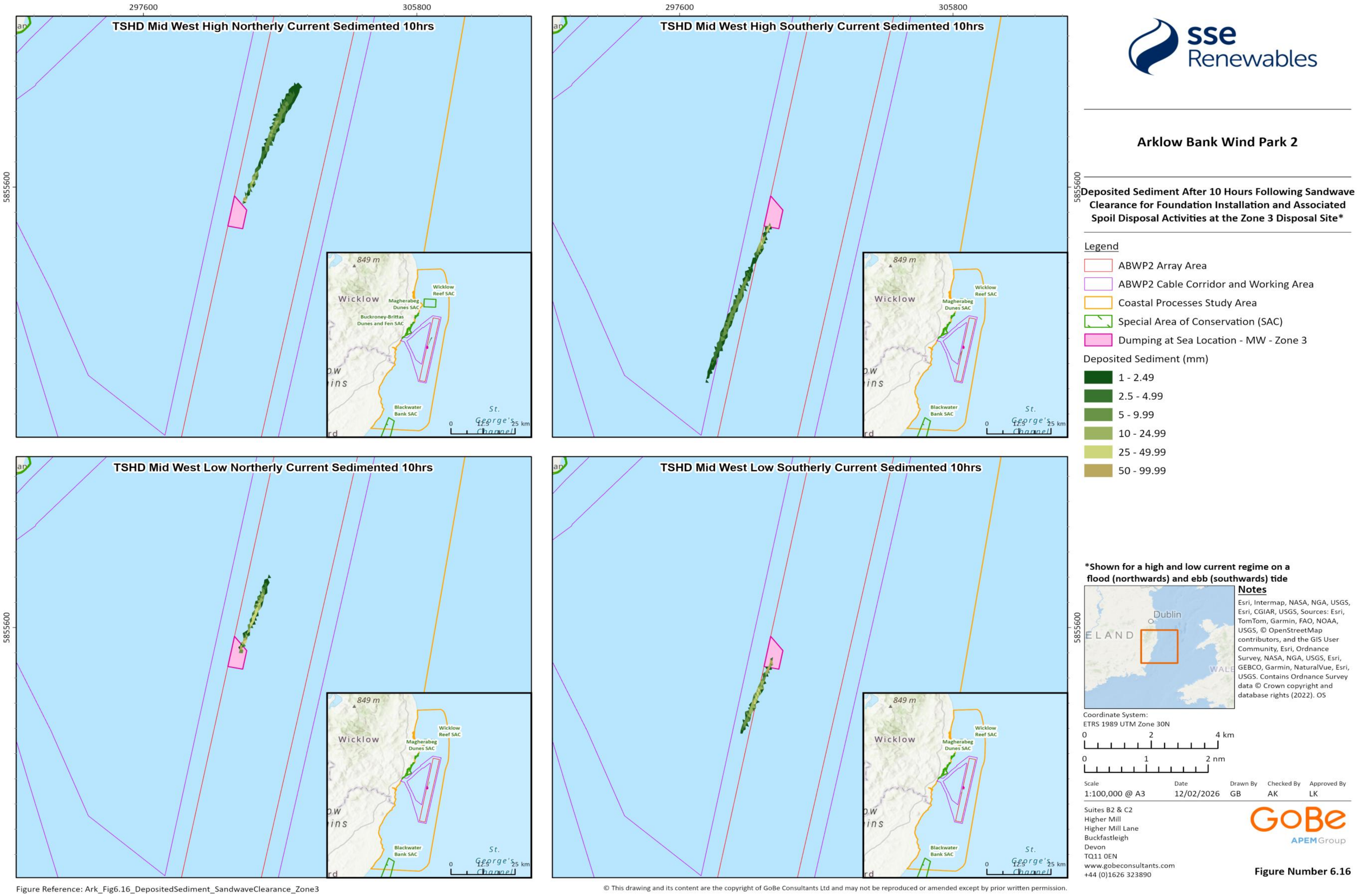

Figure 6.16: Deposited sediment following sandwave clearance for foundation installation and the associated spoil disposal activities at the Zone 3 disposal site. Shown for a high and low current regime on a flood (northwards) and ebb (southwards) tide

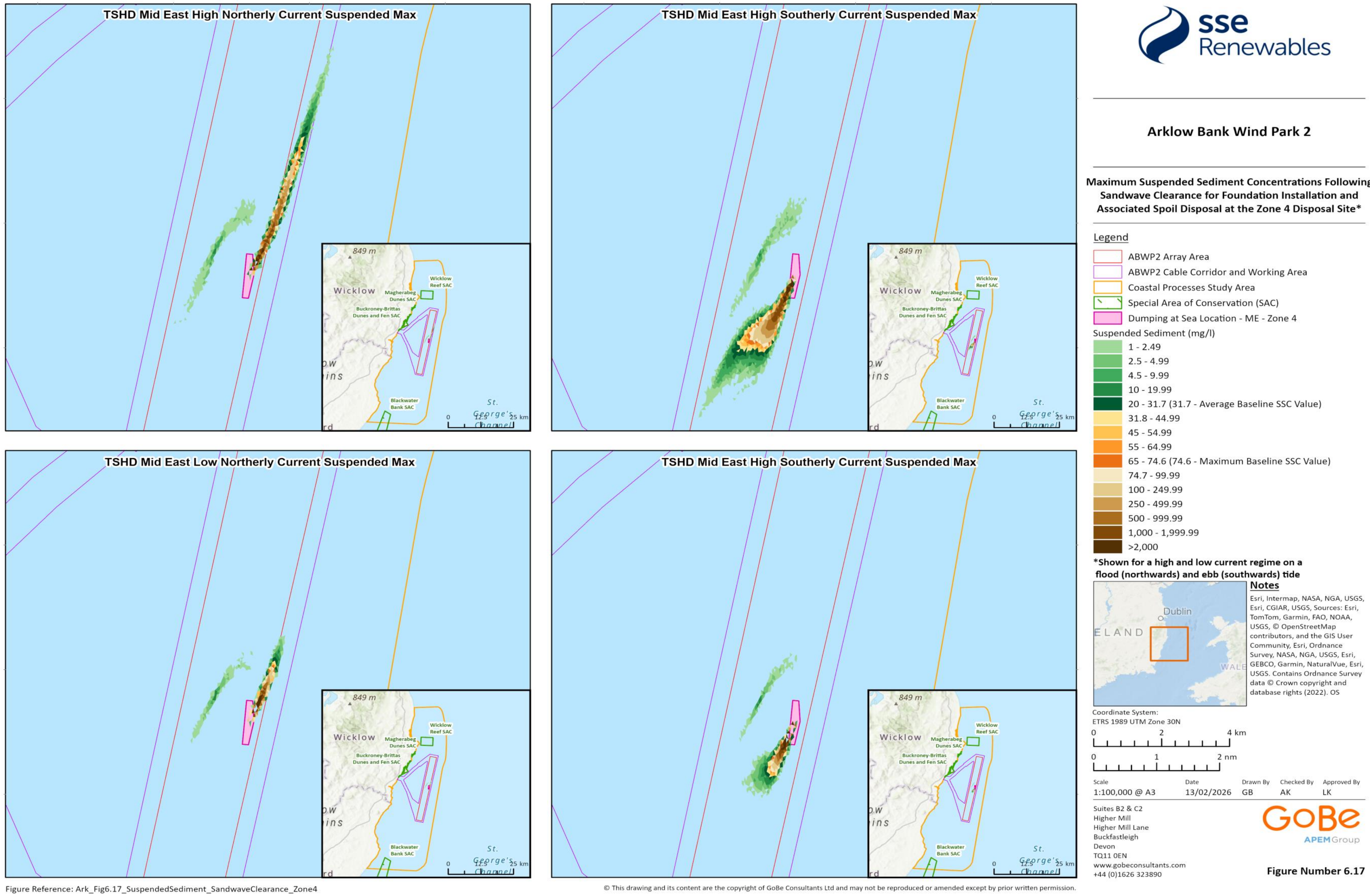

Figure 6.17: Suspended sediment concentrations following sandwave clearance for foundation installation and the associated spoil disposal at the Zone 4 disposal site. Shown for a high and low current regime on a flood (northwards) and ebb (southwards) tide

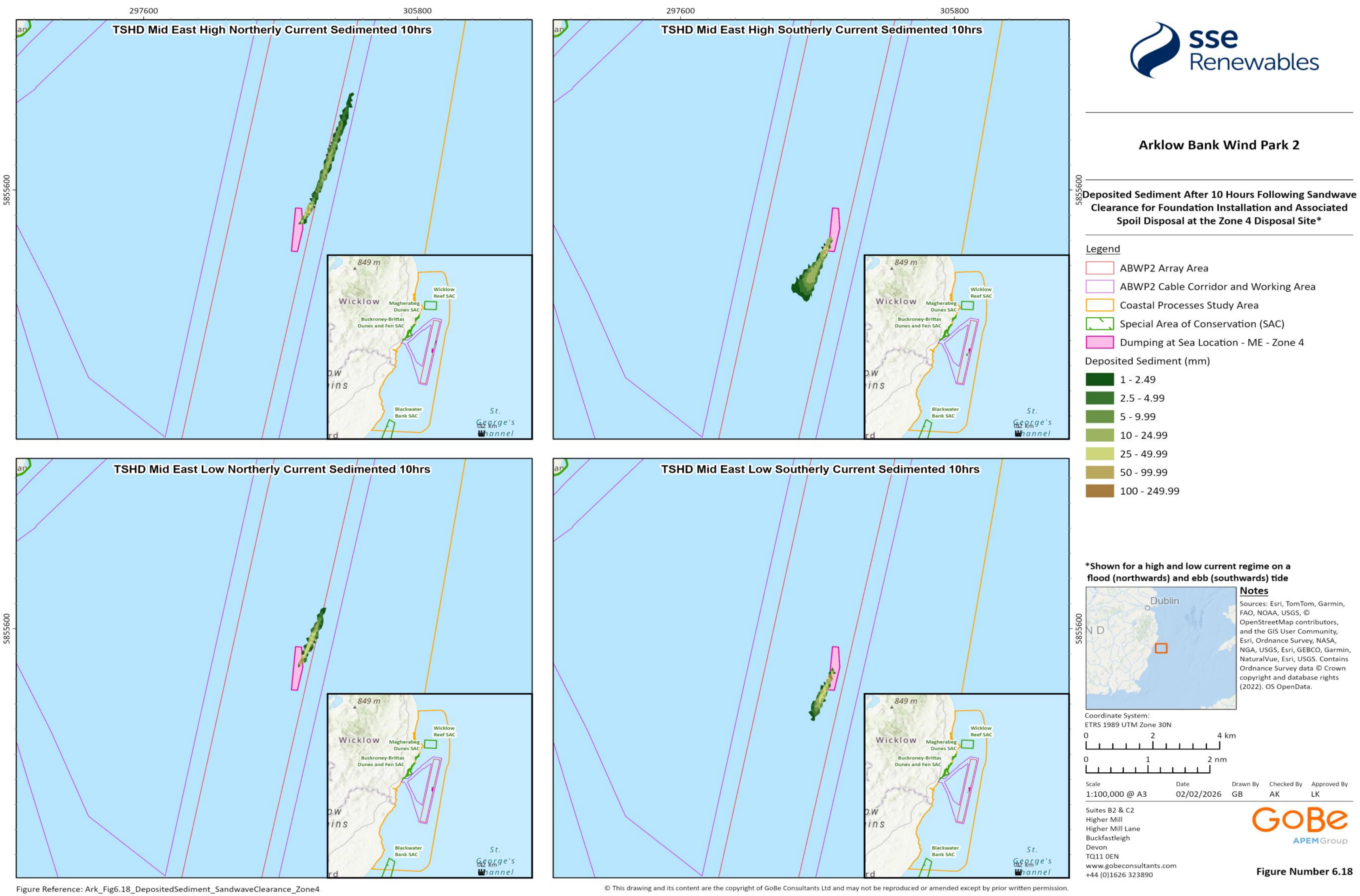

Figure 6.18. Deposited sediment following sandwave clearance for foundation installation and the associated spoil disposal activities at the Zone 4 disposal site. Shown for a high and low current regime on a flood (northwards) and ebb (southwards) tide

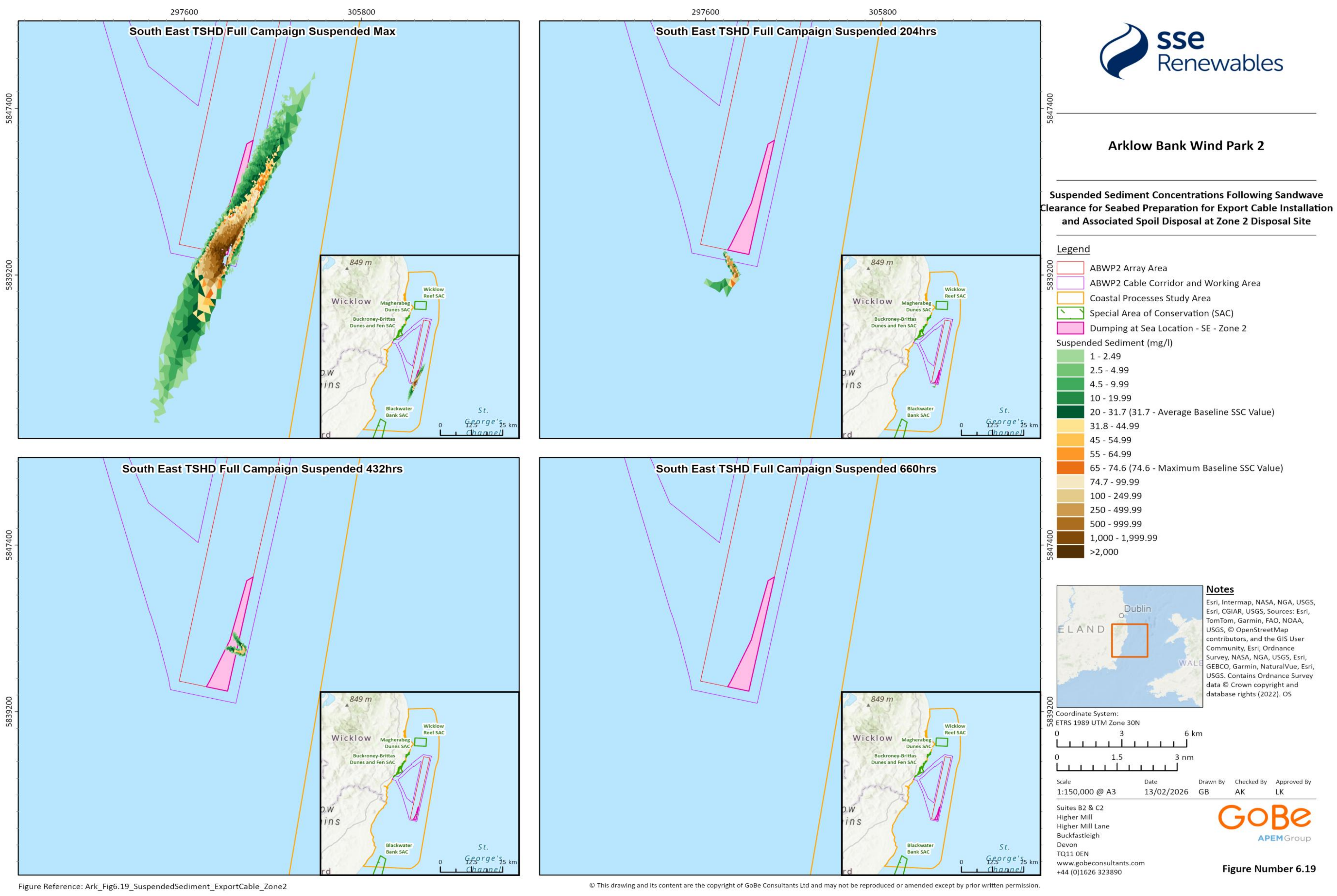

Figure 6.19: Suspended sediment concentrations following sandwave clearance for foundation installation and the associated spoil disposal at the Zone 2 disposal site.

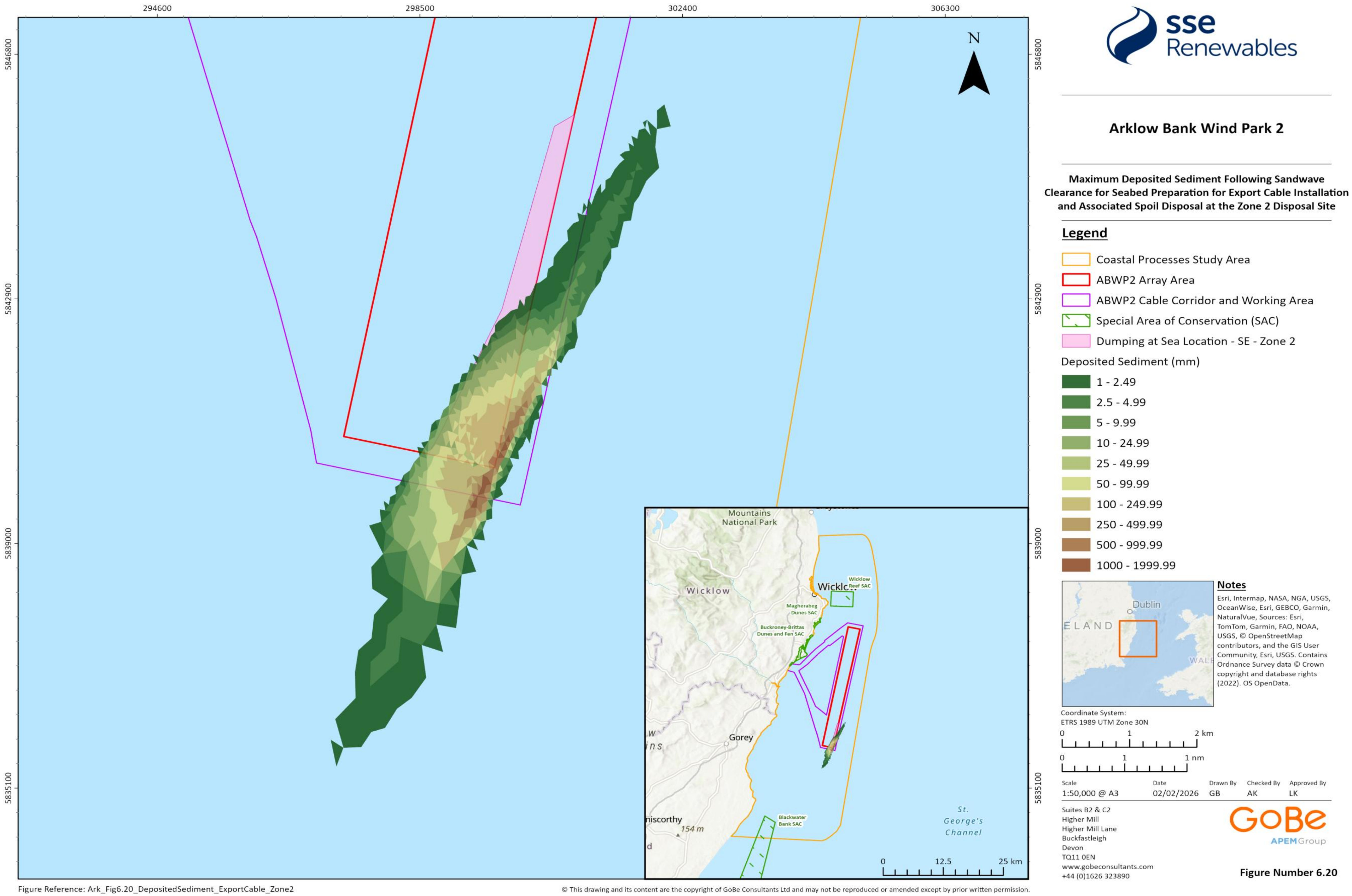

Figure 6.20: Maximum deposited sediment following sandwave clearance for foundation installation and the associated spoil disposal activities at the Zone 2 disposal site

6.10.1.24 As presented in Partrac (2022), the sedimentary processes over Arklow Bank are highly dynamic and as such it is expected that the bedforms will recover/ reform, providing that there is an adequate sediment supply available within the system. A conceptual understanding of the sediment transport regime is provided in Figure 6.10. Using the sediment transport model of Creane *et al.*, (2023b) (paragraph 6.6.1.31 *et seq.*, corroborated in Volume III, Appendix 6.2: Arklow Bank Sediment Mobility Assessment (RFI March 2026) as shown in Figure 6.11), the northern head and eastern flank represents the greatest sediment source to Arklow Bank. The rate of bedform recovery will vary in relation to the rate of sediment transport processes, faster infill and recovery rates will be associated with higher local flow speeds and more frequent wave influence, the latter of which occurs in the shallower water depths and during low-frequency, high-energy events. The shape of the bedform following recovery might recover to its original form (e.g. rebuilding a single crest feature likely in the direction of the northerly transport) or it might change (e.g. a single crest feature might bifurcate or merge with another nearby bedform). Given the highly dynamic nature of the sedimentary processes within the Array Area (Partrac, 2022), it is anticipated that any sediment deposited onto the seabed as a result of construction activities (Figure 6.16) will be quickly incorporated within the existing regime and thus contribute to the bedform recovery/ regeneration process. All such possible outcomes are consistent with the natural processes and bedform configurations that are already present in the Coastal Processes Study Area and will not adversely affect the onward form and function of the individual bedform features, nor the form and function of Arklow Bank.

6.10.1.25 Monitoring data from generally similar hydrodynamic and sedimentary environments provides evidence for this recovery process. Pre-levelling, levelling, and post-levelling bathymetry data for 19 locations (over 12 monitoring sites) within the Race Bank wind farm[15], provided observations of post-levelling sandwave response and recovery (approximately one to five months following levelling) across a range of similar but subtly different sandwave bedforms and sedimentary environments (DONG Energy, 2014). At Race Bank OWF, the surficial sediments are predominately sandy and water depths are similar to Arklow Bank. Whilst current speeds are slightly lower than at Arklow Bank (peak current speeds are between 1.0 m/s and 1.2 m/s (Centrica Energy, 2009), there is active sediment transport and seabed mobility at both locations. Evidence from Race Bank is therefore considered as an appropriate analogue for processes occurring at the Proposed Development.

6.10.1.26 The Race Bank monitoring data (DONG Energy, 2014; 2017; Figure 6.21) indicates that locally levelled sandwaves continue to evolve in a manner that is consistent with recovery towards a new natural equilibrium state over a period of months to years' post-levelling. At ten of the twelve monitoring sites within five months of levelling, there was evidence of partial to complete sandwave recovery consistent with the site being an active and dynamic sedimentary environment conducive to the development, maintenance and migration of sandwave bedforms.

---

[15] east coast of the UK

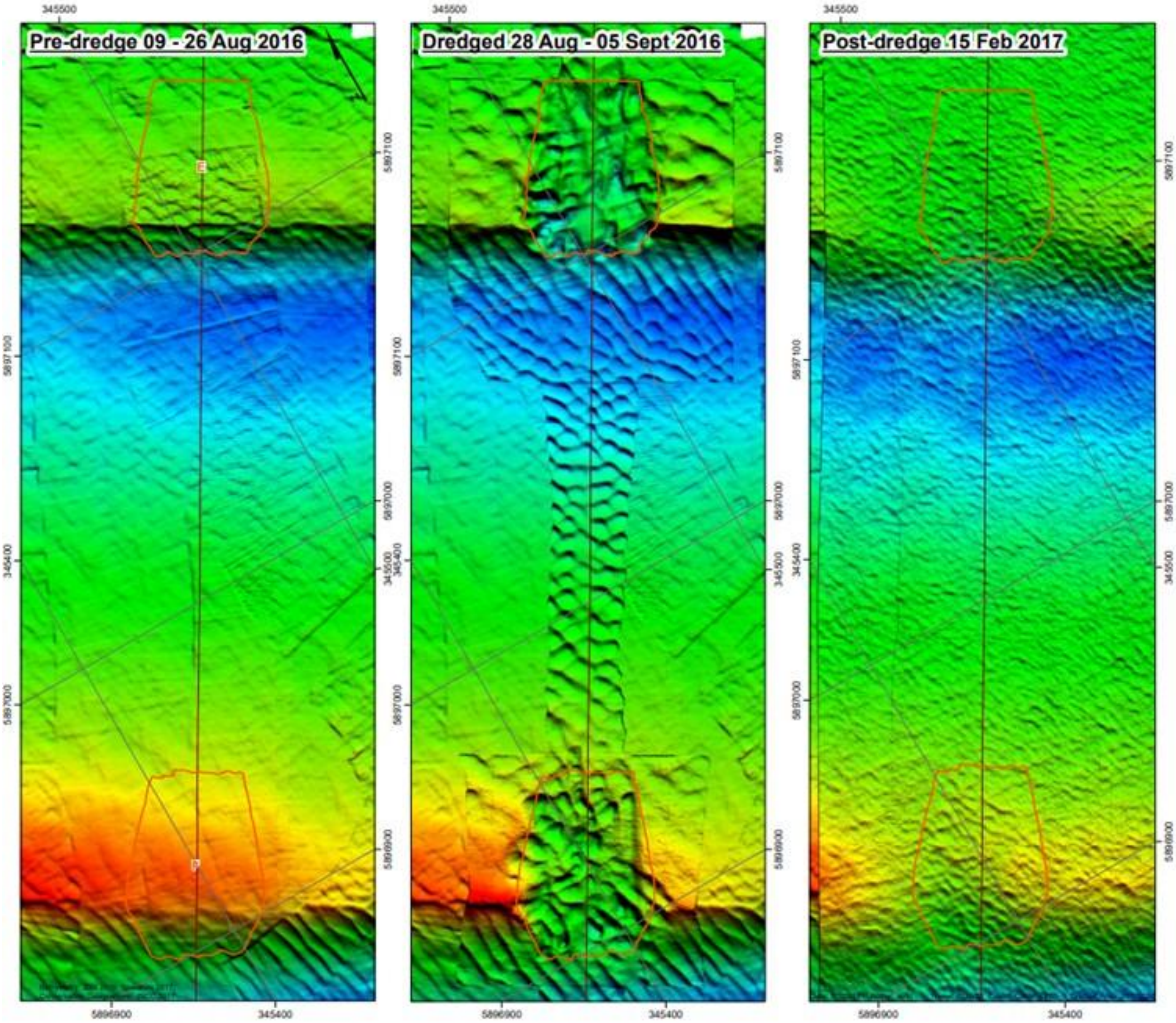

Figure 6.21. Morphological change following export cable installation within a sandwave field (DONG, 2017)

6.10.1.27 Evidence from Larsen *et al.* (2019) further supports this conclusion which compares multiple high-resolution bathymetry datasets to investigate the response of sandwaves within the Race Bank wind farm to the dredging of two 16 m bottom width trenches. For both areas surveyed, the sandwave height is observed to have regenerated to, approximately, 65% after 300 days, with a prediction of full recovery (98%) after three years.

6.10.1.28 Further evidence supporting sandwave regeneration following clearance activities is provided from the analysis of bathymetric survey data from the Greater Changhua 1&2a OWF. This analysis demonstrated the ability of sandwaves to regenerate to pre-construction (2016) dimensions following dredging activities for installation activities in 2021/ 2022 (Roulund *et al.*, 2023).

6.10.1.29 An assessment of the morphodynamics of Arklow Bank has shown that the sandwaves are under the control of the wave and tidal regime (Partrac, 2022). This is corroborated in Volume III, Appendix 6.2: Arklow Bank Sediment Mobility Assessment (RFI March 2026), with storm events important for short term bed level changes, although their effect does not accumulate over time like tidal influences. These processes function at scales larger than the proposed construction (and operational and maintenance) activities and as the installation and operational dredging works will not interrupt the wave and tidal regimes, it is not anticipated that the bedforms, in turn, will be affected (ABPmer, 2018).

6.10.1.30 Evidence available from other wind farms and literature, as above, would support the hypothesis that local perturbations to existing sandwaves that do not change the fundamental conditions of the setting (i.e. the tidal and wave regime and the volume of mobile sediment available for sediment transport) will not prevent the continued evolution of the features through the same naturally occurring processes. As such, it is expected that the sandwave features will recover towards a new equilibrium state over time.

