CONFIDENTIAL

NeuConnect

BIJLAGE 7 MARINE ARCHAEOLOGY DESK-BASED ASSESSMENT DUTCH SECTOR

NEU-ACM-CAB-NL-AP-PN-0010

ASITE DOCUMENT NUMBER

Revision Tracking

Revision No.	Revision Date	Author	Checked By	Approver	Revision Notes
P01	19/04/2021	AECOM		NeuConnect	
P02	26/08/2021	AECOM		NeuConnect	

Originator's Reference:	ITT Reference Number:

Bijlage 7: Bureau Studie Maritieme Archeologie, Wessex Archeology, mei 2021

NeuConnect – Dutch Offshore Scheme

Marine Archaeological Desk-Based Assessment

Ref: 201272.01
April 2021

wessexarchaeology

Portway House
Old Sarum Park
Salisbury
Wiltshire
SP4 6EB

www.wessexarch.co.uk

Report Information

Document title	NeuConnect – Dutch Offshore Scheme
Document subtitle	Marine Archaeological Desk-Based Assessment
Document reference	201272.01
Client name	AECOM
Address	1 Tanfield Edinburgh EH3 5DA
Site location	Dutch Territorial Waters
County	n/a
National grid reference	n/a
Statutory designations	
Planning authority	n/a
Planning reference	n/a
Museum name	n/a
Museum accession code	n/a
WA project name	Neuconnect Interconnector
WA project codes	201270; 201272; 201273
Project management by	Andrew Bicket
Document compiled by	Natalia Bain, Stephanie Said
Contributions from	Megan Metcalfe, Sophie Thorogood
Graphics by	Kitty Foster

Quality Assurance

Version & issue date		Status	Author	Approved by
V1	17/03/21		NB, SS	AB
V2	23/04/2021	RCE comments addressed; report is now being submitted as a desk research (*bureauonderzoek*)	MM, SS	AB

Contents

List of Figures

List of Tables

Summary

Wessex Archaeology was commissioned to prepare a marine archaeological baseline desk-based assessment including an Environmental Appraisal (EA) for part of the marine cable corridor of the NeuConnect Interconnector; a proposed 1400MW High Velocity Direct Current (HVDC) electricity interconnector cable extending both underwater and underground with on-shore converter stations linking into the existing electricity grids in Great Britain and Germany. The Project is being developed by an international consortium, NeuConnect Britain Limited.

The NeuConnect marine cable corridor will extend within Dutch Offshore Waters from the median line between UK and Dutch Offshore Waters in the west through the Dutch Exclusive Economic Zone (EEZ) to the median line between Dutch and German Offshore Waters to the east.

The desk-based assessment comprises:

- Relevant legislation and guidance;
- Methodology;
- An archaeological baseline study informed by an archaeological assessment of geophysical data, geotechnical samples and relevant documentary archives;
- A high-level Environmental Appraisal informed by the desk-based assessment, which includes an assessment of value and sensitivity of the assets identified within the assessed Study Area.

The archaeological resource within the Study Area are summarised as follows:

- A total of 191 features of palaeogeographic potential, including 29 palaeochannels and 25 further palaeogeographic features;
- Potential for discovery of sites and artefacts from the Palaeolithic to the Mesolithic periods across the marine cable corridor;
- A total of 120 individual anomalies of possible archaeological potential within the marine cable corridor, three of which are considered to be of high archaeological potential (A1). Of these, one was classified as a wreck, and the other two are likely associated items of debris. A 100 m Archaeological Exclusion Zone is to be placed around the extents of these features;
- Potential for the discovery of further shipwreck material from the late Mesolithic to the present;
- No known aircraft crash sites; however, there is the potential for the discovery of 20th century aircraft material, particularly from the Second World War.

Acknowledgements

This project was commissioned by AECOM, and Wessex Archaeology is grateful to David Ritchie and Natascha Schuttinga in this regard.

Wessex Archaeology would like to thank the Rijkswaterstaat Sea and Delta for supplying the terrestrial and marine sites and monuments data and the United Kingdom Hydrographic Office for supplying known wreck and obstruction data. Geophysical data was provided by MMT who are gratefully acknowledged.

The report was compiled by Natalia Bain and Stephanie Said, with contributions from Megan Metcalfe and Sophie Thorogood. The figures were prepared by Kitty Foster. Dr Andrew Bicket managed the project on behalf of Wessex Archaeology.

NeuConnect – Dutch Offshore Scheme

Marine Archaeological Desk-Based Assessment

1 INTRODUCTION

1.1 Project background

1.1.1 Wessex Archaeology was commissioned to prepare a marine archaeological baseline report including an Environmental Appraisal (EA) for part of the marine cable corridor of the NeuConnect Interconnector; a proposed 1400MW High Velocity Direct Current (HVDC) electricity interconnector cable extending both underwater and underground with on-shore converter stations linking into the existing electricity grids in Great Britain and Germany. The Project is being developed by an international consortium, NeuConnect Britain Limited.

1.1.2 This report comprises a marine archaeological baseline study of the Proposed Development, based on an archaeological assessment of geophysical and geotechnical data, gathered as part of the planning stage of the development, together with a review of records held by national and local inventories and secondary sources relating to the marine historic environment of the region.

1.1.3 The NeuConnect marine cable corridor will extend within Dutch Offshore Waters from the median line between UK and Dutch Offshore Waters in the west through the Dutch Exclusive Economic Zone (EEZ) to the median line between Dutch and German Offshore Waters to the east.

1.1.4 This Technical Report focuses on the element of the marine cable corridor within the Dutch EEZ, otherwise referred to as the NED Offshore Scheme. This report will refer to one section:

1. Dutch Offshore Waters: an approximate 265 km section of subsea DC cables in the Project Route Corridor between the UK/Netherlands median line and the Netherlands/Germany median line, estimated as KP 50 to KP 270.

1.2 Development proposal

1.2.1 NeuConnect is a 1400 megawatt (MW) interconnector between Great Britain (GB) and Germany, creating a connection for electricity to be passed in either direction. NeuConnect will be formed by a pair of subsea and underground High Voltage Direct Current (HVDC) cable system over a distance of approximately 720 km, with onshore converter stations linking into the existing electricity grids in Germany and GB.

1.2.2 The installation, operation (including maintenance and repair) and decommissioning phases of the project are described in terms of the likely component options. The following provides a summary of the development activities that likely to be undertaken, subject to a licence being awarded.

Project Installation (Overview)

1.2.3 The main installation phase activities are expected to comprise:

- **Pre-installation activities** including engineering surveys immediately prior to installation will be carried out to reconfirm existing geotechnical and geophysical information about seabed conditions, bathymetry and other seabed features. These may include swathe bathymetry; multi-beam echo sounder (MBES); side-scan sonar surveys etc. In additional visual inspection may also be made using a remote operate vehicle (ROV). Pre-installation activities may also include additional specialist studies, including geotechnical investigations, Unexploded Ordnance (UXO) studies etc. if considered necessary.

- **Route preparation** involving clearance activities to ensure the installation area is clear of boulders, dropped object debris, and other obstacles. This is likely to require a seabed plough to be towed across the surface. Any specialist clearance activities (e.g. UXO clearance) will also be carried out at this point.

  Pre-sweeping dredging may also be required through areas of sandwaves currently identified along the Project Route Corridor. A pre-lay grapnel run will also be completed involving towing a heavy grapnel with a series of specially designed hooks (grapnels) along the centre line of the route, to confirm the installation site is clear of obstructions.

  In certain places along the route, including locations where the Project crosses other cables and/or pipeline infrastructure, crossing agreements will be made with other parties owning these pipelines and cables. In these locations protection features potentially including rock placement, mattresses etc. may be required to be installed, prior to the cable installation.

- **Cable installation.** It is not yet confirmed what trenching techniques will be used to install the cables however it is anticipated that mechanical ploughing or cutting and/or water jetting will be used at different points along the Project Route Corridor, in response to the seabed sediment conditions. Installation of the cables into soft sediments will seek to achieve a target burial depth of at least 1.5 and 2 m and below the depth of mobile sediments depending on the nature of the seabed and potential hazards (e.g. anchorage areas and/or specific legislative requirements).

- **Cable Protection.** Rock placement may also be required in specific locations where the target burial depth cannot be achieved, to protect subsea cables by covering them in a continuous, profiled berm of graded rock. No rock placement will be installed within protected sensitive habitats.

Operation and Maintenance (Overview)

1.2.4 Normal operations will involve the transmission of up to 1400 MW of DC electricity between the two countries.

1.2.5 Once installed, the subsea cables are designed to require minimal maintenance during their operational lifetime. Maintenance activities may include inspection surveys to monitor cable burial, re-burial if sections become exposed through natural hydrodynamic process; maintenance and reinstatement of any protection features such as cable crossings etc.

1.2.6 In the unlikely event of a cable fault, cable repair is anticipated to involve gaining access to the cable(s) (removal of any protection structure and de-trenching); cutting out of damaged section and replacement with a new section of cable and return to the seabed for re-burial. Additional or replacement cable protection may also be required. The operations involved will be similar to those during construction but on a lesser scale.

1.2.7 For the purposes of this report, repair and maintenance has been collectively referred to as 'maintenance'.

Decommissioning (Overview)

1.2.8 Decommissioning details will be confirmed at the appropriate time in accordance with prevailing industry standards and regulatory requirement. At this stage it has been assumed that the cables will be recovered and removed to shore for recycling.

1.3 Previous impact

1.3.1 It is expected that there will be minor isolated impacts from dredging and fishing along the study area however these will mostly be superficial due to shifting sediments.

1.3.2 A number of pipelines and cable trenches are present within the study area (**Table 1**), based on the information provided by Primo Marine (MMT 2009a). These have been further discussed in **section 5.2.20** and shown in **Figures 8a-e.**

Table 1 Pipelines and cables crossing the route

NC_ID	Name	Owner	Status	Type
035	Zeepipe 1	GASCO	Active	Pipeline
036	Franpipe	GASCO	Active	Pipeline
037	SEA-ME-WE3 seg 10.4	Deutsche Telekom/BT	Inactive	Cable
038	BT North Sea	BT	Planned	Cable
039	BBL Balgzand-Bacton	BBL	Active	Pipeline
040	UK-Germany 3	BT/German	Inactive	Cable
041	K13AP-Callantsoog	Wintershall	Active	Pipeline
042	UK-Germany 2	BT/German	Inactive	Cable
043	UK-Denmark 3	BT/Danish	Inactive	Cable
044	Bacton-Borkum No 1	BT/German	Inactive	Cable
045	Bacton-Borkum No 2	BT/German	Inactive	Cable
046	PL007 – K8-FA-1 to K14-FA-1P	NAM	Active	Pipeline
047	PL142 -D15-FA-1 to L 10-AC	Noordgastranspoort BV	Active	Pipeline
048	Fano-Oye No 1	Great Northern Tel co.	Inactive	Cable
049	PL064 – K9c-A to L10-AR	Gaz de France(engie)	Active	Pipeline
050	PL047 – L4-B to L7-A	Total Fina Elf Netherland BV	Abandoned	Pipeline
051	PL048	Total Fina Elf Netherland BV	Abandoned	Pipeline
052	UK-Denmark 3	BT/Danish	Inactive	Cable
053	PL022 -L4A to L7-P	Total Fina Elf Netherland BV	Abandoned	Pipeline
054	PL021 – L4A to L7-P	Total Fina Elf Netherland BV	Abandoned	Pipeline
055	Bacton-Borkkum No 2	BT/German	Inactive	Cable
056	UK-Germany 2	BT/German	Inactive	Cable
058	PL091 – L2-FA-1 to Callantsoog	Noordgastranspoort BV	Active	Pipeline
059	Fano-Oye No 2	Great Northern Tel Co	Inactive	Cable
060	Uk-Germany 2 Winterton-Borkum 1	-	Inactive	Cable
061	SEA-ME-WE3	Deutsche Telekom/BT	Inactive	Cable
062	UK-Germany 5	BT/German	Inactive	Cable

NC_ID	Name	Owner	Status	Type
063	PL154 – G17d-A to NGT-Leiding	Noordgastranspoort BV	Active	Pipeline
064	Bacton-Norkum No 3	BT/German	Inactive	Cable
065	Mundesley-Norderney	BT/German	Inactive	Cable
066	TGN North Europe Cable	euNetworks	Active	Cable
067	ODIN 1 seg 1	TDC	Inactive	Cable
068	Atlantic Crossing 1 seg B2	Century Link	Active	Cable
069	Fano-West Terschelling	Dutch	Inactive	Cable

1.4 Scope of document

1.4.1 This assessment has been produced in order to determine, as far as is possible from existing information and bespoke survey data, the nature and extent of the known and potential marine archaeological resource within the Study Area and its environs.

1.4.2 This document has been prepared for the area of the extent of the marine cable corridor (500 m) that lies within the Dutch EEZ.

1.5 Aims

1.5.1 The specific aim of this marine assessment is to summarise the known and potential archaeological baseline within the study area.

1.5.2 The objectives of the assessment are as follows:

- to provide details of relevant legislation, national and local planning policy and best practice guidance for the Netherlands;
- to outline the known and potential marine archaeological resource based on a review of existing information within a defined study area;
- to assess the geophysical survey data comprising topographic and bathymetric data, side scan sonar data and magnetometer data in order to identify any material of archaeological and cultural heritage significance present within the study area;
- to review geotechnical logs to identify sediments of potential archaeological interest and assess alongside the sub-bottom (SBP) data;
- to compare the geophysical and geotechnical interpretation with desk-based assessments (DBA), historical data, known archaeological sites and previous investigations in the vicinity of the defined study area to outline the known and potential marine archaeological resource;
- to recommend mitigation measures for any potential archaeological or cultural heritage assets newly identified within the study area, including the addition of new Archaeological Exclusion Zones where necessary within the study area.

1.6 Copyright

1.6.1 This report may contain material that is non-Wessex Archaeology copyright (e.g. Ordnance Survey, BGS, Crown Copyright), or the intellectual property of third parties, which Wessex Archaeology are able to provide for limited reproduction under the terms of our own

2 LEGISLATION, GUIDANCE AND POLICY

2.1 Introduction

2.1.1 The marine cable corridor falls within several different jurisdictions, each covered by separate legislation and guidance, and is under the responsibility of different curators and heritage agencies.

2.1.2 A summary of legislation and guidance relevant to the marine archaeological environment within the Dutch jurisdiction is outlined below.

2.2 Marine legislation

2.2.1 The Cultural Heritage Agency (Rijksdienst voor het Cultureel Erfgoed), part of the Ministry of Education, Culture and Science (Ministerie van Onderwijs, Cultuur en Wetenschappen-MT-OCW) is responsible for the protected archaeological resource within the Netherlands, and act as advisors to Rijkswaterstaat (Directorate General for Public Works and Water Management) as the licensing body for marine development.

Heritage Act 2016 (Erfgoedwet 2016; issued by the Ministry of Education, Culture and Science)

2.2.2 The above legislation provides protection for cultural heritage assets, including wrecks, aircraft crash sites and submerged prehistory.

2.2.3 It also “prohibits without a certificate for that purpose, to carry out actions involving the detection, investigation, or acquisition of cultural heritage, or parts thereof, which results in disturbance of the soil or disruption or total or partial displacement or removal of an archaeological monument or of underwater cultural heritage” (Section 5.1). Certificates are issued on application to the Minister for Education, Culture and Science.

2.2.4 The *Heritage Act* is in accordance with the *Valletta Convention* of 1992 (European Convention for the Protection of the Archaeological Heritage (revised)), in which the preservation and improvement of archaeological heritage is designated as one of the objectives of spatial planning authorities.

2.2.5 The *Heritage Act* established the AMZ cycle (Archeologische Monumenten Zorg), which is a defined series of steps and decisions through which archaeological works, mitigation and research are structured within the Dutch planning system. The procedure is embedded in the Dutch Quality Standard for Archaeology (KNA Waterbodems 4.1) as the mandatory workflow for archaeologists. This marine archaeological desk-based assessment forms the first step within this process (bureauonderzoek).

2.3 International conventions

2.3.1 The UNESCO Convention on the Protection of Underwater Cultural Heritage was concluded in 2001 and is a comprehensive attempt to codify the law internationally, with regards to underwater cultural heritage. The Netherlands has not yet ratified the Convention, however it has adopted the Annex of the Convention, which governs the conduct of archaeological investigations, as best practice for archaeology. Although the Netherlands is not a signatory, the Convention entered into force on 2nd January 2009, having been signed or ratified by 20 member states. It has since been ratified or accepted by an additional 40 states.

2.4 Marine policy

2.4.1 The National Water Plan gives a policy framework for the Maritime Spatial Plan and as an appendix, includes the Policy Document for the North Sea 2016-2021. The Policy Document is revised every 6 years and includes the Maritime Spatial Plan and emulates the Dutch government's policy decisions for the North Sea. The Netherlands are currently preparing the Policy Document for the North Sea 2022-2027.

2.5 Dutch guidance

2.5.1 This assessment was carried out in a manner consistent with following national guidance:

- Stichting Infrastructuur Kwaliteitsborging Bodembeheer (SIKB) Protocol 4002 Bureauonderzoek (Desk Research) (Versie 4.1 2018).

2.5.2 The following best practice guidance were also consulted:

- Identifying and Protecting Palaeolithic Remains: Archaeological Guidance for Planning Authorities and Developers (English Heritage (now Historic England), 1998);
- Managing Lithic Scatters: Archaeological Guidance for Planning Authorities and Developers (English Heritage (now Historic England), 2000);
- Military Aircraft Crash Sites: Guidance on their Significance and Future Management (English Heritage (now Historic England), 2002);
- The Code of Practice for Seabed Developers (Joint Nautical Archaeology Policy Committee and The Crown Estate, 2006);
- Conservation Principles, Policies and Guidance for the Sustainable Management of the Historic Environment (English Heritage (now Historic England), 2008);
- Ships and Boats: Prehistory to Present: Designation Selection Guide (English Heritage (now Historic England), 2012);
- Herkennen van archaeologische vondsten uit waterbodems en hoe daar mee om te gaan (Recognition of archaeological finds from waterbeds and how to deal with them) (Caspers and Houkes, 2013);
- Marine Geophysics Data Acquisition, Processing and Interpretation Guidance Notes (Bates *et al.* 2013);
- Guidelines to the process of underwater archaeological research: SASMAP Guideline Manual 1 (Gregory and Manders, 2015a);
- Best practices for locating, surveying, assessing, monitoring, and preserving underwater archaeological sites: SASMAP Guideline Manual 2 (Gregory and Manders, 2015b);
- North Sea Prehistory Research and Management Framework (NSPRMF): Retuning the research and management agenda for prehistoric landscapes and archaeology in the Dutch sector of the continental shelf (Peeters *et al.* 2019).

3 METHODOLOGY

3.1 Study Area

Extent

3.1.1 For the purposes of this report, the Study Area is defined by the extent of the marine cable corridor which is approximately 500 m wide across the length concerned here. This is based on the geophysical data coverage, which is centred on the originally proposed cable route. The portion of the marine cable corridor assessed here lies within Dutch EEZ, approximately 265 km. The location of the marine cable corridor is illustrated in **Figure 1**.

Search area

3.1.2 A wider 2 km buffer area to either side of the marine cable corridor was used as the search area for obtaining records from relevant archive databases. The larger buffer allows for a greater understanding of the wider archaeological baseline environment, with the dual purpose of enabling any archaeological trends within the area to be recognised and to allow any assets within the marine cable corridor to be represented in a broader archaeological context.

3.2 Archaeological desk-based assessment

Key themes

3.2.1 The methodology follows the best practice professional guidance outlined by the Chartered Institute for Archaeologists' (CIfA) Standard and Guidance for Historic Environment Desk-Based Assessment (2014, updated 2017, updated 2020) and was conducted in accordance with the Dutch Quality Standard for Archaeology (KNA Waterbodems 4.1, Protocol 4002).

3.2.2 The marine themes relevant to marine archaeological baseline as assessed in this report are:

- Seabed prehistory (for example, palaeochannels and other features that contain prehistoric sediment, and derived Palaeolithic artefacts e.g. handaxes); and
- Seabed features, including maritime sites (such as shipwrecks and associated material including cargo, obstructions and fishermen's fasteners) and aviation sites (aircraft crash sites and associated debris).

3.2.3 The results of the study are summarised in Chapters 4 and 5. Based on this, the assessment concludes with potential impacts and recommendations for future research.

Data sources

3.2.4 A number of sources of primary and synthesised information were consulted in order to compile this assessment. Data generated from marine geophysical survey was also a main component of the data (**Section 3.3**).

3.2.5 The following data sources were consulted for this assessment:

- the United Kingdom Hydrographic Office (UKHO) data for charted wrecks and obstructions;
- the *Nationaal Contactnummer Nederland* (NCN) database maintained by Rijkswaterstaat Sea and Delta, comprising data for terrestrial and marine

archaeological sites, find spots and archaeological events from the following sources:

- The Dutch Continental Shelf and Westerschelde wrecks register from The Hydrographic Service of the Royal Netherlands Navy;
- The SonarReg92 object database of *Rijkswaterstaat*;
- The ARCHIS III database (official archaeological database of the Ministry of Cultural Heritage).

- Admiralty Charts; and
- relevant primary and secondary documentary sources and grey literature held by Wessex Archaeology, and those available through the Archaeology Data Service and other websites, both published and unpublished archaeological reports relating to excavations and observations in the area around the Study Area were reviewed.

3.2.6 For clarity, duplicate entries (i.e. heritage assets or archaeological events that had been listed in more than one dataset) have been removed, with only a single, grouped listing for each heritage asset remaining.

3.2.7 This report also refers to the results of an earlier DBA for an earlier routing version completed by Periplus Archeomare (2018) which looked at a larger study area with a buffer of 10 nautical miles (nm) around the cable route.

3.2.8 A bibliography of documentary sources consulted is presented in the References section of this report.

Data structure

3.2.9 This report is based on a Geographic Information System (GIS) using ArcGIS 10.6, incorporating the positional information of the various data sources listed in above, allowing the data to be spatially analysed. The data were subsequently compiled into gazetteers of the prehistoric, maritime and aviation resources within Dutch Waters located within the Study Area; these were used to inform the assessment of geophysical data.

3.2.10 Within this assessment, the gazetteers of datasets are compiled and illustrated in Universal Transverse Mercator (UTM) zone 31 North projected from a WGS84 datum.

Chronology

3.2.11 Archaeological material is generally studied within a framework of ‘periods’ or ‘ages’ that reflect the activities and cultural changes taking place over time. Due to the geographical and cultural differences across the international route of NeuConnect, the defined chronologies vary slightly for each neighbouring country. A list of the main archaeological periods referred to in the text, along with their broadly defined dates are presented in **Appendix 1** to facilitate local comparisons with terrestrial chronologies**.**

3.2.12 All dates are referred to as BC (before Christ), BP (before present) or AD (anno domini) within the text. BC refers to calibrated radiocarbon chronology that can be considered equivalent to calendar years. BP dates are used for periods of time older than c. 10,000 years ago.

Seabed prehistory

3.2.13 The baseline summary of Seabed Prehistory was based on a range of secondary sources, including academic papers, geological information (e.g. BGS mapping), previous work undertaken by Wessex Archaeology and Periplus Archaeomare (2018) and assessment of sub-bottom profiler data. The baseline for seabed prehistory is further discussed in the Marine Archaeological Assessment: Paleogeography below (**Section 4**, **Appendix 3**).

3.2.14 The Study Area crosses through the southern North Sea. The recent geological history of the southern North Sea is directly linked to glacial / interglacial cycles experienced by the area during the Pleistocene (2.5 million – 10 ka), which resulted in large areas of the southern North Sea being periodically exposed as a terrestrial environment. This is represented in the geological record, with distinct terrestrial landscape features being present, interspersed with deposits of marine and glacially derived sediments. Due to these fluctuations of glaciations, the corresponding rises and falls in eustatic sea level, and major reconfigurations of the landscape during the last million years, the archaeological record is phased between periods of occupation and long periods of hiatus (**Figure 2**). These changes in relative sea level are recorded as Marine Isotope Stages (MIS) (**Appendix 1**).

