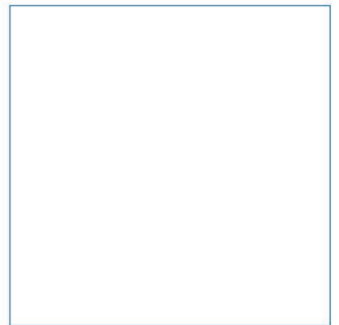
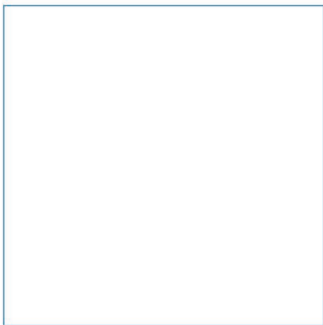
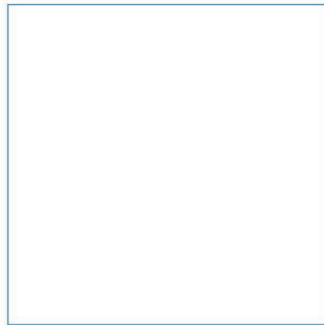
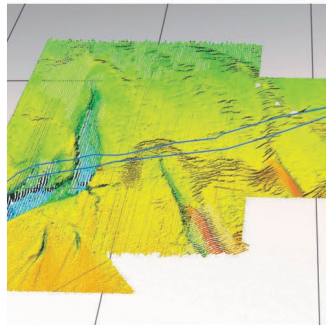


Severn Sands Holdings Ltd.

Bedwyn Sands and North Middle Grounds Scoping Report

Aggregate Dredging Licence Renewal

August 2022



Innovative Thinking - Sustainable Solutions

Page intentionally left blank

Bedwyn Sands and North Middle Grounds Scoping Report




Aggregate Dredging Licence Renewal

August 2022



Document Information

Document History and Authorisation		
Title	Bedwyn Sands and North Middle Grounds Scoping Report	
	Aggregate Dredging Licence Renewal	
Commissioned by	Severn Sands Holdings Ltd.	
Issue date	August 2022	
Document ref	R.3976	
Project no	R/5154/1	
Date	Version	Revision Details
30/08/2022	1	Issued for client review

Prepared (PM)	Approved (QM)	Authorised (PD)
Kathryn Robbins	Adam Fulford	Natalie Frost
 pp		

Suggested Citation

ABPmer, (2022). Bedwyn Sands and North Middle Grounds Scoping Report, Aggregate Dredging Licence Renewal, ABPmer Report No. R.3976. A report produced by ABPmer for Severn Sands Holdings Ltd., August 2022.

Contributing Authors

Wessex Archaeology

Notice

ABP Marine Environmental Research Ltd ("ABPmer") has prepared this document in accordance with the client's instructions, for the client's sole purpose and use. No third party may rely upon this document without the prior and express written agreement of ABPmer. ABPmer does not accept liability to any person other than the client. If the client discloses this document to a third party, it shall make them aware that ABPmer shall not be liable to them in relation to this document. The client shall indemnify ABPmer in the event that ABPmer suffers any loss or damage as a result of the client's failure to comply with this requirement.

Sections of this document may rely on information supplied by or drawn from third party sources. Unless otherwise expressly stated in this document, ABPmer has not independently checked or verified such information. ABPmer does not accept liability for any loss or damage suffered by any person, including the client, as a result of any error or inaccuracy in any third party information or for any conclusions drawn by ABPmer which are based on such information.

All content in this document should be considered provisional and should not be relied upon until a final version marked '*issued for client use*' is issued.

All images on front cover copyright ABPmer.

ABPmer

Quayside Suite, Medina Chambers, Town Quay, Southampton, Hampshire SO14 2AQ
T: +44 (0) 2380 711844 W: <http://www.abpmer.co.uk/>

Contents

1	Introduction	1
1.1	Project background.....	1
2	Project Description.....	3
2.1	Background and study areas	3
2.2	Marine aggregate dredging methods	4
2.3	Project rationale.....	5
2.4	Consideration of alternatives	6
3	Legislative and Consenting Framework.....	7
3.1	Seabed ownership consent.....	7
3.2	Marine licence	7
3.3	Environmental permitting.....	7
3.4	Protected habitats and species.....	8
3.5	Assessment requirements.....	8
3.6	Policy context	11
4	Proposed EIA Methodology	13
4.1	Further assessment content and structure	13
4.2	Impact assessment methodology.....	14
5	Scoping Review	19
5.1	Key issues to be considered	19
5.2	Physical processes.....	20
5.3	Water and sediment quality	23
5.4	Nature conservation and marine ecology.....	25
5.5	Commercial and recreational fisheries	30
5.6	Commercial and recreational navigation.....	31
5.7	Marine archaeology	33
5.8	Coast protection and flood defence	36
5.9	Air quality	38
5.10	Infrastructure and other marine users.....	39
5.11	Human health.....	40
6	Summary	43
7	References	45
8	Abbreviations/Acronyms	51

Tables

Table 1.	Proposed licence conditions for the Licence Renewal Areas	3
Table 2.	ES requirements according to the Marine Works (EIA) Regulations (Schedule 3).....	13
Table 3.	Exposure to change, combining magnitude and probability of change	16
Table 4.	Estimation of vulnerability based on sensitivity and exposure to change	16
Table 5.	Estimation of significance based on vulnerability and importance	17
Table 6.	Topics or receptors scoped out of the EIA	19
Table 7.	Proposed main sources of information for marine ecology topics	30
Table 8.	Summary of key assessment issues scoped in (orange) and scoped out (green) of the EIA, and summary of proposed further work	43

Figures

Figure 1.	Location of Bedwyn Sands and NMG (Areas 455 and 459) licensed aggregate sites.....	2
Figure 2.	Estimated resource thickness from 2021 annual monitoring survey	22
Figure 3.	Designated sites in proximity to the proposed aggregate dredge.....	26

1 Introduction

1.1 Project background

This scoping report has been prepared on behalf of Severn Sands Holdings Ltd. to accompany the marine licence renewal applications for marine aggregate dredging at Bedwyn Sands and North Middle Ground (NMG) (Areas 455 and 459) in the Severn Estuary (Figure 1). Severn Sands Holdings Ltd are seeking to renew their existing Welsh and English licences from the relevant licensing bodies, i.e. Natural Resources Wales (NRW) and the Marine Management Organisation (MMO).

ABPmer has been commissioned by Severn Sands Holdings Ltd. to produce this Scoping Report to identify the issues that will need to be addressed in detail during an Environmental Impact Assessment (EIA). The marine licence renewal applications will, therefore, need to be accompanied by an Environmental Statement (ES) that documents all of the relevant EIA information in accordance with the information detailed in Schedule 3 of the Marine Works (EIA) Regulations 2007 (as amended). This scoping study sets out the approach to be used in the EIA.

This scoping report is being submitted to both NRW and the MMO, and it is anticipated that scoping opinions will be received from each of these two bodies. The feedback regarding any additional issues or work requirements identified by key stakeholders and consultees will be addressed within a single ES for both Bedwyn Sands and NMG, whilst highlighting differences between the Areas, where applicable.

This report has been structured as follows:

- Section 1:** **Introduction:** Provides a brief project background, purpose of report and report structure;
- Section 2:** **Project Description:** Presents the project need and consideration of alternatives, and a description of the proposed work;
- Section 3:** **Legislative and Consenting Framework:** Sets out the principal consents/approvals and studies that are likely to be required;
- Section 4:** **Proposed EIA Methodology:** Presents the proposed content and structure of the ES and the impact assessment methodology;
- Section 5:** **Scoping Review:** Reviews the scope of potential impacts and further assessment work required for each of the EIA topics; and
- Section 6:** **Summary:** Provides a summary of the EIA topics, receptors and impact pathways that require further assessment work.

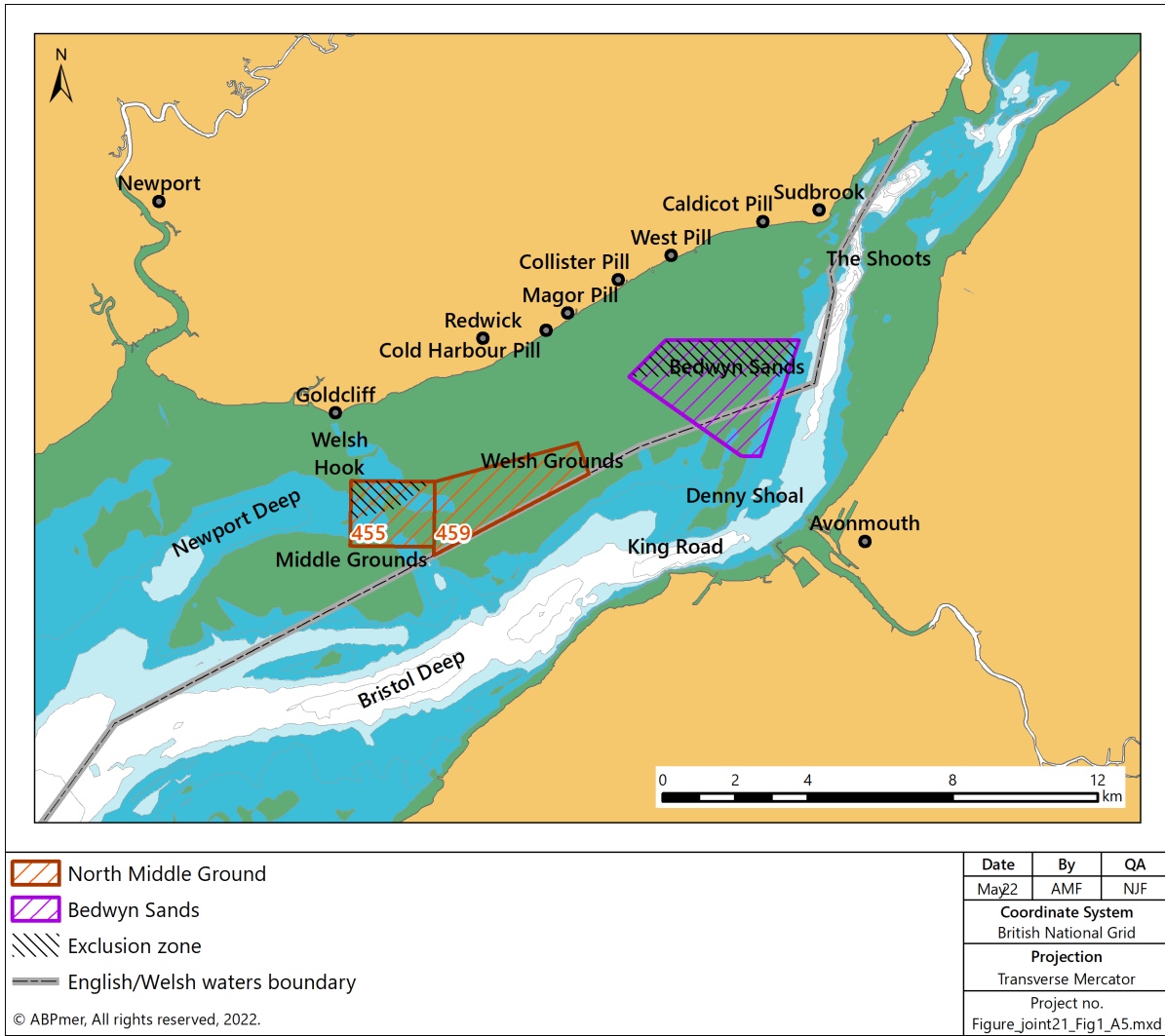


Figure 1. Location of Bedwyn Sands and NMG (Areas 455 and 459) licensed aggregate sites

2 Project Description

2.1 Background and study areas

Severn Sands Holdings Ltd. is proposing to renew permissions to dredge aggregates from Bedwyn Sands and NMG (Areas 455 and 459) in the Severn Estuary, with proposed licence periods of 15 years. Severn Sands Holdings Ltd. has been carrying out licensed aggregate extraction activities from Bedwyn Sands and NMG since 2008 and 2011, respectively. The marine licences for both sites were renewed for a further seven-year period in 2017 and are due to expire in 2024. The two Licence Renewal Areas have been grouped together within a single Environmental Impact Assessment (EIA) primarily due to their geographic proximity to each other and, therefore, similarity in terms of environmental issues.

The extraction sites are located in the Severn Estuary, within the wider Middle and Welsh Grounds area, which form part of a regional system of intertidal sand flats and banks. The Bedwyn Sands Production Area is located in the Upper Severn Estuary (Figure 1), as the eastward extension of the wider Welsh Grounds area. The resource lies wholly within the marine ownership of the Swangrove Estate and spans the harbour limits of the Gloucester Harbour Trustees (GHT) and the Bristol Port Company (BPC). The licence area covers an area just less than 9.4 km² and straddles the boundary between English and Welsh territorial waters. Bedwyn Sands is an intertidal 'sand flat' rather than a classic 'sand bank', as it lacks a distinctive crest. It is composed of sediments which range from sand to pebble-sized material, which are sorted as a result of tidal flows over the area. It is the well-sorted medium sand that is of particular interest to the aggregate industry.

The NMG Production Area (licensed aggregate extraction Areas 455 and 459) is located within the Upper Severn Estuary, between the wider intertidal sandbanks and flats of the Middle and Welsh Grounds (Figure 1). The site covers a combined area of approximately 10.4 km², lies off of the Welsh coastline and is entirely within Welsh territorial waters.

The morphology of the NMG is characterised by sandwave and ripple features. As with Bedwyn Sands, the NMG Area is composed of a range of sand to pebble-sized sediment, which are sorted by the strong tidal flows within the region. It is the medium to coarse sand that is of particular interest to the aggregate industry.

The renewal applications will seek to continue aggregate dredging, from each of the sites, at the same maximum annual extraction rates as are presently licensed (see Table 1).

Table 1. Proposed licence conditions for the Licence Renewal Areas

Parameter	Bedwyn Sands	North Middle Ground (Areas 455 and 459)
Licence area	9.4 km ²	10.4 km ²
Licence duration	2024 - 2039	2024 - 2039
Maximum annual tonnage	250,000 (in total; with no more than 150,000 tonnes from Welsh waters)	250,000
Maximum total extraction (15-year tonnage)	3,750,000	3,750,000

2.1.1 Previous surveys of the area

Annual monitoring surveys have been undertaken in the Bedwyn Sands and NMG Areas since 2008, in line with previous Marine Licence renewal conditions. The surveys have included offshore bathymetric and topographic monitoring, particle size distribution of the dredged cargoes and grab sampling and, since the 2017 renewals, benthic monitoring following the Regional Seabed Monitoring Plan (RSMP) protocol.

Bathymetric and topographic monitoring has shown yearly fluctuations in the overall bank volume in the Middle and Welsh Grounds Area. For example, slight reduction in the overall bank volume observed in 2017 (ABPmer, 2018) was reversed in the subsequent 2018 and 2019 bathymetric datasets. Similarly, slight reduction in bank volume in 2020 has now been partially reversed in 2021 (ABPmer 2022). Changes over these relatively short time periods is evidence of the dynamic nature of the wider sandbank features of the Middle and Welsh Grounds.

Benthic sampling has shown that there is a general sparseness of macrofauna across the Middle and Welsh Grounds Area which has remained relatively consistent across the baseline and repeat surveys (ABPmer 2022). Furthermore, particle size distributions have shifted slightly in some parts of the Middle Grounds Area (in areas that both overlap with and are outside of aggregate dredging); however, recent surveys concluded that overall conditions at the majority of surveyed sites have remained the same between 2017 and 2021 (ABPmer 2022).

Information from these previous surveys will be used to inform the baseline and impact assessment in the ES.

2.2 Marine aggregate dredging methods

Severn Sands Holding Ltd. is seeking to continue undertaking dredging through trailer suction hopper dredger within Bedwyn Sands and NMG. Trailing suction hopper dredging (TSHD) is a common method of extracting marine aggregates. It involves deploying trailing dredge pipes (one or two at once, though typically only one) with dragheads onto the seabed, while steaming the dredger at slow speed, typically 0.5-1.5 knots (or 0.25-0.75 m/s). The draghead and dredger's pipework is connected to a powerful inboard or outboard centrifugal pump. As sediment, mixed with seawater, is pumped up the pipe into the hopper, each draghead creates a shallow furrow in the seabed. Its penetration depth depends on the nature of the seabed and the speed of the dredger, but individual furrows are typically around 1.5 to 3 m wide and up to 0.5 m deep. Without replenishment of the extracted material, in time, dredging can create a localised lowering of the seabed within the licensed areas. However, the sandbanks at Bedwyn Sands and NMG are considered stable and replenishing in nature (Velegrakis *et al.*, 2001; ABPmer, 2015) and this is reflected in the annual monitoring surveys and analysis (e.g. ABPmer, 2022).

As aggregate is pumped into the hopper, it settles and gradually displaces the ballast water, which overflows through spillways located on either side of the cargo hopper, back into the sea. Due to high turbulence in the hopper, a proportion of the fine sediment (e.g. fine sands, silts and clays, where present in the aggregate), is also returned to the sea via the spillways, forming a sediment plume.