MAGNITUDE OF THE IMPACT

6.10.1.31 The magnitude of impacts (SSC; sediment deposition) that result from sandwave clearance for foundation installation and the associated spoil disposal activities are shown in Table 6.18 and Table 6.19. These magnitudes align with the justifications provided in Table 6.15 and are in accordance with EPA (2022).

Table 6.18: Determination of magnitude for changes to suspended sediment concentrations due to sandwave clearance for foundation installation and associated spoil disposal

Descriptor	Justification
Extent	The predicted changes will be localised to within the ZoI. The path followed by a tidal ellipse, whilst comparable, is not exactly the same on every tide. As such, it is unlikely that the same seabed area will be affected by the higher SSC and more localised plume, for more than one or two consecutive tides.
Duration	The predicted changes will occur during construction activities within the Array Area and are considered short-term, with measurable effects in the order of hours.
Frequency	The predicted changes will only occur during active sandwave clearance and spoil disposal and can be considered intermittent during construction. This is due to the transit time required from filling the TSHD to the hopper discharge at the spoil site.
Probability	The predicted changes can be reasonably expected to occur.

Descriptor	Justification
Consequence	Elevated suspended sediment concentrations immediately adjacent to the activity for the duration of works. Plume transported by tidal flow away from Array Area and expected to be rapidly dispersed by energetic wave events. Noticeable, but temporary, changes to key characteristics or features of the particular environmental aspect's character or distinctiveness
Overall Magnitude	The potential magnitude of the predicted changes is rated as **Low**.

Table 6.19: Determination of magnitude for changes to deposited sediment due to sandwave clearance for foundation installation and associated spoil disposal

Descriptor	Justification
Extent	The predicted changes will be localised to within the ZoI. The path followed by a tidal ellipse, whilst comparable, is not exactly the same on every tide. As such, it is unlikely that the same seabed area will be affected by deposition from suspended material over more than one or two tides.
Duration	The predicted changes will occur during construction activities within the Array Area and are considered short-term, with measurable effects in the order of hours.
Frequency	Suspended sediment will be deposited as it moves with the tidal flow away from the activity's location. The impact will occur intermittently throughout the construction phase given the temporary cessation in activity to allow for the TSHD to transit to the spoil disposal site.
Probability	The predicted changes can be reasonably expected to occur.
Consequence	Deposited sediment is greatest immediately adjacent to the construction activities for the duration of the activity, decreasing with distance from the activity. Any sediment deposited on the seabed will be rapidly incorporated into the active sediment transport regime.
Overall Magnitude	The potential magnitude of the predicted changes is rated as **Low**.

PRE-LAY INTER-ARRAY CABLE TRENCHING AT THE SEABED

6.10.1.32 Boulder clearance along the interconnector and array cable routes within the Array Area will result in the total disturbance of 51,000 m^3. The use of a plough is such that the sediment is displaced from the seabed within a width of 15 m and from a depth of 0.5 m. Fluidisation of sediments will only occur using techniques such as jetting or flow excavators. Only the finer sediments are likely to be suspended following the seabed disturbance. The Proposed Development expects that the time periods between boulder clearance and other seabed works would be of the order of two weeks. This period would allow any suspended sediments to be dispersed/ deposited such that there are no additive effects anticipated from seabed works at the same location.

6.10.1.33 Of the different pre-lay cable trenching techniques considered by the Proposed Development, for which more information is presented in Volume II, Chapter 4: Description of Development (Revised March 2026), the use of CFE tools has been numerically assessed here as it provides the potential for seabed sediment to be disturbed to the greatest extent into the water column. Results are presented for inter-array cable trenching operations at both the north and south of the Array Area, in order to capture a range of realistic precautionary outcomes in terms of plume extent. Operations have been simulated on an identified route between WTG locations (as outlined in Volume III, Appendix 6.1: Marine Physical Processes Numerical Modelling (Revised March 2026)).

6.10.1.34 As outlined in Table 6.11, this process would be used to excavate a trench with a width of 15 m and a depth of 1.5 m and has been calculated to result in a total seabed sediment disturbance of 1,830,000 m^2. The installation process is such that trenching will take place between two foundations whereupon the works will cease to allow for (i) the cable to be terminated at the hang-off, (ii) vessel re-positioning, (iii) inserting the cable into the J-tube and securing/ clamping and then (iv) laying across the scour layer. Should weather windows allow, it is considered that this cessation in activities will take circa 24 hours.

6.10.1.35 The temporary (24 hours) break in the trenching activity provides the opportunity for suspended material to be dispersed/ deposited in the absence of seabed disturbance activities (Figure 6.15). The trenched sediment volume is forced into suspension to a height of around 3 m above the seabed with the finer material settling within several meters of the trench. Displaced material will not be removed from the sedimentary system, and these small-scale changes in bed levels are likely to be quickly redistributed by the energetic hydrodynamic processes present within the Array Area (Section 6.6.1).

6.10.1.36 As shown in Figure 6.22 to Figure 6.25, the numerical modelling simulations undertaken show the following for inter-array cable trenching operations at the north and south of the Array Area:

- Suspended Sediment Concentrations:
  - Maximum concentrations occur in the immediate locality of, and during the active phase of, the seabed CFE works. Here, SSC exceeding 2,000 mg/l occur within 1 km of the activity. Given the rectilinear tidal flows within the Array Area, elevated SSC from inter-array cable trenching operations at the north of the Array Area typically occur in a narrow plume extending from the point of disturbance. The plume length is dependent upon the tidal direction and current speeds, such that a northerly flow with greater speeds results in the most elongated plume (elevated SSC of less than 2.5 mg/l is observed up to 17 km north and 9 km south of the seabed activities under a high northerly and high southerly current, respectively).
  - Both concentrations and plume extent are lower in the south of the Array Area due to differences in the scenario modelled, with concentrations generally not exceeding 1,500 mg/l in close vicinity to the activity, and elevated SSC generally not observed beyond 4 km from the inter-array cable trenching operations. This difference is due to the relatively finer sediments present in the north of the Array Area (with a greater proportion of fine sand as opposed to coarse sand in the south), which take longer to settle out of suspension and therefore are advected further away from the modelled location.
  - These results should be considered in the context of ambient background turbidity occurring across the Study Area, as described in paragraph 6.7.1.23 and Table 6.9. Average values of near-bed turbidity have been identified from ABS data and provide a reference point of baseline average (31.7 mg/l) and maximum (74.6 mg/l) near-bed turbidity, which is presented for context in the legend of Figure 6.22 and Figure 6.24.
- Deposited sediment:
  - Sediment is deposited within the SSC's plume extent, with patterns of deposition comparable to the direction, extents and magnitudes of the suspended sediment. Maximum deposition in the north of the Array Area occurs in the immediate proximity of the seabed activities, up to 100 mm. Sediment can be deposited within an area extending up to 18 km and 10 km, under the high northerly and high southerly currents, respectively. At these distances deposition is no greater than 2.5 mm, which is comparable to a 'very coarse' grain of sand. In the south of the Array Area, maximum deposition thicknesses are higher, reaching up to 215 mm, however it is noteworthy that deposition is not predicted to occur beyond 3 km from the inter-array cable trenching operations location.

– Continual re-working of the deposited sediment will occur through subsequent tidal cycles as re-suspension and dispersal. The wave regime will also act to re-suspend and disperse deposited sediment. Of note is that the maximum deposition occurs under the slower current speed scenarios, when the sediment is not transported as far, falling out of suspension quicker than under the faster current speeds.

6.10.1.37 Cable installation may require sandwave clearance to take place beforehand to ensure effective cable burial depths and as assessed in paragraph 6.10.1.17 *et seq*. These features are expected to recover towards a new equilibrium state over time through the naturally-occurring hydrodynamic conditions of the site.

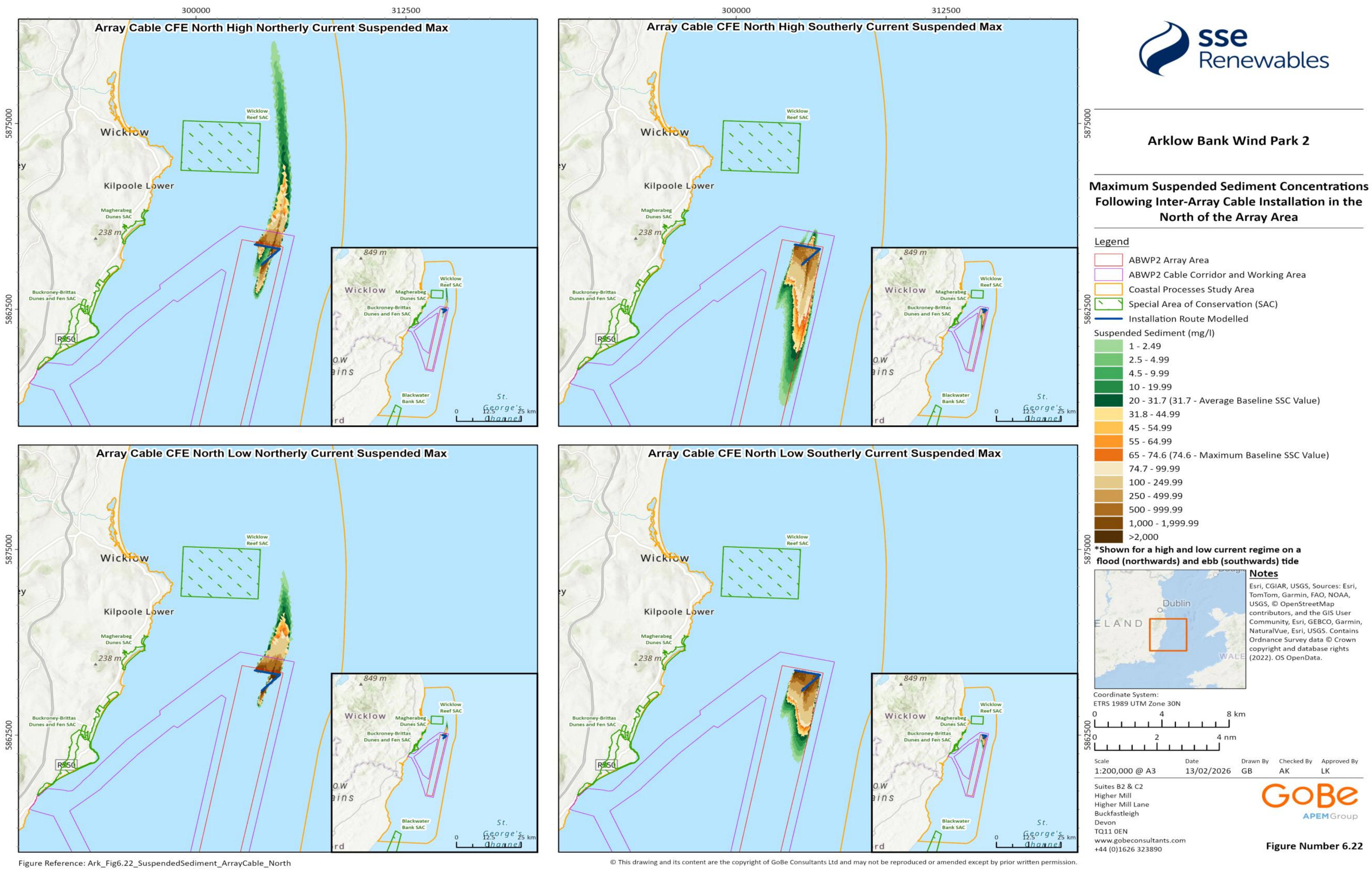

Figure 6.22: Maximum[16] suspended sediment following inter-array cable installation in the north of the Array Area. Shown for a high and low current regime on a flood (northwards) and ebb (southwards) tide

---

[16] *Where the values shown are the maximum SSC that occur within the model domain at any time during the numerical simulation. As such, the results shown on this figure may be from different timesteps.*

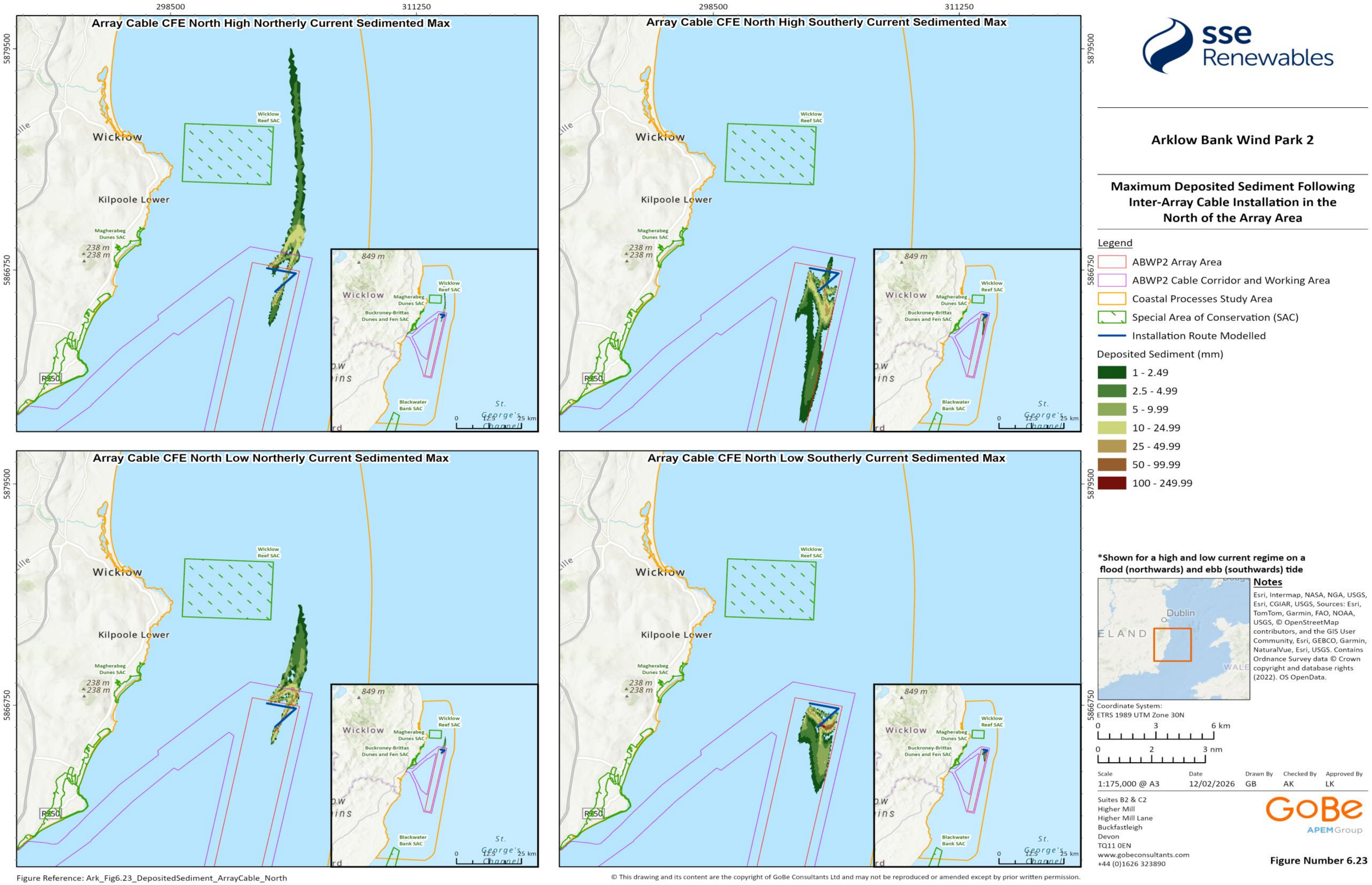

Figure 6.23: Maximum[17] deposited sediment following inter-array cable installation in the north of the Array Area. Shown for a high and low current regime on a flood (northwards) and ebb (southwards) tide

---

[17] *Where the values shown are the maximum deposition that occur within the model domain at any time during the numerical simulation. As such, the results shown on this figure may be from different timesteps.*

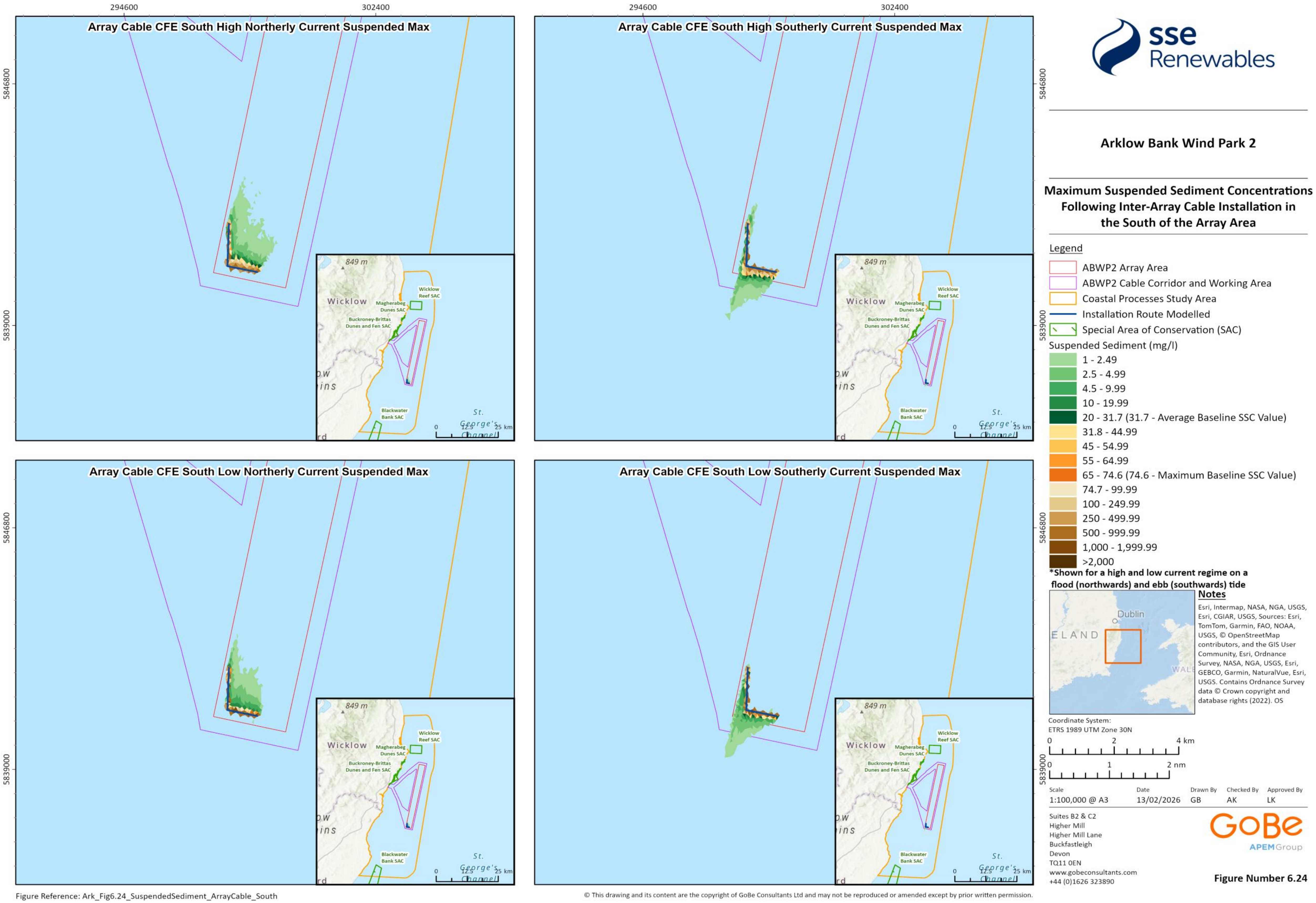

Figure 6.24: Maximum suspended sediment following inter-array cable installation in the south of the Array Area. Shown for a high and low current regime on a flood (northwards) and ebb (southwards) tide

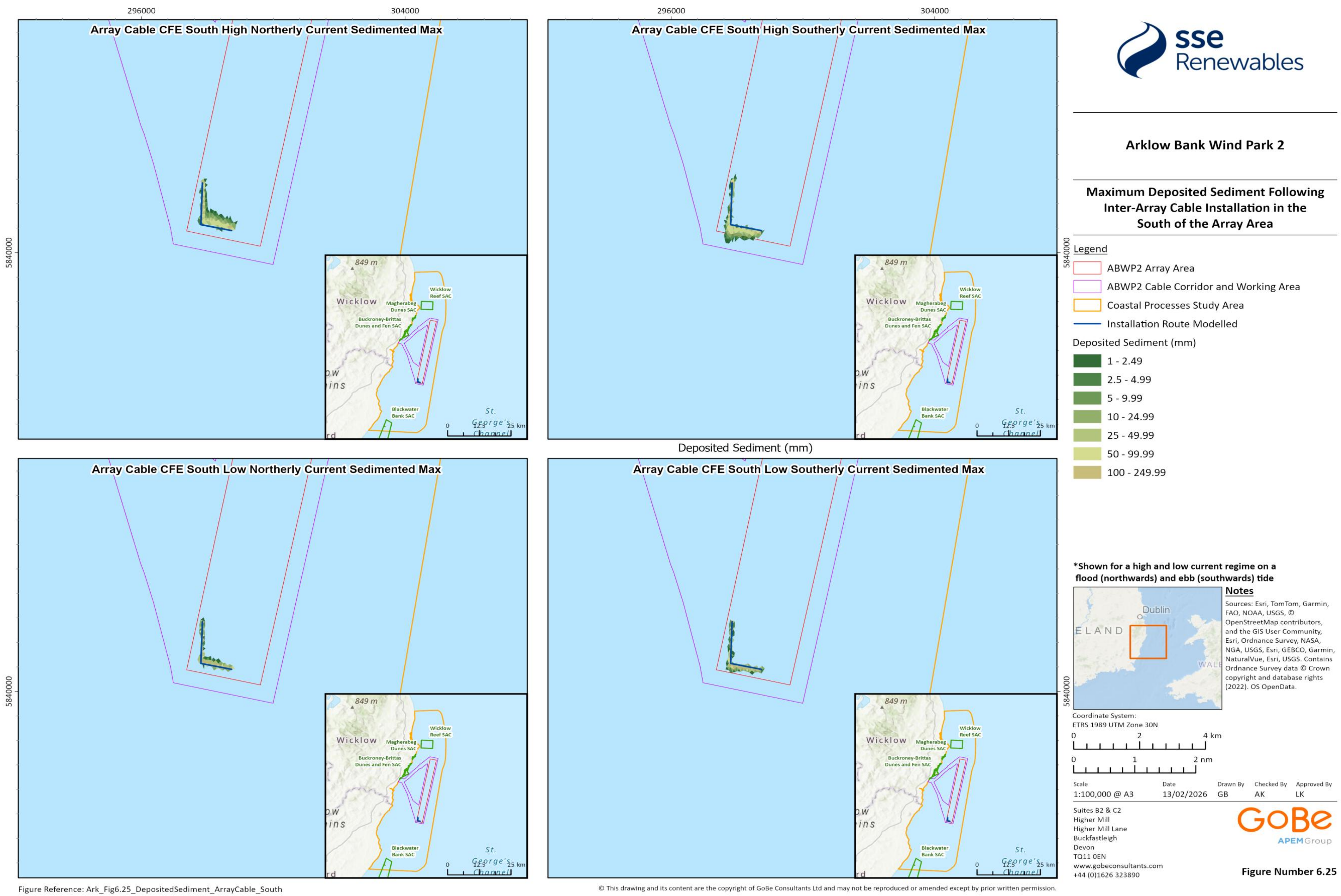

Figure 6.25: Maximum deposited sediment following inter-array cable installation in the south of the Array Area. Shown for a high and low current regime on a flood (northwards) and ebb (southwards) tide

6.10.1.38 Cable burial operations have been reported to result in a localised and temporary re-suspension and subsequent settling of sediments (BERR, 2008). The exact nature of this disturbance will be determined by the soil conditions, the length of installed cable, the burial depth, burial method and environmental conditions at the time of installation works. Evidence collected from a number of wind farms, including Race Bank (DONG Energy, 2017), in addition to aggregate extraction sites, has shown that for predominately sandy substrates, the seabed has shown to recover well following cable installation, especially in those environments (such as the Array Area) with active sediment transport (RPS, 2019).

MAGNITUDE OF THE IMPACT

6.10.1.39 The magnitude of impacts (SSC; sediment deposition) that result from pre-lay cable trenching within the Array Area are shown in Table 6.20 and Table 6.21. These magnitudes align with the justifications provided in Table 6.15 and are in accordance with EPA (2022).

Table 6.20 : Determination of magnitude for changes to suspended sediment concentrations due to pre-lay cable trenching within the Array Area

Descriptor	Justification
Extent	The predicted changes will be localised to within the ZoI. The path followed by a tidal ellipse, whilst comparable, is not exactly the same on every tide. As such, it is unlikely that the same seabed area will be affected by the higher SSC and more localised plume, for more than one or two consecutive tides.
Duration	The predicted changes will occur during construction activities within the Array Area and are considered short-term.
Frequency	The predicted changes will only occur during active pre-lay cable trenching and can be considered intermittent during construction; pre-lay cable trenching within the Array Area will undergo a, circa, 24-hour pause at the monopile location to allow for vessel re-positioning, the insertion of the cable into J-tube, placement of scour layer and re-starting of installation activities.
Probability	The predicted changes can be reasonably expected to occur.
Consequence	Elevated suspended sediment concentrations adjacent to the activity for the duration of works. Plume transported by tidal flow away from Array Area and expected to be rapidly dispersed by energetic wave events. Noticeable, but temporary, changes to key characteristics or features of the particular environmental aspect's character or distinctiveness
Overall Magnitude	The potential magnitude of the predicted changes is rated as **Low**.

Table 6.21: Determination of magnitude for changes to deposited sediment due to pre-lay cable trenching within the Array Area

Descriptor	Justification
Extent	The predicted changes will be localised to within the ZoI. The path followed by a tidal ellipse, whilst comparable, is not exactly the same on every tide. As such, it is unlikely that the same seabed area will be affected by deposition from suspended material over more than one or two tides.
Duration	The predicted changes will occur during construction activities within the Array Area and are considered short-term.

Descriptor	Justification
Frequency	Suspended sediment will be deposited as it moves with the tidal flow away from the activity's location. Suspended sediment will be available for deposition on an intermittent basis during construction (Table 6.20).
Probability	The predicted changes can be reasonably expected to occur.
Consequence	Deposited sediment is greatest immediately adjacent to the trenching activities for the duration of the activity, decreasing with distance from the activity. Any sediment deposited on the seabed will be rapidly incorporated into the active sediment transport regime.
Overall Magnitude	The potential magnitude of the predicted changes is rated as **Low.**

FOUNDATION INSTALLATION USING DRILLING TECHNIQUES;

6.10.1.40 Monopile foundations will be installed into the seabed using standard piling techniques. In some locations, the particular geology may present an obstacle to piling in which case, some or all of the seabed material might be drilled within the pile footprint to assist in the piling process. Should it be impossible to install a monopile, which may occur at a maximum of five locations, jetting may be used to remove the structure prior to moving it no more than 50 m from its original position. This activity will result in the disturbance of up to 4,473 m^3 per monopile which is circa 64% less than the volume disturbed through drilling and represents a temporary seabed disturbance. A maximum of 45% to 53% (Project Design Option 1 and 2, respectively) of locations within the Array Area have been estimated to require drilling.

6.10.1.41 The impact of drilling operations mainly relates to the release of drilling spoil at or above the water surface which will put sediment into suspension and the subsequent redeposition of that material to the seabed. The nature of the disturbance will be determined by the:

- Drilling rate;
- Total volume of material to be drilled;
- Seabed and sub-bottom material type; and
- Drilling method (affecting the texture and grain size distribution of the drill spoil).

6.10.1.42 Disposal mounds may result from foundation drilling activities whereby the persistence and evolution of these seabed deposits will be dependent upon on range of factors, principally:

- The type of sediment in the mound;
- The size/ shape of the mound; and
- The level of bed shear stress exerted on the mound by tidal currents and waves (water depth being a key determinant of the latter).

