Table of Contents

Tables

19. Marine Heritage

19.1 Introduction

19.1.1 This chapter of the Environmental Statement (ES) describes the existing environment with regard to the marine archaeological resource below Mean High Water Springs and assesses the potential impacts of the Proposed Development during the construction, operation, maintenance and decommissioning phases. Where the potential for significant effects is identified, mitigation measures and residual impacts are presented.

19.1.2 The marine and coastal archaeology resource within the Study Area are illustrated on Figure 19-1 (ES Volume II, Document Ref. 6.3). These resources include several shipwrecks and maritime artefacts, and a palaeochannel. These assets have been identified as having a degree of significance due to their heritage interest that merit consideration in planning decisions.

19.2 Legislation and Planning Policy Context

19.2.1 There is a distinct set of legislation, policy and guidance relating to marine, maritime and nautical archaeology, collectively referred to as “marine heritage” within this chapter of the ES.

19.2.2 Historic England is responsible for the preservation and enhancement of the archaeological resource within England’s Territorial Waters (up to 12 nautical miles) and is a consultee for the resource in the UK Exclusive Economic Zone (EEZ). The Marine Management Organisation (MMO) is responsible for licensing, regulating and planning marine activities in the seas around England to ensure they are carried out in a sustainable way.

19.2.3 The Marine and Coastal Access Act (MCAA) 2009 is the primary legislation relevant to marine licensing and the preparation of marine development plans. Under this legislation, marine plans must be consistent with the Marine Policy Statement (MPS) and fully reflect the requirements of the MPS at a local level. Marine plans must also be in accordance with other UK national policy, including the National Planning Policy Framework (NPPF) (MHCLG, 2019).

19.2.4 Section 16 of the NPPF entitled 'Conserving and enhancing the historic environment' sets out the principal national guidance on the importance, management and safeguarding of heritage receptors within the planning process. The aim of NPPF Section 16 is to ensure that Regional Planning Bodies and Local Planning Authorities, developers and owners of heritage receptors adopt a consistent and holistic approach to their conservation and to reduce complexity in planning policy relating to proposals that affect them. The NPPF provides a framework that:

- recognises that heritage receptors are an irreplaceable resource;
- requires applicants to provide proportionate information on the significance of heritage receptors affected by the proposals and an

impact appraisal describing the significance of any changes to the receptors;

- takes into account the desirability of sustaining and enhancing the significance of heritage receptors and their setting;
- places weight on the conservation of designated heritage receptors;
- requires developers to record and advance understanding of the significance of any heritage receptors to be lost in proportion to their importance and impact, and to make this evidence publicly accessible; and
- promotes the conservation of heritage receptors in a manner appropriate to their significance, so that they can be enjoyed for their contribution to the quality of life for this and future generations.

19.2.5 The assessment of potential impacts upon marine heritage has been made with specific reference to relevant legislation and National Policy Statements. Those relevant to the assessment are:

Legislation

- Protection of Wrecks Act 1973;
- Ancient Monuments and Archaeological Areas Act 1979;
- Protection of Military Remains Act 1986;
- Merchant Shipping Act 1995;
- Planning Act 2008;
- Marine and Coastal Access Act 2009;
- Infrastructure Planning (Decisions) Regulations 2010; and
- Infrastructure Planning (Environmental Impact Assessment) Regulations 2017.

National Planning Policy

- Overarching National Policy Statement (NPS) for Energy (EN-1) (DECC, 2011a);
- NPS for Electricity Networks Infrastructure (EN-5) (DECC, 2011b); and
- NPPF (MHCLG, 2019).

National Guidance

19.2.6 In summary, specific guidance into identifying, describing, evaluating and assessing the potential effects of the Proposed Development on the historic environment resource are provided in the following, and which have been considered in the development of this ES chapter:

- England's Coastal Heritage (English Heritage, 1996);
- Identifying and Protecting Palaeolithic Remains (English Heritage, 1998);
- Military Aircraft Crash Sites (English Heritage, 2002);

- Code of Practice for Seabed Development (Joint Nautical Archaeology Policy Committee, 2006);
- North Sea Prehistory Research and Management Framework (Peeters *et al.* 2009);
- North-East Regional Research Framework (Petts and Gerrard, 2006);
- Model Clauses for Archaeological Written Schemes of Investigations (The Crown Estate, 2010);
- Conservation Principles, Policies and Guidance for the Sustainable Management of the Historic Environment (English Heritage, 2008);
- Our Seas - A Shared Resource: High Level Marine Objectives (DEFRA, 2009);
- Ships and Boats: Prehistory to Present - Designation Selection Guide (English Heritage, 2012);
- Historic Environment Good Practice Advice in Planning Note 2. Managing Significance in Decision Taking in the Historic Environment. Historic England (Historic England, 2015); and
- Historic Environment Good Practice Advice in Planning Note 3. The Setting of Heritage Assets. (Historic England, 2017).

19.3 Assessment Methodology and Significance Criteria

19.3.1 This section presents the following:

- identification of the information sources that have been consulted throughout preparation of this chapter;
- the methodology behind the baseline assessment including the definition of an appropriate Study Area; and
- the methodology and terminology used in the assessment of effects.

Use of the Rochdale Envelope

19.3.2 At the time of writing, the final design for the Water Discharge Corridor has not been finalised. This necessitates the use of the 'Rochdale Envelope' approach, to flexibly anticipate the impacts of the worst-case scenario and to respond to those effects with appropriate mitigation.