3.2.15 The southern North Sea is known to contain relatively well preserved palaeolandscape features such as fluvial palaeochannels, created during periods of sea level lowstand but while the landscape was still free of ice. The remains of this terrestrial landscape are frequently recovered by marine aggregates dredging and fishing in numerous areas around the southern North Sea, generally in the form of the remains of extinct megafauna (e.g. mammoths, bison, horse etc.). The presence of palaeolandscape features and peat deposits may indicate a former, now-submerged terrestrial landscape and, as such, the sediments and geomorphology associated with these palaeolandscape features are deemed to be of high archaeological potential as they could contain both *in situ* or derived anthropogenic artefacts and preserved palaeoenvironmental material from Holocene and Pleistocene early prehistoric archaeology.

3.2.16 The discovery of actual human artefacts, such as hand axes and worked bone, is a rarer occurrence, but substantial numbers of artefacts have been recovered from the southern North Sea and neighbouring coastlines. Reported finds from offshore activity have, to date, produced a range of early prehistoric lithic artefacts indicating early prehistoric activity in submerged palaeolandscapes from Lower, Middle, and Upper Palaeolithic periods (Tizzard *et al*. 2014; 2015; Wessex Archaeology 2011; 2013), with notable collections of more recent Mesolithic artefacts from submerged palaeolandscape contexts (Momber *et a*l. 2011; Wessex Archaeology 2013).

3.2.17 The geology of the area is thought to be predominantly Pleistocene deposits, namely the Eem, Brown Bank and Boxtel Formations (Periplus Archaeomare, 2018), overlain by Holocene deposits.

3.2.18 As a marine deposit, the archaeological potential of the Eem Formation is considered relatively low, although the unit may cover and protect earlier land surfaces. The potential of the Brown Bank Formation is interpreted to be higher, with the possibility of derived and *in situ* artefacts and intact organic material of palaeoenvironmental interest. The potential of the Boxtel Formation is also considered to be relatively high however it should be noted that, where the formation is not protected by overlying peat, the top of the feature may have been subjected to erosion and therefore it is possible that only derived artefact may be present (Periplus Archaeomare, 2018).

3.2.19 Pre-transgression Holocene deposits may also be of higher archaeological potential. These can comprise fluvial, estuarine and terrestrial (including peat) deposits. Areas of peat are expected to be present throughout the study area (Periplus Archaeomare, 2018), likely located beneath the modern marine Holocene deposits. Seabed features: maritime and aviation sites.

Maritime and Aviation History

3.2.20 Various sources of data for maritime and aviation history have been collated and summarised in order to develop a baseline of archaeological and cultural heritage for the Study Area, and the potential for encountering unknown shipwreck and aircraft crash site (**Section 5.4**).

3.2.21 The data obtained were reviewed and those within the Study Area were extracted and compiled to form a gazetteer as part of the known maritime and aviation baseline. These records were each given a unique identifier. The research for maritime and aviation history was then combined with the archaeological assessment of geophysical survey data (**Appendix 4**).

3.2.22 Records relating to Recorded Losses were also researched from the data sources. Recorded Losses are records for ships or aircraft that are known to have wrecked or crashed offshore, but for which the exact locations are not known. The positional data of these records is unreliable and serve only to provide an indication of the types of vessels that passed through the Study Area and the wrecking incidents that are known to have occurred in the general area. Whilst the remains of these vessels are expected to exist somewhere on the seafloor, their location is unknown. As such, they support a greater understanding of the potential maritime and aviation resource.

3.2.23 The baseline assessment of maritime and aviation archaeology was further supplemented by a review of relevant primary and secondary source material in order to provide an indication on the nature of maritime and aviation activity across the Study Area. As well as summarising the known archaeological resource, the baseline assessment underlines the potential for encountering unknown shipwreck and aircraft crash sites within the Study Area (Historic England, 2002; Wessex Archaeology, 2008b). A summary of key areas of maritime and aviation potential are presented in **Table 2** and **Table 3**.

Table 2 Summary of key areas of maritime potential

Period	Summary
Pre-1500 AD	Low potential for material associated with prehistoric maritime activities. Prehistoric maritime activities include coastal travel, fishing and the exploitation of other marine and coastal resources. Vessels of this period include rafts, hide covered watercraft and log boats.
	Low potential for material associated with later prehistoric maritime activities, including seaworthy watercraft suitable for overseas voyages to facilitate trade and the exploitation of deep water resources. Such remains are likely to comprise larger boat types, including those representing new technologies such as the Bronze Age sewn plank boats which are associated with a growing scale of seafaring activities.
	Low potential for material of Romano-British date, associated with the expansion and diversification of trade with the Continent. Watercraft of this period, where present, may be representative of a distinct shipbuilding tradition known as 'Romano-Celtic' shipbuilding, often considered to represent a fusion of Roman and northern European methods.

Period	Summary
	Low potential for material associated with coastal and seafaring activity in the 'Dark Ages', associated with the renewed expansion of trade routes and Germanic and Norse invasion and migration. Vessels of this period may be representative of new shipbuilding traditions such as the technique.
	Low potential for material associated with medieval maritime activity, including that associated with increasing trade between the UK and Europe, the development of established ports around the southern North Sea and the expansion of fishing fleets and the herring industry. Vessels of this period are representative of a shipbuilding industry which encompassed a wide range of vessel types (comprising both larger ships and vernacular boats). Such wrecks may also be representative of new technologies (e.g. the use of flush-laid strakes in construction), developments in propulsion, the development of reliable navigation techniques and the use of ordnance.
1500 to 1815	Medium potential for post-medieval shipwrecks representative of continuing technological advances in the construction, fitting and arming of ships, and in navigation, sailing and steering techniques. Vessels of this period continued to variously represent both the clinker techniques and construction utilising the flush-laid strakes technique.
	Medium potential for post-medieval shipwrecks associated with continuing local trade and marine exploitation including the transport of goods associated with the agricultural revolution.
1816 to 1913	Higher potential for the discovery of shipwrecks associated with the introduction of iron and later steel in shipbuilding techniques. Such vessels may also be representative of other fundamental changes associated with the industrial revolution, particularly with regards to propulsion and the emergence of steam propulsion and the increasing use of paddle and screw propelled vessels.
	Higher potential for the discovery of shipwrecks demonstrating a diverse array of vernacular boat types evolved for use in specific environments.
	Higher potential for wrecks associated with large scale worldwide trade, the fishing industry or coastal maritime activity including marine exploitation.
1914 to 1945	Higher potential for the discovery of shipwrecks associated with the two world wars including both naval vessels and merchant ships. Wrecks of this period may also be associated with the increased shipping responding to the demand to fulfil military requirements. A large number of vessels dating to this period were lost as a result of enemy action.
Post-1946	Potential for wrecks associated with a wide range of maritime activities, including military, commerce, fishing and leisure. Although ships and boats of this period are more numerous, loses decline due to increased safety coupled with the absence of any major hostilities. Vessels dating to this period are predominantly lost as a result of any number of isolated or interrelated factors including human error, adverse weather conditions, collision with other vessels or navigational hazards or mechanical faults.

Table 3 Summary of key areas of aviation potential

Period	Summary
Pre- 1939	Minimum potential for material associated with the early development of aircraft. Aircraft of this period may represent early construction techniques (e.g. those constructed of canvas covered wooden frames) or may be associated with the mass-production of fixed wing aircraft in large numbers during WWI.
	Minimum potential for material associated with the development of civil aviation during the 1920s and 1930s, associated with the expansion of civilian flight from the UK to a number of European and worldwide destinations.
1939 to 1945	Very high potential for WWII aviation remains. Aircraft of this period are likely to be representative of technological innovations propelled by the necessities of war which extended the reliability and range of aircraft.
Post- 1945	Potential for aviation remains associated with military activities dominated by the Cold War, the evolution of commercial travel and recreational flying and the intensification of offshore industry (including helicopter remains). Aircraft of this period may be representative of advances in aerospace engineering and the development of the jet engine

3.3 Geophysical and geotechnical methodology

Data sources

3.3.1 A number of data sources were consulted during this assessment, including:

- Geophysical survey data sets acquired by MMT in 2019;
- Previous assessments of the survey area (Wessex Archaeology 2019) and Periplus Archeomare 2018);
- Geophysical survey and operations reports provided by MMT (MMT 2019a; 2019c);
- Geotechnical survey reports provided by MMT (MMT 2019b);
- Client-supplied information on known pipelines and cable crossings in the area;
- Relevant geological mapping from the area (British Geological Survey (BGS) 1984; 1986), admiralty charts received from MarineFind; and
- Recorded wreck and obstructions data acquired via the UKHO and BHS.

Technical specifications

3.3.2 The geophysical data were acquired by MMT between 23 March and 21 July 2018 (MMT 2019) onboard the *M/V Franklin*.

3.3.3 The data consisted of sub-bottom profiler (SBP) (surface towed Sparker), multibeam echosounder (MBES), sidescan sonar (SSS) and magnetometer (Mag.) data sets (MMT 2019c). The survey lines were run at 75 m line spacing and cross lines run every 5 km. A SSS range of 100 m per channel was used. Further details on equipment specifications are listed in **Table 4**.

Table 4 Summary of planned survey equipment

Survey Company	Survey Vessel	Data Type	Equipment	Data Format
MMT	*M/V Franklin*	SBP	GeoSpark 1000 (surface towed)	*.sgy*
		MBES	Hull mounted Kongsberg EM 2040D (200, 300, 400 kHz)	*.xyz*
		SSS	EdgeTech 2200 (300/600 kHz, 100 m range), mounted on a remotely operated towed vehicle (ROTV)	*.xtf*
		Mag.	Geometrics G-882	*.xls*
		Positioning	Applanix POS MV 320 with C-Nav 3050 using C2 corrections	N/A

Co-ordinate system

3.3.4 The survey data were acquired predominantly in WGS84 UTM31N, with a small amount of data acquired in WGS84 UTM32N where the Study Area overlaps with the German sector. Any features identified in the WGS84 UTM32N data sets have had their coordinates converted so all results are presented in WGS84 UTM31N.

Data quality

3.3.5 Once processed, the geophysical data sets were individually assessed for quality and their suitability for archaeological purposes and rated using the following criteria (**Table 5**).

Table 5 Criteria for assigning data quality rating

Data quality	Description
Good	Data which are clear and unaffected or only slightly affected by weather conditions, sea state, background noise or data artefacts. Seabed datasets are suitable for the interpretation of upstanding and partially buried wrecks, debris fields, and small individual anomalies. The structure of wrecks is clear, allowing assessments on wreck condition to be made. Subtle reflectors are clear within SBP data. These data provide the highest probability that anomalies of archaeological potential will be identified.
Average	Data which are moderately affected by weather conditions, sea state and noise. Seabed datasets are suitable for the identification of upstanding and partially buried wrecks, the larger elements of debris fields and dispersed sites, and larger individual anomalies. Dispersed and/or partially buried wrecks may be difficult to identify. Interpretation of continuous reflectors in SBP data is problematic. These data are not considered to be detrimentally affected to a significant degree.
Below Average	Data which are affected by weather conditions, sea state and noise to a significant degree. Seabed datasets are suitable for the identification of relatively intact, upstanding wrecks and large individual anomalies. Dispersed and/or partially buried wrecks, or small isolated anomalies may not be clearly resolved. Small palaeogeographic features, or internal structure may not be resolved in SBP data.
Variable	This category contains datasets where the individual lines range in quality. Confidence of interpretation is subsequently likely to vary within the Study Area.

3.3.6 The quality of the SBP (sparker) data has been rated as ‘Variable’ using the above criteria. Generally, the data were of good quality; possible engine noise and occasional weather effects (e.g. cavitation) could be seen in some of lines. However, in general it was possible to identify and trace the different horizons and, as such, the data were considered suitable for archaeological assessment.

3.3.7 The MBES data quality has been rated as 'Variable' using the above criteria table. The data quality and resolution of 1 m was found to be of a good standard and suitable for archaeological assessment of objects and debris over 1 m in size. However, in some of the block the tidal reductions had resulted in 'stepping' being seen in the data, which may make it hard to identify small features of possible interest.

3.3.8 The SSS data have been rated as 'Average' using the above criteria table. During the initial data audit, it was found that the high-frequency (HF) data was not imaging the full range. As such, it was necessary to use the low-frequency (LF) SSS data rather than the higher resolution, HF data. Using the LF data may mean that some of the detail on larger features is lost compared to the HF data, and smaller features may be harder to detect. However, the LF data were deemed of good quality and larger features were identifiable within the data. There were some very small data gaps around the edges of the study area in Block 11; therefore, some small anomalies may not have been imaged in these areas.

3.3.9 The Mag. data have been rated as 'Average' using the above criteria table. Occasional interference and background variation was identified throughout the data files which may obscure smaller anomalies. There are also some occasional data gaps in the Mag. lines, although these are largely covered by the other data sets. The relatively wide (75 m) line spacing, and the towed height of the magnetometer above the seafloor (approximately 8 m (MMT 2019c), may mean that features with a lower ferrous content that are situated between survey lines or at the edges of the Study Area may not be identified in the Mag. data, or may appear as lower amplitude features. As such, it is possible for some ferrous debris that are either buried or without surface expression to be present within the study area that have not been identified during this assessment. However, larger ferrous features (such as steel wrecks) are still likely to be identifiable in the data even where not directly covered by a survey line.

3.3.10 Although these data set are considered suitable for identifying large and distinct features such as wrecks within the data, after discussion with the Dutch authorities (Rijksdienst voor het Cultureel Erfgoed and Rijkswaterstaat), it was concluded that, due to the fact smaller objects of potential archaeological interest may not be identified, the resolution of the geophysical data are not considered high enough for a detailed archaeological assessment. As such, the geophysical interpretation reported on here should be considered supplementary to the desk-based assessment rather than a full geophysical technical report as per Protocol 4103 (*Inventariserend Veldonderzoek (waterbodems*), version 4.1 2018).

Processing

3.3.11 A number of datasets were assessed over the study area, each dataset was processed separately using the following software (**Table 6**).

Table 6 Software used for geophysical assessment

Dataset	Processing Software	Interpretation and rationalisation
SBP	CodaOctopus Survey Engine v5.11	ArcMap v10.6
MBES	QPS Fledermaus v7.7.5	
SSS	CodaOctopus Survey Engine v5.11	
Mag.	Geometrics MagPick and proprietary software	

3.3.12 The SBP and MBES data were used as the primary datasets for the palaeographic assessment and SSS, MBES and Mag. datasets were used for the seabed features assessment.

3.3.13 The SBP data were processed using CodaOctopus Survey Engine Seismic+ software. This software allows the data to be visualised with user selected filters and gain settings in order to optimise the appearance of the data for interpretation. The software then allows an interpretation to be applied to the data by identifying and selecting sedimentary boundaries and shallow geological features that might be of archaeological interest.

3.3.14 The SBP data were interpreted with a two-way travel time (TWTT) along the z-axis. In order to convert from TWTT to depth, the velocity of the seismic waves was estimated to be 1,600 ms-1. This is a standard estimate for shallow, unconsolidated sediments.

3.3.15 The SBP data can also be used to identify small reflectors, which may indicate buried material such as a wreck site covered by sediment. The position and dimensions of any such objects are noted in a gazetteer, and an image acquired of each anomaly for future reference. It should be noted that anomalies of this type are rare, as the sensors must pass directly over such an object in order to detect an anomaly.

3.3.16 For the SBP assessment, 25% of the lines were initially assessed. Where features of interest were identified, additional lines were then interpreted in order to more accurately map the extents of these features.

3.3.17 The MBES data were analysed to identify any unusual seabed structures that could be shipwrecks or other anthropogenic debris. The data were gridded at 1 m and analysed using QPS Fledermaus software, which enables a 3-D visualisation of the acquired data and geo-picking of seabed anomalies. The MBES data were also used in the palaeogeographic assessment.

3.3.18 The low frequency .jsf SSS data files were converted to .cod format and processed using CodaOctopus Survey Engine Sidescan+ software. This allowed the data to be replayed with various gain settings in order to optimise the quality of the images. The data were interpreted for any objects of possible anthropogenic origin. This involves creating a database of anomalies within Coda by tagging individual features of possible archaeological potential, recording their positions and dimensions, and acquiring an image of each anomaly for future reference. Due to the SSS range, the low frequency files were deemed more suitable and used for the interpretation, with high frequency files used to infill where necessary.

3.3.19 A mosaic of the SSS is produced during this process to assess the quality of the sonar towfish positioning. This process allows the position of anomalies to be checked between different survey lines and for the positioning to be further refined if necessary.

3.3.20 The form, size and/or extent of an anomaly is a guide to its potential to be an anthropogenic feature and therefore of archaeological interest. A single small but prominent anomaly may be part of a much more extensive feature that is largely buried. Similarly, a scatter of minor anomalies may be unrelated individual features, define the edges of a buried but intact feature, or may be all that remains as a result of past impacts from, for example, dredging or fishing. Assessment is made of such groups of anomalies during data interpretation to determine which of these alternatives is the most likely.

3.3.21 The Mag. data were processed and interpreted using Geometrics MagPick and proprietary software in order to identify any discrete magnetic contacts which could represent buried metallic debris or structures such as wrecks (**Figures 8a-e**).

3.3.22 The software enables both the visualisation of individual lines of data and gridding of data to produce a magnetic anomaly map. The data were first smoothed to try and eliminate any spiking. A trend was then fitted to the resulting data, and the trend values subtracted from the smoothed values. This was carried out to remove natural variations in the data (such as diurnal variation in magnetic field strength and changes in geology). The processed data were then gridded to produce a map of magnetic anomalies, and individual anomalies tagged based on the grid and individual profile lines. Images are taken in a similar process to that of the SSS data.

3.3.23 For the purposes of this assessment, any identified magnetic anomalies have been classified depending on their amplitude as small (5 nT to 49 nT), medium (50 nT to 99 nT), or large (>100 nT).

3.3.24 For the seabed features, anomalies are classified by interpreted type as per **Table 7**.

Table 7 Types of anomaly identified

Anomaly classification	Definition
Wreck	Areas of coherent structure including wrecks of ships, submarines and some aircraft (where coherent structure survives)
Debris field	A discrete area containing numerous individual debris items that are potentially anthropogenic, and can include dispersed wreck sites for which no coherent structure remains
Debris	Distinct objects on the seabed, generally exhibiting height or with evidence of structure, that are potentially anthropogenic in origin
Seabed disturbance	An area of disturbance without individual, distinct objects. Potentially indicates wreck debris or other anthropogenic features buried just below the seabed.
Rope/chain	Curvilinear dark reflectors, often with a small amount of height, indicating rope or chain (if ferrous).
Bright reflector	Individual objects or areas of low reflectivity, characteristic of materials that absorb acoustic energy, such as waterlogged wood or synthetic materials. Precise nature is uncertain
Dark reflector	Individual objects or areas of high reflectivity, displaying some anthropogenic characteristics. Precise nature is uncertain
Mound	A mounded feature with height not considered to be natural. Mounds may form over wreck sites or other debris.
Depression	An area of disturbed seabed with depth. Potentially indicates scour around a buried feature or where a feature has been cleared.
Buried object	A possible buried object identified in the SBP data as a parabola or other disturbance, thought to be caused by a buried anthropogenic feature.
Magnetic	No associated seabed surface expression, and have the potential to represent possible buried ferrous debris or buried wreck sites
Recorded Wreck	Position of a recorded wreck at which previous surveys have identified definite seabed anomalies, but for which no associated feature has been identified within the current geophysical data set.
Recorded obstruction	Position of a recorded obstruction (e.g. foul ground, fisherman's fastener recorded by the UKHO), but for which no associated feature has been identified within the current data set.

Anomaly grouping and discrimination

3.3.25 The previous section describes the initial interpretation of all available geophysical datasets which were conducted independently of one another. This inevitably leads to the possibility of any one object being the cause of numerous anomalies in different datasets and apparently overstating the number of archaeological features in the exploration area.

3.3.26 To address this fact the anomalies were grouped together; allowing one ID number to be assigned to a single object for which there may be, for example, a UKHO record, a MBES anomaly, and multiple SSS anomalies.

3.3.27 Once all the geophysical anomalies and desk-based information have been grouped, a discrimination flag is added to the record in order to discriminate against those which are not thought to be of an archaeological concern. For anomalies located on the seabed, these flags are ascribed as follows (**Table 8**).

Table 8 Criteria discriminating relevance of identified features to proposed scheme

Overview classification	Discrimination	Criteria	Data type
Archaeological	P1	Feature of probable archaeological interest, either because of its palaeogeography or likelihood for producing palaeoenvironmental material	SBP, MBES
Archaeological	P2	Feature of possible archaeological interest	SBP, MBES
Archaeological	A1	Anthropogenic origin of archaeological interest	MBES, SSS, Mag.
Archaeological	A2	Uncertain origin of possible archaeological interest	MBES, SSS, Mag.
Archaeological	A3	Historic record of possible archaeological interest with no corresponding geophysical anomaly	MBES, SSS, Mag.
Non-archaeological	U1	Not of anthropogenic origin	MBES, SSS, Mag.
Non-archaeological	U2	Known non-archaeological feature / Feature of non-archaeological interest	MBES, SSS, Mag., SBP
Non-archaeological	U3	Recorded loss	MBES, SSS, Mag.
Non-impact	O1	Outside horizontal footprint of study area	MBES, SSS, Mag., SBP
Non-impact	O2	Outside vertical footprint of proposed impact	SBP
Non-impact	O3	Area subsequently cleared after data acquired, anomaly/object recovered	MBES, SSS, Mag., SBP

3.3.28 The grouping and discrimination of information at this stage is based on all available information and is not definitive. It allows for all features of potential archaeological interest to be highlighted, while retaining all the information produced during the course of the geophysical interpretation and desk-based assessment for further evaluation should more information become available.

3.3.29 Any anomalies located outside of the defined study areas, either previously recorded in known databases (e.g. UKHO) or identified during this geophysical assessment, are deemed beyond the scope of the current assessment and are subsequently not included in this report.

Geoarchaeological framework

3.3.30 Vibrocore logs were supplied by MMT along the length of the study area (MMT 2019b). Where a vibrocore correlated with a palaeogeographic feature of interest identified in the SBP data, the core log was looked at in order to confirm the sediments and help determine the origin of the feature. Associated core logs are noted in the palaeogeographic gazetteer (**Appendix 3**).

3.4 Assumptions and limitations

Archaeological data

3.4.1 Data used to compile this report consists of primary geophysical and geotechnical survey data and secondary information derived from a variety of sources, only some of which have been directly examined for the purposes of this assessment. The assumption is made that the secondary data, as well as that derived from other secondary sources, is reasonably accurate.

3.4.2 Vibrocore logs were assessed where corresponding with a feature of palaeoenvironmental interest were identified in the SBP data to groundtruth the interpretation of the geophysical dataset. A geoarchaeological assessment of the remaining isolated logs could be undertaken if it is necessary to refine the interpretation and the wider geological context at later stages of the project.

3.4.3 Is should be noted that there is a small section of the route where the cable has been re-routed approximately 300 m south as it enters the German EEZ. In this section the route partially extends outside of the geophysical data coverage and, as such, it is not possible to comment of the presence of archaeological features in the geophysical data within this area.

3.4.4 The records held by the UKHO, NCN and the other sources used in this assessment are not a record of all surviving cultural heritage assets, rather a record of the discovery of a wide range of archaeological and historical components of the marine historic environment. The information held within these datasets is not complete and does not preclude the subsequent discovery of further elements of the historic environment that are, at present, unknown. In particular, this relates to buried archaeological features.

4 MARINE ARCHAEOLOGICAL ASSESSMENT: PALAEOGEOGRAPHY

4.1 Geological baseline

4.1.1 The following is an overview of the geological and archaeological history of the wider region from the Pleistocene to the Holocene marine transgression.

4.1.2 The Study Area crosses through the southern North Sea. The recent geological history of the southern North Sea is directly linked to glacial / interglacial cycles experienced by the area during the Pleistocene (2.5 million – 10 ka), which resulted in large areas of the southern North Sea being periodically exposed as a terrestrial environment. This is represented in the geological record, with distinct terrestrial landscape features being present, interspersed with deposits of marine and glacially derived sediments. Due to these fluctuations of glaciations, the corresponding rises and falls in eustatic sea level, and major reconfigurations of the landscape during the last million years, the archaeological record is phased between periods of occupation and long periods of hiatus (**Figure 2**). These changes in relative sea level are recorded as Marine Isotope Stages (MIS).

