

2.17



Volume 2, Chapter 17

Marine archaeology



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17. Marine Archaeology

17.1 Introduction

17.1.1 This chapter of the Preliminary Environmental Information Report (PEIR) presents the preliminary results of the assessment of the likely significant effects of Rampion 2 with respect to marine archaeology. It should be read in conjunction with the project description provided in **Chapter 4: The Proposed Development, Appendix 17.1 Marine Archaeology Technical Report, Appendix 17.2 Draft Marine Outline Written Scheme of Investigations** and the relevant parts of the following chapters:

- **Chapter 6: Coastal processes** (outlining geological aspects changes relevant to pre-history);
- **Chapter 16: Seascape landscape and visual** (associated with Historic Seascape Characterisation); and
- **Chapter 26: Historic environment** (due to overlapping study areas in the intertidal zone).

17.1.2 This chapter describes:

- the **legislation**, planning policy and other documentation that has informed the assessment (**Section 17.2: Relevant legislation, planning policy, and other documentation**);
- the **outcome** of consultation engagement that has been undertaken to date, including how matters relating to marine archaeology within the Scoping Opinion received in August 2020 have been addressed (**Section 17.3: Consultation and engagement**);
- the scope of the assessment for marine archaeology (**Section 17.4: Scope of the assessment**);
- the methods used for baseline data gathering (**Section 17.5: Methodology for baseline data gathering**);
- the overall baseline (**Section 17.6: Baseline conditions**);
- embedded environmental measures relevant to marine archaeology and the relevant maximum design scenario (**Section 17.7: Basis for PEIR assessment**);
- the assessment methods used for the PEIR (**Section 17.8: Methodology for PEIR assessment**);
- the assessment of marine archaeology effects (**Section 17.9 - 17.11: Preliminary assessment** and **Section 17.12: Preliminary assessment: Cumulative effects approach**);
- consideration of transboundary effects (**Section 17.13: Transboundary effects**);

- consideration of inter-related effects (**Section 17.14: Inter-related effects**);
- a summary of residual effects for marine archaeology (**Section 17.15: Summary of residual effects**); and
- an outline of further work to be undertaken for the Environmental Statement (ES) (**Section 17.16: Further work to be undertaken for ES**).

17.2 Relevant legislation, policy and other information and guidance

Introduction

17.2.1 This section identifies the legislation, policy and other documentation that has informed the assessment of effects with respect to marine archaeology. Further information on policies relevant to the Environmental Impact Assessment (EIA) and their status is provided in **Chapter 2: Policy and legislative context** of this PEIR.

Legislation and national planning policy

17.2.2 **Table 17-1** lists the legislation relevant to the assessment of the effects on marine heritage receptors.

Table 17-1 Legislation relevant to marine archaeology

Legislation description	Relevance to assessment
Marine and Coastal Access Act 2009	
The Act sets out a framework for the management of marine functions and activities for areas which include waters in or adjacent to England up to the seaward limits of the territorial sea. It provides for the preparation and adoption of marine plans and for the regulation of licensable activities in the marine environment through the grant and enforcement of conditions on marine licences	Rampion 2 will need to consider and comply with the requirements of the adopted Marine Policy Statement and South Marine Plan as they relate to the impact of the proposed development on marine heritage. A number of the embedded environmental measures will be secured through the deemed grant of a marine licence pursuant to the Act. The significance of marine heritage receptors within the marine archaeology study area is presented in Appendix 17.1: Marine archaeology technical report, Volume 4 . The embedded environmental measures are presented in Section 17.7, Table 17-13 .
Merchant Shipping Act 1995	

Legislation description	Relevance to assessment
<p>The Receiver of Wreck administers the Merchant Shipping Act 1995, in the UK in relation to wreck and salvage. The Receiver is responsible for processing incoming reports of wreck and cargo.</p>	<p>Rampion 2 may impact items associated with wrecks.</p> <p>If any material is recovered during works associated with Rampion 2 which fall within the definition of 'wreck', the Receiver of Wreck must be notified and will seek to identify the original owner, as detailed in Appendix 17.2: Outline Marine Written Scheme of Investigation, Volume 4.</p>
Protection of Wrecks Act 1973	
<p>Acts to secure the protection of wrecks within designated areas in territorial waters, and the sites of such wrecks, from interference by unauthorised persons.</p>	<p>There are currently no protected wreck sites identified within the Rampion 2 marine archaeology study area as presented in Appendix 17.1, Section 3.2, Volume 4.</p>
The Protection of Military Remains Act 1986	
<p>Provides protection for the wreckage of military aircraft and certain military wrecks. Designations can be either as a Controlled Site or Protected Place where access may be permitted but any operations which may disturb the site are illegal unless licensed by the Ministry of Defence.</p>	<p>If any material associated with a vessel or aircraft that were in military service when lost or wrecked is located, the area will be protected under this Act.</p> <p>All military aircraft are automatically protected under this legislation; however, vessels must be designated individually.</p> <p>There are several reported aircraft losses within the Rampion 2 marine archaeology study area that will require a licence under this Act before any works that may impact them can commence. However, no material remains from aircrafts have been located during the baseline assessment, as summarised in Section 17.6.</p>
Burial Act 1857	
<p>The Act requires a licence to be granted prior to the removal of human remains from deliberately deposited contexts.</p>	<p>If human remains are discovered during works associated with Rampion 2, they will be protected under this Act.</p> <p>The actions required where humans remain are found are further detailed in Appendix 17.2, Section 9.9, Volume 4.</p>
The Treasure Act 1996	

Legislation description	Relevance to assessment
The Act is supplemented by the Treasure (Designation) Order 2002. Finders of gold and silver objects (over 300 years old) and some base metal assemblages (prehistoric) as defined in the Act are required to report such finds by contacting the Coroner and delivering the items for handover as per the Coroner's instructions.	Should any relevant material be found during works associated with Rampion 2, advice from the Coroner must be sought and their instructions adhered to (as detailed in Appendix 17.2, Annex A).
Ancient Monuments and Archaeological Areas Act 1979	
Monuments that are of national importance within UK territorial waters can be protected by being designated within the schedule of monuments protected under this Act.	It is an offence to damage or carry out a range of specified activities on a 'scheduled monument' unless authorised to do so. There are no scheduled monuments in the Rampion 2 marine archaeology study area as presented in Appendix 17.1, Section 3.2, Volume 4 .

17.2.3 **Table 17-2** lists the national planning policy relevant to the assessment of the effects on marine heritage receptors.

Table 17-2 National planning policy relevant to marine archaeology

Policy description	Relevance to assessment
UK Marine Policy Statement	
Paragraphs 2.6.6.1 to 2.6.6.9 <i>"The historic environment includes all aspects of the environment resulting from the interaction between people and places through time, including all surviving physical remains of past human activity, whether visible, buried or submerged"</i>	As marine activities have the potential to result in adverse effects on the historic environment both directly and indirectly, including damage to or destruction of heritage assets, all available evidence to identify the significance of the heritage assets within the marine archaeology area is presented in Appendix 17.1, Volume 4 . The recommended mitigation is presented in Section 17.7 .
EN-1 NPS for Renewable Energy	
Paragraph 5.8.8 <i>"The applicant should provide a description of the significance of the heritage assets affected by the proposed development and the contribution of their setting to that significance"</i>	Known and unknown heritage assets may be affected by the proposed Rampion 2 development. All known heritage assets and their archaeological significance in the marine zone have been described in detail in Appendix 17.1, Volume 4 and summarised in Section 17.6 .

Policy description

Relevance to assessment

Paragraph 5.8.9

“Where a development site includes, or the available evidence suggests it has the potential to include, heritage assets with an archaeological interest, the applicant should carry out appropriate desk-based assessment and, where such desk-based research is insufficient to properly assess the interest, a field evaluation”

The archaeological potential within the marine archaeology study area as defined in **Section 9.1.2** of **Appendix 17.1, Volume 4** has been considered and assessed in **Appendix 17.1, Volume 4** and is further summarised in **Section 17.6**.

Paragraph 5.8.10

“The applicant should ensure that the extent of the impact of the proposed development on the significance of any heritage assets affected can be adequately understood from the application and supporting documents”

The archaeological significance and potential impact on the marine heritage receptors of the Proposed Development is discussed in **Section 17.9**.

Paragraph 5.8.20

“Where the loss of the whole or a material part of a heritage asset’s significance is justified, the IPC should require the developer to record and advance understanding of the significance of the heritage asset before it is lost. The extent of the requirement should be proportionate to the nature and level of the asset’s significance. Developers should be required to publish this evidence and deposit copies of the reports with the relevant Historic Environment Record. They should also be required to deposit the archive generated in a local museum or other public depository willing to receive it”

Appendix 17.2 Outline Marine Written Scheme of Investigations (WSI), Volume 4 outlines all provisions made and standards expected for archaeological recording of marine heritage receptors. The document further details where archives and material will be deposited. The securement of the WSI document is detailed as Embedded mitigation measure C-57 **Table 17-13** and is expected to be reflected in the Development Consent Order (DCO) requirements or deemed Marine Licence (dML) conditions.

Paragraph 5.8.21

“Where appropriate, the IPC should impose requirements on a consent that such work is carried out in a timely manner in accordance with a written scheme of investigation that meets the requirements of this Section and has been agreed in writing with the relevant Local Authority (...the Marine Management Organisation and Historic England) and that the completion of the exercise is properly secured”

Embedded environmental measures relevant to marine archaeology are set out in **Table 17-13**, C-57 details how the WSI **Appendix 17.2, Volume 4** will be implemented.

The embedded environmental measures are expected to be reflected in the DCO requirements or dML conditions.

Policy description	Relevance to assessment
<p>Paragraph 5.8.22 <i>“Where the IPC considers there to be a high probability that a development site may include as yet undiscovered heritage assets with archaeological interest, the IPC should consider requirements to ensure that appropriate procedures are in place for the identification and treatment of such assets discovered during construction”</i></p>	<p>The Protocol for Archaeological Discoveries (PAD) is appended to the WSI Appendix 17.2, Volume 4 and defines the procedure that will be followed if new marine heritage receptors are identified during the construction, operation and maintenance or decommissioning phases of Rampion 2.</p> <p>The securement of the WSI document is detailed as Embedded mitigation measure C-57 Table 17-13 and is expected to be reflected in the DCO requirements or dML conditions.</p>
EN-3 NPS for Renewable Energy	
<p>Paragraph 2.6.139 <i>“Heritage assets can be affected by offshore wind farm development in two principal ways: from the direct effect of the physical siting of the development itself and from indirect changes to the physical marine environment”</i></p>	<p>Potential direct or indirect effects on marine heritage receptors have been assessed in Table 17-5.</p>
<p>Paragraph 2.6.140 <i>“Consultation with the relevant statutory consultees (including English Heritage...) should be undertaken by the applicants at an early stage of the development”</i></p>	<p>Consultations with Historic England and other stakeholders throughout the development are outlined in Section 17.3.</p>
<p>Paragraph 2.6.141 <i>“Assessment should be undertaken as set out in Section 5.8 of EN-1. Desk-based studies should take into account any geotechnical or geophysical surveys that have been undertaken to aid the wind farm design”</i></p>	<p>Appendix 17.1 Marine Archaeology Technical Report, Volume 4 presents and details the archaeological assessments of the geophysical data collected to date. The results are also summarised in Section 17.6.</p>
<p>Paragraph 2.6.142 <i>“Assessment should include the identification of any beneficial effects on the historic marine environment, for example through improved access or the contribution to new knowledge that arises from investigation”</i></p>	<p>Beneficial effects on potential marine heritage receptors are discussed in Section 17.8.</p>
<p>Paragraph 2.6.143</p>	<p>The onshore and offshore archaeological resources have been cross-referenced and</p>

Policy description	Relevance to assessment
<p><i>“Where elements of an application (whether offshore or onshore) interact with features of historic maritime significance that are located onshore, the effects should be assessed in accordance with the policy at Section 5.8 in EN-1”</i></p>	<p>technical reports have been shared between archaeological contractors. The offshore and onshore archaeological assessments overlap at the intertidal zone as outlined in the respective technical reports.</p>
<p>Paragraph 2.6.144 <i>“The IPC should be satisfied that offshore wind farms and associated infrastructure have been designed sensitively taking into account known heritage assets and their status, for example features designated as Protected Wrecks”</i></p>	<p>Appendix 17.1 Marine Archaeology Technical Report, Volume 4 presents, and details all known wrecks and obstructions. There are no Protected Wrecks within the archaeology study area.</p>
<p>Paragraph 2.6.145 <i>“Avoidance of important heritage assets, including archaeological sites and historic wrecks, is the most effective form of protection and can be achieved through the implementation of exclusion zones around such heritage assets which preclude development activities within their boundaries”</i></p>	<p>Archaeological Exclusion Zones (AEZ) (as per C-58 (Table 17-13)) have been applied to all known wrecks and contacts of high and medium significance as outlined in Section 17.6. The embedded environmental measures are further detailed in Section 17.7 and Table 17-13.</p>

Local planning policy

17.2.4 **Table 17-3** lists the local planning policy relevant to the assessment of the effects on marine heritage receptors.

Table 17-3 Local planning policy relevant to marine archaeology

Policy description	Relevance to assessment
<p>South Inshore and South Offshore Marine Plan (July 2018)</p>	
<p>The South Marine Plan provides a strategic approach to planning within the inshore and offshore waters along the South coast. The plan aims to apply national policies in a local context reflecting the marine plan (Marine and Coastal Access Act Section 51).</p>	<p>Rampion 2 is located within the marine plan area. As per S-HER-1 Objective 8, an assessment of heritage assets that are significant to the historic environment has been undertaken and detailed in Appendix 17.1, Volume 4. Furthermore, relevant environmental measures are outlined Section 17.7.</p>
<p>Adoption Arun Local Plan 2011-2031 (July 2018)</p>	

Policy description	Relevance to assessment
<p>The Arun Local Plan sets out the requirements for development and Sites of Archaeological Interest (Policy HER DM6). <i>“There will be a presumption in favour of the preservation of scheduled and other nationally important monuments and archaeological remains. Where proposed developments will have either a direct impact on sites listed in Table 16.1 (i.e. developments requiring Scheduled monument Consent) or where developments will have an indirect impact on the settings of those sites listed in Table 16.1, or where a site on which development is proposed has the potential to include heritage assets with archaeological interest (having consulted the Historic Environment Record) permission will only be granted where it can be demonstrated that development will not be harmful to the archaeological interest of these sites.”</i></p> <p><i>“In all such instances:</i></p> <p><i>a. Applicants must arrange for a desk based archaeological assessment of the proposed development site to be undertaken by a suitably qualified person. The archaeological assessment will take the form of a factual review of the known information on historic assets and an appraisal of these assets. This information shall accompany the planning application, and, where not supplied, will be required before any planning application is determined*. Where the Planning Authority has reason to believe, either from the archaeological assessment as above, or from other evidence sources, that significant archaeological remains may exist, further assessment in the form of a field evaluation will be required to be carried out before the planning application is determined. Any field survey undertaken shall be carried out by a professionally qualified archaeological organisation or consultant only. All stages of archaeological fieldwork shall be subject to</i></p>	<p>The Marine Archaeology PEIR Assessment Boundary area reaches up to Mean High Water Spring (MHWS). An assessment of heritage assets that are located within Arun District council significant to the historic environment has been undertaken and detailed in Appendix 17.1, Volume 4. Furthermore, relevant environmental measures are outlined Section 17.7 which includes the production of a Written Scheme of Investigation.</p> <p>Listed buildings structures of character, areas of interest and sites outside the marine archaeology study area are outlined in Chapter 26.</p>

Policy description**Relevance to assessment**

a. Written Scheme of Investigation approved by the local planning authority. No development shall take place on the proposed development site until the applicant, or their agents or successors in title, is in receipt of a Written Scheme of Investigation that has been approved by the Local Planning Authority;

or

b. A field evaluation as above, which shall include a historic environmental record of the archaeological site without the requirement to undertake a separate desk based archaeological assessment.

c. Preservation in situ of archaeological sites or remnants of such sites, is the preferred option. However, where the assessment, which shall be subject to a Written Scheme of Investigation, shows that the preservation of archaeological remains in situ is not justified, conditions may be attached to any permission granted that development will not take place until provision has been made by the developer for a programme of archaeological investigation and recording. Any such programme shall be carried out prior to the commencement of the development.

d. Whenever practicable, opportunities should be taken for the enhancement and interpretation of archaeological remains left in situ. Developers shall record any heritage assets to be lost (wholly or in part) in a manner proportionate to their importance and possible impact, and to make this evidence (and any archive generated) publicly accessible.

e. Where development is to be phased the presumption would normally be that the whole site should be recorded as one project in order to maintain the continuity of the archaeological record.