19.3.3 The worst-case scenario for marine heritage comprised the construction of the Power, Capture and Compression (PCC) Site and works associated with the Water Discharge Corridor and the launch site for the Horizontal Directional Drilling (HDD) construction of the CO_2 Export Pipeline, as set out in Chapter 5: Construction Programme and Management (ES Volume I, Document Ref. 6.2).

19.3.4 The worst-case scenario for marine heritage has been interpreted to mean that any heritage assets within the Site have the potential to be completely

and permanently removed during the construction of the Proposed Development.

Consultation

19.3.5 Consultation for the Proposed Development has been ongoing and commenced at the EIA Scoping Stage with the preparation of the EIA Scoping Opinion Report which was submitted in February 2019 and Scoping Opinion was received from the Planning Inspectorate in April 2019 (Appendix 1A in ES Volume III, Document Ref. 6.4).

19.3.6 The Applicants also undertook a formal Section 42 and Section 47 consultation, which commenced at the same time as the publication of the Preliminary Environmental Information (PEI) Report in early July 2020 and ended in September 2020. The issues that have been raised through consultation, and how these have been considered and addressed within the design evolution of the Proposed Development and the EIA is set out where relevant within each of the topic chapters in the ES and where relevant in Chapter 6: Alternatives and Design Evolution (ES Volume I, Document Ref. 6.2).

19.3.7 Table 19-1 provides an account of how comments raised by stakeholders in the Scoping Opinion in relation to marine heritage have been considered and actioned.

19.3.8 Stage 2 consultation on the PEI Report (AECOM, 2020) did not include any comments from any consultees relating to marine heritage. In addition to the Stage 2 consultation process, requests for consultation with the Archaeological Advisor for Redcar and Cleveland Borough Council (RCBC) were issued through RCBC's planning team and directly to the Archaeological Advisor[1], but a response was not received.

19.3.9 Where comments were made with a general relevance to Cultural Heritage and Archaeology matters, these are only provided in Chapter 18: Archaeology and Cultural Heritage (ES Volume I, Document Ref. 6.2).

Table 19-1: Consultation Summary Table

Key issue raised (by whom, ID/page no., theme)	Response to issue raised and action taken where appropriate
Secretary of State Scoping Opinion, 4.9.5, Impacts to marine archaeology: The Scoping Report does not refer to potential impacts to marine archaeology. However, the Proposed Development may include infrastructure in the marine area. The ES should consider the potential for these works to impact on known/unknown marine archaeological remains. Any likely significant effects to receptors in the marine environment should be assessed.	An assessment of marine heritage and archaeology impacts are presented in this ES chapter.

[1] Email to archaeological advisor to RCBC dated 15.01.20.

Study Area

19.3.10 The Study Area comprises the Site plus a 1 km buffer around the Site boundary (refer to Figure 19-1: Location of Marine Heritage Assets within the 1 km Study Area, ES Volume II, Document Ref. 6.3). This has been deemed as sufficient to include nearby paleoenvironmental features, wrecks, obstructions and associated assets. Although there are additional assets outside of this Study Area, these are now-undetectable 'dead' wrecks that would not be affected by the Proposed Development.

Sources of Information

19.3.11 Sources of information that were consulted include:

- National Heritage List for England;
- Redcar and Cleveland Historic Environment Record (HER);
- Teesside HER;
- UK Hydrographic Office (UKHO) Wrecks and Obstructions EEZ Dataset;
- Published and unpublished literature;
- British Geological Survey (BGS) Geology of Britain Viewer; and
- Online bibliographic resources such as Environmental Statements from nearby offshore projects.

19.3.12 In addition, this chapter has also been informed by existing assessment reports and studies undertaken for the nearby Teesside Offshore Wind Farm Environmental Statement (Forewind, 2014).

Impact Assessment Methodology

Assessment Criteria

19.3.13 The environmental assessment has been undertaken following relevant elements of key guidance and good practice advice (GPA), including:

- the requirements of EIA as set out in the EIA Directive 2014/52/EU implemented in the UK through the Town and Country Planning (Environmental Impact Assessment) Regulations 2017 (Secretary of State, 2017);
- Historic England GPA Note 2, Managing Significance in Decision Taking in the Historic Environment (Historic England, 2015);
- Historic England GPA Note 3, The Setting of Heritage Assets (Historic England, 2017);
- Advice Note 12, Statements of Heritage Significance (Historic England, 2019); and
- Chartered Institute for Archaeologists, Code of Conduct and Standards and Guidance for Historic Environment Desk-based Assessment (CIfA, 2014).

Scope and Level of Assessment

19.3.14 The objective of this assessment is to identify any effects upon marine cultural heritage receptors that are likely to arise from construction and/or operation of the Proposed Development.

19.3.15 Identified marine cultural heritage assets are numbered with their UKHO Wreck numbers or their HER numbers, issued by the UKHO and the Redcar and Cleveland Borough Council and Hartlepool Borough Councils, respectively.

19.3.16 The principles of the impact methodology rest upon independently evaluating the value of the marine cultural heritage resources and the magnitude of impact upon them. By combining the value of the marine cultural heritage resource with the predicted magnitude of impact, the significance of the effect can be determined. The effect significance can be beneficial or adverse.