6.10.1.43 Geological information, based on historic data and project specific boreholes (paragraph 6.6.1.18 *et seq.)* indicates that gravels and sands predominate under the Holocene layer. A thin clay layer was observed in one of the boreholes. In those areas where disposal mounds comprise clays and gravels, it can reasonably be assumed that these mounds will become semi-permanent seabed features. The 'live bed' regime identified on Arklow Bank is such that the sand-sized sediment is mobilised on each tidal cycle (Partrac, 2022). Thus, over time, it can be expected that finer grained material will be further disaggregated and winnowed away, lowering the profile of the mound. As such, it can be reasonably expected that wave events will act, particularly under extreme, storm events and in the shallower water depths, to mobilise and disperse the larger grained material with time.

6.10.1.44 Numerical modelling (Volume III, Appendix 6.1: Marine Physical Processes Numerical Modelling (Revised March 2026)) has simulated drilling at two locations; at a WTG location on the western side of Arklow Bank and the southern OSP. The release of drill arisings is simulated to persist for 88 hours (at the WTG), followed by a 12 hour pause, followed by another 88-hour period of drilling (at the southern OSP). The location of the two releases is such that, due to the orientation of the tidal axis and the absence of wave influence, there is opportunity for the disturbed sediment to be additive. These timings have been developed based on expert judgment of comparative works, informed by active engagement with the industry and consultation with subject matter experts. The results can be summarised as follows:

- Suspended sediment concentrations (Figure 6.22 and Figure 6.24):
  - Elevations in SSC progressively increase in both concentration and spatial extent as the drilling operations continue. The distance of increased SSC from the installation activity is predicted to be greater under higher current speeds; of note is that the plume remains within the ZoI. As would be expected, the greatest SSC concentration is predicted to occur towards the end of the drilling period, at each location (WTG; OSP). The maximum concentration occurs closer to the OSP and is a direct consequence of a greater volume of drill arisings which results from a wider pile dimension (5,280 m^3 (Project Design Option 1); 7,040 m^3 (Project Design Option 2) vs 13,860 m^3 (OSP)). (OSP)).
  - Under high, ebb (southerly), current conditions, once the WTG drilling has been completed (88 hours following commencement of works) the greatest SSC is predicted to occur in the plume centre (circa 25 mg/l), this rapidly dissipates such that prior to drilling at the OSP, there are no noticeable increases in SSC within the ZoI.
  - Under the high current conditions, drilling at the OSP elevates SSC by over 100 mg/l at the point of activity only. Beyond the drilling location, SSC rapidly reduces to less than 25 mg/l. Movement along the tidal axis, to the (approximately) north and south is such that concentrations less than 25 mg/l are predicted 18 km to the north of the release in a narrow, 1 km, plume and 6 km to the south.
  - 12 hours following the completion of the OSP drilling, elevated SSC of up to 2.5 mg/l are predicted 7 km to the south of the array, with a maximum elevation of 10 mg/l within an area of hundreds of metres from the location of the works. These results should be considered in the context of ambient background turbidity occurring across the Study Area, as described in paragraph 6.7.1.23 and Table 6.9. Average values of near-bed turbidity have been identified from ABS data and provide a reference point of baseline average (31.7 mg/l) and maximum (74.6 mg/l) near-bed turbidity, which is presented for context in the legend of Figure 6.24. Nearly two days following completion, no measurable elevated SSC is observed.
  - Patterns of elevated SSC under low tidal currents are similar both in magnitude and elevation, though it is observed that dispersion is lower and is such that there is a greater areal extent of the 2.5 mg/l elevations. Of note is that these remain within the ZoI.
- Deposited sediment (Figure 6.27):
  - The depth and areal extent of sediment deposited during and following foundation (WTG; OSP) installation works progressively increases with time. The suspended sediment (Figure 6.26) will be both dispersed by the tidal currents and settle out from suspension when the tidal current speeds are insufficient to transport it. Deposited sediment remains within the ZoI and its location is under the control of the tidal axis, in addition to the current speeds. Of note is that any deposited sediment has the potential to be re-worked by the tidal, and wave, regime. In an energetic environment such as Arklow Bank, this will be a rapid process and any deposited sediment is expected to quickly re-enter the sediment system. As is expected, sediment deposition is greater under lower (flood; northerly) tidal current flows, as such the following discussion is focussed on the results presented from these numerical simulations.
  - The depth and areal extent of the deposited sediment increases throughout the period of active works, such that, 12 hours following completion of the WTG installation, over 15 mm

of sediment has settled onto the seabed immediately adjacent to the foundation. A narrow, <0.25 km, strip of sediment is deposited along the tidal axis, up to 12 km from the installation work.

- Once drilling commences for the OSP foundations, a second area of deposition occurs, again with the greatest deposition occurring in close proximity to the activity. Following completion of the OSP foundation drilling, the maximum deposition depth is, approximately, 15 mm in the vicinity of the project works.

MAGNITUDE OF THE IMPACT

6.10.1.45 The magnitude of impacts (SSC; sediment deposition) that result from the installation drilling of foundations within the Array Area are shown in Table 6.22 and Table 6.23. These magnitudes align with the justifications provided in Table 6.15 and are in accordance with EPA (2022).

Table 6.22 : Determination of magnitude for changes to suspended sediment concentrations due to foundation drilling activities

Descriptor	Justification
Extent	The predicted changes will be localised to within the ZoI. The path followed by a tidal ellipse, whilst comparable, is not exactly the same on every tide. As such, it is unlikely that the same seabed area will be affected by the higher SSC and more localised plume, for more than one or two consecutive tides.
Duration	The predicted changes will occur during construction activities within the Array Area and are considered short-term.
Frequency	The predicted changes will only occur during active foundation drilling and can be considered intermittent during the construction period.
Probability	The predicted changes can be reasonably expected to occur.
Consequence	Elevated suspended sediment concentrations immediately adjacent to the activity for the duration of works. Plume transported by tidal flow away from Array Area and expected to be rapidly dispersed by energetic wave events. Noticeable, but temporary, changes to key characteristics or features of the particular environmental aspect's character or distinctiveness
Overall Magnitude	The potential magnitude of the predicted changes is rated as **Low**.

Table 6.23: Determination of magnitude for changes to deposited sediment due to foundation drilling activities

Descriptor	Justification
Extent	The predicted changes will be localised to within the ZoI. The path followed by a tidal ellipse, whilst comparable, is not exactly the same on every tide. As such, it is unlikely that the same seabed area will be affected by deposition from suspended material over more than one or two tides.
Duration	The predicted changes will occur during construction activities within the Array Area and are considered short-term.
Frequency	The predicted changes will only occur during active foundation drilling and can be considered intermittent during the construction period.
Probability	The predicted changes can be reasonably expected to occur.
Consequence	Deposited sediment is greatest immediately adjacent to the foundation drilling activities for the duration of the activity, decreasing with distance from the activity.

Descriptor	Justification
	Any sediment deposited on the seabed occurs aligned with the direction of the tidal flow and is expected to be rapidly incorporated into the active sediment transport regime.
Overall Magnitude	The potential magnitude of the predicted changes is rated as **Low**.

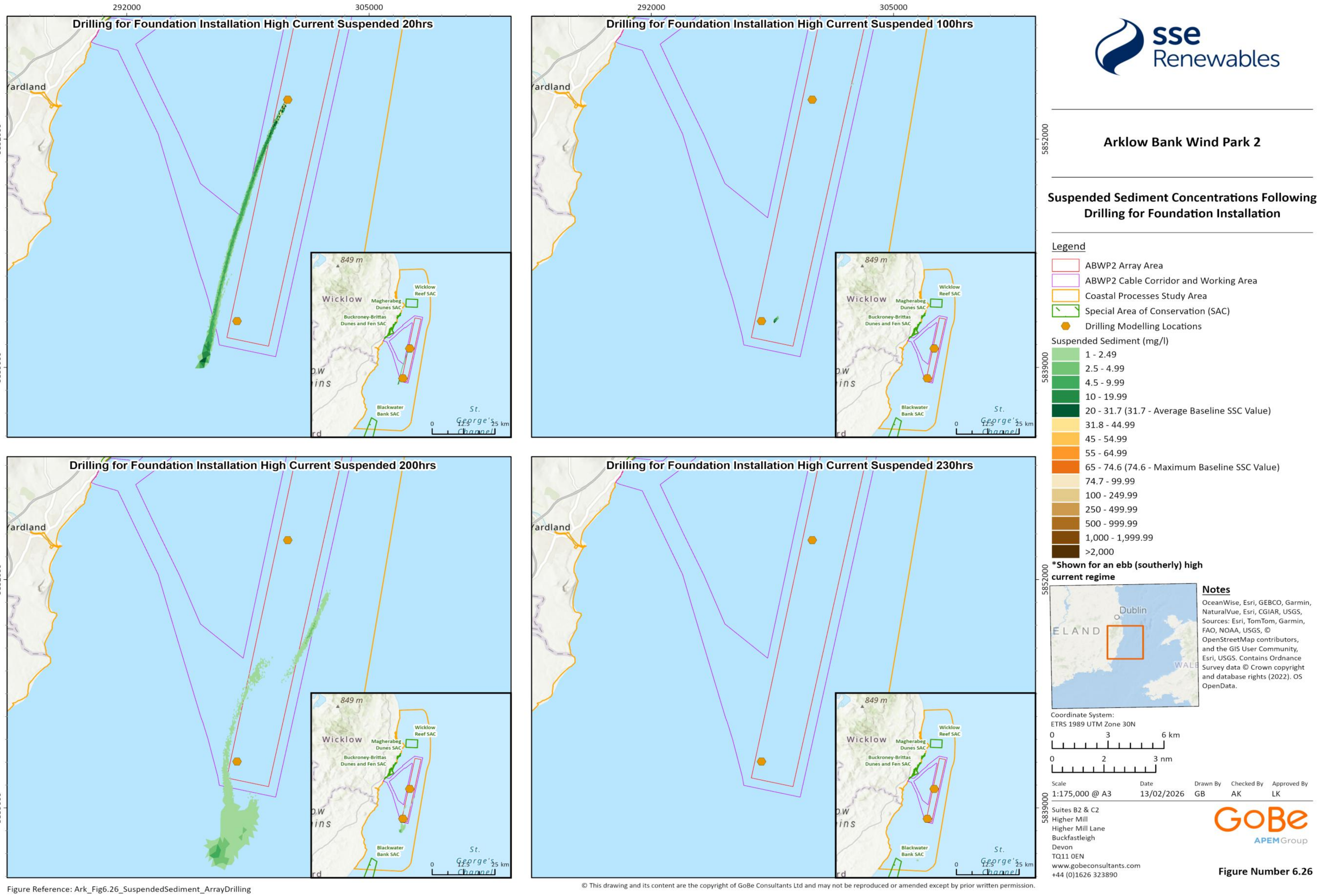

Figure 6.26: Suspended sediment concentrations following drilling for foundation installation. Shown for an ebb (southerly) high current regime

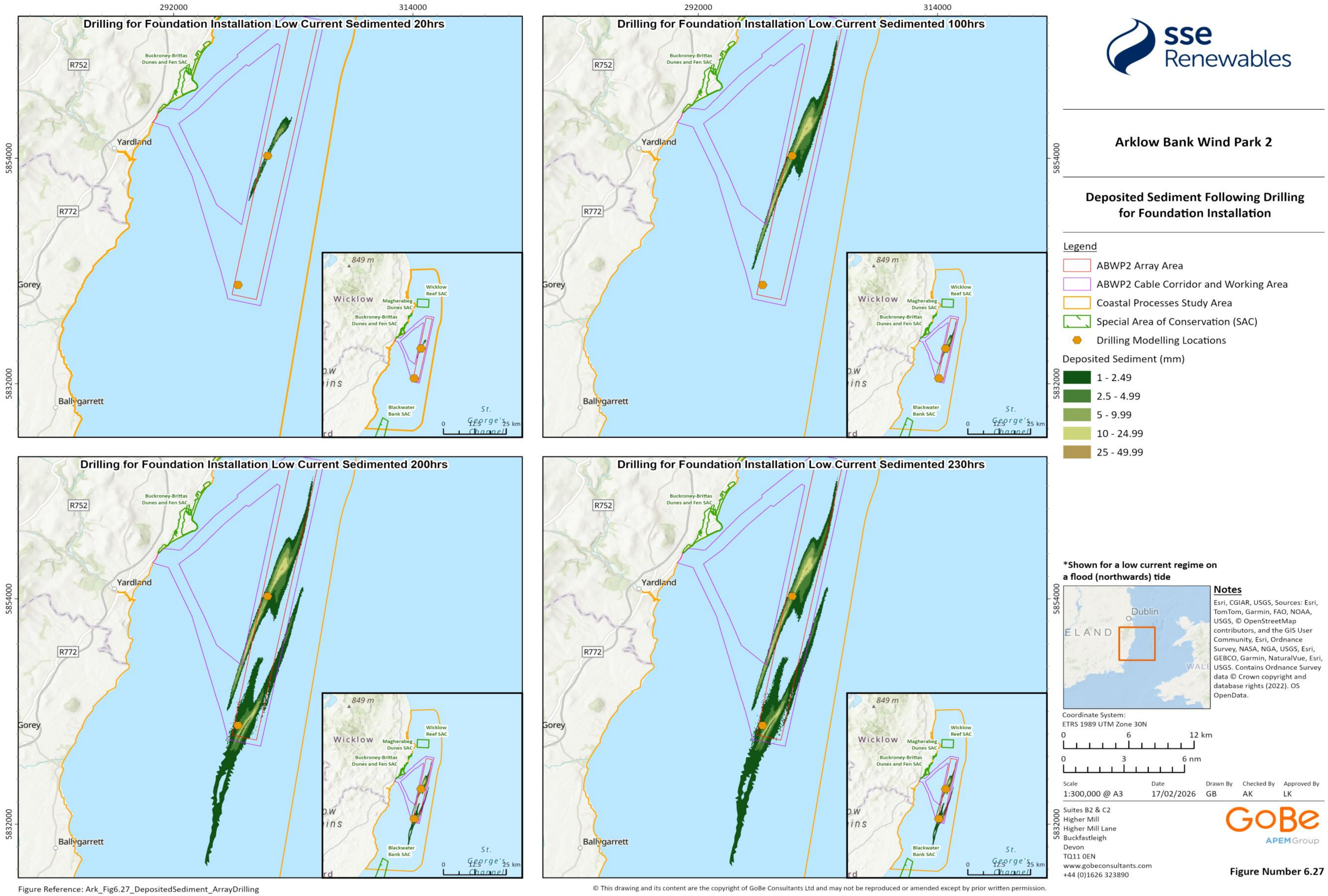

Figure 6.27: Deposited sediment following drilling for foundation installation. Shown for a low current regime on a flood (northwards) tide

EXPORT CABLE SEABED PREPARATION AND INSTALLATION ACTIVITIES

6.10.1.46 The following sections present the assessment for those construction activities within the Cable Corridor and Working Area.

SEABED PREPARATION (SANDWAVE CLEARANCE FOR CABLES) INCLUDING SPOIL DISPOSAL VIA A TRAILER SUCTION HOPPER DREDGER;

6.10.1.47 Seabed preparation may be required prior to the installation of the Proposed Developments' infrastructure. This is likely to include sandwave clearance (the removal of sections of mobile bedforms) for cable installation activities in order to ensure effective cable burial below the level of the stable bed. The parameters for these activities are presented in Table 6.11. Sandwaves may be cleared along a corridor of 70 m in width (for each cable) with 10 m depth of material being relocated. This may occur across 30% (12 km) of the total export cable length (maximum 40 km), resulting in, circa, 500,000 m^3 to be excavated using a TSHD with an assumed hopper volume of 20,000 m^3. It should be noted that this is a conservative estimate of hopper volume and it is possible that a smaller vessel may be used, which would consequently result in smaller potential impacts relating to sediment plumes and associated deposition. The behaviour of the sediment upon collection and as spoil is presented in paragraph 6.9.1.15 *et seq*.

6.10.1.48 Numerical modelling has simulated the filling of a TSHD hopper load, in addition to overspill, followed by discharge at a spoil disposal site (as set out in Volume III, Appendix 6.1: Marine Physical Processes Numerical Modelling (Revised March 2026)). Results are presented for disposal at the Zone 5 (Figure 6.28 and Figure 6.29). The dredger is simulated as moving along a 2 km line in the centre of the northern cable route for 350 minutes before transiting to the disposal site in the northeastern (Zone 5) corner of the Array Area, approximately 3.2 km away. Whilst the hopper is being filled, overspill is likely to develop a near-surface sediment plume composed primarily of fine sediments. The overspill phase from the TSHD lasts 290 minutes after which there is then a 20-minute break in discharge during the demobilisation and transit to the disposal site, where a sudden discharge under the vessel occurs over a 15-minute period. For the overspill phase, the sediment is released at the water surface and for the disposal phase the material is released 10 m below the surface. These timings have been developed based on expert judgment of comparative works, informed by active engagement with the industry and consultation with subject matter experts.

6.10.1.49 Once the dredger moves to discharge a full hopper load, the majority of the finer sediments are expected to have already been lost to overspill, although this will vary based on the sediment type and filling rate. During spoil disposal, sediments will be discharged as a highly turbid dynamic plume, with the coarser sediment fraction falling quickly to the seabed (on timescales of minutes to tens of minutes) with limited opportunity to be advected away by tidal currents, leading to a correspondingly greater localised depth of accumulation on the seabed. Finer sediments in the spoil will remain in suspension for longer (up to around a day), forming a passive plume which will then be advected by tidal currents. Should any wave energy be present during the operations, then any plume will be dispersed more quickly than under tidal currents alone.The potential consequences of sandwave clearance upon the seabed regime have been considered elsewhere within this EIAR Chapter using both numerical assessments and monitoring results and it has been shown that:

- Race Bank OWF monitoring data (DONG Energy, 2017; Figure 6.21) provides evidence of sandwave regeneration after dredging, with the sandwave height observed to have regenerated to, approximately, 65% after 300 days and a prediction of full recovery (98%) after three years (Larsen *et al*., 2019);

- analysis of bathymetric survey data from the Greater Changhua 1&2a OWF demonstrates the ability of sandwaves to regenerate to the former magnitude following dredging activities (Roulund *et al*., 2023); and
- assessments undertaken for Norfolk Vanguard conclude that '*sandwave behaviour and responses are determined by the governing processes (tidal forcing, water depth and sediment supply) that occur at a much larger and regional scale than the proposed works. As these will not be disrupted by the proposed works, all available indicators point towards the form and function of the sandwaves and sandbanks being maintained'* (ABPmer, 2018)

6.10.1.50 As shown in Figure 6.28 and Figure 6.29 the numerical modelling simulations undertaken show the following:

- Suspended Sediment Concentrations (Figure 6.28):
  - Within the first several hours of sandwave clearance, a plume of fine sediment is observed within several km of the seabed works, representing the overspill phase. Maximum SSCs within this plume are generally below 25 mg/l and disperse within several hours.
  - Disposal of the TSHD load at the Zone 5 disposal site, initially results in the formation of a thin (less than 0.2 km wide) plume observed within 11 km of the seabed works[18]. The maximum concentrations within this plume are of the order of 2,000 mg/l and occurs immediately adjacent to the TSHD location. As this plume is advected by the tidal currents along the tidal axis, it is also dispersed such that the SSC levels reduce with increasing distance from the release location. Five hours after disposal, and no measurable elevated SSC (above 1 mg/l) is predicted.
  - Under all tidal flow simulations (speeds and direction), elevated suspended sediment concentrations above 1 mg/l are not shown to disperse beyond 8 km from the Cable Corridor and Working Area.These results should be considered in the context of ambient background turbidity occurring across the Study Area, as described in paragraph 6.7.1.23 and Table 6.9. Average values of near-bed turbidity have been identified from ABS data and provide a reference point of baseline average (31.7 mg/l) and maximum (74.6 mg/l) near-bed turbidity, which is presented for context in the legend of Figure 6.28.
- Deposited Sediment (Figure 6.29):
  - Sediment deposition is shown to have the following general characteristics:
    - under higher current speeds[19], the resultant deposition is shown to have a greater areal extent and lower thickness *than*;
    - under lower current speeds, the resultant deposition is shown to have a lesser areal extent and greater thickness.
    - the deposition location aligns with the axis of tidal flow, which are relatively linear to the north and south of Arklow Bank (Figure 6.1).
  - Sediment deposition is greatest in the vicinity of the disturbance activity, with thicknesses up to 250 mm occurring within 1 km. Beyond this, the thickness of deposited sediment rapidly reduces such that at 10 km from the active disturbance, the deposited thickness is of the order of 2.5 mm. Beyond this, the thickness of deposited sediment becomes immeasurable. In reality, deposited sediment will become re-worked and entrained back

[18] For a release during high current speeds. During lower current speeds, the plumes' SSC remain of similar orders of magnitude, but its extent is reduced as would be expected due to the reduced dispersive energy of the tidal regime.

[19] Noting that the peak current speed occurs during the final ten minutes of the overspill phase.

into the sediment transport system under the action of both tides and waves, which is not shown within the model results due to the model approach outlined in paragraph 6.10.1.6 *et seq*.

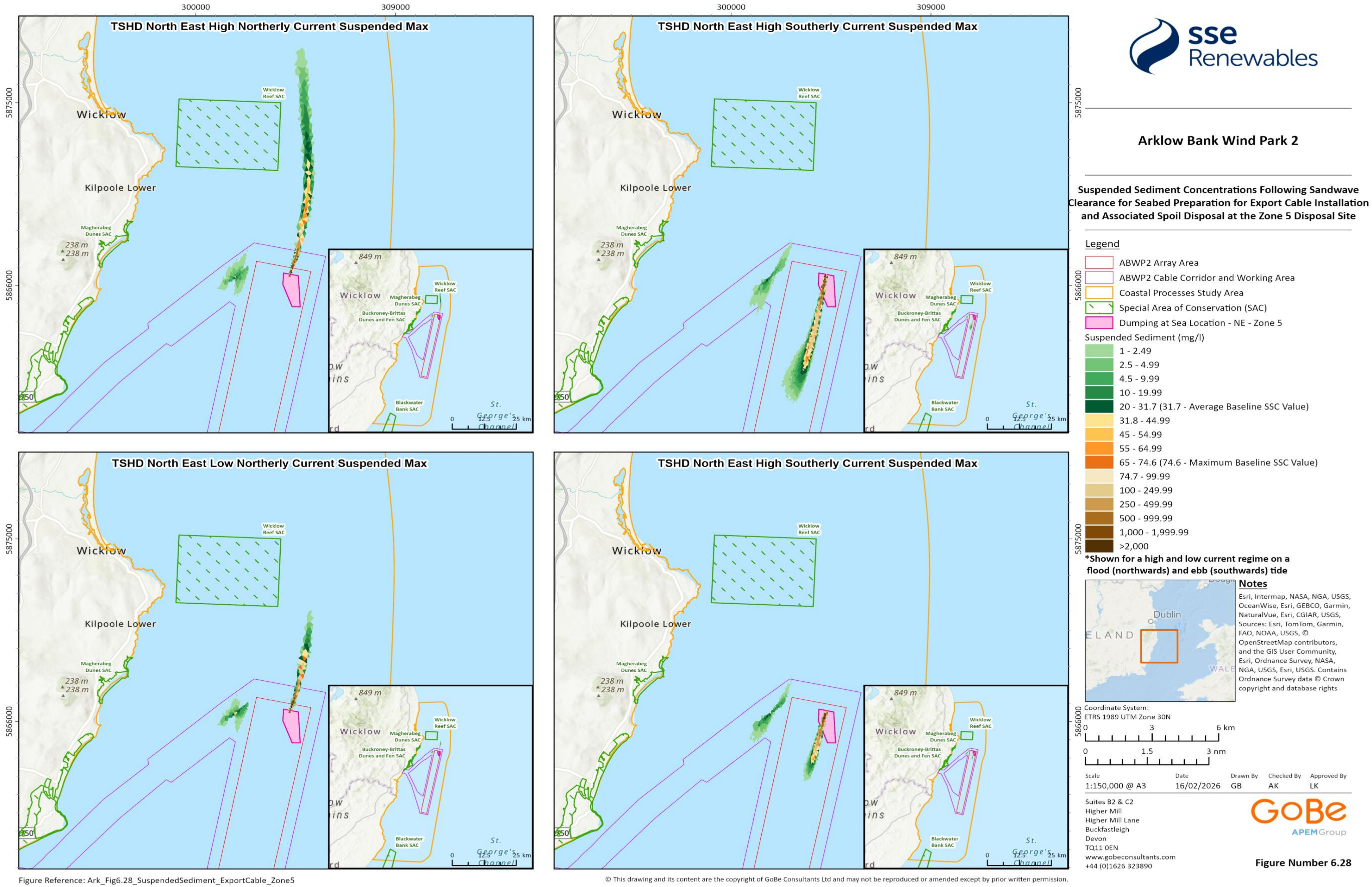

Figure 6.28: Maximum suspended sediment concentrations following sandwave clearance for seabed preparation for export cable installation and the associated spoil disposal at the Zone 5 disposal site. Shown for a high and low current regime on a flood (northwards) and ebb (southwards) tide.

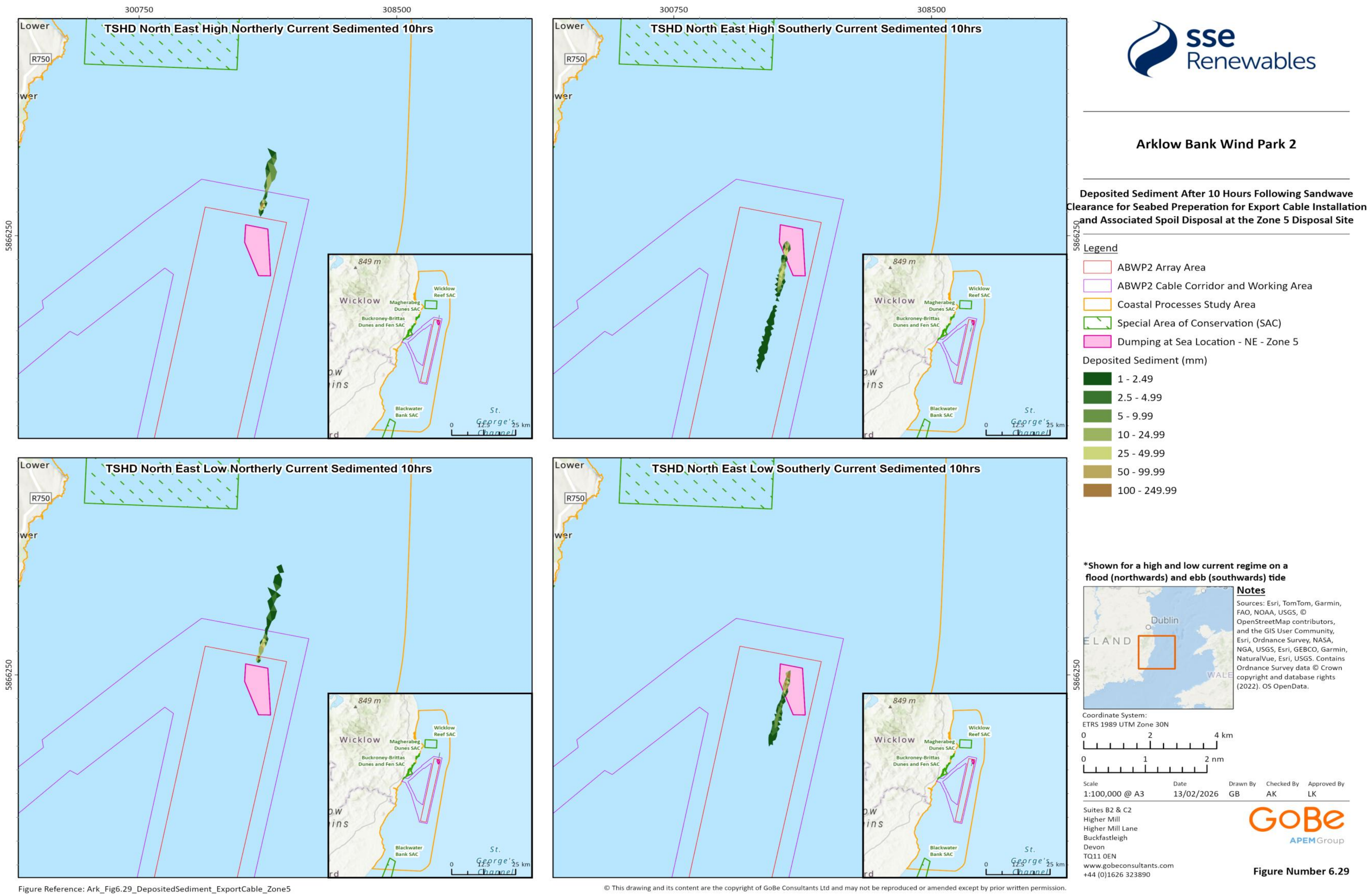

Figure 6.29 : Deposited sediment following sandwave clearance for seabed preparation for export cable installation and the associated spoil disposal activities at the Zone 5 disposal site. Shown for a high and low current regime on a flood (northwards) and ebb (southwards) tide.