Policy description	Relevance to assessment
<p><i>f. Developments shall also be consistent with all other Local Plan Policies.</i></p>	
<p><i>* Those submitting planning applications are strongly advised however to undertake a desk based archaeological assessment in advance of a planning application being lodged as, depending on the outcome of this assessment, further assessment in the form of a field evaluation may be required (as outlined in a. above)."</i></p>	

Other relevant information and guidance

- 17.2.5 A summary of other information and guidance relevant to the assessment undertaken for marine archaeology is provided below. The documents listed here summarise current archaeological best practice and guidance for offshore development and are discussed further in **Appendix 17.2, Volume 4**:
- A Guide to the Theory and Practice of Methods, from Sampling and Recovery to Post-excavation (Second Edition) (Historic England, 2011);
 - Collaborative Offshore Wind Research into the Environment (COWRIE) Guidance for Assessment of Cumulative Impacts on the Historic Environment from Offshore Renewable Energy, 2008;
 - Commercial Renewable Energy Development and the Historic Environment (Historic England, 2021)
 - Environmental Archaeology: A Guide to the Theory and Practice of Methods, from Sampling and Recovery to Post-excavation (second edition; 2011); and
 - Geoarchaeology: Using Earth Sciences to Understand the Archaeological Record. (Historic England, 2015);
 - Geoarchaeology: Using earth sciences to understand the archaeological record (2015).
 - Historic England Deposit Modelling and Archaeology Guidance for Mapping Buried Deposits (2020);
 - Historic Environment Guidance for the Offshore Renewables Energy Sector (COWRIE, 2007);
 - Joint Nautical Archaeology Policy Committee (JNAPC) Code for Practice for Seabed Development (JNAPC, 2006);
 - Marine Geophysics Data Acquisition, Processing and Interpretation (Historic England, 2013);
 - Model Clauses for Archaeological Written Schemes of Investigation, Offshore Renewables Projects (The Crown Estate, 2010);

- Protocol for Archaeological Discoveries: Offshore Renewables Projects (ORPAD) (The Crown Estate, 2014);
- Standard and guidance for an archaeological watching brief (Chartered Institute for Archaeologists (CIfA, 2014e));
- Standard and guidance for archaeological field evaluation (CIfA, 2014c);
- Standard and guidance for commissioning work on, or providing consultancy advice on, archaeology and the historic environment (CIfA, 2014b);
- Standard and guidance for nautical archaeological recording and reconstruction (CIfA, 2014d); and
- Standard and guidance for the collection, documentation, conservation and research of archaeological materials (CIfA, 2014a).

17.3 Consultation and engagement

Overview

- 17.3.1 This section describes the outcome of, and response to, the Scoping Opinion in relation to marine archaeology assessment and also provides details of the ongoing informal consultation that has been undertaken with stakeholders and individuals. An overview of the consultation process can be found in **Section 1.5** of **Chapter 1: Introduction**.
- 17.3.2 Given the restrictions which have been in place due to COVID-19 during this period, all consultation has taken the form of conference calls using Microsoft Teams and emails.

Early engagement

Introduction

- 17.3.3 Early engagement was undertaken with a number of prescribed and non-prescribed consultation bodies and local authorities including, Historic England, East Sussex County Council (ESCC), West Sussex County Council (WSCC), South Downs National Park Authority (SDNPA) and Marine Management Organisation (MMO), in relation to marine archaeology with the main consultees being Historic England. This engagement was undertaken to introduce the Proposed Development and the proposed approach to scoping the EIA.

Historic England

- 17.3.4 Early engagement with Historic England was undertaken in the form of emails followed by a conference call on 27 May 2020. During the conference call the overview of the Proposed Development, baseline sources and approach to mitigation was presented. No agreements or disagreements were reached during the meeting.

Scoping opinion

- 17.3.5 Rampion Extension Development (RED) submitted a Scoping Report (RED, 2020) and request for a Scoping Opinion to the Secretary of State (SoS) (administered by the Planning Inspectorate (PINS)) on 2 July 2020 (RED, 2020). A Scoping Opinion was received on 11 August 2020. The Scoping Report set out the proposed marine archaeology assessment methodologies, outline of the baseline data collected to date and proposed, and the scope of the assessment. **Table 17-4** sets out the comments received in Section 4 of the PINS Scoping Opinion ‘Aspect based scoping tables – Offshore by Historic England and how these have been addressed in this PEIR. A full list of the PINS Scoping Opinion comments and responses is provided in **Appendix 5.1: Response to the Scoping Opinion, Volume 4**.

Table 17-4 PINS Scoping Opinion responses – marine archaeology

PINS ID number	Scoping Opinion comment	How this is addressed in this PEIR
7	The proposals have high potential to impact upon both designated and undesignated heritage assets and their settings, in both an onshore and offshore context.	The potential impacts on all known heritage assets and their settings within the marine archaeology study area is assessed in Sections 17.8 17.9 and Appendix 17.1, Volume 4 .
8	There are significant number of designated heritage assets and Archaeological Notification Areas (ANA) that fall within the scoping area. It will be essential that in the Environmental Statement (ES) the full range of heritage assets are identified that may be affected by the scheme.	There are currently no ANAs, protected wreck sites or designated heritage sites within the intertidal zone (up to MHWS) or the PEIR marine archaeology study area as detailed in Appendix 17.1, Volume 4 . ANAs which fall within the onshore study area are covered in Chapter 26 .
9	We would expect an assessment to clearly demonstrate that the extent of the proposed study area is of the appropriate size to ensure that all heritage assets likely to be affected have been included and can be properly assessed. An arbitrary radial search may not accurately reflect the impact of the development on heritage assets in the wider area, and a more tailored approach that takes into account geology and topography would be required.	The marine archaeology study area is based on a 2km buffer around the offshore part of the PEIR Assessment Boundary to mitigate for direct and indirect impacts as detailed in Section 17.4.2 and Appendix 17.1, Volume 4, Section 2.2 . The buffer designated for the onshore study area is detailed Chapter 26 .

PINS ID number	Scoping Opinion comment	How this is addressed in this PEIR
10	In line with the advice in the National Planning Policy Framework (NPPF) and Marine Policy Statement (MPS), we would expect a Scoping Report and subsequent ES, to contain a thorough assessment of the likely effects which the proposed development might have upon those elements which contribute to the significance of these assets. These effects might originate from construction, operation and decommissioning of the proposed scheme.	The likely effects of Rampion 2 on marine heritage receptors, their setting and elements that contribute to their significance throughout all stages of the Proposed Development, have been assessed and included in Sections 17.9, 17.10, 17.11, 17.13, 17.14, 17.15 and 17.16. Known marine heritage receptors, and their significance are detailed within Appendix 17.1, Volume 4 and further summarised in Section 17.13 of this Chapter.
11	The assessment should also therefore take account of the potential impacts which associated development activities (such as construction, servicing, maintenance, and associated traffic) might have upon perceptions, understanding, and appreciation of heritage assets.	All impacts on settings of marine archaeology heritage assets have been assessed through the Application of Historic Seascape Characterisation summarised in Sections 17.6, and 17.12 as well as detailed in Appendix 17.1, Volume 4.
14	On such a large project, an integrated approach to assessment is required that demonstrates an understanding of how all the individual elements of the historic environment come to together to form a 'special place', and which fully analyses how the development proposals may impact upon the uniqueness of the area, and the heritage assets within it.	Setting and sense of place has been considered in relation to the marine aspects of the Application through the use of Historic Seascape Characterisation (HSC): Hastings to Purbeck and Adjacent Waters (Maritime Archaeology and SeaZone Solutions, 2011), which has been interpreted in relation to the Proposed Development and is summarised in Sections 17.6, and 17.12 and detailed in Appendix 17.1, Volume 4. Onshore archaeology and seascape, landscape and visual impacts are covered within Chapter 26 and Chapter 16 , respectively.
15	We think it essential therefore that an integrated landscape approach	HSC principles have been applied to complement onshore Historical

PINS ID number	Scoping Opinion comment	How this is addressed in this PEIR
	to assessment of heritage assets (both designated and undesignated) is undertaken and translated into the report.	<p>Landscape Characterisation approaches in relation to the Proposed Development to integrate and interpret the large study areas. The results are summarised in Sections 17.6, and 17.12 and further detailed in Appendix 17.1, Volume 4.</p> <p>Onshore archaeology and seascape, landscape and visual impacts are covered within Chapter 26 and Chapter 16, respectively.</p>
16	Geoarchaeology will be a key issue for this project, both onshore and offshore. Landscape characterisation would help predict previous land use, combining geology and archaeology to identify where people might have lived and their contemporary environment, and providing evidence to feed into an overarching deposit model.	<p>A full geoarchaeological programme will be developed and will be coordinated across both the offshore and onshore zones.</p> <p>Any part of the programme undertaken post-consent will be included in the geoarchaeological assessment as per embedded environmental measures C-59 (Table 17-13) which sets out the requirement for a staged geoarchaeological approach and C-57 (Table 17-13) which ensures that the geoarchaeological assessment requirements are clearly stated. The environmental measures are presented in full in Appendix 4.1: Commitments register, Volume 4 and further expected to be reflected in the DCO requirements or dML conditions.</p> <p>The archaeological assessment of sub-bottom data and the preliminary deposit model, as summarised in Section 17.6 and detailed in Appendix 17.1, Volume 4, considers geoarchaeological potential prior to the commencement of a full geotechnical programme or works.</p>

PINS ID number	Scoping Opinion comment	How this is addressed in this PEIR
18	We recommend close collaboration of cultural heritage and landscape/visual impact assessment, in order to adequately address issues in relation to setting of designated heritage assets.	HSC in the offshore zone is summarised in Section 17.6.39 and has been coordinated with the SLVIA team where topic overlap occurs. The assessment potential impacts on Seascape, landscape and visual aspects is detailed in Chapter 16 .
20	Setting may also form a part of the wider conceptual significance of a heritage asset and how it is experienced, and the report must therefore additionally reflect these more nuanced aspects of setting in order to fully take account of impact.	HSC principles have been applied to complement onshore Historic Landscape Character (HLC) approaches in relation to the Proposed Development to integrate and interpret the large study areas. The results are summarised in Section 17.6.39 . The assessment of potential changes to the historic seascape are detailed in Section 17.12
22	There will be a requirement through planning policy to avoid harm to designated heritage assets, but by following planning policy and guidance we would also expect the project to be creative in how it might offer opportunities for their enhancement and public (heritage) benefit.	There are no protected wreck sites or other designated heritage assets within the marine archaeology study area. However, the same principles will be applied to non-designated heritage assets when encountered. Impact on all identified heritage receptors is being mitigated through environmental measures C-57 which secures the Written Scheme of Investigation and C-60 which secures the avoidance of all identified marine heritage receptors by utilising archaeological exclusion zones, as detailed in Section 17.7, Table 17-13 . Discussions are ongoing regarding public engagement and dissemination.
24	We would expect the ES to consider the potential impacts on non-designated features of historic, architectural, archaeological or artistic interest.	The ES will consider all potential impacts on the listed features within the marine archaeology study area outlined in Appendix 17.1, Volume 4 .

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27	They [West Sussex Council] are well placed to advise on: local historic environment issues and priorities; the nature and design of any required mitigation measures; and opportunities for securing wider benefits for the future conservation and management of heritage assets. They will also be able discuss how a proposed scheme could further enhance the historic environment.	Historic England and other relevant stakeholders, including WSCC, have been consulted for advice on all elements of the Proposed Development that may have an effect on heritage receptors as per EPP Steering Groups meetings detailed in Section 17.3 .
28	The County Archaeological Officer will be a key consultee regarding impacts to undesignated heritage assets. It would be advantageous if Historic England could be consulted in parallel for onshore and intertidal zone matters, as that would minimise any conflicting advice and allow us to consider designated and non-designated heritage issues together.	The County Archaeological Officer at WSCC the Inspector of Ancient Monuments at Historic England and the Historic England Marine Planning Unit have been consulted in parallel as per EPP Steering Groups meetings as detailed in Section 17.3 .
31	Glossary: The Historic Seascape Characterisation (HSC) and the Marine Policy Statement should be included here.	The HSC and Marine Policy Statement terms has been added to the glossary of this Chapter.
32	Chapter 2: Reference is made to the utilisation of seabed preparation techniques for the installation of the Wind Turbine Generator (WTG) foundations and inter-array cables, but not in relation to the substation foundations or export cables. It should be clarified whether seabed preparation may be required for these elements of the project.	The latest version of the Rampion 2 Project Design has been utilised for this PEIR Chapter, which includes seabed preparation methods for the installation of the WTG foundations and inter-array cables as well as substation foundations and export cables. Design parameters relevant to marine heritage receptors are detailed in Section 17.7.2 . The design is further detailed in Chapter 4 .
34	It would be useful to also include data from: The British Marine Aggregate Producers Association (BMAPA) finds protocol, The	The BMAPA data is included in the National Marine Heritage Record (NMRHE) dataset while the Portable Antiquity Scheme data have been

PINS ID number	Scoping Opinion comment	How this is addressed in this PEIR
	Offshore Renewables Protocol for Archaeological Discoveries; Portable Antiquity Scheme data/Maritime Antiquity Scheme.	included as further detailed in Table 17-8 and Appendix 17.1, Volume 4 .
35	Aircraft crash sites that would be designated under the Protection of Military Remains Act 1986, should also be included in the High/Very High category.	Aircraft crash sites are included in the definition of Marine Heritage Receptor and are designated under the Protected Wrecks Act 1986 the significance of aviation remains is summarised in Section 17.6 Aviation remains have also been added to Table 17-5 (criteria for establishing the level of receptor sensitivity).
36	Geophysical survey: We note that a 100% coverage geophysical survey is planned for June/July 2020 to help inform the archaeological assessment with the EIA. In the absence of a WSI, it would be advisable to produce a method statement for the assessment of this data.	The geophysical survey was completed in Q3 2020 and a Method Statement for the archaeological assessment of the geophysical data has been submitted for approval to Historic England. The results of the archaeological assessments are summarised in Section 17.6 and detailed in Appendix 17.1, Volume 4 . An Outline Marine WSI has been produced as part of the PEIR process (Appendix 17.2, Volume 4)
37	Paragraph 5.14.11: The list of guidance documents presented could be usefully expanded to make reference to the South Marine Plan heritage policy S-HER-1, and to include: Historic England Deposit Modelling and Archaeology Guidance for Mapping Buried Deposits (2020); Environmental Archaeology: A Guide to the Theory and Practice of Methods, from Sampling and Recovery to Post-excavation (second edition; 2011); and Geoarchaeology: Using earth sciences to understand the archaeological record (2015).	The South Marine Plan policy and its relevance to Rampion 2 has been summarised in Table 17-3 . The guidance documents have been referred to in Section 17.2 and considered as part of the assessment.

PINS ID number	Scoping Opinion comment	How this is addressed in this PEIR
39	<p>Table 5.14.7: We acknowledge the list of Commitments presented (Relevant marine archaeology embedded environmental measures) and are content that the overall direction of the commitments are appropriate. Subject to further information being present with the ES, Preliminary Environmental Information Report (PEIR) and EIA, we may wish to suggest amendments and additions over the course of the preapplication consultation and examination process, to ensure that the commitments reflect the most up-to-date information and best practice.</p>	<p>Regular ETG meetings will present progress on these commitments on which Historic England will have the opportunity to comment and inform the further direction. See Sections 17.3 and 17.17.6.</p>
40	<p>Table 5.14.7 does not make it clear that geoarchaeology/archaeology requirements should help steer the geotechnical interventions and will influence the locations and sampling requirements. The geotechnical survey should be designed to address geoarchaeological and geotechnical requirements. The geoarchaeologist should not only review the data but examine samples and sub-samples for palaeoenvironmental remains and dating (see 'Geoarchaeological Advice' below).</p>	<p>A Method Statement for the geoarchaeological review of geotechnical samples will be produced and submitted to Historic England for review as per requirement in the outline WSI detailed in the embedded environmental measure C-57 (Table 17-13).</p> <p>The Method Statement will present an overarching geoarchaeological strategy, based on a staged geoarchaeological approach as per embedded environmental measures C-59 (Table 17-13) which sets out the requirement for a staged geoarchaeological approach.</p> <p>RED's commitment to undertake geoarchaeological works throughout the life of the Proposed Development is detailed in the embedded environmental measure C-57 (Table 17-13) which secures the Written Scheme of Investigation document detailing the workflow and responsibilities ahead of archaeological assessments of site</p>

PINS ID number	Scoping Opinion comment	How this is addressed in this PEIR
		<p>investigation data and C-59 which secures early archaeological engagement ahead of geotechnical works followed by a staged assessment (Table 17-13).</p> <p>Close contact with the onshore Historic Environment team is being facilitated through regular meetings. The above will be documented in the ES.</p> <p>It is expected that the embedded environmental measures will form DCO requirements or dMLs conditions.</p>
42	<p>It is our understanding that this [<i>scoping out the majority of the impacts, with the exception of those relating to scour and draw-down impacts</i>] scoping out is hinged on the 'Commitments'; the assessment of data to determine the known and unknown potential for archaeological receptors will be undertaken, and known receptors avoided. Whilst we wish to raise no objection to this approach at this stage, we caveat that this is subject to the appropriate wording of the Commitments, and securing these within the Development Consent Order, Deemed Marine Licences, and the Outline Offshore Written Scheme of Investigation (WSI).</p>	<p>The embedded environmental measures are presented in Section 17.7 and Table 17-13 and are included in Appendix 17.2, Volume 4.</p> <p>The embedded environmental measure C-57 secures the Written Scheme of Investigation document as per Table 17-13.</p> <p>It is expected that the embedded environmental measures will form DCO requirements or dMLs conditions.</p>
43	<p>Paragraph 5.14.44: Additionally, it would be useful if this paragraph was modified to reflect the geoarchaeological input to the design of the geotechnical survey, and the need for sample examination (rather than simply reviewing the results), as outlined in the comments above on Table 5.14.7.</p>	<p>A Method Statement for geoarchaeological review of geotechnical samples will be produced and submitted to Historic England for review as per embedded environmental measures C-57 and C-59 (Table 17-13) which sets out the requirement for a WSI and a staged geoarchaeological approach.</p>