19.3.17 The marine cultural heritage assessment includes an assessment of the heritage significance of potentially affected assets, in line with the NPPF (MHCLG, 2019). This will also assess any change to heritage significance resulting from changes to the setting of heritage assets.

19.3.18 NPPF Annex 2 glossary defines value of heritage assets as deriving from *its heritage asset to present and future generations*, (MHCLG, 2019) and sets out criteria which should be considered when assessing the significance of cultural heritage assets, which include archaeological, architectural, artistic and historic interest. These criteria are used in the assessment of value (heritage significance) for each affected asset and this information, in conjunction with professional judgement, is used to assess the magnitude of impact of the scheme upon the asset and in turn the significance of effect.

19.3.19 Within the NPPF (MHCLG, 2019), impacts affecting the value of designated heritage assets are considered in terms of harm. There is a requirement to determine whether the level of harm amounts to ‘substantial harm’ or ‘less than substantial harm’. Although there is no direct correlation between the significance of effects identified through the EIA process and the level of harm caused to heritage significance, the assessment of harm arising from the impact of the Proposed Development is reported within this ES and determined using professional judgement, and with regard to the following considerations:

- a large (significant) effect on a heritage asset would more often be the basis by which to determine that the level of harm to the significance of the asset would be substantial;
- a moderate (significant) effect is unlikely to meet the test of substantial harm and would therefore more often be the basis by which to determine that the level of harm to the significance of the asset would be less than substantial;
- a slight (not significant) effect would amount to less than substantial harm; and
- a neutral effect would be classified as having no harm.

19.3.20 The level of harm affecting each asset is assessed on an individual basis using professional judgement. For example, some moderate effects may cross the threshold into substantial harm.

Assessment of Value

19.3.21 The value (heritage significance) of a heritage asset is derived from its heritage interest which may be archaeological, architectural, artistic or historic. The value of a place is defined by the sum of its heritage interests. Taking these criteria into account, each identified heritage asset can be assigned a level of value in accordance with the criteria set out in Table 19-2.

Table 19-2: Criteria for Determining the Value (Heritage Significance) of Heritage Assets

Value (heritage significance)	Criteria
High	Assets of international importance, such as World Heritage Sites. Scheduled monuments. Non-designated archaeological assets of schedulable quality and importance. Protected Wrecks.
Medium	Non-designated heritage assets of a regional resource value.
Low	Non-designated heritage assets of a local resource value as identified through consultation. Non-designated heritage assets whose heritage values are compromised by poor preservation or damaged so that too little remains to justify inclusion into a higher grade.

19.3.22 When professional judgement is considered, some heritage assets may not fit into the specified category presented in Table 19-2 above. Each heritage asset is assessed on an individual basis taking into account regional variations and individual qualities of sites.

Magnitude of Impact

19.3.23 Having identified the value of the heritage asset, the next stage in the assessment is to identify the level and degree of impact to an asset arising from the Proposed Development. Potential impacts are defined as a change resulting from the Proposed Development which affects a heritage asset. The impacts of a development upon heritage assets can be positive or negative; direct or indirect; long term or short term and/or cumulative. Impacts may arise during construction, operation or decommissioning and can be temporary or permanent. Impacts can occur to the physical fabric of the asset or affect its setting.

19.3.24 The level and degree of impact (impact rating) is assigned by reference to a four-level scale as set out in Table 19-3. The level of impact considers mitigation measures which have been embedded within the Proposed Development as part of the design development process (embedded mitigation).

Table 19-3: Criteria for Determining the Magnitude of Impact on Heritage Assets

Magnitude of impact	Description of impact
High	Change such that the heritage value of the asset is totally altered or destroyed. Comprehensive change to elements of setting that would result in harm to the asset and our ability to understand and appreciate its heritage significance.
Medium	Change such that the heritage value of the asset is significantly altered or modified. Changes such that the setting of the asset is noticeably different, affecting significance and resulting in changes in our ability to understand and appreciate the heritage value of the asset.
Low	Change such that the heritage value of the asset is slightly affected. Changes to the setting that have a slight impact on significance resulting in changes in our ability to understand and appreciate the heritage value of the asset.
Very low	Changes to the asset that hardly affect heritage value. Changes to the setting of an asset that have little effect on significance resulting in no real change in our ability to understand and appreciate the asset.

19.3.25 An assessment to classify the effect, having taken into account any embedded mitigation, is determined using the matrix at Table 19-4, which takes account of the value of the asset (Table 19-2) and the magnitude of impact (Table 19-3). Effects can be neutral, adverse or beneficial.

Table 19-4: Classification of Effects

Significance (Heritage Value)	Magnitude of Impact			
	High	Medium	Low	Very low
High	Major	Major	Moderate	Minor
Medium	Major	Moderate	Minor	Minor
Low	Moderate	Minor	Minor	Negligible

19.3.26 This chapter considers that major or moderate effects are significant for the purposes of the EIA Regulations, in accordance with standard EIA practice. In all cases, determining the level of harm to the significance of the asset arising from the Proposed Development is one of professional judgement.

19.3.27 It should be noted that paragraph 199 of the NPPF states that ‘the ability to record evidence of our past should not factor into deciding whether or not such loss should be permitted’ (MHCLG, 2019). Accordingly, whilst it is noted that there is potential to uncover remains of our past and generate records through the Proposed Development, the benefit or otherwise of this has not been considered as a factor that either mitigates or reduces any identified harm. Similarly, it has not been treated as a benefit of the Proposed Development.