MAGNITUDE OF THE IMPACT

6.10.1.51 The magnitude of impacts (SSC; sediment deposition) that result from sandwave clearance for export installation and the associated spoil disposal activities are shown in Table 6.24 and Table 6.25. These magnitudes align with the justifications provided in Table 6.15 and are in accordance with EPA (2022).

Table 6.24: Determination of magnitude for changes to suspended sediment concentrations due to sandwave clearance for export cable installation and associated spoil disposal

Descriptor	Justification
Extent	The predicted changes will be localised to within the ZoI. The path followed by a tidal ellipse, whilst comparable, is not exactly the same on every tide. As such, it is unlikely that the same seabed area will be affected by the higher SSC and more localised plume, for more than one or two consecutive tides.
Duration	The predicted changes will occur during construction activities within the Cable Corridor and Working Area and are considered short-term.
Frequency	The predicted changes will only occur during active sandwave clearance and spoil disposal and can be considered intermittent during construction. This is due to the transit time required from filling the TSHD to the hopper discharge at the disposal site.
Probability	The predicted changes can be reasonably expected to occur.
Consequence	Elevated suspended sediment concentrations immediately adjacent to the activity for the duration of works. Plume transported by tidal flow away from Array Area and expected to be rapidly dispersed by energetic wave events. Noticeable, but temporary, changes to key characteristics or features of the particular environmental aspect's character or distinctiveness
Overall Magnitude	The potential magnitude of the predicted changes is rated as **Low**.

Table 6.25: Determination of magnitude for changes to deposited sediment due to sandwave clearance for export cable installation and associated spoil disposal

Descriptor	Justification
Extent	The predicted changes will be localised to within the ZoI. The path followed by a tidal ellipse, whilst comparable, is not exactly the same on every tide. As such, it is unlikely that the same seabed area will be affected by deposition from suspended material over more than one or two tides.
Duration	The predicted changes will occur during construction activities within the Cable Corridor and Working Area and are considered short-term.
Frequency	Suspended sediment will be deposited as it moves with the tidal flow away from the activity's location. The impact will occur intermittently throughout the construction phase given the temporary cessation in activity to allow for the TSHD to transit to the spoil disposal site.
Probability	The predicted changes can be reasonably expected to occur.
Consequence	Deposited sediment is greatest immediately adjacent to the sandwave clearance activities along the Cable Corridor and Working Area, for the duration of the activity, decreasing with distance from the activity. Any sediment deposited on the seabed occurs aligned with the direction of the tidal flow and is expected to be rapidly incorporated into the active sediment transport regime.
Overall Magnitude	The potential magnitude of the predicted changes is rated as **Low**.

PRE-LAY CABLE TRENCHING AT THE SEABED

SENSITIVITY OF RECEPTOR

6.10.1.52 The following receptors have been considered in the assessment of increased suspended sediment concentrations and associated deposition:

- Sites designated for physical features – Magherabeg Dunes and Buckroney-Brittas Dunes and Fen SACs

SITES DESIGNATED FOR PHYSICAL FEATURES

6.10.1.53 Magherabeg Dunes and Buckroney-Brittas Dunes and Fen SACs (Figure 6.3) are designated for the following qualifying features:

- Annual vegetation of drift lines;
- Embryonic shifting dunes;
- Shifting dunes along the shoreline with Ammophila arenaria (white dunes);
- Fixed coastal dunes with herbaceous vegetation (grey dunes);
- Atlantic decalcified fixed dunes;
- Dunes with Salix repens ssp. argentea; and
- Humid dune slacks.

6.10.1.54 Whilst these designated sites are located above the HWM, the two SACs have been included with this Coastal Processes assessment as a precautionary measure. The form and function of these designated sites is dependent upon a sufficient sediment supply, although it is noted in the associated conservation objectives that the sites are subject to natural varying cycles of accretion and erosion (NWPS, 2017a and 2017b). Justification of the sensitivity of the Magherabeg Dunes and Buckroney-Brittas Dunes and Fen SACs, to increased suspended sediment concentrations and associated deposition, according to the definitions provided in Table 6.14, are presented in Table 6.26.

Table 6.26: Determination of sensitivity to Impact 1: Export cable seabed preparation and installation activities for the receptor: Magherabeg Dunes and Buckroney-Brittas Dunes and Fen SACs

Descriptor	Justification
Adaptability	The receptor cannot avoid or adapt to an impact: the qualifying features of Magherabeg Dunes and Buckroney-Brittas Dunes and Fen SACs undergo cycles of accretion and erosion.
Tolerance	The environment has high capacity to accommodate the proposed form of change: the qualifying features of the SAC are dependant upon a sufficient sediment supply, noting that the site is subject to naturally varying cycles of accretion and erosion. As such, it is considered that this feature has a high capacity to accommodate increases in SSC and associated deposition, should they occur as a result of landfall installation activities.
Recoverability	The effect on the receptor is anticipated to be short-term (i.e. over the Proposed Developments' individual construction activities): any effects arising from landfall installation activities will only occur for the duration of these works.
Value	The receptor is designated for international importance and/or very high socio-economic value: Magherabeg Dunes and Buckroney-Brittas Dunes and Fen are designated as SACs.
Overall Sensitivity	The potential sensitivity of the predicted changes is rated as **Low**.

6.10.1.55 Boulder clearance along the export cable route will result in the total disturbance of 300,000 m^3. The use of a plough is such that the sediment is displaced from the seabed from within a width of 15 m and to a depth of 0.5 m. Fluidisation of sediment only occurs using techniques such as jetting or flow excavators. Only the finer sediments are likely to be suspended following the seabed disturbance. The Proposed Development expects that the time periods between boulder clearance and other seabed works would be of the order of two weeks. This period would allow any suspended sediments to be dispersed/ deposited such that there are no additive effects anticipated from seabed works at the same location.

6.10.1.56 Of the different pre-lay cable trenching techniques considered by the Developer, for which more information is presented in Volume II, Chapter 4: Description of Development (Revised March 2026), the use of CFE has been numerically assessed along the export cable route. A description of the process which occurs is presented in Sections 6.10.1.34 and 6.10.1.38. As presented in Table 6.11, this process would be used to excavate a trench with a width at the seabed of 15 m and a depth of 2.5 m and represents a maximum total seabed area of disturbance of 600,000 m^2. Results are presented for operations within both the northern and southern extents of Cable Corridor and Working Area.

6.10.1.57 For the purposes of the northern scenario modelled for this assessment, the tool is simulated to be moving along a 2 km section of the cable route, approximately 5.2 km offshore. The tool moves at a rate of 50 m per hour, such that trenching activities are continuous for 40 hours, and the material is released 3 m above the bed. For the purposes of the southern scenario modelled for this assessment, the tool is simulated to be moving along a 2.2 km section of the cable route, before travelling to the site of the exit pit (taking approximately 10 minutes). Then further excavation occurs for 400 m from the centre of the exit pit for a period of 60 minutes. The material is released at 3 m above the bed. These timings have been developed based on expert judgment of comparative works, informed by active engagement with the industry and consultation with subject matter experts.

6.10.1.58 Full details of the assumptions and parameters used in the modelling scenarios are provided in Volume III, Appendix 6.1: Marine Physical Processes Numerical Modelling (Revised March 2026).

6.10.1.59 As shown in Figure 6.32 to Figure 6.33, the numerical modelling simulations undertaken show the following:

- Suspended Sediment Concentrations (Figure 6.32):
  - The spatial distribution of elevated SSC is greater under higher[20] tidal currents with a greater magnitude under lower tidal current speeds in the plumes' centre;
  - The greatest increase in SSC is observed immediately adjacent to the active works, with levels circa 1,500 mg/l although reaching up to 2,500 mg/l in some areas. Concentrations are higher at the northern location, with maximum concentrations at the southern scenario not exceeding 1,500 mg/l. Concentrations above 2.5 mg/l are observed up to 10 km from the point of disturbance for the northern scenario, and 14 km at the southern scenario. In the south, the reversal of the tide can also be observed, with linear plumes extending both northeast and southwest of the modelled cable route;
  - Following completion of the active seabed disturbance, the elevated SSC rapidly reduces such that levels are immeasurable.
  - These results should be considered in the context of ambient background turbidity occurring across the Study Area, as described in paragraph 6.7.1.23 and Table 6.9. Average values of near-bed turbidity have been identified from ABS data and provide a reference point of baseline average (31.7 mg/l) and maximum (74.6 mg/l) near-bed turbidity, which is presented for context in the legend of Figure 6.32.

[20] current speed peak events occur half way along the excavation route

- Deposited Sediment (Figure 6.31 and Figure 6.33):
  - – Sediment deposition is shown to have the following general characteristics:
    - under higher current speeds[21], the resultant deposition is shown to have a greater areal extent and lower thickness than under lower current speeds when the resultant deposition is shown to have a lesser areal extent and relatively larger thickness.
    - the deposition location aligns with the axis of tidal flow, which are relatively linear to the north and south of Arklow Bank (Figure 6.1).
  - – Sediment deposition is greatest in the vicinity of the disturbance activity, with thicknesses up to 150 mm (for the southern scenario) and 100 mm (for the northern scenario) occurring within 1 km. Beyond this, the thickness of deposited sediment rapidly reduces such that less than 2 km from the active disturbance, the deposited thickness is less than 2.5 mm for both scenarios. With even further distance, the thickness of deposited sediment becomes immeasurable. Sediment deposition is of greater thickness but lesser extent in the southern scenario, which is likely to be due to the shallower water depths present closer to shore (with sediment having less chance to be advected horizontally).
  - – In reality, deposited sediment will become re-worked and entrained back into the sediment transport system under the action of both tides and waves. Offshore export cable installation closer to the coastline may lead to a small amount of localised sedimentation on the foot of the dunes at the Magherabeg Dunes and Buckroney-Brittas Dunes and Fen SACs. The sediment deposited will be native to the site and would be beneficial in the accretive behaviour of the dune systems.

[21] *Noting that the peak current speed occurs during the final ten minutes of the overspill phase.*

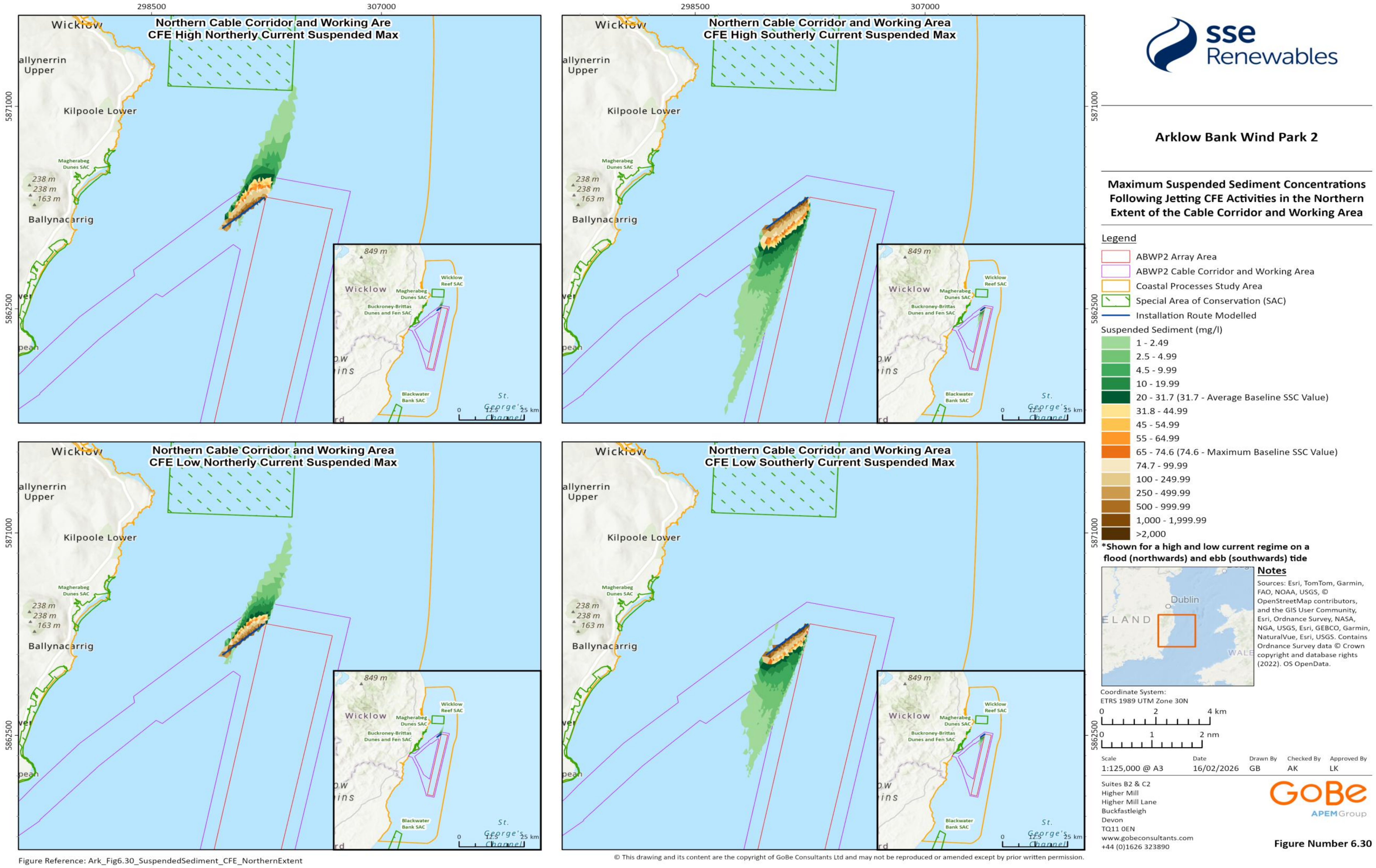

Figure 6.30: Maximum22 suspended sediment concentrations following CFE activities within the northern extent of the Cable Corridor and Working Area. Shown for a flood (northerly) low and high current regime

---

[22] *Where the values shown are the maximum SSC that occur within the model domain at any time during the numerical simulation. As such, the results shown on this figure may be from different timesteps.*

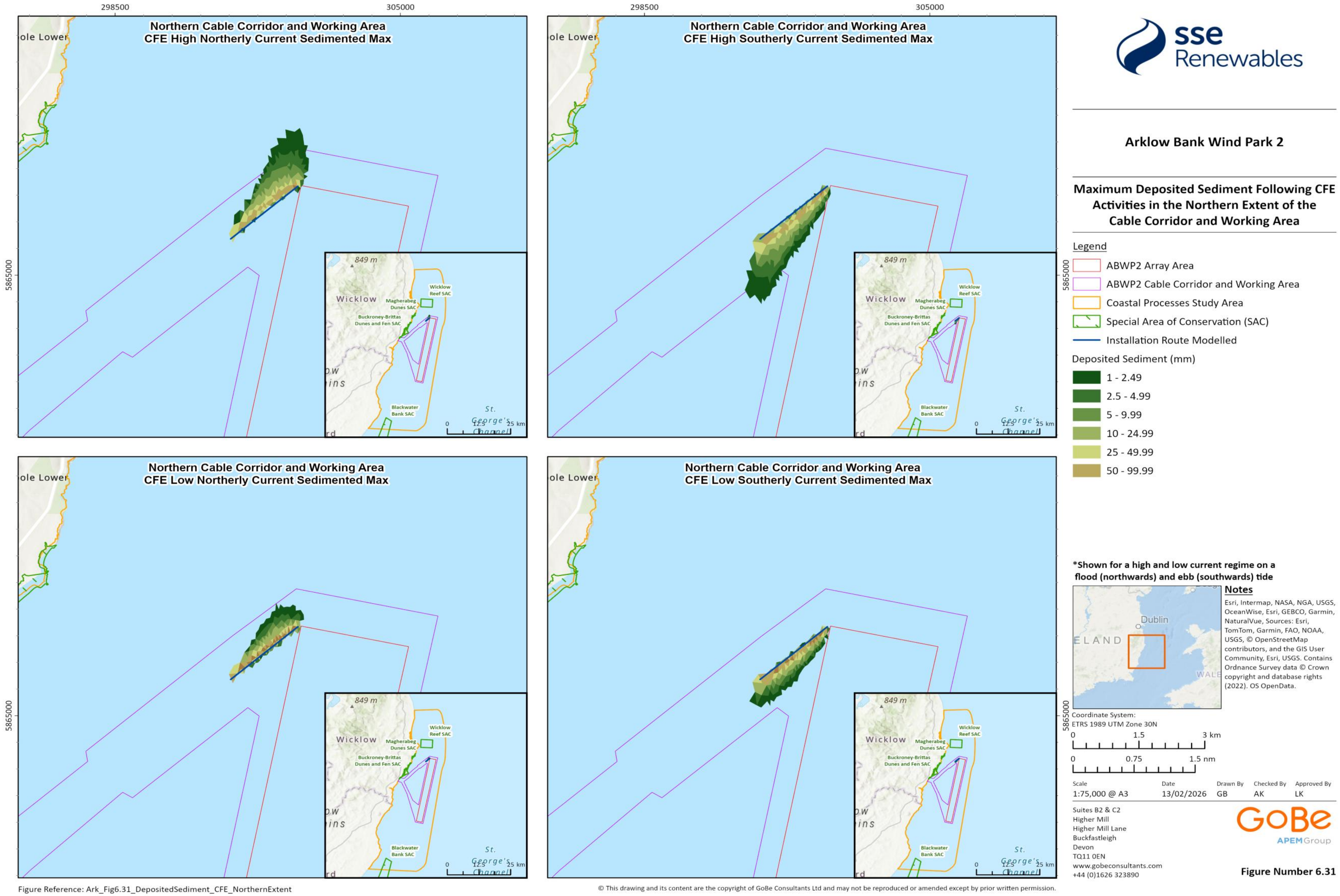

Figure 6.31: Deposited sediment following completion of CFE activities within the northern extent of the Cable Corridor and Working Area. Shown for a high and low current regime on a flood (northwards) and ebb (southwards) tide.

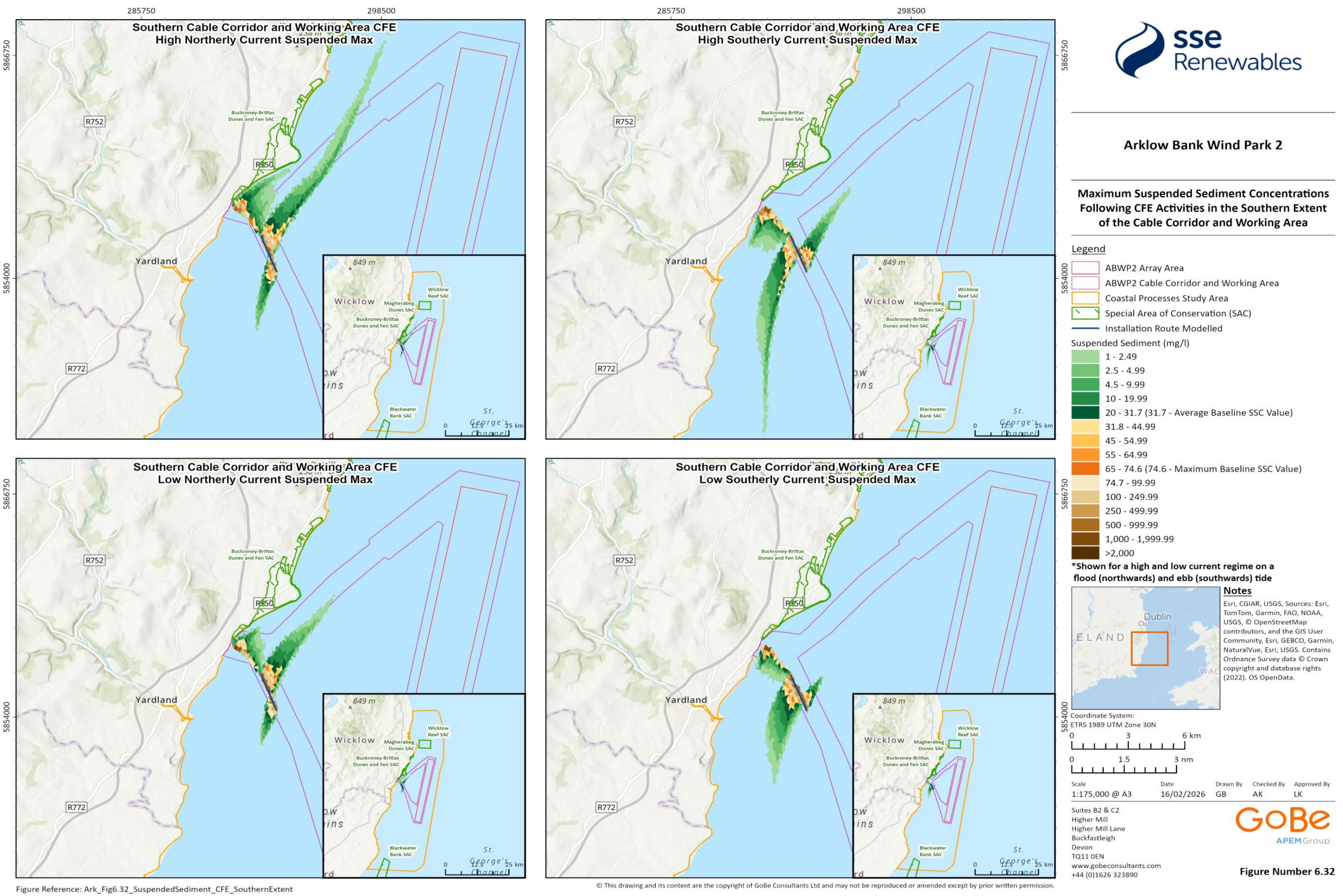

Figure 6.32 Suspended sediment concentrations following CFE activities within the southern extent of the Cable Corridor and Working Area. Shown for a high and low current regime on a flood (northwards) and ebb (southwards) tide.

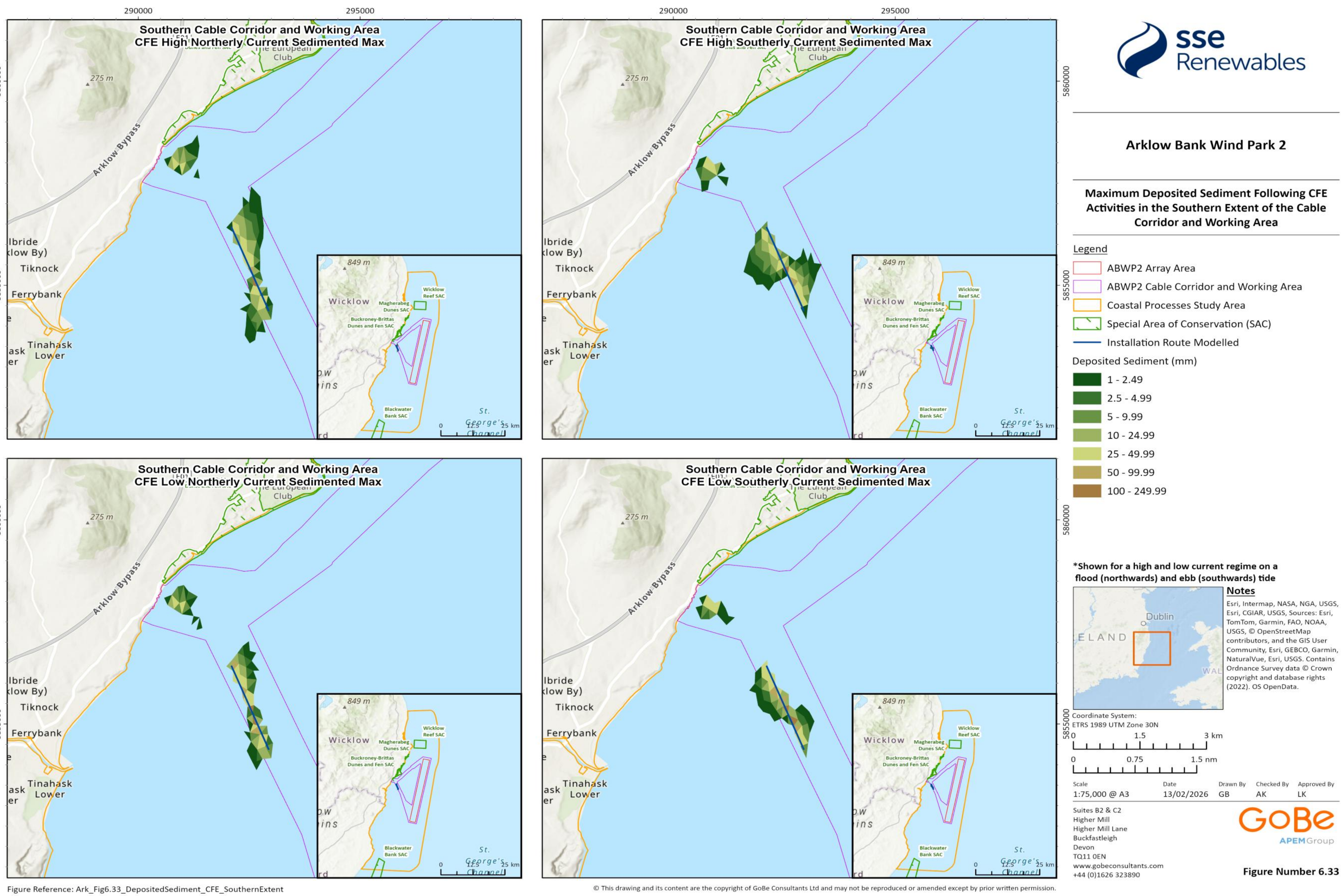

Figure 6.33 Deposited sediment following completion of CFE activities within the southern extent of the Cable Corridor and Working Area. Shown for a high and low current regime on a flood (northwards) and ebb (southwards) tide

MAGNITUDE OF THE IMPACT

6.10.1.60 The magnitude of impacts (SSC; sediment deposition) that result from sandwave clearance for export cable installation and the associated spoil disposal activities are shown in Table 6.27 and Table 6.28. These magnitudes align with the justifications provided in Table 6.15 and are in accordance with EPA (2022).

Table 6.27: Determination of magnitude for changes to suspended sediment concentrations due to sandwave clearance for export cable installation and associated spoil disposal

Descriptor	Justification
Extent	The predicted changes will be localised to within the ZoI The path followed by a tidal ellipse, whilst comparable, is not exactly the same on every tide. As such, it is unlikely that the same seabed area will be affected by the higher SSC and more localised plume, for more than one or two consecutive tides.
Duration	The predicted changes will occur during construction activities within the Cable Corridor and Working Area and are considered short-term.
Frequency	The predicted changes will only occur during active sandwave clearance and spoil disposal and can be considered intermittent during construction. This is due to the transit time required from filling the TSHD to the hopper discharge at the disposal site.
Probability	The predicted changes can be reasonably expected to occur.
Consequence	Elevated suspended sediment concentrations immediately adjacent to the activity for the duration of works. Plume transported by tidal flow away from the Cable Corridor and Working Area and expected to be rapidly dispersed by energetic wave events. Noticeable, but temporary, changes to key characteristics or features of the particular environmental aspect’s character or distinctiveness
Overall Magnitude	The potential magnitude of the predicted changes is rated as **Low**.