4.1.3 The geology of the area is thought to be predominantly Pleistocene deposits, namely the Eem, Brown Bank and Boxtel Formations (Periplus Archaeomare, 2018), overlain by Holocene deposits. The oldest of these, the Eem Formation, was deposited during the Eemian interglacial period, and is thought to comprise a shallow marine / intertidal deposit of shelly and muddy sands. The Brown Bank Formation is generally thought to be a lagoon deposit of Lower Weichselian age (Cameron *et al*., 1992). However, based on previous geophysical and geotechnical assessments of areas of Brown bank Formation, it may have a much longer, more complex history, including changes of sediment input and potential periods of drying out/exposure (Wessex Archaeology, 2018a; 2018b). The Boxtel formation, thought to comprise aeolian sands and fluvial periglacial sands and is also Weichselian in age (Periplus Archaeomare, 2018).

4.1.4 The southern North Sea is known to contain relatively well preserved palaeolandscape features such as fluvial channels, created during periods of sea level lowstand but while the landscape was still free of ice. The remains of this terrestrial landscape are frequently recovered by dredging and fishing in numerous areas around the southern North Sea, generally in the form of the remains of extinct megafauna (e.g. mammoths, bison, horse etc.). The discovery of actual human artefacts, such as hand axes and worked bone, is a rarer occurrence, but artefacts have been recovered. Reported finds from offshore activity have, to date, produced a range of early prehistoric lithic artefacts indicating early prehistoric activity in submerged palaeolandscapes from Lower, Middle, and Upper Palaeolithic periods (Tizzard *et al.* 2014; Wessex Archaeology 2011; 2013), with notable collections of more recent Mesolithic artefacts from submerged palaeolandscape contexts (Momber *et a*l. 2011; Wessex Archaeology 2013b; Peeters and Amkreutz 2020).

Pre-Elsterian (>478 ka; >MIS 12)

4.1.5 Prior to the Elsterian glaciation, an extensive estuarine/deltaic landscape existed at the location of the current North Sea basin. This landscape, the Ur-Frisia delta (Cameron *et al*. 1992), drained many major European rivers, including the palaeo-Thames-Medway system, which drained northwards through Essex and East Anglia (Bridgland 1994), the Rhine (Hijma *et al*. 2012) and the 'Baltic River System' which deposited a large delta in the North Sea (Elhers *et al.* 2011).

4.1.6 At this time a chalk ridge along the axis of the Weald-Artois high, between southeast England and northern France, separated the North Sea and the English Channel into two

distinct basins. Any river systems northeast of the ridge flowed northwards across the North Sea basin to the Ur-Frisia delta, whilst those southwest of the ridge flowed along the English Channel towards the Atlantic.

4.1.7 In the UK, the earliest direct evidence for hominin activity has been identified at the Lower Palaeolithic sites of Happisburgh, on the Norfolk coast, and Pakefield, on the Suffolk coast, which date from c. 900,000 and 700,000 BP respectively (Parfitt *et al*. 2005; 2010). These sites would have been situated on the edge of an extensive landscape of low-lying estuaries, major river systems, plains and rolling hills. Whilst the archaeology at Pakefield was created during a more Mediterranean climate, around MIS 17 (**Figure 2**), the remains at Happisburgh Site 3 are indicative of colder-than-present conditions at the edge the boreal zone (Candy *et al*. 2011), indicating that earlier hominins were capable of surviving in conditions previously thought to be too harsh for habitation (Parfitt *et al*. 2010).

4.1.8 The importance of these sites is international, as they are currently unique at this latitude for this early date (Wessex Archaeology 2013). Cohen *et al*. (2012) have highlighted the North Sea basin as a key region for understanding Pleistocene hominins within a northerly, coastal environment.

Elsterian to Eemian (c. 478 ka – 115 ka; MIS 12 – 5e)

4.1.9 The Elsterian glacial period was the most extensive glaciation of the Pleistocene and saw ice sheets extending further south than at any time in the past 2.5 million years (**Figure 2**), although during the coldest phase of the Saalian major part of the Dutch Shelf and the northern part of the Netherlands was covered by an ice sheet (Periplus Archaeomare, 2018). The advancing ice sheets drastically remodelled the drainage systems. The historically south-east to north-west drainage system of the Rhine and Meuse were blocked by the ice advance and were forced to alter their courses to a proglacial lake in the southern North Sea. (Verpoorte *et al*. 2015). The lake was fed with melt water of the retreating glaciers and the Rhine which developed a northerly course via the Vecht Valley.

4.1.10 During deglaciation and retreat of the ice sheet at the end of the Elsterian, it is thought that the emptying of an ice-dammed lake within the North Sea may have created a volume of water large enough to breach the chalk ridge along the Weald-Artois high. This connected the North Sea to the English Channel, incising the Lobourg Channel off the Kent coast and some of the English Channel palaeovalleys in the process (Gupta *et al*., 2017; Hamblin *et al*., 1992). This initial catastrophic breaching of the Weald-Artois ridge is thought to have been followed by further erosive events leading to the permanent breaching of the English Channel approximately 150 kya (Hijma *et al.,* 2012). However, the precise timing and mechanism of breaching is still under debate. After the breaching of Weald-Artois ridge, the Lobourg Channel is likely to have formed the main drainage route of the major northern European rivers flowing into the dry North Sea Basin (Cameron et al., 1992).

4.1.11 During the periods of glaciation, vast tunnel valleys formed due to the transport of melt water beneath the ice sheets. It is possible that the edges of these valleys may have been attractive locations for hunting, as reindeer are thought to have used them as their migration routes. Evidence from later Ahrensburg sites suggest that where the reindeer were more confined by the narrow lengths of the valleys, they were relatively easier to hunt. (Periplus Archaeomare, 2018).

4.1.12 During the interglacial periods between the Elsterian and Weichselian glaciations (Holsteinian and Eemian), warmer climate conditions meant the area was more hospitable to hominin communities. The Middle Pleistocene is the time when there starts to be major archaeological evidence for the presence of humans in central Europe. This evidence post-

dates the Elsterian glaciation, however it is uncertain as to whether this is due to traces of earlier occupation being eroded by the glaciation or by actual human absence (Ehlers *et al*., 2011). The transition from the Saalian to Eemian resulted in a further inundation of the North Sea basin and a coherent transgressive infill of glacial basins. (Periplus Archaeomare, 2018).

4.1.13 The Netherlands is thought to be located at the northern limits of the Neanderthal range, with one of the earliest traces of occupation being a collection of flint tools found in the Belvédère quarry, thought to date to the intra-Saalian interglacial as well as the Early Weichselian (Verpoorte *et al*. 2015). It has been suggested that the flint finds may demonstrate the presence of children practising their flint knapping skills (Stapert 2007). Further evidence from the Early Middle Palaeolithic comes from the site of Kesselt - Op deSchans, where four clusters of lithic artifacts were discovered on an ancient land surface dated to MIS-9 / MIS-8 (Van Baelen *et al.* 2008), although it is thought that these artefacts may have been eroded out of their original context (Meijs *et al.* 2014). Well-preserved sites in stratigraphic context are extremely rare in the Netherlands and limited to the loess region of southern Limburg.

4.1.14 Other evidence of the Middle palaeolithic in the Netherlands comes from the 'Rhenen industry' artefacts, including collections characterised by Levallois production and scraper-dominated tool assemblages. These were identified in fluvial sediments dated to early MIS 6 and are thought to have been made, used and discarded ahead of the Late Saalian glaciation (Verpoorte *et al.* 2015).

4.1.15 The international importance of Early Middle Palaeolithic archaeology in the southern North Sea is highlighted by the numerous sites preserved around the south-east of the UK (White., 2006; Scott and Ashton, 2011) and, in particular, by the submerged prehistoric Levallois lithic assemblage from marine aggregates licence Area 240 in the palaeo-Yare catchment. Over 120 artefacts have now been recovered from this locale, some of which are identifiable as Levallois, with many recovered from *in situ* or near *in situ* contexts (Tizzard *et al*., 2014; Wessex Archaeology 2013).

4.1.16 The substantial, mixed assemblage of handaxes also recovered from Area 240 may be of older Lower Palaeolithic origin (e.g. >MIS 9, **Figure 2**), or may date to the Later Middle Palaeolithic when technologically similar artefacts were made (c. MIS 3, **Figure 2**) (Boismier *et al*., 2012). However, based on palaeoenvironmental and sedimentological evidence an Early Middle Palaeolithic date is most likely (Tizzard *et al.,* 2014).

4.1.17 Palaeogeographically, Area 240 is one of the most northerly Neanderthal sites in northwest Europe and of primary archaeological importance for defining Middle Palaeolithic potential and the contemporary palaeogeography across the southern North Sea basin (Tizzard *et a*l., 2014). The site highlights the archaeological potential of preserved Pleistocene fluvial deposits within the southern North Sea.

4.1.18 During the Eemian interglacial (MIS 5e) which saw warm and humid climatic conditions in Europe, the archaeological record in the Netherlands is unknown, with no sites or artefacts dated to the Eemian (Verpoorte *et al*. 2017).

Weichselian to Late Glacial Maximum (c. 115 ka – 18 ka; MIS 5d – 2)

4.1.19 Deterioration of the climate during the Late Pleistocene resulted in the most recent glaciation of the North Sea during the Weichselian period. During the Weichselian, the British ice sheet is thought to have reached into the Dutch sector of the North Sea (Laban and Jaap 2011), although it is not thought to have extended as far as into the Study Area.

During this period, the prograding Rhine and Meuse delta entered a lower deltaic flood basin referred to as the Brown Bank delta plain, which extended into the south-west section of the Study Area (Periplus Archaeomare, 2018).

4.1.20 Within the context of early prehistory and submerged palaeogeography, substantial areas of the southern North Sea basin would have been dry land during the warming and cooling limbs of the various sub-stages (MIS 5a to 5e, **Figure 2**). Therefore, the potential exists for human activity to have occurred in the area of exposed terrestrial environment within the southern North Sea basin, during and after the Weichselian glaciation.

4.1.21 The North Sea was characterised by an open subarctic landscape during the cold periods of the Early Weichselien. This changed during the relative warm Brørup interstadial 100,000 years ago and Odderade interstadial 80,000 years ago, when the area became characterised by forested landscape with meandering rivers and bogs (Periplus Archaeomare, 2018). Locally, in low lying areas, wet conditions resulted in the development of peat. However, the colder periods at the end of the Weichselian major, much of the North Sea would have been a polar desert. During this period, aeolian sands, part of the Boxtel Formation, were being eroded from the North Sea landscape and deposited over vast areas of the Netherlands (Periplus Archaeomare, 2018).

4.1.22 Climatically, MIS 3 was significantly colder than now but did not attain the glacial conditions of later or earlier glacial periods (e.g. MIS 6 or 2, **Figure 2**) (Pettitt and White 2012). It is likely that humans hunted for large mammals throughout glacial periods, even under very cold conditions (Periplus Archaeomare, 2018). For the Neanderthals that may have occupied the region at this time, surviving during this period may have been subject to a variety of technological and cultural adaptations (White 2006).

4.1.23 During the Late Glacial Maximum, sea level dropped drastically, up to 120 meters, and a major part of the North Sea area became a terrestrial environment. During this period, it's thought that the glacial landscape was occupied by Late Palaeolithic and Early Mesolithic hunters-gatherers. (Periplus Archaeomare, 2018). A skull fragment, thought to have belonged to a young adult male Neanderthal was discovered in Middle Weichselian sediments extracted from the so-called Zeeland Ridges area, a complex of south-west to north-east oriented sandy ridges situated parallel to the Dutch coast, which have become known as a Palaeolithic 'treasure trove' (Verpoorte *et al*. 2017; Peeters and Amkreutz 2020). A number of finds have been found in the waste heaps from the dredging of these ridges which consist of sediment, which is often re-worked, dating to the Early Pleistocene, Eemian, Weichselian and Holocene (Peeters and Amkreutz 2020).

4.1.24 Closer inshore, a number of Middle Palaeolithic flint implements, including two hand-axes and several Levallois flakes have been dredged from the Middeldiep area. A recent geological study allowed the correlation of the offshore stratigraphic units in the Middeldiep area with onshore deposits dated between 50,000 and 30,000 BP, which would data these tools and the skull fragment to the Middle Palaeolithic (Peeters and Amkreutz 2020). These finds highlight the importance of potential of the Pleistocene and Holocene archaeological archive in the Southern North Sea.

Post-Late Glacial Maximum and early Holocene (18,000 – 6000 BP; MIS 2 – 1)

4.1.25 Following the Weichselian glacial maximum, ice sheet retreat once again left significant areas of the southern North Sea exposed as a terrestrial environment. In the Early Upper Palaeolithic, at the end of the Late Pleistocene, there was a transition period for hominins. Neanderthals died out around 40,000 BP, and modern humans then colonised Doggerland. Archaeological evidence for this period is relatively sparse, but submerged

palaeolandscapes provide key contextual evidence for recovered artefacts and provides a background landscape within which to place these human communities.

4.1.26 During the Last Glacial Maximum, the environment within the southern North Sea was relatively poor for human colonisation, and was situated at the north-western extents of possible habitation. However, there was increasing human exploitation after 15,000 BP. Humans at this time were hunting game, such as mammoth and deer, and evidence of these animals has been reported through marine aggregate dredging within the southern North Sea, and the associated reporting requirements (Bicket and Tizzard, 2015).

4.1.27 The onshore archaeological record of Upper Palaeolithic activity is relatively sparse, and offshore locations may provide unique and important context for coastal and lowland human activity during this period (Wessex Archaeology 2013). For example, a Maglemosian harpoon artefact from trawled peat in the early 20th century was subsequently radiocarbon dated to around 12,000 years ago (Housely 1991), and archaeological and palaeoenvironmental material has been reported from North Sea contexts for over a century (Reid, 1913; Godwin and Godwin, 1933).

4.1.28 The Mesolithic period began in the early Holocene. Around 10,000 BP, sea levels were still more than 60 m below current levels, and during this period, an extremely large area of the southern North Sea and English Channel was dry land, suitable for human occupation. In the UK, evidence of this environment has been identified from the foreshore at Jaywick, Essex, where layers of peat dating from the Early Holocene are present along with a preserved land surface from which Mesolithic artefacts have been recovered (Wilkinson and Murphy, 1995).

4.1.29 Considerable attention has been paid to Mesolithic Doggerland in the last decade (Gaffney *et al*. 2007; Tappin *et al*., 2011) and the geoarchaeology (Boomer *et al*. 2007), submerged forests (Hazell 2008), and palaeo-river systems around the current North Sea coast of the UK (Wessex Archaeology 2013; Limpenny *et a*l. 2011; EMU 2009). Increasingly, a maritime perspective has developed for understanding the early prehistoric archaeological record, where coasts, estuaries and wetlands are key landscape elements (Ransley *et al*. 2013).

4.1.30 It is clear from numerous research and development-led investigations that postglacial marine transgression has not destroyed Pleistocene and Holocene palaeogeography by default (Wessex Archaeology, 2013). Areas of preserved palaeogeographic features do remain, and detailed reconstructions of palaeoenvironments and palaeogeography can be achieved for large parts of the North Sea basin (Tappin *et al*., 2011; Limpenny 2011; Dix and Sturt 2011). By the early Holocene, Mesolithic hunter-fisher-gatherers in Doggerland were active in a familiar ecosystem of mixed deciduous woodland with oak, elm, alder and lime populated by deer and a wide variety of other mammals (Tappin *et al*., 2011).

4.1.31 Since the last ice age, the sedimentation rates along the southern North Sea coast have been enormous (Karle and Goldhammer 2017). Before the Middle Ages large parts of the western and northern Netherlands were covered with an extensive peat bed that, in many places has been drowned or almost completely disappeared. Although Intertidal flat environments would have been unfit for habitation due to tides, dwelling mounds on highly silted-up salt marshes would have made certain areas of these marsh lands a desirable place to live due to the high biological productivity of the area. Geoarchaeological evidence suggests that salt marshes were inhabited only if the cover of salt-marsh clay had reached a minimum thickness of about 80 cm (Vos & Knol, 2015).

4.1.32 The presence of fluvial features and peat deposits may indicate a former terrestrial landscape and, as such, the sediments associated with these features are deemed to be of high archaeological potential as they could contain both *in situ* or derived anthropogenic artefacts and preserved palaeoenvironmental material.

4.1.33 Adjacent to the Flevoland area of the Netherlands, palaeogeographic modelling of in-filled channels has aided in the interpretation of the Mesolithic-Neolithic landscape. Evidence from the back-barrier, intertidal and coastal peats show how archaeological material can survive beneath land that is now covered by subsequent deposits, and in some cases, by the sea. One such submerged example was found at the mouth of an estuary, which lead to the discovery of the Yangzte Harbour Mesolithic site in Rotterdam Harbour. (Momber & Peeters, 2017).

4.1.34 Available sea level curves indicate that the Pleistocene landscape drowned between 8000 and 7000 BC (Periplus Archaeomare, 2018). Much of the land was inundated by eustatically driven sea level change (Bicket and Tizzard 2015), and by 6,000 BP sea level was only approximately 7 m below the present level (Cameron *et a*l. 1992). Settlements at the time were often transitory and seasonal, and therefore leave little trace in the archaeological record, however, new types of stone tools were introduced during this period. It is possible that the now submerged environment of which the Study Area was was occupied up until the final marine transgression.

4.1.35 It should be noted that a number of Neolithic finds have been found offshore in the Netherlands within the Brown bank area, including several Neolithic axe blades. During this period, sea level is thought to have been at roughly its present level and, as such, the topographic highs of the Dogger Bank and the Brown Bank are thought to have been fully submerged, although the highest parts of the Brown Bank may have been exposed as shallow islands or banks at low tide. It is therefore possible that the Neolithic finds represent a ritual deposition or lost cargo (Peeters and Amkreutz 2020).

4.1.36 Post the Holocene marine transgression, the archaeological potential of the southern North Sea, including the Study Area, shifts to the maritime history, which is presented in **Appendix 4** and summarised in **Section 4.2**.

4.2 Geophysical and geotechnical palaeogeographic assessment

4.2.1 A number of palaeogeographic features of archaeological potential have been identified within the Study Area. These features are discussed below, individually described in gazetteer format in **Appendix 3**, and their distribution is illustrated in **Figures 3a-h** with examples shown in **Figures 4** and **5**.

4.2.2 The identified geology within the Study Area has been divided into 8 Units, as described below (**Table 9**):

Table 9 Shallow stratigraphy of the Study Area

Unit	Unit Name	Geophysical Characteristics (1)	Sediment Type (2)	Archaeological Potential
8	Holocene Seabed Sediments (post-transgression) (Marine Isotope Stage (MIS) 1)	Generally observed as a veneer in the east, thickening towards the west. Boundary between surficial sediments and underlying units not always discernible.	Gravelly sand with shell fragments, sand waves and ripples indicate sediment is mobile.	Considered of low potential in itself, but possibly contains re-worked artefacts and can cover wreck sites and other cultural heritage.
7	Holocene Sediments (Pre-transgression) (MIS 2 to 1)	Small shallow infilled channels with either seismically transparent fill, or fill characterised by sub-parallel internal reflectors. Also comprises a basal high amplitude reflector peat layer.	Fluvial, estuarine and terrestrial (including peat) deposits	Potential to contain *in situ* and derived archaeological material, and palaeoenvironmental material.
6	Boxtel Formation (Upper Weichselian) (MIS 3 to 2)	Complex units which can comprise acoustically unstructured units, occasional possible cross bedding, high amplitude reflectors and some possible channelling of infilled depressions at its base.	Fluvioglacial or aeolian periglacial sand, fluvio-periglacial, floodbasin and bog deposits.	Potential to contain *in situ* and derived archaeological and palaeoenvironmental material, and to protect underlying surfaces.
5	Brown Bank Formation (Late Eemian to Lower Weichselian) (MIS 5d to 3)	Observed as a blanket deposit across much of the area, either acoustically transparent or characterised by sub-horizontal layered reflectors.	Clayey silty sand infilling channels or hollows and deposited in an intertidal / lagoon environment.	*In situ* Palaeolithic artefacts may be protected, particularly where protected by overlying peat. Middle Palaeolithic *in situ* and derived artefacts may be associated particularly with channel edges dependent on the age of the fill. Palaeoenvironmental information. Basal contact may cover old land surfaces.

Unit	Unit Name	Geophysical Characteristics (1)	Sediment Type (2)	Archaeological Potential
4	Lower Brown Bank / Eem Formation (Eemian or Lower Weichselian) (MIS 5e to 5d)	Broad, blanket deposit. Generally characterised by low relief basal and either an acoustically transparent or well-layered fill.	Silty sand and sandy silt, possible intertidal or shallow marine deposits.	*In situ* Lower Palaeolithic artefacts may be protected. Middle Palaeolithic *in situ* and derived artefacts may be associated particularly with channel edges dependent on the age of the fill. Palaeoenvironmental information. Basal contact may cover old land surfaces.
3	Cleaver Bank/ Drente Formation (Saalian 6-10 MS)	Not definitively identified within the geophysical data however may be characterised by thick unit either seismically unstructured or containing numerous areas of channel complexes characterised by layered sub-parallel internal reflectors. Top of unit generally a well-defined regional erosion surface.	Proglacial and Glacimarine Silty clays with silt and sand lamiae	Low likelihood of *In situ* artefacts however the basal contact may cover old land surfaces of archaeological and palaeoenvironmental interest.
2	Peelo Formation (Elsterian) (MIS 12)	Not definitively identified within the geophysical data	Sub-glacial channel fill, comprising a basal reworked till with upper glaciolacustrine / glaciomarine sediment.	Unlikely to contain archaeological material.
1	Yarmouth Roads Formation (Lower to Middle Pleistocene) (MIS 62 to 13)	Not definitively identified within the geophysical data however may be characterised by thick unit either seismically unstructured or containing numerous areas of channel complexes characterised by layered sub-parallel internal reflectors. Top of unit generally a well-defined regional erosion surface.	Silty sand with occasional shell fragments with occasional layers of clay. Generally becoming silty with depth. Sediments deposited as part of delta complex.	Possibility of *in situ* finds in later part of formation if not eroded. Contemporaneous with terrestrial Cromer Forest Bed Formation (Pakefield and Happisburgh). Has been found to contain plant debris, wood and peat in some areas of possible palaeoenvironmental importance. Potential greatest where associated with river valleys.

Unit	Unit Name	Geophysical Characteristics (1)	Sediment Type (2)	Archaeological Potential
(1) Based on geophysical data (2) Based on borehole data and Cameron *et al.,* (1992), Perplus Archeomare (2018) and Vibrocore logs (MMT 2019b)				

4.2.3 Throughout the majority of the Study Area, a broad, blanket deposit of a relatively acoustically unstructured unit, with very few internal reflectors, has been identified. Locally, some large, slightly complex channelling observed, characterised by faint, sub-parallel internal reflectors. The geological formation of this unit is uncertain; based on its seismic similarities in relation to other sites in the southern North Sea, it is possible that this unit represents the Yarmouth Roads formation (Unit 1). The Yarmouth Roads formation is thought to be an extensive delta top deposit covering a large section of the southern North Sea, deposited during the Cromerian prior to the Elsterian Glaciation (Cameron *et al.* 1992). The upper layers of the Yarmouth Roads formation are interpreted as being contemporaneous with the Cromer Forest Bed Formation of East Anglia, within which the Lower Palaeolithic sites at Happisburgh and Pakefield have been discovered (Parfitt et al., 2010; Parfitt *et al.*, 2005). As such, there is the potential for both *in situ* and reworked archaeological and palaeoenvironmental material to be present within Unit 2.

4.2.4 However, it is also possible that this unit represents Unit 3, which is interpreted as a partly marine, proglacial diamicton of eastern provenance (Cameron *et al*. 1992). Sediments are expected to comprise of stratified laminae of clay, silt and fine sand, with the laminated sequence marking the evolution from shallow freshwater lakes into brackish lagoons into an open marine environment (Periplus Archaeomare, 2018). Based on its depositional environment, it is considered of low archaeological potential.

4.2.5 Unit 2 is reported as filling tunnel valleys up to 400 m deep, which were incised by melt water transport underneath the ice sheets during the Elsterian, and has not been definitively identified within the study area. It is possibly present directly below Unit 4, infilling channel features **79138**, **79139** and **79183**. However, these channel features are identified cutting into the top of broad blanket deposit interpreted as either Unit 1 or Unit 3. If these features are cutting into Unit 3, then stratigraphically it would not be possible for their fill to comprise Unit 2.