19.4 Baseline Conditions

Geology

Bedrock

19.4.1 The seabed bedrock geology within the Site comprises the Triassic Sherwood Sandstone Group, Mercia Mudstone Group and Penarth Group and the Jurassic Redcar Mudstone Formation of the Lias Group. These are sedimentary bedrocks that are fluvial, lacustrine and marine in origin (British Geological Survey, n.d.). The bedrock is overlain by marine sands and gravelly muddy sands.

Superficial

19.4.2 Geophysical surveys (side-scan sonar, bathymetric surveying and magnetic and marine seismic reflection surveys) undertaken by Pelorus for the Teesside Offshore Wind Farm have identified the superficial seabed deposits to consist of silty sands and gravelly clays (Entec, 2004). These are likely to be Quaternary Tidal Flat Deposits of sand, silt and clay that are shallow-marine in origin (British Geological Survey, n.d.).

Topography

19.4.3 The area of seabed within the corridor of the Water Discharge Connection is relatively shallow (UKHO, 2019a). In the area of discharge, the seabed slopes from the coast at 0 m CD (chart datum) down to approximately -6 m CD.

Geoarchaeology and Palaeoenvironmental Potential

19.4.4 The North Sea contains important information on the colonisation and re-colonisation of the British Isles from the Pleistocene and Holocene periods. Since the earliest hominin activity in Britain (Happisburgh - 850,000 BP and Pakefield - 700,000 BP), the north-west of Europe has been shaped by episodes of climate change. Alternating warm (interglacials and interstadials) and cold (glacials and stadials) periods and associated rise and fall in relative sea level have influenced the evolution of the landscape. This is considered to have affected the suitability of the North Sea landscape for hominin exploitation (Lewis *et al.* 2019, Parfitt *et al.* 2005; 2010).

19.4.5 During the Pleistocene the North Sea was an extensive terrestrial plain between southern and eastern England and the European continent (Coles, 1998). Studies into the terrestrial plain, known as ‘Doggerland’, (approximately 200 km east of the Site) have identified that this was a prime location for human settlement, due to the abundance of fresh water and ecological resources (ibid). Geophysical surveying has revealed the potential for identifying not only prehistoric sites but the geographical landscape they were situated in, enabling a nuanced understanding of human-environmental relationships (Gaffney *et al.* 2007).

19.4.6 Since the end of Devensian glaciation, in the present Holocene interglacial period, relative sea level in the North Eastast has risen by c. 30 m, resulting

from eustatic[2] sea level changes from melting sea ice and isostatic rebound[3] from terrestrial uplift and topographical changes (Tolan-Smith, 2008). This continuous relative sea level rise after the last glacial maximum (LGM – the last phase during which glacial ice was at maximum extent) flooded Doggerland approximately 7,000 - 6,000 years ago.

19.4.7 The flooding of Doggerland was not necessarily gradual, or linear. Research has indicated that catastrophic events such as the Storegga Slide submarine landslide at the edge of Norway's continental shelf and associated tsunami at around 8100 BP (Bondevik *et al.* 2005) would have flooded the north-eastern coastline and the Doggerland coast (Gaffney *et al.* 2007, Tappin *et al*. 2011). The impact on communities inhabiting the North Sea is likely to have been devastating, with substantial loss of life (Smith *et al.* 2004). However, no evidence for this event has yet been observed near Teesside. Communities attracted to the increasingly hospitable environment of biodiverse temperate grassland and boreal forests (Val Baker *et al*. 2007) would have been both at-risk and unprepared for this sudden environmental change. This existing research and evidence relating to sea level change demonstrates that areas of the North Sea were once occupied, and evidence of occupation may be present within the Study Area.

Palaeolithic

19.4.8 Currently, very little is known about the Pleistocene colonisation of the North East of England. Sites which constitute the current baseline are located on the coastlines of Norfolk and Suffolk. The archaeological deposits at these sites suggest that whilst the potential for Palaeolithic archaeology is likely to be lower in the North East, deposits located here could possibly be of similar national and international significance.

Mesolithic

19.4.9 The Mesolithic period for the Tees Valley is represented by flint scatter sites and stray find spots (Rowe, 2006). Flint scatters from nearby Hartlepool, to the north of the Site, have a wide date range extending into later prehistory (Raistrick *et al.* 1935, Weyman, 1984, Haselgrove and Healey, 1992). Archaeological evaluations at Middle Warren, Hartlepool, provide further mixed-period lithic scatters with origins in the Mesolithic period (Rowe, 2006).

19.4.10 Also in Hartlepool (approximately 8 km north-west of the Site) is the regionally-significant submerged forest, containing a multi-period prehistoric sequence from the Mesolithic onwards, with diagnostic flint-work and well-preserved flora and fauna in the associated peat deposits (Waughman *et al.* 2005). The presence of wooden stakes associated with fish traps and evidence related to woodland burning in the 5th millennium BC indicate that woodland management was taking place during this period. This evidence was also associated with juvenile cattle footprints, suggesting that the semi-domestication of wild animals was also undertaken.

[2] Changes in sea level as a result of meltwater influx from glaciers and sea ice. Typically occurs after a shift in climate from a glacial (cold) period to an interstadial or interglacial (warm) period.
[3] Isostatic rebound is when land masses rise following a reduction in weight from ice sheets which retreat after a shift in climate from a glacial (cold) period to an interstadial (warm) period.