PINS ID number	Scoping Opinion comment	How this is addressed in this PEIR
58	This is a large project located in an area of archaeologically sensitive buried palaeochannels and therefore has the potential to cause a high level of harm.	The Method Statement will also include presentation of the overarching geoarchaeological strategy, with commitments secured as described in response to Scoping Opinion comment number 40 (above). Impact on marine heritage receptors and areas of archaeological potential has been assessed and is presented in Sections 17.9, 17.10, 17.11, 17.13, 17.14, 17.15 and 17.16 . Details on the presence of palaeochannels and their significance is presented in detail in Appendix 17.1, Volume 4 . The presence of paleochannels is also shown in Chapter 6 .
59	It will be important therefore that appropriate information is collected to understand the archaeological resource so that harm may be avoided. This means that mechanisms must be put in place to make sure geoarchaeological input to any geophysical and geotechnical surveys is proactive and does not simply react to datasets, samples and information passed on from other workstreams.	A Method Statement for geoarchaeological review of geotechnical samples will be produced and submitted to Historic England for review as per embedded environmental measures C-57 and C-59 (Table 17-13) which sets out the requirement for a WSI and a staged geoarchaeological approach. Agreement of the Method Statement and presentation of the overarching strategy will ensure that appropriate archaeological input to the pre-construction geotechnical and geophysical surveys is proactively provided for, with commitments secured as described in response to Scoping Opinion comment number 40 (above).
61	Constructing an overarching framework will be vital to the research outcome of the project. This should have objectives that will	A Method Statement for geoarchaeological review of geotechnical samples will be produced and submitted to Historic

PINS ID number	Scoping Opinion comment	How this is addressed in this PEIR
	<p>be addressed (and refined) by a staged geoarchaeological approach, with each component building on the last.</p>	<p>England for review as per embedded environmental measures C-57 and C-59 (Table 17-13) which sets out the requirement for a WSI and a staged geoarchaeological approach. The Method Statement will include an overarching geoarchaeological strategy, based on a staged geoarchaeological approach.</p> <p>Agreement of the Method Statement and presentation of the overarching strategy will ensure that appropriate archaeological input to the pre-construction geotechnical and geophysical surveys is proactively provided for, with commitments secured as described in response to Scoping Opinion comment number 40 (above).</p>
62	<p>Geoarchaeology will be a major component of the project, with a continuous thread through both on- and off-shore work. Appointing a geoarchaeologist to have oversight of the project and synthesise both elements would therefore be extremely beneficial.</p>	<p>The onshore and offshore archaeological contractors have cooperated on the geoarchaeological assessment undertaken ahead of this PEIR chapter see Chapter 26.</p> <p>Ahead of post consent geotechnical surveys a geoarchaeologist will be appointed and a Method Statement for the geoarchaeological review of geotechnical samples will be produced and submitted to Historic England for review as per embedded environmental measures C57 and C-59 (Table 17-13) which sets out the requirement for a WSI and a staged geoarchaeological approach.</p> <p>The Method Statement will demonstrate early input to this process, sample locations and research questions and outline</p>

PINS ID number	Scoping Opinion comment	How this is addressed in this PEIR
63	Geoarchaeological review of the geophysical surveys proposed for this summer, together with review of the previous (Rampion 1 and Gupta's Arun Valley work and other available information) should give some idea of the pattern or likely extent of buried palaeofeatures within the Rampion 2 study area.	<p>details of geoarchaeologists involved and their competence.</p> <p>The Method Statement will also present an overarching geoarchaeological strategy, based on a staged geoarchaeological approach.</p> <p>RED's commitment to undertake this work will be set out in clearly worded embedded environmental measures (found in Section 17.7 and Table 17-13). Close contact with the Historic Environment team is being facilitated through regular meetings. It is also expected that the embedded environmental measures will form DCO requirements or dMLs conditions</p>
64	Based on this, we would expect to see in the PEIR/ ES/ EIA/ WSI documents a clear set of overarching research objectives and supporting strategies for addressing them.	<p>Ahead of any geoarchaeological works a Method Statement for the geoarchaeological review of geotechnical samples will be produced and submitted to Historic England for review as per environmental measures embedded environmental measures C-59 (Table 17-13) which sets out the requirement for a staged geoarchaeological approach and C-57 (Table 17-13) which ensures that the geoarchaeological assessment requirements are clearly stated.</p>

PINS ID number	Scoping Opinion comment	How this is addressed in this PEIR
		<p>The Method Statement will demonstrate early input to this process, sample locations and research questions.</p> <p>The Method Statement will also present an overarching geoarchaeological strategy, based on a staged geoarchaeological approach.</p> <p>Submitting future Method Statements ahead of any archaeological works is a requirement set out in embedded environmental measure C-59 (Table 17-13) and Appendix 17.2, Volume 4 and further expected to be reflected in the DCO requirements or dML conditions.</p> <p>This Chapter summarises the baseline conditions presented in Appendix 17.1, Volume 4, the baseline assessment undertaken ahead of the ES will further develop the understanding and present additional data if available and relevant.</p>
67	<p>The project archaeologist/geoarchaeologist should work with the contractors planning the geophysical and geotechnical investigation. This would ensure some boreholes and transect lines are located with the aim of building up a better understanding of the character, date and archaeological significance of the channel system (or/and other features identified).</p>	<p>Method Statement for the geoarchaeological review of geotechnical samples will be produced and submitted to Historic England for review as per environmental measures embedded environmental measures C-59 (Table 17-13) which sets out the requirement for a staged geoarchaeological approach and C-57 (Table 17-13) which ensures that the geoarchaeological assessment requirements are clearly stated.</p> <p>The documents will demonstrate early input to this process, sample locations and research questions.</p>

PINS ID number	Scoping Opinion comment	How this is addressed in this PEIR
68	<p>The geoarchaeologist should ensure the collection of information from specific locations to form datasets that will build-up an understanding of the archaeological resource. The intention for this approach must be made clear from the earliest documentation, irrespective of what survey work has yet been possible. This will enable appropriate mechanisms to be put in place and methodologies agreed as the project moves forward.</p>	<p>The Method Statement will also present an overarching geoarchaeological strategy, based on a staged geoarchaeological approach.</p> <p>It is expected that this process is reflected in the DCO requirements or dML conditions.</p> <p>Early archaeological engagement during the geotechnical survey planning process is set out in embedded environmental measures C-57 and C-59 (Table 17-13) and Appendix 17.2, Volume 4 and will be detailed in the geoarchaeology Method Statement, as well as form DCO requirements or dMLs conditions.</p> <p>As per Appendix 17.2, Volume 4 Section 9.3 Method Statements will be submitted to Historic England at least 20 working days before the commencement of planned works and is the responsibility of RED.</p>
69	<p>We also highlight the importance of submitting method statements to Historic England for geophysical and geotechnical surveys. This will enable us to have a greater degree of input into the design of surveys and the assessment of data and allow for clear expectations to be formalised between all parties. This is especially important for the geoarchaeological side of the project and should be inclusive of collection, retention, access and storage for geotechnical core samples, as well as the staged analysis.</p>	<p>A Method Statement for the geoarchaeological review of geotechnical samples will be produced and submitted to Historic England which will demonstrate early input to this process, sample locations and research questions. It will also aim to present an overarching geoarchaeological strategy, based on a staged geoarchaeological approach.</p> <p>A Method Statement for the archaeological assessment of geophysical work was submitted ahead of the PEIR to Historic England.</p>

PINS ID number	Scoping Opinion comment	How this is addressed in this PEIR
70	<p>It is also important that geoarchaeological access is afforded to the core samples extracted, for logging, detailed description, and sampling; and the standard staged approach to scientific dating, palaeoenvironmental assessment, deposit modelling and subsequent analysis is undertaken.</p>	<p>Submitting future Method Statements ahead of any archaeological works is a requirement set out in embedded environmental measure C-57 (Table 17-13) and Appendix 17.2, Volume 4.</p> <p>Early archaeological engagement during the geotechnical survey planning process is a requirement set out in embedded environmental measures C-57 and C-59 (Table 17-13) and Appendix 17.2, Volume 4. and will be detailed in the geoarchaeology Method Statement.</p> <p>It is expected that this process is reflected in the DCO requirements or dML conditions.</p>
71	<p>On Rampion 1, gas blanking (potentially because of peat deposits) was a problem for construction and led to requested boreholes for geoarchaeological purposes not being taken as part of mitigation (as these areas were avoided for construction). Hopefully with adequate geoarchaeological input from the outset, similar issues will not occur on Rampion 2, as suitable samples will be taken during earlier rounds of geotechnical survey and their location and potential for further analysis clearly recorded and understood.</p>	<p>The archaeological assessment of the sub-bottom data has been summarised in Section 17.6 and detailed in Appendix 17.1, Volume 4.</p> <p>The sub-bottom data covers the whole offshore part of the PEIR Assessment Boundary, and no major blanking of data was noted. The Rampion 1 geotechnical investigations did collect one core within the cannel deposits (VC3) and recovered a thin layer of peat which is discussed in Appendix 17.1, Volume 4.</p> <p>Early archaeological engagement during the Rampion 2 geotechnical survey planning process is a requirement set out in embedded environmental measures C-57 and C-59 (Table 17-13) and Appendix 17.2, Volume 4 and will be detailed in the geoarchaeology Method</p>

PINS ID number	Scoping Opinion comment	How this is addressed in this PEIR
73	<p>We would expect to see mechanisms in place to ensure all samples and sub-samples taken for geoarchaeological purposes are clearly identified in an ongoing register, to include their location; and that appropriate storage facilities are available for the duration of the project.</p>	<p>Statement, as well as form DCO requirements or dMLs conditions.</p> <p>Retention of samples is set out in the WSI document which is a requirement within the embedded environmental measure C-57 (Table 17-13) and Appendix 17.2, Volume 4. Further details will be included in the geoarchaeology Method Statement.</p> <p>Geoarchaeological analysis will utilise a geodatabase within an industry standard GIS platform.</p>
74	<p>It would also be very useful if each report produced, clearly set out in a grid its genesis and hierarchy, so it was absolutely clear how each piece of work fitted into the overarching scheme of archaeological/geoarchaeological investigation. Lack of communication and uncertainty about what had been done, by whom and when, as well as what material was still available, were issues that led to a very muddled Rampion 1 paper trail.</p>	<p>The Outline WSI (Appendix 17.2, Volume 4) and the final WSI as per embedded environmental measure C-57 (Table 17-13), will when further archaeological reports are finalised, contain a table outlining all archaeological works completed.</p> <p>Reporting is a requirement of embedded environmental measure C-57 (Table 17-13) and Appendix 17.2, Volume 4, all forthcoming geoarchaeological reports will follow the Offshore Geotechnical Investigations and Historical Environment Analysis: Guidance for the Renewable Energy Sector (COWRIE, 2011).</p>
4.13.1 to 4.13.7	<p>The impacts proposed to be scoped out in Table 5.14.8 are on the basis of “<i>embedded environmental measures to be adopted for the Proposed Development, forming commitments by RWE to avoid all identified archaeological receptors of a medium or high archaeological potential</i>”. This will be through the establishment of archaeological exclusion zones (AEZs) of an “<i>appropriate size and extent</i>” and</p>	<p>Embedded environmental measure C-57 has been adopted to secure the development of a Marine WSI in accordance with the Outline Marine WSI which has been produced as part of the PEIR process (Appendix 17.2, Volume 4). The Outline WSI details the AEZ which have been recommended following desk-based studies combined with the assessment of geophysical data to ensure correct location as well as</p>

PINS ID number	Scoping Opinion comment	How this is addressed in this PEIR
	<p>‘tertiary’ mitigation in the form of archaeological written schemes of investigation (WSI) and project specific reporting protocol for unexpected discoveries. The embedded measures are listed in table 5.14.7 and summarised as follows:</p> <ol style="list-style-type: none"> 1) A marine WSI (in accordance with an Outline Marine WSI), including a protocol for archaeological discoveries) 2) Offshore geophysical surveys (including unexploded ordnance (UXO) survey) will be undertaken prior to construction covering 100% of the development area. 3) Offshore geotechnical surveys will be undertaken prior to construction, including geoarchaeological assessment and analysis of data (inclusive of publication), 4) Offshore export cable corridor and the array cabling will be routed to avoid any identified archaeological receptors (with buffer zones as to be detailed in the WSI). The Scoping Report does not provide specific detail in respect to these measures, but they are acknowledged to constitute recognised methods of control for the impacts described (with reference to relevant guidance in paragraphs 5.14.11 - 5.14.12). <p>The Inspectorate is content that if the above measures are adequately secured (with reference to implementation) and presented in sufficient detail then they may be relied upon as means to demonstrate an absence of</p>	<p>appropriate size and extent of protective area. This is further discussed in Section 5 of the Marine archaeology Technical Report Appendix 17.1, Volume 4.</p> <p>All embedded environmental measures are presented in Section 17.7 and Table 17-13.</p> <p>Regular ETG meetings will present progress on the embedded commitments on which Historic England will have the opportunity to comment and inform the further direction. See Sections 17.3 and 17.17.6.</p> <p>It is expected that the embedded environmental measures will form DCO requirements or dMLs conditions.</p>

PINS ID number	Scoping Opinion comment	How this is addressed in this PEIR
	<p>significant effect in the ES. In this regard, the Inspectorate expects that the “<i>outline</i>” WSI would form part of the DCO application documents and that this document and the ES would provide additional detail to what “appropriate size and extent” of AEZs would comprise and where they would be located. The Applicant should make efforts to agree the detail in relation to these measures with relevant consultation bodies, and the Inspectorate welcomes the Applicants intent in this regard, for example through the evidence plan process.</p>	
4.13.8	<p>Based on the baseline information presented in tables 5.14.5 and 5.14.6 and the receptor sensitivity criteria, the Inspectorate understands that unmitigated impacts of the Proposed Development could be of high significance. In setting out the proposed mitigation measures as considered above, the Applicant should acknowledge worst case assumptions in respect receptor sensitivity of potentially unidentified archaeological assets including those identified through geophysical survey.</p>	<p>Section 17.7 includes the assessment of maximum adverse scenario for each receptor and establishes the maximum potential adverse impact on potential known and unknown receptors. The criteria for magnitude of impact are included in Table 17-15 where the adverse and beneficial criteria is outlined (Major to Negligible) and the significance of assessment matrix is detailed in Table 17-16. Impacts on receptors as per Table 17-6 are detailed in Sections 17.10 and 17.11.</p> <p>Receptors identified in the baseline assessment and the archaeological assessment of geophysical data (as per C-58 (Table 17-13)) are included in the preliminary assessments in Sections 17.10 and 17.11. and further detailed in Appendix 17.1, Volume 4. Potential impact on the receptors is mitigated within commitments C-57 (Table 17-13) which outlines AEZ’s within the WSI document (Appendix 17.2, Volume 4) and C-60 (Table 17-13) where</p>

PINS ID number	Scoping Opinion comment	How this is addressed in this PEIR
		<p>the avoidance of identified marine heritage receptors is secured.</p> <p>Impact on unidentified and unexpected receptors are mitigated through commitment C-57 (Table 17-13) which includes a reporting protocol for instances where a site or find may be located during offshore works (Appendix 17.2, Volume 4)</p> <p>Impacts on unknown receptors are also mitigated through C-58 (Table 17-13), the assessment of geophysical data and C-59 (Table 17-13), the assessment of geotechnical data ensuring that unknown receptors are identified and assessed for archaeological significance followed by mitigation secured in C-57 (Table 17-13), the WSI document (Appendix 17.2, Volume 4) and C-60 (Table 17-13), the avoidance of known receptors.</p> <p>It is expected that the process will be reflected in the DCO requirements or dML conditions.</p>
4.13.9	<p>The Inspectorate notes an important distinction between geophysical survey and geotechnical survey coverage. Paragraph 5.14.45 states “<i>geophysical survey data covering 100 percent of the seabed within the development area, currently expected to be undertaken June / July 2020</i>”. However, paragraph 5.14.46 implies the only a “<i>limited coverage survey</i>” will be undertaken in support of the Application and that 100 percent coverage of the final design plan will be completed and reviewed prior to construction. The “<i>limited coverage</i>” geophysical survey to support the DCO</p>	<p>The extent of geophysical data coverage and data used to develop the marine archaeology baseline (Section 17.6) as well as the marine archaeology study area (paragraph 17.4.2) is clarified in this PEIR Chapter.</p> <p>Early archaeological engagement during the Rampion 2 geotechnical survey planning process is a requirement of embedded environmental measures C-57 and C-59 (Table 17-13) as well as Appendix 17.2, Volume 4 and will be detailed in geoarchaeology Method Statements. Regular</p>

PINS ID number	Scoping Opinion comment	How this is addressed in this PEIR
	<p>application is not specifically quantified as a percentage of the development area. This should be presented as part of the ES. The basis for, and point at which, the “<i>comprehensive programme of geotechnical survey data</i>” would commence in terms of informing considering archaeological potential (and coverage of geotechnical survey) is not specifically stated. The Inspectorate understands that detailed geotechnical surveys will be undertaken prior to construction and that the outline WSI will set out it’s specification so as the reliance placed on it at as mitigation in addressing potentially significant effects can be understood. The marine archaeological assessment chapter of the ES should clearly set out the geoarchaeological considerations in the design and specification of the geotechnical survey.</p>	<p>meetings are held between the offshore and onshore team.</p> <p>It is expected that the process will be reflected in the DCO requirements or dML conditions.</p> <p>The assessment of sub-bottom data and an outline deposit model based on the results and desk-based studies is summarised in Section 17.6 and detailed in Appendix 17.1, Volume 4.</p> <p>The ES marine archaeology chapter will be updated following further studies as per commitments detailed in Appendix 17.2, Volume 4.</p>

Evidence Plan Process (EPP)

- 17.3.6 The EPP has been set up to provide a formal, non-legally binding, independently chaired forum to agree the scope of the EIA and HRA, and the evidence required to support the DCO Application. For historic environment, further engagement has been undertaken via the Evidence Plan Process (EPP) Expert Topic Group (ETG)

Historic England

- 17.3.7 Historic England agreed to take part in the EPP Steering Group as per email 9 March 2020. The Steering Group aims to monitor and oversee the Evidence Plan process.
- 17.3.8 Under the EPP, ETGs have been established to as discuss and agree the evidence and assessment requirements for each topic. Engagement with Historic England has been ongoing since 5 August 2020 in the form of conference calls and emails as detailed in **Chapter 1, Table 1.2**.
- 17.3.9 On 15 September 2020, the first seascape, landscape, historic environment and marine archaeology ETG meeting was held where the scope of the assessment relating to the Scoping Opinion was discussed. The proposed methodology was

presented and there was a brief discussion of key datasets, see **Chapter 1, Table 1.2** for details.