4.2.6 In the SBP data, these channel features appear to be relatively small in relation to Unit 2 channels identified in other sites in the southern North Sea, and therefore they cannot be definitively correlated to Unit 2. It is possible that channels **79138**, **79139** and **79183** may instead represent internal channelling within Unit 1, or possible pre-Eemian fluvial channelling. Due to the uncertainty in the age of these features, they have been mapped and retained as of potential interest, but discriminated as P2 features of lower potential.

4.2.7 Unit 4 and Unit 5 are thought to represent different members of the same formation, with Unit 4 representing the Eem or Lower Brown Bank formation, which is described as a shallow marine / intertidal deposit of shelly and muddy sands (Cameron *et al.* 1992), and Unit 5 which is the Brown Bank formation which is thought to be a lagoon deposit of Lower Weichselian Age (Cameron *et al.,* 1992). Although, evidence from other sites within the UK have suggested that Unit 5 may have a much more complex history, including changes of sediment input and potential periods of drying out/exposure (Wessex Archaeology, 2018a; 2018b).

4.2.8 The archaeological potential of these features depends on their age. As a marine deposit, the archaeological potential of Unit 4 is considered relatively low, with the exception of areas where overlying peat are present, (Periplus Archaeomare, 2018). It is also possible that the unit may cover and protect earlier land surfaces. The potential of Unit 5 is interpreted to be higher, with the possibility of derived artefacts and intact organic material of palaeoenvironmental interest. In areas where peat is seen to be overlying Unit 5, there is the possibility of finding Palaeolithic or possibly later Mesolithic artefacts where deposited on the surface (Periplus Archaeomare, 2018).

4.2.9 Unit 4 is expected throughout the Study Area, whereas Unit 5 is only expected to the south-west, and possibly in sporadic areas throughout the rest of the Study Area. Above Unit 4 and Unit 5, a significant number of high-amplitude reflectors have been identified which are interpreted as being peat deposits (**Appendix 3**, **Figures 3a-h, 4** and **5**). Towards the south-west of the Study Area, these are generally seen below a relatively thick overlying unit of marine sands (Unit 8), and were therefore below the sample depth of the vibrocores. However, moving towards the east where the overlying Unit 8 thins, it was possible for a number of these features to be sampled and confirmed to correlate with peat in the vibrocore logs, for example high amplitude reflectors **79072** and **79089.** It is possible that this peat represents the Woudenberg formation (Periplus Archaeomare, 2018), although further analysis would be needed to confirm this.

4.2.10 These high amplitude reflectors are seen intermittently throughout the Study Area and may suggest preservation of an extensive terrestrial landscape. The age of these peat deposits is uncertain. It is possible that the peat indicates periods of drying of the Brown Bank lagoon, which lasted long enough for land surfaces to form making them late Eemian or early Weichselian in age; however, they may be late Pleistocene peats of the Woudenberg formation (Periplus Archaeomare, 2018), or possibly pre-transgression deposits (Unit 7). Further analysis and dating of the sediments would be needed in order to confirm the age of these features. However, as these features could contain in situ archaeological artefacts and preserved organic material, they are considered of high archaeological and palaeoenvironmental potential.

4.2.11 Throughout the Study Area, some slightly higher amplitude reflectors can be seen. These are less distinct and appear lower amplitude in comparison to the high amplitude reflectors mentioned above, but are still relatively defined and otherwise similar in form. Based on their similarities with the high-amplitude reflectors, it is possible that they represent the same former terrestrial landscape but with a lower peat content; however, this is not certain. Where the features appear less distinct in the SBP data or have been found by vibrocores to not contain peat, they have been retained as a precaution but discriminated as P2 based on the uncertainty around their formation (Appendix 3). Distinct, high amplitude reflectors were also identified at the base of the interpreted Unit 4 (**79063-4, 79071, 79080, 79084, 79140, 79150-1, 79162** and **79190**). These were often seen to be irregular and undulating, occasionally over extensive areas. It is noted by the Geological Survey of the Netherlands on their website providing data and information on the Dutch Subsurface (DINOloket) that the lower boundary of the Eem formation has localised areas of *Gyttja* at its base. It is therefore possible that these high amplitude reflectors represent that although, as the Eem formation was deposited in a maritime setting, the sediments associated with it are unlikely to be of archaeological interest. As this cannot be confirmed without further investigation, they have been retained as a precaution and discriminated as P2 features.

4.2.12 A number of channel features were identified cutting into the surface of Units 4 and 5 (**79006, 79014, 79028, 79048, 79049, 79056, 79082, 79104-5, 79109, 79111, 79113-4**). These were generally seen to have distinct basal reflectors and fill characterised by

numerous sub-horizontal reflectors. A number of these features were sampled by vibrocores (**79006, 79104-5, 79113, 79124**) and were generally found to comprise low-strength clay, often with laminations of silt or sand. A number of these channel features were also found to contain peat. The exact age of these features is uncertain. It may be that they represent Weichselian channels (Unit 5 or 6) or Holocene pre-transgression channelling (Unit 7).

4.2.13 These features represent former terrestrial landscapes and, as such, the sediments associated with these features are deemed to be of high archaeological potential. This is due to the fact they could contain *in situ* or derived anthropogenic artefacts and preserved palaeoenvironmental material.

4.2.14 Unit 6 is identified in large areas from the centre to the east of the Study Area. Unit 6 is thought to comprise several different members including the Weirden member (aeolian sands) and the Singraven Member (fluvioperiglacial sand and loam with subordinate peat and gyettja) (Periplus Archaeomare, 2018; DINOloket), related to their different depositional environments. This is reflected in the SBP data, with the acoustic characteristics of the unit ranging from acoustically quiet to acoustically chaotic, with some areas displaying distinct, horizontal reflectors and possible well-layered sediments and channelling.

4.2.15 Unit 6 is considered of high archaeological potential, particularly in areas where the unit has been overlain by pre-transgression Holocene peat deposits (Unit 7), which is likely to have protected the surface from erosion (Periplus Archaeomare, 2018). However, even in areas where the unit is not overlain by peat, there is still the potential for *in situ* archaeological remains to be present. Evidence from the UK and continental Europe suggest that within low-lying, predominantly wetland, areas, topographic highs, such as ridges formed by the aeolian sands, can provide an area of high ground which would be favourable for habitation. Sites such as Peacock's Farm in Cambridgeshire and the Great Coversand Ridge in northern Belgium show that prehistoric communities were using such features (Crombé *et al.,* 2012).

4.2.16 A number of high amplitude reflectors were identified both within and at the top of Unit 6 (**Appendix 3**, **Figures 3a-h, 4** and **5**). A number of these were sampled by vibrocores and found to comprise peat. It is possible these peat horizons and other high-amplitude reflectors represent Weichselian peats related to the Boxtel formation (Unit 6) or overlying pre-transgression Holocene peats associated with Unit 7. As with the peat deposits identified overlying Units 4 and 5, geoarchaeological dating would be necessary to undertake further geoarchaeological analysis to accurately date these features.

4.2.17 A number of interpreted channel features were identified in areas where the Boxtel formation were interpreted as being present (**79122, 79124, 79148, 79132, 79135, 79141, 79145, 79161, 79165, 79171, 79178, 79185-6**). These are seen to either be cutting into the interpreted Boxtel formation or at the base. A number of these were found by vibrocores to contain peat (**79124, 79128, 79145, 79171, 79185**). Based on their association with the Boxtel, these features are likely to be Weichselian (Unit 6) or Holocene pre-transgression features (Unit 7). As with the other channel features, these are considered of high archaeological potential.

4.2.18 Several possible coarse-grained deposits were interpreted throughout the Study Area (**79026**, **79027**, **79142**, **79147**, **79149**, **79152** and **79156**). These were generally seen to be acoustically chaotic, or unstructured sediments, with no clearly defined basal reflector. It is possible that these represent areas of re-worked sediments or may be poorly defined cut and fill features. Three of these were sampled by vibrocores (**79142**, **79149** and **79152**) and

were found to comprise gravely sand, with **79149** and **79152** having occasional laminae of clay or organic matter.

4.2.19 A number of cut and fills were identified throughout the area and are thought to likely be either Weichselian or Holocene in age (Appendix 3). However, as they could not be traced any distance as coherent palaeochannels, they are interpreted as cut and fill features. It is possible that they are the remnants of eroded palaeochannel systems but, as their nature is less certain, they are considered of lower archaeological potential, with the exception of (**79090**, **79129**, **79133**, **79137**) which have been discriminated as P1 based on the fact they were sampled by vibrocores and found to contain peat.

4.2.20 Unit 8 is a modern marine sediment deposited since the Holocene marine transgression. The unit is likely present as a thin veneer across much of the site, deepening to a thicker unit towards the west of the Study Area. Due to its age and depositional environment, Unit 8 is not considered of archaeological potential in itself. However, it has the potential to contain re-worked sediments or to periodically bury seabed archaeological sites such as shipwrecks and associated debris where the sediments are more mobile.

5 MARINE ARCHAEOLOGICAL ASSESSMENT: MARITIME AND AVIATION SITES

5.1 Introduction

5.1.1 The geophysical data were assessed to identify features of archaeological potential relating to maritime and aviation activity.

5.1.2 Where features were identified during the previous geophysical assessment of target areas within the Study Area (Wessex Archaeology 2019), their original interpretation and anomaly numbers have been retained, unless it has been deemed necessary to update based on new information (e.g. from the UKHO record) or based on the wider context of the geophysical data.

5.1.3 Any sites located outside of the defined Study Area (the 500 m corridor centred on the originally proposed cable route), either previously recorded in known databases (e.g. UKHO) or identified during this or previous geophysical assessments, are deemed beyond the scope of the current project and are subsequently not included as part of the assessment.

5.2 Geophysical seabed features assessment

5.2.1 The results of this assessment are collated in gazetteer format detailed in **Appendix 4** and illustrated in **Figures 6a-e** and **7**.

5.2.2 A total of 120 features have been identified as being of possible archaeological potential within the Study Area and are discriminated as shown in **Table 10**.

Table 10 Anomalies of archaeological potential within the Study Area

Archaeological discrimination	Quantity	Interpretation
A1	3	Anthropogenic origin of archaeological interest
A2	109	Uncertain origin of possible archaeological interest
A3	8	Historic record of possible archaeological interest with no corresponding geophysical anomaly
Total	**120**	

5.2.3 Furthermore, these anomalies can be classified by probable type, which can further aid in assigning archaeological potential and importance (**Table 11**).

Table 11 Types of anomaly identified

Anomaly classification	Definition	Number of anomalies
Wreck	Areas of coherent structure including wrecks of ships, submarines and some aircraft (where coherent structure survives)	1
Debris field	A discrete area containing numerous individual debris items that are potentially anthropogenic, and can include dispersed wreck sites for which no coherent structure remains	1
Debris	Distinct objects on the seabed, generally exhibiting height or with evidence of structure, that are potentially anthropogenic in origin	10
Seabed disturbance	An area of disturbance without individual, distinct objects. Potentially indicates wreck debris or other anthropogenic features buried just below the seabed.	4
Bright reflector	Individual objects or areas of low reflectivity, characteristic of materials that absorb acoustic energy, such as waterlogged wood or synthetic materials. Precise nature is uncertain	2
Dark reflector	Individual objects or areas of high reflectivity, displaying some anthropogenic characteristics. Precise nature is uncertain	39
Mound	A mounded feature with height not considered to be natural. Mounds may form over wreck sites or other debris.	5
Buried object	A possible buried object identified in the SBP data as a parabola or other disturbance, thought to be caused by a buried anthropogenic feature.	1
Magnetic	No associated seabed surface expression, and have the potential to represent possible buried ferrous debris or buried wreck sites	49
Recorded Wreck	Position of a recorded wreck at which previous surveys have identified definite seabed anomalies, but for which no associated feature has been identified within the current geophysical data sets.	8
Total		**120**

5.2.4 Full details of these anomalies are available in **Appendix 4**.

5.2.5 It should be noted that the features identified here include only the features identified in the geophysical data within the 500 m Study Area which are considered to be of archaeological potential. Any features deemed to be natural, such as boulders, or modern anthropogenic, such as cables and pipelines (see **section 5.2.20**) have not been reported on here.

Archaeological Discrimination: A1

5.2.6 One wreck, **7477**, has been identified in the geophysical data within the study area (**Wreck Sheet 1; Figure 6b**). This corresponds with the UKHO record 28296 and *Nationaal Contactnummer Nederland* (NCN) record 2238 and was identified in the previous assessment of priority areas (Wessex Archaeology 2019). In the SSS data this is visible as a large wreck that appears to be relatively intact and possibly lying upright on the seabed, with dimensions of 37.0 x 9.9 x 0.9 m. One edge of the hull appears to be partially degraded or buried by sediment. There are some slightly slatted features visible within the vessel which could represent internal structure. The wreck is situated on a sandy and featureless area of the seabed, within a depression, with possible associated debris in the vicinity. In the MBES data this is visible as a distinct mound, measuring 1.7 m high, orientated on an approximate north-west to south-east alignment. Scour up to -0.5 m deep is visible around

the wreck and extending approximately 22 m to the north-east. In the MBES data, the wreck is seen orientated north-west to south-east on the seabed, in three main segments which may suggest there is some deterioration in its centre. There is a small magnetic anomaly associated with this feature indicating the presence of some ferrous material; however, as the nearest magnetometer line is situated 50 m from the wreck, it is likely that the true amplitude would be larger if the wreck were directly covered by the magnetometer data. This is recorded in the UKHO database as the wreck of a fishing vessel.

5.2.7 Two likely associated items of debris (**7475** and **7476**) are identified in the vicinity of wreck **7477** and have been assigned an A1 archaeological potential rating. Anomaly **7476** is a small dark reflector which does not cast a shadow. This is located 2m from the bow or stern of the wreck and is possibly an associated item of wreck debris. Debris item **7475** is a curved dark reflector, again which does not cast a shadow. This is located 12m from the wreck and is possibly an associated item of debris. Both were reported on in the previous assessment of priority areas (Wessex Archaeology 2019).

Archaeological Discrimination: A2

5.2.8 There are 109 anomalies ascribed an archaeological potential rating of A2. For a full list of anomalies, please refer to **Appendix 4**.

5.2.9 Of these, one feature has been classified as a debris field (**7482**). It is visible in the SSS data as a curved dark reflector, measuring 4.2 x 2.3 x 1.1 m, identified within a slight depression, directly next to a very small and rounded dark reflector measuring 1.3 x 1.3 x 0.6 m. Some very slight dark reflectors were seen surrounding the main objects, however it is not possible to discern whether these are associated debris items or natural features. In total, the debris field measures 10.0 x 10.0 x 1.1 m. The feature corresponds with a large magnetic anomaly of 237 nT, indicating ferrous material is present.

5.2.10 A total of eight A2 anomalies have been classified as items of debris. These are generally identified in the SSS data as dark reflectors with shadows, ranging in size from 3.6 x 1.0 x 0.2 m (**7545**) to 8.5 x 3.9 x 0.2 m (**7484**). None of the possible items of debris have associated magnetic anomalies; however, it should be noted that due to the magnetometer line spacing, this may be reflective of their distance from the closest line of magnetometer data rather than their ferrous content. Of these possible debris items, two have been reported on in the previous assessment on priority areas (**7472** and **7484**) (Wessex Archaeology 2019).

5.2.11 A total of four seabed disturbances are noted in the Study Area, all newly identified during the latest phase of assessment. These are generally irregular in plan and somewhat indistinct, although they may contain more distinct dark reflectors. These range in size from 7.8 x 3.2 m (**7606**) to 24.5 x 18.9 m (**7515**). No associated magnetic anomalies are present, indicating feature comprise non-ferrous material. These may represent collections of partially buried, non-ferrous debris; however they may also be natural in origin.

5.2.12 In total two anomalies have been classified as bright reflectors, both were newly identified in this assessment. Anomaly **7523** measures 5.7 x 4.9 m and is a slightly elongate ‘L’ shape in plan. Anomaly **7576** measures 4.9 x 1.7 m and is distinct, curved and elongate in plan. These anomalies potentially represent pieces of debris that absorb rather than reflect acoustic waves, such as waterlogged wood or synthetic material, or seabed scars.

5.2.13 A total of 39 dark reflectors were identified in the Study Area. The anomalies range in size from 1.1 x 0.3 x 0.1 m (**7601**) to 27.9 x 0.9 m (**7481**). None of the dark reflectors were associated with magnetic anomalies and are therefore likely to be non-ferrous; although

some features were present in the areas between magnetometer survey lines and therefore the possibility of some ferrous material being present remains. Dark reflectors could either be individual pieces of debris or natural features; ground truthing would be needed to further determine their archaeological potential.

5.2.14 A number of dark reflectors identified in the SSS data correspond with an area of natural seabed undulations identified in the MBES data (**7571-4** and **7577-83**). It is possible that these dark reflectors are therefore related to these natural formations. However, as they appeared anomalous in the SSS data, and covered a smaller area than that seen in the MBES data, they have been retained as a precaution.

5.2.15 In total five anomalies have been classified as mounds, all are newly identified and were seen in the MBES data only. These are mostly angular and range in size between 5.0 x 4.0 x 0.2 m (**7543**) to 19.0 x 5.1 x 0.1 m (**7603**). All five mounds are of uncertain origin, and could represent debris partially covered by seabed sediment or be natural features.

5.2.16 A total of 49 magnetic anomalies have been noted in the study area, all of which are newly identified and without associated SSS or MBES anomalies. These range from 5 nT (**7514** and **7556**) to 182 nT (**7532**) in amplitude. These indicate potential ferrous debris that is either buried or without surface expression.

5.2.17 A number of magnetic anomalies were seen to be in a roughly linear orientation (**7528-30**, **7547** and **7548-50**); although were not seen on all the lines. Given the length of the features, it is unlikely that these are of archaeological potential. However, none of these features were charted on the relevant admiralty chart or in the client supplied pipeline and cable shapefiles, and therefore their exact origin is not certain. It is likely that they may represent modern, uncharted lengths of cable; however, as there is the potential for them to represent lengths of chain, or to be individual features in a linear orientation such as wartime mine fields, they have been retained as a precaution.

5.2.18 It should be noted that the magnetic anomalies reported on here are only the features deemed to be of archaeological potential, and does not include known modern anthropogenic features such as pipelines and cables. As discussed in **section 3.3**, the line spacing of the magnetometer data is such that objects with a smaller ferrous content, or ferrous objects positioned between lines, may not have been identified in the geophysical data.

Archaeological Discrimination: A3

5.2.19 The remaining eight anomalies have all been ascribed an archaeological potential rating of A3. These are recorded wreck locations for which no remains were visible in any of the geophysical data sets. Of these, four were covered by the geophysical data but not identified in any of the geophysical data sets (**7474**, **7487**, **7489**, **7591**). The remaining four recorded wreck locations (**7486**, **7488, 7607** and **7492**) were outside of the geophysical data coverage and therefore no comment can be made on whether the wrecks, or wreck material, are present on the seabed. However, they have been included here due to their proximity (within 100 m) of the Study Area. For a description of these receptors, please refer to **Appendix 4**.

Pipeline and Cable crossings in the Geophysical data

5.2.20 A number of cables and pipelines are charted as crossing the Study Area (**see Section 1.3**). Although not considered of archaeological potential in themselves, the installation of these pipelines and cables are may have impacted any features of archaeological potential which were present on the seabed prior to their installation. As such, any features identified

within the immediate vicinity of the pipelines or cables are likely to be either modern features or out of their original context.

5.2.21 The client-supplied shapefiles of all cable crossings, which includes the RWS database and the MMT background database, were compared against the marine magnetometer data to confirm whether they were identified. The results are listed in **Table 12**.

Table 12 Pipelines and cables identified in the geophysical data

NC_ID	Name	Owner	Status	Type	Observed in geophysical data
035	Zeepipe 1	GASCO	Active	Pipeline	Yes
036	Franpipe	GASCO	Active	Pipeline	Yes
037	SEA-ME-WE3 seg 10.4	Deutsche Telekom/BT	Inactive	Cable	Yes
038	BT North Sea	BT	Planned	Cable	Information from Primo Marine is that this has not yet been built. The latest information is that this will be built in the UK sector.
039	BBL Balgzand-Bacton	BBL	Active	Pipeline	Yes
040	UK-Germany 3	BT/German	Inactive	Cable	Not definitively identified; however, it should be noted that magnetic anomalies **7505** – **7507** are approximately 150 m north and therefore it is possible they may represent this cable crossing
041	K13AP-Callantsoog	Wintershall	Active	Pipeline	Yes
042	UK-Germany 2	BT/German	Inactive	Cable	Not definitively identified; however, a linear magnetic trend is identified approximately 1.7 km south of the RWS charted position. See paragraph 5.2.22.
043	UK-Denmark 3	BT/Danish	Inactive	Cable	A linear magnetic trend is identified approximately 85 m north-west of RWS charted position
044	Bacton-Borkum No 1	BT/German	Inactive	Cable	A linear magnetic trend is identified approximately 370 m north of MMT supplied background charts
045	Bacton-Borkum No 2	BT/German	Inactive	Cable	Not identified in any of the geophysical data sets
046	PL007 – K8-FA-1 to K14-FA-1P	NAM	Active	Pipeline	Yes
047	PL142 -D15-FA-1 to L 10-AC	Noordgastranspoort BV	Active	Pipeline	Yes
048	Fano-Oye No 1	Great Northern Tel co.	Inactive	Cable	Not identified in any of the geophysical datasets
049	PL064 – K9c-A to L10-AR	Gaz de France(engie)	Active	Pipeline	Yes
050	PL047 – L4-B to L7-A	Total Fina Elf Netherland BV	Abandoned	Pipeline	Yes

NC_ID	Name	Owner	Status	Type	Observed in geophysical data
051	PL048	Total Fina Elf Netherland BV	Abandoned	Pipeline	Yes
052	UK-Denmark 3	BT/Danish	Inactive	Cable	Not identified in any of the geophysical datasets
053	PL022 -L4A to L7-P	Total Fina Elf Netherland BV	Abandoned	Pipeline	Yes, although proximity to PL021 -L4A to L7-P makes it hard to definitively differentiate between the two pipelines.
054	PL021 – L4A to L7-P	Total Fina Elf Netherland BV	Abandoned	Pipeline	Yes, although proximity to PL022 -L4A to L7-P makes it hard to definitively differentiate between the two pipelines.
055	Bacton-Borkkum No 2	BT/German	Inactive	Cable	Not identified in any of the geophysical datasets
056	UK-Germany 2	BT/German	Inactive	Cable	Linear magnetic trend observed approximately 300 m south-east
058	PL091 – L2-FA-1 to Callantsoog	Noordgastranspoort BV	Active	Pipeline	Yes
059	Fano-Oye No 2	Great Northern Tel Co	Inactive	Cable	Not identified in any of the geophysical datasets
060	Uk-Germany 2 Winterton-Borkum 1	-	Inactive	Cable	Yes
061	SEA-ME-WE3	Deutsche Telekom/BT	Inactive	Cable	Yes
062	UK-Germany 5	BT/German	Inactive	Cable	Weak linear magnetic trend identified approximately 30 m north of RWS charted position
063	PL154 – G17d-A to NGT-Leiding	Noordgastranspoort BV	Active	Pipeline	Yes
064	Bacton-Norkum No 3	BT/German	Inactive	Cable	Not identified in any of the geophysical datasets
065	Mundesley-Norderney	BT/German	Inactive	Cable	Not identified in any of the geophysical datasets
066	Tata (VSNL) North Europe	Zayo	Active	Cable	Yes
067	ODIN 1 seg 1	TDC	Inactive	Cable	Yes
068	Atlantic Crossing 1 seg B2	Century Link	Active	Cable	Yes
069	Fano-West Terschelling	Dutch	Inactive	Cable	Not identified in any of the geophysical datasets

5.2.22 A linear magnetic feature has been identified within the magnetic data, orientated north-east to south west across the Study Area (centred on 523438 mE, 5903796 mN. This does not appear to correspond with any charted pipeline or cable routes; however, MMT have noted it as being the UK - Germany 2 cable route which is located approximately 1.7 km to the north. Based on its form in the data, it is interpreted as being likely modern infrastructure and not of archaeological interest. Its presence within the Study Area should be noted; however, as it is not considered of archaeological potential, it will not be discussed further in this report.