19.4.11 Recent work offshore nearby Redcar and Tynemouth has demonstrated the survival of Mesolithic land surfaces (Waughman *et al.* 2005). This is comparable to the landscapes identified further east of Teesside at Dogger Bank (Gaffney *et al.* 2007). This identifies that there is clear potential for archaeological deposits offshore in the greater North East and North Sea environs.

19.4.12 Currently, no evidence for Mesolithic activity is known in the Tees Estuary or the southern Tees Valley, although it is likely to have existed. It is likely that coastal erosion has destroyed much of the evidence of settlement or land use (Fulford *et al.* 1997).

Neolithic

19.4.13 As with the Palaeolithic, very little is known about the Neolithic period in the Tees valley. Wattle hurdling found in Hartlepool submerged forest may represent a fish trap (Waughman *et al.* 2005). This is unsurprising as by the Neolithic, the North Sea was no longer a terrestrial plain and human settlement would have been pushed landward to higher ground forming the then-present coastline. Due to the shift from broad-spectrum foraging to agriculture and domestication of livestock, settlement would have likely pushed back further upstream of the River Tees rather than the coastline where the landscape was more suited to these activities.

19.4.14 A later prehistoric peat bed is also known to exist on the beach at Redcar, approximately 2 km to the east of the Site (Sherlock, 2019). Given the surrounding prehistoric submerged peat beds, it is likely that there is contemporary evidence within the Site.

Post-Medieval

19.4.15 Nearly all known wrecks recorded from the Teesmouth environs are of post-medieval date or later. The number of wrecks rises after the 18th century, as a result of increased shipping due to the rise of coal and the industrial revolution, continuing into the mid-19th century where shipping increasingly used steam power and steel construction as reflected in the known wrecks recorded (Petts and Gerrard, 2006). The sea has played an essential role in the history of the North East, linking the region to other ports in Britain and to other countries bordering the North Sea (e.g. the Netherlands). The ports thrived and a range of industries, from shipbuilding to fishing, relied on their contact with the sea (ibid). This would likely have required a significant amount of dredging to support the newer, larger and heavier ships, therefore, any buried landforms have possibly been removed or truncated by dredging activities.

Palaeoenvironment

19.4.16 Palaeogeographic landforms pertaining to the Holocene have been identified through geophysical surveying further offshore to the east of the Tees Valley (Wessex Archaeology, 2014). These fluvial features such as braided rivers and palaeochannels are key indicators of areas of human occupation and therefore archaeological potential. The evidence from Hartlepool Bay, north-west of the Study Area, also suggests that occupation and settlement focused around watercourses and around palaeochannels flowing throughout the bay (Waughman *et al.* 2005). Artefactual evidence is often

discovered in association with river infill and floodplain deposits. There is a single recorded palaeochannel located in the eastern limits of the Site between South Gare and Coatham Rocks (HER 6396). Palaeochannels are not typically located in isolation, and there is potential for further examples and associated features to be present and to extend into the Site.

Known Marine Heritage Receptors

Submerged Prehistoric Archaeology and Palaeolandscapes

Designated Assets

19.4.17 There are no designated assets related to submerged prehistoric archaeology or palaeolandscapes within the Study Area.

Undesignated Assets

19.4.18 There is one undesignated asset related to submerged prehistoric archaeology or palaeolandscapes within the Water Connection Corridor, as is described in Table 19-5. The palaeochannel is contemporary to the early Holocene Hartlepool and Redcar submerged forests and peat beds. This known pre-existing marine heritage is of regional importance as set out in the North-East Regional Research Framework (Petts and Gerrard, 2006), therefore by association, this asset is assessed to be of medium value.

Table 19-5: Summary of HER Records of Undesignated Palaeoenvironmental Assets

HER	Name	Site Type	Period	Location	Description	Relation to Proposed Development
6396	Between South Gare and Coatham Rocks	Palaeo-channel	Pre-historic	54 38.31 N 001 5.47 W	This palaeochannel was identified during an offshore geophysical survey carried out as part of an Environmental Statement for Teesside Offshore Wind Farm (Entec, 2004). The channel is approximately 300 m wide and was traced for roughly 4 km from the shoreline, following a similar alignment to the River Tees.	With the Site boundary (Water Discharge Connection)

Maritime or Shipwreck Archaeology

Designated Assets

19.4.19 There are no designated shipwrecks within the Study Area. The closest designated asset is a protected shipwreck (List no. 1000077) located off Seaton Carew, 4.2 km west of the Site boundary.

Undesignated Assets

19.4.20 There are 24 UKHO records on undesignated maritime shipwrecks and obstructions and 31 HER records on undesignated maritime assets identified within the Study Area. While it appears that there is overlap and duplication between the UKHO and HER sets of data, the multiple records (with the same name) are due to the wrecks being in a state of advanced decay and

degradation, dispersing into multiple fragments in various locations throughout the River Tees and the Tees Estuary. As such, the decision was taken not to merge the records, but to add a column in the baseline tables to list the constituent parts of dispersed wrecks, showing the spatial relationship between the fragments.

19.4.21 As the HER and the UKHO database listed different types of information, the baseline tables have kept the assets separate to more effectively communicate the information. However, the impact assessment has merged the assets to avoid duplication of impact scores.