- 17.3.10 On 18 March 2021 the second seascape, landscape, historic environment and marine archaeology ETG meeting was held where the scope of the assessment relating to the PEIR submission was discussed. The updated baseline data and methodology was presented and clarifications on the embedded environmental measures was discussed further details can be found in **Chapter 1, Table 1.2**.

Informal consultation and engagement

- 17.3.11 Informal consultation has been ongoing with a number of prescribed and non-prescribed consultation bodies and local authorities in relation to marine archaeology.
- 17.3.12 An Informal Consultation exercise was undertaken between 14 January and 11 February 2021. This exercise aimed to engage with a range of stakeholders including the prescribed and non-prescribed consultation bodies, local authorities, Parish Councils and general public with a view to introducing the Proposed Development and seeking early feedback on the emerging designs.

17.4 Scope of the assessment

Overview

- 17.4.1 This section sets out the scope of the PEIR assessment for marine archaeology. This scope has been developed as Rampion 2 design has evolved and responds to feedback received to date as set out in **Section 17.3**. As outlined in PINS Advice Note Seven, Section 8 information presented in the PEIR is preliminary and therefore this scope will be reviewed and may be refined as Rampion 2 evolves including as a result of ongoing consultation.

Spatial scope and study area

- 17.4.2 The spatial scope of the marine archaeology assessment is defined as the PEIR Assessment Boundary up to MHWS and surrounded by a 2km buffer seaward of MHWS (**Figure 17.1, Volume 3**). The extended area allows for the consideration of direct and indirect effects on marine heritage receptors and is to accommodate the potential imprecision of historic marine positioning. This is in line with the existing Rampion 1 offshore wind farm marine archaeology study area and has been agreed under the EPP with Historic England.

Temporal scope

- 17.4.3 The temporal scope of the assessment of marine archaeology is consistent with the lifetime of the proposed development and therefore covers the construction, operation and maintenance and decommissioning periods.

Potential receptors

- 17.4.4 The spatial and temporal scope of the assessment enables the identification of receptors which may experience a change as a result of Rampion 2. The receptors identified that may experience likely significant effects for marine archaeology are outlined in **Table 17-5**.

Table 17-5 Receptors requiring assessment for marine archaeology

Receptor group	Receptors included within group
Marine heritage receptors	Physical resources such as shipwrecks, aviation remains, archaeological sites, archaeological finds and material including pre-historic deposits as well as archival documents and oral accounts recognised as of historical/archaeological or cultural significance.

- 17.4.5 The list of receptors will be kept under review during the EIA as more detailed information is obtained during baseline surveys and other forms of data collection by all aspects and will be reflected in the final ES.

Potential effects

- 17.4.6 Potential effects on marine heritage receptors that have been scoped in for assessment are summarised in **Table 17-6**.

Table 17-6 Potential effects on marine heritage receptors scoped in for further assessment.

Receptor	Activity or impact	Potential effect
Construction		
	None identified.	None identified.
Operation and Maintenance		
Marine heritage receptors	Scour effects caused by the presence of WTG substation foundations and the exposure of inter-array and export cables or the use of cable protection measures.	Effects may include exposing marine heritage receptors to natural, chemical, or biological processes and causing or accelerating loss of the same.
Decommissioning		

Receptor	Activity or impact	Potential effect
Marine heritage receptors	In the event that the foundations are removed, effects may include the destabilisation of archaeological sites and contexts, and exposing such material to natural, chemical, and biological processes, causing or accelerating loss of the same.	Draw-down of sediment into voids left by removed WTG foundations leading to loss of sediment.

Activities or impacts scoped out of assessment

- 17.4.7 A number of potential effects have been scoped out from further assessment, subject to the securing of the embedded environmental measures outlined in **Table 17-13**, resulting from a conclusion of no likely significant effect.
- 17.4.8 These conclusions have been made based on the knowledge of the baseline environment, the nature of planned works and the wealth of evidence on the potential for impact from such projects more widely. The conclusions follow (in a site-based context) existing best practice. Each scoped out activity or impact is considered in turn below and an indication given of whether the scope has evolved since Scoping.

Table 17-7 Activities or impacts scoped out of assessment

Activity or impact	Rationale for scoping out
Removal of sediment containing undisturbed archaeological contexts during seabed preparation for WTG and offshore substation foundations leading to total or partial loss of the receptor (Construction).	The embedded environmental measures as detailed Section 17.7 will ensure that impact on marine heritage receptors will either be completely avoided through established AEZs or offset by the agreement to further assess data for archaeological potential.
Penetration of piling foundations resulting in total or partial loss of the receptor (Construction).	
Compression of stratigraphic contexts containing archaeological material from combined weight of foundation, transition piece, tower and WTG (Construction).	Historic England is content that if the embedded environmental measures are adequately secured and presented in sufficient detail then they may
Disturbance of sediment containing potential marine heritage receptors (material and contexts) during the laying of inter-array cables (Construction).	

Activity or impact	Rationale for scoping out
Disturbance of sediment containing potential marine heritage receptors (material and contexts) during export cable laying operations (Construction).	be relied upon as means to demonstrate an absence of significant effect (Scoping Opinion ID 39 and 42). MMO concluded that the proposed scoping-out is acceptable (Scoping Opinion ID 3.16.1 Appendix 5.1: Response to the Scoping Opinion, Volume 4).
Penetration and compression effects of jack-up barges and anchoring of construction vessels during WTG, sub-station or cable installation leading to total or partial loss of archaeological receptors (material or contexts) (Construction).	
Penetration and compression effects on seabed caused by corrective and preventative operation and maintenance activities (via jack-up vessels) (Operation).	
Draw-down of sediment into voids left by removed WTG foundations leading to loss of sediment (Decommissioning).	
Penetration and compression effects of jack-up barges and anchoring of decommissioning vessels leading to total or partial loss of archaeological receptors (material or contexts) (Decommissioning)	

17.5 Methodology for baseline data gathering

Overview

- 17.5.1 Baseline data collection has been undertaken to obtain information within the marine archaeology study area as described in **Section 17.4: Scope of the assessment**. The current baseline conditions presented in **Section 17.6: Baseline conditions** summarises the current understanding of the environment within the marine archaeology study area.

Desk study

- 17.5.2 The data sources that have been collected and used to inform this marine archaeology assessment are summarised in **Table 17-8**.

Table 17-8 Data sources used to inform the marine archaeology PEIR assessment

Source	Date received, accessed or published	Summary	Coverage of study area
United Kingdom Hydrographic Office (UKHO) via Emapsite	22/04/2020	Database of known wrecks and obstructions held and maintained by the UKHO.	Full coverage of the marine archaeology study area.
Historic England National Record of the Historic Environment (NRHE) (Historic England)	28/09/2020	Site based information on intertidal sites and known wrecks and reported losses offshore including designated and non-designated archaeological sites.	Full coverage of the marine archaeology study area.
West Sussex County Council (WSCC) Historic Environment Record (HER)	23/04/2020	County maintained database of all known archaeological monuments and events, including designated and non-designated archaeological sites, designated and non-designated buildings and standing structures, conservation areas, sites with known palaeoenvironmental significance and historic landscape character studies.	Partial coverage of the marine archaeology study area (approximately 2/3 rd s falls within WSCC jurisdiction).
East Sussex County Council (ESCC) HER	06/05/2020	County maintained database of all known archaeological monuments and events, including designated and non-designated archaeological sites, designated and non-designated buildings and standing structures, conservation areas, sites with known palaeoenvironmental significance and historic	Partial coverage of the marine archaeology study area. (approximately 1/3 rd falls within ESCC jurisdiction).

Source	Date received, accessed or published	Summary	Coverage of study area
		landscape character studies.	
Submerged Palaeo-Arun River Project (Gupta <i>et al.</i> 2004; 2008)	2004, 2008	A reconstruction of the prehistoric landscapes connected to the River Arun with an evaluation of the archaeological resource potential.	Partial coverage of the marine archaeology study area.
The South Coast Regional Environmental Characterisation (James <i>et al.</i> 2010)	2010	A regional marine assessment, focusing on evaluating the geological, biological and archaeological resource.	Broadscale data with regional coverage.
HSC: Hastings to Purbeck and Adjacent Waters (Maritime Archaeology and SeaZone Solutions 2011)	2011	A regional marine assessment presenting the archaeological understanding of the historic cultural dimension of our coasts and seas, identifying and mapping areas whose present character has been shaped by similar dominant cultural processes.	Broadscale data with regional coverage.
South East Rapid Coastal Zone Assessment (Wessex Archaeology, 2011; 2013)	2011, 2013	A regional assessment undertaken to enhance the knowledge of the coastal historic environment in order to inform Shoreline Management Plans.	Broadscale data with regional coverage.
Rampion Offshore Wind Farm ES (RSK Environment Ltd 2012)	2012	The ES for Rampion 1. Chapter 13 - Marine Archaeology provides a review of the archaeological potential of the area directly adjacent to Rampion 2.	Partial coverage of the marine archaeology study area.

Source	Date received, accessed or published	Summary	Coverage of study area
BMAPA Finds Protocol (Wessex Archaeology)	28/09/2020	Database of unexpected archaeological discoveries found and reported in material from offshore aggregate areas. Data received as part of the NRHE dataset.	Full coverage of the marine archaeology study area.
Offshore Renewables Protocol for Archaeological Discoveries (Wessex Archaeology)	28/09/2020	Database of unexpected archaeological discoveries found and reported during offshore development activities. Received as part of the NRHE dataset.	Full coverage of the marine archaeology study area.
Portable Antiquities Scheme	07/09/2020	Database containing records of terrestrial or intertidal archaeology found and reported by the public.	Partial coverage of the marine archaeology study area.
Marine Antiquities Scheme	Accessed September 2020	Database containing records of marine archaeology found and reported by the public.	No data within study area.
Receiver of Wreck	30/09/2020	Database containing records of shipwrecks or archaeological sites of significance.	Full coverage of the marine archaeology study area.

Site surveys

17.5.3 **Table 17-9** summarises the survey undertaken, and the data collected which was assessed for archaeological potential and significance.

Table 17-9 Site survey undertaken

Survey type	Scope of survey	Coverage of study area	Survey status
Geophysical survey of the offshore part of the PEIR Assessment Boundary undertaken in 2020	Full suite of geophysical data including side scan sonar, multibeam, magnetometer and sub-bottom profiler.	Between 100 percent and 300 percent coverage of the study area.	Completed and assessed for archaeological potential.

Data limitations

17.5.4 There are no data limitations relating to marine archaeology that affect the robustness of the assessment of this PEIR.

17.6 Baseline conditions

Introduction

17.6.1 The following sections provide a summary of the baseline conditions. Detailed descriptions and significance assessments are included in **Appendix 17.1, Volume 4**.

Current baseline

Overview

17.6.2 The marine archaeological resource can be characterised within the following four main categories of sites and features:

- **Landscape:** submerged prehistoric landscapes related to fluctuations in past sea-level. Such landscapes may contain significant evidence of prehistoric human occupation and/or environmental change.
- **Vessel:** Archaeological remains of vessels deposited after a wrecking event at sea or abandoned in an intertidal context.
- **Aircraft:** Remains of aircraft crash sites, either coherent assemblages or scattered material, typically the result of Second World War military conflict, but also numerous passenger casualties. This category includes aircraft, airships and other dirigibles dating to the First World War.
- **Structures:** Structural remains including defensive structures, lighthouses, jetties, harbours, fish traps or sites lost to the sea as a result of coastal erosion may be found within the intertidal zone (between Mean Low Water Springs (MLWS) and MHWS).

Environmental context and maritime activity

- 17.6.3 The area of seabed that the marine archaeology study area covers has undergone a dynamic process of evolution through the Pleistocene and early Holocene (Mesolithic), from large swathes of dryland to submerged seabed, as a result of fluctuations in temperature and sea-level.
- 17.6.4 The West Sussex Coastal Plains are home to a significant Lower Palaeolithic site known as Boxgrove (c. 500,000 Before Present (BP) or Marine Isotope Stage (MIS) 13), situated some 10km inland of the present coastline of the English Channel. The archaeological and palaeoenvironmental potential of the offshore Palaeolithic deposits from the English Channel and Solent region is high and can be demonstrated by artefacts, faunal remains and peat evidence identified to date. However, *in situ* offshore finds are rare, with most artefacts within the marine zone being found on the seabed in a secondary context.
- 17.6.5 By the Neolithic, sea level had risen to levels similar to the present-day coastline and therefore the potential for submerged landscape deposits is significantly reduced. As no localised models have been created for the south east coast, it remains true that there is some potential for *in situ* Neolithic remains, such as occupational material, structural remains and watercraft, to be found in the intertidal and marine zone. Furthermore, there is also potential for secondary context Neolithic material, originating from eroded deposits along the coast.
- 17.6.6 The potential for substantial submerged landscape deposits is further reduced in the Bronze Age. However, growing sedentary populations, both on the coast and inland, inevitably gave rise to increased communications along the coast and waterways of the region, and therefore elevates the potential for *in situ* archaeological remains and secondary context material from eroded deposits in the inshore and intertidal zone. There is evidence of maritime activity including the development of more complex plank-built hull forms replacing skin/hide vessels and logboats.
- 17.6.7 By the Iron Age, sea-level change no longer has a significant effect on the geomorphology of the coastline and is replaced by coastal erosion as the key factor in these changes. Maritime trade networks were further developed, with evidence of cross-channel, as well as coastal and inland, trade.
- 17.6.8 By the Romano-British period there is clear evidence for seaborne and coastal activity, with several important sites established in Sussex following the Roman invasion of AD 43. A range of vessels fit for the wide variety of marine and inland waterways activities were used at this time.
- 17.6.9 There was a decline in maritime activity in the Early Medieval period, after the fall of the Roman Empire, until the late 6th century when there was a resurgence of trade with continental Europe which continued into the 9th century. As with the Roman period, the variety of maritime activities meant an extensive range of vessels were used. These vessels continued to increase in size and complexity, however smaller craft were still commonly used, especially for coastal and inshore activities.
- 17.6.10 In the post-medieval period, there was a marked increase in detailed historical records, which meant that known maritime losses began to be recorded. There was also a continued increase in trade and maritime activity, and with this

expansion of shipping activity and traffic came an ever-greater number of wrecking events within the marine archaeology study area.

- 17.6.11 The rapid pace of technological development in the beginning of the twentieth century had a great impact on the broad pattern of maritime activity. Wartime innovations led to the increase in use of new types of vessels and technologies, and a transformation of a growing global shipping trade. Globalisation also expanded into the leisure industry, with a decrease in the use of ocean liners in favour of cruise ships and newly developed passenger aircraft in the mid-1900s, and planes becoming the primary method of intercontinental travel.

Known wrecks and obstructions

- 17.6.12 Wrecks and obstructions are classified by the UKHO as:
- **LIVE**: Wreck considered to exist as a result of detection through survey;
 - **DEAD**: Not detected over repeated surveys, therefore not considered to exist in that location;
 - **LIFT**: Wreck has been salvaged;
 - **UNKNOWN**: The state of the wreck is unknown or unconfirmed; and
 - **ABEY**: Existence of wreck in doubt and therefore not shown on charts.
- 17.6.13 The archaeological assessment of geophysical data combined with the baseline conditions has concluded that there are 49 LIVE wrecks, 20 DEAD wrecks, three UNKNOWN or unconfirmed, and three LIFTED wrecks within the marine archaeology study area (**Figure 17.2, Volume 3**).
- 17.6.14 There are also 85 documented vessel losses within the study area. Their location within the dataset is recorded as a general area (602.17km²). However, seabed features potentially correlating with recorded losses have been identified as anomalies during the archaeological assessment of geophysical data and potential correlations are further discussed in **Appendix 17.1, Volume 4**.

Aviation remains

- 17.6.15 Remains of aircraft crash sites, either coherent assemblages or scattered material are usually the result of Second World War military conflict. The numerous passenger casualties, particularly during the peak of seaplane activity during the inter-war period are the other most likely potential source. Aviation remains include aircraft, airships and other dirigibles dating to the First World War, although these rarely survive in the archaeological record.
- 17.6.16 There are 21 reported losses of aircraft within the study area, all but one, which is unidentified, date to the Second World War. Only one of the losses has associated known remains: WP275, a British Supermarine Attacker which crashed in 1956. Parts of this aircraft were dredged up in 2005 but appeared to comprise dispersed remains rather than a coherent crash site, no remains of a potential crash site were identified on the seabed in the vicinity. The location is outside Rampion 2 geophysical survey area and was included in the Rampion 1 baseline assessment but not further investigated. Where *in-situ* remains associated with any aviation

losses are found, they will be archaeologically significant and protected under the Protection of Military Remains Act 1986.