5.2.23 For more detail on cable crossings within the area, please refer to MMT 2019a.

5.3 Maritime archaeological potential

5.3.1 The assessment of potential for the discovery of shipwreck and shipwreck-derived material within the Study Area draws on the results of the geophysical survey and desk-based research combined with further research of the wider area. A list of receptors found within the wider search area, out-with the Study Area are presented in **Appendix 5**.

Recorded Losses

5.3.2 Recorded Losses can be considered as an indication of the potential for archaeological maritime remains to exist within the Study Area and the type and number of wrecks that could be present. These records relate to vessels reportedly lost or for which no physical wreck remains have ever been identified.

5.3.3 Eight recorded wrecks, which will impact the Study Area, have been identified for which no remains were visible in the geophysical data (**7474**, **7486**, **7487**, **7488**, **7489**, **7591, 7492** and **7607**). Details regarding these losses are presented in **Appendix 4**.

5.3.4 The Netherlands has been a seafaring nation for over five centuries and has developed a close commercial connection to its rivers and seas. As a major naval power during the 17th century a majority of the trade was undertaken by the Dutch merchant fleet (United East India Company) with the Dutch navy protecting shipping lanes all over the world. Although their naval power declined during the second half of the 18th century their presence within East Asia was still very much at large. During the First World War the Royal Netherlands Navy saw the introduction of submarines, light cruisers and destroyers, whilst during the Second World War, the Dutch navy was based in Allied countries, with submarines based in the Dutch East Indies. Although during both wars the Netherlands declared neutrality, a number of Dutch ships were lost at sea. After the wars the Dutch fleet expanded. The port of Rotterdam embraced the industrial revolution of the 19th century and developed its port facility, later on becoming one of the largest container-handling ports in Europe. (North Sea 2050 Spatial Agenda).

5.3.5 There is the potential for the presence of archaeological material of maritime nature spanning from the Mesolithic to the present day within the Study Area. The key areas of potential are summarised in **Table 2**.

5.4 Aviation archaeological baseline and potential

5.4.1 The assessment of potential for the discovery of aircraft crash sites and aircraft derived material within the Study Area draws on the results of the geophysical survey and desk-based research combined with further research of the wider area.

5.4.2 There are no known aircraft crash sites or Recorded Losses within the Study Area, nonetheless there is potential for aircraft or aircraft-related debris to exist on the seafloor within the Proposed Development. During the Second World War ('WWII') the Netherlands was to become the main area for the Luftwaffe from which to attack the UK. A number of military air bases were constructed, including Deelen Air Base, north of Arnhem, of which is now a national monument, and the adjacent central air control bunker for Belgium and the Netherlands, Diogenes. The Netherlands later turned into the first line of western air defence for Germany and its industrial heartland of the Ruhrgebiet, complete with extensive flak, sound detection installations and later radar.

5.4.3 Given the identified potential of the area for military aircraft crashes, particularly relating to the Second World War, the likelihood would be for any aircraft crash to be of military origin. This would include both Allied and Axis aircraft and would relate to both complete aircraft wrecks and debris scatters. A summary of key areas of aviation potential is presented in **Table 3**.

6 ENVIRONMENTAL APPRAISAL AND RECOMMENDATIONS

6.1 Potential Impacts

6.1.1 Offshore developments can affect heritage assets in two ways:

- from the direct effect of the physical siting of the project; and
- from indirect changes to the physical marine environment.

Damage to known and unknown assets from direct impacts of construction

6.1.2 All seabed receptors have the potential to be damaged or destroyed if they are directly impacted during seabed preparation or construction activities. Furthermore, all damage to archaeological sites or material is permanent and recovery is limited to stabilisation or re-burial, aimed at preventing further impacts. There is no potential for the recoverability of any seabed receptors if they are affected following a direct physical impact. As such, all wrecks, aircraft, associated material and debris and seabed prehistory should be regarded as having high sensitivity to physical impacts.

6.1.3 Direct physical impacts to marine archaeology are most likely to occur during the construction phase of the Proposed Development upon the archaeological receptors that have been identified above and any potential archaeology within the marine cable corridor. Impacts resulting in negative effects upon archaeological receptors as part of construction works are those involving contact with the seabed and/or the removal of seabed sediments. Marine archaeological receptors with height, such as shipwrecks, may also be impacted by activities that occur within the water column. Construction activities that may lead to direct physical impacts include:

- Route preparation prior to cable laying, including clearance of obstacles and/or seabed features, and construction of crossing structures over in-service cables;
- Pre-sweeping dredging required through areas of sandwaves identified along the Project Route Corridor;
- The use of a pre-lay grapnel run involving towing a heavy grapnel with a series of specially designed hooks (grapnels) along the centre line of the route, to confirm the installation site is clear of obstructions;
- Laying marine cables using the following options dependent on type of seabed – plough, jet trenching, and/or mechanical trenching;
- Backfilling of cable trench and stabilisation of unburied marine cables;
- Placement of non-burial protection on the seabed; and,
- Use of anchors or jack-up legs on vessels associated with the installation, maintenance and decommissioning phases of the project.

6.1.4 Activities considered here refer to direct physical impacts associated with seabed preparation and construction, but some may also occur during operational and decommissioning activities undertaken within the area of the Proposed Development. Direct physical impacts associated with construction works are considered to arise as a result of

seabed preparation, cable installation/ protection and seabed contact by construction vessels through jack-ups or anchors.

Damage to known and unknown assets from indirect impacts of construction

6.1.5 The indirect effects upon the known and potential marine archaeological assets considered here are those which occur as a result of changes to hydrodynamic and sediment transport regimes, where these changes have occurred as a consequence of activities and structures associated with the construction activities. These impacts may occur from the clearance of areas of sandwaves and large ripples during route preparation but may also occur through sediment deposition or the placement of cable protection on the seabed. Construction activities that may create indirect physical impacts include:

- Dredging in areas where sandwaves and ripples are present; and,
- Scour associated with the disturbance from construction activities and structures.

6.1.6 Indirect impacts may affect marine archaeological baseline conditions where they result in the increased exposure of burial of marine archaeological assets. The increased exposure of marine archaeological receptors has the potential to cause erosion and deterioration to the receptors. Conversely, should receptors be subject to increased sedimentation and burial, they may, in turn benefit from conditions which afford higher levels of preservation.

Operation (including maintenance and repairs)

6.1.7 Operational effects will be limited to those arising from repair, maintenance or any monitoring that may be required. Potential effects on marine heritage assets during the operation of the Proposed Development could include direct effects such as re-burial of cables, repair / replacement of cables, placement of additional cable protection, anchors or jack-ups being used for any maintenance activities (although these are likely to be minimal), and indirect effects such as changes in local scouring and sedimentation patterns. The heritage asset receptors most at risk of direct effects are those closest to the final cable route.

Decommissioning

6.1.8 As with construction activities, decommissioning activities have the potential to affect archaeological assets either directly or indirectly. However, what infrastructure will be decommissioned and the methodology for doing so is not currently fully known but will be agreed prior to the commencement of decommissioning works.

6.1.9 If the cables are left buried however, likely significant effects from decommissioning will be avoided. If the cables are to be removed at decommissioning this assessment assumes that impacts from decommissioning activities are of a similar nature to operation activities and would be of a similar or lesser scale.

6.2 Recommendations

Avoidance

6.2.1 The primary mitigation for the protection of known archaeological assets is avoidance. This is achieved through the implementation and monitoring of Archaeological Exclusion Zones (AEZs), which are proposed for identified high value seabed features of anthropogenic origin (i.e. A1 classified geophysical anomalies).

6.2.2 The mitigation strategy will establish 100 m AEZs around receptors which have been considered to be of high archaeological potential, in consultation with the Archaeological

Curator (Directorate-General for Public Works and Water Management (Rijkswaterstaat) and the National Agency for the Protection of Cultural Heritage (Rijksdienst voor het Cultureel Erfgoed).

6.2.3 These areas would be out of bounds to construction activities and to anchoring. Monitoring of any AEZs to ensure there is no disturbance to them will be part of this mitigation.

6.2.4 As features of high archaeological potential, it is recommended that AEZs are implemented around the three A1 anomalies (**7477**, **7475**, **7476**).

6.2.5 For the wreck (**7477**), an AEZ of 100 m around the wreck's extents is recommended. For the two debris items (**7475** and **7476**), a smaller AEZ of 25 m has been recommended. Due to their proximity to wreck **7477** these features will be covered by the recommended 100 m AEZ for wreck **7477** (**Figure 6b**).

6.2.6 For features assigned A2 archaeological discrimination rating, no AEZs are recommended at this time. However, avoidance is recommended with further mitigation to be implemented (e.g. visual inspection (divers or ROV)) if they are proposed to be directly impacted by development.

6.2.7 For the four features assigned an A3 archaeological discrimination that were not fully covered by the geophysical survey data extents (**7486**, **7488, 7492** and **7607**), a precautionary 100 m exclusion zone is recommended (**Figure 6**).

6.2.8 As noted in **section 3.3.10**, after discussions with the Dutch authorities, it was decided that the resolution of the geophysical data are not considered suitable for archaeological assessment. It is therefore recommended that higher resolution geophysical survey data is acquired, and archaeologically assessed, over the Study Area ahead of any construction. This will be undertaken in accordance with the Dutch AMZ cycle (archaeological heritage) to conduct a field investigation (*Inventariserend veldonderzoek opwaterfase*).

Reduction

6.2.9 Reduction of impact can be achieved by means of appropriate mitigation identified through potential opportunities for further investigation of assets (e.g. during UXO survey and clearance works). Further investigations mean that these anomalies can either have their archaeological value removed, if they prove to be of non-anthropogenic nature or modern, or their value as archaeological assets confirmed. If their value is confirmed, mitigation in the form of either avoidance (which may be enacted by the implementation of an AEZ) or through remedying or offsetting measures as identified through an Archaeological Project Design, implemented by a qualified Retained Archaeologist and in consultation with the Archaeological Curators.

Remedying and offsetting

6.2.10 In cases where avoidance is either inappropriate or impossible, the damage to archaeological assets should be offset. In the case of seabed prehistoric features, this can be achieved by undertaking a palaeoenvironmental assessment of deposits with high geoarchaeological potential, principally peat deposits and other sedimentary deposits of palaeoenvironmental potential. Pollen and macrofossil assessment, supported by radiocarbon dating, will provide information on age and vegetation history of the submerged terrestrial environment, providing a landscape context to any prehistoric activity within the area. Recovery of artefacts and/or other archaeological receptors should be a final resort, when all other mitigation has failed. Any recovery should be completed under the supervision of an appropriately qualified and experienced marine archaeologist. Recovery

methods will be identified in the Archaeological Project Design, with specific Method Statements covering those specific activities and agreed in consultation with the Archaeological Curator.

6.2.11 As terrestrial features interpreted as being deposited during periods of likely human occupation, those features given a P1 archaeological rating are considered of high archaeological potential. Those features with a P2 discrimination are considered of medium archaeological potential, partly due to the uncertainty of features formation and fill. Further geoarchaeological work, such as a stage one assessment of all the core logs or sampling and dating work, would aid in refining the interpretation and therefore help determine the archaeological potential of the area.

6.2.12 Should further ground investigation work be undertaken within the Study Area, it is recommended that the archaeological contractor be consulted to advise on potential samples to be acquired for archaeological purposes and other identified units of archaeological interest identified within the data. It is also recommended that any future additional geotechnical logs from within the study area be made available for geoarchaeological assessment.

6.2.13 Furthermore, it is recommended that any samples acquired containing material of archaeological potential, particularly those within the interpreted Pleistocene/early Holocene features, be made available for geoarchaeological assessment.

REFERENCES

Bibliography

ADS 2013 *Caring for Digital Data in Archaeology: a guide to good practice*. Archaeology Data Service & Digital Antiquity Guides to Good Practice

Bates, R., Dix, J. and Pelts, R. 2013 *Marine Geophysics Data Acquisition, Processing and Interpretation, Guidance Notes.* English Heritage.

Bicket, A and Tizzard, L 2015 'A Review of the Submerged Prehistory and Palaeolandscapes of the British Isles' *Proceedings of the Geologist's Association Volume* 126, Issue 6, p.643-663

Boismier, W., Gamble, C., and Coward, F. 2012 *Neanderthals among Mammoths: Excavations at Lynford Quarry, Norfolk, UK*. English Heritage.

Boomer, I., Waddington, C., Stevenson, T., and Hamilton, D. 2007 'Holocene Coastal Change and Geoarchaeology at Howick, Northumberland, UK' *The Holocene* 17(1), 89–104.

Bridgland, D R 1994 The Pleistocene of the Thames. In Bridgeland, D (ed.) *Quaternary of the Thames. London, Geological Conservation Review Series No. 7,* Chapman and Hall

British Geological Survey 1984 Flemish Bight 52°N - 02°E *Quaternary Geology*. 1: 250 000 Series, Crown Copyright

British Geological Survey 1986 Indefatigable 53°N - 02°E *Quaternary Geology*. 1: 250 000 Series, Crown Copyright

Cameron, T. D. J., Crosby, A., Balson, P. S., Jeffery, D. H., Lott, G. K., Bulat, J. and Harrison, D. J. 1992 'The Geology of the Southern North Sea' *British Geological Survey United Kingdom Offshore Regional Report*, London, HMSO

Candy, I, Silva, B and Lee, J. 2011 'Climates of the Early Middle Pleistocene in Britain: Environments of the Earliest Humans in Northern Europe' In Ashton N, Lewis, S G, and Stringer, C (eds.) *The Ancient Human Occupation of Britain.* Vol. 14, 11–22, Amsterdam, Netherlands, Elsevier B.V.

Caspers, S & Houkes, M.C. (eds) 2013 *Herkennen van archaeologische vondsten uit waterbodems en hoe daar mee om te gaan.* Cultural Heritage Agency (RCE), Amersfoort,

Chartered Institute for Archaeologists 2020 *Standards and guidance for historic environment desk-based assessment*. Published December 2014, updated in 2017, updated in 2020. Available at: www.archaeologists.net/sites/default/files/CIfAS%26GDBA_4.pdf viewed 28/01/21

Crombé, P., Van Strydonck, M., Boudin, M., Van den Brande, T., Derese, C., Vandenberghe, D. A. G., Van den Haute, P., Court-Picon, M., Verniers, J., Gelorini, V., Bos, J. A. A., Verbruggen, F., Antrop, M., Bats, M., Bourgeois, J., De Reu, J., De Maeyer, P., De Smedt, P., Finke, P. A., Van Meirvenne, M., and Zwertvaegher, A. 2012 'Absolute Dating (14C and OSL) of the Formation of Coversand Ridges Occupied by Prehistoric Hunter-Gatherers in NW Belgium' *Radiocarbon* 54(3-4), pp. 715-726

Cohen, K M, MacDonald, K, Joordens, J C A, Roebroeks, W and Gibbard, P L. 2012 'The Earliest Occupation of North-West Europe: a Coastal Perspective' *Quaternary International* 271, 70-83.

Cultural Heritage Agency 2015 *Policy Document for the North Sea 2016-2021* net180349.pdf (fao.org) viewed 13/01/21

Dix, J and Sturt, F 2011 *The Relic Palaeo-landscapes of the Thames Estuary*. Southampton, University of Southampton for MALSF

Elhers J., Grube A., Stephas J., Wansa S., 2011 'Pleistocene Glaciations of North Germany- New Results' *Developments in Quaternary Science* 15:149-162, DOI: 10.1016/B978-0-444-53447-7.00013-1.

Emu Ltd. 2009 *Outer Thames Estuary Regional Environmental Characterisation*, ISBN 978-00907545-28-9, published by the MALSF, Crown Copyright 2009.

English Heritage (now Historic England) 1998 *Identifying and Protecting Palaeolithic Remains: Archaeological Guidance for Planning Authorities and Developers.* English Heritage.

English Heritage (now Historic England) 2000 *Managing Lithic Scatters: Archaeological Guidance for Planning Authorities and Developers*. English Heritage.

English Heritage (now Historic England) 2002 *Military Aircraft Cash Sites: Archaeological guidance on their significance and future management*. English Heritage.

English Heritage (now Historic England) 2008 *Conservation principles, policies and guidance for the sustainable management of the historic environment*. London: English Heritage.

English Heritage (now Historic England) 2012 *Ships and Boats: Prehistory to Present: Designation Selection Guide.* English Heritage.

Gaffney, V., Thomson, K. and Fitch, S. 2007 *Mapping Doggerland: The Mesolithic Landscapes of the Southern North Sea* Oxford, Archaeopress.

Godwin, H, and Godwin, M E 1933 'British Maglemose Harpoon Sites' *Antiquity* 7, 36–48

Gupta, S, Collier, J S, Garcia-Moreno, D, Oggioni, F, Trentesaux, A, Vanneste, K, De Batist, M, Camelbeeck, T, Potter, G, Van Vliet, B, and Arthur, J C R 2017 'Two-Stage Opening of the Dover Strait and the Origin of Island Britain' *Nature Communications* 8, 15101

Hamblin, R J., Crosby, A, Balson, P S, Jones, S M, Chadwick, R A, Penn, I E and Arthur, M J 1992 *The Geology of the English Channel*. British Geological Survey United Kingdom Offshore Regional Report, London HMSO

Hazell, Z. J. 2008 'Offshore and Intertidal Peat Deposits, England — A Resource Assessment and Development of a Database' *Environmental Archaeology* 13(2), 101–110.

Hijma, M P, Cohen, K M, Roebroeks, W, Westerhoff, W E and Busschers, F S 2012 'Pleistocene Rhine-Thames Landscapes: Geological Background for Hominin Occupation of the Southern North Sea Region' *Journal of Quaternary Science* 27(1), 17–39

Housley, R A 1991 'AMS Dates from the Late Glacial and Early Postglacial in North-West Europe: A Review' in Barton, N, Roberts, A J, and Roe, D A (eds.) *The Late Glacial in North-West*

Europe: Human Adaptation and Environmental Change at the End of the Pleistocene. London, Council for British Archaeology, 25-36

Joint Nautical Archaeology Policy Committee and The Crown Estate 2006 *JNAPC Code of Practice for Seabed Development.* JNAPC.

Karle, M., Goldhammer, J., 2017. The Wadden Sea of North-West Germany: An Intertidal Environment of High Archaeological Research Potential (Chapter 15), *Under the Sea; Archaeology and Palaeolandscapes of the Continental Shelf*, Coastal Research Library 20, DOI 10.1007/978-3-319-53160-1_15.

Limpenny, S. E., Barrio Froján, C., Cotterill, C., Foster-Smith, R. L., Pearce, B., Tizzard, L., Limpenny, D. L., Long, D., Walmsley, S., Kirby, S., Baker, K., Meadows, W. J., Rees, J., Hill, J., Wilson, C., Leivers, M., Churchley, S., Russell, J., Birchenough, A. C., Green, S. L. and Law, R. J. 2011 *The East Coast Regional Environmental Characterisation*. MEPF.

Laban C, Jaap, J M 2011 'Pleistocene Glaciaton in the Netherlands' *Developments in Quaternary Science* 10.1016/B978-0-444-53447-7.00020-9

Manders, M & Gregory, D. (eds) 2015a *Guidelines to the process of underwater archaeological research*, SASMAP Guideline Manual 1.

Manders, M & Gregory, D. (eds) 2015b *Best practices for locating, surveying, assessing, monitoring and preserving underwater archaeological sites:* SASMAP Guideline Manual 2

Meijs, E.P.M., Peer, Ph.V., Warrimont, J-P.L.M.N, 'Geomorphologic context and proposed chronostratigraphic position of Lower Palaeolithic artefacts from the Op de Schans pit near Kesselt (Belgium) to the west of Maastricht' *Netherlands Journal of Geosciences* 91 , Issue 1-2 , September 2012 , pp. 137 – 157

MMT 2018 *Neuconnect Route Surveys and Geotechnical Investigation Project Execution Plan*. Unpublished Client Report Ref: 102553-NEU-MMT-COM-TEN-METHODSTMMT 2019a *Neuconnect Cable Geophysical & Geotechnical Route Survey. Southern North Sea March – July 2018*. Unpublished Client Report Ref: 102553-NEU-MMT-SUR-REP-SURVEYRE

MMT 2019a *Neuconnect Cable Geophysical & Geotechnical Route Survey. Southern North Sea March – July 2018*. Unpublished Client Report Ref: 102553-NEU-MMT-SUR-REP-SURVEYRE

MMT 2019b *Neuconnect Cable Geotechnical Route Survey. Southern North Sea March – July 2018*. Unpublished Client Report Ref: 102553-NEU-MMT-SUR-REP-GEOTECH

MMT 2019c *Operations Report: M/V Franklin Geophysical Survey and Crossing Survey*. NeuConnect cable geophysical route survey, Southern North Sea March-May 2018 Unpublished Client Report Ref: 02553-NEU-MMT-SUR-REP-OPERFR

Momber, G, Tomalin, D, Scaife, R, Satchell, J and Gillespie, J 2011 *Mesolithic Occupation at Bouldner Cliff and the Submerged Prehistory Landscapes of the Solent.* CBA Report 164, Council for British Archaeology

Parfitt, S A, Barendregt, R W, Breda, M, Candy, I, Collins, M J, Coope, G R, Durbidge, P, Field, M H, Lee, J R, Lister, A M, Mutch, R, Penkman, K E H, Preece, R C, Rose, J, Stringer, C B,

Symmons, R, Whittaker, J E, Wymer, J, and Stuart, A J. 2005 'The Earliest Record of Human Activity in Northern Europe' *Nature* 438(7070), 1008–12.

Parfitt, S A, Ashton, N M, Lewis, S G, Abel, R L, Coope, G R, Field, M H, Gale, R, Hoare, P G, Larkin, N R, Lewis, M D, Karloukovski, V, Maher, B A, Peglar, S M, Preece, R C, Whittaker, J E, and Stringer, C B. 2010 'Early Pleistocene Human Occupation at the Edge of the Boreal Zone in Northwest Europe' *Nature* 466(7303), 229–33.

Peeters, J.H.M., Amkreutz, L.W.S.W., Cohen, K.M. & Hijma, M.P. 2019 *North Sea Prehistory Research and Management Framework: Retuning the research and management agenda for prehistoric landscapes and archaeology in the Dutch sector of the continental shelf*. Nederlandse Archaeologische Rapporten 063, Cultural Heritage Agency, Ministry of Education, Culture and Science.

Peeters, H., Amkreutz, L., 2020 'The Netherlands: Probing into the Submerged Prehistoric Archaeology, Landscapes and Palaeontology of the Dutch Continental Shelf' in: Bailey G., Galanidou N., Peeters H., Jöns H., Mennenga M. (eds) *The Archaeology of Europe's Drowned Landscapes.* Coastal Research Library, vol 35. Springer, Cham. https://doi.org/10.1007/978-3-030-37367-2_8

Periplus Archaeomare 2018 *Archaeological Desk Study; NeuConnect Interconnector, Document 17A022-neuconnect-Interconnector-V1-Draft, revision 2.0 (draft).*

Ransley, J., Sturt, F., Dix, J., Adams, J. and Blue, L. (eds.) 2013 *People and the Sea: A Maritime Archaeological Research Agenda for England.* CBA Research Report 171, Council for British Archaeology.

Reid, C 1913 *Submerged Forests*. London, Cambridge University Press

Scott, B, and Ashton, N 2011 'The Early Middle Palaeolithic: The European Context' in Ashton, N, Lewis, S G, and Stringer, C (eds.) *The Ancient Human Occupation of Britain*. Volume 14, 91–112, Amsterdam, Netherlands, Elsevier B.V Sumbler, M. G., 1996, British Regional Geology; London and the Thames Valley, London: HMSO

Stapert, D 2007 'Neanderthal children and their flints' *PalArch's Journal of Archaeology of Northwest Europe* 1,2

Tappin, D. R., Pearce, B., Fitch, S., Dove, D., Gearey, B., Hill, J. M., Chambers, C., Bates, R., Pinnion, J., Diaz Doce, D., Green, M., Gallyot, J., Georgiou, L., Brutto, D., Marzialetti, S., Hopla, E., Ramsay, E., and Fielding, H. 2011 *The Humber Regional Environmental Characterisation.* British Geological Survey Open Report OR/10/54.