19.4.22 The UKHO assets are all 19th and 20th century wrecks and obstructions that are “dead” (i.e. they have not been detected by visual or radar surveys for some time). This means that little of the shipwreck evidence remains, and therefore they are of low archaeological significance. These shipwrecks can be broadly described as cargo vessels carrying coal, iron and ballast (steam ships) or military vessels (tugs and barges) used around Tees port.

19.4.23 For the purposes of this assessment, the Redcar and Cleveland and Tees HER records have been merged due to overlap and similarities between the records. These are mostly 19th and 20th century trading and military vessel wrecks and obstructions with associated maritime artefacts with a floating hospital. Little of their physical evidence remains with a lot of the HER information comprised of documentary records, therefore the assets are of low archaeological significance. The exception to this is asset HER 2814 which is a Bronze Age canoe, of regional archaeological interest therefore being of medium archaeological value. However, this asset has been removed from its location. Most of the wrecks are in a poor condition of advanced decay and dispersal, contributing to their status as ‘dead’ wrecks.

Table 19-6: Summary of UKHO Records of Undesignated Maritime Assets

Wreck Number	Wreck Location	Status	Category	Name	Description	Relation to Proposed Development	Associated Records
5590	54 38.175 N 1 7.131 W	Dead	Dangerous Wreck	SS Eidsiva	Steam ship built in 1907. Wreck mostly salvaged 1922-23. Vessel 216 ft, x 31 ft. x 20 ft. Approx. 1053 tons. Wreck was largely salvaged between 1925 and 1932. Theoretical position, based on a variety of sources shown in 5438 10N 001 07 03W. 'EIDSVOLD', lying on the foreshore between South Gare and Warrenby since March 1918.	Within the Site boundary	HER 3123
5592	54 38.475 N 1 7.315 W	Dead	Foul Ground	SS Lemnos	Steam ship broken in three parts. Examined 14th - 15th September 1925. Re-examined in 1929 by divers, heavy slag and wood a threat to small shipcraft. Buoys removed in 1968.	Within the Study Area	HER 2774, HER 3125, UKHO 5596, UKHO 5799
5596	54 38.525 N 1 7.265 W	Dead	Foul Ground	SS Lemnos	Steam ship broken in three parts. Examined 14th - 15th September 1925. Re-examined 1929 by divers, heavy slag and wood a threat to small shipcraft. Buoys removed in 1968.	Within the Study Area	HER 2774, HER 3125, UKHO 5592, UKHO 5799
5799	54 38.442 N 1 7.365 W	Dead	Foul Ground	SS Lemnos	Steam ship broken in three parts. Examined 14th -15th September 1925. Re-examined 1929 by divers, heavy slag and wood a threat to small shipcraft. Buoys removed in 1968.	Within the Study Area	HER 2774, HER 3125, UKHO 5592, UKHO 5596
66500	54 38.658 N 1 7.948 W	Dead	Wreck showing any portion of hull or superstructure	SS Charlotte	Sailing vessel, first surveyed in 1931.	Within the Study Area	N/A
5775	54 37.908 N 1 8.364 W	Dead	Obstruction	N/A	An obstruction identified in 1984.	Within the Study Area	N/A

Wreck Number	Wreck Location	Status	Category	Name	Description	Relation to Proposed Development	Associated Records
5595	54 38.525 N 1 6.315 W	Dead	Foul ground	MV Guildford	Motor vessel. Surveyed in 1954.	Within the Study Area	N/A
5591	54 38.283 N 1 9.689 W	Dead	Wreck showing any portion of hull or superstructure	S T Wallsend	Examined in 1927. Only a boiler and condenser still visible. Information too vague to chart.	Within the Study Area	HER 3124
5606	54 39.054 N 1 7.9 W	Dead	Dangerous Wreck	Victory	Tug, carrying ballast	Within the Study Area	N/A
5604	54 38.988 N 1 7.812 W	Dead	Foul Ground	Ida Duncan	Tug. An obstruction. Wreck broken up.	Within the Study Area	HER 3130
5602	54 38.963 N 1 7.887 W	Dead	Dangerous Wreck	SS Harvest	Steam ship sank and dispersed by 1905. Surveyed in 1921. Remains of pig iron, a ship boiler and a large anchor mostly recovered in 1982.	Within the Study Area	HER 3129
5607	54 39.133 N 1 7.99 W	Dead	Dangerous Wreck	N/A	Sunk and was subsequently clear by 1929. Dispersed fully.	Within the Study Area	N/A
89492	54 38.916 N 1 8.225 W	Dead	Dangerous Wreck	N/A	Examined in 1918.	Within the Study Area	N/A
63051	54 39.041 N 1 8.052 W	Dead	Dangerous Wreck	N/A	Examined in 1983. Small wreck embedded in sand.	Within the Study Area	N/A