Aggregate dredgers can produce a cargo in two different ways. Firstly, the cargo can be produced as it is dredged from the seabed, referred to as 'all in'. Alternatively, the cargo can be partially sorted by the dredger as it is loaded by a process known as screening; this process enables a degree of control on the sand:gravel ratio of the dredged sediment. Screening involves passing the seawater and entrained sand and gravel over a plastic or steel screen mesh, where either the gravel or sand fraction can be preferentially retained within the vessel's hopper. T

he rejected component is directed overboard into the water column, where it forms part of the plume and settles back to the seabed. As a result of the increased sedimentation, longer loading time and increased wear and tear on the dredger associated with this process, use of screening will continue to be minimised at the Bedwyn Sands and NMG sites.

However, on the limited occasions where screening is required, a 4 mm mesh will be used, with sediment greater in size than this being released on site, where it will settle to the bed immediately below the dredger. When screening is in progress at Bedwyn Sands or NMG, it has been estimated that 3% of dredged material is returned to the seabed.

On completion of the dredging operation, the vessels use their ballast handling equipment to pump out the seawater from the wet aggregate. By the time the vessels arrive at their discharge ports, the cargo is dry enough to be discharged and prepared for use ashore in a variety of ways.

Severn Sands Holdings Ltd. is specifically seeking consent to continue their presently licensed TSHD and screening activities at the Bedwyn Sands and NMG sites. This consent includes the requirement to take core and grab samples from the seabed, within and around Bedwyn Sands and NMG, for resource management and monitoring purposes. No hopper washing is proposed.

2.3 Project rationale

Marine aggregates are essential minerals which are widely used in concrete for the construction of homes, schools, hospitals and infrastructure. They are also used for beach nourishment. Government policy (DCLG, 2006; HM Government, 2011) recognises that marine aggregates play a key role in servicing the nation's demand for construction aggregate and supplying materials for the maintenance of coastal and flood protection defences required for climate change adaptation. Marine aggregates also contribute to energy security and economic development through provision of fill for major coastal infrastructure projects, for example ports, renewable energy and nuclear energy projects.

Land-based and marine-based construction aggregate resources are unevenly distributed, and many regions are heavily dependent on supplies from other areas. Marine aggregates contribute to the diversity of supply and deliver high quality aggregate into the centre of areas of high demand with minimum disruption. One of the main benefits of using marine sources is that vessels can deliver aggregates directly to wharves in urban areas, which reduces pollution and road congestion.

Significant proportions of the sand used for construction purposes are obtained from marine sources. In South Wales, it is particularly important because of its current and historic high dependence on marine dredged resources. In 2019, approximately 2% of aggregate sales are from land-won sand and gravel sources, whereas 7% are marine landings (with the remaining 91% being crushed rock) (Mankelov *et al.*, 2021). Such trends are expected to continue into the future (Cuesta Consulting Ltd., 2014).

The Welsh National Marine Plan (WNMP) recognises the importance of marine aggregates for Wales and highlights the economic contribution of aggregates (Welsh Government, 2019). On the English side of the Bristol Channel, marine dredged aggregates make up a smaller proportion of the overall aggregates won from the region. The South Inshore Marine Plan recognises the importance of aggregate dredging by safeguarding aggregate licence areas to enable continuity of the supply of construction aggregates and support local national objectives and policies.

2.4 Consideration of alternatives

The EIA process requires the developer to consider alternatives to the proposed scheme. For this proposal, there are relatively few available alternatives, which will be assessed as part of the EIA.

An alternative option is to 'do nothing' i.e. allow the existing licences for Bedwyn Sands and NMG aggregate dredging to expire. The 'do nothing' option does, however, have clear implications for the future of the marine aggregate industry in the Severn region. The dredging of marine aggregates is a well-established practice, and the resources extracted are delivered to established markets where a continuity of supply is required.

There are also alternative sources of aggregate, such as land-based sources, recycled and secondary aggregates.

All relevant alternative options will be considered further as part of the EIA, which will include further details about economic benefits in order to clarify the economic rationale for the proposed activity.

3 Legislative and Consenting Framework

The proposed renewed marine aggregate dredging activities in Bedwyn Sands and NMG will require a range of consents and approvals under different legislative acts, supported by detailed technical and environmental investigations to inform an EIA, as well as appraisals in relation to the Habitats Regulations and Water Framework Directive (WFD). The principal consents are summarised in the following sections, although there is in addition a wide range of related environmental legislation with which the proposals will need to comply.

3.1 Seabed ownership consent

The Bedwyn Sands dredging area lies within the Swangrove Estate. The NMG dredging areas is held under licence from The Crown Estate, who owns the seabed out to 12 nautical miles and the mineral rights to the limit of the United Kingdom (UK) territorial waters. Permission will, therefore, be required from the Swangrove Estate and The Crown Estate to continue dredging Bedwyn Sands and NMG.

3.2 Marine licence

The current process of marine licensing under the Marine and Coastal Access Act 2009 came into force on 6 April 2011 and covers the area from Mean High Water Springs (MHWS) out to 12 nautical miles.

This process requires anybody wishing to undertake certain works below MHWS to obtain a marine licence. The licence will cover those works that impact upon the marine environment, namely the proposed aggregate dredging. For the Welsh sub-area of Bedwyn Sands and all of NMG, marine licence applications will be submitted to NRW, whilst for the English sub-area of Bedwyn Sands, an application will be submitted to the MMO.

3.3 Environmental permitting

Flood risk activities are regulated through environmental permits (previously flood defence consents) under the Environmental Permitting (England and Wales) Regulations 2016. Environmental permits are required for works in, over, under or near a main river or flood defence, or within a flood plain. This is to ensure activities do not cause a risk of flooding, make existing flood risk worse or interfere with flood risk management assets.

The Severn Estuary Flood Risk Management Strategy (FRMS) sets out where and how to manage flood risk to provide most benefit to communities and the environment in the region. Various sites in the Severn Estuary have been identified as potential for habitat creation to offset intertidal and other habitat loss. The Severn river basin district flood risk management plan was published in 2016 detailing the objectives and measures for managing flood risk between 2015 and 2021 (Environmental Agency and NRW, 2016).

It is understood that the Environment Agency will review the marine licence applications for compatibility with the permitting regulations as part of the consultation that is undertaken by the MMO. NRW will also review the application from a flood risk perspective.

3.4 Protected habitats and species

Various species and habitats are protected from being killed, injured or disturbed under provisions of the Habitats Regulations¹ and Section 9(4) and Schedule 5 of the Wildlife and Countryside Act 1981 (as amended).

In particular, Regulation 43 of the Habitats Regulations makes it an offence to deliberately disturb wild animals of any 'European Protected Species' in such a way as to be of likely significance:

- To impair their ability:
 - To survive, to breed or reproduce, or to rear or nurture their young; or
 - In the case of animals of a hibernating or migratory species, to hibernate or migrate; or
- To affect significantly the local distribution or abundance of the species to which they belong.

European Protected Species include a range of terrestrial and marine species such as bats, otters, great crested newts and cetaceans (i.e. dolphins, porpoises and whales).

Section 9(4) of the Wildlife and Countryside Act 1981 (as amended) makes it an offence to intentionally or recklessly disturb dolphins, whales or basking sharks subject to a defence that the act was the incidental result of a lawful operation and could not reasonably have been avoided. Natural England and Countryside Council for Wales (CCW, predecessor to NRW) produced detailed guidance on the application of these provisions (Natural England and CCW, 2007).

The Natural Environment and Rural Communities (NERC) Act came into force in October 2006. Section 41 (S41) of the Act requires the Secretary of State, in consultation with Natural England, to publish a list of habitats and species which are of principal importance for the conservation of biodiversity in England. The S41 list is used to guide decision-makers such as public bodies, including local and regional authorities, in implementing their duty under Section 40 of the NERC Act 2006, to have regard to the conservation of biodiversity in England, when carrying out their normal functions. There are 943 species of principal importance and 56 habitats of principal importance included on the S41 list.

In Wales, the Environment (Wales) Act 2016 provides the legislative framework for the sustainable management of natural resources. Central to this is building resilience into natural systems and communities, in order to tackle the challenges faced now and into the future. Amongst other things, Section 7 of the Act replaces the 2006 NERC Act duties and notes that priority lists for species and habitats would duly be published. Marine and coastal species and habitats are now available from the Wales Biodiversity Partnership Website. There are 534 species (and communities/assemblages) and 55 habitats which are considered a priority at present.

3.5 Assessment requirements

3.5.1 Environmental Impact Assessment

The Environmental Impact Assessment (EIA) Directive (2011/92/EU) requires plans, programmes or projects likely to have significant effects on the environment to undergo an environmental assessment, prior to their approval or authorisation. EU legislation which applied directly or indirectly to the UK before 31 December 2020 has been retained in UK law as a form of domestic legislation known as 'retained EU legislation'. The implementing legislation which transposes the EIA Directive into UK law

¹ These have been modified by the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019 (HMSO, 2019).

is a series of EIA regulations. The EIA regulations which apply to the Bedwyn Sands and NMG aggregate dredge are the Marine Works (Environmental Impact Assessment) Regulations 2007 (as amended) (hereafter referred to as the Marine Works EIA Regulations).

The Marine Works EIA Regulations set out the procedure that must be followed before approval is granted for a range of plans and projects. In the Marine Works EIA Regulations, these are defined in Schedules A1 and A2. Schedule A1 identifies those activities for which EIA is mandatory. The proposed work is not considered to comprise any of these activities. Schedule A2 of the Marine Works EIA Regulations identifies developments that require EIA if they exceed specified thresholds, and/or if it is deemed the development may have likely significant effects on the environment by virtue of factors such as its nature, size or location. The proposed work is considered to fall within Paragraph 10 of Schedule A2 of the Marine Works EIA Regulations, which state "*Extraction of minerals by fluvial or marine dredging*".

An EIA is not mandatory for all Schedule A2 developments. The proposed activities are considered to require an EIA because there may be potential for the activities to result in significant effects on the environment, specifically on interest features of designated nature conservation sites (Section 5.4).

This Scoping Report has been prepared to support the formal request for an EIA scoping opinion from the MMO and NRW. It sets out the proposed approach to and scope of the information required to inform the preparation of an EIA required to support the marine licence applications. Following receipt of the scoping opinion from the MMO and NRW, which will confirm the final scope of any survey requirements, supporting assessments and consultation, an ES will be prepared.

The ES will document all the relevant EIA information in accordance with the requirements detailed in Schedule 3 of the Marine Works EIA Regulations, including identification and consideration of all potential significant impacts on population, human health, biodiversity, land, soil, water, air, climate, material assets, cultural heritage, and landscape. It will also include an assessment of the interaction between these elements and identify any measures that are required to prevent, reduce or offset any significant adverse effects which may be caused by the proposed work.

3.5.2 Marine Plan Conformance Assessment

In considering an application for a marine licence, the MMO and NRW will take into account Government policy statements and guidance, including the Marine Policy Statement (MPS), the Southwest Marine Plan and the Welsh National Marine Plan (Section 3.6).

A marine plan conformance assessment will be prepared to support the marine licence applications for the Bedwyn Sands and NMG aggregate dredging. This will review the proposed activities against the visions, objectives and policies of the South West Inshore Marine Plan and Welsh National Marine Plan. This marine plan conformance assessment will be informed by the information provided in the ES. In taking a proportionate approach to applying policies, consideration will be given to the scale, complexity and impact of the proposed work. Available NRW guidance will be consulted in completing the conformance assessment.

3.5.3 Habitats Regulations Assessment

Where a development project (or activity), such as the proposed aggregate extraction from Bedwyn Sands and NMG, is located close to, or within, an area designated or proposed under the Birds² and

² Council Directive 79/409/EEC on the conservation of wild birds.

Habitats Directives³ (European Sites) and/or the Ramsar Convention⁴, the requirements of Part 6 of the Conservation of Habitats and Species Regulations 2017 (SI 2017/1012) (the “Habitats Regulations”) apply. In essence, this requires the lead Competent Authority, in this case NRW and the MMO for Welsh and English waters respectively, to determine whether the proposed works are likely to have a significant effect on a European Site and, if so, to undertake an Appropriate Assessment (AA) of the implications of the proposals in light of the site's conservation objectives. The AA takes account of the in-combination effects of the proposal on the protected areas in association with other relevant projects and plans.

The proposed works are located within the Severn Estuary Special Area of Conservation (SAC), the Severn Estuary Special Protection Area (SPA), and the Severn Estuary Ramsar site. Given the location of the proposed work overlaps internationally designated sites, the proposed work is anticipated to trigger the requirement for a Habitats Regulations Assessment (HRA).

The process that needs to be followed for an HRA is clearly laid out by NRW in their marine licensing advice (NRW, 2021), and by Natural England in relevant guidance documents (Natural England, 2019; 2021). In simple terms, it involves two key stages. The first stage (Stage 1: Test of Likely Significant Effect (LSE)) determines if the proposed work has the potential to result in an LSE on a European/Ramsar site and if there is a need to progress to the next stage of the HRA. Stage 2 (Appropriate Assessment), if required, provides the evidence required to confirm whether the proposed work has the potential to result in an adverse effect on integrity (AEIOI) on any European/Ramsar site either alone or in-combination with other plans and projects. Unless the conclusion is that there will be no adverse impact, the applicant will have to consider measures to mitigate any adverse effects. If appropriate and adequate mitigation measures are not possible, the project may only be consented if there is no alternative approach, that there are reasons of overriding public interest for it to proceed, and after a suitable compensation package has been agreed. The information contained in the HRA will enable the competent authority to undertake an AA, assessing the effects of the proposed work on the features for which the sites are designated. The HRA will be provided as an appendix to the ES.

3.5.4 Marine Conservation Zones

The Marine and Coastal Access Act 2009 facilitates the establishment of an ecologically coherent network of Marine Protected Areas (MPAs). The Act established a new type of MPA called a MCZ to protect nationally important marine wildlife, habitats, geology and geomorphology.

There are no MCZs within 60 km of Bedwyn Sands and NMG. Given that there are no MCZs in proximity to the areas, a formal MCZ assessment is not considered necessary.

3.5.5 Water Framework Regulations

The Water Framework Directive (WFD) (2000/60/EC) established a framework for the management and protection of Europe's water resources. It was implemented in England and Wales through the Water Environment (WFD) (England and Wales) Regulations 2017, known as the Water Framework Regulations⁵.

³ Council Directive 92/43/EEC on the conservation of natural habitats and wild fauna.

⁴ The Ramsar Convention on Wetlands - the Conservation on Wetlands of International Importance, especially on Waterfowl Habitat.

⁵ Following the UK leaving the EU, the main provisions of the WFD have been retained through the Floods and Water (Amendment etc.) (EU Exit) Regulations 2019. Available at: <https://www.legislation.gov.uk/ukxi/2019/558/contents/made> (accessed August 2021).

The overall objectives of the WFD as implemented by the Water Framework Regulations is to achieve “good ecological and good chemical status” in all inland and coastal waters by 2021 (now working towards revised objectives for 2027) unless alternative objectives are set or there are grounds for time limited derogation. For example, where pressures preclude the achievement of good status (e.g. navigation, coastal defence) in heavily modified water bodies (HMWBs), the WFD provides that an alternative objective of “good ecological potential” is set. Groundwater waterbodies are included in the WFD and are assessed on quantitative and chemical status. There is also a general “no deterioration” provision to prevent decline in status.

To support the marine licence applications, a WFD compliance assessment will be required to determine whether the proposed work complies with the objectives of the WFD. This will be undertaken in two stages; an initial screening/scoping stage to review the potential for the proposed work to cause a ‘deterioration’ or failure of the water body to meet its WFD objectives, followed by a full assessment if required. A full WFD assessment will consider the potential implications of the proposed work on the achievement of ‘good’ status within adjacent WFD water bodies. This information will be provided as an appendix to the ES following the format specified in the latest Environment Agency ‘Clearing the Waters for All’ guidance which will apply to Marine Licence Applications for both England and Wales.

3.5.6 UK Marine Strategy (Marine Strategy Framework Directive)

The aim of the Marine Strategy Framework Directive (MSFD) (2008/56/EC) is to protect more effectively the marine environment across Europe. It aims to achieve good environmental status (GES) of marine waters by 2020 and to protect the resource base upon which marine-related economic and social activities depend. The MSFD constitutes the vital environmental component of future maritime policy, designed to achieve the full economic potential of oceans and seas in harmony with the marine environment. It establishes European Marine Regions on the basis of geographical and environmental criteria. Each Member State is required to develop strategies for its marine waters. A Statutory Instrument transposing the MSFD into UK law came into force on 15 July 2010 and puts in place a clear legal framework to enable the MSFD to be implemented in the UK. The UK Marine Strategy provides the framework for delivering the MSFD at a national level and sets out how the UK will achieve the vision of clean, healthy, safe, productive and biologically diverse oceans and seas.

There are 11 descriptors of GES, including seafloor integrity, biological diversity and introduction of energy (e.g. noise). GES is assessed at the level of the European Marine Regions, of which there are two covering UK waters. The pressures exerted on the marine environment by dredging will, therefore, be a small contribution in the context of UK Marine Regions and unlikely to be a significant issue.

3.6 Policy context

In considering an application for a marine licence, the MMO and NRW will take into account UK and Welsh Government policy statements and guidance. The following sections provide an overview of the key planning context applicable to the aggregate dredging proposed at Bedwyn Sands and NMG and identify some of the policy considerations that will be material to the decision-making process. The ES will present a more detailed review of the national and local policy context of the proposed aggregate dredging.