Tizzard, L, Bicket, A R, Benjamin, J, and De Loecker, D 2014 *A Middle Palaeolithic Site in the Southern North Sea: Investigating the Archaeology and Palaeogeography of Area 240*. Journal of Quaternary Science 29, 698–710

Van Baelen, A., Meijs, E.P.M., Peer, P.V., Warrimont, J-P. 2008 'The Early Middle Palaeolithic Site of Kesselt - Op de Schans (Belgian Limburg) Excavation Campaign 2008' *Notae Praehistoricae* 28-2008 : 5-9

Verpoorte, A., Loecker, D.De., Niekus, M.J.L.Th., Rensink, E. 2017 *The Middle Palaeolithic of the Netherlands Contexts and perspectives, Quaternary International 411 149-162 Recording*. Salisbury, unpubl report, ref: 112380.03.

Vos, P.C., Knoll, E. 2015 *Holocene Landscape Reconstruction of the Wadden Sea Area Between Marsdiep and Weser; Explaination of the Coastal Evolution and Visualisation of the Landscape Development of the Northern Netherlands and Neidersachsen in Five Palaeogeographical Maps from 500 BC to Present* Netherlands Journal of Geosciences, Geologie en Mijnbouw doi:10.1017/njg.2015.4.

Wessex Archaeology 2008a *Aircraft Crash Sites at Sea: A Scoping Study: Archaeological Desk-based Assessment.* York: Archaeology Data Service [distributor] https://doi.org/10.5284/1000045

Wessex Archaeology 2008b *Selection Guide; Boats and Ships in Archaeological Context*. York: Archaeology Data Service [distributor] https://doi.org/10.5284/1000046.

Wessex Archaeology 2011 *Seabed Prehistory: Site Evaluation Techniques (Area 240).* Salisbury, unpubl report, ref: 70754.04

Wessex Archaeology 2013 *Audit of Current State of Knowledge of Submerged Palaeolandscapes and Sites.* Salisbury, unpubl report, ref: 84570.01

Wessex Archaeology 2018a. *East Anglia ONE North and East Anglia TWO Offshore Windfarm Export Cable Route; Archaeological Assessment of Geophysical Data.* Salisbury, unpubl report, ref: 117810.2.

Wessex Archaeology - 2018b. *Norfolk Vanguard Offshore Wind Farm; Stage 2 Geoarchaeological Recording.* Salisbury, unpubl report, ref: 112380.03.

Wessex Archaeology 2019 *NeuConnect – Dutch Offshore Scheme; Marine Archaeological Technical Report*. Salisbury, unpubl report, ref: 201270.01

White, M. 2006 'Things to Do in Doggerland when you're Dead: Surviving OIS3 at the North-western-Most Fringe of Middle Palaeolithic Europe' *World Archaeology* 44(April), 0–28.

Wilkinson, T. J. and Murphy, P. L. 1995 *The Archaeology of the Essex Coast, Volume I: The Hullbridge Survey.* East Anglian Archaeology Report No. 71, Essex County Council.

Websites

DINOloket, Data and Information on the Dutch Subsurface. Available here: https://www.dinoloket.nl/en/stratigraphic-nomenclature/by-stratigraphic-group/upper-north-sea-group

North Sea 2050 Spatial Agenda 2014. Available here: https://www.noordzeeloket.nl/en/policy/noordzee-2050/wrakken-noordzee/

SIKB. Knowledge of quality in soil management. Available here: https://www.sikb.nl/archeologie/richtlijnen/brl-4000

APPENDICES

Appendix 1: Terminology

Glossary

The terminology used in this assessment follows definitions contained within the UK's *National Planning Policy Framework* (Department for Communities and Local Government, 2012: 50-57):

Archaeological interest	There will be archaeological interest in a heritage asset if it holds, or potentially may hold, evidence of past human activity worthy of expert investigation at some point. Heritage assets with archaeological interest are the primary source of evidence about the substance and evolution of places, and of the people and cultures that made them.
Conservation (for heritage policy)	The process of maintaining and managing change to a heritage asset in a way that sustains and, where appropriate, enhances its significance.
Designated heritage asset	A World Heritage Site, Scheduled Monument, Listed Building, Protected Wreck Site, Registered Park and Garden, Registered Battlefield or Conservation Area designated under the relevant legislation.
Development Plan	This includes adopted Local Plans, neighbourhood plans and the London Plan, and is defined in section 38 of the Planning and Compulsory Purchase Act 2004.
Environmental Impact Assessment	A procedure to be followed for certain types of projects to ensure that decisions are made in full knowledge of any likely significant effects on the environment.
Heritage asset	A building, monument, site, place, area or landscape identified as having a degree of significance meriting consideration in planning decisions, because of its heritage interest. Heritage asset includes designated heritage assets and assets identified by the local planning authority (including local listing).
Heritage coast	Areas of undeveloped coastline which are managed to conserve their natural beauty and, where appropriate, to improve accessibility for visitors.
Historic environment	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, and landscaped and planted or managed flora.
Historic environment record	Information services that seek to provide access to comprehensive and dynamic resources relating to the historic environment of a defined geographic area for public benefit and use.
Setting of a heritage asset	The surroundings in which a heritage asset is experienced. Its extent is not fixed and may change as the asset and its surroundings evolve. Elements of a setting may make a positive or negative contribution to the significance of an asset, may affect the ability to appreciate that significance or may be neutral.

Significance (for heritage policy)	The value of a heritage asset to this and future generations because of its heritage interest. That interest may be archaeological, architectural, artistic or historic. Significance derives not only from a heritage asset's physical presence, but also from its setting.

Chronology

Where referred to in the text, the main archaeological periods are broadly defined by the following date ranges (adopted from SIKB, Code table 3 – period, 2015):

Period	Date Range
Palaeolithic	*c.* 900,000 BP– 8800 BC
Mesolithic	8800 – 5300 BC
Neolithic	5300 – 2000 BC
Bronze Age	2000 – 800 BC
Iron Age	800 – 12 BC
Roman	BC 12 – AD 450
Early Medieval	450 – 1050
Medieval	1050 – 1500
Post-medieval	1500 – 1800
19th century	1800 – 1899
Modern	1900 – present day

The geological periods and associated Marine Isotope Stages are defined by the following date ranges:

Period	Date Range	MIS
Holocene	11,700 – present day	1
Devensian	115,000 – 11,700 BP	5d – 2
Ipswichian	130,000 – 115,000 BP	5e
Saalian	374,000 – 130,000 BP	10 – 6
Hoxnian	424,000 – 374,000 BP	11
Anglian	478,000 – 424,000 BP	12
Pre-Anglian	>478,000 BP	>12

Appendix 2: Legislative, policy and guidance

Global Policy and Legislation

Legislation/Policy	Summary
The World Heritage Convention 1972	The Convention provides for the identification, protection, conservation and presentation of cultural and natural sites of 'outstanding universal value' for inscription on the World Heritage List. The Convention sets out the duties of States Parties in identifying potential sites and their role in protecting and preserving them. By signing the Convention, each country pledges to conserve not only the World Heritage sites situated on its territory, but also to protect its national heritage. The 1972 UNESCO World Heritage Convention was ratified by the UK in 1984 and the UK currently has 29 World Heritage Sites.
The United Nations Convention on the Law of the Sea 1982	UNCLOS 1982 was ratified by the UK in 1997. Article 149 applies only to those archaeological and historical objects that lie outside national jurisdiction and stipulates that 'all objects of an archaeological and historical nature found in the Area shall be preserved or disposed of for the benefit of mankind as a whole, particular regard being paid to the preferential rights of the State or country of origin, or the State of cultural origin, or the State of historical and archaeological origin'. Article 303 stipulates that 'states have the duty to protect objects of an archaeological and historical nature found at sea and shall co-operate for this purpose'. Article 303 also provides for coastal states to exert a degree of control over the archaeological heritage to 24 nm, though the UK has not introduced any measures to implement this right.
International Council of Monuments and Sites Charter on the Protection and Management of Underwater Cultural Heritage 1996 (the Sofia Charter)	The Charter upon which the Annex of the UNESCO Convention is largely based includes a series of statements regarding best practice, intending 'to ensure that all investigations are explicit in their aims, methodology and anticipated results so that the intention of each project is transparent to all'. The UK is a member of the International Council of Monuments and Sites.
UNESCO Convention on the Protection of the Underwater Cultural Heritage (2001)	The UNESCO Convention was concluded in 2001, and is a comprehensive attempt to codify the law internationally with regards to underwater archaeological heritage. The UK abstained in the vote on the final draft of the Convention, however, it has stated that it has adopted the Annex of the Convention, which governs the conduct of archaeological investigations, as best practice for archaeology. Although the UK is not a signatory, the convention entered into force on 2nd January 2009 having been signed or ratified by 20 member states.

European Policy and Legislation

Legislation/Policy	Summary
The European Convention on the Protection of the Archaeological Heritage (Revised) 1992 (The Valletta Convention)	The Articles of the Valletta Convention tackle various aspects. Article 1 deals with the inventorying and protection of sites and areas; Article 2 deals with the mandatory reporting of chance finds and providing for 'archaeological reserves' on land or underwater; Article 3 promotes high standards for all archaeological work undertaken by suitably qualified people; Article 4 requires the conservation of excavated sites and the safe-keeping of finds; and Article 5 is concerned with consultation that should take place between planning authorities and developers to avoid damage to archaeological remains. The Valletta Convention was ratified by the UK Government in 2000 and came into force in 2001. The convention binds the UK to implement protective measures for the archaeological heritage within the jurisdiction of each party, including sea areas. Insofar as the UK exerts jurisdiction over the Continental Shelf, then it would appear that the provisions of the Valletta Convention apply to that jurisdiction.
The European Landscape Convention 2000	The European Landscape Convention became binding on the UK from 1 March 2007. Its principal clauses require the Government to protect and manage landscapes and to integrate landscape into regional and town planning policies including its cultural, environmental, agricultural, social and economic policies. The Convention applies to the entire territory of the UK and includes land, inland water and marine areas. It is not regarded as applying to sea areas regulated by the UK that lie beyond territorial waters.
European Directives for Environmental Impact Assessments (2014/52/EU)	The EIA Directive entered into force on 15 May 2014 to simplify the rules for assessing the potential effects of projects on the environment. The newly amended directive replaces former directives (85/337/EEC; 97/11/EC; 2003/35/EC; 2009/31/EC; 2011/92/EU) and Member States must apply these from 16 May 2017 at the latest.

Dutch Policy and Legislation

Heritage Act 2016 (Erfgoedwet 2016; issued by the Ministry of Education, Culture and Science)	This provides protection for cultural heritage assets, including wrecks, aircraft crash sites and submerged prehistory. It also "prohibits without a certificate for that purpose, to carry out actions involving the detection, investigation, or acquisition of cultural heritage, or parts thereof, which results in disturbance of the soil or disruption or total or partial displacement or removal of an archaeological monument or of underwater cultural heritage" (Section 5.1). Certificates are issued on application to the Minister for Education, Culture and Science. The Heritage Act established the AMZ cycle (Archeologische Monumenten Zorg), which is a defined series of steps and decisions through which archaeological works, mitigation and research are structured within the Dutch planning system. The procedure is embedded in the Dutch Quality Standard for Archaeology (KNA Waterbodems 4.1) as the mandatory workflow for archaeologists.

Guidance

Code of Practice for Seabed Developers, Joint Nautical Archaeology Policy Committee (Joint Nautical Archaeology Policy Committee 2006)	This voluntary Code provides a framework for seabed developers similar to the principles found in current policy and practice on land. The aim of the Code is to ensure a best practice model for seabed development. The Code offers guidance to developers on issues such as risk management and legislative implications.
Standard and guidance for historic environment desk-based assessment (Chartered Institute for Archaeologists 2014)	This guidance seeks to define good practice for the execution and reporting of desk-based assessment, in line with the by-laws of the Chartered Institute for Archaeologists. The standard and guidance was formally adopted as approved practice at the Annual General Meeting of the Institute held on 14 October 1994. This revision recognises the new Chartered status of the Institute.
Guidelines to the process of underwater archaeological research: SASMAP Guideline Manual 1 & Best practices for locating, surveying, assessing, monitoring and preserving underwater archaeological sites: SASMAP Guideline Manual 2 (2015)	As part of the European Collaborative Research Project, SASMAP (development of tools and techniques to survey, assess, stabilise, monitor and preserve underwater archaeological sites), two sets of best practice guidelines have been established for stakeholders and managers of underwater cultural heritage. Guideline Manual 1 offers a thorough overview of the process of (underwater) cultural heritage management within development-led archaeology (Treaty of Valletta), using a question-based approach. Guideline Manual 2 illustrates, using best practice examples, a practical approach for implementing the different steps in the process. These are divided into accepted methods that have already been applied in multiple projects around the world, and newly developed research processes, such as the methods and techniques developed within the SASMAP project. The two guideline manuals are intrinsically linked.

Appendix 3: Palaeogeographic features of archaeological potential

ID	Classification	Archaeological Discrimination	Depth Range (mBSB)		Description
			From	To	
79000	High amplitude reflector	P2	11.7	12.5	Small high amplitude reflector identified towards the base of a unit characterised by horizontal reflectors, interpreted as the BNB formation. Slightly chaotic. May be thin layer of peat or possibly just reworked sediments
79001	High amplitude reflector	P2	13.6	14.2	Small high amplitude reflector identified towards the base of a unit characterised by horizontal reflectors, interpreted as the BNB formation. Slightly chaotic. May be thin layer of peat or possibly just reworked sediments
79002	High amplitude reflector	P1	3	4	A high amplitude reflector identified at the top of the interpreted BNB formation, beneath a unit of modern marine sands. Possible peat horizon.
79003	High amplitude reflector	P1	3.4	5.4	A high amplitude reflector identified at the top of the interpreted BNB formation, beneath a unit of modern marine sands. Possible peat horizon.
79004	High amplitude reflector	P1	3.6	4.3	A high amplitude reflector identified at the top of the interpreted BNB formation, beneath a unit of modern marine sands. Possible peat horizon.
79005	High amplitude reflector	P1	1.2	5.9	A high amplitude reflector identified at the top of the interpreted BNB formation, beneath a unit of modern marine sands. Located on one side of a possible channel feature (**79006**). Possible peat horizon. Feature was sampled by Vibrocore 553-VC-B06-284 and found to comprise peat.
79006	Channel	P1	4	10.4	A small channel identified beneath a unit of modern marine sand, cutting into the interpreted BNB formation. Feature has a relatively faint basal reflector and fill characterised by faint, draping reflectors, which was found by 553-VC-B06-285 to comprise silty sand with occasional laminae of clay with gravel sized pockets of brown organic matter.
79007	High amplitude reflector	P1	2.5	4.4	A high amplitude reflector identified at the top of the interpreted BNB formation, beneath a unit of modern marine sands. Located on one side of a possible channel feature (**79006**). Possible peat horizon.
79008	High amplitude reflector	P1	2.2	6.3	A distinct, flat, high amplitude reflector identified at the top of the interpreted BNB formation, beneath a unit of modern marine sands. Possible peat horizon.

79009	High amplitude reflector	P1	3.5	3.6	A distinct, flat, high amplitude reflector identified at the top of the interpreted BNB formation, beneath a unit of modern marine sands. Possible peat horizon.
79010	High amplitude reflector	P1	3.6	7.5	A distinct, flat, high amplitude reflector identified at the top of the interpreted BNB formation, beneath a unit of modern marine sands. Possible peat horizon.
79011	High amplitude reflector	P1	5.4	7.3	A distinct, flat, high amplitude reflector identified at the top of the interpreted BNB formation, beneath a unit of modern marine sands. Possible peat horizon.
79012	High amplitude reflector	P1	4.3	7.2	A distinct, flat, high amplitude reflector identified at the top of the interpreted BNB formation, beneath a unit of modern marine sands. Possible peat horizon.
79013	High amplitude reflector	P1	4.9	5.9	A high amplitude reflector identified at the top of the interpreted BNB formation, beneath a unit of modern marine sands. Located on one side of a possible channel feature (**79014**). Possible peat horizon.
79014	Channel	P1	5.3	11.3	A small channel identified beneath a unit of modern marine sand, cutting into the interpreted BNB formation. Feature has a relatively distinct basal reflector and quiet fill, possibly with some very faint, draping reflectors which may indicate some well-layered sediments. Feature is flanked in some areas by a high amplitude reflector, possibly indicating associated peat or overbank deposits.
79015	High amplitude reflector	P1	5.5	6.2	A high amplitude reflector identified at the top of the interpreted BNB formation, beneath a unit of modern marine sands. Located on one side of a possible channel feature (**79014**). Possible peat horizon.
79016	High amplitude reflector	P1	5.2	5.6	A distinct, flat, high amplitude reflector identified at the top of the interpreted BNB formation, beneath a unit of modern marine sands. Possible peat horizon.
79017	High amplitude reflector	P1	5.5	8.2	A distinct, high amplitude reflector identified at the top of the interpreted BNB formation, beneath a unit of modern marine sands. Feature is largely horizontal, although appears to dip down slightly in places, possibly where the sediments are infilling a depression in the surface of the underlying unit.
79018	High amplitude reflector	P1	6.3	6.7	A distinct, flat, high amplitude reflector identified at the top of the interpreted BNB formation, beneath a unit of modern marine sands. Possible peat horizon.
79019	High amplitude reflector	P1	6	9.2	A distinct, high amplitude reflector identified at the top of the interpreted BNB formation, beneath a unit of modern marine sands. Feature is largely horizontal, although appears to dip down slightly in places, possibly where the sediments are infilling a depression in the surface of the underlying unit.

79020	High amplitude reflector	P1	6.3	10.2	A distinct, high amplitude reflector identified at the top of the interpreted BNB formation, beneath a unit of modern marine sands. Feature is largely horizontal, although appears to dip down slightly in places, possibly where the sediments are infilling a depression in the surface of the underlying unit.
79021	High amplitude reflector	P1	6.7	13.1	A distinct, high amplitude reflector identified at the top of the interpreted BNB formation, beneath a unit of modern marine sands. Feature is largely horizontal, although appears to dip down slightly in places, possibly where the sediments are infilling a depression in the surface of the underlying unit.
79022	High amplitude reflector	P1	7.9	8.2	A small, higher amplitude reflector identified on one survey line at the top of the interpreted BNB formation, beneath a unit of modern marine sands. Possible peat, but appears less distinct and therefore less certain.
79023	High amplitude reflector	P1	7.4	8.3	A small, distinct, high amplitude reflector identified at the top of the interpreted BNB formation, beneath a unit of modern marine sands. Possible peat horizon.
79024	High amplitude reflector	P1	7.8	8.2	A small, higher amplitude reflector identified on one survey line at the top of the interpreted BNB formation, beneath a unit of modern marine sands. Possible peat, but appears less distinct and therefore less certain.
79025	High amplitude reflector	P1	8.2	8.9	A small, distinct, high amplitude reflector identified at the top of the interpreted BNB formation, beneath a unit of modern marine sands. Possible peat horizon.
79026	Coarse-grained deposit	P2	10.4	15.8	A small disturbance with chaotic fill and no discernible basal reflector identified beneath a unit of modern marine sands, cutting into the interpreted BNB formation. Possible re-worked sediments, however has the potential of being a poorly-defined channel feature.
79027	Coarse-grained deposit	P2	10.5	14.9	A small disturbance with chaotic fill and no discernible basal reflector identified beneath a unit of modern marine sands, cutting into the interpreted BNB formation. Possible re-worked sediments, however has the potential of being a poorly-defined channel feature.
79028	Channel	P1	11.1	17.7	A small channel identified beneath a unit of modern marine sand, cutting into the interpreted Eem formation. Feature has a faint basal reflector and quiet fill, possible with some very faint, draping reflectors which may indicate some well-layered sediments.
79029	High amplitude reflector	P2	10.5	11	A small, slightly higher amplitude reflector identified at the top of the interpreted Eem formation, beneath a unit of modern marine sands. Feature appears to cause parabolas, which may indicate buried objects although these are likely to be geological in origin. Possible coarse-grained deposits or peat horizon.

79030	High amplitude reflector	P2	10.8	11.3	A small, slightly higher amplitude reflector identified at the top of the interpreted Eem formation, beneath a unit of modern marine sands. Feature appears to cause parabolas, which may indicate buried objects although these are likely to be geological in origin. Possible coarse-grained deposits or peat horizon.
79031	High amplitude reflector	P2	10.2	10.9	A small, slightly higher amplitude reflector identified at the top of the interpreted Eem formation, beneath a unit of modern marine sands. Feature appears to cause parabolas, which may indicate buried objects although these are likely to be geological in origin. Possible coarse-grained deposits or peat horizon.
79032	High amplitude reflector	P1	11	11.5	A small, distinct, high amplitude reflector identified at the top of the interpreted Eem formation, beneath a unit of modern marine sands. Possible peat horizon.
79033	High amplitude reflector	P1	10.3	11.9	A small, distinct, high amplitude reflector identified at the top of the interpreted Eem formation, beneath a unit of modern marine sands. Possible peat horizon.
79034	High amplitude reflector	P1	10.6	10.9	A small, distinct, high amplitude reflector identified at the top of the interpreted Eem formation, beneath a unit of modern marine sands. Possible peat horizon.
79035	High amplitude reflector	P1	11.1	11.4	A small, distinct, high amplitude reflector identified at the top of the interpreted Eem formation, beneath a unit of modern marine sands. Possible peat horizon.
79036	High amplitude reflector	P1	11.1	11.6	A small, distinct, high amplitude reflector identified at the top of the interpreted Eem formation, beneath a unit of modern marine sands. Possible peat horizon.
79037	High amplitude reflector	P2	10.2	11.4	A small, higher amplitude reflector identified on one survey line at the top of the interpreted BNB formation, beneath a unit of modern marine sands. Possible peat, but appears less distinct and therefore less certain.
79038	High amplitude reflector	P1	10.5	10.8	A small, distinct, high amplitude reflector identified at the top of the interpreted Eem formation, beneath a unit of modern marine sands. Possible peat horizon.
79039	High amplitude reflector	P1	11	12.6	A small, distinct, high amplitude reflector identified at the top of the interpreted Eem formation, beneath a unit of modern marine sands. Possible peat horizon.
79040	High amplitude reflector	P1	10.7	11.3	A distinct, high amplitude reflector identified at the top of the interpreted Eem formation, beneath a unit of modern marine sands. Feature appears to dip down slightly into the underlying unit , possibly indicating an infilled depression or shallow cut and fill containing peat.

79041	High amplitude reflector	P1	10.6	11.5	A distinct, high amplitude reflector identified at the top of the interpreted Eem formation, beneath a unit of modern marine sands. Feature appears to dip down slightly into the underlying unit , possibly indicating an infilled depression or shallow cut and fill containing peat.
79042	High amplitude reflector	P1	10.5	13.2	A distinct, high amplitude reflector identified at the top of the interpreted Eem formation, beneath a unit of modern marine sands. Feature appears to be slightly inset , possible infilled depression or shallow channel containing peat.
79043	High amplitude reflector	P1	11	14.8	A distinct, high amplitude reflector identified at the top of the interpreted Eem formation, beneath a unit of modern marine sands. Feature appears to be slightly inset , possible infilled depression or shallow channel feature containing peat.
79044	High amplitude reflector	P2	11.8	14.7	A distinct, high amplitude reflector identified close to the top but slightly within the interpreted Eem formation. Feature appears to be slightly inset. Possible infilled depression or shallow channel containing peat, but appears less distinct and therefore less certain.
79045	High amplitude reflector	P2	10.1	10.9	A small, higher amplitude reflector identified on one survey line at the top of the interpreted Eem formation, beneath a unit of modern marine sands. Possible peat, but appears less distinct and therefore less certain.
79046	Cut and fill	P2	8.3	12.3	A small simple cut and fill identified beneath a unit of modern marine sediments, cutting into the interpreted Eem formation. Feature has a relatively well-defined basal reflector and fill characterised by sub-horizontal reflectors, possibly indicating well-layered fill. Possible remnants of a buried fluvial feature.
79047	High amplitude reflector	P1	7.4	8.1	A distinct, high amplitude reflector identified at the top of the interpreted Eem formation, beneath a unit of modern marine sands. Feature appears to dip down into underlying sediment, possible peat infilling slight depression.
79048	Channel	P1	8.4	17.4	A small channel identified beneath a unit of modern marine sand, cutting into the interpreted BNB formation. Feature has a relatively distinct basal reflector and fill characterised by faint, horizontal reflectors which may indicate some well-layered sediments. Some slight blanking of underlying horizons which may indicate the presence of gas caused by the microbial breakdown of organic matter. Located close to channel feature **79049** and possibly related.