Table 19-7: Summary of HER Records of Undesignated Maritime Assets

HER	Name	Site Type	Classification	Period	Location	Description	Relation to Proposed Development	Associated Records
2138	Unknown	Obstruction	Fishermen's fastener	Unknown	54 38.53 N 000 45.20 W	N/A	Within the Study Area	N/A
2390	Unknown	Obstruction	Unknown	Unknown	54 38.53 N 001 06.20 W	N/A	Within the Study Area	N/A
2822	Unknown	Vessel	Craft	19th century	54 38.08 N 001 07.03 W	Wreck marked on Admiralty Chart 01-Feb-1893, 1884/1891 Surveys. Position given is approx.	Within the Study Area	N/A
3123	Eidsiva	Steam vessel	Cargo vessel	20th century	54 38.10 N 001 07.02 W	Vessel 216ft, x 31ft. x 20ft. Approx. 1053 tons. Wreck was largely salvaged between 1925 and 1932. Theoretical position, based on a variety of sources shown in 5438 10N 001 07 03W. 'EIDSVOLD', lying on the foreshore between South Gare and Warrenby since March 1918.	Within the Site boundary	UKHO 5590
3124	Wallsend	Steam vessel	Trawler	19th century	54 38.16 N 001 09.35 W	Vessel lost in 1903. Examined in 1929 when it was found that a boiler and condenser were all that remained visible covered frequently by sand. Position on N. Gare Sands 1 mile 236 degrees from South Gare Light. Vessel built in 1865, approx. 6 tons. 4 crew members.	Within the Study Area	UKHO 5591
3125	Lemnos	Steam vessel	Cargo vessel - collier	19th century	54 38.28 N 001 07.13 W	Vessel 270 ft. x 34 ft. x 19 ft. Approx. 1530 tons. Examined in 1925. Both seaward portions reported level with the slag. The landward portion had some pieces left which were considered dangerous to small craft crossing the slag bank or mole. Both seaward portions were examined by divers in 1929 and were found to be level with the slag bottom. The inshore portion consists of small pieces of iron mixed with the slag, the seaward heavier pieces.	Within the Study Area	HER 2774, UKHO 5592, UKHO 5596, UKHO 5799

HER	Name	Site Type	Classification	Period	Location	Description	Relation to Proposed Development	Associated Records
						Lying on foreshore between S. Gare and Warrenby since Feb. 1916. GPS position 54 38 503N 001 07 210W. Stranded and became a total wreck. A single-deck (iron), iron-screw steamer.		
3129	Harvest	Steam vessel	Cargo vessel	19th century	54 38.57 N 001 07.47 W	Sank following collision with S.S. Regent. 245 ft. x 33 ft. x 16 ft. Approx. 1338 tons. Dispersed 1905. Surveyed 1921. Surveyed in 1924 after further dispersal, nothing found above ground level. Clear at 27.75 ft. and accepted as clear of all danger to navigation. Wreck lowered by scouring and blasting with dynamite to 16 ft.	Within the Study Area	UKHO 5602
3130	Ida Duncan	Steam Vessel	Unknown	20th century	54 39.00 N 001 07.42 W	N/A	Within the Study Area	UKHO 5604
3133	Motor	Steam vessel	Cargo vessel	Modern	54 39.07 N 001 07.53 W	Sunk and dispersed in 1915 and reported clear. Examined by diver in 1929s, swept clear of obstruction.	Within the Study Area	N/A
3176	Bran sands wreck	Vessel	Craft	Unknown	54 37.54 N 001 08.16 W	The remains of a wooden vessel visible at most times of the year to a height of some 0.3 m. From the outline of the visible frames the bow section seems to be relatively intact, as does the stern portion of the port side. The starboard side of the vessel appears to have been crushed inwards though still holding its shape. The wreck was surveyed by the NAS in May 1996.	Within the Study Area	N/A
3180	Unknown	Wreckage	Craft	Unknown	54 39.01 N 001 07.36 W	Small wreck embedded in sand. Steel ribs protruding 1.5 m to 2 m high. Length 15 m app. least depth	Within the Study Area	N/A

HER	Name	Site Type	Classification	Period	Location	Description	Relation to Proposed Development	Associated Records
						9.7 m. in general 10.5 m to 11.3 m. Position 54 39 01.14N 001 07 56.11W or 033.5 degrees in 1983.		

Aviation Archaeology

Designated Assets

19.4.24 There are no designated assets related to aviation archaeology within the Study Area.

Undesignated Assets

19.4.25 There are no undesignated aviation assets within the Study Area. The closest undesignated aviation asset is a seaplane (HER 3174), 4.1 km south of the Site boundary.

Potential Historic Environment Receptors

Submerged Prehistoric Archaeology and Palaeolandscapes

19.4.26 The palaeochannel (HER 6396) located within and likely extending into the corridor of the CO_2 Export Pipeline is anticipated to be part of a wider fluvial system.

19.4.27 Palaeochannels are rarely found in isolation, generally part of a larger complex of an extinct river system. Bathymetric surveys and side-scan sonar, as part of the Pelorus geophysical survey undertaken in advance of the Teesside Offshore Wind Farm, identified 82 anomalies (Entec, 2004). The anomalies may represent geological features and may not be of anthropogenic origin; however, they could also represent palaeochannels and palaeolandscape evidence. Palaeochannel (HER 6369) has been identified within the corridor for the Water Discharge Connection, and there is a potential for further channels associated with former river systems to be present within the Site.

19.4.28 The Site is located between two areas of archaeological and palaeoenvironmental potential (the submerged forests), and therefore the likelihood of any previously unrecorded submerged prehistoric remains is assessed as medium.

Maritime or Shipwreck Archaeology

19.4.29 The Navigational Hazards Project, by Bournemouth University (Merritt *et al*. 2007), assessed historical records of navigational hazards to build a Geographic Information System (GIS) and characterise the marine historic environment. Areas of hazard were combined with a model of the preservation potential of marine sediments to identify areas where there was a high potential for ship losses and high potential for the preservation of archaeological remains. These areas are known as Areas of Maritime Archaeological Potential (AMAP). The area of the Tees estuary was identified as an AMAP, with the surrounding environs ranking as medium for navigational hazards. This would suggest the potential for the existence of multiple shipwrecks.