Fishermen's fasteners

- 17.6.17 Data contained within the NRHE database and reported as Fishermen's fastener meaning "*places where fishermen have snagged their fishing gear*" are included in this baseline assessment. There are 32 records classed as fishermen's fasteners recorded by the NRHE. Records classed as fishermen's fasteners or which otherwise remain unidentified and are not associated with vessel or structural remains (including records classified as DEAD by the UKHO). They are unidentified obstructions reported by fishermen, possibly indicative of a wreck or submerged feature. No other baseline information is available for any of these obstructions, while they may well represent archaeological remains, this is not possible to ascertain from the existing sources.

Archaeological assessment of geophysical data

- 17.6.18 The archaeological assessment of geophysical data is presented below and the results are summarised in **Table 17-10**.

Table 17-10 Summary of archaeological anomalies

Archaeological potential	No. anomalies
High	31
Medium	24
Low	228
Magnetic anomalies of low potential	2,280

- 17.6.19 Thirty-one anomalies have been assessed as high archaeological potential as summarised below and detailed in **Appendix 17.1, Section 18**. All high potential anomalies have been assigned 100m AEZs as per **Figure 17.3, Volume 3**.
- **MA0001** The coherent remains of a wreck, measuring 88m in length and 15m width, with a shadow that suggests it sits 8m above the seabed.
 - **MA0002** The curved outline is showing a partially buried hull of a vessel measuring approximately 12m in length and 5m width.
 - **MA0004** The semi-coherent bow of a vessel, partially buried, measuring 31m in length and 6.5m in width.
 - **MA0005** The semi-coherent, partially buried outline of a hull measuring approximately 22m in length and 9m in width.
 - **MA0007** The coherent outline of the bow of a vessel and associated debris to the SW, covering an area of approximately 60m by 40m.

- **MA0008** The coherent remains of a vessel and its super-structure, measuring approximately 93m in length and 19m. The shadow suggests a height of 8m above the seabed, with some scour.
- **MA0009** The coherent remains of a wreck and associated debris over an area of 90m x 45m.
- **MA0010** The cylindrical, partially buried remains of a wreck, measuring approximately 77m in length and 7m width.
- **MA0011** The semi-coherent outline of a vessel measuring 60m in length and 17m width with an extended shadow suggesting it sits approximately 7m above the seabed.
- **MA0012** The semi-coherent remains of a partially buried cylindrical anomaly, potentially a wreck, measuring approximately 61m in length and 14m width, associated with two hard reflectors c. 100m to the north north-east.
- **MA0013** The coherent remains of a vessel measuring approximately 73m in length and 11m in width, with an extended shadow which suggests the wreck sits approximately 7m above the seabed and much of the super-structure remains.
- **MA0014** The semi-coherent remains of a cylindrical anomaly, measuring approximately 60m in length and 7m width, partially buried with an extended shadow which suggest a height of 8m above the seabed.
- **MA0015** The semi-coherent outline of a vessel, measuring approximately 76m in length and 7m width, with associated scour.
- **MA0016** A spread of debris over an area of 105m by 30m with an extended shadow which suggests a height of 7.3m above the seabed.
- **MA0017** A long, ovate feature, measuring approximately 23m in length and 6m width, partially buried, with an elongated shadow that suggest a height of 2m above the seabed.
- **MA0018** The semi-coherent partially buried remains of a vessel with associated debris measuring approximately 77m in length and 16m width.
- **MA0020** The coherent remains of a partially buried vessel measuring approximately 70m in length and 14m width, with extended shadows suggesting the presence of super-structure.
- **MA0021** A buried linear anomaly measuring approximately 28m in length with a shadow suggesting a height of 2m above the seabed.
- **MA0022** The semi-coherent buried remains of a vessel measuring approximately 102m in length and 32m width, with extended shadows from the centre of the vessel suggesting the remains of super-structure, potentially the boilers, and other associated debris.
- **MA0024** The broken remains of a vessel over an area approximately 60m by 8m, with extended shadow suggesting a height of approximately 4m above the seabed.

- **MA0025** The semi-coherent remains of a partially buried vessel measuring approximately 74m in length and 20m width, with an extended shadow suggesting debris and super-structure with a height of 5m above the seabed.
- **MA0026** The semi-coherent remains of a partially buried vessel measuring approximately 55m in length and 10m width, with an extended shadow suggesting debris and super-structure with a height of 3m above the seabed.
- **MA0027** Three sets of parallel linear hard reflectors with associated shadows suggesting a height of approximately 2.5m above the seabed, and a partially buried ladder-like anomaly, contained within an area of approximately 55m by 50m.
- **MA0029** The scattered debris of a wreck over an area of approximately 90m by 20m.
- **MA0030** A cluster of features concentrated within an area measuring 60m by 15m.
- **MA0032** The scattered debris of a wreck over an area of approximately 91m by 14m. It is located outside of the PIER Assessment Boundary, but within the marine archaeology study area.
- **MA0033** The semi-coherent partially buried remains of a wreck measuring approximately 83m in length and 15m width, with extended shadow suggesting the remains of super-structure including two boilers.
- **MA0034** Ovate anomaly with extended shadow, measuring approximately 14.5m in length and 7m width, sitting 3m above the seabed.
- **MA0036** Coherent remains of a steel plated cargo ship approximately 120m in length and 30m width. Super-structure including three boilers remains.
- **MA0037** Pair of 'L' shaped anomalies with extended shadows suggesting a height of approximately 4m above the seabed.
- **MA0062** Buried hard reflector measuring approximately 47m in length.

17.6.20 Twenty-four anomalies of medium archaeological potential have been identified as summarised below and detailed in **Appendix 17.1, Volume 4**. All medium potential anomalies have been assigned 50m AEZs as per **Figure 17.3, Volume 3**.

- **MA0006** An ovate hard reflector measuring approximately 15m in length and 4m in width, with no associated debris. The feature appears to have raised edges with a depression in the middle which corresponds to the surrounding seabed.
- **MA0019** An ovate feature with an extended shadow suggesting a height of approximately 3m above the seabed and some scour.
- **MA0028** A cluster of features concentrated within an area measuring 70m by 15m.
- **MA0031** A linear anomaly measuring approximately 24m in length with an extended triangular shadow suggesting a height of 1m above the seabed.

- **MA0035** Two parallel buried reflectors approximately 15m in length and 1m apart.
- **MA0038** A prominent mound which may represent anthropogenic material. The mound measures 10.6m by 3.7m, with a maximum height of 0.9m.
- **MA0040** A cluster of features concentrated within an area measuring 48m by 16m, with shadow suggesting a height of 1.6m above the seabed.
- **MA0041** A cluster of features concentrated within an area measuring 38m by 29m.
- **MA0042** A cluster of features concentrated within an area measuring 57m by 24m.
- **MA0045** Two anomalies identified from the magnetometer data (MAG) MA5501 104 Nanotesla (nT) and MAG MA5503 (105nT).
- **MA0046** Isolated magnetic anomaly c. 30m SSW of seabed reflector (110nT) (MAG MA7206).
- **MA0048** Isolated magnetic anomaly (112nT) (MAG MA6485).
- **MA0049** Pair of linear hard reflectors; potential anthropogenic debris or boulders, associated with magnetic anomaly (115nT) (SSS MA2085, MAG ID MA6224).
- **MA0050** Isolated magnetic anomaly (116nT) (MAG MA6529).
- **MA0051** Isolated magnetic anomaly (125nT) (MAG MA5844).
- **MA0052** Isolated magnetic anomaly (125nT) (MAG MA5600).
- **MA0053** Isolated magnetic anomaly (145nT) (MAG MA5202).
- **MA0054** Isolated magnetic anomaly (156nT) (MAG MA5537).
- **MA0055** Isolated magnetic anomaly (165nT) (MAG MA5380).
- **MA0056** Isolated magnetic anomaly associated with seabed reflector (4nT) (MAG MA5032).
- **MA0058** Three magnetic anomalies MA5504 (245nT) MA5505 (47nT) MA5506 (38nT) (MAG MA5504).
- **MA0059** Isolated magnetic anomaly (147nT) (MAG MA6556).
- **MA0060** Isolated magnetic anomaly (300nT) (MAG MA5823).
- **MA0061** Isolated magnetic anomaly (716nT) (MAG MA5529).

17.6.21 Low potential anomalies have been characterised as a mixture of small features, often boulder like, or isolated linear features and modern debris such as rope, chain, fishing gear or lost equipment.

17.6.22 The 2,280 magnetic anomalies over 4nT but with no corresponding data in any of the assessed geophysical datasets or research resources have also been assigned low archaeological potential.

Geoarchaeological assessment of geophysical data

- 17.6.23 This section presents a preliminary deposit model which is to be refined following a geoarchaeological assessment of forthcoming geotechnical data. Ahead of any works a Method Statement for the geoarchaeological review of geotechnical samples will be produced and submitted to Historic England for review as per embedded environmental measures C-59 (**Table 17-13**) which sets out the requirement for a staged geoarchaeological approach and C-57 (**Table 17-13**) which ensures that the geoarchaeological assessment requirements are clearly stated in the WSI document. It is expected that the embedded environmental measures will form DCO requirements or dMLs conditions.
- 17.6.24 This section also summarises the interpretation of the archaeological assessment of the sub-bottom data and places the current understanding of the complex prehistoric landscapes and the correlation between marine and terrestrial sediment phases in the context. For further detail refer to **Appendix 17.1, Volume 4**.
- 17.6.25 The area of seabed that the marine archaeology study area now covers was previously large swathes of dry land that were exploited by people during the Pleistocene and early Holocene. Early to Middle Pleistocene deposits of the West Sussex Coastal Plain and wider Solent Basin were shaped by successive interglacial sea-level highstands during the last 500,000 years (Bates *et al.*, 2010).
- 17.6.26 Previous studies in the area have revealed details of the submerged topography including terraces and details of the submerged floodplain, features of the Palaeo-Arun Valley landform which runs the terrestrial zone into the marine zone (Gupta *et al.*, 2008).
- 17.6.27 The Solent and the south coast of England have yielded early Palaeolithic archaeology in high concentrations, for example at Boxgrove, West Sussex (Roberts *et al.*, 1994; Roberts and Parfitt, 1999). Here, the earliest hominid fossils from the British Isles were recovered from a Pleistocene raised beach and finds of interest are commonly reported by the aggregate dredging industry (Bates *et al.*, 2004).
- 17.6.28 Supporting the development of this PEIR chapter, an archaeological assessment of sub-bottom profiler data was undertaken which has resulted in a number of features being identified as of geoarchaeological interest (**Figure 17.4, Volume 3**).
- 17.6.29 Together, the features reveal a complex system of inundated valleys and channels interlinked and associated with The Northern Palaeovalley, a large system that flowed from the east and joined the Median Palaeovalley offshore from Cherbourg, France possibly dating to the Elsterian/Anglian stage (MIS 12) age or the initially Saalian/Wolstonian stage (MIS 10–6) (Gupta *et al.*, 2007).
- 17.6.30 The palaeo-Arun valley (MA3000) as mapped by (Gupta *et al.*, 2008) is clearly visible. It follows the route as previously mapped and continues further south turning east.
- 17.6.31 The extent of a channel feature (MA3001) identified during the development of the Rampion 1 ES has also been confirmed as it extends into the Rampion 2 survey area.

- 17.6.32 The channel and valley features have been mapped as detailed in **Appendix 17.1**. They represent an extensive deltaic river system containing a combination of shallow braided channels system with many tributaries, numerous wider, deeper channels and simple cut and fill features. The channel features are in the majority cut into the chalk bedrock and filled with a combination of hard reflectors representing sand or gravel and softer reflectors representing silt and possible clay.
- 17.6.33 The outline deposit model presented in **Table 17-11** shows that the seabed in the marine archaeology study area is predominantly gravels and sands (Unit 5) which are overlying consolidated and clays (Unit 3 and 2).
- 17.6.34 The fine-grained sediments tend to be mobile and sand waves are widespread across much of the survey area stretching north-west to south-east. The underlying geology in the area is characterised by Upper Cretaceous Chalk (Unit 1) which is in places cut by channel and valley features filled with Unit 4.
- 17.6.35 The outline deposit model will be further refined following a staged geoarchaeological assessment as outlined in **Appendix 17.2, Volume 4**.

Table 17-11 Preliminary deposit model

Unit	Sediment	Description	Epoch	Geoarchaeological potential
5	Mobile seabed sediments	SAND and GRAVEL	Holocene	No
4	Channel/Valley infill	Soft possibly peaty CLAY and SAND	Late Pleistocene to Early Holocene	Yes
3	London Clay	Firm to hard silty CLAY	Tertiary	Low
2	Lambeth group	SILT, CLAY and SAND	Tertiary	Low
1	Cretaceous Upper Chalk Group.	CHALK and gravel	Cretaceous	No

Historic seascape characterisation

- 17.6.36 HSC has been used as a measure in this assessment to provide a contextual and regional approach to the marine archaeology study area. Historic seascapes cannot be destroyed or damaged but impacts on them can change their historical character.
- 17.6.37 Impacts on the current seascape is further detailed in **Chapter 16**.
- 17.6.38 Changes to the character of the sea surface and the perception of the historic seascape as a direct result of the construction, operation, maintenance and decommissioning of Rampion 2 will result from the addition of new infrastructure

such as foundations and turbines as well as ongoing activity from installation and maintenance vessels.

- 17.6.39 The HSC assessment draws on Historic Seascape Characterisation: England's Historic Seascape: HSC Method Consolidation (Tapper & Johns, 2008) and England's Historic Seascape: Demonstrating the Method (Merritt & Dellino-Musgrave, 2009).
- 17.6.40 The HSC considers the added effect of Rampion 2 within the multiple dimensions of the marine environment (sub-sea floor, sea floor, water column, sea surface, coastal land and previous historic character) in combination with the existing activity within the Broad Historic Character Types (navigation, Industry, fishing, coastal infrastructure, communication, telecommunications, military, settlements, recreations, cultural tomography, and woodland) as further detailed in **Appendix 17.1, Volume 4** and summarised below.
- 17.6.41 Activities on the sea surface and the water column are dominated by modern and current navigational routes in combination with historic shipping routes. The sea surface also comprises offshore infrastructure such as renewables, gas, oil, navigational markers and ocean survey equipment. It is therefore unlikely that Rampion 2 will further alter the perception of the Historic Seascape within the sea surface and water column.
- 17.6.42 Activities on the sea floor and within the sub-sea floor include fishing, the energy industry (oil, gas, renewables) construction including foundations, cables, pipelines and anchor activities and telecommunication cables. The historic characterisation of the sea floor and sub-sea floor also considers the cultural topography which includes prehistoric deposits and artefacts as well as shipwrecks and aviation remains from multiple periods. The impact on marine heritage receptors is further discussed in **Sections 17.8-17.16**.
- 17.6.43 It is therefore unlikely that Rampion 2 will further alter the perception of the Historic Seascape within the sea floor and sub-sea floor.
- 17.6.44 The value and perception of the Broad Historic Character Types include the increased attention of the wider general public of modern aquaculture and the benefits and disadvantages of renewable energy, sub-sea communication cables and marine global trading. People's perception of the sea and its value also include the biodiversity, the archaeological potential and fishing and transport heritage.

Future baseline

- 17.6.45 Marine heritage receptors within the offshore environment are identified by a combination of baseline assessment of the relevant marine study area and analysis of geophysical and/or geotechnical data for archaeological potential. On the assumption that Rampion 2 will not be constructed, the current baseline as described in **Section 17.6** is assumed to remain the same.
- 17.6.46 Natural sediment movements might expose and/or bury the identified receptors. Covered receptors are likely to be protected from impacts, whereas uncovered receptors may be exposed to natural and chemical degradation.

- 17.6.47 There is potential for the scientific knowledge of marine archaeology within the marine archaeology study area to develop over time. Alongside studies of existing data and newly collected in the area ahead of other marine developments or undertaken as part of future research projects. Our understanding of the baseline and identified receptors could be therefore enhanced.

17.7 Basis for PEIR assessment

Maximum design scenario

- 17.7.1 Assessing using a parameter-based design envelope approach means that the assessment considers a maximum design scenario whilst allowing flexibility to make improvements in the future in ways that cannot be predicted at the time of submission of the DCO Application. The assessment of the maximum adverse scenario for each receptor establishes the maximum potential adverse impact and as a result impacts of greater adverse significance will not arise should any other development scenario (as described in **Chapter 4**) to that assessed within this Chapter be taken forward in the final scheme design.
- 17.7.2 The maximum assessment assumptions that have been identified to be relevant to marine archaeology are outlined in **Table 17-12** below and are in line with the Project Design Envelope (**Chapter 4**).