79049	Channel	P1	8.1	14.8	A small channel identified beneath a unit of modern marine sand, cutting into the interpreted BNB formation. Feature has a relatively distinct basal reflector and fill characterised by faint, horizontal reflectors which may indicate some well-layered sediments. Some slight blanking of underlying horizons which may indicate the presence of gas caused by the microbial breakdown of organic matter. Located close to channel feature **79048** and possibly related.
79050	High amplitude reflector	P1	7.8	8.2	A high amplitude reflector identified at the top of the interpreted Eem formation, beneath a unit of modern marine sands. Located on one side of a possible channel feature (**79049**) and possibly represents associated deposits. Possible peat.
79051	High amplitude reflector	P1	7.8	9.9	A distinct, high amplitude reflector identified at the top of the interpreted Eem formation, beneath a unit of modern marine sands. Feature appears to dip down slightly into the underlying unit , possibly indicating an infilled depression or shallow cut and fill containing peat.
79052	High amplitude reflector	P1	7.6	8	A small, distinct, high amplitude reflector identified at the top of the interpreted Eem formation, beneath a unit of modern marine sands. Possible peat horizon.
79053	High amplitude reflector	P1	7.4	7.9	A small, distinct, high amplitude reflector identified at the top of the interpreted Eem formation, beneath a unit of modern marine sands. Possible peat horizon.
79054	High amplitude reflector	P1	7.1	7.7	A small, distinct, high amplitude reflector identified at the top of the interpreted Eem formation, beneath a unit of modern marine sands. Possible peat horizon.
79055	Cut and fill	P2	7.8	13.4	A small simple cut and fill identified beneath a unit of modern marine sediments, cutting into the interpreted Eem formation. Feature has a relatively well-defined basal reflector and fill characterised by sub-horizontal reflectors, possibly indicating well-layered fill. Possible remnants of a buried fluvial feature related to nearby channel feature **79056**.
79056	Channel	P1	7.1	14.5	A small channel identified beneath a unit of modern marine sand, cutting into the interpreted BNB formation. Feature has a relatively distinct basal reflector and fill characterised by faint, horizontal reflectors which may indicate some well-layered sediments. Located close to simple cut and fill **79055** and possibly related.

79057	High amplitude reflector	P2	6.7	7.2	A high amplitude reflector identified at the top of the interpreted Eem formation, beneath a unit of modern marine sands. Located on one side of a possible channel feature (**79056**) and possibly represents associated deposits. Possible peat, but appears less distinct and therefore less certain.
79058	High amplitude reflector	P1	5.6	6.1	A small, distinct, high amplitude reflector identified at the top of the interpreted Eem formation, beneath a unit of modern marine sands. Possible peat horizon.
79059	High amplitude reflector	P1	5.3	6	A distinct, high amplitude reflector identified at the top of the interpreted Eem formation, beneath a unit of modern marine sands. Feature appears to dip down slightly into the underlying unit , possibly indicating an infilled depression or shallow cut and fill containing peat.
79060	High amplitude reflector	P1	5.4	8.4	A distinct, high amplitude reflector identified at the top of the interpreted Eem formation, beneath a unit of modern marine sands. Feature appears to dip down slightly into the underlying unit , possibly indicating an infilled depression or shallow cut and fill containing peat.
79061	High amplitude reflector	P1	5.8	8.5	A distinct, high amplitude reflector identified at the top of the interpreted Eem formation, beneath a unit of modern marine sands. Feature appears to dip down slightly into the underlying unit , possibly indicating an infilled depression or shallow cut and fill containing peat.
79062	High amplitude reflector	P1	4.1	4.6	A distinct, high amplitude reflector identified at the top of the interpreted Eem formation, beneath a unit of modern marine sands. Feature appears to dip down slightly into the underlying unit , possibly indicating an infilled depression or shallow cut and fill containing peat.
79063	High amplitude reflector	P2	9.7	13.4	A distinct, fairly extensive and slightly undulating high amplitude reflector identified at the base of an acoustically quiet unit, interpreted as the possible Eem formation. It is noted in DINOloket that the lower boundary of the Eem formation has localised areas of Gyttja at its base, and therefore it is possible that the high amplitude reflector mapped here represents that. As the Eem formation was deposited in a maritime setting, the sediments associated with it are unlikely to be of archaeological interest. However, as the unit is not definitively the Eem formation, the feature has been retained here as of possible interest.

79064	High amplitude reflector	P2	4.6	10.1	A distinct, fairly extensive and slightly undulating high amplitude reflector identified at the base of an acoustically quiet unit, interpreted as the possible Eem formation. It is noted in DINOloket that the lower boundary of the Eem formation has localised areas of Gyttja at its base, and therefore it is possible that the high amplitude reflector mapped here represents that. As the Eem formation was deposited in a maritime setting, the sediments associated with it are unlikely to be of archaeological interest. However, as the unit is not definitively the Eem formation, the feature has been retained here as of possible interest.
79065	High amplitude reflector	P2	3.1	4.2	A high amplitude reflector identified at the top of the interpreted Eem formation, beneath a unit of modern marine sands. Possible peat, but appears less distinct and therefore less certain.
79066	High amplitude reflector	P2	3.5	5.4	A high amplitude reflector identified at the top of the interpreted Eem formation, beneath a unit of modern marine sands. Possible peat, but appears less distinct and therefore less certain.
79067	High amplitude reflector	P2	3.9	4.3	A high amplitude reflector identified at the top of the interpreted Eem formation, beneath a unit of modern marine sands. Possible peat, but appears less distinct and therefore less certain.
79068	High amplitude reflector	P1	3.4	4.9	A distinct, high amplitude reflector identified at the top of the interpreted Eem formation, beneath a unit of modern marine sands. Feature appears to dip down slightly into the underlying unit , possibly indicating an infilled depression or shallow cut and fill containing peat.
79069	High amplitude reflector	P1	4.1	4.3	A distinct, high amplitude reflector identified at the top of the interpreted Eem formation, beneath a unit of modern marine sands. Feature appears to dip down slightly into the underlying unit , possibly indicating an infilled depression or shallow cut and fill containing peat. Possible related to nearby feature **79068**.
79070	Cut and fill	P2	3.6	8.8	A small simple cut and fill identified beneath a unit of modern marine sediments, cutting into the interpreted Eem formation. Feature has a distinct basal reflector and fill characterised by sub-horizontal reflectors, possibly indicating well-layered fill. Possible remnants of a buried fluvial feature.

79071	High amplitude reflector	P2	4.6	14.7	A distinct, fairly extensive and slightly undulating high amplitude reflector identified at the base of an acoustically quiet unit, interpreted as the possible Eem formation. It is noted in DINOloket that the lower boundary of the Eem formation has localised areas of Gyttja at its base, and therefore it is possible that the high amplitude reflector mapped here represents that. As the Eem formation was deposited in a maritime setting, the sediments associated with it are unlikely to be of archaeological interest. However, as the unit is not definitively the Eem formation, the feature has been retained here as of possible interest.
79072	High amplitude reflector	P1	3.3	7.8	A distinct, high amplitude reflector identified at the top of the interpreted Eem formation, beneath a unit of modern marine sands. Feature appears to be dip down slightly in places, possible where it is infilling slight depressions in the top of the underlying sediment. Feature corresponds with a layer of peat identified in vibrocore 553-VC-B08-353.
79073	High amplitude reflector	P2	3.1	3.9	Area of occasionally intermittent high amplitude reflectors identified at the top of the interpreted Eem formation, beneath a unit of modern marine sands. Appears similar in acoustic characteristics to **79072**, however not identified within vibrocore 553-VC-B08-354 and therefore less certain.
79074	Cut and fill	P2	4.3	7.2	A small simple cut and fill identified beneath a possible unit of peat, overlain by a unit of modern marine sediments, cutting into the interpreted Eem formation. Feature has a distinct basal reflector and fill characterised by sub-horizontal reflectors, possibly indicating well-layered fill. Possible remnants of a buried fluvial feature.
79075	High amplitude reflector	P1	2.7	7.8	Area of occasionally intermittent, high amplitude reflectors identified at the top of the interpreted Eem formation beneath a unit of modern marine sands. Occasionally appears to be infilling slight depressions. Possible peat.
79076	High amplitude reflector	P2	2.4	2.9	A high amplitude reflector identified at the top of the interpreted Eem formation, beneath a unit of modern marine sands. Possible peat, but appears less distinct and therefore less certain.
79077	High amplitude reflector	P2	2.5	3.1	A high amplitude reflector identified at the top of the interpreted Eem formation, beneath a unit of modern marine sands. Possible peat, but appears less distinct and therefore less certain.
79078	Cut and fill	P2	3.4	6	A small simple cut and fill identified beneath a possible unit of peat, overlain by a unit of modern marine sediments, cutting into the interpreted Eem formation. Feature has a distinct basal reflector and fill characterised by sub-horizontal reflectors, possibly indicating well-layered fill. Possible remnants of a buried fluvial feature.

79079	High amplitude reflector	P2	2.4	3.1	A high amplitude reflector identified at the top of the interpreted Eem formation, beneath a unit of modern marine sands. Possible peat, but appears less distinct and therefore less certain.
79080	High amplitude reflector	P2	10.2	13.4	A distinct, intermittent and slightly undulating, high amplitude reflector identified as a relatively extensive horizon at the base of an acoustically quiet unit, interpreted as the possible Eem formation. It is noted in DINOloket that the lower boundary of the Eem formation has localised areas of Gyttja at its base, and therefore it is possible that the high amplitude reflector mapped here represents that. As the Eem formation was deposited in a maritime setting, the sediments associated with it are unlikely to be of archaeological interest. However, as the unit is not definitively the Eem formation, the feature has been retained here as of possible interest.
79081	High amplitude reflector	P2	2.2	2.9	A high amplitude reflector identified at the top of the interpreted Eem formation, beneath a unit of modern marine sands. Possible peat, but appears less distinct and therefore less certain. Identified at the edge of a n interpreted channel feature.
79082	Channel	P1	2.7	10.6	A channel identified beneath a thin unit of modern marine sand, cutting into the interpreted Eem formation. Feature has a distinct basal reflector and fill characterised by faint, horizontal reflectors which may indicate some well-layered sediments.
79083	High amplitude reflector	P1	2.1	6.2	A distinct, high amplitude reflector identified at the top of the interpreted Eem formation, beneath a unit of modern marine sands. Feature appears to be dip down slightly in places, possible where it is infilling slight depressions in the top of the underlying sediment. Possible peat.
79084	High amplitude reflector	P2	11	15.3	A distinct, intermittent and slightly undulating, high amplitude reflector identified as a relatively extensive horizon at the base of an acoustically quiet unit, interpreted as the possible Eem formation. It is noted in DINOloket that the lower boundary of the Eem formation has localised areas of Gyttja at its base, and therefore it is possible that the high amplitude reflector mapped here represents that. As the Eem formation was deposited in a maritime setting, the sediments associated with it are unlikely to be of archaeological interest. However, as the unit is not definitively the Eem formation, the feature has been retained here as of possible interest.
79085	High amplitude reflector	P1	2.3	3.4	A distinct, high amplitude reflector identified at the top of the interpreted Eem formation, beneath a unit of modern marine sands. Feature appears to be dip down slightly in places, possible where it is infilling slight depressions in the top of the underlying sediment. Possible peat.

79086	High amplitude reflector	P2	2.2	3.1	A distinct, high amplitude reflector identified at the top of the interpreted Eem formation, beneath a unit of modern marine sands. Feature appears to be dip down slightly in places, possible where it is infilling slight depressions in the top of the underlying sediment. Corresponds with a layer of clay with frequent organic matter identified in 553-VC-B08-360, which may indicate a former terrestrial surface however its origins are less certain.
79087	High amplitude reflector	P2	11.7	12.8	A distinct, intermittent and slightly undulating, high amplitude reflector identified at the base of an acoustically quiet unit, interpreted as the possible Eem formation. It is noted in DINOloket that the lower boundary of the Eem formation has localised areas of Gyttja at its base, and therefore it is possible that the high amplitude reflector mapped here represents that. As the Eem formation was deposited in a maritime setting, the sediments associated with it are unlikely to be of archaeological interest. However, as the unit is not definitively the Eem formation, the feature has been retained here as of possible interest. Possibly related to nearby feature **79088**.
79088	High amplitude reflector	P2	11.4	13.5	A distinct, intermittent and slightly undulating, high amplitude reflector identified at the base of an acoustically quiet unit, interpreted as the possible Eem formation. It is noted in DINOloket that the lower boundary of the Eem formation has localised areas of Gyttja at its base, and therefore it is possible that the high amplitude reflector mapped here represents that. As the Eem formation was deposited in a maritime setting, the sediments associated with it are unlikely to be of archaeological interest. However, as the unit is not definitively the Eem formation, the feature has been retained here as of possible interest. Possibly related to nearby feature **79087**.
79089	High amplitude reflector	P1	2.1	4.3	A distinct, high amplitude reflector identified at the top of the interpreted Eem formation, beneath a unit of modern marine sands. Feature appears to be dip down slightly in places, possible where it is infilling slight depressions in the top of the underlying sediment. Feature corresponds with a layer of peat identified in vibrocore 553-VC-B08-362.
79090	Cut and fill	P1	2.1	6.6	A small simple cut and fill identified beneath a unit of modern marine sediments, cutting into the interpreted Eem formation. Feature has a distinct basal reflector and is seen to be flanked towards the south-east by a high amplitude reflector, possibly peat. Unit fill was found by vibrocore 553-VC-B08-363 to comprise a unit of low-strength clay, interlaminated in places with sand, with peat at the base. Possible remnants of a buried fluvial feature.

79091	High amplitude reflector	P1	1.6	4.7	A distinct, high amplitude reflector identified at the top of the interpreted Eem formation, beneath a unit of modern marine sands. Feature appears to be dip down slightly in places, possible where it is infilling slight depressions in the top of the underlying sediment. Feature is located south-east of cut and fill **79090** and is possibly related. Possible peat.
79092	High amplitude reflector	P1	1.8	6.6	A distinct, high amplitude reflector identified at the top of the interpreted Eem formation, beneath a unit of modern marine sands. Feature appears to be dip down slightly in places, possible where it is infilling slight depressions in the top of the underlying sediment. Feature corresponds with a thin band of brown clayey peat identified in vibrocore 553-VC-B08-364.
79093	High amplitude reflector	P1	1.6	2.4	A distinct, high amplitude reflector identified at the top of the interpreted Eem formation, beneath a unit of modern marine sands. Feature appears to be dip down slightly in places, possible where it is infilling slight depressions in the top of the underlying sediment. Possible peat.
79094	High amplitude reflector	P2	1.8	3.1	A distinct, high amplitude reflector identified at the top of the interpreted Eem formation, beneath a unit of modern marine sands. Close to simple cut and fill and possible associated.
79095	Cut and fill	P2	2.2	5.9	A shallow simple cut and fill identified beneath a veneer of seabed sediments, cutting into the interpreted Eem formation.
79096	High amplitude reflector	P2	1.6	2.1	A high amplitude reflector identified at the top of the interpreted Eem formation, beneath a unit of modern marine sands. Possible peat, but appears less distinct and therefore less certain.
79097	High amplitude reflector	P2	1.6	2.2	A high amplitude reflector identified at the top of the interpreted Eem formation, beneath a unit of modern marine sands. Possible peat, but appears less distinct and therefore less certain.
79098	Cut and fill	P2	3.4	6	A small simple cut and fill identified beneath a possible unit of peat, overlain by a unit of modern marine sediments, cutting into the interpreted Eem formation. Feature has a distinct basal reflector and fill characterised by sub-horizontal reflectors, possibly indicating well-layered fill. Possible remnants of a buried fluvial feature.
79099	High amplitude reflector	P2	1.3	2	A high amplitude reflector identified at the top of the interpreted Eem formation, beneath a unit of modern marine sands. Feature appears to be dip down slightly in the top of the underlying sediment. Possible peat infilling depression or shallow cut and fill.

79100	High amplitude reflector	P2	2	4.2	A high amplitude reflector identified at the top of the interpreted Eem formation, beneath a unit of modern marine sands. Feature appears to be dip down slightly in the top of the underlying sediment. Possible peat infilling depression or shallow cut and fill.
79101	High amplitude reflector	P1	1.8	6.6	A distinct, high amplitude reflector identified at the top of the interpreted Eem formation, beneath a unit of modern marine sands. Feature appears to be dip down slightly in places, possible where it is infilling slight depressions in the top of the underlying sediment. Feature may correspond with a thin band with pockets of clayey peat identified between 0.66-0.72 m in vibrocore 553-VC-B08-370, although this appears to be shallower than identified in the geophysical data and therefore is less certain. Feature possibly represents a former terrestrial landscape.
79102	High amplitude reflector	P2	1.4	5.1	A high amplitude reflector identified beneath a veneer of modern marine sands. Feature appears to be overlaying a unit with faint, dipping reflectors, possibly a poorly defined cut and fill although this isn't clear. Possible peat, but appears less distinct and therefore less certain.
79103	High amplitude reflector	P1	1.5	1.9	A high amplitude reflector identified at the top of the interpreted Eem formation, beneath a unit of modern marine sands. Appears slightly inset. Possible peat infilling a slight depression but less certain.
79104	Channel	P1	2	8.8	A channel feature identified beneath a veneer of modern marine sediments. Feature had a well defined basal reflector and fill characterised by numerous dipping reflectors. Unit fill was found by vibrocore 553-VC-B08-372 to comprise a unit of low-strength clay with peat at the base.
79105	Channel	P1	1.5	18.1	A complex, multiphase channel feature identified cutting into the interpreted Eem formation, overlain by a distinct, high-amplitude reflector. Feature has a poorly-defined basal reflector and multiple phases of cut and fill, some of which are characterised by numerous dipping reflectors. Unit fill was found by vibrocore 553-VC-B08-373 to comprise clay and sand with band of clay, overlain with clay with pockets of peat.
79106	High amplitude reflector	P2	1.3	1.9	A high amplitude reflector identified at the top of the interpreted Eem formation, beneath a unit of modern marine sands. Possible peat, but appears less distinct and therefore less certain.

79107	High amplitude reflector	P1	1.3	5.5	A high amplitude reflector identified at the top of the interpreted Eem, or possibly Boxtel formation, beneath a unit of modern marine sands. Appears slightly inset in places. Feature sampled by vibrocores 553-VC-B08-376 to 381 which indicate clay overlying sand, with some occasional areas of organic matter, including a band of dark brown black fibrous peat with wood fragments in core, which may indicate a former terrestrial land surface.
79108	Cut and fill	P2	2.9	7.7	A shallow, simple cut and fill identified below a veneer of marine sediment, cutting through a possible peat horizon. Feature had a distinct basal reflector and slightly chaotic fill. Possible remnants of a buried fluvial feature.
79109	Channel	P1	2.7	10.5	A complex, multi-phase channel identified beneath a thin unit of modern marine sand, cutting into the interpreted Eem formation. Feature has a distinct basal reflector and an acoustically quiet lower fill and fill characterised by faint, horizontal reflectors which may indicate some well-layered sediments. Feature is flanked by a high amplitude horizon which may represent a former land surface or peat horizon.
79110	High amplitude reflector	P1	2	7.1	A high amplitude reflector identified at the top of the interpreted Eem, or possibly Boxtel formation, beneath thin unit of modern marine sands. Appears slightly inset in places. Feature sampled by vibrocores 553-VC-B08-383 to 385 which indicate clay overlying sand, with some occasional areas of organic matter, including a band laminated peat in 553-VC-B08-383, which indicates a former terrestrial land surface.
79111	Channel	P1	3.4	8.3	A shallow channel feature identified either beneath a veneer of modern marine sediments or a thin peat later. Feature had a well defined basal reflector and quiet fill with occasional horizontal reflectors, which may indicate sediments deposited in a low-energy environment.
79112	High amplitude reflector	P2	2.6	3.1	A high amplitude reflector identified at the top of the interpreted Eem formation, beneath a veneer of modern marine sands. Located between two interpreted channel features. Possible peat, but less distinct and therefore less certain.
79113	Channel	P1	3.4	12.3	A complex channel feature identified beneath a veneer of modern marine sediments. Feature had a well defined basal reflector and fill characterised by numerous horizontal reflectors, with a lower, older, acoustically quiet phase. Unit fill was found by vibrocore 553-VC-B08-386 to comprise sandy silt with thin laminations of organic matter. Close to and possibly related to channel **79114**.

79114	Channel	P1	3.3	10.3	A small channel feature identified beneath a thin unit of acoustically quiet sediments, possibly the Boxtel formation. Feature had a well defined basal reflector and fill characterised by numerous dipping reflectors, with a lower, older, acoustically quiet phase. Close to and possibly related to channel **79113**.
79115	High amplitude reflector	P2	2.4	7.2	A high amplitude reflector identified at the top of the interpreted Eem formation, beneath a veneer of modern marine sands. Appears inset in places. Possible peat, but less distinct and therefore less certain.
79116	High amplitude reflector	P1	2.1	6.2	A high amplitude reflector identified at the top of the interpreted Eem, or possibly Boxtel formation, beneath thin unit of modern marine sands. Appears slightly inset in places. Feature sampled by vibrocores 553-VC-B08-390 to 392 which indicate peat overlying sand, suggesting a former terrestrial land surface.
79117	High amplitude reflector	P2	2.7	3	A high amplitude reflector identified at the top of the interpreted Eem formation, beneath a unit of modern marine sands. Possible peat, but appears less distinct and therefore less certain.
79118	High amplitude reflector	P2	2.7	4	A high amplitude reflector identified at the top of the interpreted Eem formation, beneath a unit of modern marine sands. Possible peat, but appears less distinct and therefore less certain.
79119	High amplitude reflector	P2	3.2	3.3	A high amplitude reflector identified at the top of the interpreted Eem formation, beneath a unit of modern marine sands. Possible peat, but appears less distinct and therefore less certain.
79120	High amplitude reflector	P1	2.6	3.5	A high amplitude reflector identified at the top of the interpreted Eem formation, beneath a unit of modern marine sands. Possible peat, but appears less distinct and therefore less certain. Not definitively identified in Vibrocore 553-VC-B08-395, although a gravel sized pocket of peat was identified at 3.17 - 3.21 m.
79121	High amplitude reflector	P1	2.4	5.1	A high amplitude reflector identified at the top of the interpreted Eem, or possibly Boxtel formation, beneath an acoustically quiet unit. Appears slightly inset in places. Feature sampled by vibrocores 553-VC-B08-396 to 553-VC-B09-401, which indicate clay with frequent pockets of dark brown fibrous peat overlying sand, with a thicker bands of peat being identified in 53-VC-B08-400 and 553-VC-B09-401, suggesting a former terrestrial land surface.
79122	Channel	P1	3.7	14.8	A shallow channel feature identified either beneath an acoustically quiet unit which may be modern sands or potentially a member of the Boxtel formation. Feature has an undulating, occasionally poorly-defined defined basal reflector and acoustically quiet fill with, which may indicate fine-grained sediments deposited in a low-energy environment.