3.6.1 Marine Policy Statement

The Marine Policy Statement (MPS) (HM Government, 2011) provides a framework for the development of marine plans. It is the role of marine plans to set out how the MPS will be implemented in specific areas, providing detailed policy and spatial guidance and help to ensure that decisions within an area contribute to the delivery of UK, national and any area specific policy objectives.

The UK vision for the marine environment is identified as being “*clean, healthy, safe, productive and biologically diverse oceans and seas*” (paragraph 2.1.1 of the MPS). High level marine objectives which reflect the principles for sustainable development and contribute to the delivery of this vision are provided within the MPS.

In terms of decision making, the MPS explains at a high level that the decision maker should make authorisation decisions in accordance with the relevant marine policy documents unless relevant considerations indicate otherwise.

3.6.2 South West Inshore Marine Plan

A sub-area of Bedwyn Sands is located within English waters in the South West Inshore Marine Plan area. The South West Inshore Marine Plan was prepared by Defra for the purposes of Section 51 of the Marine and Coastal Access Act 2009 to enhance and protect the marine environment and achieve sustainable economic growth while respecting local communities both within and adjacent to the marine plan area. The South West Inshore Marine Plan area covers approximately 2,000 km² of the coastline and takes in a total of 16,000 km² of sea (HM Government, 2021).

Policy SW-AGG-1 recognises that the marine aggregate industry is important for the continued supply of construction aggregates and for local and national objectives and economies. The Policy in the South West Marine Plan safeguards marine aggregate licence areas from other activities unless demonstrated that other activities are compatible with marine aggregate extraction.

3.6.3 Welsh National Marine Plan

NMG and a sub-area of Bedwyn Sands are located within the Inshore Welsh Marine Plan region. The Welsh Marine Plan was prepared by Welsh Government for the purposes of Section 51 of the Marine and Coastal Access Act 2009 to guide sustainable development of the marine area by supporting economic, social, cultural and environmental objectives. Specific policies have been formed to support the aggregate sector objectives within the Welsh Marine Plan. The objective is to “continue to use marine aggregates resources at a rate and in locations which best meet our current and future needs by ensuring adequate reserves are provided for through long-term licences”.

Policy AGG_01a supports the proposals for new aggregate extraction within any tonnage limits, which contribute to the objective. Policy SAF_01a and SAF_02 safeguard aggregate sector activities by ensuring that existing aggregate activities are taken into account by any new proposal which has the potential to adversely impact upon them.

4 Proposed EIA Methodology

4.1 Further assessment content and structure

An EIA of the proposed activity will be undertaken and documented in an ES. The ES will include the requirements outlined in Schedule 3 of the Marine Works EIA Regulations as set out in Table 2. Consideration of the potential risks to human health, the potential impacts on climate and the vulnerability of the proposed works to climate change, as well as to risks of major accidents and/or disasters will be considered within each individual EIA topic.

Table 2. ES requirements according to the Marine Works (EIA) Regulations (Schedule 3)

Schedule Reference	Requirements for ES
1	A description of the project, including in particular:
	a) A description of the location of the development.
	b) A description of the physical characteristics of the whole development, including, where relevant, requisite demolition works, and the land-use requirements during the construction and operational phases.
	c) A description of the main characteristics of the operational phase of the development (in particular any production process), for instance, energy demand and energy used, nature and quantity of the materials and natural resources (including water, land, soil and biodiversity).
	d) An estimate, by type and quantity, of expected residues and emissions such as water, air, soil and subsoil pollution, noise, vibration, light, heat, radiation and quantities and types of waste produced during the construction and operation phases.
2	A description of the reasonable alternatives (for example in terms of development design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects.
3	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 development 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.
4	a) A description of the factors specified in regulation 4(2) (of the Town and Country Planning EIA Regulations) and 21A(2)(a) (of the Marine Works EIA Regulations) likely to be significantly affected by the development:
	b) Population, human health;
	c) Biodiversity (for example fauna and flora);
	d) Land (for example land take), soil (for example organic matter, erosion, compaction, sealing);
	e) Water (for example hydromorphological changes, quantity and quality);
	f) Air, climate (for example greenhouse gas emissions, impacts relevant to adaptation);
	g) Material assets;
	h) Cultural heritage, including architectural and archaeological aspects; and
	i) Landscape.

Schedule Reference	Requirements for ES
5	A description of the likely significant effects of the development on the environment resulting from, inter alia: <ol style="list-style-type: none"> The construction and existence of the development, including, where relevant, demolition works; The use of natural resources, in particular land, soil, water and biodiversity, considering as far as possible the sustainable availability of these resources; The emission of pollutants, noise, vibration, light, heat and radiation, the creation of nuisances, and the disposal and recovery of waste; The risks to human health, cultural heritage or the environment (for example due to accidents or disasters); The cumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources; The impact of the project on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change; The technologies and the substances used.
6	The description of the likely significant effects should cover the direct effects and any indirect, secondary, cumulative, transboundary, short-term, medium-term and long-term, permanent and temporary, positive and negative effects of the development.
7	A description of the forecasting methods or evidence, used to identify and assess the significant effects on the environment, including details of difficulties (for example technical deficiencies or lack of knowledge) encountered compiling the required information and the main uncertainties involved.
8	A description of the measures envisaged to avoid, prevent, reduce or, if possible, offset any identified significant adverse effects on the environment and, where appropriate, of any proposed monitoring arrangements (for example the preparation of a post-project analysis). That description should explain the extent, to which significant adverse effects on the environment are avoided, prevented, reduced or offset, and should cover both the construction and operational phases.
9	A description of the expected significant adverse effects of the development on the environment deriving from the vulnerability of the development to risks of major accidents and/or disasters which are relevant to the project concerned.
10	A non-technical summary of the information provided under paragraphs 1 to 8/9.
11	A reference list detailing the sources used for the descriptions and assessments included in the environmental statement.

4.2 Impact assessment methodology

To facilitate the impact assessment process and ensure consistency in the terminology of significance, a standard assessment methodology will be applied where possible. This methodology has been developed from a range of sources, including the Marine Works EIA Regulations, the EIA Directive (2014/52/EU), statutory guidance, consultations and ABPmer's previous (extensive) EIA project experience and is explained in the following sections. ABPmer has an IEMA Quality Mark, demonstrating their commitment to excellence in leading the co-ordination of statutory EIAs in the UK. The ES will also follow the principles of relevant guidance, including the Chartered Institute of Ecology and Environmental Management (CIEEM) guidelines for ecological impact assessment in the UK and Ireland (which consolidate advice for terrestrial, freshwater and coastal environments) (CIEEM, 2018) and Institute of Environmental Management and Assessment (IEMA) guidelines (IEMA, 2016).

The effect of the proposed works on each of the environmental receptors will be assessed by describing in turn: the baseline environmental conditions of each receiving environment; the 'impact pathways' by which the receptors could be affected; the significance of the impacts occurring; and the measures to mitigate for significant adverse impacts where these are predicted.

This impact assessment methodology, which is presented in the following sections, is designed to incorporate the key criteria and considerations without being overly prescriptive.

4.2.1 Stage 1 – Identify receptors and changes

The first stage identifies the potential environmental changes resulting from the proposed activity and the features of interest (receptors) that are likely to be affected (which are together referred to as the impact pathway). The potential impact pathways which are considered relevant to this EIA will be set out within each topic-specific assessment chapter.

4.2.2 Stage 2 – Understand change and sensitivity

The second stage involves understanding the nature of the environmental changes to provide a benchmark against which the changes and levels of exposure can be compared. The scale of the impacts via the impact pathways depends upon a range of factors, including the following:

- Magnitude (local/strategic):
 - Spatial extent (small/large scale);
 - Duration (temporary/short/intermediate/long-term);
 - Frequency (routine/intermittent/occasional/rare);
 - Reversibility;
- Probability of occurrence;
- The margins by which set values are exceeded (e.g. water quality standards);
- The baseline conditions of the system;
- Existing long-term trends and natural variability;
- The sensitivity of the receptor (resistance/adaptability/recoverability);
- The importance of the receptor (e.g. designated habitats and protected species); and
- Confidence, or certainty, in the impact prediction.

4.2.3 Stage 3 – Impact assessment

To assess the significance of effects, the magnitude of the impact pathway and the probability of it occurring is evaluated to understand the exposure to change, and this is assessed against the sensitivity of a receptor/feature to understand its vulnerability. Finally, this is compared against the importance of a receptor/feature to generate a level of significance for effects resulting from each impact pathway. This is summarised in the following sections.

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

1. Insignificant: Change not having a discernible effect;
2. Minor: Change is discernible but tolerable and not significant;
3. Moderate: Change is significant and if adverse, is likely to require mitigation; and
4. Major: Change is highest in magnitude, and the receptor has a high vulnerability and importance. Change is significant and if adverse, will require mitigation.

To ensure transparency in the impact assessment, it is important to make clear the evidence-based or value-based judgments used at each stage of the assessment, and how they have been attributed to a level of significance. This will be presented in the impact assessment for each impact pathway.

Impact assessment guidance tables

The matrices in Table 3 to Table 5 will be used to help assess significance (see below).

Table 3 will be used as a means of generating an estimate of exposure to change for each impact pathway. Magnitude of change needs to be considered in spatial and temporal terms (including duration, frequency and seasonality), and against the background environmental conditions in a study area. Once a magnitude has been assessed, this should be combined with the probability of occurrence to arrive at an exposure score which can then be used for the next step of the assessment, which is detailed in Table 4. For example, an impact pathway with a medium magnitude of change and a high probability of occurrence would result in a medium exposure to change.

Table 3. Exposure to change, combining magnitude and probability of change

Probability of Occurrence	Magnitude of Change			
	Large	Medium	Small	Negligible
High	High	Medium	Low	Negligible
Medium	Medium	Medium/Low	Low /Negligible	Negligible
Low	Low	Low /Negligible	Negligible	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible

Table 4 will then be used to score the vulnerability of the features/receptors of interest based on the sensitivity of those features and their exposure to a given change. Where the exposure and sensitivity characteristics overlap then vulnerability exists, and an adverse effect may occur. For example, if the impact pathway previously assessed with a medium exposure to change acted on a receptor which had a high sensitivity, this would result in an assessment of high vulnerability. Sensitivity can be described as the intolerance of a habitat, community or individual of a species to an environmental change and essentially considers the response characteristic of the feature. Thus, if a single or combination of environmental changes is likely to elicit a response then the feature under assessment can be considered to be sensitive. Where an exposure or change occurs for which the receptor is not sensitive, then no vulnerability can occur. Similarly, vulnerability will always be 'none' no matter how sensitive the feature is, if the exposure to change had been assessed as 'negligible'.

Table 4. Estimation of vulnerability based on sensitivity and exposure to change

Sensitivity of Feature	Exposure to Change			
	High	Medium	Low	Negligible
High	High	High	Moderate	None
Moderate	High	Moderate	Low	None
Low	Moderate	Low	Low	None
None	None	None	None	None

The vulnerability will then be combined with the importance of the feature of interest using Table 5 to generate an initial level of significance. The importance of a feature is based on its value and rarity (e.g. to either ecosystem or economy), such as the levels of protection, whilst recognising that importance should be determined having regard to geographic context (i.e. international/European, national, regional, and local). For an example of estimating significance, if a high vulnerability was previously given to a feature of low importance, an initial level of significance of minor would be given.

Table 5. Estimation of significance based on vulnerability and importance

Importance of Feature	Vulnerability of Feature to Impact			
	High	Moderate	Low	None
High	Major	Moderate	Minor	Insignificant
Moderate	Moderate	Moderate/Minor	Minor/Insignificant	Insignificant
Low	Minor	Minor/Insignificant	Insignificant	Insignificant
None	Insignificant	Insignificant	Insignificant	Insignificant

4.2.4 Stage 4 – Impact management (mitigation)

The final stage is to identify any impacts that are found to be significant (i.e. moderate and/or major adverse) and require mitigation measures to reduce residual impacts, as far as possible, to environmentally acceptable levels. Mitigation measures considered throughout the EIA process can take three forms (IEMA, 2016):

- **Primary (inherent)** – modifications to the location or design of the development made during the pre-application phase that are an inherent (or embedded) part of the project. These are captured and taken account of in the initial impact assessment (Section 4.2.3);
- **Secondary (foreseeable)** – actions that will require further activity in order to achieve the anticipated outcome (identified as necessary through the assessment process). Within the impact assessment process, the use of secondary mitigation measures will alter the risk of exposure and, hence, will require significance to be re-assessed and thus the residual impact (i.e. with mitigation) identified; and
- **Tertiary (inexorable)** – actions that would occur with or without input from an environmental impact assessment process, including actions that will be undertaken to meet other existing legislative requirements, or actions considered to be standard practices to manage commonly occurring environmental effects. These are captured and taken account of in the initial impact assessment (Section 4.2.3)

In addition, it is appropriate to adopt a mitigation hierarchy which, from the CIEEM (2018) guidance⁶ on ecological impact assessment specifically, can be summarised as follows:

- Seek to adopt options that **avoid** harm in the first instance;
- Identify ways to **minimise** adverse effects that cannot be completely avoided;
- Undertake **compensation** where there are significant residual adverse effects despite the mitigation proposed; and
- Provide **net benefits** (for biodiversity) above requirements for avoidance, mitigation or compensation.

In instances, a decision may need to be taken despite residual uncertainty about the effects. In such cases, adaptive management, linked to a bespoke monitoring programme, is a well-established and recommended way of ensuring that any negative impacts or effects are addressed in the course of the development and during the subsequent operational phase.

4.2.5 Confidence assessment

Following the significance assessment, a confidence assessment will be undertaken which recognises the degree of interpretation and expert judgement applied. This will be presented in the summary table

⁶ Adapted from Royal Town Planning Institute (RTPI) (2000) *Planning for Biodiversity* (out of print) as used in the emerging CIEEM guidance

contained within the conclusions section of each impact assessment section. Confidence will be assessed on a scale incorporating three values: low, medium and high.

4.2.6 Cumulative impact and in-combination assessment

Under the Marine Works EIA Regulations, it is necessary to assess the potential cumulative impacts of a proposed activity on all environmental receptors together with other existing or consented developments in the area. Under the Habitats Regulations⁷, it is also necessary to consider the in-combination effects of a development proposal specifically on the interest features of European/Ramsar sites.

The cumulative (and in-combination) assessment will consider the effects of the proposed works alongside those arising from other plans, projects and activities. Cumulative impacts result from the combined impacts of multiple developments or from the combined effect of individual impacts (e.g. where different project elements in different locations have a cumulative impact on a particular feature). The impacts resulting from a single scheme may not be significant on their own but when combined with impacts resulting from other schemes, these could become significant.

The cumulative and in-combination assessment will be presented in a separate ES chapter. The assessment of cumulative impacts will involve a desk-based review of relevant marine licence applications within 2 km of the proposed works. Further consultation with NRW and the MMO will also be undertaken to understand any other plans, projects or activities which may have the potential for cumulative effects with the proposed works.

4.3 Consultation

Consultation is a crucial part of the assessment process. During the scoping phase of the application, formal consultation will be led by the MMO and NRW to seek views of statutory consultees and any other non-statutory consultees that MMO consider may be impacted by the proposed works.

Consultation with relevant stakeholders will be carried out to obtain baseline information and further advice on the environmental assessments (e.g. assessment approach) in support of the applications for the proposed works where required.

4.4 Study area

The scope of the study area to be considered will be defined on the basis of the preferred design for the proposed works. It will also take into account the spatial and temporal extent (zone of influence) of the likely significant effects and their importance in a geographical context that could arise from the proposed works and the sensitivities of the relevant topics/receptors on an individual basis. Areas outside the range of any potential impacts are representative of the wider natural environment and form part of the wider study area.

An initial study area has been identified in this scoping report as part of the baseline review that has been undertaken for each EIA topic. The study area for each EIA topic will be refined in the ES, within the topic-specific chapters.

⁷ These have been modified by the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019. Available at: <https://www.legislation.gov.uk/ukdsi/2019/9780111176573> (Accessed May 2022).

5 Scoping Review

5.1 Key issues to be considered

Based on the nature of the proposals for aggregate extraction at Bedwyn Sands and NMG and existing knowledge of the baseline conditions within the study area, the following issues are considered to be potentially relevant to the EIA:

- Physical processes (including coastline, hydrodynamic, seabed characteristics and turbidity);
- Water and sediment quality;
- Nature conservation and aquatic ecology;
 - Nature conservation protected areas and species;
 - Benthic ecology;
 - Fish and shellfish;
 - Marine mammals and turtles;
 - Ornithology;
- Commercial and recreational fisheries;
- Commercial and recreational navigation;
- Coast protection and flood defence;
- Marine archaeology;
- Air quality (including Greenhouse Gas (GHG) Emissions);
- Infrastructure and other marine users;
- Human health; and
- Cumulative effects.

A number of topics/receptors are proposed to be scoped out of the EIA. The rationale for not undertaking further assessment is presented in Table 6.

Table 6. Topics or receptors scoped out of the EIA

Topic or Receptor	Justification
Terrestrial ecology	The proposed aggregate dredging will all take place below MHWs and within the marine environment. There will, therefore, be no potential effect on terrestrial ecology features and this topic is proposed to be scoped out of the EIA.
Light	Given the distance from receptors and the existing level of aggregate extraction in the area, there will be no significant lighting effects due to the dredger activity. Therefore, this issue is proposed to be scoped out of the EIA.
Airborne noise and vibration	Given the distance from the nearest sensitive receptors and the existing level of aggregate extraction in the area, it has been concluded that there is no impact pathway for humans to be disturbed by noise. The effects of noise and vibration from dredging activity on ecological receptors are considered in Section 5.4.
Landscape/seascape and visual impact	Dredging operations have been occurring at Bedwyn Sands and NMG since 2008 and 2011, respectively. Therefore, there will be no change to landscape character or visual appearance due to the continuation of aggregate extraction within the area. This issue has, therefore, is proposed to be scoped out of the EIA.