Table 6.28: Determination of magnitude for changes to deposited sediment due to sandwave clearance for export cable installation and associated spoil disposal

Descriptor	Justification
Extent	The predicted changes will be localised to within the ZoI. The path followed by a tidal ellipse, whilst comparable, is not exactly the same on every tide. As such, it is unlikely that the same seabed area will be affected by deposition from suspended material over more than one or two tides.
Duration	The predicted changes will occur during construction activities within the Cable Corridor and Working Area and are considered short-term.
Frequency	Suspended sediment will be deposited as it moves with the tidal flow away from the activity’s location. The impact will occur intermittently throughout the construction phase given the temporary cessation in activity to allow for the TSHD to transit to the spoil disposal site.
Probability	The predicted changes can be reasonably expected to occur.
Consequence	Deposited sediment is greatest within the Cable Corridor and Working Area, for the duration of the activity, decreasing with distance from the activity. Any sediment deposited on the seabed occurs aligned with the direction of the tidal flow and is expected to be rapidly incorporated into the active sediment transport regime.
Overall Magnitude	The potential magnitude of the predicted changes is rated as **Low**.

SIGNIFICANCE OF THE EFFECT

6.10.1.61 Those Coastal Processes receptors sensitive to the impact pathway are considered in the following section.

SITES DESIGNATED FOR PHYSICAL FEATURES

6.10.1.62 The sensitivity of Magherabeg Dunes and Buckroney-Brittas Dunes and Fen SACs has been assessed as **Low**. The magnitude of Impact 1: Export cable seabed preparation and installation activities has been assessed as **Low**. Consequently, and in accordance with the matrix provided in Table 6.16 the significance is concluded to be **Slight,** which is **Not Significant** in EIA terms**.**

PROPOSED MITIGATION

6.10.1.63 As there are no significant effects identified, it is considered that additional (non-embedded mitigation) measures are not required.

RESIDUAL EFFECT ASSESSMENT

6.10.1.64 There are no additional (non-embedded mitigation) measures proposed and as such a residual effect assessment has not been undertaken.

LANDFALL INSTALLATION ACTIVITIES

6.10.1.65 The following sections present the assessment for those construction activities at Landfall.

SENSITIVITY OF RECEPTOR

6.10.1.66 The following receptors have been considered in the assessment of increased suspended sediment concentrations and associated deposition:

- Sites designated for physical features – Magherabeg Dunes and Buckroney-Brittas Dunes and Fen SACs

6.10.1.67 As the assessment of landfall installation activities considers the SSC and resultant sediment deposition, information pertaining to the sensitivity of these designated sites provided in paragraphs 6.10.1.52 *et seq.* and Table 6.26 remains relevant.

DRILLING FLUID RELEASE DURING HDD, OR OTHER TRENCHLESS TECHNIQUE, OPERATIONS.

6.10.1.68 The subsea export cable ducts will be installed underneath the beach using trenchless installation techniques, with HDD techniques as detailed in Chapter 4: Description of Development and as outlined in Table 6.11. The drilling activity utilises a viscous drilling fluid which consists of a mixture of water and bentonite, a non-toxic, naturally occurring clay mineral. The release of drilling fluid and drill cuttings from HDD operations will result in a plume of elevated SSC. The drilling fluid has an overall density and viscosity similar to seawater and so is expected to behave in a similar manner.

6.10.1.69 Numerical modelling has been used to simulate the release of bentonite over a 4.5 day[23] period during trenchless Landfall operations. Further detail is provided in Volume III, Appendix 6.1: Marine Physical Processes Numerical Modelling (Revised March 2026).

6.10.1.70 The modelling results demonstrate that:

---

[23] initial punch-out followed by a reaming phase

- Elevated SSC will be of localised extent and temporary duration, with maximum concentrations of 50 mg/l occurring only within at the location of the punch-out HDD exit pit and during the installation works. Rapid dispersion by tides and waves will result in the immediate dispersion and dilution of these concentrations. SSC is advected along the coast along the tidal axis to distances of up to 4 km, although concentrations at this distance are limited to below 25 mg/l. Of note is that dispersion to the south, following a release during a high spring southerly current is, approximately, 1 km less than under the equivalent northerly release (Figure 6.1). Away from the Landfall HDD activities and outside the Cable Corridor and Working Area, but within the ZoI, SSC levels are shown to be no greater than 2.5 mg/l;
- These results should be considered in the context of ambient background turbidity occurring across the Study Area, as described in paragraph 6.7.1.23 and Table 6.9. Average values of near-bed turbidity have been identified from ABS data and provide a reference point of baseline average (31.7 mg/l) and maximum (74.6 mg/l) near-bed turbidity, which is presented for context in the legend of (Figure 6.1). While these values have been taken from more offshore areas, turbidity is generally higher close to the coast than offshore due to shallower water depths and terrestrial input, and these values are therefore able to demonstrate a precautionary baseline; and
- Sediment deposition following cessation of HDD activities is shown in Figure 6.35. Deposition that is measurable in practice occurs within the immediate proximity of the Landfall works, remaining within the Cable Corridor and Working Area. Maximum deposition occurs during the activity as a result of the active release of the bentonite. Following cessation of the works, any deposited sediment will be re-worked by the tide and wave regimes, reducing its area and depth. Here, 6.5 days following the commencement of installation works, a maximum deposition of 7.5 mm is predicted within a coastal extent of 0.3 km within the Cable Corridor and Working Area (Figure 6.35). A similar pattern of deposition is predicted for releases during a northerly and southerly tidal flow. Deposition predicted for releases during high tidal flows, for both northerly and southerly flow, indicates a wider spread of deposition than during the low tidal flows. This is to be expected due to the higher (faster) currents distributing sediment over a wider area. The directionality of the tidal flows is such that any deposited sediment is not transported, and ultimately deposited, in the offshore environment and remains close to the coast.

6.10.1.71 In summary therefore, any measurable increases in SSC and deposition are small-scale, highly localised and is expected to be rapidly redistributed by wave action.

MAGNITUDE OF THE IMPACT

6.10.1.72 The magnitude of impacts (SSC; sediment deposition) that result from bentonite release from trenchless techniques, such as HDD, used at Landfall are shown in Table 6.29 and Table 6.30. These magnitudes align with the justifications provided in Table 6.15 and are in accordance with EPA (2022).

Table 6.29: Determination of magnitude for changes to suspended sediment concentrations due to drilling fluid release during Horizontal Direction Drilling at the proposed Landfall.

Descriptor	Justification
Extent	The predicted changes will be localised to within the ZoI and remain within the coastal zone.
Duration	The predicted changes will occur during construction activities at Landfall and as such can be classified as temporary.
Frequency	The predicted changes will only occur during the HDD works at Landfall and thus can be considered intermittent through the Proposed Developments'

Descriptor	Justification
	construction phase. The effects are reversible as the tide and waves disperse the suspended material.
Probability	The predicted changes can be reasonably expected to occur.
Consequence	Elevated suspended sediment concentrations occur immediately adjacent to the Landfall works for the duration of the activity. Increased concentrations occur within the coastal zone for up to 4 km, but within the range of natural levels, which are rapidly disperse due to wave and tidal action.
Overall Magnitude	The potential magnitude of the predicted changes is rated as **Low**.

Table 6.30: Determination of magnitude for changes to deposited sediment due to drilling fluid release during Horizontal Direction Drilling at the proposed Landfall

Descriptor	Justification
Extent	The predicted changes will be localised to within the ZoI and remain within the coastal zone.
Duration	The predicted changes will occur during construction activities at Landfall and as such can be classified as temporary.
Frequency	The predicted changes will only occur during the HDD works at Landfall and thus can be considered intermittent through the Proposed Developments' construction phase. The effects are reversible as the tide and waves redistribute the deposited material.
Probability	The predicted changes can be reasonably expected to occur.
Consequence	Deposited sediment is greatest immediately adjacent to the Landfall activities and remains within the Cable Corridor and Working Area. Any sediment deposited on the seabed occurs aligned with the direction of the tidal flow and is expected to be rapidly dispersed by any wave and tidal action.
Overall Magnitude	The potential magnitude of the predicted changes is rated as **Low**.

SIGNIFICANCE OF THE EFFECT

Those Coastal Processes receptors sensitive to the impact pathway are considered below.

SITES DESIGNATED FOR PHYSICAL FEATURES

The sensitivity of Magherabeg Dunes and Buckroney-Brittas Dunes and Fen SACs has been assessed as **Low**. The magnitude of Impact 1: Landfall installation activities has been assessed as **Low**. Consequently, and in accordance with the matrix provided in Table 6.16, the significance upon the SACs is concluded to be **Slight,** which is **Not Significant** in EIA terms.

PROPOSED MITIGATION

6.10.1.73 As there are no significant effects identified, it is considered that additional (non-embedded mitigation) measures are not required.

RESIDUAL EFFECT ASSESSMENT

6.10.1.74 There are no additional (non-embedded mitigation) measures proposed and as such a residual effect assessment has not been undertaken.

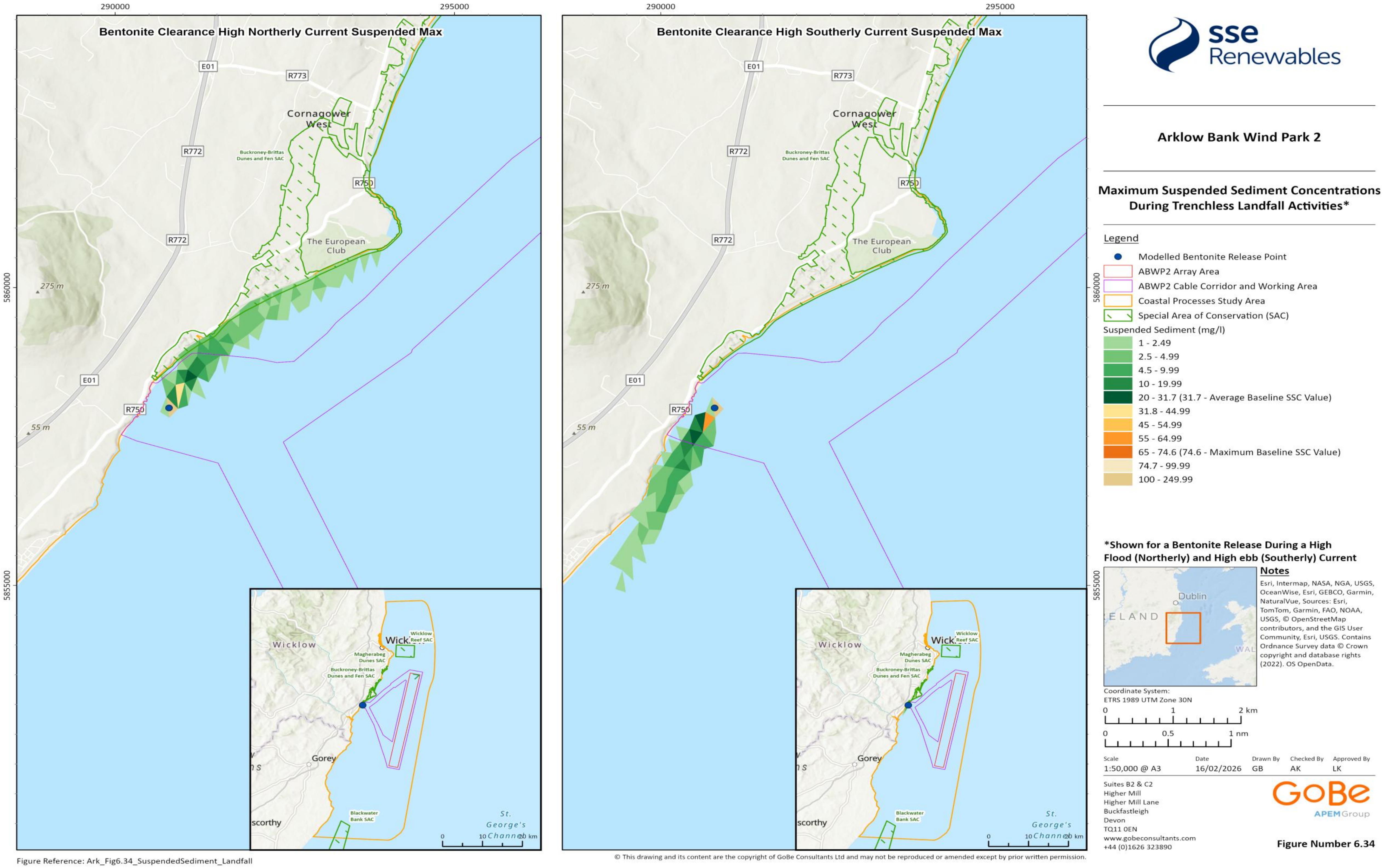

Figure 6.34: Maximum[24] suspended sediment concentrations during trenchless Landfall activities, shown for a bentonite release during a high flood (northerly) and high ebb (southerly) current

[24] *Where the values shown are the maximum SSC that occur within the model domain at any time during the numerical simulation. As such, the results shown on this figure may be from different timesteps.*

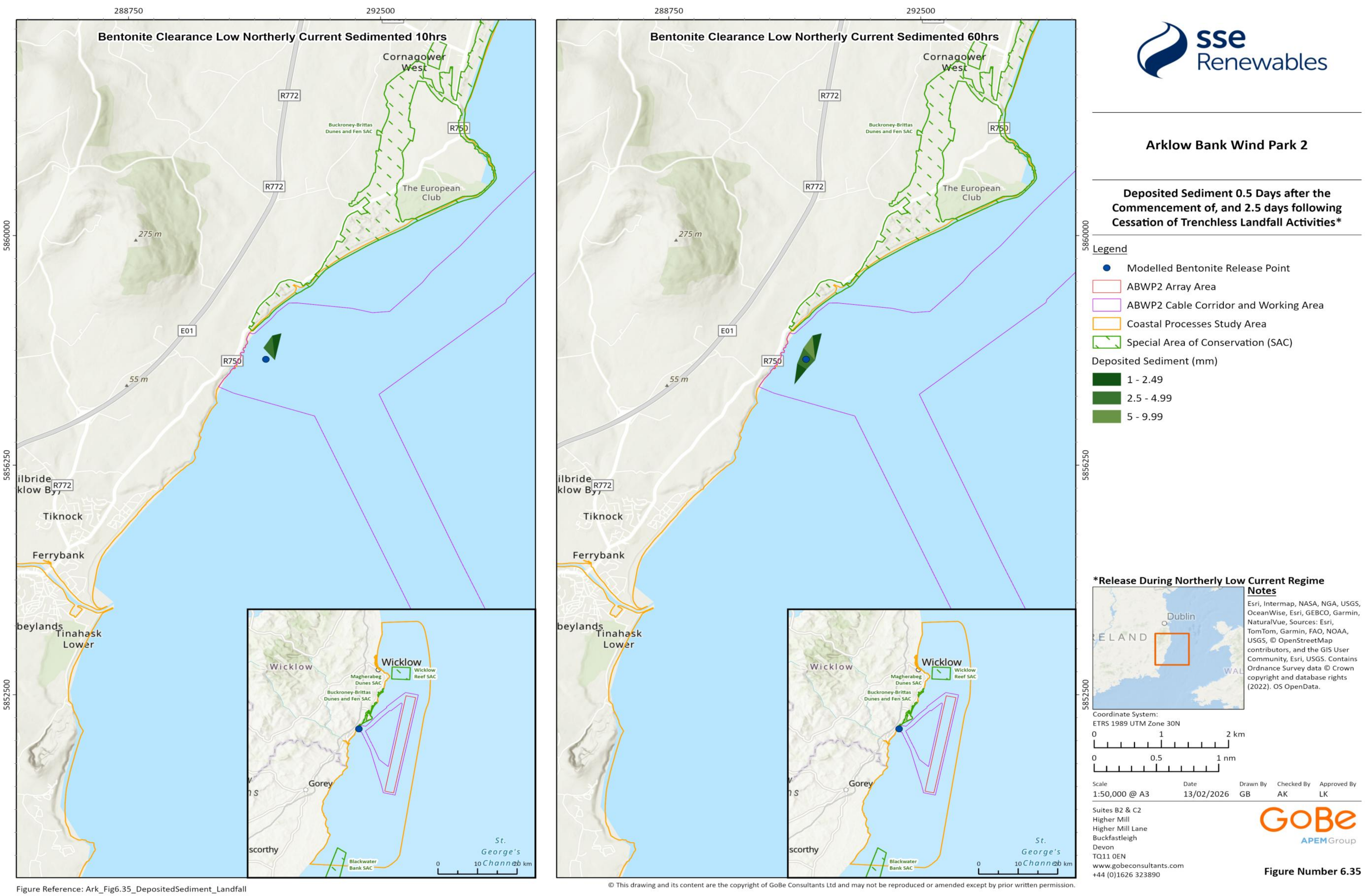

Figure 6.35: Deposited sediment 0.5 days after the commencement of, and 2.5 days following cessation of trenchless Landfall activities. Release during northerly low current regime

Operational and maintenance phase

6.10.1.75 Whilst activities associated with the Proposed Development during the operational and maintenance phase will result in seabed sediment disturbance into the water column, primarily through (i) cable protection and re-burial works; and (ii) operational maintenance dredging, if required, the volumes disturbed are much less than those disturbed during the construction phase. Both these activities can be considered intermittent throughout this phase of the Proposed Development's lifetime. The removal of any accumulated sediment along the inter-array and export cables route is not expected to impact the seabed morphology for the reasons discussed in paragraph 6.10.1.24 *et seq*. As the magnitude of effect during the construction phase for all activities has been assessed as **Low***,* the magnitude of effect arising as a result of 'increased suspended sediment concentrations and associated deposition' during the operational and maintenance phase are considered to be **Negligible.**

Decommissioning phase

6.10.1.76 Activities associated with the Proposed Development during the decommissioning phase will result in seabed sediment disturbance into the water column, the volumes of which are considered to be equal to, or less than, those disturbed during the construction phase. Given that the magnitude of effect during the construction phase has been assessed as **Low**, the magnitude of effect arising as a result of 'increased suspended sediment concentrations and associated deposition' during the decommissioning phase is also considered to be **Low.**

6.10.2 Impact 2 – Presence of infrastructure may lead to changes to tidal currents, wave climate, sediment transport and seabed morphology

6.10.2.1 The presence of offshore infrastructure will have the potential to result in a localised blockage of waves and tides, which could lead to changes to seabed and coastal morphology. This blockage will commence when offshore construction begins, increasing incrementally until the array is installed in its entirety, which is outlined in Table 6.11 and corresponds to an array for Design Option 1 which comprises 53 WTG foundations, 100% of which are monopiles (with a maximum pile diameter of 11 m) and two OSP structures, both of which are monopiles (with a maximum pile diameter of 14 m).

6.10.2.2 The evidence base has been used to assess the potential impacts of these activities upon Coastal Processes using, where available, monitoring results from comparable activities in similar environmental conditions (and as presented in the following assessment). This has been supplemented by a suite of project specific numerical modelling simulations developed in response to RFIs (Volume III, Appendix 6.3: Arklow Bank – Quantitative Assessment of the Influence of In-place Infrastructure on the Local Sediment Transport System (RFI March 2026)). Infrastructure associated with Project Design Option 1, including foundations, scour protection, and dredging and dumping areas, have been integrated into a morphodynamic model in order to compare predicted changes to hydrodynamics, waves, sediment transport and seabed morphology associated with the Proposed Development to the modelled baseline scenario. Details of the morphodynamic numerical model and baseline simulations are provided in Volume III, Appendix 6.2: Arklow Bank Sediment Mobility Assessment (RFI March 2026), with details of the methodology applied to assess the potential changes to the hydrodynamic regime, alongside further details of the results, presented in Volume III, Appendix 6.3: Arklow Bank – Quantitative Assessment of the Influence of In-place Infrastructure on the Local Sediment Transport System (RFI March 2026). The findings are presented in the following sections.

SENSITIVITY OF THE RECEPTOR

6.10.2.3 The following receptors have been considered in the assessment of modifications to the wave and tidal regime and associated potential impacts on morphology:

- Offshore sandbanks – Arklow Bank, Seven Fathom Bank, and Glassgorman Banks;
- Important bathymetric features – Wicklow Trough;
- Sites designated for physical features – Wicklow Reef SAC; and
- Coastal receptors below the HWM.

OFFSHORE SANDBANKS

6.10.2.4 Detail regarding the seabed sediments, bedforms, sediment transport and morphology of the Arklow, Seven Fathom, and Glassgorman Banks is provided in Section 6.6 of this EIAR Chapter.

6.10.2.5 Arklow Bank, an Open Shelf Linear Bank, is maintained '*in dynamic equilibrium by the perpetual tidal processes, episodic wave processes*[25]*, atmospheric (i.e. surge related) and Coriolis effects. These processes interact spatially (i.e. varying across the bank and with depth), and temporally (varying on timescales from a single tide through to decadal changes). The non-linear and complex processes that drives the evolution of such dynamic systems are typically characterized by multiple response pathways and subsequent system states*' (Partrac, 2022).

6.10.2.6 Seven Fathom Bank can be considered to be a satellite bank to Arklow Bank. Whilst there is limited information available, Partrac (2022) concluded that '*it is reasonable to postulate that due to its relative location, shape, profile and orientation, analogous processes to that which occur across Arklow Bank, occur across Seven Fathom Bank'*. The sheltering effect of Arklow Bank to Seven Fathom Bank would suggest that the wave regime has limited influence upon the latter feature.

6.10.2.7 The Glassgorman Banks are located approximately 10 km west of the southern portion of Arklow Bank, closer to the coast. These banks are considered to provide a significant sediment source to Arklow Bank (Creane *et al.*, 2023b; Delatares, 2025).

6.10.2.8 Both the tide and wave regimes have been shown to impart control upon sediment transport over the sandbank, with the latter's influence rarely occurring in greater depths and during the high-frequency, low-energy events. Justification of the sensitivity of the Offshore sandbanks, to changes in the tidal and wave regimes, according to the definitions provided in Table 6.14, are presented in Table 6.31.

Table 6.31: Determination of sensitivity to Impact 2 for the Coastal Processes receptor: sandbanks

Descriptor	Justification
Adaptability	The receptor cannot avoid or adapt to an impact: the sandbanks 'form and function' are dependant upon energetic tidal flows and episodic wave events (in addition to atmospheric and Coriolis effects).
Tolerance	The environment has moderate to low capacity to accommodate the proposed form of change: the tidal regime has been shown to be the dominant control upon the sandbanks 'form and function'. As such, it is considered that this feature has a higher capacity to accommodate changes in other forcing controls, such as the wave regime.
Recoverability	The effect on the receptor is anticipated to be medium-term (i.e. over the Proposed Developments' operational and maintenance period): impacts of the Proposed Development upon the tide and wave regimes are only anticipated whilst the array (WTG and OSP) is installed.

[25] the influence of waves is limited to a short duration and only to the shallowest regions of Arklow Bank (Partrac, 2022)

Descriptor	Justification
Value	The receptor is not designated but of local level importance: the sandbanks are a local seabed feature which contribute to the physical processes of the local area.
Overall Sensitivity	The potential sensitivity of the coastal process receptors is rated as **Medium**.

IMPORTANT BATHYMETRIC FEATURES

6.10.2.9 Detail regarding the Wicklow Trough is presented in Section 6.6 of this EIAR Chapter. The Wicklow Trough is a seabed depression hypothesised to constrain the position of the north of Arklow Bank and provide the primary sediment source to the bank (Partrac, 2022). It is a tunnel valley formed as a result of glacial retreat (Coughlan *et al.*, 2020) and therefore is relatively insensitive to changes to ambient hydrodynamic and wave processes. Justification of the sensitivity of the Wicklow Trough, to changes in the tidal and wave regimes, according to the definitions provided in Table 6.14, are presented in Table 6.32.

Table 6.32 Determination of sensitivity to Impact 2 for the Coastal Processes receptor: Wicklow Trough

Descriptor	Justification
Adaptability	The receptor has capacity to avoid or adapt to an impact: the Wicklow Trough's 'form and function' are dependent upon existing bathymetry.
Tolerance	The environment has high capacity to accommodate the proposed form of change: the Wicklow Trough is a relict (glacial) feature, rather than the result of contemporary seabed processes.
Recoverability	The effect on the receptor is anticipated to be medium-term (i.e. over the Proposed Developments' operational and maintenance period): impacts of the Proposed Development upon the tide and wave regimes are only anticipated whilst the array (WTG and OSP) is installed.
Value	The receptor is not designated but of local level importance: the Wicklow Trough is a local seabed feature which contributes to the physical processes of the local area.
Overall Sensitivity	The potential sensitivity of the coastal process receptors is rated as **Low**.

SITES DESIGNATED FOR PHYSICAL FEATURES

6.10.2.10 Wicklow Reef SAC (Figure 6.3) is designated for the marine Annex I qualifying interest of Reefs with the habitat: current-swept subtidal reef. For further information on the benthic habitats/ communities supported by Wicklow Reef SAC, please refer to Chapter 9: Benthic Subtidal and Intertidal Ecology. The form and function of this designated site is dependent upon high current flows and as such this feature has a high capacity to accommodate changes in the wave regime. Justification of the sensitivity of the Offshore sandbanks, to changes in the tidal and wave regimes, according to the definitions provided in Table 6.14, are presented in Table 6.33.

6.10.2.11 Magherabeg Dunes and Buckroney-Brittas Dunes and Fen SACs (Figure 6.2) has been previously discussed in paragraphs 6.10.1.2 *et seq*. A consideration of sensitivity to changes in the tidal and wave regimes, according to the definitions provided in Table 6.14, is presented in Table 6.34.

Table 6.33: Determination of sensitivity to Impact 2 for the Coastal Processes receptor: marine designated site: Wicklow Reef SAC

Descriptor	Justification
Adaptability	The receptor cannot avoid or adapt to an impact: the qualifying features of Wicklow Reef SAC are dependent upon energetic tidal flows
Tolerance	The environment has moderate to low capacity to accommodate the proposed form of change: the tidal regime has been shown to be the dominant control upon the qualifying features of Wicklow Reef SAC. As such, it is considered that this feature has a high capacity to accommodate changes in other forcing controls, such as the wave regime.
Recoverability	The effect on the receptor is anticipated to be medium-term (i.e. over the Proposed Developments' operational and maintenance period): impacts of the Proposed Development upon the tide and wave regimes are only anticipated whilst the array (WTG and OSP) is installed.
Value	The receptor is designated for international importance and/or very high socio-economic value: Wicklow Reef is designated as an Annex 1 habitat.
Overall Sensitivity	The potential sensitivity of the predicted changes is rated as **Medium**.

Table 6.34: Determination of sensitivity to Impact 2 for the Coastal Processes receptor: terrestrial designated sites: Magherabeg Dunes and Buckroney-Brittas Dunes and Fen SACs

Descriptor	Justification
Adaptability	The receptor has capacity to avoid or adapt to an impact: the qualifying features of the SAC are dependant upon cycles of accretion and erosion.
Tolerance	The environment has moderate to low capacity to accommodate the proposed form of change: the tidal regime has been shown to flow parallel to the coast and thus any changes are unlikely to influence the immediate shoreline. The shingle beach has been shown to be under the influence of storm events and therefore any changes to these events which occur along the shoreline may impact the supply of this sediment to the SAC.
Recoverability	The effect on the receptor is anticipated to be medium-term (i.e. over the Proposed Developments' operational and maintenance period): impacts of the Proposed Development upon the tide and wave regimes are only anticipated whilst the array (WTG and OSP) is installed.
Value	The receptor is designated for international importance and/or very high socio-economic value: Magherabeg Dunes and Buckroney-Brittas Dunes and Fen are designated as an SAC.
Overall Sensitivity	The potential sensitivity of the predicted changes is rated as **Low**.