Table 17-12 Maximum assessment assumptions for impacts on marine heritage receptors

Project phase and activity/impact	Maximum assessment assumptions	Justification
Construction	<p>Landfall</p> <p>Up to four Horizontal Directional Drilling (HDD) drills (diameter of duct 630mm) and four exit pits (area 30m by 4m). HDD exit pit excavated material volume 720m³.</p> <p>Offshore cable corridor</p> <p>Up to four cable trenches 2m wide and 1.0-1.5m deep. Total seabed disturbance 2,015,000m², rock protection area 61,000m² and 155,000m³. spoil and Temporary Floatation Pits spoil 275,000m³.</p>	<p>The maximum assessment assumptions represent the maximum seabed disturbance that could potentially affect marine heritage receptors. Note that impacts on marine heritage receptors during the construction phase have been scoped out as per Table 17-7.</p>

Project phase and activity/impact	Maximum assessment assumptions	Justification
	<p>Jack-up vessel total area of disturbance 3,000m² (125m² per leg, six legs, four exit pits).</p> <p>WTG foundations (116 smaller turbine type)</p> <p>Number of WTG foundations: 116.</p> <p>Monopiles</p> <p>Diameter of monopile 10m, typical embedment depth (below seabed) 30-60m. Seabed take foundation 80m². Area of seabed take including scour protection 5,100m², spoil volume per foundation from drill arisings 5,800m², scour protection volume 15000m³, gravel bed for jack-up spud cans 4,000m³.</p> <p>Jack-up vessel total area of disturbance 4,500m² (250m² per leg, six legs, three max number of vessels).</p> <p>WTG installation</p> <p>Jack-up vessel total area of disturbance 2000m² (250m² per leg, four legs, two max number of vessels).</p> <p>Offshore substation</p> <p>Three substations. Total area of seabed take (per substation) including scour protection 8,800m². Spoil volume 12,000m³. Scour protection, 26,400m³.</p> <p>Jack-up vessel total area of disturbance 2,250m² (125m² per leg, six legs, three substations).</p>	

Project phase and activity/impact	Maximum assessment assumptions	Justification
	<p>Inter-array cable</p> <p>Total cable length 250km, Trench 1m deep, 2m wide. Total seabed disturbance 6,250,000m². Width of seabed affected by installation 25. Burial spoil 500,000m³. Rock berm protection on 20 percent of route, total area 260,000m² or volume 10,000m³.</p> <p>Inter-connector cables</p> <p>Two cables, total length of cables 50km. Trench 2m wide by 1m burial depth. Total seabed disturbance 1,250,000m². Burial spoil 100,000m³ Rock protection area 40,000m² and volume 25,000m³. Assuming 20 percent of cables require additional protection (10km by 4m wide berm).</p> <p>Site preparations</p> <p>Boulder clearance (array):</p> <p>Total impact area, pre-lay plough: 7,500,000m², subsea grab 4,500,000m² and foundations and jack-up legs 1,100,000m².</p> <p>Boulder clearance (offshore export cable corridor):</p> <p>Total impact area, pre-lay plough: 1,900,000m², and subsea grab 1,140,000m².</p> <p>Sand-wave clearance:</p> <p>Sand-wave clearance impact width (array and interconnector cables) 10m. Length of array cables affected by sand waves 60km. Total in array area</p>	

Project phase and activity/impact	Maximum assessment assumptions	Justification
	<p>(export cables, array cables, interconnector cables, foundations) 1,375,000m³.</p> <p>Construction vessel anchorage footprint</p> <p>Assuming only export cable installation vessels in shallow water (up to 10m Lowest Astronomical Tide (LAT) water depth) and the floating crane vessel used to install the offshore substation topside will use anchors 20,050m²</p>	
<p>Operation and Maintenance</p>	<p>Site visits</p> <p>Jack-up trips per year 18. Total seabed disturbance 23,250m² 125m² per leg, six legs, 31 vessels).</p> <p>Vessel anchor total footprint.</p> <p>Inter-array-cables</p> <p>Maximum footprint of seabed disturbance array cable reburial 550,000m²</p> <p>Maximum footprint of (temporary) seabed disturbance for jetting exercise for inter array cable remediation (200,000m² by 18 events).</p> <p>Footprint of seabed disturbance via jacking-up activities for inter array cable repair 30,600m² (450m² by 6 events).</p> <p>Offshore sub-station</p> <p>Footprint of seabed disturbance via jacking-up activities for substation component replacement 6,750m² (27 events x 450m²).</p>	<p>The maximum assessment assumptions represent the maximum seabed disturbance that could potentially affect marine heritage receptors. Note that some impacts on marine heritage receptors during the Operation and Maintenance phase have been scoped out as per Table 17-7.</p>

Project phase and activity/impact	Maximum assessment assumptions	Justification
	<p>Export Cable</p> <p>Maximum footprint of (temporary) seabed disturbance per individual jetting exercise 2,400,000m² (12 events by 200,000m²).</p> <p>Footprint of seabed disturbance via jacking-up activities for cable repair 15,750m² (35 events by 450m²).</p> <p>Footprint of seabed disturbance via jacking-up activities for J-tube replacement 12,150m² (27 events by 450m²).</p>	
Decommissioning	<p>At the end of the operational lifetime of the Proposed Development, it is anticipated that all structures above the seabed or ground level will be completely removed.</p> <p>The decommissioning sequence will generally be the reverse of the construction sequence and involve similar types and numbers of vessels and equipment.</p>	<p>The maximum assessment assumptions represent the maximum seabed disturbance that could potentially affect marine heritage receptors are assumed to be no greater than for the construction phase. Note that some impacts on marine heritage receptors during the decommissioning phase have been scoped out as per Table 17-7.</p>

Embedded environmental measures

- 17.7.3 As part of the Rampion 2 design process, a number of embedded measures have been adopted to reduce the potential for impacts on marine heritage receptors. These embedded measures will evolve over the development process as the EIA progresses and in response to consultation. They will be fed iteratively into the assessment process.
- 17.7.4 These measures typically include those that have been identified as good or standard practice and include actions that will be undertaken to meet existing legislation requirements. As there is a commitment to implementing these environmental measures, and also to various standard sectoral practices and procedures, they are considered inherently part of the design of Rampion 2 and are set out in this PEIR.

17.7.5 **Table 17-13** sets out the relevant embedded measures within the design and how these affect the marine archaeology assessment.

Table 17-13 Relevant marine archaeology embedded environmental measures

ID	Environmental measure proposed	Project phase measure introduced	How the environmental measures will be secured	Relevance to marine archaeology assessment
C-57	A Marine Written Scheme of Archaeological Investigation (WSI) will be developed in accordance with the Outline Marine WSI. The Marine WSI will outline the Archaeological Exclusion Zones (AEZ), the implementation of a Protocol for Archaeological Discoveries in accordance with 'Protocol for Archaeological Discoveries: Offshore Renewables Projects' (The Crown Estate, 2014) and future monitoring and assessment requirements.	Scoping - updated at PEIR	DCO requirements or dML conditions.	The WSI sets out the agreed mitigation strategy for the project, developed following baseline and geophysical assessment phases.
C-58	Offshore geophysical surveys (including Unexploded Ordnance (UXO) surveys) undertaken during the life of the project will be subject to full archaeological review where relevant in consultation with Historic England.	Scoping - updated at PEIR	DCO requirements or dML conditions.	Forms the primary method of identifying marine archaeological receptors.
C-59	Offshore geotechnical surveys prior to construction will be undertaken following early discussions with Historic England. The results of the geoarchaeological assessment will be presented in a staged	Scoping - updated at PEIR	DCO requirements or dML conditions.	Offsets the potential impact of development on deposits of geoarchaeological significance.

ID	Environmental measure proposed	Project phase measure introduced	How the environmental measures will be secured	Relevance to marine archaeology assessment
	geoarchaeological report inclusive of publication.			
C-60	All intrusive construction activities will be routed and microsited to avoid any identified marine heritage receptors pre-construction, with Archaeological Exclusion Zones (AEZs) (buffers) as detailed in the Outline Marine Written Scheme of Investigation (WSI) unless other mitigation is agreed with Historic England as per the WSI.	Scoping - updated at PEIR	DCO requirements or dML conditions.	Utilises the principles of avoidance to reduce impact on known or newly identified marine archaeological receptors to an acceptable level, as defined in Section 17.8 .
C-111	A decommissioning plan will be prepared for the project in line with the latest relevant available guidance.	PEIR	Outline COCP and DCO requirement	Ensures continued review and evaluation of mitigation strategies and monitoring of potential impacts on marine archaeological receptors during decommissioning.

17.8 Methodology for PEIR assessment

Introduction

- 17.8.1 The project-wide general approach to assessment is set out in **Chapter 5: Approach to the EIA**. The assessment methodology for marine archaeology for the PEIR is consistent with that provided in in the Scoping Report (RED, 2020) and no changes to the assessment methodology have been made since the scoping phase. However, this PEIR chapter includes baseline data (**Section 17.4**) that was not included in the Scoping Report.

Desk-based assessment

- 17.8.2 A full desk-based assessment has been undertaken and presented in **Appendix 17.1**. The baseline study establishes the marine archaeological potential of the Rampion 2 PEIR Assessment Boundary and the wider marine archaeology study area. Within this, an assessment of the importance of marine heritage receptors, both known and currently unknown, has been undertaken to ensure appropriate mitigation measures. The preliminary assessment presented in **Section 17.9** considers all aspects of the maximum design scenario to determine likely effects on all marine heritage receptors.
- 17.8.3 The characterisation of known marine heritage receptors to determine likely importance of any unknown receptors that may be encountered with in the Rampion 2 marine archaeology study area is detailed in **Appendix 17.1, Volume 4**. Furthermore, likely significant effects are described in **Sections 17.9 to 17.11** and the assessment includes consideration of potential significant cumulative effects as set out in **Section 17.13**.

Assessing effect and determining significance

- 17.8.4 The following paragraphs outline the method that was used to assess the significance of effect on marine heritage receptors up to MHWS. The criteria for determining this significance is based on both the sensitivity level of those receptors and the magnitude of change as a result of potential impacts, as well as professional judgement based on the guidance set out by the Department for Culture, Media and Sport (2013).
- 17.8.5 The criteria for establishing the level of receptor sensitivity are outlined in **Table 17-14**.

Table 17-14 Criteria for establishing the level of receptor sensitivity

Sensitivity	Criteria	Receptor type
Very high/ high	<p>Very high / high importance and rarity of an international / national scale.</p> <p>Unique with regards to period, rarity, level of documentation, group value, condition, vulnerability, diversity, and / or archaeological potential.</p>	Designated heritage assets, protected wreck sites, aviation remains palaeoenvironmental features or deposits with evidence of <i>in situ</i> finds.
Medium	<p>High or medium importance and rarity of a regional scale with limited potential for substitution.</p> <p>Regionally rare with regards to period, rarity, level of documentation, group value,</p>	Non-designated live wreck sites, geophysical anomalies of high potential, recorded wrecks not confirmed by survey, palaeoenvironmental features or deposits.

Sensitivity	Criteria	Receptor type
Low	<p>condition, vulnerability, diversity, and / or archaeological potential.</p> <p>Low importance and rarity, local scale.</p> <p>Low or no recognised value with regards to period, rarity, level of documentation, group value, condition, vulnerability, diversity, and / or archaeological potential.</p>	Fouls and obstructions, geophysical anomalies of low potential.
Negligible	<p>Very low to no archaeological importance and rarity, local scale.</p> <p>The nature of the receptor is in very poor condition and survival and is therefore not considered a receptor.</p>	Dead wrecks, dead fouls or obstructions, geophysical anomalies of negligible potential such as cables.

17.8.6 The criteria for establishing the magnitude of impact are outlined **Table 17-15**.

Table 17-15 Criteria for magnitude of impact

Magnitude of impact	Criteria (Adverse)	Criteria (Beneficial)
Major	Substantial or irreversible change of archaeological sites, materials or context of archaeological materials or features resulting in significant alteration of archaeological site, feature, or materials, inhibiting interpretation of characteristics, sub-features, or components.	Large-scale enhanced understanding of the archaeological resource inversely proportional to the scale of adverse effect, for example benefit through large area geophysical/geotechnical survey data released to public domain.
Moderate	Moderate changes to archaeological sites, materials or context of archaeological materials or features resulting in clear alteration, inhibiting interpretation of several key characteristics, sub-features, or components.	Benefit to, or addition of, key characteristics, features or elements for example site-specific survey and investigation leading to an enhancement of disseminated knowledge; for example, diver/ROV ground-truthing of anomalies, published results.
Minor	Minor changes to archaeological sites, material or contexts of	Minor benefit to, or addition of, one or more key characteristics, features or

Magnitude of impact	Criteria (Adverse)	Criteria (Beneficial)
	archaeological materials or features resulting in clear alteration, inhibiting interpretation of several key characteristics, sub-features or components.	elements through enhanced knowledge and understanding of receptors not disseminated or made publicly available.
Negligible	Changes that are indistinguishable from natural variation, do not change archaeological sites or materials, and do not affect key characteristics, sub-features, or components or their environment or context.	N/A

17.8.7 The significance of the effect on marine heritage receptors will be determined by correlating the sensitivity of the receptor and the magnitude of the impact as outlined in **Table 17-16**. For the purpose of this PEIR, any effects with a significance level of minor or less will be considered as not significant in terms of the EIA Regulations (2017).

Table 17-16 Significance assessment matrix

		Magnitude of Change			
		Major	Moderate	Minor	Negligible
Sensitivity of Receptor	Very High/High	Significant	Significant	Potentially Significant	Not Significant
	Medium	Significant	Potentially Significant	Not Significant	Not Significant
	Low	Potentially Significant	Not Significant	Not Significant	Not Significant
	Negligible	Not Significant	Not Significant	Not Significant	Not Significant

17.9 Preliminary assessment: Construction phase

17.9.1 The impacts of the Rampion 2 construction phase have been considered on marine heritage receptor in **Table 17-12**. As outlined in **Table 17-7** and agreed

with stakeholders all impacts from the construction phase have been scoped out from further assessments based on the embedded environmental measures set out in **Table 17-13** being secured through the DCO requirements or dMLs conditions.

17.10 Preliminary assessment: Operation and maintenance phase

Scour effects caused by the presence of WTG, substation foundations and the exposure of inter-array, inter-connector cables and export cables or the use of cable protection measures.

Magnitude of impact

- 17.10.1 Magnitude of impact on marine heritage receptors have been assessed according to the criteria outlined in **Table 17-15** and is taking into account the embedded environmental measures as outlined in **Table 17-13**. The impact of scour effects are expected to be limited to the immediate area around the WTG and substation foundations and along the inter-array and export cables.
- 17.10.2 Impacts on marine heritage receptors during the operation and maintenance phase can occur if deposits of archaeological potential are buried close to the seabed and are directly, or by sedimentary changes, affected by the works.
- 17.10.3 Impacts on marine heritage receptors during the construction phase can occur if objects or deposits of archaeological potential are buried close to the seabed and are directly, or by sedimentary changes, affected by the works.
- 17.10.4 If a direct impact or exposure of archaeological material to natural, chemical or biological processes occurs, it will generally be major and substantial or irreversible and result in a permanent change to the receptor.
- 17.10.5 If any marine heritage receptors are subject to increased sedimentation covering and protecting the receptor as a result of the construction phase, the marine heritage receptor might benefit from the conditions which could provide a higher level of preservation *in situ*.
- 17.10.6 The magnitude of the impact that construction activities relating to Rampion 2 will have on marine heritage receptors after the embedded environmental measures as detailed in **Table 17-13** have been applied is considered to be **negligible**.

Sensitivity of the receptor

- 17.10.7 **Table 17-17** summarises the sensitivity of the marine archaeological receptor as defined in **Table 17-14**.

Table 17-17 Receptor sensitivity (Operation and Maintenance)

No.	Marine archaeological receptor	Receptor sensitivity
31	High potential anomalies	Medium
24	Medium potential anomalies	Medium
228	Low potential anomalies	Low
2,280	Low potential magnetic anomalies	Low
5	High significance (archaeological term) known wrecks	Very high/ high
42	Medium significance (archaeological term) known wrecks	Very high/high/ medium
4	Low significance (archaeological term) known wrecks	Very high/high/ medium
270	Reported losses/ fishermen's fasteners/ obstructions/ dead wrecks	Low/ Negligible

Significance of residual effect

- 17.10.8 The embedded environmental measures as outlined in **Section 17.7** and **Table 17-13** will ensure that all marine heritage receptors are avoided.
- 17.10.9 As per embedded environmental measure C-60, the locations on the seabed of potential and confirmed receptors are informed by the archaeological assessment of geophysical and geotechnical data.
- 17.10.10 As per embedded environmental measures C-58 and C-59, further archaeological works will be a requirement under **Appendix 17.2** and associated documents as per embedded environmental measure C-57.
- 17.10.11 It is predicted that the sensitivity of the receptor is **negligible** to **very high** and the magnitude is **negligible**. The significance of effect is therefore of **not significant**, in EIA terms.

17.11 Preliminary assessment: Decommissioning phase

Draw-down of sediment into voids left by removed turbine foundations leading to loss of sediment.

Magnitude of impact

- 17.11.1 Magnitude of impact on marine heritage receptors have been assessed according to the criteria outlined in **Table 17-15** and considers the embedded environmental measures as outlined in **Table 17-13**.
- 17.11.2 The impact of draw down effects are expected to be limited to the immediate area where voids might be left if turbine foundations are removed.
- 17.11.3 Impacts on marine heritage receptors during the decommissioning phase can occur if deposits of archaeological potential are buried close to the seabed and are directly affected by the removal works, or indirectly by sedimentary changes.
- 17.11.4 If a direct impact, or exposure of archaeological material to natural, chemical or biological processes, occurs, it will generally be a major and substantial, irreversible effect and is likely to result in a permanent change to the receptor.
- 17.11.5 If as a result of the works during the decommissioning phase, marine heritage receptors are subject to increased sedimentation covering the marine heritage receptor they may benefit from additional protection and a higher level of preservation *in situ*.
- 17.11.6 The magnitude of the impact that decommissioning activities relating to Rampion 2 will have on marine heritage receptors after the embedded environmental measures (C-57, C-60 and C-111) as detailed in **Table 17-13** have been applied is considered to be **negligible**.

Sensitivity of the receptor

- 17.11.7 **Table 17-18** summarises the sensitivity of the marine archaeological receptor as defined in **Table 17-14**.