The following sections provide a brief overview of the baseline environment for each of these topics (receptors) to determine the potential mechanisms by which sources of change are sufficient to cause an impact to a receptor, i.e. the establishment of an 'impact pathway'. A list of the remaining key issues to be addressed within the EIA and specific studies and assessments that will be required is provided.

The impact pathways are considered against the following activities:

- **Draghead:** the draghead removes the sediment/water mixture from the seabed. The action of the draghead leaves behind a furrow during trailing suction dredging, the depth of which varies depending on the compaction of the seabed sediments, the power of the dredge pump and the duration/intensity of dredging. The action of the draghead and of material moving through the pump and pipework also cause noise and vibration disturbance;
- **Overspill:** the process of loading the dredger involves large quantities of sediment and water being pumped from the seabed into the hopper of the vessel leading to an overspill of excess water and fine sediment (where present in the bed material) from the vessel's spillways. The material disperses horizontally and vertically to form a sediment plume, carried through the water by tidal flows and wave action to eventually disperse and settle onto the seabed until the sediment concentrations are reduced to background levels;
- **Screening:** the process used to influence the sand and gravel ratio of sediment collected by the dredger (see Section 2.1); and
- **Vessel Presence:** the presence of the vessel has the potential to displace other vessels and sea users from the section of the Area within which it is working and may also have such impacts during transit to and from the Area. During the dredging activity, the vessel remains active during daylight and hours of darkness and, therefore, has associated potential noise, vibration and visual impacts.

5.2 Physical processes

This section sets out the proposed scope of the ES chapter that will report the findings of the physical processes assessment of the proposed aggregate dredging.

5.2.1 Legislation, policy and guidance position

The potential effects of the proposed aggregate dredging on physical processes will be considered in the respective topic-specific ES chapter, which will cross-reference, as appropriate, relevant policy, legislation and guidance, including:

- The Marine and Coastal Access Act 2009 (MCAA);
- The Habitats Regulations;
- The Water Framework Regulations 2017;
- The Waste (England and Wales) Regulations 2011;
- UK Marine Policy Statement (MPS) (HM Government, 2011) as required by Section 44 of the Marine and Coastal Access Act 2009;
- Southwest Inshore Marine Plan;
- Welsh National Marine Plan (Welsh Government, 2019);
- Environment (Wales) Act 2016;
- UK Marine Strategy (Defra, 2019a);
- British Marine Aggregate Producers Association (BMAPA) 'Marine Aggregate Dredging and the Coastline: A Guidance Note' (BMAPA 2013);
- BMAPA and The Crown Estate 'Good Practice Guidance: Extraction by Dredging of Aggregates from England's Seabed' (BMAPA, 2017); and
- Relevant local policy.

5.2.2 Description of the existing environment

The Bedwyn Sands and NMG are predominantly intertidal sandflat features, located within the wider region of the Severn Estuary. The downstream extent of the Severn Estuary is commonly taken between the headlands at Lavernock Point on the Welsh coast and Brean Down on the English coast, passing through the prominent island features of Flat Holm and Steep Holm.

The area seaward is commonly referred to as the Inner Bristol Channel. It is at this location where the orientation of the coastline changes from a mainly east to west trend downstream to a northeast alignment and the start of the funnel-shaped form of the Severn Estuary. These changes in form have an effect on the local wave regime (reduced exposure to Atlantic swell) and tidal regime (progressive amplification of tidal range). The narrow upstream end of the funnel-shaped form is located at Beachley (the alignment of the first Severn Bridge), approximately 8 and 15 km upstream of the Bedwyn Sands and NMG Licence Renewal Areas, respectively.

Previous studies (e.g. McLaren and Collins, 1989) have identified that sand moves freely between the sandbank features of the Severn Estuary, driven predominantly by the asymmetry of the tide, and is in a continual state of re-working. The key characteristics of the wider sandbank feature are:

- The morphology can be characterised by both sand wave and ripple features. These indicate that the Middle and Welsh Grounds are active areas, in relation to sediment mobility;
- The resource is up-drift of the available sediment transport sources, as indicated by sediment trends analysis (McLaren and Collins, 1989); and
- The tidal regime is macro-tidal, with strong flows experienced throughout the estuary and within the deep-water channels (the Bristol Deep and Newport Deep) that flank Bedwyn Sands and NMG. The licensed dredge sites are intertidal (and are exposed at the lower tidal states), with vessel access typically restricted to periods either side of high water.

The available resource thickness, as estimated from the annual monitoring surveys conducted in 2021, is shown across both sites in Figure 2. This shows the sediment thickness across the 455/459 Licence Area, averaged onto a 250 m x 250 m grid, extend up to 16-18 m with the thickest deposits located towards the eastern end of Area 459. Up-estuary, across the Bedwyn Sands site, the majority of the sand resource is located within Welsh waters, and particularly concentrated within the exclusion zone along the northern extent of the extraction site. Within the area available to dredge from Welsh waters (the area outside of the exclusion zone), resource thickness ranges from 6-8 m on the eastern edge to >22 m in the west. Similarly, across the part of the site within English waters, available resource thickness varies from 4-6 m in the east to 14-16 m at the southern tip of the site.

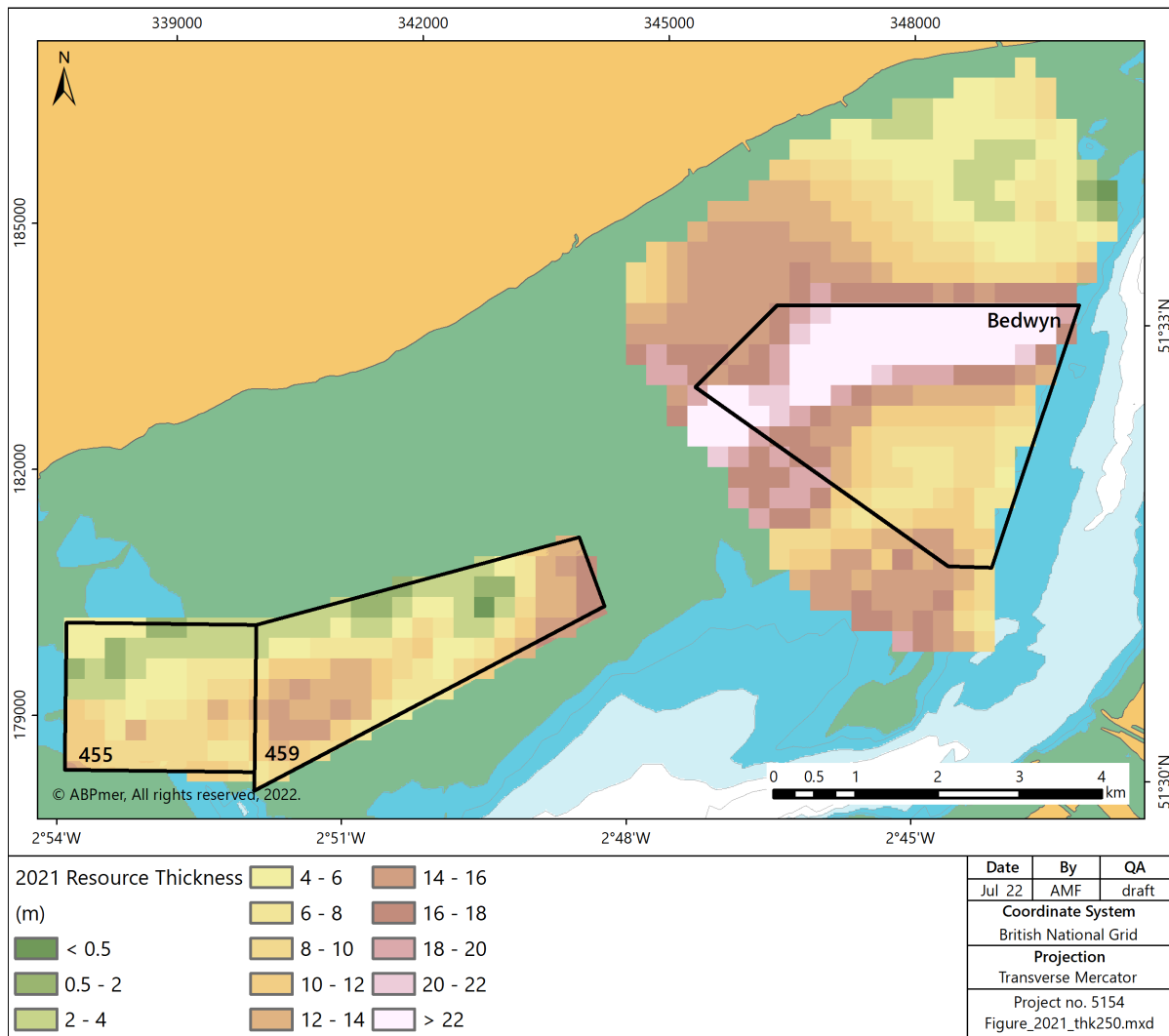


Figure 2. Estimated resource thickness from 2021 annual monitoring survey

5.2.3 Possible environmental effects

Dredging on Bedwyn Sands and NMG has the potential to affect physical processes through the following impact pathways:

- Reduction in beach volume from ‘draw-down’ of material into the dredged areas;
- Reduction of shelter provided by the banks, as a result of dredging;
- Changes to the tidal regime due to the creation of dredged depressions;
- Changes to the wave regime at the coast, as a result of refraction over the dredged areas;
- Changes to the sediment transport and supply to the coastline; and
- Cumulative effects of dredging in other sites within the region.

Marine aggregate extraction has the potential to indirectly change marine hydrodynamic processes including currents and waves. The most important factors that drive these changes are the total volume of material removed and the water depths where aggregate extraction takes place. Previous wave studies carried out for the Severn Estuary found no predicted changes to wave heights along either the Welsh or English coastlines, as a result of the cumulative extraction of aggregates (HR Wallingford, 2008).

5.2.4 Further work required for EIA

The following key elements of work will be required as part of the EIA:

- A review of physical processes at Bedwyn Sands and NMG, and the surrounding region, based on existing available information;
- Bedwyn Sands and NMG-specific data and reports, including the Coastal Impact Study (CIS) (to be undertaken in support of the renewal application process), ongoing annual monitoring surveys and reporting, and studies undertaken in support of the previous Marine Licence applications;
- Assessment of the identified impact pathways will be carried out based on consideration of the proposed activities, set against the context of available monitoring data and pre-existing studies on the impacts of aggregate extraction across the Study Area; and
- The potential cumulative effects of dredging in Bedwyn Sands and NMG and relevant other areas within the Severn Estuary region will be considered.

5.3 Water and sediment quality

This section sets out the proposed scope of the ES chapter that will report the findings of the water and sediment quality assessment of the proposed aggregate dredging.

5.3.1 Legislation, policy and guidance position

The potential effects of the proposed aggregate dredging on water and sediment quality will be considered in the respective topic-specific ES chapter, which will cross-reference, as appropriate, relevant policy, legislation and guidance, including:

- The Marine and Coastal Access Act 2009 (MCAA);
- The Habitats Regulations;
- The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017;
- Bathing Water Regulations 2013;
- Nitrate Pollution Prevention Regulations 2015 (as amended);
- Urban Waste Water Treatment (England and Wales) Regulations 1994 (as amended);
- Shellfish Water Protected Areas (England and Wales) Directions 2016 (under the WFD Regulations 2017);
- UK Marine Policy Statement (MPS) (HM Government, 2011) as required by Section 44 of the Marine and Coastal Access Act 2009;
- South West Inshore Marine Plan;
- Welsh National Marine Plan (Welsh Government, 2019);
- Environment (Wales) Act;
- Relevant local policy; and
- The Environment Agency's "Clearing the Waters for All" guidance (Environment Agency, 2016a).

5.3.2 Description of the existing environment

The National Marine Monitoring Programme (NMMP) found that, in general, the highest contaminant concentrations are found in coastal waters close to industrialised and heavily urbanised areas (Marine Environment Management Group (MEMG), 2004), such as the Severn Estuary.

The WFD (2000/60/EEC) establishes a framework for the management and protection of Europe's water resources. It is implemented in England and Wales through the Water Environment (WFD) (England

and Wales) Regulations 2017, known as the Water Framework Regulations⁸. In addition to the WFD Regulations, other relevant for Bedwyn Sands and NMG comprise the Priority Substances Directive (2008/105/EC and 2013/39/EU), the revised Bathing Water Directive (2006/113/EC) and the MSFD (2008/56/EC).

The Environment Agency published River Basin Management Plans (RBMPs), which set out measures through which compliance with WFD objectives will be achieved. The proposed activities are located within the Severn River Basin District (Environment Agency, 2016b), and overlap the Welsh Severn Lower transitional water body (ID: GB530905415401). As summarised by Environment Agency (2009), the Severn Lower transitional water body is classified as a heavily modified water body (HMWB) and is currently at 'moderate' overall status, based on 'moderate' ecological potential and 'good' chemical status. The Severn Middle (ID: GB530905415402), Bristol Avon (ID: GB530905415405), Wye (ID: GB530905415406) and Usk (ID: GB530905415404) transitional water bodies all flow into the Severn Lower transitional water body. All these water bodies are in moderate overall condition with moderate ecological potential and good chemical status with the exception of Severn Middle which has a failing chemical status.

Swansea Bay East, South and West, Queen's Dock Swansea and Porthcawl are the closest designated Shellfish Waters to Bedwyn Sands and NMG (approximately 50 km to the west).

The nearest coastal bathing water to Bedwyn Sands and NMG is Clevedon Beach in England (approximately 6 km to the south), for which 'good' water quality has been reported for the past 5 years (Environment Agency, 2021).

5.3.3 Possible environmental effects

The proposed work at Bedwyn Sands and NMG has the potential to affect water and sediment quality conditions through the following impact pathways:

- Potential changes to suspended sediment concentrations;
- Potential changes to dissolved oxygen;
- Potential changes to levels of contaminants in water; and
- Potential impacts from redistribution of sediment-bound chemical contaminants.

5.3.4 Further work required for EIA

The following key elements of work will be required as part of the EIA:

- A review of water and sediment quality conditions at Bedwyn Sands and NMG, based on existing available information of the marine environment. This will include:
 - Area specific sediment data,
 - Monitoring / pre-dredge reports and data from Bedwyn Sands and NMG;
 - Other sources, including: the latest RBMPs, Severn Tidal Power SEA⁹; Joint Nature Conservation Committee (JNCC) website;
 - NRW and Environment Agency water quality monitoring data.
- Assessment of the effects of dredging on bathing waters and WFD water bodies; and
- Assessment of the identified pathways for water and sediment quality impacts.

⁸ Following the UK leaving the EU, the main provisions of the WFD have been retained in English law through the Floods and Water (Amendment etc.) (EU Exit) Regulations 2019.

⁹ Available at: <https://www.gov.uk/government/collections/severn-tidal-power-feasibility-study-conclusions> (Accessed May 2022)

A separate WFD compliance assessment will be produced and included as an appendix.

Please note that impacts related to vessel movement and risks of water quality impacts from spillages, etc. will be considered as part of the navigation impact assessment.

5.4 Nature conservation and marine ecology

This section sets out the proposed scope of the ES chapter that will report the findings of the nature conservation and marine ecology assessment of the proposed work. Specifically, this includes consideration of potential effects on benthic habitats and species (including non-native species), fish and shellfish, and marine mammals. This section also considers coastal waterbirds utilising intertidal and subtidal habitats for roosting and feeding.

5.4.1 Legislation, policy and guidance position

The potential effects of the proposed aggregate dredging on nature conservation and marine ecology receptors will be considered in the respective topic-specific ES chapter, which will cross-reference, as appropriate, relevant policy, legislation and guidance, including:

- The Marine and Coastal Access Act 2009 (MCAA);
- The Wildlife and Countryside Act (WCA) 1981, as amended;
- The Countryside and Rights of Way Act 2000;
- The Natural Environment and Rural Communities (NERC) Act 2006;
- The Habitats Regulations;
- The Water Environment (WFD) Regulations 2017;
- UK Marine Policy Statement (MPS) (HM Government, 2011) as required by Section 44 of the Marine and Coastal Access Act 2009;
- South West Inshore Marine Plan;
- Welsh National Marine Plan (Welsh Government, 2019);
- Environment (Wales) Act 2016;
- UK Biodiversity Action Plan, superseded by the UK Post-2010 Biodiversity Framework (JNCC, 2012);
- UK Marine Strategy (Defra, 2019a); and
- Relevant local policy.

5.4.2 Description of the existing environment

Nature conservation sites

Three international nature conservation designations are present within the study area. These are the Severn Estuary/Môr Hafren Special Area of Conservation (SAC), the Severn Estuary SPA, and the Severn Estuary/Môr Hafren Ramsar site (Figure 3). Many of these habitats support important numbers of resident and migratory birds and marine species. Together, these sites form the Severn Estuary/Môr Hafren European Marine Site (Natural England and CCW, 2009) which protects the following features:

- Estuaries;
- Intertidal mud and sandflats;
- Saltmarsh;
- Reefs;
- Subtidal sandbanks;
- Migratory fish; and
- Birds (overwintering and on passage).