COASTAL RECEPTORS BELOW HWM

6.10.2.12 Coastal receptors are under the influence of waves and tides and therefore may be impacted by changes to the wave and tidal regime. Justification of the sensitivity of the coast, to changes in the tidal and wave regimes, according to the definitions provided in Table 6.14, are presented in Table 6.35.

Table 6.35 : Determination of sensitivity to Impact 2 for the Coastal Processes receptor: coastal receptors below the High Water Mark

Descriptor	Justification
Adaptability	The receptor has capacity to avoid or adapt to an impact: the presence of the installed monopiles will likely create a local blockage to wave energy moving through the array, with localised reduction and increases in the tidal flow around the monopiles. A reduction in wave energy at the coastline will reduce its erosive tendencies.
Tolerance	The environment has moderate to low capacity to accommodate the proposed form of change: the coast is currently experiencing erosion and any increase in wave energy which may reach the receptor has the potential to exacerbate this process.
Recoverability	The effect on the receptor is anticipated to be medium-term (i.e. over the Proposed Development operational and maintenance period): impacts of the Proposed Development upon the tide and wave regimes are only anticipated whilst the array is installed.
Value	The receptor is not designated, but of county level importance and low socio-economic value: the coast has residential and business value.
Overall Sensitivity	The potential magnitude of the predicted changes is rated as **Medium**.

CONCEPTUAL UNDERSTANDING OF CHANGE

ARRAY INFRASTRUCTURE: TIDE REGIME

6.10.2.13 The interaction between the tidal regime and the foundations of the wind farm infrastructure will result in a general reduction in current speed and an increase in levels of turbulence in a narrow, localised wake due to frictional drag effects. Incident flows will be decelerated immediately upstream and downstream of each foundation, with separation around the structure resulting in localised acceleration and the creation of vortices. Within the extent of the Array Area, the effect on tidal currents will be evident as a series of narrow and discrete wake features extending downstream along the tidal axis from each foundation. For smaller structures such as the wind farm foundations, the wake signature is expected to naturally dissipate within a distance in the order of ten to twenty obstacle diameters downstream (Li *et al.*, 2014; Cazaneve *et al.*, 2016; Rogan *et al.*, 2016).

6.10.2.14 Numerical modelling has been undertaken to quantify change in hydrodynamic flows attributable to the Proposed Development, with details of the model methods and results presented in Volume III, Appendix 6.2: Arklow Bank Sediment Mobility Assessment (RFI March 2026) and Volume III, Appendix 6.3: Arklow Bank – Quantitative Assessment of the Influence of In-place Infrastructure on the Local Sediment Transport System (RFI March 2026). The tidal conditions modelled represent southward (ebb-tide) and northward (flood-tide) flow over the model duration.

6.10.2.15 Changes in the tidal flow characteristics are predicted to be small in absolute and relative terms, with <±0.05 m/s change in current velocity relative to baseline conditions. The change in hydrodynamics are shown in current speeds for both scenarios modelled are shown in Figure 6.36, with the left panel showing the velocity magnitude and direction in the presence of the Proposed Development, and the right panel displaying the difference in velocity magnitude between the baseline and infrastructure scenario. The largest changes in speed are predicted within the Array Area and immediately downstream of the foundations, with the reduction in flow limited to less than 5% change from baseline conditions. Reductions less than 0.05 m/s form wakes up to approximately 2 km out with and downstream of the Array Area for northward (flood) tidal conditions only. This is anticipated to be in response to the elevated current speeds which flow between Wicklow Trough and Arklow Bank. In several locations mainly along the sandbank's eastern flank (shown (paragraph 6.6.1.31 *et seq.*) to be a net sediment loss) the wakes are shown to overlap due to the highly rectilinear nature of the tides (Figure 6.5). The result is that these modifications to the tidal regime predominately occur parallel to and along the flanks of Arklow Bank, with no observable resultant change in tidal direction simulated.

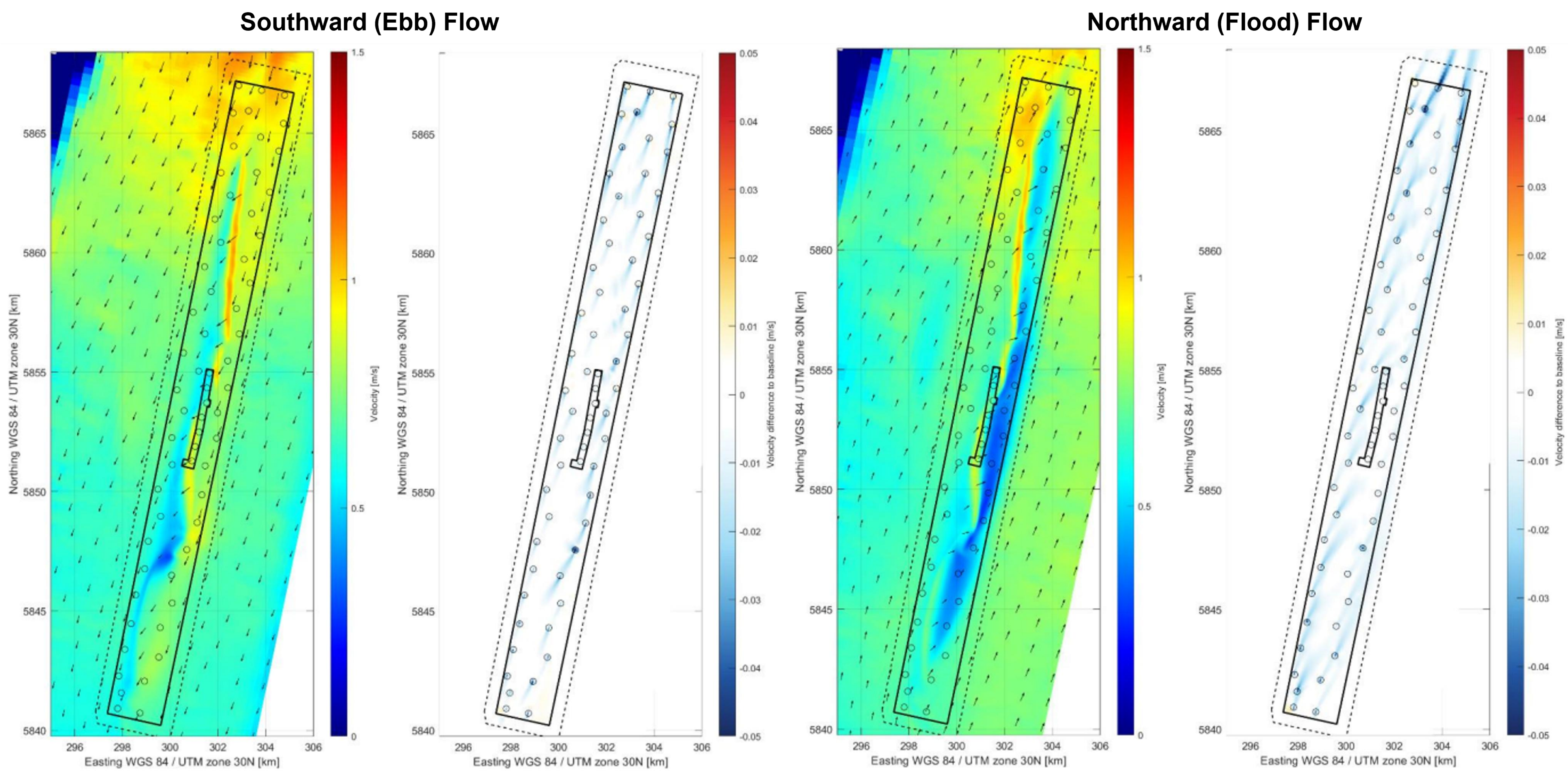

Figure 6.36: Map of current velocity magnitude and direction (left) and change in velocity to baseline (right) for two different tidal conditions: Project Design Option 1

ARRAY INFRASTRUCTURE: WAVE REGIME

6.10.2.16 The presence of the foundations in the sea also has the potential to modify the wave and wind wave regime passing through an OWF. The primary effects on waves (as identified by Christensen *et al*., 2013) are caused by:

- Drag forces against passing waves in contact with the foundation;
- Reflection (and scattering) of wave energy off the face of the foundation; and
- Diffraction of wave energy around the structure.

6.10.2.17 The interaction between waves and the wind farm infrastructure may result in a reduction in wave energy locally around foundations. Where the wave climate is important to local processes and is persistently modified, these changes may potentially alter the frequency of pattern of sediment transport, and therefore seabed morphology, in affected offshore areas. Further the rate and direction of littoral transport may be altered, potentially causing depositional/ accretional changes to coastal morphology on those coastlines reliant upon the sediment supply.

6.10.2.18 There is a strong evidence base which demonstrates that the changes to the wave regime due to the presence of foundation structures, even under a worst case of the largest surface area of structures in the water column, are both relatively small and relatively localised in spatial extent. Typically, the foundation type with the largest surface area in the water column are gravity base foundations which are not included with the project design of the Proposed Development (Volume II, Chapter 4: Description of Development (Revised March 2026)). This is supported by a review of modelling studies from circa 30 wind farms within the UK and European waters (Seagreen, 2012), existing guidance documents (ETSU 2000; ETSU 2002; COWRIE 2009), published research (Ohl *et al*., 2001) and post-installation monitoring (Cefas, 2006).

6.10.2.19 The degree to which an individual wave will interact with an obstacle of finite width depends on the ratio of the obstacle width and the wavelength. A wave that is long in comparison to the width of the obstacle will experience relatively little resistance other than some surface friction as the water within the wave moves against the foundation surface; in this case, energy loss is minimal and the wave will experience little to no change to its height, period or direction. A wave that is short in comparison to the width of the obstacle is more likely to result in the wave breaking or being reflected from the foundation, resulting in partial to total wave energy blockage within the cross-sectional width of the obstacle. However, such short waves are typically created continuously and by local winds consequentially any local energy loss will be quickly dispersed and replenished.

6.10.2.20 Wave modelling was carried out during an energetic wave event, with results shown in Figure 6.37, with the left panel displaying significant wave height and direction in the presence of the Proposed Development, and the right panel displaying the difference in wave height between the baseline and infrastructure scenarios. The results show that each foundation (as well as scour protection) presents an obstacle to the passage of waves locally, causing a localised changes in wave height of around 1% as they pass (Figure 6.37). This causes a wave shadow effect to be created by each foundation. Of note is that the wave blockage modelling includes AWBP1 as a precautionary measure in case of any delay in its decommissioning. As such, the removal of AWBP1 will act to reduce any blockage effects.

6.10.2.21 The results indicate a slight reduction in wave conditions, up to ±0.05 m in significant wave height (H_{m0}) immediately adjacent to the individual structures. Changes to significant wave heights are generally located within the Array Area with the exception of the northwest, where change of between approximately 0 m to -0.02 m can be identified extending several kilometres from the Array Area. These effects are a combined influence of the WTG foundations, the changes in wind speed from the WTGs, and seabed interventions (mainly the scour protection).

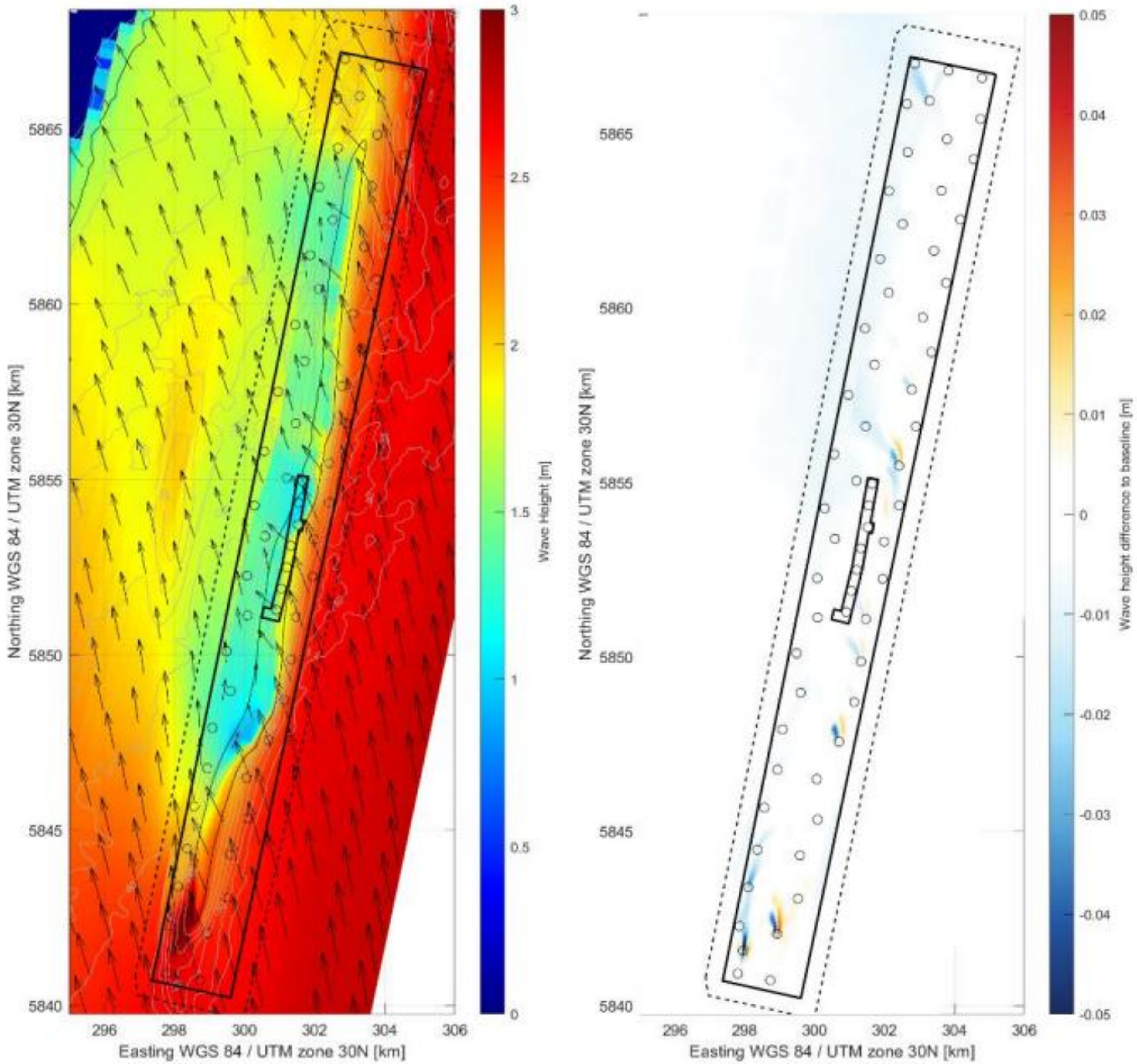

Figure 6.37: Map of significant wave height and direction (left) and change in wave heights to baseline (right) during an energetic wave event (RP100): Project Design Option 1

CABLE PROTECTION MEASURES

6.10.2.22 All offshore cables will be buried as far as is practicable. However, where it is not possible to bury cables to an adequate depth it will be necessary to install cable protection to prevent scour and minimise the risk of cable exposure. Details of the proposed cable protection for the inter-connector, inter-array and export cables are provided in Table 6.11 and Table 6.12.

6.10.2.23 The implementation of rock berms (which is considered to represent the greatest seabed alteration from the Project Design Options) will result in a change in the seabed profile of up to 1.5 m for the inter-array and export cables, and 1.8 m for the inter-connector cables. There is also likely to be a change in substrate type, dependent upon the protection method implemented, with potential effects that could last over the operations period. The presence of cable protection measures may also have the potential to cause a direct (albeit highly localised) blockage of bedload sediment transport processes. Based on the seabed environment outlined in Section 6.6, the installation of rock berms in mobile, sandy sediments is considered to represent the most precautionary impact upon Coastal Processes.

6.10.2.24 In areas of sand, active sediment transport processes are indicated by the presence of mobile bedforms such as sandwaves and megaripples, as shown in Figure 6.12. Here, the installation of rock berms will result in a change to the sediment substrate. However, following installation an initial period of sediment accumulation would be expected to occur, creating a smooth slope against the cable protection. Once any void spaces have been infilled, saltation is expected to be largely unaffected by the presence of the cable protection such that existing transport process (including bedform migration) will remain unaffected.

PRESENCE OF MAINTENANCE VESSELS

6.10.2.25 The presence of jack-up vessels and associated anchors during the operations phase may result in changes to seabed morphology due to depressions left by jack-up vessels and associated anchors.

6.10.2.26 As the jack-up leg (of an area of 300 m^2 per leg) is inserted (between 0 m and 20 m depending on the soil's geotechnical properties at the exact point of penetration), seabed sediments would primarily be compressed vertically downwards and displaced laterally which may result in the seabed around the inserted leg to be raised in a series of concentric pressure ridges. Whilst the leg will have a maximum penetration depth, in reality it is unlikely that this depth will be reached. As the leg is retracted, some sediment would return to the hole via mass slumping under gravity until a stable slope angle is achieved. Over longer timescales, the hole is likely to become shallower and less distinct due to infilling from mobile seabed sediments, although the seabed response is dependent on the actual leg dimensions and the local soils' geotechnical properties. Post-construction monitoring from the Moray East Offshore Wind Farm, which is located in a more benign hydrodynamic regime and thus lesser mobile sediment environment with a smaller potential for sediment infilling, indicates that whilst the deepest leg penetration was 13 m, the depression remaining after natural backfill was 5.4 m (Royal HaskoningDHV, 2020).

6.10.2.27 A maximum of 14 jack-up vessels per annum will be onsite; it is noted that the maximum number of vessels on site at any one time will less than this and likely to be less than two.

6.10.2.28 Depressions in clay-type soils are likely to persist for longer periods than mobile sands (the latter being present at the Proposed Development), in the order of months to years, as evidenced by post-construction scour monitoring undertaken at several Round 1 and Round 2 wind farm sites (TKOWFL, 2015). Monitoring at the Barrow OWF showed spud-can depressions were almost entirely infilled, approximately, one year after construction (BOWind, 2008). Indentations with depths between 0.5 m and 2.0 m were identified at the Kentish Flats OWF, which is characterised by variable thicknesses of coarse sand underlain by soft to firm clays. After approximately three years, these depressions had infilled by an average of 0.6 m (ABPmer *et al.*, 2010).

6.10.2.29 Whilst jack-up footprint depressions would likely persist after jack-up operations have been completed, it is likely that these would infill over time through natural seabed mobility particularly given the highly active regime upon Arklow Bank (Partrac, 2022).

6.10.2.30 Once depressions have been infilled, sediment transport will continue unimpeded. Vessel footprints (300 m^2) will be of a much smaller scale than the processes governing the overall evolution of the sediment transport system (hydrodynamic regime, water depth and sediment availability (array-scale to regional-scale; months to years)) and they are therefore expected to recover through natural processes. Therefore, it is not anticipated that jack-up vessel footprints will have implications for the morphological or sediment regimes.

MAGNITUDE OF THE IMPACT

6.10.2.31 Changes in the tidal regime may indirectly impact seabed morphology in a number of ways. In particular, there is a close relationship between flow speed and bedform type (Belderson *et al.*, 1982) and therefore any changes to flows have the potential to alter seabed morphology over the lifetime of the Proposed Development. In the immediate near-field, there may be localised reductions in current speed leading to localised reductions in seabed mobility. However, although this change is noticeable, it is restricted in both spatial and temporal extent, with localised variation throughout the tidal cycle. On this basis, the magnitude of impact to the tidal regime, from the presence of the proposed infrastructure, is assessed in Table 6.36. These magnitudes align with the justifications provided in Table 6.15 and are in accordance with EPA (2022).

6.10.2.32 Evidence from the Scroby Sands OWF, also installed on a sandbank, demonstrates that the overall sandbank form has not changed since the construction of the offshore wind farm, and that natural change dominates. Detailed survey results show no change in overall elevation or morphology across the bank, with no evidence for direct interaction between the installed monopile foundations and sandwave features (Cefas, 2006). This outcome is considered to be indicative of similar sandbank locations with high sediment mobility, such as on Arklow Bank (DECC, 2008). Furthermore, surveys suggest that no major change to the form of Arklow Bank can be identified since the installation of ABWP1 (Partrac, 2022). This evidence demonstrates that potential reductions in flow speed, although they may have localised effects on sediment mobility, are not of sufficient scale to impact on the wider hydrodynamic and sedimentary processes governing the structure of Arklow Bank.

6.10.2.33 Similarly, any changes in the wave regime may contribute to changes in seabed morphology due to alteration of sediment transport patterns. Within the Coastal Processes Study Area, sediment transport is dominated by the action of tidal currents, with wave-driven sediment transport only becoming important to shallow coastal waters, distant to the Array Area (Partrac, 2022). As shown in Figure 6.36 to Figure 6.38, any change to the wave climate dissipates far from the coast, and therefore there is no pathway of effect on the nearshore wave climate. This also limits any potential for impact on coastal erosion or processes. Any impacts on the wave regime will not result in any discernible change to morphology. On this basis, the magnitude of impact to the wave regime, from the presence of the proposed infrastructure, is assessed in Table 6.37. These magnitudes align with the justifications provided in Table 6.15 and are in accordance with EPA (2022).

6.10.2.34 These conclusions are supported by the evidence provided in Volume III, Appendix 6.3: Arklow Bank – Quantitative Assessment of the Influence of In-place Infrastructure on the Local Sediment Transport System (RFI March 2026), which presents the results of morphodynamic modelling that assesses the impacts of the Proposed Development on sediment transport and seabed dynamics. Morphodynamic model simulations have been conducted for the baseline (do nothing) and infrastructure scenarios, with comparisons made in terms of computed volumetric changes,

changes in bed slopes, in sediment transport and pathways, and bed level changes (i.e. erosion/sedimentation). Over a 20-year simulation period (2024 to 2044), the model shows that large-scale morphodynamic behaviour of Arklow Bank is preserved. The bank continues to exhibit the same alternating eastward and westward migration zones that are observed in the baseline simulation, with comparisons indicating that net erosion and sedimentation volumes are effectively unchanged between the simulations. During an extreme event (100-year return period) scenario, the Proposed Development has no significant effect on morphodynamics and sediment transport.

6.10.2.35 The presence of Proposed Development infrastructure is shown to result in mainly localised changes of below, approximately, ±2 m, particularly near foundations and disposal sites, where bed levels are increased (Figure 6.38). These changes tend to extend longitudinally from the foundations (i.e. aligned with the main flow and sediment transport directions) and therefore overlap the deeper parts of the flanks. Changes in the shallower areas near to the bank crest are typically of lower extent, with crest elevation maintained relative to the baseline (do nothing) condition. Volumetric comparison of simulated morphology changes demonstrates that the change in erosion and sedimentation resulting from the presence of the Proposed Development is small, within a few percent of overall changes occurring during baseline conditions.

6.10.2.36 Differences between the baseline and Proposed Development simulations in terms of sediment transport (as shown in Figure 6.2) are primarily confined to areas close to the monopiles, with localised decreases in transport of around 10%, which can be mainly attributed to locally reduced flow velocity magnitudes (as shown in Figure 6.36). Transport directions are shown to change slightly at certain points along the crest of the bank, although the results of the baseline and Proposed Development scenarios are broadly similar. These changes do not significantly affect the balance between in- and outflux of sediment from the bank, which would undermine its longer-term morphological stability and behaviour.

6.10.2.37 Overall, the modelled sediment pathways demonstrate that the relative effects of the Proposed Development are limited to areas within or immediately adjacent to the bank, with pathways generally equivalent outside of this. This demonstrates that the effects of the Proposed Development on the sediment transport forcing (i.e. hydrodynamics and waves) and sediment availability do not extend to the entirety of the morphodynamic system represented within the numerical model area. The effects of Proposed Development are therefore not anticipated to extend to the regional or larger-scale sediment transport pathways in the south-western Irish sea. Similarly, morphological and sediment transport changes at Arklow Bank are not of sufficient scale to affect the morphological behaviour of receptors within the wider morphological system, including the Seven Fathom and Glassgorman Banks.

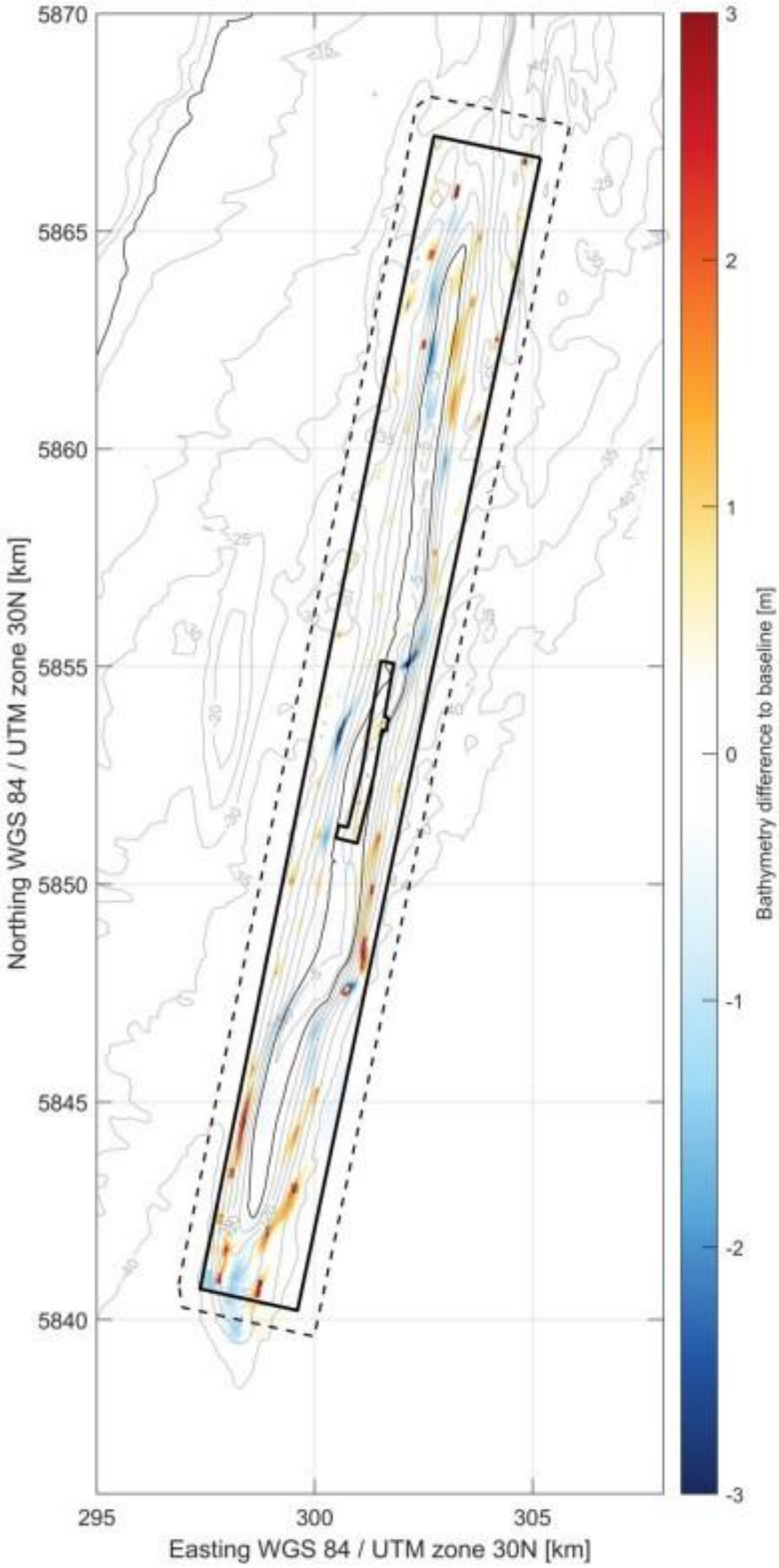

Figure 6.38: Difference between modelled cumulative erosion/sedimentation within the Coastal Processes Study Area during the baseline (do-nothing) scenario and with Project Design Option 1, as shown in Volume III, Appendix 6.3: Arklow Bank – Quantitative Assessment of the Influence of In-place Infrastructure on the Local Sediment Transport System (RFI March 2026)

6.10.2.38 Furthermore, the model results show equivalent crest elevations of Arklow Bank both with and without the presence of infrastructure. These results therefore show that there will be a negligible impact on the wave blocking function provided by the bank, acting to shelter the adjacent coastline. Potential wind wake effects from the WTGs are small in magnitude (typically less than 0.3 m/s) and only reach the coast under specific wind conditions (easterly winds). Given the infrequency of such conditions and the distance to shore, the impact of the Proposed Development on coastal wind regimes is considered marginal. These results demonstrate that potential impacts to the coast through changes to the hydrodynamic and wave regime from the presence of the Proposed Development will be negligible.