19.4.30 Only two geophysical anomalies were identified as wrecks in the Teesside Offshore Wind Farm geophysical survey (Entec, 2004), which have subsequently been included in the Redcar and Cleveland HER.

19.4.31 Several shipwrecks have already been identified within the Site boundary and the Study Area. Therefore, surveys that identified these assets can be

assumed to have been exhaustive and the likelihood of any unknown maritime remains within the parts of the Site that fall within the survey areas is very low. There remains a low possibility the previously unrecorded wrecks are present within parts of the Site that have not been subject to previous survey.

Aviation or Aircraft Archaeology

19.4.32 It is unlikely that there are aviation assets within the Study Area. The nearest undesignated aviation assets, 4.1 km south of the Site boundary, a seaplane (HER 3174). Records for World War I and World War II aircraft are quite fragmentary, requiring estimates on aircraft losses which are not spatially precise (English Heritage, 2002). In addition to this, the Site and Study Area is located very close to the shoreline, therefore any lost aircraft are likely to have been partially visible suggesting that the likelihood of any unknown aviation remains within the Site is low.

19.5 Development Design and Impact Avoidance

19.5.1 At present there are no design measures to reduce or avoid impacts on archaeological receptors.

19.6 Likely Impacts and Effects

19.6.1 This section identifies the potential impacts resulting from the Proposed Development. The magnitude of impacts is defined and the significance of effects is determined in accordance with the identified methodology presented in Section 19.3.

Construction

19.6.2 Construction of the Proposed Development has the potential to affect heritage assets in the following ways:

- partial or total removal of heritage assets; and
- compaction of archaeological deposits by structures.

19.6.3 There will be no physical impact upon any designated heritage assets during construction.

19.6.4 There is one undesignated paleoenvironmental asset within the Study Area, Palaeochannel (HER 6396) which will extend into the corridor of the Water Discharge Connection (replacement outfall). The construction of the launch site and HDD for the CO_2 Export Pipeline and Water Discharge Corridor (replacement outfall) may result in the loss of a small part of the asset, which is assessed to be of medium value. This would constitute a low impact, resulting in a minor adverse effect.

19.6.5 There will be no physical impacts to undesignated marine heritage assets in the Study Area (recorded in Table 19-6 and Table 19-7). The undesignated maritime assets within the Study Area are of low value (heritage significance) and the construction of the Proposed Development would have no impacts on these assets, resulting in a negligible effect.

19.6.6 There are no undesignated aviation assets within the Study Area.

Operation

19.6.7 There will be no physical impact upon any heritage assets during operation of the Proposed Development.

19.6.8 No operational impacts upon the designated or undesignated marine archaeological resource are envisaged.

Decommissioning

19.6.9 There will be no additional impacts on marine heritage assets during decommissioning activities. Decommissioning will be undertaken within the same footprint used during construction and therefore any impact to marine heritage assets will have occurred, and have been mitigated, at the construction phase.

19.7 Mitigation and Enhancement Measures

19.7.1 Prior to construction, a geoarchaeological assessment should be undertaken to determine the extent of any deposits and palaeoenvironmental features that may extend into the Site. The results of the geoarchaeological assessment would inform a proportionate mitigation scope which may entail analysis and publication of the results.

19.7.2 There is a low potential that unrecorded heritage assets may be present within the Site, particularly in areas not included in previous surveys. It is recommended that a protocol is adopted in order to mitigate any impacts to chance archaeological discoveries during construction. The protocol will follow published guidance (The Crown Estate, 2014) and will ensure that any finds are promptly reported, archaeological advice is obtained, and any recovered material receives the appropriate level of stabilisation, recording and conservation, proportionate to its heritage value.

19.7.3 An appropriate and proportionate mitigation strategy will be agreed with the archaeological advisor to the local planning authority and, if applicable, Historic England.

19.8 Limitations or Difficulties

19.8.1 The baseline data collection has utilised all relevant sources of available secondary information, listed in Section 19.3 Assessment Methodology and Significance Criteria. No additional surveys were undertaken to collect primary data to ground-truth these records. The previously discussed Pelorus geophysical surveys were relatively comprehensive, however, only a proportion of the Site falls within the area surveyed. As such there is a possibility, albeit low, that previously unknown heritage assets are present within the Site.

19.9 Cumulative Effects

19.9.1 A cumulative impact may arise where the construction, operation or decommissioning of other planned projects or developments interact with those impacts associated with the Proposed Development to result in a greater significance of effect on environmental receptors. For a cumulative

impact to arise as a result of an impact to marine heritage assets, a development would have to impact the same heritage asset as the Proposed Development.

19.9.2 Other developments considered in this assessment are described in Chapter 24 of this ES (Volume I, Document Ref. 6.2) and illustrated on Figure 24-1 (ES Volume II, Document Ref. 6.3). None of the shortlisted developments identified at Chapter 24 are likely to result in additional physical impacts, or impacts to the setting of marine heritage assets and therefore have been scoped out of further assessment. The cumulative developments, alongside the Proposed Development, would not result in effects that are greater than those reported in this ES.

19.10 Residual Effects and Conclusions

19.10.1 There would be no significant effects to marine heritage assets as a result of the construction, operation or decommissioning of the Proposed Development, or in combination with other developments.

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