Mobile and migratory fish species of the River Usk and River Wye SACs could furthermore conceivably be affected when on migration to and from the rivers, and these sites will thus be considered in the ES and HRA.

In addition, Bedwyn Sands and NMG areas overlap the Severn Estuary SSSI, which is designated for a range of nationally important features including saltmarsh, birds, intertidal mud, sand and rock.

There are no MCZs that overlap with the study area. The closest to the study area is Lundy MCZ located off the north coast of Devon. Additionally, there are no nationally designated sites, Areas of Outstanding Natural Beauty (AONB) or World Heritage Sites located within the study area that directly overlaps with Bedwyn Sands or NMG.

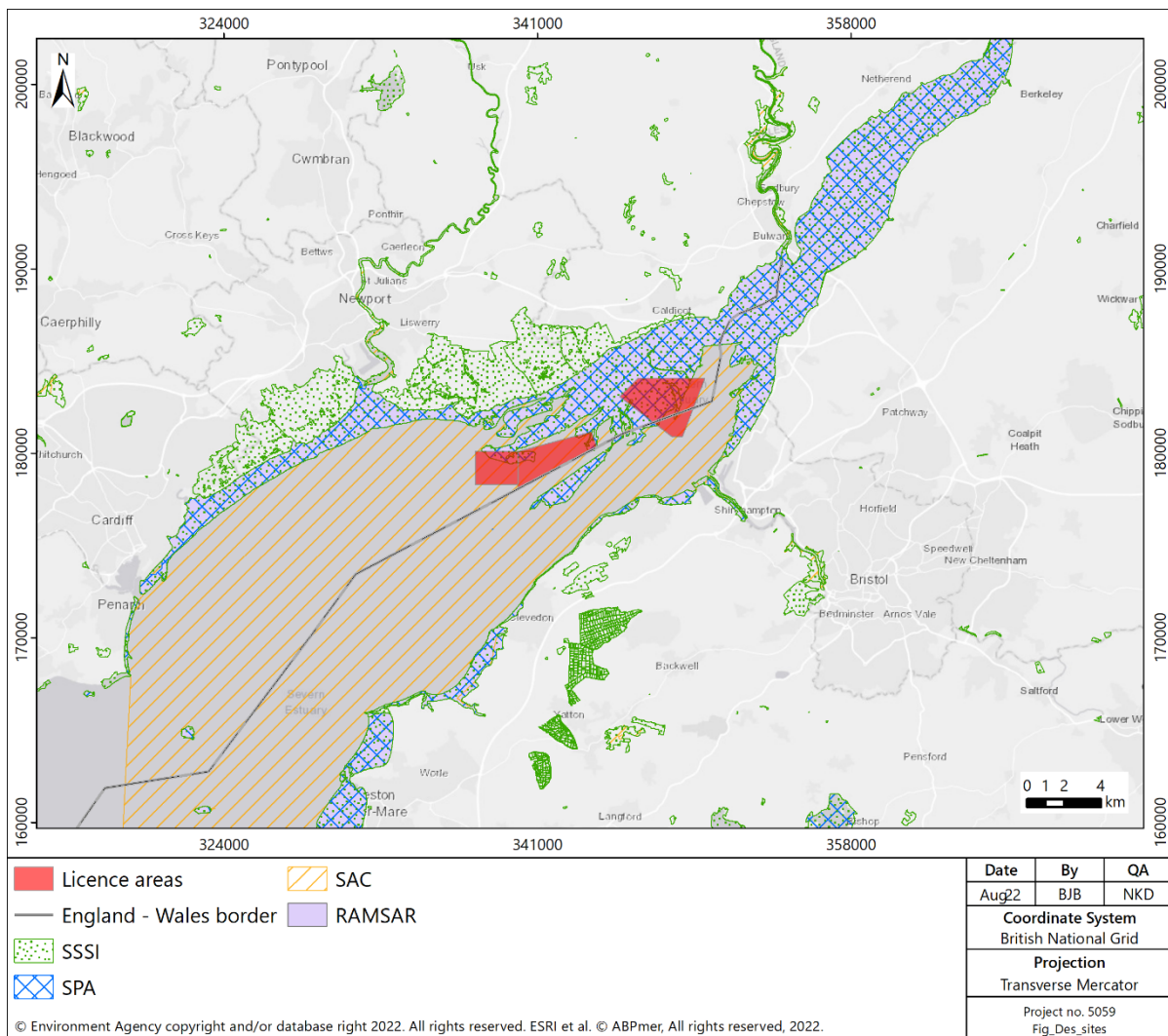


Figure 3. Designated sites in proximity to the proposed aggregate dredge

Benthic ecology

Broad-scale habitat mapping suggests that mud and muddy sand, sand, shingle, rock, saltmarsh and fucoids are the most common marine habitats present throughout the Severn Estuary (Emu, 2006; Brazier *et al.* 2007; Natural England and CCW, 2008). Benthic species distribution within the estuary is mainly influenced by sediment type and the level of consolidation (Davies, 1991); however, in general the physical processes caused by strong tidal currents result in a benthic environment where

colonisation is difficult. A species poor benthic assemblage is therefore characteristic of the estuary, although biomass is not necessarily low (Boyden and Little, 1973).

Previous benthic monitoring at Bedwyn Sands and NMG has highlighted that these areas are overall impoverished in terms of fauna (Henderson *et al.*, 2006; Brazier *et al.*, 2007). This would be expected, as tide-swept, sand environments have limited food availability and are typically characterised by a species poor, macrofaunal community (Van der Wal *et al.*, 2011). In 2017, macrofaunal grab samples were taken within both areas as part of routine monitoring under the previous marine licence. Analysis of these samples showed that Nematodes, polychaetes *Sabellaria alveolata* and *Streblospio* sp., barnacles *Austrominius modestus* and *Amphibalanus improvisus*, and the mudsnail *Peringia ulvae*. In addition, the wider area also had species such as the amphipod *Bathyporeia pelagica*, and polychaete *Mediomastus fragilis*. These species were also present in surveys undertaken in the wider area in 2020.

Non-native species

In general, non-native species find their way into UK coastal waters by a variety of means; however, the most significant mode is via shipping by attachment to hulls or in ballast water. The high levels of commercial shipping and recreational boating within the Severn Estuary have resulted in several non-native invasive species becoming established within the estuary. These include slipper limpet (*Crepidula fornicata*), wireweed (*Sargassum muticum*), Australasian barnacle (*Austrominius modestus*), soft-shelled clam (*Mya arenaria*), Pacific oyster (*Magallana gigas*), Jenkin's spire shell (*Potamopyrgus antipodarum*) and Asian shore crab (*Hemigrapsus sanguineus*).

Fish and shellfish

The fish community of the Severn Estuary is notably species rich and exceeds 100 species in total (Henderson and Bird, 2010). The fish assemblage present in the Middle Grounds area has generally been found to consist of a low number of species, with the most common species being the sand goby. Other species including whiting, bib, cod, poor cod, sprat, greater sandeel, common goby and pogge are present but in very low numbers. Consequently, it is thought that the Middle Grounds sandbank support few if any fish species of commercial interest. The low numbers of fish in the area suggests that it does not provide a significant nursery area for any of the identified species.

The inner Bristol Channel and Severn Estuary are part of a migratory route to and from the rivers of the Severn Estuary for seven species of fish: salmon, sea trout, freshwater lamprey, sea lamprey, eel, twaite shad and allis shad.

The general area is of relatively limited value to commercial shellfisheries. Brown shrimp are the only commercially important shellfish species recorded in the area but again are likely to be present in low densities (less than one per 10 m²) (HR Wallingford, 2003; Emu, 2001). Oysters are also commercially farmed at Porlock Bay over 50 km from the proposed aggregate dredge area.

Marine mammals

The two most commonly encountered marine mammal species in the Severn Estuary are harbour porpoise and grey seal. Harbour porpoise have been found to occur at moderate to high densities throughout much of the outer Bristol Channel (Baines and Evans, 2012; Channel Energy Limited, 2012; Heinänen and Skov, 2015). Harbour porpoises are known to utilise estuaries periodically and have been recorded in the Inner Bristol Channel and Severn Estuary, and even up the River Avon as far as Hotwell (Sea Watch Foundation 2020), although densities further up the estuary are lower than in the outer Bristol Channel, Harbour porpoise is therefore considered likely to occur on occasion in the Bedwyn Sands and NMG areas. Observations gathered primarily from Hurlstone Point suggests that numbers

may fluctuate seasonally, with most sightings occurring during June and July (Sea Watch Foundation 2020).

Grey seals are regularly observed in the Bristol Channel, although usually in small numbers. Sightings are widespread, showing no clustering at any particular location (Channel Energy Limited, 2012). Sightings within the Severn Estuary are occasional; hence the species is expected to occur only sporadically in the Bedwyn Sands and NMG areas. Bottlenose dolphin and common dolphin have also been sighted on occasion further down the estuary, although are thought unlikely to occur within the Bedwyn Sands and NMG areas (Sea Watch Foundation 2020).

Coastal ornithology

The Severn Estuary is an important overwintering site for diverse range of migratory wildfowl and waders, regularly supporting in excess of 75,000 individuals (Austin *et al.* 2014). The Severn Estuary SSSI is internationally important for Dunlin, supporting 7.5% of the British wintering population. The only commonly recorded seabird species in the Severn Estuary are gulls and the Great Cormorant (British Trust for Ornithology (BTO), 2010). Herring Gull and Lesser Black-backed Gull are abundant throughout the area with important breeding populations on Flat Holm and Steep Holm, the former supporting 2.5% of the national population of Lesser Black-backed Gull. The Licence Renewal Areas are within the foraging range of these species when present at the breeding sites.

Bird monitoring undertaken on the sandflats in the vicinity of NMG has generally only recorded small numbers of waterbirds in the area, consisting mainly of gull species (HR Wallingford, 2003; BTO, 2010). To understand better the distribution and abundance of birds in Licence Renewal Areas, the most recently available WeBS Low Tide counts for the sectors which specifically overlap with NMG will be obtained from the BTO.

5.4.3 Possible environmental effects

The anticipated activity at Bedwyn Sands and NMG has the potential to affect marine ecological receptors through a number of key pathways. These are identified for each receptor below. The potential impacts upon designated nature conservation interest features will be assessed in the appropriate receptor group sections.

There is also the potential for impacts to occur through the cumulative effects of dredging from other marine aggregate licence areas. These effects are addressed under the relevant sub-headings below.

Benthic ecology

Dredging has the potential to affect benthic species and habitats through the following impact pathways:

- Potential impacts on benthic species and habitats receptors from seabed removal;
- Potential impacts due to the suspended sediment plume¹⁰;
- Potential impacts due to fine sand dispersion (including bedform);
- Potential impacts due to bathymetric changes (including sediment flux) following dredging;
- Potential disturbance due to noise; and
- Potential impacts through the introduction of non-native species.

¹⁰ In line with an accepted methodology for sediment compliance monitoring in the Severn Estuary / Bristol Channel, a maximum secondary impact zone of 500 m is considered scientifically justifiable for all plume and bedform effects for Bedwyn Sands and NMG; as outlined above in Section 5.2, this is due to the high tidal flows and natural turbidity observed in the Severn Estuary / Bristol Channel region (MarineSpace, 2015). This was also applied and accepted for a recent nearby EIA (ABPmer, 2019).

Fish and shellfish

Dredging has the potential to affect fish and shellfish through the following impact pathways:

- Potential impacts of seabed removal on spawning, nursery and overwintering grounds (including impacts on resident sandeel and spawning herring);
- Potential impacts due to changes in water quality (due to fine sediment plume and fine sand dispersion); and
- Potential impacts due to noise, vibration and lighting effects.

Marine mammals and turtles

Dredging has the potential to affect marine mammals and turtles through the following impact pathways:

- Potential impacts to marine mammals due to the removal of seabed;
- Potential impacts from reduced water clarity due to the suspended sediment plume;
- Potential disturbance due to the noise and vibration effects; and
- Potential collision risk due to vessel movements.

Ornithology

Dredging has the potential to affect ornithology through the following impact pathways:

- Potential indirect effects on waterbirds and marine birds as a result of seabed removal (including prey availability for foraging breeding birds using foraging distances specified by Thaxter *et al.*, 2012);
- Potential impacts on the foraging of marine birds due to suspended sediment plumes;
- Potential impacts on the foraging of waterbirds due to fine sand dispersion (including bedform); and
- Potential impact of disturbance generated by vessel presence on waterbirds and marine birds (including visual, noise and vibration).

5.4.4 Further work required for EIA

The following key elements of work will be required as part of the EIA:

- Review of available sources of information (please see Table 7 for more detail on the proposed main sources of information for the individual sub-topics);
- No dedicated marine ecology surveys have been proposed for the EIA phase for Bedwyn Sands and NMG, nor is it thought necessary to further review geophysical data for the presence of reefs. Rather, it is considered that sufficient data from annual monitoring undertaken in the Areas under the conditions of the previous Marie Licences are available for a high-level classification as part of the Cefas Regional Seabed Monitoring Programme (Cooper and Barry, 2017), covering a characterisation survey in 2017 and a follow-up survey in 2020 (to inform the substantive review; ABPmer, 2022);
- The current biosecurity plan has been in place since the latest renewals in 2017 and will be reviewed (and updated, as necessary) at the pre-dredge stage (i.e. not during the EIA), should renewal licences be granted; and
- Assessment on the effects of dredging on the identified impact pathways for each of the receptor groups (see Section 5.4.3) based on available data and consideration of the proposed activities.

Table 7. Proposed main sources of information for marine ecology topics

Marine Ecology Topic	Proposed Main Sources of Information
Nature conservation sites and species	Relevant GIS site data from the regulators, latest data from designated sites.
Marine ecology - benthic habitats and species	A review of previous sediment and benthic surveys undertaken in the Areas. Other data sources: recent ESs for nearby licence areas; Severn Tidal Power SEA ¹ ; habitat mapping studies undertaken by CCW (now NRW), Natural England and JNCC; European Marine Observation and Data Network (EMODnet); EUSeaMap data; National Biodiversity Network (NBN) gateway; <i>Sabellaria</i> studies and records; SAC and SPA Condition Assessment Monitoring.
Marine ecology - Fish and shellfish ecology	Nearby licence Area 531 (2019) ES; CCW Severn Estuary Fish Review; Cefas nursery and spawning grounds reports and data layers; most recent EA / NRW transitional and coastal (TraC) fish surveys; Cefas trawl surveys; Severn Tidal Power SEA. Consultation with recreational fishermen, Devon and Severn Inshore Fisheries and Conservation Authority (IFCA), Welsh Fishermen's Association.
Marine ecology - Marine and coastal ornithology	Severn Estuary WeBS Core Counts and Low Tide counts; WeBS annual Core Count; European Seabirds at Sea Database, Birdlife International seabird database; Severn Tidal Power SEA. Overlap analysis for breeding seabirds (Woodward <i>et al.</i> , 2019).
Marine ecology - Marine mammals and turtles	Welsh Marine Mammals Atlas, Marine Mammals in UK waters, Small Cetacean Abundance in the European Atlantic and North Sea programmes, Special Committee on Seals Annual Report; Severn Tidal Power SEA; Seal telemetry studies, JNCC reports highlighting areas of high density for harbour porpoise, Joint Cetacean Protocol data.

5.5 Commercial and recreational fisheries

This section sets out the proposed scope of the ES chapter that will report the findings of the fisheries assessment of the proposed work.

5.5.1 Legislation, policy and guidance position

The potential effects of the proposed aggregate dredging on fisheries receptors will be considered in the respective topic-specific ES chapter, which will cross-reference, as appropriate, relevant policy, legislation and guidance, including:

- The Marine and Coastal Access Act 2009 (MCAA);
- The Water Framework Regulations;
- UK Marine Policy Statement (MPS) (HM Government, 2011) as required by Section 44 of the Marine and Coastal Access Act 2009;
- UK Fisheries Act 2020;
- UK Marine Strategy (Defra, 2019a);
- South West Inshore Marine Plan;
- Welsh National Marine Plan (Welsh Government, 2019); and
- Wales Marine and Fisheries Strategic Action Plan (Welsh Government, 2013).

5.5.2 Description of the existing environment

Negligible landings were registered from the respective ICES rectangle. Over the period 2016-2020, landings were only registered in 2016, 2017 and 2018. All were from 10 m and under vessels using drift and fixed nets, or gears using hooks. The total annual average weight of landings from this rectangle was 28 kg of demersal fish, worth £146. The low levels of commercial fishing in the area are primarily due to the large tidal range limiting the use of fishing gear (HR Wallingford, 2008).

Some small-scale, part-time commercial fishing does occur in the estuary however, using gill nets to target mullet, bass and flounder. Several small vessels have been reported to also fish with small beam trawls for flatfish and brown shrimp, supplementing income through chartered angling trips that often target cod, a species that have remained relatively abundant in the area (Walmsley and Pawson, 2007), although it is not clear whether this activity still continues. Previous consultation with fishermen and Automated Identification System (AIS) data suggests that the Bedwyn Sands and NMG area is not considered a worthwhile fishing areas (HR Wallingford, 2003; ABPmer, 2019).

A small number of shore-based fisheries also exist in the vicinity of NMG and Bedwyn Sands. This includes salmon and heritage (elver) fisheries (also sometimes referred to as migratory commercial fisheries).