Table 17-18 Receptor sensitivity (Decommissioning)

No. of receptors	Marine archaeological receptor	Receptor sensitivity
31	High potential anomalies	Medium
24	Medium potential anomalies	Medium
228	Low potential anomalies	Low
2,280	Low potential magnetic anomalies	Low

No. of receptors	Marine archaeological receptor	Receptor sensitivity
5	High significance (archaeological term) known wrecks	Very high/ high
42	Medium significance (archaeological term) known wrecks	Very high/high/ medium
4	Low significance (archaeological term) known wrecks	Very high/high/ medium
270	Reported losses/ fishermen's fasteners/ obstructions/ dead wrecks	Low/ Negligible

Significance of residual effect

- 17.11.8 The embedded environmental measures as outlined in **Section 17.7** and **Table 17-13** will ensure that all marine heritage receptors are avoided.
- 17.11.9 As per embedded environmental measure C-60, the locations on the seabed of potential and confirmed receptors are informed by the archaeological assessment of geophysical and geotechnical data.
- 17.11.10 As per embedded environmental measures C-58 and C-59, the commitment to undertake further archaeological works will be a requirement under **Appendix 17.2** and associated documents as per embedded environmental measure C-57.
- 17.11.11 It is predicted that the sensitivity of the receptor is **negligible** to **very high** and the magnitude is **negligible**. The significance of effect is therefore **not significant**, in EIA terms.

17.12 Preliminary assessment: Historic Seascape Character

- 17.12.1 The visual impacts and perception of the magnitude of impact (**Table 17-15**) of construction and decommissioning activities on historical seascapes is expected to be **negligible**. The presence of construction vessels is considered to be comparatively inconsequential considering the current marine activity within the marine archaeology study area. The inshore activities at landfall will be short term and small scale with the use of larger construction vessels transitional. Therefore, it is assumed that magnitude will be **negligible** which is **not significant** in EIA terms.
- 17.12.2 The visual impacts and perception of the magnitude of impact (**Table 17-15**) of activities during the operational phase on historical seascapes is expected to be **negligible**. In terms of the presence of operation and maintenance vessels it is considered short term and small scale.
- 17.12.3 The presence of WTGs, substation and sub-sea cables existing on the sea floor, the sub- sea floor, the water column and the surface will alter the Historical Seascape Character, however considering the modern activities within the Broad Historic Character Types it is not expected that the presence of Rampion 2 will

further alter the perception of the Historic Seascape Therefore, it is assumed that magnitude will be **negligible** which is **not significant** in EIA terms.

- 17.12.4 It has been established that HSC is value-neutral and was developed to be a positive force in informing change as well as recognising that landscape and seascape are both a product of that inevitable change. Developments should therefore respect and retain cultural distinctiveness and legibility wherever possible (Tapper & Johns 2008).
- 17.12.5 Considering the perception of the above outlined Broad Historic Character Types (as well as people's perception of the sea and its value), no significant change in the multiple dimensions of the marine environment as a result of Rampion 2 in isolation or cumulatively with neighbouring developments is identified. Therefore, it is assumed that magnitude will be **negligible** which is **not significant** in EIA terms.

17.13 Preliminary assessment: Cumulative effects

Approach

- 17.13.1 A preliminary cumulative effects assessment (CEA) has been carried out for Rampion 2 which examines the result from the combined impacts of Rampion 2 with other developments on the same single receptor or resource and the contribution of Rampion 2 to those impacts. The overall method followed in identifying and assessing potential cumulative effects in relation to the offshore environment is set out in **Chapter 5, Section 5.10**.
- 17.13.2 The offshore screening approach is based on PINS Advice Note Seventeen (PINS, 2019), with relevant components of the RenewableUK (RenewableUK, 2013) accepted guidance, which includes aspects specific to the marine elements of an offshore wind farm, addressing the need to consider mobile wide-ranging species (foraging species, migratory routes etc).

Cumulative effects assessment

- 17.13.3 For marine archaeology, a Zone of Influence (ZOI) of 50km from the marine archaeology study area has been applied for the CEA to ensure direct and indirect cumulative effects can be appropriately identified and assessed. This area is determined to avoid any impact from potential cumulative effects of sediment movement and disturbance.
- 17.13.4 A short list of 'other developments' that may interact with the Rampion 2 ZOIs during their construction, operation or decommissioning is presented in **Appendix 5.4: Cumulative effects assessment shortlisted developments, Volume 4** and on **Figure 5.4.1, Volume 4**. This short list has been generated applying criteria set out in **Chapter 5** and has been collated up to the finalisation of the PEIR through desk study, consultation, and engagement.
- 17.13.5 A tiering structure has been used for screening and assessment of other developments as in accordance with PINS Advice Note Seventeen (**Chapter 5**). Definitions of Tiers are set out in **Table 5-3 of Chapter 5: Approach to EIA, Volume 4**. Where other projects are expected to be completed before construction

of the Proposed Development and the effects of those projects are fully determined, effects arising from them are considered as part of the baseline and may be considered as part of both the construction and operational assessment.

17.13.6 Only those developments in the short list that fall within the marine archaeology ZOI have the potential to result in cumulative effects with the Proposed Development. The marine archaeology ZOI is shown in **Chapter 5, Figure 5.1, Volume 3**. All developments falling outside the 50km ZOI are excluded from this assessment. Furthermore, the following types of other development have the potential to result in cumulative effects on marine heritage receptors:

- sub-sea cables and pipelines (telecommunication and power cables);
- aggregate production areas;
- offshore wind farms; and
- telecommunication cables.

17.13.7 Other developments that could result in loss or change (permanent and/ or temporary) to marine heritage receptors, which could potentially also be affected by Rampion 2 have been screened in based on their spatial effect interactions as presented in **Table 17-19**.

Table 17-19 Developments to be considered as part of the CEA

ID (Figure 5.4.1)	Development type	Project	Status	Confidence in assessment	Tier	Distance to Rampion ECC (km)	Distance to Rampion array (km)
C4	Cable	Kis-Orca subsea pipeline/ cable 26	Active	Low, ES not available or does not contain marine archaeology impact assessment.	1	<50	12.8
C5	Cable	Kis-Orca subsea pipeline/ cable 30	Active	Low, ES not available or does not contain marine archaeology impact assessment.	1	<50	27.7
A407	Aggregates	CEMEX UK Marine Ltd. St Catherine's Area 407	Active	High, marine archaeology impact assessments are undertaken.	1	38.6	28.4
A340	Aggregates	340 South East IOW Area – Volker Dredging Ltd	Active	High, marine archaeology impact assessments are undertaken.	1	30.6	23.7
A351	Aggregates	351 South East IOW Area – Tarmac Marine Ltd	Active	High, marine archaeology impact assessments are undertaken.	1	21.2	15.8

ID (Figure 5.4.1)	Development type	Project	Status	Confidence in assessment	Tier	Distance to Rampion ECC (km)	Distance to Rampion array (km)
A395/1	Aggregates	395/1 Off Selsey Bill Area - Kendall Bros (Portsmouth) Ltd	Active	High, marine archaeology impact assessments are undertaken.	1	20.2	15
A395/2	Aggregates	395/2 Off Selsey Bill Area – Kendall Bros (Portsmouth) Ltd	Active	High, marine archaeology impact assessments are undertaken.	1	21	16.9
A340	Aggregates	340 South East IOW Area – CEMEX UK Marine Ltd	Active	High, marine archaeology impact assessments are undertaken.	1	30.6	23.7
A351	Aggregates	351 South East IOW Area – Volker Dredging Ltd	Active	High, marine archaeology impact assessments are undertaken.	1	21.1	15.8
A395/1	Aggregates	395/1 Off Selsey Bill – Tarmac Marine Ltd	Active	High, marine archaeology impact assessments are undertaken.	1	20.2	15
A395/2	Aggregates	395/2 Off Selsey Bill Area –	Active	High, marine archaeology impact	1	21	16.9

ID (Figure 5.4.1)	Development type	Project	Status	Confidence in assessment	Tier	Distance to Rampion ECC (km)	Distance to Rampion array (km)
		Tarmac Marine Ltd		assessments are undertaken.			
A451	Aggregates	451 St Catherine's Area – Westminster Gravels Ltd	Active	High, marine archaeology impact assessments are undertaken.	1	23.5	16.5
A453	Aggregates	453 Owers Extension – CEMEX UK Marine Ltd.	Active (end date 31/03/2032)	High, marine archaeology impact assessments are undertaken.	1	0.5	5.5
A488	Aggregates	488 Inner Owers North – Tarmac Marine Ltd.	Active (end date 07/07/2030)	High, marine archaeology impact assessments are undertaken.	1	0.6	3.9
A396/1	Aggregates	Tarmac Marine Ltd Inner Owers Area 396/1	Active (end date 07/07/2030)	High, marine archaeology impact assessments are undertaken.	1	0.1	0
A396/2	Aggregates	396/2 Inner Owers – Tarmac Marine Ltd	Active (end date 07/07/2030)	High, marine archaeology impact assessments are undertaken.	1	2	3.5

ID (Figure 5.4.1)	Development type	Project	Status	Confidence in assessment	Tier	Distance to Rampion ECC (km)	Distance to Rampion array (km)
A435/1	Aggregates	435/1 Inner Owers – Hanson Aggregates Marine Ltd	Active (end date 07/07/2030)	High, marine archaeology impact assessments are undertaken.	1	0.7	0.1
A435/2	Aggregates	435/2 Inner Owers – Hanson Aggregates Marine Ltd	Active (end date 07/07/2030)	High, marine archaeology impact assessments are undertaken.	1	2.3	0.7
A458	Aggregates	458 West Bassurelle Area – Tarmac Marine Ltd	Active	High, marine archaeology impact assessments are undertaken.	1	<50	36.4
A460	Aggregates	460 South Hastings Area – CEMEX UK Marine Ltd	Active	High, marine archaeology impact assessments are undertaken.	1	<50	34.8
A461	Aggregates	461 Median Deep Area – Volker Dredging Ltd	Active	High, marine archaeology impact assessments are undertaken.	1	<50	36.8
A16	Aggregates	464 West Bassurelle Area	Active	High, marine archaeology impact	1	<50	33.6

ID (Figure 5.4.1)	Development type	Project	Status	Confidence in assessment	Tier	Distance to Rampion ECC (km)	Distance to Rampion array (km)
		– Tarmac Marine Ltd		assessments are undertaken.			
A473/2	Aggregates	473/1 Greenwich Light East Area - CEMEX UK Marine Ltd	Active	High, marine archaeology impact assessments are undertaken.	1	<50	25.7
A473/2	Aggregates	473/2 North Area - Hanson Aggregates Marine Ltd	Active	High, marine archaeology impact assessments are undertaken.	1	<50	28.5
A478	Aggregates	478 Area 1 South Area - DEME Building Materials Ltd	Active	High, marine archaeology impact assessments are undertaken.	1	<50	29.6
A460	Aggregates	460 South Hastings Area - Tarmac Marine Ltd	Active	High, marine archaeology impact assessments are undertaken.	1	<50	34.8
A460	Aggregates	Area 460 - Hanson Aggregates Marine Ltd	Active	High, marine archaeology impact assessments are undertaken.	1	<50	34.8

ID (Figure 5.4.1)	Development type	Project	Status	Confidence in assessment	Tier	Distance to Rampion ECC (km)	Distance to Rampion array (km)
A458	Aggregates	458 West Bassurelle Area - CEMEX UK Marine Ltd	Active	High, marine archaeology impact assessments are undertaken.	1	<50	36.4
A16	Aggregates	464 West Bassurelle Area – CEMEX UK Marine Ltd	Active	High, marine archaeology impact assessments are undertaken.	1	<50	33.6
A473/2	Aggregates	Hanson Aggregates Marine Ltd North Area 473/1	Active	High, marine archaeology impact assessments are undertaken.	1	<50	25.7
A473/2	Aggregates	473/2 Greenwich Light East Area - CEMEX UK Marine Ltd	Active	High, marine archaeology impact assessments are undertaken.	1	<50	28.5
W48	Offshore wind farm	Rampion 1	Active	High, marine archaeology impacts assessment undertaken as part of ES.	1	10.5	0

ID (Figure 5.4.1)	Development type	Project	Status	Confidence in assessment	Tier	Distance to Rampion ECC (km)	Distance to Rampion array (km)
T1	Tidal Energy	Perpetuus Tidal Energy Centre (PTEC)	Proposed (Offshore plans approved 2016, plan to be operational 2025. Onshore planning application to be submitted 2021.)	High, marine archaeology impacts assessment was undertaken as part of ES.	1	47.8	<50
TC1	Telecommunication	ATLANTIC CROSSING 1 Century Link	Active	Low, ES not available or does not contain marine archaeology impact assessment	1	12.5	29
TC2	Telecommunication	COWES-FAWLEY 2 BT	Active	Low, ES not available or does not contain marine archaeology impact assessment	1	<50	<50
TC3	Telecommunication	PORTSMOUTH RYDE BT	Active	Low, ES not available or does not contain	1	31.5	<50

ID (Figure 5.4.1)	Development type	Project	Status	Confidence in assessment	Tier	Distance to Rampion ECC (km)	Distance to Rampion array (km)
				marine archaeology impact assessment			
TC5	Telecommunication	RIOJA 2 BT	Disused	High, not used	1	28	42
TC6	Telecommunication	CIRCLE SOUTH ZAYO	Active	Low, ES not available or does not contain marine archaeology impact assessment	1	34	16
C2	Power cable	IFA 2 RTE	Installed but not yet operational	Low, ES not available or does not contain marine archaeology impact assessment	1	43	<50

- 17.13.8 Baseline data and further information on other developments will continue to be collected prior to the finalisation of the ES and iteratively fed into the assessment. An updated cumulative effects assessment will be reported in the ES.
- 17.13.9 The cumulative Project Design Envelope is described in the following table.

Table 17-20 Cumulative Project Design Envelope for marine archaeology

Project phase and activity/impact	Scenario	Justification
Construction, operation and maintenance, and decommissioning activities Cumulative sediment disturbance from Rampion 2 alongside other developments may result in the loss of sediment, destabilising marine heritage receptors exposing such material to natural, chemical or biological processes, and causing or accelerating loss of the same	Tier 1: All other developments within Tier 1	Maximum cumulative sediment disturbance is calculated within a representative 50km buffer of Rampion 2 marine archaeology study area as it can be considered to represent marine heritage receptors. Seabed activities during the construction, operation, and decommissioning activities during the Rampion 2 project phases cumulatively with the activities undertaken by the other projects as listed in Table 17-19 have the potential to alter and disturb sediment.
	Tier 2: No other developments to consider	
	Tier 3: No other developments to consider	
Construction, operation and maintenance, and decommissioning activities Cumulative deposition of sediments from Rampion 2 alongside other developments, resulting in a positive effect on marine heritage receptors.	Tier 1: All other developments within Tier 1	Maximum cumulative sediment disturbance is calculated within a representative 50km buffer of Rampion 2 marine archaeology study area as it can be considered to represent marine heritage receptors. Seabed activities during the construction, operation, and decommissioning activities during the Rampion 2 project phases cumulatively with the activities undertaken by the other projects as listed in Table 17-19 have the potential to alter and disturb sediment.
	Tier 2: No other developments to consider	
	Tier 3: No other developments to consider	

- 17.13.10 The CEA has been based on information available in respective ESs where available and it is noted that the project parameters quoted within ESs are often refined during the determination period and in the post-consent phase.

Sub-sea cables and pipelines (telecommunication and power cables)

- 17.13.11 Cumulative sediment changes during all Rampion 2 project phases and the presence of sub-sea cables and pipelines may over time result in the loss or accumulation of sediment. Together with maintenance operations of sub-sea cables and pipelines if undertaken they may alter or destabilise unknown marine heritage receptors, archaeological sites and contexts, including paleoenvironmental information and exposing such material to natural, chemical, or biological processes, and causing or accelerating loss of the same.
- 17.13.12 The cumulative effects during all Rampion 2 project phases and the outlined presence of subsea cables and pipelines are therefore predicted to be of local spatial extent, long term duration, continuous and limited reversibility.
- 17.13.13 There is currently limited detail on archaeological data and assessments within the impact assessments undertaken ahead of the subsea cables and pipelines detailed in **Table 17-19** and therefore it is not possible to make a comprehensive assessment of the significance of effect, however given that construction activities do not overlap and disturbance from operational and maintenance of Rampion 2 are expected to be short term and localised to the offshore part of the PEIR Assessment Boundary, it is not anticipated that any effects, will result in a significant impact.
- 17.13.14 Based on the commitments to avoid known marine heritage receptors within the marine archaeology study area of Rampion 2 as per embedded environmental measure C-60, and ensure further investigation C-57, C-58 and C-59 to mitigate impact on unknown marine archaeological receptors (**Table 17-13**), the magnitude of impact is expected to be indistinguishable from natural variation, meaning **not significant** in EIA terms.

Aggregate production areas

- 17.13.15 Cumulative sediment changes during all Rampion 2 project phases and the presence of active aggregate production areas in the locality as set out in **Table 17-19** may result in the loss or accumulation of sediment, thereby altering or destabilising archaeological sites and contexts, including paleoenvironmental information and exposing such material to natural, chemical or biological processes, and causing or accelerating loss of the same.
- 17.13.16 The cumulative effects during all Rampion 2 project phases and the outlined active aggregate production areas are therefore predicted to be of local spatial extent, long term duration, continuous and limited reversibility.
- 17.13.17 The BMAPA ensures that proportionate planning is undertaken which provides a framework to enable delivery of a 'licence to operate' for all dredging activities and operation and a Guidance Note which ensures that marine heritage receptors are

addressed at every stage of marine aggregate development and production has been agreed.