Table 6.36 : Determination of magnitude for changes to tidal currents due to the presence of the infrastructure

Descriptor	Justification
Extent	The predicted changes will be localised to within the Array Area and adjacent to its boundary. No changes are anticipated to occur at the coast or designated sites. There is therefore no pathway of effect on designated sites or coastal receptors.
Duration	The predicted changes will occur throughout the project's operations phase and as such can be classified as long-lasting.
Frequency	The predicted changes will occur on every tide throughout the project's operations phase.
Probability	The predicted changes can be reasonably expected to occur.
Consequence	Changes which are not discernible outwith background variations of key characteristics or features of the particular environmental aspect's character or distinctiveness.
Overall Magnitude	The potential magnitude of the predicted changes to the tidal regime at the identified coastal process receptors is rated as: Offshore sandbanks: **Low** Sites designated for physical features: **Negligible** Coastal receptors below HWM: **Negligible**

Table 6.37: Determination of magnitude for changes to the wave regime due to the presence of the infrastructure

Descriptor	Justification
Extent	The predicted changes will be localised to within the Array Area and adjacent to its boundary. No changes are anticipated to occur at the coast or designated sites. There is therefore no pathway of effect on designated sites or coastal receptors.
Duration	The predicted changes will occur throughout the project's operations phase and as such can be classified as long-lasting.
Frequency	The predicted changes will occur on every tide throughout the project's operations phase.
Probability	The predicted changes can be reasonably expected to occur.
Consequence	Changes which are not discernible outwith background variations of key characteristics or features of the particular environmental aspect's character or distinctiveness.

Descriptor	Justification
Overall Magnitude	The potential magnitude of the predicted changes to the wave regime at the identified coastal process receptors is rated as: Offshore sandbanks: **Low** Sites designated for physical features: **Negligible** Coastal receptors below HWM: **Negligible**

SIGNIFICANCE OF THE EFFECT

6.10.2.39 A discussion of the significance of the effect upon the Coastal Processes receptors sensitive to the Impact 2 is provided in the following sections below.

OFFSHORE SANDBANKS

6.10.2.40 The sensitivity of Arklow Bank, Seven Fathom Bank, and Glassgorman Bank has been assessed as **Medium**. The magnitude of Impact 2 has been assessed as **Low**. Consequently, and in accordance with the matrix provided in, the significance of Impact 2 upon the offshore sandbanks is concluded to be **Slight.**

IMPORTANT BATHYMETRIC FEATURES

6.10.2.41 The sensitivity of the Wicklow Trough has been assessed as **Low**. The magnitude of Impact 2 has been assessed as **Low**. Consequently, and in accordance with the matrix provided in Table 6.16 the significance of Impact 2 upon the important bathymetric features is concluded to be Slight.

SITES DESIGNATED FOR PHYSICAL FEATURES

6.10.2.42 The sensitivity of Wicklow Reef SAC has been assessed as **Medium**. The magnitude of Impact 2 has been assessed as **Negligible**. Consequently, and in accordance with the matrix provided in, the significance of Impact 2 upon the Wicklow Reef SAC is concluded to be **Not Significant.**

6.10.2.43 The sensitivity of Magherabeg Dunes and Buckroney-Brittas Dunes and Fen SACs has been assessed as **Low**. The magnitude of Impact 2 has been assessed as **Negligible**. Consequently, and in accordance with the matrix provided in, the significance of Impact 2 upon the the Magherabeg Dunes and Buckroney-Brittas Dunes and Fen SACs is concluded to be **Not Significant.**

COASTAL RECEPTORS BELOW MHW

6.10.2.44 The sensitivity of coastal receptors below Mean High Water (MHW) has been assessed as **Medium**. The magnitude of Impact 2 has been assessed as **Negligible**. Consequently, and in accordance with the matrix provided in Table 6.16, the significance of Impact 2 upon the coastal receptors below MHW is concluded to be **Not Significant.**

PROPOSED MITIGATION

6.10.2.45 As there are no significant effects identified, it is considered that additional (non-embedded mitigation) measures are not required.

RESIDUAL EFFECT ASSESSMENT

6.10.2.46 There are no additional (non-embedded mitigation) measures proposed and as such a residual effect assessment has not been undertaken.

6.11 Assessment of Project Design Option 2

6.11.1 Impact 1 – Increased suspended sediment concentrations and associated deposition

6.11.1.1 The assessment of Project Design Option 1 is applicable for Project Design Option 2 for a consideration of Impact 1; the methodologies for installation (seabed preparation; cable installation) for the two Project Design Options are the same and the results presented are representative of both Project Design Options. Therefore, for a consideration of Impact 1 for Project Design Option 2, the reader is referred to Section 6.10.1.

6.11.2 Impact 2 – Presence of infrastructure may lead to changes to tidal currents, wave climate, sediment transport and seabed morphology

6.11.2.1 The assessment of Project Design Option 1 is applicable for Project Design Option 2 for a consideration of Impact 2. As outlined in paragraph 6.6.5.6, the differences between the design options are not considered sufficient to alter the overall significance of the results for Impact 2. Furthermore, the greater number of structures present in Project Design Option 1 means that there is greater potential for wave and hydrodynamic blockage. The results presented are therefore representative (although precautionary) for both Project Design Options. Therefore, for a consideration of Impact 2 for Project Design Option 2, the reader is referred to Section 6.10.2.

6.12 Cumulative impacts assessment methodology

6.12.1 Methodology

6.12.1.1 The Cumulative Impact Assessment (CIA) takes into account the impacts associated with the Proposed Development together with other proposed and reasonably foreseeable projects, plans and existing and permitted projects. The projects and plans selected as relevant to the CIA presented within this chapter are based upon the results of a screening exercise (see Volume III, Appendix 3.2: Cumulative Impact Assessment Screening (Revised March 2026)). Each project and plan has been considered on a case-by-case basis for screening in or out of this chapter's assessment based upon the source-impact-receptor model and the spatial/temporal scales involved.

6.12.1.2 A tiered approach is adopted to provide an assessment of the Proposed Development as a whole. The tiering methodology is provided in Volume III, Appendix 3.2: Cumulative Impact Assessment Screening (Revised March 2026).

6.12.1.3 The specific projects scoped into this cumulative impact assessment, and the tiers into which they have been allocated are presented in Table 6.38. The operational projects included within the table are included due to their completion/ commission subsequent to the data collection process for the Proposed Development and as such not included within the baseline characterisation. Other elements of the overall project are also assessed in this section, namely the Onshore Grid Infrastructure (OGI), Operational and Maintenance Facility (OMF) and EirGrid Upgrade Works.

6.12.1.4 Due to the commitments made by the Developer in respect of the Foreshore Licence FS007339 and Foreshore Licence Application FS007555 (Table 6.17) FS007339 and FS007555 have been screened out of the cumulative impact assessment.

6.12.1.5 In accordance with the UK guidance on cumulative effects assessment for Nationally Significant Infrastructure Projects (Planning Inspectorate, 2024), a reasonable precautionary approach has been applied to address uncertainty regarding the future status of ABWP1. This includes the assumption of a potential temporal overlap of decommissioning activities with the Proposed Development where appropriate.

6.12.1.6 In this scenario, ABWP1 is assumed to be in the process of decommissioning at the same time as construction of the Proposed Development. While this may result in a degree of overlap and potential double counting of effects, it reflects a precautionary approach given the uncertainty surrounding the timing of decommissioning activities. This scenario is precautionary and ensures that all reasonably foreseeable circumstances are addressed and that the assessment captures all potential cumulative effects.

Table 6.38: List of other projects and plans considered within the cumulative impact assessment

Project/Plan	Status	Distance from Array Area (km)	Distance from Cable Corridor and Working Area (km)	Description of Project/Plan	Dates of Construction	Dates of Operation	Justification for screening in
Tier 1							
Arklow Onshore Grid Infrastructure (OGI)	Consented	10.2	0.0	Onshore grid infrastructure located onshore and required for the operation of the Proposed Development. Includes onshore grid infrastructure including 220kV export cable circuits and fibre optic cables, new 220kV GIS substation at Shelton Abbey and overhead line connection and all associated ancillary works	2027 - 2030	2030 - 2066	Potential temporal overlap with the Proposed Development construction, operational and maintenance phases.
Arklow Bank Wind Park 2 (ABPW2) Operational and Maintenance Facility (OMF) Onshore and Nearshore infrastructure and associated works	Approved	11.9	4.3	Relates to ABPWP2. As part of the works, a pontoon is proposed along with up to four craned for the loading and unloading of vessels. Additionally, dredging of approximately 6,000 m^3 from the nearshore is also proposed, to provide for navigational depth, berthing area, and manoeuvring areas for vessels.	2026 - 2030	2030 – uncertain	Potential temporal overlap with the Proposed Development construction phase.
Arklow Bank Wind Park 1 (ABWP1) (Arklow Offshore Array)	Operational	0.0	0.5	Constructed in 2003/04 consisting of seven wind turbines with a capacity of 25.2 MW. Included as part of the baseline environment with potential for ongoing impact to the Proposed Development.	Complete	2003/2004 - uncertain	Temporal overlap with Proposed Development construction, O&M and

Project/Plan	Status	Distance from Array Area (km)	Distance from Cable Corridor and Working Area (km)	Description of Project/Plan	Dates of Construction	Dates of Operation	Justification for screening in
							decommissioning phases
ABWP1 Power Cable	Operational	0.0	0.0	Export cable from ABWP1 Array Area to the Irish mainland.	Complete	2003/2004 - uncertain	Potential for temporal overlap of operation with Proposed Development construction and operational and maintenance phases.
Hibernia Atlantic Telecom Cable	Operational	15.4	14.8	Part of a transatlantic submarine cable system in the North Atlantic Ocean, connecting Canada, the United States, Ireland and the United Kingdom	Complete	2021 -	Potential for temporal overlap of operation with Proposed Development construction and operational and maintenance phases.
Codling Wind Park	Application Submitted	10.3	9.4	'Relevant Project'. Application submitted under the Maritime Area Planning (MAP) Act 2021.	2026 - 2029	2029 onwards	Potential for temporal overlap with Proposed Development construction and operational and maintenance phases.
Codling Wind Park Export Cable Corridor	Application Submitted	18.9	18.0	'Relevant Project'. Application submitted under the Maritime Area Planning (MAP) Act 2021.	2026 – 2029	2029 onwards	Potential for temporal overlap with Proposed Development construction and

Project/Plan	Status	Distance from Array Area (km)	Distance from Cable Corridor and Working Area (km)	Description of Project/Plan	Dates of Construction	Dates of Operation	Justification for screening in
							operational and maintenance phases.
Wicklow Port	Operational	9.7	9.0	Ongoing maintenance dredging and disposal activities as part of the existing baseline/ reasonably foreseeable port maintenance regime.	Unknown	Unknown	Potential for temporal overlap with Proposed Development construction and operational and maintenance phases.
Arklow Port	Operational	11.5	4.0	Ongoing maintenance dredging and disposal activities as part of the existing baseline/ reasonably foreseeable port maintenance regime.	Unknown	Unknown	Potential for temporal overlap with Proposed Development construction and operational and maintenance phases.
Arklow Flood Relief Scheme	Conditionally Approved	11.5	4.0	Wicklow County Council funded by the Office of Public Works (OPW), proposes to undertake engineering works along the Avoca River and surrounds to mitigate the risk of flooding in the Arklow town area in County Wicklow. Proposed works include dredging, installation of flood defence embankments/ walls and gravel/ debris traps.	2024 - 2028	2028 - uncertain	Potential for temporal overlap with Proposed Development construction phase, operational and maintenance and decommissioning phase.

Project/Plan	Status	Distance from Array Area (km)	Distance from Cable Corridor and Working Area (km)	Description of Project/Plan	Dates of Construction	Dates of Operation	Justification for screening in
Tier 3							
ABWP1	Decommissioning	0.0	0.5	Proposed decommissioning of the seven existing offshore wind turbines at Arklow Bank Wind Park 1 (ABWP1). For assessment purposes, a precautionary scenario is assumed whereby decommissioning activities overlap temporally with construction of the Proposed Development. Decommissioning methods are assumed to be similar to those set out in the ABWP2 Rehabilitation Schedule.	Not defined – assumed to overlap with Proposed Development construction phase for assessment purposes		Potential for temporal overlap with Proposed Development construction phase

6.12.1.7 The potential impacts, development phase, and the list of projects/ plans with which the two Project Design Options have been cumulatively assessed are presented in Table 6.39.

Table 6.39 : Cumulative assessment impacts, phases, scenarios, and projects to be considered cumulatively

Potential cumulative impact	Phase			Projects considered cumulatively	Justification for projects considered cumulatively
	C	O	D		
Impact 1 – Increased suspended sediment concentrations and associated deposition	✓	✓	✓	Project parameters associated with Project Design Option 1 or 2 plus the following projects: **Tier 1** ABWP2 OGI; ABWP2 OMF; ABWP1 Power Cable; ABWP1 Offshore Array; Hibernia Atlantic Telecom; Codling Wind Park; Wicklow Port;Arklow Port; Arklow Flood Relief Scheme; and **Tier 3** Decommissioning of ABWP1	If these intermittent activities overlap temporally with either the construction or O&M of the Proposed Development, there is potential for cumulative SSC and sediment deposition to occur within the modelled plume footprints.
Impact 2 – Presence of infrastructure may lead to changes to tidal currents, wave climate, sediment transport and seabed morphology	×	✓	×	Project parameters associated with Project Design Option 1 or 2 plus the following projects: **Tier 1** ABWP1 Offshore Array; Codling Wind Park;Wicklow Port; and Arklow Port.	Potential for cumulative changes to hydrodynamics, waves and sediment transport.

6.13 Cumulative impact assessment

6.13.1.1 A description of the significance of cumulative effects upon Coastal Processes arising from each identified impact is given below.

6.13.2 Project Design Option 1 and 2 - Impact 1 - Increased suspended sediment concentrations and associated deposition

SENSITIVITY OF THE RECEPTOR

6.13.2.1 As stated in paragraph 6.10.1.2, all the identified Coastal Processes receptors will be insensitive to localised changes in SSC and bed levels associated with the sediment disturbance activities described in this section.

Construction phase

TIER 1

MAGNITUDE OF IMPACT

6.13.2.2 Due to the localised effects and short-term duration of the construction activities (sandwave clearance and TSHD disposal; foundation drilling; CFE) of the Proposed Development alone, the magnitude is considered to be Low for both Project Design Options.

6.13.2.3 Sediment plumes from operational and maintenance dredging/activities are generally short-lived, with major maintenance works infrequent. Any impacts from the subsea infrastructure or routine port operations (from Wicklow and Arklow Ports) in Table 6.39 are therefore likely to be short-lived and of localised extent, with limited opportunity to overlap with the Proposed Development's activities.

6.13.2.4 The ABWP2 OMF is a project required for the operation of the Proposed Development, where construction activities have the potential to temporally and physically overlap with construction activities of the Proposed Development that may lead to a cumulative increase in SSC. Of note, the ABWP2 OMF is largely based on land where construction and O&M activities pose no effect-receptor pathways in terms of Coastal Processes. Impacts from installation of the pontoon and associated dredging are likely to be short-lived and of localised extent, with limited opportunity to overlap with the Proposed Development's activities.

6.13.2.5 Interaction between sediment plumes generated by Proposed Development's construction activities and those from nearby seabed disturbance due to flood relief works within the River Avoca could theoretically occur in two ways:

- Where plumes generated from the two different activities meet and coalesce to form one larger plume; or
- Where seabed sediment disturbance occurs within the plume generated by Proposed Development's construction activities (or vice versa).

6.13.2.6 For two or more separately formed plumes that meet and coalesce, the physical laws of dispersion theory mean concentrations within the plumes are not additive but instead a larger plume is created with regions of potentially differing concentration representative of the separate respective plumes. In contrast, in the case of plumes formed by dredging operating within the plume created by foundation installation or bed preparation activities (or vice versa), the two plumes would be additive, creating a plume with higher SSC.

6.13.2.7 The assessment undertaken for the Proposed Development alone shows that in almost all cases, sediment plumes are rapidly indistinguishable from background levels. On this basis, although there is limited potential for sediment plumes from Proposed Development activities to interact with those from other activities resulting in seabed disturbance, any overlap is expected to be short-lived and affect the near-field only. Further, the assessment also indicates that the sediment plumes disperse along the north-south orientated tidal axis which further limits the potential for sediment plumes from Proposed Development activities to interact with those from other activities resulting in seabed disturbance. Therefore, when assessed cumulatively with the Proposed Development, the magnitude is considered to be **Low** for both Project Design Options. Therefore, when assessed cumulatively with the Proposed Development, the magnitude is considered to be **Low** for both Project Design Options.

6.13.2.8 Construction activities for Codling Wind Park will also result in temporary SSC increases and resultant sediment deposition. The Proposed Development and Codling Wind Park are not directly aligned according to the tidal flows, reducing the potential for any sediment plumes to overlap. Further, on a northerly tide any sediment plumes produced during construction works will travel in a northerly direction from both developments (and visa versa on a southerly tide) thus reducing further the potential for any cumulative impacts. Therefore, when assessed cumulatively with the Proposed Development, the magnitude is considered to be **Low** for both Project Design Options.

TIER 1 + TIER 3

MAGNITUDE OF IMPACT

6.13.2.9 Due to the localised effects and short-term duration of the construction activities (sandwave clearance and TSHD disposal; foundation drilling; CFE) of the Proposed Development alone, the magnitude is considered to be **Low** for both Project Design Options.

6.13.2.10 Opportunity exists for overlap between impacts resulting from the Proposed Development's Array Area construction activities and the removal of ABWP1 array infrastructure, namely the removal of the seven monopiles to 2 m below the seabed. The current assumption is that this process will take four months and occur concurrently with the construction of the Proposed Development (thus providing a small temporal overlap in the activities). Therefore, whilst there is some potential for sediment plumes from the Proposed Development activities to interact with those from the decommissioning of ABWP1, any overlap is expected to be short-lived and within the near-field only. Therefore, when assessed cumulatively with the Proposed Development, the magnitude is considered to be **Low** for both Project Design Options.

Operational and maintenance phase

6.13.2.11 Whilst activities associated with the Proposed Development during the Operational and Maintenance phase will result in seabed sediment disturbance into the water column, primarily through cable protection and re-burial works, if required, the volumes disturbed are much less than those disturbed during the construction phase. Given that the magnitude of effect during the construction phase for all activities has been assessed as **Low,** impacts arising as a result of 'increased suspended sediment concentrations and associated deposition' during the Operational and Maintenance phase have been not considered further within this EIAR Chapter. Further, when considered cumulatively with the Proposed Development, the impact of the magnitude is considered to be **Low** for both Project Design Options (as presented in Table 6.11 and Table 6.12).

SIGNIFICANCE OF THE EFFECT

6.13.2.12 There are no Coastal Processes receptors sensitive to the impact pathway and as such, assessment of significance is not applicable.

Decommissioning phase

6.13.2.13 Activities associated with the Proposed Development during the decommissioning phase will result in seabed sediment disturbance into the water column, the volumes of which are considered to be equal to, or less than, those disturbed during the construction phase. Given that the magnitude of effect during the construction phase has been assessed as low, impacts arising as a result of 'increased suspended sediment concentrations and associated deposition' during the decommissioning phase are also considered to be **Low**. Further, when considered cumulatively with the Proposed Development, the impact of the magnitude is considered to be **Low** for both Project Design Options (as presented in Table 6.11 and Table 6.12).

SIGNIFICANCE OF THE EFFECT

6.13.2.14 There are no Coastal Processes receptors sensitive to the impact pathway and as such, assessment of significance is not applicable.

6.13.3 Project Design Option 1 and 2 - Impact 2 – Presence of infrastructure may lead to changes to tidal currents, wave climate, sediment transport and seabed morphology

SENSITIVITY OF THE RECEPTOR

6.13.3.1 As discussed in paragraph 6.10.2.3 *et seq*., the following receptors have been considered in the assessment of modifications to the wave and tidal regime and associated potential impacts on morphology:

- Offshore sandbanks – Arklow Bank, Seven Fathom Bank, and Glassgorman Bank – Medium sensitivity;
- Important bathymetric features – Wicklow Trough – Low sensitivity;
- Sites designated for physical features – Wicklow Reef SAC – Medium sensitivity; Magherabeg Dunes and Buckroney-Brittas Dunes and Fen SACs Low sensitivity.; and
- Coastal receptors below the HWM – Medium sensitivity.

Operational and maintenance phase

TIER 1

MAGNITUDE OF IMPACT

6.13.3.2 Blockage effects from the presence of the Proposed Development's infrastructure has the potential to combine with those from other projects within the region. On the basis of hydrodynamic and wave blockage modelling presented in paragraph 6.10.2 *et seq*., it is expected that only projects within 12 km of the Array Area have the potential to create overlapping blockage effects or other changes to wave and tidal transmission. This is based on the maximum array-scale wave blockage created by the Array Area over baseline conditions, as shown in Figure 6.37 and Figure 6.38. The Tier 1 projects that have the potential to create cumulative blockage effects are the ABWP1 Offshore Array, Codling Wind Park, and the Wicklow and Arklow Ports.

6.13.3.3 Additional numerical modelling has been undertaken to assess the potential impacts of Project Design Option 1 associated with Impact 2 (Volume III, Appendix 6.2: Arklow Bank Sediment Mobility Assessment (RFI March 2026) and Volume III, Appendix 6.3: Arklow Bank - Quantitative Assessment of the Influence of In-place Infrastructure on the Local Sediment Transport System (RFI March 2026)), which is considered to be representative of potential impacts of both scenarios as outlined in paragraph 6.6.5.6. This modelling includes the ABWP1 Offshore Array structures, and therefore potential cumulative impacts between the Proposed Development and ABWP1 Offshore Array are considered to be inherently assessed within Section 6.10.2.

6.13.3.4 The results of the numerical hydrodynamic modelling, as presented in Section 6.10.2, show that change to the tidal regime remains localised to the Array Area. Any interaction with Codling Wind Park or the Wicklow and Arklow Ports is therefore not considered likely and hence hydrodynamic blockage effects have not been considered further.

6.13.3.5 The wave blockage modelling, as shown in Figure 6.36 and Figure 6.37 indicates that any changes to the wave regime are restricted to the immediate west and west north west of the array. This would indicate that there is limited to no potential for wave regime effects introduced by the presence of the Proposed Development to act cumulatively with that of Codling Wind Park, Wicklow Port or Arklow Port.

6.13.3.6 Therefore the impact of the magnitude is considered to be as per that as a result of the Proposed Development alone and as provided in Table 6.36, Table 6.37, Figure 6.36 and Figure 6.37.

SIGNIFICANCE OF THE EFFECT

6.13.3.7 A discussion of the significance of the effect upon the Coastal Processes receptors sensitive to the Impact 2 is provided in the following sections below.

OFFSHORE SANDBANKS

6.13.3.8 The sensitivity of Arklow Bank, Seven Fathom Bank and Glassgorman Bank has been assessed as **Medium**. The magnitude of the Proposed Development alone has been assessed as **Low.** Given that any tide and wave interaction impacts with other project infrastructure is not considered likely the cumulative significance of Impact 2 for both Project Design Options upon the Offshore sandbanks is concluded to be **Slight.**

IMPORTANT BATHYMETRIC FEATURES

6.13.3.9 The sensitivity of the Wicklow Trough has been assessed as **Low**. The magnitude of the Proposed Development alone has been assessed as **Low**. Given that any tide and wave interaction impacts with other project infrastructure is not considered likely the cumulative significance of Impact 2 for both Project Design Options upon the Wicklow Trough is concluded to be **Slight.**

SITES DESIGNATED FOR PHYSICAL FEATURES

6.13.3.10 The sensitivity of Wicklow Reef SAC has been assessed as **Medium**. The magnitude of the Proposed Development alone has been assessed as **Low**. Given that any tide and wave interaction impacts with other project infrastructure is not considered likely the cumulative significance of Impact 2 for both project design options upon sites designated for physical features is concluded to be **Not Significant.**

6.13.3.11 The sensitivity of Magherabeg Dunes and Buckroney-Brittas Dunes and Fen SACs has been assessed as **Low**. The magnitude of the Proposed Development alone has been assessed as **Low**. Given that any tide and wave interaction impacts with other project infrastructure is not considered likely the cumulative significance of Impact 2 for both Project Design Options upon sites designated for physical features is concluded to be **Not Significant.**

COASTAL RECEPTORS BELOW MHW

6.13.3.12 The sensitivity of coastal receptors below the HWM has been assessed as **Medium**. The magnitude of the Proposed Development alone has been assessed as **Low**. Given that any tide and wave interaction impacts with other project infrastructure is not considered likely the cumulative significance of Impact 2 for both Project Design Options upon coastal receptors below the HWM is concluded to be **Not Significant.**

6.14 Transboundary effects

6.14.1.1 A screening of transboundary impacts has been carried out and has identified that there was no potential for significant transboundary effects with regard to Coastal Processes from the Proposed Development upon the interests of other states.

6.15 Summary of effects

6.15.1.1 This chapter has investigated the potential effects on Coastal Process receptors arising from the Proposed Development. The range of potential impacts and associated effects has been informed by the Scoping Opinion and consultation responses from stakeholders, alongside reference to existing legislation and guidance.

6.15.1.2 The assessment has been undertaken in the three following stages:

- The identification of the project parameters for Project Design Option 1 and 2 from the Offshore Project Description (Volume II, Chapter 4: Description of Development (Revised March 2026));
- The determination of the baseline physical environment (including potential changes over the Proposed Development lifetime due to natural variation); and
- Assessment of changes to Coastal Processes arising from the project design options both for the Proposed Development on its own and in conjunction with other built and consented projects.

6.15.1.3 In order to assess the potential changes relative to the baseline (existing) coastal and marine environment, a combination of complementary approaches have been adopted for this Coastal Processes assessment. These include:

- Numerical modelling of hydrodynamic, wave and sediment transport processes;
- The 'evidence base' containing monitoring data collected during the construction and O&M of other OWF developments (especially in similar environmental settings); and
- Analytical assessments of project-specific data.

6.15.1.4 A wide range of potential changes to Coastal Processes have been considered, including short-term sediment disturbance due to construction activities and the potential for changes to the coast and sandbank systems, arising from the blockage of waves and tides.

6.15.1.5 Using a precautionary assessment approach, it has been found that for all receptor groups, the level of effect significance is either **Negligible** or **Low** for all phases of development (Table 6.40 and Table 6.41). Accordingly, all of the potential effects to Coastal Process receptors are therefore considered **Not Significant** in terms of the EIA Regulations.