5.5.3 Possible environmental effects

The key impact pathways relating to commercial and recreational fisheries are the following:

- Potential disruption of fisheries activities due to vessel movements;
- Potential for fishing gear damage; and
- Fishing impacts due to fish stock impacts.

Details of the indirect impacts on commercial and recreational fisheries in relation to fish and shellfish ecology including impacts on critical habitats such as spawning, nursery and overwintering grounds are covered in Fish and Shellfish Ecology (Section 5.4). Reference should also be made to Benthic Ecology (Section 5.4).

5.5.4 Further work required for EIA

The following key elements of work will be required as part of the EIA:

- Detailed review of existing available information and data. The following information sources are to be consulted:
 - MMO landings statistics by ICES rectangle;
 - Devon and Severn IFCA data;
 - Welsh Government data;
 - Vessel management system (VMS) and MMO surveillance data; and
 - Area 531 ES (2019)
- Consultation with local fishermen, as well as relevant staff at the Devon and Severn IFCA, Welsh Fishermen's Association, MMO, Welsh Government and NRW is to be undertaken; and
- Assessment on the effects of dredging on the identified impact pathways.

5.6 Commercial and recreational navigation

This section sets out the proposed scope of the ES chapter that will report the findings of the commercial and recreational navigation assessment of the proposed work.

5.6.1 Legislation, policy and guidance position

The potential effects of the proposed aggregate dredging on commercial and recreational navigation will be considered in the respective topic-specific ES chapter, which will cross-reference, as appropriate, relevant policy, legislation and guidance, including:

- UK Marine Policy Statement (MPS) (HM Government, 2011) as required by Section 44 of the Marine and Coastal Access Act 2009;
- South West Inshore Marine Plan;
- Welsh National Marine Plan (Welsh Government, 2019);
- The Port Marine Safety Code (DfT, 2016);
- A Guide to Good Practice on Port Marine Operations (DfT, 2018); and
- International Maritime Organization (IMO) Revised Guidelines for Formal Safety Assessment (FSA) for use in the IMO rule making process (IMO, 2018).

5.6.2 Description of the existing environment

For the purpose of this EIA, the wider study area for the navigation assessment is proposed to cover Bedwyn Sands, NMG and the Severn Estuary, from the M4 Severn Bridge up to the line passing through Lavernock Point and Flat Holm in the west.

The Bristol Channel and Severn Estuary is an important shipping area with large ships from national and international destinations using the estuary's ports and anchorages. The study area includes a number of significant commercial ports, namely Bristol (Avonmouth and Royal Portbury Dock) and Newport. Collectively, these ports are an important part of the regional and national economy; in 2020, they handled approximately 9 million tonnes of cargo representing around 2% of the UK total (Department for Transport (DfT), 2020).

Commercial vessels enter the Severn Estuary from the south-west via the deep water approaches in the Outer Bristol Channel. Those bound for Cardiff navigate to the northwest of Flat Holm whilst those transiting to Newport, Bristol or locations up-estuary of the Severn Bridge crossings take the deep water channel between Flat Holm and Steep Holm. Vessels bound for Newport usually transit north of Flat Holm and south of Monkstone, and then transit towards the Newport Channel. Vessels bound for Bristol and Sharpness navigate through the Bristol Deep and King Road channels, with vessels continuing to Sharpness on the tidal River Severn (Severn Tidal Partnership, 2010). The Bristol Deep channel runs along the southern margins of Bedwyn Sands and NMG (see Figure 1).

A range of recreational boating activities take place in the wider study area, including keel boat racing/cruising, motor boating and dinghy sailing. Many of these activities are carried out through Royal Yachting Association (RYA) affiliated training centres and yacht/sailing clubs, of which there are several located in the wider study area. These include Newport and Uskmouth Sailing Club, Clevedon Sailing Club and Portishead Yachting and Sailing Club. Large marinas within the wider study area include Bristol (450 berths) and Portishead (250 berths).

5.6.3 Possible environmental effects

The key impact pathways relating to commercial and recreational navigation include:

- Aggregate dredger accident or incident in Bedwyn Sands or NMG;
- Aggregate dredger accident or incident whilst on passage between Bedwyn Sands or NMG and the dredger berth(s);
- Displacement of vessels out of Bedwyn Sands or NMG; and
- Water quality impacts from pollutants resulting from accidents, incidents or spillages.

A hazard log will also be completed. The potential risks associated with encountering unexploded ordnance (UXO) will be considered specifically under Marine Archaeology (see Section 5.7).

5.6.4 Further work required for EIA

This section sets out the key elements of work which will be required as part of the EIA.

Key information on navigation within the study area will be collected from public domain datasets e.g. DfT shipping and port statistics and the most recently released Maritime and Coastguard Agency (MCA) Automatic Identification System (AIS) data. This will identify:

- Vessel transit tracks and intensity of sea area usage;
- Vessel type; and
- Vessel voyage information (including port of origin and destination).

Data will be requested from aggregate companies regarding the nature of vessel movements to, at and from other aggregate licence areas. Further relevant information sources include:

- Military practice and exercise areas;
- Licensed marine disposal sites;
- Royal Yachting Association indicative cruising routes and sailing areas;
- Data from the Marine Accident Investigation Branch (MAIB) on reportable ship incidents;
- Royal National Lifeboat Institute (RNLI) incident response data;
- National 2015 AIS dataset; and
- The Severn Tidal Power SEA navigation study.

Consultation will be carried out with Statutory Harbour Authorities adjacent to Bedwyn Sands and NMG, including (but not limited to) the following organisations:

- The Bristol Port Company (in their capacity as Vessel Traffic Service (VTS) authority);
- Gloucester Harbour Trustees; and
- Associated British Ports (for the ports of Cardiff and Newport).

An assessment on the effects of dredging on the identified navigational impact pathways will be carried out. The potential risks associated with encountering unexploded ordnance (UXO) will be considered specifically under Marine Archaeology (see Section 5.7).

5.7 Marine archaeology

This section sets out the proposed scope of the ES chapter that will report the findings of the marine archaeology assessment of the proposed work. Wessex Archaeology has been commissioned to undertake the marine archaeology assessments for the Bedwyn Sands and NMG EIA.

5.7.1 Legislation, policy and guidance position

The potential effects of the proposed aggregate dredging on marine archaeology will be considered in the respective topic-specific ES chapter, which will cross-reference, as appropriate, relevant policy, legislation, and guidance, including:

- Ancient Monuments and Archaeological Areas Act 1979;
- Historic Environment (Wales) Act 2016
- The Marine and Coastal Access Act 2009;
- Merchant Shipping Act 1995;

- The Protection of Wrecks Act 1973;
- Protection of Military Remains Act 1986;
- National Planning Policy Framework (2021);
- Planning Policy Wales (Welsh Government, 2021);
- Planning Policy Wales Technical Advice Note (TAN) 24: The Historic Environment (Welsh Government, 2017);
- South West Inshore Marine Plan;
- Welsh National Marine Plan (Welsh Government, 2019);
- Well-being of Future Generations (Wales) Act 2015;
- Cadw best-practice guidance on managing the marine historic environment of Wales (Cadw, 2020);
- BMAPA and The Crown Estate 'Good Practice Guidance: Extraction by Dredging of Aggregates from England's Seabed' (BMAPA, 2017); and
- Marine Aggregate Industry (MAI) Protocol for the reporting of finds of archaeological interest (2005); and
- Relevant local policy.

5.7.2 Description of the existing environment

As described in the Physical Process section above, Bedwyn Sands and North Middle Ground (Licence Areas 455 and 459) are predominantly intertidal sandflat features, located within the Severn Estuary. Bedwyn Sands is an intertidal 'sand flat' rather than a classic 'sand bank', as it lacks a distinctive crest. It is composed of sediments which range from sand to pebble-sized material, which are sorted as a result of tidal flows over the area. It is the well-sorted medium sand that is of particular interest to the aggregate industry. Previous studies (e.g. McLaren and Collins, 1989) have identified that sand moves freely between the sandbank features of the Severn Estuary, driven predominantly by the asymmetry of the tide, and is in a continual state of re-working giving significant depths of material across the three licence areas. The three licence areas cover approximately 19.8 km².

Marine archaeology receptors will be considered against the following four categories:

- Prehistoric Archaeology: this comprises land surface with evidence of human activity, including now-submerged landscape features, artefacts, sites and find-spots that date from the earliest occupation;
- Maritime Archaeology: maritime archaeological sites consist broadly of vessel remains, wreckage and submerged vessel/cargo debris;
- Aviation Archaeology: this comprises all military and civilian aircraft crash sites and related wreckage; and
- Historic Seascape Characterisation.

Prehistoric archaeology

The Severn Estuary has one of the richest and most varied archaeological landscapes in Europe and has been subject to anthropogenic influences from the Palaeolithic era (Bell, 2000). Finds in the Severn Estuary have included Palaeolithic hand axes, Mesolithic footprints at Goldcliff on the Gwent Levels, and stone tool scatters recovered from the foreshore; indicating the presence of hunter-gatherer groups present before the introduction of farming (Severn Estuary Partnership, 2022a). In addition, changes in sea level have resulted in the potential for archaeological assets in the Severn Estuary to now be submerged. At times of lower sea level, areas that are currently submerged would have been dry land, and where these areas contained rich natural resources (e.g. river valleys and the coastal zone), they would have been preferred areas of habitation for human populations.

Maritime archaeology

Maritime archaeological sites can be considered to comprise two broad categories; the remains of vessels that have been lost as a result of stranding, foundering, collision, enemy action and other causes, and those sites that consist of vessel related material. Wreck related debris includes (but is not limited to) equipment lost overboard or deliberately jettisoned such as fishing gear, ammunition and anchors or the only surviving remains of a vessel such as its cargo or a ballast mound. Shipwrecks on the seabed provide an insight on the types of vessels used in the past, the nature of shipping activity in the wider area and the changing usage of the marine environment through different periods. Such remains are considered to be more likely in sediments which promote the preservation of wreck sites (e.g. finer grained sediments that are not subject to high levels of mobility), particularly where such sediments have seen limited, recent disturbance.

Wrecks have been identified within the Severn Estuary covering various periods of history. Though evidence for Neolithic seafaring is indirect or through reuse of materials, the environment of the Severn estuary is favourable to the preservation of organic material, including early boat remains. For example, a Bronze Age boat has been recorded at Caldicot, and a possible Roman ferry boat found close to the inland margin of the levels at Magor, Gwent, from what was then a tidal creek. Similarly, the '*Newport Ship*' was discovered during the excavation for a new arts centre in Newport and is one of the most complete examples of a late medieval ship, believed to have been built *circa* 1465 (Severn Estuary Partnership, 2022a).

Within the three Licence Areas, the remains of one distributed vessel, the tug *Mercia*, lost in 1942, have been identified. NRHE/NMHR, GGAT and Bristol HER report no recorded losses for the three Areas. This does not, however, preclude the possibility of wreck material from unknown losses being found or transported into the Licence Areas, though none has been reported through the MAI Protocol.

Aviation archaeology

Marine aviation archaeology receptors comprise the remains of military and civilian aircraft that have been lost at sea. Evidence is divided into three primary time periods based on major technological advances in aircraft design: Pre-1939; 1939-1945; and post-1945.

Whilst there are no reported aviation crash sites within the three licence areas, there is potential for the remains of unidentified aircraft to be found within the dredged areas, particularly dating to the 1939-1945 period when there was significant aviation activity in the area, including training flights, air transport, and enemy action against ports and towns on both sides of the Severn. As nearly 20% of all losses during this period are recorded as accidental, with a significant number having no known location, the possibility of material being found must be considered.

5.7.3 Possible environmental effects

The key impact pathways relating to marine archaeology are as follows:

- Direct damage to the marine archaeological resource; and
- Indirect damage to the marine archaeological resource.

An additional consideration when assessing the presence of World War I (WWI) and WWII vessels and aircraft may be the potential presence of unexploded ordnance (UXO) remaining on board. A statement on this will be included in the ES.

5.7.4 Further work required for EIA

This section sets out the key elements of work which will be required as part of the EIA. The assessment will focus on the three main assessment themes: Prehistoric archaeology; Maritime archaeology; and Aviation archaeology. The key objectives of the study will be:

- To provide an overview on the historic environment in the study area based on existing archaeological records and secondary sources;
- To highlight known sites that may be impacted by the proposal with particular reference to located marine sites and recorded shipping losses;
- To summarise the potential for the presence of hitherto unknown sites that may be impacted by the proposal;
- To comment on the importance of known and potential sites;
- To set out the statutory, planning and policy context relating to the historic environment in the study area; and
- To assess the effects of dredging on the identified archaeological pathways.

The following data sources will be consulted / interpreted:

- Previous reports and analyses of the marine archaeology of the study area (including for the previous licence renewal applications and any reported finds since (a new geophysical survey is not considered necessary due to the stable and replenishing nature of the sandbanks (Velegrakis *et al.*, 2001; ABPmer, 2015));
- Records held by: the UK Hydrographic Office (UKHO), the National Records of the Historic Environment (NRHE/NMHR), Cadw and Welsh Archaeological Trusts; Royal Commission of Ancient and Historic Monuments of Wales (RCAHMW) database Coflein;
- Records of shipping and aircraft casualties held by the NRHE/NMHR;
- Records of isolated finds from the English Channel, including those reported through the BMAPA Protocol and relevant assessments, research, and secondary sources; and
- Severn Tidal Power SEA.

Standards statement

The methodology adopted reflects best practice in carrying out archaeological desk-based assessments, as set out by the Chartered Institute for Archaeologists (CIfA) Standard and Guidance for Historic Environment Desk-based Assessment (CIfA, 2014, updated 2020); Wessex Archaeology is a Registered Organisation of the CIfA, and fully endorses its Code of Conduct. Wider industry best-practice will also be followed, including the publication Marine Aggregate Dredging and the Historic Environment (BMAPA *et al.*, 2005). The latter document aims to ensure the effective and practical consideration of the historic environment in the licensing of marine aggregate extraction and elaborates on the guidance provided in the Code of Practice for Seabed Developers produced by the Joint Nautical Archaeology Policy Committee (JNAPC, 2006).

5.8 Coast protection and flood defence

This section sets out the proposed scope of the ES chapter that will report the findings of the coastal protection and flood defence assessment of the proposed work.

5.8.1 Legislation, policy and guidance position

The potential effects of the proposed aggregate dredging on flood risk receptors will be considered in the respective topic-specific ES chapter, which will cross-reference, as appropriate, relevant policy, legislation and guidance, including:

- National Strategy for Flood and Coastal Erosion Risk Management (Welsh Government, 2020);
- Planning Policy Wales (Welsh Government, 2021);
- Planning Policy Wales Technical advice note (TAN) 15: development and flood risk (Welsh Government, 2004);
- The Water Framework Regulations;
- Flood and Water Management Act 2010;
- Severn Estuary Shoreline Management Plan (Severn Estuary Coastal Group, 2016);
- River Severn Catchment Flood Management Plan (Environment Agency Wales, 2009); and
- Relevant local policy.

5.8.2 Description of the existing environment

The Welsh Government's National Strategy for Flood and Coastal Erosion Risk Management (2020) sets the following overarching objectives for the management of flood and coastal erosion risk in Wales:

- Reduce the consequences for individuals, communities, businesses and the environment from flooding and coastal erosion;
- Raise awareness of and engaging people in the response to flood and coastal erosion risk;
- Provide an effective and sustained response to flood and coastal erosion events; and
- Prioritise investment in the most at-risk communities.

In England, operational management of coastal protection structures lies largely with District and Unitary Councils. Under the Water Resources Act 1991, the Environment Agency is responsible for supervision of all matters relating to flood defence and has permissive powers to maintain and improve water levels on main rivers, overseeing management and funding coast protection works.

Shoreline Management Plans (SMPs) are non-statutory documents intended to both inform and be supported by the statutory planning process. The intention of an SMP is to develop a broad coast defence strategy that is technically, economically and environmentally sustainable. The coastal management policies for the area encompassing the proposed aggregate dredging are detailed within the Severn Estuary Flood Risk Management Plan and the Severn Estuary (Anchor Head to Lavernock Point) SMP19 (Severn Estuary Coastal Group, 2016).

The Severn Estuary Flood Risk Management Strategy (FRMS) sets out where and how to manage flood risk to provide most benefit to communities and the environment in the region. Various sites in the Severn Estuary have been identified as potential for habitat creation to offset intertidal and other habitat loss. The Severn River Basin District (Environment Agency, 2016b) was made available as part of implementing the Flood Risk Regulations 2009.

5.8.3 Possible environmental effects

A change in wave energy along a coastline over the long term could change the potential for increased coastal erosion, undermining coastal defence infrastructure (leading to increases in maintenance expenditure and/or a requirement for beach recharge schemes). Changes in wave heights and/or sediment transport pathways due to the cumulative effects of aggregate extraction from all licence areas

in the region could impact the adjacent coastline. Therefore, the following impact pathway is considered to be relevant to coastal defences:

- Potential for changes to wave height/exposure to affect coastal protection/flood defence; and
- Potential for maintaining source of aggregate for coastal defences and beach nourishment.

It is feasible that the type of sediment extracted from Bedwyn Sands and NMG could be used for coastal defences and beach nourishment in the future. Historically, material from a nearby (surrendered) Licence Area, Area 377/379/381 (Holme Sand), has been used for such purposes and, therefore, the potential impact pathway (benefit) for maintaining a source of aggregate for coastal defences and beach nourishment has been scoped in.