- 17.13.18 Given that construction activities will overlap with active dredging operations and disturbance from the operational and maintenance phase of Rampion 2 are expected to be short term and localised to the Proposed Development area effects may result in a cumulative impact. However, based on the commitments to avoid known marine heritage receptors within the marine archaeology study area of Rampion 2 as per embedded environmental measure C-60, and ensure further investigation C-57, C-58 and C-59 to mitigate impact on unknown marine archaeological receptors (**Table 17-13**), as well as the mitigation applied by the BMAPA the magnitude of impact is expected to be minor or negligible and indistinguishable from natural variation, meaning **not significant** in EIA terms.

Offshore wind farms

- 17.13.19 Operational offshore wind farms in the vicinity as outlined in **Table 17-19** consist of sub-sea cables and permanent structures on the seabed. Cables and foundation structures when installed may require regular planned and unplanned maintenance causing seabed disturbance why cumulative sediment changes during all Rampion 2 project phases and the presence of operational offshore wind farms may result in the loss or accumulation of sediment. Thereby altering or destabilising archaeological sites and contexts, including paleoenvironmental information and exposing such material to natural, chemical or biological processes, and causing or accelerating loss of the same.
- 17.13.20 The cumulative impact during all Rampion 2 project phases and the outlined presence of operational offshore wind farms (**Table 17-19**) is therefore predicted to be of local spatial extent, long term duration, continuous and limited reversibility.
- 17.13.21 Given that construction activities do not overlap with any operational offshore wind farms within the assessment, and disturbance from the operation and maintenance phase of Rampion 2 is expected to be short term and localised, it is not anticipated that any significant cumulative effects will arise.
- 17.13.22 Further, based on the commitments to avoid known marine heritage receptors within the marine archaeology study area of Rampion 2 as per embedded environmental measure C-60, and ensure further investigation C-57, C-58 and C-59 to mitigate impact on unknown marine archaeological receptors (**Table 17-13**), as well as the as well as the mitigation strategies secured through the consents granted for the individual offshore wind farms set out in **Table 17-19**, the magnitude of impact is expected to be minor or negligible and indistinguishable from natural variation, meaning **not significant** in EIA terms.

Telecommunication cables

- 17.13.23 Cumulative sediment changes during all Rampion 2 project phases and the presence of telecommunication cables may result in the loss or accumulation of sediment, thereby altering or destabilising archaeological sites and contexts, including paleoenvironmental information and exposing such material to natural, chemical or biological processes, and causing or accelerating loss of the same.

- 17.13.24 The cumulative impact during all Rampion 2 project phases and the outlined presence of telecommunication cables is therefore predicted to be of local spatial extent, long term duration, continuous and limited reversibility.
- 17.13.25 There is currently limited detail on archaeological data and assessments within the impact assessments undertaken ahead of the telecommunication cable installations detailed in **Table 17-19** and therefore it is not possible to make a comprehensive assessment of the significance of effect. However, given that construction activities do not overlap and disturbance from operational and maintenance of Rampion 2 are expected to be short term and localised, it is not anticipated that any significant cumulative effects, will arise.
- 17.13.26 Further, based on the commitments to avoid known marine heritage receptors within the marine archaeology study area of Rampion 2 as per embedded environmental measure C-60, and ensure further investigation C-57, C-58 and C-59 to mitigate impact on unknown marine archaeological receptors (**Table 17-13**), as well as the magnitude of impact is expected to be indistinguishable from natural variation, meaning **not significant** in EIA terms.

Tidal energy

- 17.13.27 There is one tidal energy development included in the CEA, the PTEC, located off the Isle of Wight. The development consenting process included an assessment of potential environmental and community impacts (including marine heritage receptors) and final consent was awarded in April 2016. The development has been paused on and off over the last years and its current status is not known.
- 17.13.28 There is currently limited detail available on the marine heritage receptors likely to be affected, and the impact assessments undertaken ahead of the ES submission for the tidal project. Therefore it is not possible to make a detailed assessment of the significance of cumulative effect as project parameters are unknown. However, given that construction activities will most likely not overlap, and disturbance from operational and maintenance of Rampion 2 are expected to be short term and localised, it is not anticipated that any significant cumulative effects will arise.
- 17.13.29 Further, based on the commitments to avoid known marine heritage receptors within the marine archaeology study area of Rampion 2 as per embedded environmental measure C-60, and ensure further investigation C-57, C-58 and C-59 to mitigate impact on unknown marine archaeological receptors (**Table 17-13**), as well as the mitigation strategies secured through the consents granted for the PTEC, should construction go ahead, the magnitude of impact is expected to be minor or negligible and indistinguishable from natural variation, meaning **not significant** in EIA terms.
- 17.13.30 To summarise, the cumulative effects during all phases of Rampion 2 and the outlined other developments are predicted to be of **negligible** magnitude. The significance of cumulative effect is therefore **not significant**, in EIA terms.

17.14 Transboundary effects

- 17.14.1 Transboundary effects arise when impacts from a development within one European Economic Area (EEA) state affects the environment of another EEA

state(s). A screening of transboundary effects has been undertaken and is presented in Appendix B of the Scoping Report (RED, 2020).

- 17.14.2 The screening exercise concluded that there is no potential for significant transboundary effects upon the interests of other EEA States in relation to marine archaeology to occur as a result of the construction, operation or decommissioning of Rampion 2.

17.15 Inter-related effects

- 17.15.1 The inter-related effects assessment considers likely significant effects from multiple impacts and activities from the construction, operation and maintenance, and decommissioning of Rampion 2 on the same receptor, or group of receptors.
- 17.15.2 The majority of seabed disturbance including penetration, draw down and compression, will occur within the construction and decommissioning phases.
- 17.15.3 While there is potential for some disturbance within the operational phase, these activities will avoid known marine heritage receptors as per the embedded environmental measure (C-60) **Table 17-13** and mitigate impact on unknown receptors as per C-57, C-58 and C-59) **Table 17-13**. It is therefore considered that impacts during the operation phase will not contribute to inter-related effects.
- 17.15.4 It is concluded that there will be no integration of effect between construction and decommissioning phases as they are undertaken during separate temporal phases and there will therefore be no inter-related effects of greater significance compared to the impacts considered alone.
- 17.15.5 The greatest potential for direct spatial impact on marine heritage receptors is likely to occur during contact with the seabed during the construction and decommissioning phases. The individual impacts were assigned a significance of **negligible**. Largely due to the implementation of embedded environmental measures.
- 17.15.6 It is therefore not anticipated that any inter-related effects will occur that are of any greater significance compared to the impacts considered alone.

17.16 Summary of residual effects

- 17.16.1 **Table 17-21** presents a summary of the preliminary assessment of significant impacts, any relevant embedded environmental measures, and residual effects on marine heritage receptors.

Table 17-21 Summary of preliminary assessment of residual effects

Activity and impact	Magnitude of impact	Receptor and sensitivity or value	Embedded environmental measures	Preliminary assessment of residual effect (significance)
Operation				
Scour effects caused by the presence of WTG, substation foundations and the exposure of inter-array, inter-connector and export cables or the use of cable protection measures.	Negligible	Marine heritage receptors negligible to very high.	C-57	Not significant
			C-58	
			C-59	
			C-60	
Decommissioning				
Draw-down of sediment into voids left by removed turbine foundations leading to loss of sediment.	Negligible	Marine heritage receptors negligible to very high.	C-57	Not significant
			C-58	
			C-59	
			C-60	

17.17 Further work to be undertaken for ES

Introduction

- 17.17.1 Further work that will be undertaken to support the marine archaeology assessment and presented within the ES is set out below.

Baseline

- 17.17.2 The current baseline assessment has been compiled using the most recent data sources available as outlined in **Section 17.6**. The baseline assessment is expected to remain largely unchanged.
- 17.17.3 An increased understanding of the sedimentary horizons and in-depth development of the deposit model will be included following geoarchaeological

assessments of material collected as part of future geotechnical campaigns planned to be undertaken pre-construction.

Assessment

- 17.17.4 The assessment methodology will be consistent with the scoping stage methodology and the PEIR methodology as presented in **Section 17.8**. The methodology will be discussed during ongoing dialogue with Historic England as well as during forthcoming evidence plan meetings where any potential concerns will be addressed.
- 17.17.5 No changes to the preliminary assessment of impact in relation to marine archaeology as presented in the PEIR chapter are expected.

Consultation and engagement

- 17.17.6 Further consultation and engagement that will be undertaken to inform the marine archaeology assessment and presented within the ES is set out in **Table 17-22**.

Table 17-22 Further consultation and engagement

Consultee	Issues to be addressed	Relevance to assessment
Historic England	Ongoing consultation as part of the EPP Steering Group.	Confirmation that the assessment is satisfactory.
ESCC	Ongoing consultation as part of the EPP Steering Group.	Confirmation that the assessment is satisfactory.
WSCC	Ongoing consultation as part of the EPP Steering Group.	Confirmation that the assessment is satisfactory.
SDNPA	Ongoing consultation as part of the EPP Steering Group.	Confirmation that the assessment is satisfactory.
MMO	Ongoing consultation as part of the EPP Steering Group.	Confirmation that the assessment is satisfactory.

17.18 Glossary of terms and abbreviations

Table 17-23 Glossary of terms and abbreviations

Term (acronym)	Definition
Archaeological Exclusion Zones (AEZs)	Buffers around known marine heritage receptors that should be avoided during construction works.
Archaeological Notification Area (ANA)	Area identified by the local authority as having a high potential for archaeological remains to be present.
BMAPA	British Marine Aggregate Producers Association
Baseline conditions	The environment as it appears (or would appear) immediately prior to the implementation of the Proposed Development together with any known or foreseeable future changes that will take place before completion of the Proposed Development.
Before Present (BP)	Time scale referring to the years before 1950.
Bronze Age	This period follows on from the Neolithic and is characterized by the increasing use of Bronze work. It is subdivided in the Early, Middle and Late Bronze Age. Archaeological period lasting from 2,600-700 BC.
ClfA	Chartered Institute for Archaeologists
Coastal processes	The processes that interact to control the physical characteristics of a natural environment, for example: winds, waves, currents, water levels, sediment transport, turbidity, coastline, beach and seabed morphology.
Coastal retreat	Natural recession of a coastline over time.
Development Consent Order (DCO)	An order made under the Planning Act 2008 granting development consent for one or more Nationally Significant Infrastructure Projects (NSIP).
Decommissioning	The period during which a development and its associated processes are removed from active operation
Early Medieval	This dates from the breakdown of Roman rule in Britain to the Norman invasion in 1066 and is to be used for monuments of post Roman, Saxon and Viking date. Archaeological period lasting from AD410 to 1066.
Early Prehistoric	For monuments which are characteristic of the Palaeolithic to Mesolithic but cannot be specifically

Term (acronym)	Definition
	assigned. Archaeological period lasting from 50,000 to 4,000 BC.
EEA	European Economic Area
Effect	Term used to express the consequence of an impact. The significance of an effect is determined by correlating the magnitude of the impact with the importance, or sensitivity, of the receptor or resource in accordance with defined significance criteria.
EIA Regulations, 2017	The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017. The EIA regulations require that the effects of a project, where these are likely to have a significant effect on the environment, are taken into account in the decision-making process for the project.
Environmental Impact Assessment (EIA)	The process of evaluating the likely significant environmental effects of a proposed project or development over and above the existing circumstances (or 'baseline').
Environmental Statement (ES)	The written output presenting the full findings of the Environmental Impact Assessment.
ETG	Expert Topic Group
Evidence Plan Process (EPP)	A voluntary consultation process with specialists' stakeholders to agree the approach, the information to support, the EIA and HRA for certain aspects.
ESCC	East Sussex County Council
Future Baseline	Refers to the situation in future years without the Proposed Development.
Geographical Information System (GIS)	A system that captures, stores, analyses, manages and presents data linked to location. It links spatial information to a digital database.
Geophysical	Relating to the physical properties of the Earth.
Heritage	The historic environment and especially valued assets and qualities such as historic buildings and cultural traditions.
Historic Environment Record (HER)	County maintained database of all known archaeological monuments and events in the region.

Term (acronym)	Definition
Historic England	The public body that champions and protects England's historic places.
Historic England National Record of the Historic Environment (NRHE)	National database of known wrecks and reported losses held by Historic England.
Historic Seascape Characterisation (HSC)	Maps and describes historic cultural influences which shape seascape perceptions across marine areas and coastal land.
HLC	Historic Landscape Character
Horizontal Directional Drill (HDD)	An engineering technique avoiding open trenches.
Impact	The changes resulting from an action.
Inshore	The sea up to two miles from the coast.
Intertidal	The area of the shoreline which is covered at high tide and uncovered at low tide.
Iron Age	This period follows on from the Bronze Age and is characterized by the use of iron for making tools and monuments such as hillforts and oppida. The Iron Age is taken to end with the Roman invasion. Archaeological period lasting from 800 BC to AD 43.
JNAPC	Joint Nautical Archaeology Policy Committee
LAT	Lowest Astronomical Tide
MAG	Magnetometer
Marine aggregate	Marine dredged sand and/or gravel.
Marine archaeology study area	Defined as the PEIR Boundary area up to MHWS and surrounded by a 2km buffer.
Marine Heritage Receptors	Physical resources such as shipwrecks, remains of aircraft, archaeological sites, archaeological finds and material including pre-historic deposits as well as archival documents and oral accounts recognised as of historical/archaeological or cultural significance.
MIS	Marine Isotope Stage
Marine Management Organisation (MMO)	MMO is an executive non-departmental public body, sponsored by the Department for Environment, Food &

Term (acronym)	Definition
	Rural Affairs. MMO license, regulate and plan marine activities in the seas around England so that they're carried out in a sustainable way.
Marine Policy Statement (MPS)	Framework for preparing Marine Plans and taking decisions affecting the marine environment.
Medieval	The Medieval period or Middle Ages begins with the Norman invasion and ends with the dissolution of the monasteries. Archaeological period lasting from AD 1066-1540.
Mesolithic	The Middle Stone Age, falling between the Palaeolithic and the Neolithic; marks the beginning of a move from a hunter gatherer society towards food producing society. Archaeological period lasting from 10,000-4,000 BC.
MHWS	Mean High Water Springs
MLWS	Mean Low Water Springs
Nanotesla (nT)	Measurement describing the magnetic field (flux) of ferrous materials as measures by a magnetometer. (one nanotesla equals 10^{-9} tesla)
NMRHE	National Marine Heritage Record
NPPF	National Planning Policy Framework.
Neolithic	This period follows on from the Palaeolithic and the Mesolithic and is itself succeeded by the Bronze Age. This period is characterized by the practice of a farming economy and extensive monumental constructions. Archaeological period lasting from 4,000-2,200 BC.
Offshore	The sea further than two miles from the coast.
Offshore area	An area that encompasses all planned offshore infrastructure.
Offshore Wind Farm	An offshore wind farm is a group of wind turbines in the same location (offshore) in the sea which are used to produce electricity.
Onshore area	An area that encompasses all planned onshore infrastructure.
Palaeolithic	The period is defined by the practice of hunting and gathering and the use of chipped flint tools. This period is usually divided up into the Lower, Middle and Upper

Term (acronym)	Definition
Preliminary Environmental Information Report (PEIR)	Palaeolithic. Archaeological period lasting from 50,000-10,000 BC. Presents the results of the Environmental Impact Assessment to date and the results of the potential impacts of Rampion 2 Offshore Wind Farm on marine archaeology heritage receptors.
PEIR Assessment Boundary	The area comprised of the export cable corridor and wind farm array within which the construction, operation and maintenance of Rampion 2 will occur.
Portable Antiquities Scheme	Run by the British Museum on behalf of the Museums, Libraries and Archives Council to record archaeological objects found by the public.
Post-medieval	Begins with the dissolution of the monasteries (AD 1536-1541) and ends with the death of Queen Victoria (AD 1901). A more specific period is used where known. Archaeological period lasting from AD 1540-1901.
Proposed Development	The development that is subject to the application for development consent.
Protocol for Archaeological Discoveries (PAD)	A document detailing how finds made during the lifetime of the Proposed Development should be reported.
PTEC	Perpetuus Tidal Energy Centre
Receiver of Wreck	Official of the British Government whose main task is to administer the law in relation to Wreck and Salvage.
RED	Rampion Extension Development Limited
Roman period	Traditionally begins with the Roman invasion in AD 43 and ends with the emperor Honorius directing Britain to look to its own defences in AD 410. Archaeological period lasting from AD 43-410.
Scoping Report	A report that presents the findings of an initial stage in the Environmental Impact Assessment process.
Scour	A localised sediment erosion feature caused by local enhancement of flow speed and turbulence due to interaction with an obstacle.
Seascape	Landscapes with views of the coast or seas, and coasts and adjacent marine environments with cultural, historical and archaeological links with each other.

Term (acronym)	Definition
Secretary of State (SoS)	The body who makes the decision to grant development consent.
Significance	A measure of the importance of the environmental effect, defined by criteria specific to the environmental aspect.
Study area	Area where potential impacts from the Proposed Development could occur, as defined for each aspect.
The Applicant	Rampion Extension Development Limited (RED).
United Kingdom Hydrographic Office (UKHO)	Database of known wrecks and obstructions held and maintained by the UKHO.
UXO	Unexploded Ordnance
West Sussex Historic Environment Record	This record collection provides details of all known archaeological assets, sites and former archaeological events within West Sussex.
Written Scheme of Investigation (WSI)	A document forming the agreement between the client, the appointed archaeologists, contractors and the relevant stakeholders. The document sets out methods to mitigate the effects on all the known and potential marine heritage receptors within the development area.
WSCC	West Sussex County Council
WTG	Wind Turbine Generator
ZOI	Zone of Influence

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