Table 6.40: Summary of potential environmental impacts, mitigation and monitoring for Project Design Option 1

Description of impact	Phase C	Phase O	Phase D	Factored-in measures	Magnitude of impact	Sensitivity of Receptors	Significance of effect	Additional measures	Residual effect	Proposed monitoring
1. Increased suspended sediment concentrations and associated deposition	✓	✓	✓	The factored-in measures (Table 6.17) include: – Definition and implementation of construction methods, Volume II, Chapter 4: Description of Development (Revised March 2026) and Volume III, Appendix 4.1: Rehabilitation Schedule. – Preparation and implementation of environmental monitoring – Cables will be buried where possible and protected where not possible. – Undertaking of post-installation cable burial surveys and	C: Low O: Negligible D: Low	C: n/a (pathway) O: n/a (pathway) D: n/a (pathway)	C: n/a (pathway) O: n/a (pathway) D: n/a (pathway)	None	C: n/a (pathway) O: n/a (pathway) D: n/a (pathway)	n/a

Description of impact	Phase C	O	D	Factored-in measures	Magnitude of impact	Sensitivity of Receptors	Significance of effect	Additional measures	Residual effect	Proposed monitoring
				periodic monitoring of cables.						
2. Presence of infrastructure may lead to changes to tidal currents, wave climate and sediment transport	✓	✓	✓	n/a	C: Negligible O: Low to Negligible D: Negligible	C: Medium O: Medium D: Medium	C: Not significant in EIA terms O: Slight adverse to not significant (not significant in EIA terms) D: Not significant in EIA terms	None	C: Not significant in EIA terms O: Slight adverse to not significant (not significant in EIA terms) D: Not significant in EIA terms	n/a

Table 6.41: Summary of potential environmental impacts, mitigation and monitoring for Project Design Option 2

Description of impact	Phase C	Phase O	Phase D	Factored-in measures	Magnitude of impact	Sensitivity of Receptors	Significance of effect	Additional measures	Residual effect	Proposed monitoring
1. Increased suspended sediment concentrations and associated deposition.	✓	✓	✓	The factored-in measures (Table 6.17) include: – Definition and implementation of construction methods, Volume II, Chapter 4: Description of Development (Revised March 2026) and Volume III, Appendix 4.1: Rehabilitation Schedule. – Preparation and implementation of environmental monitoring – Cables will be buried where possible and protected where not possible. – Undertaking of post-installation cable burial surveys and	C: Low O: Negligible D: Low	C: n/a (pathway) O: n/a (pathway) D: n/a (pathway)	C: n/a (pathway) O: n/a (pathway) D: n/a (pathway)	None	C: n/a (pathway) O: n/a (pathway) D: n/a (pathway)	n/a

Description of impact	Phase C	Phase O	Phase D	Factored-in measures	Magnitude of impact	Sensitivity of Receptors	Significance of effect	Additional measures	Residual effect	Proposed monitoring
				periodic monitoring of cables						
2. Presence of infrastructure may lead to changes to tidal currents, wave climate and sediment transport.	✓	✓	✓	N/A	C: Negligible O: Low to Negligible D: Negligible	C: Medium O: Medium D: Medium	C: Not significant in EIA terms O: Slight adverse to not significant (not significant in EIA terms) D: Not significant in EIA terms	None	C: Not significant in EIA terms O: Slight adverse to not significant (not significant in EIA terms) D: Not significant in EIA terms	n/a

References

ABPmer (2018), 'SEASTATES Metocean Data and Statistics Interactive Map'. Available online at: https://www.renewables-atlas.info/ [Accessed: January 2026].

ABPmer (2018). Norfolk Vanguard and Norfolk Boreas Export Cable Route, Sandwave bed levelling, ABPmer Report No. R.2920. A report produced by ABPmer for Royal HaskoningDHV, April 2018 Available online at: https://nsip-documents.planninginspectorate.gov.uk/published-documents/EN010079-001482-5.03%20Appendix%207.1%20ABP%20Sandwave%20study.pdf. [Accessed: January 2026]

ABPmer, HR Wallingford and Cefas (2010), 'Further review of sediment monitoring data (Collaborative Offshore Wind Energy Research into the Environment (COWRIE) ScourSed-09)'.
ABPmer and METOC (2002). Potential effects of Offshore Wind Developments on Coastal Processes. ETSU W/35/00596/00/REP. Report for the Department of Trade and Industry. Available Online at: https://tethys.pnnl.gov/sites/default/files/publications/Carroll-et-al-2010_0.pdf [Accessed: January 2026]

Aquafact (2025). Arklow Environmental Survey. Consultancy Report for SSE Renewables Ltd. Reference Number P15458.

Arup (2018). Irish Water: Arklow Wastewater Treatment Plant Project. Coastal processes assessment. Published 29 August 2018. Available from https://www.water.ie/sites/default/files/docs/arklow-wwtp/Appendix-G-EIA-Reports/EIAR-Volume4-Appendices/Appendix%2015.5%20Coastal%20Processes%20Report.pdf [Accessed January 2026]

Belderson, RH, Johnson, MA, and Kenyon, NH. (1982). Bedforms. In: Stride, AH (ed). Offshore tidal sands, processes and deposits. Chapman and Hall Ltd, London, UK pp 27-57. Available Online at: https://archive.org/details/offshoretidalsan0000unse/page/n9/mode/1up [Accessed: January 2026]

BERR (2008), Review of Cabling Techniques and Environmental Effects applicable to the Offshore Wind Farm Industry.' Department for Business Enterprise and Regulatory Reform in association with Defra. Available online at: https://tethys.pnnl.gov/sites/default/files/publications/Cabling_Techniques_and_Environmental_Effects.pdf [Accessed: January 2026]

BOWind (2008), 'Barrow Offshore Wind Farm Post Construction Monitoring Report'. First annual report, 15 January 2008, 60pp.Available online at: https://tethys.pnnl.gov/sites/default/files/publications/Barrow_Offshore_Wind_Monitoring_Report.pdf [Accessed January 2026]

Brooks, A., Whitehead, P., and Lambkin, D (2018). Natural Resources Wales (NRW) Monitoring Evidence Report No: 243 Guidance on Best Practice for Marine and Coastal Physical Processes Baseline Survey and Monitoring Requirements to inform EIA of Major Development Projects. Available online at: https://cdn.naturalresources.wales/689057/guidance-on-best-practice-for-marine-and-coastal-physical-processes-baseline-survey-and-monitoring-requirements-to-inform-eia-of-major-developement-projects.pdf [Accessed January 2026]

Cazenave, P. W., Torres, R., & Allen, J. I. (2016). Unstructured grid modelling of offshore wind farm impacts on seasonally stratified shelf seas. Progress in oceanography, 145, 25-41. Available online at: https://www.sciencedirect.com/science/article/pii/S0079661115300379?via%3Dihub [Accessed January 2026]

Cefas, (2016), Suspended Sediment Climatologies around the UK. Report for the UK Department of Energy and Climate Change's offshore energy Strategic Environmental Assessment programme. Available online at:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/584621/CEFAS_2016_Suspended_Sediment_Climatologies_around_the_UK.pdf [Accessed January 2026]

Cefas (2006). Scroby Sands Offshore Wind Farm – Coastal Processes Monitoring. Final Report. Contract AE0262. Report for the Department of Trade and Industry. Available online at: https://tethys.pnnl.gov/sites/default/files/publications/Scroby_Sands_Coastal_Processes.pdf [Accessed January 2026]

Centrica energy, 2009. Race Bank Environmental Statement: Chapter 5, Physical Environment. Available online at: https://www.marinedataexchange.co.uk/details/TCE-1790/2002---2007-centrica-race-bank-environmental-statement/packages/6373?type=Report&directory=%2F#downloads [Accessed January 2026]

Cooper Marine Advisor, (2021). Marine Geology, Oceanography and Physical Processes. Hornsea Four Offshore Wind Farm, Volume A2, Chapter 1. Available online at: https://nsip-documents.planninginspectorate.gov.uk/published-documents/EN010098-000703-A2.1%20ES%20Volume%20A2%20Chapter%201%20Marine%20Geology%20Oceanography%20and%20Physical%20Processes.pdf [Accessed: January 2026]

Coughlan, M., Tóth, Z., Van Landeghem, K. J., McCarron, S., & Wheeler, A. J. (2020). Formational history of the Wicklow Trough: a marine-transgressed tunnel valley revealing ice flow velocity and retreat rates for the largest ice stream draining the late-Devensian British–Irish Ice Sheet. Journal of Quaternary Science, 35(7), 907-919. Available online at: https://mural.maynoothuniversity.ie/id/eprint/15747/1/StephenMccarronFormational%20history2020.pdf [Accessed: January 2026]

Coughlan, M., Wheeler, A. J., Dorschel, B., Long, M., Doherty, P., & Mörz, T. (2019). Stratigraphic model of the Quaternary sediments of the Western Irish Sea Mud Belt from core, geotechnical and acoustic data. Geo-Marine Letters, 39, 223-237. Available online at: https://link.springer.com/article/10.1007/s00367-019-00569-z [Accessed: January 2026]

Collaborative Offshore Wind Research into the Environment (COWRIE) (2009). Understanding the environmental impacts of offshore wind farms. ISBN- 978-0-9565843-8-0. Available online at: https://www.researchgate.net/publication/312951757_Understanding_the_Environmental_Impacts_of_Offshore_Windfarms [Accessed: January 2026]

Creane, S., O'Shea, M., Coughlan, M. and Murphy, J. (2023a). Hydrodynamic processes controlling sand bank mobility and long-term base stability: A case study of Arklow Bank. Geosciences, 13(2), p.60. Available online at: https://www.mdpi.com/2076-3263/13/2/60 [Accessed: January 2026]

Creane, S., O'Shea, M., Coughlan, M., Murphy, J. (2023b). Morphological Modelling to Investigate the Role of External Sediment Sources and Wind and Wave-Induced Flow on Sandbank Sustainability: An Arklow Bank Case Study. J. Mar. Sci. Eng. 2023, 11, 2027 Available online at: https://www.mdpi.com/2077-1312/11/10/2027 [Accessed: January 2026]

Creane, S., Coughlan, M., O'Shea, M., Murphy, J. (2022). Development and Dynamics of Sediment Waves in a Complex Morphological and Tidal Dominant System: Southern Irish Sea. Geosciences 2022, 12, 431. Available online at: https://www.mdpi.com/2076-3263/12/12/431 [Accessed: January 2026]

Davis, N. N., and Coauthors, 2023, 'The Global Wind Atlas: A High-Resolution Dataset of Climatologies and Associated Web-Based Application'. Bulletin of the American Meteorological Society, 104, E1507–E1525, https://doi.org/10.1175/BAMS-D-21-0075.1. Available online at: https://globalwindatlas.info/en/area/Ireland [Accessed: January 2026].

Deltares (2025). Arklow Bank Sediment Mobility Assessment.

Deltares (2026). Arklow Bank - Quantitative assessment of the influence of in-place infrastructure on the local sediment transport system.

Department of Energy and Climate Change (2008). Review of Round 1 Sediment Process Monitoring Data – Lessons Learnt. Available online at: https://docslib.org/doc/4748473/review-of-round-1-sediment-process-monitoring-data-lessons-learnt [Accessed: January 2026]

Department of the Environment, Climate and Communication (2010). Strategic Environmental Assessment (SEA) of the Offshore Renewable Energy Development Plan (OREDPI and OREDPII) in the Republic of Ireland. Available online at: https://www.seai.ie/sites/default/files/publications/OREDP-SEA-ER-Volume-2-Main-Report.pdf [Accessed: January 2026]

Department of the Environment, Climate and Communication (2025). National Designated Maritime Area Plan (DMAP) for Offshore Renewable Energy Proposal and Public Participation Statement. Available online at: https://www.gov.ie/en/department-of-climate-energy-and-the-environment/publications/national-designated-maritime-area-plan-dmap-for-offshore-renewable-energy/ [Accessed: January 2026].

Devoy, R.J.N., (2008). Coastal vulnerability and the implications of sea-level rise for Ireland. Journal of Coastal Research 24(2): 325–341. Available online at: https://www.academia.edu/54611030/Coastal_Vulnerability_and_the_Implications_of_Sea_Level_Rise_for_Ireland [Accessed: January 2026]

DONG Energy (2017). DONG Energy, 2017. Race Bank Offshore Wind Farm Export Cable Sandwave Levelling Monitoring Data (various). Available online: https://marinelicensing.marinemanagement.org.uk (application reference: MLA/2015/00452/5) [Accessed: January 2026

DONG Energy (2014). ROW01 Race Bank Metocean assessment for Offshore Substation. August 2014. Pondus Ver. no. 1783962J.

Environmental Protection Agency (2024). Ireland's State of the Environment Report. Published October 2024. Available online https://www.epa.ie/our-services/monitoring--assessment/assessment/state-of-environment-report-/?_gl=1*1168j0w*_ga*MjM4NDgyMzIzLjE3Njg0MDQwNDc.*_ga_TPK2CK9KEX*czE3Njg0MDQwNDYkbzEkZzEkdDE3Njg0MDQwNjckajM5JGwwJGgw [Accessed January 2026]

Environmental Protection Agency (2022). Guideline on the information to be contained in Environmental Impact Assessment Reports. Published May 2022. Available online https://www.epa.ie/publications/monitoring--assessment/assessment/EIAR_Guidelines_2022_Web.pdf. [Accessed January 2026]

Environment Canada (1994). Environmental impacts of dredging and sediment disposal. Great Lakes Cleanup Fund. Environmental Protection, Quebec and Ontario Regions Available online at: https://catalog.hathitrust.org/Record/102155678 [Accessed: January 2026]

Energy Technology Support Unit (2002). Potential effects of offshore wind farms on Coastal Processes. Report No. ETSU W/35/00596/REP. Available online at: https://tethys.pnnl.gov/sites/default/files/publications/Potential_Effects_of_Offshore_Wind_Developments_on_Coastal_Processes.pdf [Accessed: January 2026]

Farrell, E. and Connolly, N. (2019). Historic and contemporary dune inventories to assess dune vulnerability to climate change impacts. Irish Geography, 52(1), 1-21. Available online at: https://irishgeography.ie/index.php/irishgeography/article/view/1432/1172 [Accessed: January 2026]

Flather, R.A., Smith, J.A., Richards, J.D., Bell, C. & Blackman, D.L., 1998. Direct estimates of extreme storm surge elevations from a 40-year numerical model simulation and from observations. The Global Atmosphere and Ocean System, 6, 165-176.

Fugro GB Marine (2021). Final Data Report: Arklow Offshore Wind Farm.*

Fugro GB Marine (2022). Field Operations and Preliminary Results Report (ISO Part 1) Arklow Bank Wind Park – Geotechnical Borehole Survey 2022.*

Gallagher, S., Tiron, R., Whelan, E., Gleeson, E., Dias, F & McGrath, R. (2015), 'The nearshore wind and wave energy potential of Ireland: A high resolution assessment of availability and accessibility'. Renewable Energy, 88, 494-516. Available online at: https://www.sciencedirect.com/science/article/abs/pii/S0960148115304304 [Accessed: January 2026]

Horrillo-Caraballo, J.M., Yin, Y., Fairley, I., Karunarathna, H., Masters, I., and Reeve, D.E. (2021). A comprehensive study of the tides around the Welsh coastal waters. Estuarine, Coastal and Shelf Science, 254, p.107326. Available online at: https://www.sciencedirect.com/science/article/pii/S0272771421001797 [Accessed: January 2026]

Howarth, M. J. (2005). Hydrography of the Irish Sea. In SEA6 Technical Report. UK Department of Trade and Industry's offshore energy-Strategic Environmental Assessment programme 30pp. Available online at: https://docslib.org/doc/6137559/1-hydrography-of-the-irish-sea-sea6-technical-report-pol [Accessed: January 2026]

H.R. Wallingford (2008). Dynamics of scour pits and scour protection – Synthesis report and recommendations. (Milestones 2 and 3). A report for the Research Advisory Group, Department of Energy and Climate Change. Available online at: https://tethys.pnnl.gov/publications/dynamics-scour-pits-scour-protection-synthesis-report-recommendations [Accessed: January 2026]

Huthnance, J.M, 1980. On One Mechanism Forming Linear Sand Banks. Estuarine, Coastal and Shelf Science (1982), 14, 79 – 99. Available online at: https://www.sciencedirect.com/science/article/abs/pii/S0302352482800686 [Accessed: January 2026]

Judd, A. (2012). Guidelines for Data Acquisition to Support Marine Environmental Assessments of Offshore Renewable Energy Projects. Report by Centre for Environment Fisheries and Aquaculture Science (CEFAS). Available online at: https://tethys.pnnl.gov/publications/guidelines-data-acquisition-support-marine-environmental-assessments-offshore [Accessed: January 2026]

Lambkin, D., Harris, J., Cooper, W., Coates, T. (2009), 'Coastal Process Modelling for Offshore Windfarm Environmental Impact Assessment: Best Practice Guide'. Technical Report, COWRIE. Available online at: https://tethys.pnnl.gov/publications/coastal-process-modelling-offshore-wind farm-environmental-impact-assessment-best [Accessed: January 2026]

Larsen, S.M, Roulund, A., and McIntyre, D. L. (2019). Regeneration of partially dredged sandwaves, Coastal Sediments 2019 May 27-31, pp. 3026-3039, Tampa/St. Petersburg, FL. https://www.worldscientific.com/doi/abs/10.1142/9789811204487_0260 [Accessed January 2026]

Masselink, G., Brooks, S., Poate, T., Stokes, C. and Scott, T. (2022). Coastal dune dynamics in embayed settings with sea-level rise – Examples from the exposed and macrotidal north coast of SW England. Marine Geology, 450: 106853. Available online at: https://www.sciencedirect.com/science/article/pii/S0025322722001244 [Accessed: January 2026]

MetOceanWorks (2021a). Metocean Data Overview: Arklow Bank Offshore Wind Farm.*

MetOceanWorks (2021b). Arklow Bank Wind Park Phase 2, Metocean Analysis for Site Assessment: Eastern Zone.*

Met Office (2024). Why have there been so many storms in the UK this year? Official blog. Available online: https://blog.metoffice.gov.uk/2024/01/23/why-have-there-been-so-many-storms-in-the-uk-this-year/ [Accessed January 2026] :

Marine Management Organisation (2014). Review of post-consent offshore wind farm monitoring data associated with licence conditions. A report produced for the Marine Management Organisation, pp 194. MMO Project No: 1031. ISBN: 978-1-909452-24-4. Available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/317787/1031.pdf [Accessed: January 2026]

Meucci, A., Young, I. R., Hemer, M., Kirezci, E., & Ranasinghe, R. (2020). Projected 21st century changes in extreme wind-wave events. Science advances, 6(24), eaaz7295. Available online at: https://www.science.org/doi/10.1126/sciadv.aaz7295 [Accessed: January 2026]

Natural England and Joint Nature Conservation Committee (2022). Nature conservation considerations and environmental best practice for subsea cables for English Inshore and UK offshore waters.

Natural England (2018). Natural England Offshore wind cabling: ten years experience and recommendations. Available online at: https://nsip-documents.planninginspectorate.gov.uk/published-documents/EN010080-001240-Natural%20England%20-%20Offshore%20Cabling%20paper%20July%202018.pdf [Accessed: January 2026]

Nordstrom, K.F. (2015). Chapter 8: Coastal Dunes. In Coastal Environments and Global Change (pp178-193). Available online at: https://doi.org/10.1002/9781119117261.ch8. [Accessed: January 2026]

National Parks & Wildlife Service (2017a). Magherabeg Dunes SAC (site code: 001766). Conservation objectives supporting document – coastal habitats. https://www.npws.ie/sites/default/files/publications/pdf/Magherabeg%20Dunes%20SAC%20(001766)%20Conservation%20objectives%20supporting%20document%20%E2%80%93%20Coastal%20habitats%20[Version%201].pdf [Accessed January 2026]

National Parks & Wildlife Service (2017b). Buckroney-Brittas Dunes and Fen SAC (site code: 000729). Conservation objectives supporting document – coastal habitats. https://www.npws.ie/sites/default/files/publications/pdf/Buckroney-Brittas%20Dunes%20and%20Fen%20(000729)%20Conservation%20objectives%20supporting%20document%20%E2%80%93%20Coastal%20habitats%20[Version%201].pdf [Accessed January 2026]

Office of Public Works, Minister Kevin Moran announces additional funding approval for Minor Flood Mitigation Works and Coastal Protection for Clogga Beach, Arklow, County Wicklow. Press Release. Available from https://www.gov.ie/en/office-of-public-works/press-releases/minister-kevin-moran-announces-additional-funding-approval-for-minor-flood-mitigation-works-and-coastal-protection-for-clogga-beach-arklow-county-wicklow/ [Accessed January 2026].

Ohl, C.O.G., Taylor, P.H., Eatock Taylor, R. and Borthwick, A.G.L. (2001). Water wave diffraction by a cylinder array part II: irregular waves. Journal of Fluid Mechanics, 442, 33 – 66. Available online at: https://researchportal.plymouth.ac.uk/en/publications/water-wave-diffraction-by-a-cylinder-array-part-2-irregular-waves/ [Accessed: January 2026]

Palmer, M., Howard, T., Tinker, J., Lowe, J., Brichenon, L., Calvert, D., Edwards, T., Gregory, J., Harris, G., Krijnen, J., Pickering, M., Roberts, C., and Wolf, J., (2018). UKCP18 Marine Report. Available online at: https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/research/ukcp/ukcp18-marine-report-updated.pdf [Accessed: January 2026]

Panigrahi, J.K., Ananth, P.N. and Umesh, P.A. (2009). Coastal morphological modeling to assess the dynamics of Arklow Bank, Ireland. International Journal of Sediment Research, 24(3), pp.299-314. Available online at: https://www.sciencedirect.com/science/article/abs/pii/S1001627910600054 [Accessed: January 2026]

Partrac (2022). Arklow Bank Wind Park Morphodynamic Study Interpretative Report.*

Parr, W, Clarke, SJ, Van Dijk, P, Morgan, N. (1998). Turbidity in English and Welsh tidal waters. WRc report No. 10419-0

Pennekamp, JGS, Epskamp, RJC, Rosenbrand, WF, Mullié, A, Wessel, GL, Arts, T, Deibel, IK. (1996). Turbidity caused by dredging; viewed in perspective. Terra et Aqua, 64, 10-17. Available online at: https://www.researchgate.net/publication/281313693_Turbidity_caused_by_dredging_viewed_in_perspective [Accessed: January 2026]

Philips, C. (2022). When places change: impacts of undesirable environmental change on coastal community's well-being and adaptive capacity. Thesis submitted for the degree of Doctor of Philosophy, Irish Climate Analysis and Research Units (ICARUS), Department of Geography, Maynooth University. Available online at: https://mural.maynoothuniversity.ie/16581/1/ChristopherPhillips_PhD_Thesis_for_submission.pdf [Accessed January 2026]

Philips, C., Murphy, C., and Bresnihan, P. (2022). The impacts of and responses to place loss in a coastal community in Ireland. Local Environment 2022, 27(7), 879 – 896. Available from https://www.tandfonline.com/doi/epdf/10.1080/13549839.2022.2078294?needAccess=true [Accessed January 2026]

Posford Duvivier Environment and Hill, M.I (2001). Guidelines on the impact of aggregate extraction on European Marine Sites. Countryside Council for Wales (UK Marine SACs Project). Available online: https://ukmpa.marinebiodiversity.org/uk_sacs/pdfs/aggregates-report.pdf [Accessed January 2026]

Project Management Support Services Ltd (2004). Review of bank morphology, physical processes post-construction at Arklow Bank, and similarities with the formation of, and potential implications of placing foundations at, Inner Gabbard and the Galloper.

Rogan, C., Miles, J., Simmonds, D., and Iglesias, G. (2016). The turbulent wake of a monopile foundation. Renewable Energy, 93, 180-187. Available online at: https://www.sciencedirect.com/science/article/abs/pii/S0960148116301513 [Accessed: January 2026]

Royal HaskoningDHV, 2020. Marine Licence Application. Rock Volume Change for Backfilling Activity. Environmental Report for Moray Offshore Windfarm (East) Limited. Available online: https://marine.gov.scot/sites/default/files/00009022_-_environmental_report_v2.pdf. [Accessed January 2026].

RPS (2021). Irish Coastal Wave and Water Level Modelling Study 2018 Phase 2 – Coastal Areas Potentially Vulnerable to Wave Overtopping Available online at: https://s3-eu-west-1.amazonaws.com/docs.floodinfo.opw/floodinfo_docs/ICWWS-2018/Phase-2/IBE1505_ICWWS_Ph2_Rp02_F03.pdf [Accessed: January 2026]

RPS (2019). Review of cable installation, protection, mitigation and habitat recoverability. Report for The Crown Estate. Available online at: https://www.marinedataexchange.co.uk/resources/key-documents/TCE/raw-data/101/1714/6185_EOR0744%20Cables%20Rev03%20Final.pdf [Accessed: January 2026]

RPS (2010). Irish Coastal Protection Strategy Study Phase 3 - North East Coast Work Packages 2, 3 & 4A - Technical Report, Available online: https://www.gov.ie/en/collection/d52a5e-irish-coastal-protection-strategy-study-phase-3-north-east-coast/#main-technical-report [Accessed January 2026]

Roulund, A., Riezebos, H.J., and Saverymuttu, K., (2023). Foundation installation in sandwave fields. Field observations of sandwave regeneration and sediment infill. International Society for Soil Mechanics and Geotechnical Engineering. Available online: https://www.issmge.org/uploads/publications/108/123/Foundation_installation_in_sandwave_fields._Field_observations_of_sandwave_regeneration_and_sediment_infill.pdf [Accessed January 2026]

Seagreen (2012). The Seagreen Project Environmental Statement Appendix E1 – Physical Environment Consultation Documents. September 2012. Available online at: https://marine.gov.scot/sites/default/files/appendix_e1.pdf [Accessed: January 2026]

Sweeny, J., (2000). A three-century storm climatology for Dublin 1715 – 2000. Irish Geography Available online at: https://irishgeography.ie/index.php/irishgeography/article/view/300/0 [Accessed: January 2026]

Triton Knoll Offshore Wind Farm Ltd. (2011). Triton Knoll Offshore Wind Farm Environmental Statement. RWE npower renewables

Triton Knoll Offshore Wind Farm Ltd. (2015), Triton Knoll Electrical System Environmental Statement: Marine Physical Environment.

Vousdoukas, M. I., Ranasinghe, R., Mentaschi, L., Plomaritis, T. A., Athanasiou, P., Luijendijk, A., & Feyen, L. (2020). Sandy coastlines under threat of erosion. Nature climate change, 10(3), 260-263. Available online at: https://www.nature.com/articles/s41558-020-0697-0 [Accessed: January 2026]

Vousdoukas, M.I., Mentaschi, L., Voukouvalas, E., Verlaan, M. and Feyen, L. (2017). Extreme sea levels on the rise along Europe's coasts. Earth's Future, 5, 304–323. Available online at: https://agupubs.onlinelibrary.wiley.com/doi/full/10.1002/2016EF000505 [Accessed: January 2026]

Vousdoukas, M.I., Mentaschi, L., Voukouvalas, E., Verlaan, M., Jevrejeva, S., Jackson, L.P. and Feyen, L. (2018). Global probabilistic projections of extreme sea levels show intensification of coastal flood hazard. Nature communications, 9(1), p.2360. Available online at: https://www.nature.com/articles/s41467-018-04692-w [Accessed: January 2026]

Waterman Infrastructure & Environment Limited (2022). Arklow Bank Wind Park. LF2 Landfall Feasibility Study.

Waterman Infrastructure & Environment Limited (2020). Arklow Bank Wind Park, Phase II. Cable Landfall: Feasibility Study.*

White, M., Gaffney, S., Bowers, D. G., & Bowyer, P. (2003). Interannual variability in Irish sea turbidity and relation to wind strength. In Biology and Environment: Proceedings of the Royal Irish Academy (Vol. 103, No. 2, pp. 83-90). Royal Irish Academy. Available online at: https://www.jstor.org/stable/20500184 [Accessed: January 2026]

Whitehouse, R.J.S.., Harris, J.M., Sutherland, J., and Rees, J. (2011). The nature of scour development and scour protection at offshore wind farm foundations. Published in Marine Pollution Bulletin, Volume 62 (1). Available online at: https://www.sciencedirect.com/science/article/abs/pii/S0025326X10004066 [Accessed: January 2026]

Whitehouse, R.J.S.., Harris, J.M., and Rees, J. (2008). SED02 Seabed and Coastal Process Research, Dynamics of scour pits and scour protection - synthesis report and recommendations (Milestones 2 and 3). A report for the Research Advisory Group. Available online at: https://tethys.pnnl.gov/sites/default/files/publications/Whitehouse-et-al-2008.pdf [Accessed: January 2026]

Whitehouse, R. J. S. (2006). Scour at coastal structures. Available online at: https://www.researchgate.net/publication/269084555_Scour_at_Offshore_Structures [Accessed: January 2026]