5.8.4 Further work required for EIA

The following key elements of work will be required as part of the EIA:

- A review of the potential net lowering of the seabed, as a consequence of the aggregate extraction at Bedwyn Sands and NMG, which could lead to increased wave activity along the coast (based on the coastal processes assessment);
- Consider potential impacts of dredging at Bedwyn Sands and NMG on coast protection and flood defence objectives set by the Severn SMP and the Severn Flood Risk Management Strategy (FRMS);
- Consider information contained in: Severn Estuary Coastal Group (SECG) website, Area 531 (2019) ES;
- Provide consideration of future climate change impacts in the region; and
- To assess the effects of dredging on the identified pathways.

5.9 Air quality

This section sets out the proposed scope of the ES chapter that will report the findings of the air quality assessment of the proposed work.

5.9.1 Legislation, policy and guidance position

The potential effects of the proposed aggregate dredging on air quality will be considered in the respective topic-specific ES chapter, which will cross-reference, as appropriate, relevant policy, legislation and guidance, including:

- Clean Air Strategy (Defra, 2019b);
- National Planning Policy Framework (MHCLG, 2021) and relevant Planning Practice Guidance (Ministry of Housing, Communities and Local Government (MHCLG), 2019);
- The UK Marine Policy Statement (HM Government, 2011);
- Air Quality Standards Regulations 2016 (as amended); and
- Relevant local policy.

5.9.2 Description of the existing environment

There is no available information on background air quality levels for Bedwyn Sands and NMG. Generally, air quality around Bedwyn Sands and NMG appears to be good, apart from some of the urban areas in relative proximity to the Areas, for which Air Quality Management Areas (AQMAs) have been declared. Air Quality Plans have been developed in nearby urban areas to monitor and control levels of nitrogen dioxide (NO₂), including the Cardiff Urban Area Bristol Urban Area agglomeration zones

(UK0026 and UK0009, respectively) (Defra, 2020). However, it is not anticipated that the aggregate dredging operations at Bedwyn Sands and NMG will impact NO₂ levels in the area. There are no Air Quality Management Areas (AQMAs) that overlap with the Licence Renewal Areas; the closest AQMAs are located more than 5 km away in Bristol, Newport and Cardiff (Defra AQMA Interactive Map¹¹).

Most international shipping uses low grade residual fuel which generates carbon dioxide (CO₂), nitrogen oxides (NO_x) and sulphur oxides (SO_x), all of which are greenhouse gases. Dredging vessels in the UK marine aggregate industry use Marine Diesel Oil (MDO) or Marine Gas Oil (MGO) which are distillate fuels with lower sulphur content than residual fuel, and hence marine aggregate vessels will generate lower SO_x emissions than from comparably sized vessels using residual fuel (Lloyd Jones *et al.*, 2010). The Crown Estate (2010) commissioned a study to investigate the carbon footprint of the extraction of marine aggregates from seabed areas surrounding England and Wales. The report concluded that total CO₂ emissions for vessels with a loading capacity <3,000 tonnes is 6.41 kg/t, compared to 11.73 kg/t for vessels with >3,000 tonnes capacity.

5.9.3 Possible environmental effects

The dredger movements will result in short-term air quality changes. These changes are expected to be confined to the Areas and transit routes and, given the distance from sensitive receptors, are unlikely to result in a significant effect. Despite this low risk, current Government guidance identifies air quality as a potential issue that requires further consideration in marine aggregate EIAs (DCLG, 2006). In outline, therefore, the key impact pathway relating to air quality is as follows:

- Potential for change in air quality due to aggregate dredger emissions.

5.9.4 Further work required for EIA

The following key elements of work will be required as part of the EIA:

- The following information sources will be considered: UK Air Information and Air Quality Management Areas websites, BMAPA sustainable development reports; Severn Tidal Power SEA; and
- The anticipated air emissions resulting from the renewal of dredging licences will be estimated based on existing data on carbon dioxide (CO₂) emitted per tonne dredged (reported in BMAPA sustainable development reports; e.g. (BMAPA, 2022).

5.10 Infrastructure and other marine users

This section sets out the proposed scope of the ES chapter that will report the findings of the infrastructure and other marine users assessment of the proposed work.

5.10.1 Legislation, policy and guidance position

The potential effects of the proposed aggregate dredging on infrastructure and other marine users will be considered in the respective topic-specific ES chapter, which will cross-reference, as appropriate, relevant policy, legislation and guidance, including:

- South West Inshore Marine Plan;
- Welsh National Marine Plan (Welsh Government, 2019);

¹¹ Defra AQMA Interactive Map (<http://uk-air.defra.gov.uk/aqma/> Accessed May 2022)

- National Planning Policy Framework (2021);
- Planning Policy Wales (Welsh Government, 2021);
- Planning Policy Wales Technical advice note (TAN) 15: development and flood risk (Welsh Government, 2004);
- UK Marine Policy Statement (MPS) (HM Government, 2011) as required by Section 44 of the Marine and Coastal Access Act 2009;
- Severn Estuary Shoreline Management Plan (Severn Estuary Coastal Group, 2016);
- British Marine Aggregate Producers Association (BMAPA) 'Marine Aggregate Dredging and the Coastline: A Guidance Note' (BMAPA 2013);
- BMAPA and The Crown Estate 'Good Practice Guidance: Extraction by Dredging of Aggregates from England's Seabed' (BMAPA, 2017); and
- National Strategy for Flood and Coastal Erosion Risk Management (Welsh Government, 2020);
- Flood and Water Management Act 2010; and
- River Severn Catchment Flood Management Plan (Environment Agency Wales, 2009).

5.10.2 Description of the existing environment

There do not appear to be any energy generation developments, active subsea cables, and oil and gas infrastructure (current or planned) within proximity to Bedwyn Sands and NMG, or the surrounding area, hence there is no potential for impact on these receptors. However, there are a number of disposal sites within 5 km of the Licence Renewal Areas, and a military firing range approximately 5 km to the north east.

Tourism is one of the largest services industries around the estuary (Severn Estuary Partnership, 2022b), although the combination of high tidal range, strong currents and high levels of turbidity limits the amount of recreational water use in the Severn Estuary (Thomson, 2007). Activities within the wider study area include bird watching, wildfowling and walking (Department of Energy and Climate Change (DECC), 2010; Severn Estuary Partnership, 2022b). Please note that recreational navigation is addressed under Section 5.6.

5.10.3 Possible environmental effects

Dredging at Bedwyn Sands and NMG has the potential to affect infrastructure and other users through the following impact pathway:

- Potential impacts of physical processes changes on marine and land-based infrastructure.

5.10.4 Further work required for EIA

The following key elements of work will be required as part of the EIA:

- The following information sources are to be considered to characterise the baseline (amongst others): Relevant data layers (e.g. cables, pipelines, activity and lease areas); Severn Estuary Partnership website; Severn Tidal Power SEA; Welsh Planning Portal data layers;
- To assess the effects of dredging on the identified pathway.

5.11 Human health

This section sets out the proposed scope of the ES chapter that will report the findings of the human health assessment of the proposed work.

5.11.1 Legislation, policy and guidance position

The potential effects of the proposed aggregate dredging on human health will be considered in the respective topic-specific ES chapter, which will cross-reference, as appropriate, relevant policy, legislation and guidance, including:

- Well-being of Future Generations (Wales) Act 2015;
- Health and Social Care Act 2012;
- Somerset Health and Wellbeing Board / strategy (Somerset County Council, 2021); and
- Relevant local policy.

5.11.2 Description of the existing environment

Information on the general health and well-being of the English and Welsh population can be drawn from several Community Health Indicators obtained in the 2011 Census (with similar data from the 2021 Census expected to be analysed by early 2023). One of these indicators uses the percentage of household residents who reported their health over the previous 12 months as having been "not good". For the UK as a whole, 18.8% of people described their health for the 12 months prior to Census day (27 March 2011) as "not good". Values for England were below the UK average at 18.5%, with Wales the highest at 22.2%. The proportion of people with a limiting long-term illness showed a similar trend, with the lowest proportion in England and highest in Wales. Life expectancy was slightly above the UK average in England and typically slightly below in Wales.

With regard to the Severn Estuary / Inner Bristol Channel region, population density is generally low, below that of both England and the UK as a whole, although above that of Wales. Higher population densities are observed around Bristol and Cardiff (4,022 and 2,531 persons/km², respectively).

Employment structure is considered to be very similar to the rest of the UK, although considerable variation is observed between individual areas. Contributions to the industrial sector are greatest in the south Wales areas of Neath Port Talbot (25.4%) and Bridgend (23.7%), while the service sector is most dominant in urban areas such as Cardiff (86.6%) and Bristol (85.7%).

England and Wales both have national legislation in place to promote human health and wellbeing. In Wales, the Well-being of Future Generations (Wales) Act 2015 aims to uphold and promote sustainable development and well-being by ensuring that public bodies consider long term effects and work effectively with communities and other relevant public bodies.

This Act put in place seven well-being goals. In England, the Health and Social Care Act 2012 led to the establishment of Health and Wellbeing Boards at county council level. These are forums designed to produce an understanding of the needs of local communities, and to improve the overall health and wellbeing. These boards developed Health and Wellbeing Strategies which identify priorities for their given area.

5.11.3 Possible environmental effects

Dredging at Bedwyn Sands and NMG has the potential to affect human health through the following impact pathway:

- Potential impacts on human health.

5.11.4 Further work required for EIA

The following key elements of work will be required as part of the EIA:

- The following information sources are to be considered to characterise the baseline (amongst others): The Wales We Want website, The Office of National Statistics 2001 /2011 census comparison (2021, if available), and the Welsh Government website;
- Signposting of other relevant chapters of the ES; and
- To assess the effects of dredging on the identified pathway.

6 Summary

Following this scoping review, a number of environmental topics and impact pathways are proposed to be either 'scoped in' (i.e. require further assessment as part of the EIA) and/or 'scoped out' (i.e. do not require further assessment as part of the EIA). The findings for each topic and the potential impact pathways that are proposed to be scoped in and out of the EIA are summarised in Table 8.

The relevant environmental topic sections of the report in Section 5 provide further detail on the justification for, and approach to, the further assessment work that will be undertaken as part of the EIA.

Furthermore, potential cumulative effects of the proposed aggregate dredging alone and as a result of other plans, projects and ongoing activities will be assessed for each topic that has been scoped into the EIA (Section 4.2.6).

In addition to the EIA which will be documented in the ES, a marine plan conformance assessment, an HRA, a WFD compliance assessment, an archaeology desk-based assessment and a consultation log will be provided within or as an appendix to the ES.

Table 8. Summary of key assessment issues scoped in (orange) and scoped out (green) of the EIA, and summary of proposed further work

Issue	Proposed Further Work
Physical Processes (Section 5.2)	<ul style="list-style-type: none"> ▪ A review of physical processes at Bedwyn Sands and NMG, and the surrounding region, based on existing available information, ongoing annual monitoring surveys and a dedicated Coastal Impact Study; ▪ Assessment of the identified physical processes impact pathways; ▪ Assessment of potential cumulative effects.
Water and Sediment Quality (Section 5.3)	<ul style="list-style-type: none"> ▪ A review of water quality conditions at Bedwyn Sands and NMG, based on existing available information and monitoring data; ▪ Assessment of the effects of dredging on nearby bathing waters and WFD water bodies; and ▪ Assessment of the identified pathways for water and sediment quality. <p>Impacts related to vessel movement and related risks of water quality will be considered as part of the navigation impact assessment.</p>
Nature Conservation and Ecology (Section 5.4)	<ul style="list-style-type: none"> ▪ Detailed review of existing available information, including 2017-2021 benthic survey and available sediment data; and ▪ Assessment on the effects of dredging on the identified impact pathways for each of the receptor groups. ▪ No dedicated marine ecology surveys or interpretation of geophysical data to investigate the presence of reefs are proposed for this EIA (it is proposed to defer any investigations considered necessary to the pre-dredge stage).
Commercial and Recreational Fisheries (Section 5.5)	<ul style="list-style-type: none"> ▪ Review of available information and data, ▪ Consultation with fishermen and relevant organisations / regulators to determine the level and intensity of commercial and recreational fishing activity within and around Bedwyn Sands and NMG; and ▪ Assessment on the effects of dredging on the identified fisheries pathways.

Issue	Proposed Further Work
Commercial and Recreational Navigation (Section 5.6)	<ul style="list-style-type: none"> ▪ Key information on navigation and marine transport within the study area will be collected through consultation with local stakeholders and analysis of relevant statistics / data (including analysis of Automatic Identification System (AIS) data, dredging vessel movements, reportable ship incidents, etc.); and ▪ Assessment on the effects of dredging on the identified navigational pathways.
Marine Archaeology (Section 5.7)	<ul style="list-style-type: none"> ▪ Provide an overview on the development of the historic environment in the study area based on existing archaeological records and secondary sources, supported by the archaeological review of available reports and datasets; ▪ Highlight known sites that may be impacted by the proposal with particular reference to located marine sites and recorded shipping losses; ▪ Summarise the potential for the presence of hitherto unknown sites; ▪ Comment on the importance of known and potential sites; and ▪ Assessment on the effects of dredging on the identified archaeological pathways.
Coast Protection and Flood Defence (Section 5.8)	<ul style="list-style-type: none"> ▪ A review of the baseline conditions; ▪ A review of the potential for increased wave activity along the coast (based on coastal processes assessments); ▪ Consider potential impacts of the licence on coast protection and flood defence objectives set by Severn SMP and FRMS; and ▪ Provide consideration of future climate change impacts in the region.
Air Quality (Section 5.9)	<ul style="list-style-type: none"> ▪ A review of the baseline conditions; and ▪ Estimate the anticipated air emissions resulting from the proposed activity (based on existing CO₂ emissions data).
Infrastructure and Other Marine Users (Section 5.10)	<ul style="list-style-type: none"> ▪ A review of the baseline conditions; and ▪ An evaluation of potential effects of aggregate dredging in close proximity to relevant infrastructure and a military practice area.
Human Health (Section 5.11)	<ul style="list-style-type: none"> ▪ A review of the baseline conditions; and ▪ An evaluation of potential effects of aggregate dredging on human health.
Terrestrial Ecology	No further work is required.
Light	No further work is required.
Airborne Noise and Vibration	No further work is required.
Landscape/Seascape and Visual	No further work is required.
Cumulative/ in-combination (Section 4.2.6)	The potential cumulative/in-combination effects of dredging in Bedwyn Sands and NMG and other known activities, plans or projects in the area will be considered.

7 References

ABPmer (2015). Bedwyn Sands Environmental Statement. ABPmer Report R2389.

ABPmer (2019). Area 531 Environmental Statement, (Marine Aggregate Extraction), ABPmer Report No. R.3078. A report produced by ABPmer for Tarmac Marine and Hanson Aggregates Marine Ltd.

ABPmer (2022). Bedwyn Sands and North Middle Ground: 5-year Substantive Review. ABPmer Report No. R.3836. A report produced by ABPmer for Severn Sands Holdings Ltd.

Austin, G.E., Calbrade, N.A., Mellan, H.J., Musgrove, A.J., Hearn, R.D., Stroud, D.A., Wotton, S.R. and Holt, C.A. (2014). Waterbirds in the UK 2012/13: The Wetland Bird Survey. BTO/RSPB/JNCC.

Baines, M.E. and Evans, P.G.H. (2012). Atlas of the Marine Mammals of Wales. CCW Monitoring Report No. 68. 2nd edition. 139p.

Bell, M, 2000 The Goldcliff Late Mesolithic site, 5400- 4000 cal BC, in Bell, M, Caseldine, A and Neumann, H Prehistoric intertidal archaeology in the Welsh Severn Estuary (CBA Research Report 120, York), 33-63 <https://archaeologydataservice.ac.uk/catalogue/adsdata/arch-281-1/dissemination/pdf/RR120.pdf>

Boyden, C. R., & Little, C. (1973). Faunal distributions in soft sediments of the Severn Estuary. *Estuarine and Coastal Marine Science*, 1(3), 203-223.

Brazier, P., Birch, K., Brunstrom, A., Bunker, A., Jones, M., Lough, N., Salmon, L. and Wyn, G. (2007). When the Tide Goes Out. The Biodiversity and Conservation of the Shores of Wales - Results From a 10 year Inter-Tidal Survey of Wales. Countryside Council for Wales.

British Marine Aggregate Producers Association (BMAPA), English Heritage and The Crown Estate (2005). Protocol for reporting finds of archaeological interest. Prepared by Wessex Archaeology. August 2005.

BMAPA 2013. British Marine Aggregate Producers Association (BMAPA) 'Marine Aggregate Dredging and the Coastline: A Guidance Note'

BMAPA 2017. BMAPA and The Crown Estate 'Good Practice Guidance: Extraction by Dredging of Aggregates from England's Seabed'

British Marine Aggregate Producers Association (BMAPA) (2022) S BMAPA Sustainable Development 2020/2021. BMAPA, London, 12p.

British Trust for Ornithology (BTO) (2010). Severn Tidal Power SEA Topic Paper. Waterbirds. Prepared for Parsons Brinckerhoff Ltd and Black and Veatch Limited.

Cadw (2020). Managing the marine historic environment of Wales. Available at: <https://cadw.gov.wales/sites/default/files/2020-03/39705%20Managing%20Marine%20E%20WEB.pdf>

Channel Energy Limited (2012). Atlantic Array Offshore Wind Farm Draft Environmental Statement Volume 3: Annex 9.1: Marine Mammals.

Chartered Institute for Archaeologists (CIfA) (2014). Standard and guidance for historic environment desk-based assessment. Published December 2014.

CIEEM (2018). Guidelines for Ecological Impact Assessment in the UK and Ireland (Terrestrial, Freshwater, Coastal and Marine). Available at: <https://www.cieem.net/data/files/ECIA%20Guidelines.pdf> (Accessed May 2022).

Cooper, K.M. and Barry, J. (2017). A big data approach to macrofaunal baseline assessment, monitoring and sustainable exploitation of the seabed. Scientific Reports 7, Article number: 12431 (2017).

Cuesta Consulting Limited (2014). Regional Technical Statement for North Wales and South Wales: 1st Review.

Davies, J. (1991). Benthic Marine Ecosystems in Great Britain: A Review of Current Knowledge. Western Channel and Bristol Channel and approaches. MNCR sectors 8 and 9. Nature Conservation Council, CSD Report, No. 1173 (Marine Nature Conservation Review Report, No. MNCR/0R/9).

Defra (2019a) Marine strategy part one: UK updated assessment and Good Environmental Status. Available at: <https://www.gov.uk/government/publications/marine-strategy-part-one-uk-updated-assessment-and-good-environmental-status>.

Defra (2019b). Clean Air Strategy 2019. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/770715/clean-air-strategy-2019.pdf

Defra (2020). Air pollution in the UK 2019. Available at: https://uk-air.defra.gov.uk/assets/documents/annualreport/air_pollution_uk_2019_issue_1.pdf

DfT, 2016. The Port Marine Safety Code. Department for Transport, 2016

DfT, 2018. A Guide to Good Practice on Port Marine Operations. Department for Transport, 2018

Department for Transport (DfT) (2020). UK port freight annual statistics: interactive dashboard. Available at: <https://maps.dft.gov.uk/port-freight-statistics/interactive-dashboard/index.html> [Accessed May 2022].

Department of Communities and Local Government (DCLG) (2006). Marine Minerals Guidance (MMG1). Guidance on the Extraction by Dredging of Sand, Gravel and Other Minerals from the English Seabed. London.

Department of Energy and Climate Change (DECC) (2010). Severn Tidal Power - SEA Topic Paper. Migratory and Estuarine Fish Annex 6: Review of the recreational and commercial fisheries of the Severn Estuary. March 2010.

Emu (2001). North Bristol Deep Aggregate Extraction Licence Area 470; Baseline Macrobenthic Ecology Study.

Emu (2006). Severn Estuary Inter-tidal Biotope Mapping Baseline Phase I Study. A report commissioned by Natural England.

Environment Agency Wales (2009) River Severn: catchment flood management plan. Available at: <https://www.gov.uk/government/publications/river-severn-catchment-flood-management-plan>

Environment Agency (2016a). Clearing the Waters for All guidance. Available at: <https://www.gov.uk/guidance/water-framework-directive-assessment-estuarine-and-coastal-waters> (Accessed May 2022).

Environment Agency (2016b). Part 1: Severn River Basin District River Basin Management Plan. p. 108. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/718336/Severn_RBD_Part_1_river_basin_management_plan.pdf

Environment Agency and NRW (2016) Severn river basin district flood risk management plan. Available at: <https://www.gov.uk/government/publications/severn-river-basin-district-flood-risk-management-plan>

Environment Agency (2009). River Basin Management Plan Severn River Basin District. Main Document, December 2009

Environment Agency (2021). 2021 Bathing water profile of Clevedon Beach [online]. Available at: <https://environment.data.gov.uk/data/bathing-water-profile/ukk1202-36000/2021:1>

Heinänen, S. and Skov, H (2015). The identification of discrete and persistent areas of relatively high harbour porpoise density in the wider UK marine area, JNCC Report No.544 JNCC, Peterborough.

Henderson, P.A. and Bird, D.J. (2010). Fish and macro-crustacean communities and their dynamics in the Severn Estuary. Marine Pollution Bulletin 61(1): 100-114.

Henderson, P.A., Seaby, R.M. and Somes, J.R. (2006). The benthic fauna of the North Middle Grounds and Bedwyn Sands, Severn Estuary. Pisces Conservation Ltd.

HM Government (2011). UK Marine Policy Statement. HM Government, Northern Ireland Executive, Scottish Government, Welsh Assembly Government. March 2011. London: The Stationery Office. Available at: <https://www.gov.uk/government/publications/uk-marine-policy-statement> [Accessed May 2022].

HM Government (2021). South West Inshore and South West Offshore Marine Plan. Department for Environment, Food and Rural Affairs. p. 68. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1004494/FINAL_South_West_Marine_Plan__1_.pdf

HMSO, 2019. Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019

HR Wallingford (2003). North Middle Ground, Severn Estuary. Study of effects of proposed dredging: revised report. HR Wallingford Limited, Report EX4724.

HR Wallingford (2008). Severn Estuary Aggregates Working Group (SEAWG). Interpretation of wave modelling results for coastal impacts. . HR Wallingford Limited, Report EX5707.

HR Wallingford (2008). Severn Estuary Aggregates Working Group (SEAWG). Interpretation of wave modelling results for coastal impacts. . HR Wallingford Limited, Report EX5707.

IEMA (2016). Environmental Impact Assessment Guide to: Delivering Quality Development.

IMO (2018). Revised Guidelines for Formal Safety Assessment (FSA) for Use In The Imo Rule-Making Process.

JNAPC (2006). JNAPC Code of Practice for Seabed Development. Maritime Cultural Heritage and Seabed Development. The Crown Estate.

JNCC (2012). UK Post-2010 Biodiversity Framework, 2012. Available at <http://jncc.defra.gov.uk/page-6189> (Accessed May 2022).

Lloyd Jones, D., van Rhee, C. and Gibbs, T. (2010) Mitigation of Marine Aggregate Dredging Impacts - Benchmarking Equipment, Practices and Technologies Against Global Best Practice. Emu Ltd, Southampton, 168p.

Mankelow, J.M.; Wrighton, C.E.; Brown, T.J.; Sen, M.A.; Cameron, D.G.. 2021 Collation of the results of the 2019 aggregate minerals survey for England and Wales. Nottingham, UK, British Geological Survey, 166pp. (OR/21/024) (Unpublished): http://nora.nerc.ac.uk/id/eprint/530871/1/AM2019_National_Collation-Final.pdf

Before downloading, please read NORA policies.

Marine Aggregate Industry (MAI) Protocol for the reporting of finds of archaeological interest (2005)

MarineSpace (2015). Consideration of Evidence in Respect of Defining Realistic Secondary Impact Zones in the Bristol Channel and Severn Estuary. MarineSpace, Southampton, 5p.

McLaren, P. and Collins, M.B. (1989). Sediment Transport Pathways in the Severn Estuary and Bristol Channel. Unpublished Technical Report for the Severn Barrage Development Project. 54p.

MEMG, 2004. The National Marine Monitoring Programme (NMMP). Marine Environment Management Group, 2004.

MHCLG, 2021. National Planning Policy Framework and relevant Planning Practice Guidance. Ministry of Housing, Communities and Local Government, 2021.

Natural England (2019). Natural England Standard. Habitats Regulations Assessment (HRA) Standard. 15p. Available at: <http://publications.naturalengland.org.uk/file/5479463940259840> [last accessed August 2022]

Natural England (2021). Habitats regulations assessments: protecting a European site. Online content available at: <https://www.gov.uk/guidance/habitats-regulations-assessments-protecting-a-european-site> [last [accessed August 2022]

Natural England and Countryside Council for Wales (CCW) (2007). Disturbance and protected species: understanding and applying the law in England and Wales: A view from Natural England and the Countryside Council for Wales.

Natural England and Countryside Council for Wales (CCW), (2008). The Severn Estuary / Môr Hafren candidate Special Area of Conservation European marine site Natural England (NE) & the Countryside Council for Wales (CCW) advice given under Regulation 33(2)(a) of the Conservation (Natural Habitats, &c.) Regulations 1994, as amended.

Natural England and Countryside Council for Wales (CCW) (2009). The Severn Estuary / Môr Hafren European Marine Site. Natural England and the Countryside Council for Wales' advice given under Regulation 33(2)(a) of the Conservation (Natural Habitats, & c.) Regulations 1994, as amended. June 2009.

NRW, 2021. Permits and Permissions - How a Habitats Regulations Assessments (HRA) is undertaken in the marine licensing process: <https://naturalresources.wales/permits-and-permissions/marine-licensing/marine-licence-habitats-regulations-assessment/?lang=en>

RTPI, 2000. Planning for Biodiversity (out of print) as used in the emerging CIEEM guidance. Royal Town Planning Institute (RTPI), 2000.

Sea Watch Foundation (2020). Somerset Sea and Exmoor Sea Watch 2020 Report. Available at: https://www.somersetwildlife.org/sites/default/files/2021-02/SomersetExmoorSeaWatchreport_2020.pdf

Severn Estuary Coastal Group (2016). The Shoreline Management Plan - SMP2 Policy Statement [online]. Available at: <https://severnestuarycoastalgroup.org.uk/shoreline-management-plan/smp2-further-information/>

Severn Estuary Partnership (2022a) Archaeology [online]. Available at: <https://severnestuarypartnership.org.uk/the-estuary/physical-natural-environment/archeology/#:~:text=The%20Severn%20Estuary%20has%20one,archaeological%20record%20throughout%20the%20region> [Accessed May 2022].

Severn Estuary Partnership (2022b). Tourism and recreation [online]. Available at: <https://severnestuarypartnership.org.uk/the-estuary/use-of-the-severn/tourism-and-recreation/> [Accessed May 2022].

Severn Tidal Power (2010). SEA Topic Paper: Navigation. Prepared for the Department of Energy and Climate Change.

Somerset County Council (2021). Somerset Health and Wellbeing Board [online]. Available at: <https://www.somerset.gov.uk/social-care-and-health/somerset-health-and-wellbeing-board/>

Thaxter, C.B., Lascelles, B., Sugar, K., Cook, A.S.C.P., Roos, S., Bolton, M., Langston, R.H.W. and Burton, N.H.K. 2012. Seabird foraging ranges as a preliminary tool for identifying candidate Marine Protected Areas. *Biological Conservation* 156: 53-61.

The Crown Estate (2010) Marine Estate Research Report. Carbon Footprint of Marine Aggregate Extraction. Prepared by Environmental Resources Management Limited. July 2010.

Thomson S. (2007). Identifying Recreational Cruising Routes, Sailing and Racing Areas within the SEA 8 Area. A Report for the Department of Trade and Industry by the Royal Yachting Association.

Van der Wal, D., Forster, R.M., Rossi, F., Hummel, H., Ysebaert, T., Roose, F. and Herman, P.M.J. (2011). Ecological evaluation of an experimental beneficial use scheme for dredged sediment disposal in shallow tidal waters *Marine Pollution Bulletin* 62: 99-108.

Velegrakis, A.F., Houghton, A., Thompson, C. and Collins, M.B., 2001. Morphological development and sediment dynamics of the Middle Ground Banks (Severn Estuary), Technical Report, School of Ocean and Earth Science, University of Southampton.

Walmsley, S.A. and Pawson, M.G. (2007). The coastal fisheries of England and Wales, Part V: a review of their Status 2005-6. Science Series Technical Report No. 140, 83pp. Cefas Lowestoft.

Welsh Government, 2004. Planning Policy Wales Technical advice note (TAN) 15: development and flood risk.

Welsh Government (2013). Wales Marine and Fisheries Strategic Action Plan. November 2013.

Welsh Government, 2017. Planning Policy Wales Technical Advice Note (TAN) 24: The Historic Environment

Welsh Government (2019). Welsh National Marine Plan. p. 180. Available at:
https://gov.wales/sites/default/files/publications/2019-11/welsh-national-marine-plan_5.pdf

Welsh Government (2020). The National Strategy for Flood and Coastal Erosion Risk Management in Wales. Available at: <https://gov.wales/sites/default/files/publications/2020-11/the-national-strategy-for-flood-and-coastal-erosion-risk-management-in-wales.pdf>

Welsh Government (2021). Planning Policy Wales. Available at:
https://gov.wales/sites/default/files/publications/2021-02/planning-policy-wales-edition-11_0.pdf

Woodward, I., Thaxter, C.B., Owen, E. and Cook, A.S.C.P. (2019) Desk-based revision of seabird foraging ranges used for HRA screening. Report of work carried out by the British Trust for Ornithology on behalf of NIRAS and The Crown Estate. BTO Research Report No. 724.

Websites

<http://uk-air.defra.gov.uk/aqma/>

<https://www.gov.uk/government/collections/severn-tidal-power-feasibility-study-conclusions>

<https://www.legislation.gov.uk/uksi/2019/558/contents/made>

<https://www.legislation.gov.uk/ukdsi/2019/9780111176573>

8 Abbreviations/Acronyms

AA	Appropriate Assessment
AEOI	Adverse Effect on Integrity
AIS	Automated Identification System
AONB	Areas of Outstanding Natural Beauty
AQMA	Air Quality Management Area
BMAPA	British Marine Aggregate Producers Association
BPC	Bristol Port Company
BTO	British Trust for Ornithology
Cadw	Welsh Government Historic Environment Service
CCW	Countryside Council for Wales
Cefas	Centre for Environment, Fisheries and Aquaculture Sciences
CIEEM	Chartered Institute of Ecology and Environmental Management
CIfA	Chartered Institute for Archaeologists
CIRIA	Construction Industry Research and Information Association
CIS	Coastal Impact Study
CO ₂	Carbon Dioxide
DCLG	Department of Communities and Local Government
DECC	Department of Energy and Climate Change
Defra	Department for Environment Food and Rural Affairs
DfT	Department for Transport
EA	Environment Agency
EC	European Commission
EEC	European Economic Community
EIA	Environmental Impact Assessment
EMODnet	European Marine Observation and Data Network
ES	Environmental Statement
ESs	Environmental Statements
EU	European Union
EUSeaMap	EMODnet Broad-scale Seabed Habitat Map for Europe
FRMS	Flood Risk Management Strategy
FSA	Formal Safety Assessment
GES	Good Environmental Status
GGAT	Glamorgan-Gwent Archaeological Trust
GHG	Greenhouse Gas
GHT	Gloucester Harbour Trustees
GIS	Geographic Information System
HER	Historic Environment Record
HM	Her Majesty
HMWB	Heavily Modified Water Body
HRA	Habitats Regulations Appraisal
ICES	International Council for the Exploration of the Sea
ID	Identity
IEMA	Institute of Environmental Management and Assessment
IFCA	Inshore Fisheries and Conservation Authority
IMO	International Maritime Organization
JNAPC	Joint Nautical Archaeology Policy Committee
JNCC	Joint Nature Conservation Committee

LSE	Likely Significant Effect
MAI	Marine Aggregate Industry
MAIB	Marine Accident Investigation Branch
MCA	Maritime and Coastguard Agency
MCAA	Marine and Coastal Access Act
MCZ	Marine Conservation Zone
MDO	Marine Diesel Oil
MEMG	Marine Environment Monitoring Group
MGO	Marine Gas Oil
MHCLG	Ministry of Housing, Communities and Local Government
MHWS	Mean High Water Springs
MMG	Marine Minerals Guidance
MMO	Marine Management Organisation
MNCR	Marine Nature Conservation Review
MPA	Marine Protected Areas
MSFD	Marine Strategy Framework Directive
NBN	National Biodiversity Network
NERC	Natural Environment and Rural Communities
NMG	North Middle Ground
NMHR	National Marine Heritage Record
NMMP	National Marine Monitoring Programme
NOx	Nitrogen Oxides
NRHE	National Records of the Historic Environment
NRW	Natural Resources Wales
Ramsar	Wetlands of international importance, designated under The Convention on Wetlands (Ramsar, Iran, 1971)
RBMP	River Basin Management Plan
RCAHMW	Royal Commission of Ancient and Historic Monuments of Wales
RNLI	Royal National Lifeboat Institution
RSMP	Regional Seabed Monitoring Plan
RSPB	Royal Society for the Protection of Birds
RTPI	Royal Town Planning Institute
RYA	Royal Yachting Association
S41	Section 41
SAC	Special Area of Conservation
SEA	Strategic Environmental Assessment
SEAWG	Severn Estuary Aggregates Working Group
SECG	Severn Estuary Coastal Group
SMP	Shoreline Management Plan
SOx	Sulphur Oxides
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
TAN	Technical Advice Note
TraC	Transitional and Coastal Waters
TSHD	Trailing Suction Hopper Dredging
UK	United Kingdom
UKHO	UK Hydrographic Office
UXO	Unexploded Ordnance
VMS	Vessel Management System
VTS	Vessel Traffic Service
WCA	Wildlife and Countryside Act
WeBS	Wetland Bird Survey

WFD	Water Framework Directive
WNMP	Welsh National Marine Plan
WWI	World War One
WWII	World War Two

Cardinal points/directions are used unless otherwise stated.

SI units are used unless otherwise stated

Contact Us

ABPmer

Quayside Suite,

Medina Chambers

Town Quay, Southampton

SO14 2AQ

T +44 (0) 23 8071 1840

F +44 (0) 23 8071 1841

E enquiries@abpmer.co.uk

www.abpmer.co.uk