79123	High amplitude reflector	P1	3.3	6.4	A distinct, undulating high-amplitude reflector identified beneath an acoustically quiet unit which was found by Vibrocores 553-VC-B09-402 to 403 to comprise sandy silt and silty sandy clay. The base of the feature corresponds with a layer of peat, identified in both vibrocores, indicating a former terrestrial landscape.
79124	Channel	P1	3.7	11.3	A broad, shallow channel or infilled depression identified beneath an acoustically quiet unit. Feature has an undulating, occasionally poorly-defined defined basal reflector and acoustically quiet fill, with occasional horizontal reflectors, which was found by Vibrocores 553-VC-B09-404 to 407 to comprise low-strength clay with laminations of sand and organic matter with a layer of peat corresponding with the base of the feature.
79125	Cut and fill	P2	2.9	9.1	A shallow, simple cut and fill identified below an acoustically quiet unit, cutting through a distinct horizontal reflector, possibly representing a peat horizon although appears less distinct on this line. Feature had a faint basal reflector and acoustically quiet fill. Possible remnants of a buried fluvial feature, possibly related to **79126**.
79126	Cut and fill	P2	3.1	7	A shallow, simple cut and fill identified below an acoustically quiet unit, cutting through a distinct horizontal reflector, possibly representing a peat horizon. Feature had a faint basal reflector and acoustically quiet fill. Possible remnants of a buried fluvial feature, possibly related to **79125**.
79127	High amplitude reflector	P1	2.7	3.7	A distinct, high-amplitude reflector identified beneath an acoustically quiet unit which was found by Vibrocores 553-VC-B09-402 to 409 to comprise silt and clay, overlying a unit characterised by numerous horizontal reflectors, found by both vibrocores to contain peat. The base of the feature corresponds with a layer of peat, identified in both vibrocores, indicating a former terrestrial landscape.
79128	Channel	P1	3.4	10.1	A broad, shallow channel or infilled depression identified either beneath an acoustically quiet unit. Feature has an undulating, occasionally poorly-defined defined basal reflector and acoustically quiet fill, with occasional horizontal reflectors, which was found by Vibrocores 553-VC-B09-410 to comprise lew-strength clay with laminations of sand and organic matter. A layer of peat corresponds with the base of the feature.
79129	Cut and fill	P1	3.6	15.8	A small simple cut and fill identified beneath an acoustically quiet unit, cutting into the interpreted Eem formation. Feature has a poorly-defined basal reflector and acoustically chaotic fill. Unit fill was found by vibrocore 553-VC-B09-411 to comprise clay overlying peat. Possible remnants of a buried fluvial feature.
79130	High amplitude reflector	P2	3.5	4.1	A high amplitude reflector identified at the top of the interpreted Eem formation, beneath unit of interpreted marine sands. Possible peat, but appears less distinct and therefore less certain.

79131	High amplitude reflector	P2	3	3.4	A high amplitude reflector identified at the top of the interpreted Eem formation, beneath an acoustically quiet unit. Possible peat, but appears less distinct and therefore less certain.
79132	Channel	P1	2.9	8.3	A small channel feature identified beneath a thin unit of acoustically quiet sediments. Feature had a well defined basal reflector and appears to have slightly chaotic fill which may indicate coarse-grained sediments.
79133	Cut and fill	P1	3.2	6.7	A small simple cut and fill identified beneath a unit an acoustically quiet unit, cutting into the interpreted Eem, or possibly Boxtel formation. Feature has a relatively distinct basal reflector and slightly acoustically chaotic fill. Unit fill was found by vibrocore 553-VC-B09-411 to comprise gravelly, sandy clay overlying sand with frequent pockets of peat. Possible remnants of a buried fluvial feature.
79134	High amplitude reflector	P1	2.4	3.7	A distinct, high-amplitude reflector identified beneath an acoustically quiet unit which was found by Vibrocores 553-VC-B09-402 to 409 to comprise low to extremely low-strength clay. High amplitude reflector corresponds with a layer of peat, indicating a former terrestrial landscape. Located adjacent to channel feature **79135** and possibly related.
79135	Channel	P1	2.9	11	A shallow channel feature identified either beneath an acoustically quiet unit. Feature has an undulating, occasionally poorly-defined defined basal reflector and acoustically chaotic fill, with occasional horizontal reflectors. Unit fill was found by Vibrocores 553-VC-B09-428 to comprise low-strength clay with laminations of sandy silty clay and organic material. A number of gravel-sized fragments of wood were noted at 4.76 - 4.85 m.
79136	High amplitude reflector	P2	1.9	6.7	A high amplitude reflector identified within an upper, slightly acoustically chaotic unit interpreted as the Boxtel formation. Feature appears to be slightly inset in places. Possible shallow channel or peat, but appears less distinct and therefore less certain.
79137	Cut and fill	P1	0.6	11	A distinct simple cut and fill identified either directly at the seabed or beneath a veneer of seabed sediments. The feature is seen to cut through a slightly acoustically chaotic unit, which may represent the Boxtel formation, into an acoustically quiet formation (possible Eem). The feature has a distinct basal reflector and some draping horizons indicating layered fill. The feature is causing blanking of lower horizons, possibly indicating the presence of gas caused by the microbial breakdown of organic matter. Vibrocore 553-VC-B09-435 found the feature fill comprises sand with pockets of peat over a thick layer of slightly clayey peat. Possible remnants of a buried fluvial feature.

79138	Channel	P2	12.9	37.6	A broad channel feature identified below an acoustically quiet unit interpreted as the possible Eem formation, cutting into a more acoustically chaotic unit. Feature has a relatively defined basal reflector, although this is not always clearly discernible due to the blanking caused by the overlying simple cut and fill **79137**. The feature has some faint sub horizontal reflectors, which may indicate layered sediments. Due to the uncertain age of the feature it has been discriminated as P2.
79139	Channel	P2	7.8	43.4	A broad channel feature identified below an acoustically quiet unit interpreted as the possible Eem formation, cutting into a more acoustically chaotic unit. Feature has a relatively defined basal reflector, although this is not always clearly discernible due to depth of the feature extending beyond the SBP penetration. The feature fill is acoustically quiet with some undulating internal horizons. Due to the uncertain age of the feature it has been discriminated as P2.
79140	High amplitude reflector	P2	8.2	9.6	A distinct, fairly extensive and slightly undulating high amplitude reflector identified at the base of an acoustically quiet unit, interpreted as the possible Eem formation. It is noted in DINOloket that the lower boundary of the Eem formation has localised areas of Gyttja at its base, and therefore it is possible that the high amplitude reflector mapped here represents that. As the Eem formation was deposited in a maritime setting, the sediments associated with it are unlikely to be of archaeological interest. However, as the unit is not definitively the Eem formation, the feature has been retained here as of possible interest.
79141	Channel	P1	0.8	8.1	A small channel feature identified either directly at the seabed or beneath a veneer of seabed sediments. Feature had a well defined basal reflector and appears to have slightly chaotic fill which may indicate coarse-grained sediments. The feature is causing blanking of lower horizons, possibly indicating the presence of gas caused by the microbial breakdown of organic matter. Feature is cutting through an acoustically chaotic unit found by vibrocores to comprise gravelly sand.
79142	Coarse-grained deposit	P2	1.3	7.3	An acoustically chaotic feature identified either directly at the seabed or below a veneer of seabed sediments. Feature has no clearly discernible basal reflector but is characterised by slightly chaotic fill, with occasional draping reflectors. Vibrocore 553-VC-B10-445 found the feature comprises gravelly sand. Possible channel feature or area of re-worked sediments.
79143	High amplitude reflector	P2	1.3	2.3	A high amplitude reflector identified at the top of an acoustically chaotic unit, possibly the Boxtel formation, beneath a veneer of marine sands. Possible peat, but appears less distinct and therefore less certain.

79144	High amplitude reflector	P2	1.1	2	A high amplitude reflector identified at the top of an acoustically chaotic unit, possibly the Boxtel formation, beneath a veneer of marine sands. Possible peat, but appears less distinct and therefore less certain.
79145	Channel	P1	1.6	4.9	A small channel feature identified either directly at the seabed or beneath a veneer of seabed sediments. Feature had a distinct basal reflector and possibly layered fill, although due to the shallow nature of the feature this is hard to discern. Unit fill was found by Vibrocore 553-553-VC-B10-449 to comprise low strength clay overlying a layer of peat with frequent plant fibres.
79146	High amplitude reflector	P2	1.4	1.8	A high amplitude reflector identified at the top of an acoustically chaotic unit, possibly the Boxtel formation, beneath a veneer of marine sands. Possible peat, but appears less distinct and therefore less certain.
79147	Coarse-grained deposit	P2	1.3	8	An acoustically chaotic feature identified either directly at the seabed or below a veneer of seabed sediments. Feature has no clearly discernible basal reflector but is characterised by slightly chaotic fill, with occasional draping reflectors. Possible channel feature or area of re-worked sediments.
79148	Cut and fill	P2	9.1	32.3	A broad simple cut and fille identified below an occasionally acoustically chaotic unit, found by vibrocore 553-VC-B10-455 to comprise brown sand overlying grey sand with shell fragments, interpreted as the possible Boxtel formation, although this is uncertain. Feature has a relatively defined basal reflector, although this is not always clearly discernible due to depth of the feature. The feature fill is acoustically quiet with some undulating internal horizons. Possible remnants of a buried fluvial feature although may be an internal channelling feature.
79149	Coarse-grained deposit	P2	1.2	7.5	An acoustically chaotic feature identified either directly at the seabed or below a veneer of seabed sediments. Feature has no clearly discernible basal reflector but is characterised by slightly chaotic fill, with occasional draping reflectors. Vibrocore 553-VC-B10-458 found the feature comprises gravelly sand with occasional laminae of clay and pockets of silt. Possible channel feature or area of re-worked sediments.
79150	High amplitude reflector	P2	11.5	19.5	A distinct, high amplitude reflector identified at the base of an acoustically quiet unit, possibly infilling depressions, interpreted as the possible Eem formation. It is noted in DINOloket that the lower boundary of the Eem formation has localised areas of Gyttja at its base, and therefore it is possible that the high amplitude reflector mapped here represents that, although it may also represent internal channelling within a unit. Due to the uncertainty of the features formation and depositional environment, the feature has been retained here as of possible interest.

79151	High amplitude reflector	P2	11.4	12.6	A distinct, high amplitude reflector identified at the base of an acoustically quiet unit, possibly infilling depressions, interpreted as the possible Eem formation. It is noted in DINOloket that the lower boundary of the Eem formation has localised areas of Gyttja at its base, and therefore it is possible that the high amplitude reflector mapped here represents that. As the Eem formation was deposited in a maritime setting, the sediments associated with it are unlikely to be of archaeological interest. However, as the unit is not definitively the Eem formation, the feature has been retained here as of possible interest.
79152	Coarse-grained deposit	P2	1.2	11.1	An acoustically chaotic feature identified either directly at the seabed or below a veneer of seabed sediments. Feature has no clearly discernible basal reflector but is characterised by slightly chaotic fill which appear to cut through into the underlying acoustically quiet unit. Vibrocore 553-VC-B10-463 found the feature comprises gravelly sand with laminae of dark brown silty organic material between 3.58 and 3.61 m. Possible channel feature or area of re-worked sediments.
79153	Cut and fill	P2	5.3	6.5	A small simple cut and fill identified beneath an acoustically chaotic unit interpreted as the possible Boxtel formation. Feature had a distinct basal reflector and acoustically chaotic fill similar to the overlying unit. Possible remnants of a buried fluvial feature or shallow infilled depression.
79154	Cut and fill	P2	4.9	9.2	A small simple cut and fill identified beneath an acoustically chaotic unit interpreted as the possible Boxtel formation. Feature had a distinct basal reflector and acoustically chaotic fill similar to the overlying unit. Possible remnants of a buried fluvial feature or shallow infilled depression.
79155	Cut and fill	P2	4.3	8.1	A small simple cut and fill identified beneath an acoustically chaotic unit interpreted as the possible Boxtel formation. Feature had a distinct basal reflector and acoustically chaotic fill similar to the overlying unit. Possible remnants of a buried fluvial feature or shallow infilled depression.
79156	Coarse-grained deposit	P2	3.3	11.9	A possible coarse-grained deposit identified beneath, or possibly truncated by, an overlying acoustically quiet unit. Feature has a distinct basal reflector and slightly acoustically chaotic fill. Possible re-worked sediments or may be gravelly sediments related to the overlying feature.
79157	High amplitude reflector	P1	3.3	4.4	A distinct, high-amplitude reflector identified beneath an acoustically quiet unit which was found by Vibrocores 553-VC-B10-465 to comprise slightly gravelly sand with shell fragments. The feature corresponds with a layer of peat, indicating a former terrestrial landscape.

79158	Cut and fill	P2	1.5	10.7	A small possible channel feature identified either directly BSB or beneath a veneer of seabed sediments. Feature doesn't have a clearly definable basal reflector, however fill is characterised by acoustically chaotic fill.
79159	Cut and fill	P2	7.5	15.3	A possible infilled depression or simple cut and fill identified beneath a slightly acoustically chaotic upper unit found by vibrocore 553-VC-B10-472 to comprise slightly gravelly silty sand. Feature fill is characterised by numerous sub-horizontal reflectors, possibly indicating cross-bedding.
79160	High amplitude reflector	P1	1.8	4.6	A distinct, high amplitude reflector identified at the top of a unit of sand, beneath thin unit characterised by numerous horizontal reflector, possibly indicating well-layered sediments. Appears slightly inset in places. Feature sampled by vibrocore 553-VC-B10-476 which indicates thinly laminated clay overlying gravelly sand. The feature is identified to one side of a channel feature, and may represent associated fine-grained deposits such as overbank deposits.
79161	Channel	P1	2.7	10.6	A distinct , complex channel feature identified beneath a thin acoustically quiet unis, cutting into a more acoustically chaotic unit. Feature has a relatively distinct basal reflector and fill characterised by at least two separate phases of fill, the upper if which is characterised by numerous sub-horizontal reflectors indicating layered sediments.
79162	High amplitude reflector	P2	9.7	13.3	A distinct, high amplitude reflector identified beneath a channel feature. Feature may represent an internal reflector within the underlying sediment, however it has the potential of representing the basal reflector of an earlier phase of cut and fill related to overlying channel **79161**; and, as such, has been retained as a precaution.
79163	High amplitude reflector	P1	2.3	4.2	A distinct, high amplitude reflector identified at the top of a unit of sand, beneath thin unit characterised by numerous horizontal reflector, possibly indicating well-layered sediments. Appears slightly inset in places. Feature sampled by vibrocore 553-VC-B10-477 which indicates sandy silt with thick laminations of clay overlying sand. The feature is identified to one side of a channel feature, and may represent associated fine-grained deposits such as overbank deposits.
79164	High amplitude reflector	P2	2.1	2.5	A distinct, high amplitude reflector identified at the edge of an interpreted channel feature (**79165**), beneath a thin acoustically quiet unit of possible marine sands. The feature may represent associated fine-grained deposits such as overbank deposits.

79165	Channel	P1	2.2	11.5	A distinct, complex channel feature identified beneath a thin unit of marine sands, cutting into a generally acoustically quiet unit, possibly representing the Eem formation. Feature has a distinct basal reflector and at least 2 phases of cut and fill, with unit fill characterised by numerous sup-horizonal reflectors. Unit fill was found by vibrocore 553-VC-B10-479 to comprise slightly sandy silt with frequent thin laminae of brown organic matter.
79166	High amplitude reflector	P2	2.3	2.7	A high amplitude reflector identified at the top of a slightly acoustically chaotic unit, possibly the Boxtel formation, beneath a veneer of marine sands. Possible peat, but appears less distinct and therefore less certain.
79167	High amplitude reflector	P2	1.5	1.6	A high amplitude reflector identified at the top of a slightly acoustically chaotic unit, found by nearby vibrocore 553-VC-B10-484 to comprise sand, beneath a veneer of marine sands. Possible peat, but appears less distinct and therefore less certain.
79168	High amplitude reflector	P2	1.5	2	A high amplitude reflector identified at the top of a slightly acoustically chaotic unit, found by nearby vibrocore 553-VC-B10-483 to comprise sand, beneath a veneer of marine sands. Possible peat, but appears less distinct and therefore less certain.
79169	High amplitude reflector	P2	1.3	2	A high amplitude reflector identified at the top of a slightly acoustically chaotic unit beneath a veneer of marine sands. Feature possibly corresponds with a sand unit with pockets of brown organic matter and gravelly sand identified by vibrocore 553-VC-B10-484 although these appear to be slightly shallower than identified in the geophysical data. Possible former terrestrial surface, but appears less distinct and therefore less certain.
79170	High amplitude reflector	P2	1.4	2	A high amplitude reflector identified at the top of a slightly acoustically chaotic unit, beneath a veneer of marine sands. Close to channel feature **79171** and possibly related. Possible peat, but appears less distinct and therefore less certain.
79171	Channel	P1	1	8.8	A distinct channel feature identified either directly at the seabed or beneath a veneer of marine sediments. Feature has a distinct basal reflector and acoustically chaotic fill which appears to cause blanking of lower horizons, possibly indicating the presence of gas caused by the microbial breakdown of organic matter. Feature was sampled by vibrocore 553-VC-B10-486 and found to comprise extremely low-strength clay overlying peat with occasional thin laminae of clay.

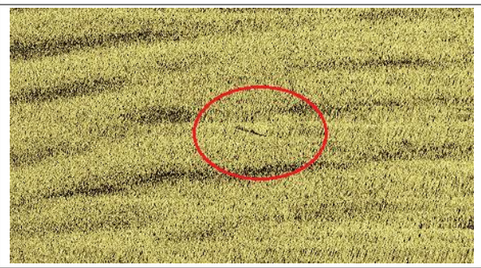
79172	High amplitude reflector	P2	6.4	7.5	A high amplitude reflector identified at the top of a slightly acoustically chaotic unit, beneath a veneer of marine sands. Possibly an internal reflector; however, as there is the possibility of the feature representing peat it has been retained as a precaution.
79173	High amplitude reflector	P2	7	7.2	A high amplitude reflector identified at the top of a slightly acoustically chaotic unit, beneath a veneer of marine sands. Possibly an internal reflector; however, as there is the possibility of the feature representing peat it has been retained as a precaution.
79174	High amplitude reflector	P2	7	7.3	A high amplitude reflector identified at the top of a slightly acoustically chaotic unit, beneath a veneer of marine sands. Possibly an internal reflector; however, as there is the possibility of the feature representing peat it has been retained as a precaution.
79175	High amplitude reflector	P2	7.1	7.2	A high amplitude reflector identified at the top of a slightly acoustically chaotic unit, beneath a veneer of marine sands. Possibly an internal reflector; however, as there is the possibility of the feature representing peat it has been retained as a precaution.
79176	High amplitude reflector	P2	6.9	7.2	A high amplitude reflector identified at the top of a slightly acoustically chaotic unit, beneath a veneer of marine sands. Possibly an internal reflector; however, as there is the possibility of the feature representing peat it has been retained as a precaution.
79177	High amplitude reflector	P2	5.8	6.7	A high amplitude reflector identified at the top of a slightly acoustically chaotic unit, beneath a veneer of marine sands. Possibly an internal reflector or base of the upper sand unit; however, as there is the possibility of the feature representing peat it has been retained as a precaution.
79178	Channel	P1	6.8	12.7	A small possible channel feature identified below the upper unit, found by nearby vibrocore 553-VC-B10-493 to comprise gravelly sand with shell fragments. Feature has a distinct basal reflector and acoustically chaotic fill, with occasional faint draping reflectors.
79179	High amplitude reflector	P2	6	6.8	A high amplitude reflector identified at the top of a slightly acoustically chaotic unit, beneath a veneer of sands. Vibrocore 553-VC-B10-494 notes a thick laminae of organic matter at 5.30 - 5.31 m which may be associated, although this is shallower than identified in the geophysical data and may therefore be unrelated. Possibly an internal reflector or base of the upper sand unit; however, as there is the possibility of the feature representing peat it has been retained as a precaution.

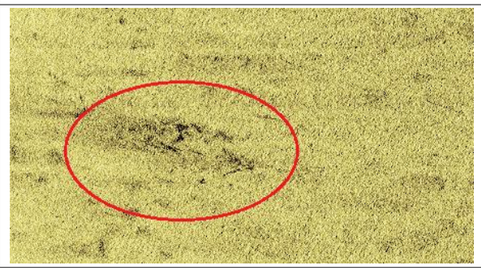
79180	Cut and fill	P2	1.3	12.8	A possible complex cut and fill identified cutting through the upper sand unit. Basal reflector hard to discern however may extend to the seabed. Unit fill appears to be slightly chaotic with at least two phases of fill. Possible cut and fill however may also be re-worked sediments.
79181	High amplitude reflector	P2	0.9	1.6	A distinct high amplitude reflector identified close to the seabed, beneath a possible veneer of modern marine sediments. Feature is overlying an acoustically chaotic unit, possibly the Boxtel formation. Possible peat, but appears less distinct and therefore less certain.
79182	High amplitude reflector	P2	1.2	1.6	A distinct high amplitude reflector identified close to the seabed, beneath a possible veneer of modern marine sediments. Feature is overlying an acoustically chaotic unit, possibly the Boxtel formation. Possible peat, but appears less distinct and therefore less certain.
79183	Channel	P2	5.7	32.7	A distinct channel feature identified beneath an upper acoustically chaotic unit found by vibrocore 553-VC-B10-499 as gravelly sand with some layers containing shell fragments. Feature has a distinct basal reflector and acoustically quiet fill and some faint, draping reflectors which may have just been sampled by vibrocore 553-VC-B10-499 and found to comprise firm to stiff silty clay.
79184	Cut and fill	P2	5.7	13.2	A simple cut and fill identified on one line beneath an upper acoustically chaotic unit, possibly the Boxtel formation. Feature has a relatively defined basal reflector and acoustically quiet fill indicating fine-grained deposits. Possible remnants of a buried fluvial feature or may be an internal reflector.
79185	Channel	P1	0.8	6.5	A distinct channel feature identified either directly at the seabed or beneath a veneer of seabed sediments, upper acoustically chaotic unit interpreted as the possible Boxtel formation. Feature has a distinct basal reflector and fill characterised by numerous sub-horizontal reflectors indicating well-layered sediments. Unit fill was found by vibrocore 553-VC-B10-501 to comprise silt with frequent thin laminae of brown organic matter overlying peat.
79186	Channel	P1	4.4	16.9	A distinct channel feature identified beneath an upper acoustically chaotic unit interpreted as the possible Boxtel formation. Feature has a distinct basal reflector and acoustically quiet fill and some faint, draping reflectors. Possibly related to nearby feature **79187**.
79187	Cut and fill	P2	3.8	8.3	A simple cut and fill identified beneath an upper acoustically chaotic unit interpreted as the possible Boxtel formation. Feature has a distinct basal reflector and acoustically quiet fill and some faint, draping reflectors. Possible remnants of a buried fluvial feature related to nearby feature **79186**.

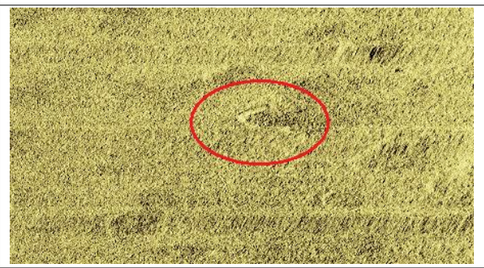
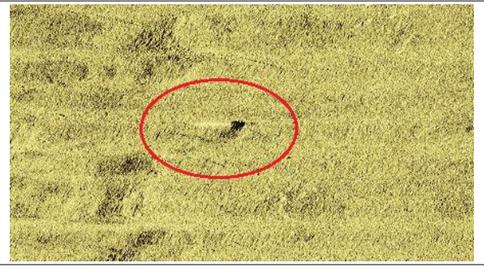
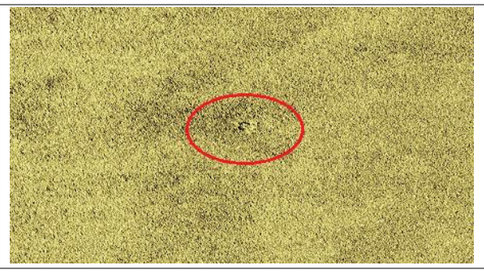
79188	Cut and fill	P2	2.2	11.6	A small, simple cut and fill identified beneath the upper acoustically quiet unit. Feature has a relatively distinct basal reflector and acoustically quiet fill, indicating fine-grained sediments. Possible remnants of a buried fluvial feature.
79189	Cut and fill	P2	3	8.6	A simple cut and fill feature identified beneath the upper acoustically quiet unit, with a relatively defined basal reflector and fill characterised by numerous draping reflectors indicating layered fill. Feature was found by vibrocore 553-VC-B12-520 to comprise sandy silt with thin to thick bands of sand. Possible remnants of a buried fluvial feature.
79190	High amplitude reflector	P2	10.6	12.8	A distinct, high amplitude reflector identified slightly to the south-west of the base of channel feature **79165**. Feature may represent an internal reflector within the underlying sediment, however it has the potential of representing the basal reflector of an earlier phase of cut related to overlying channel **79165**; and, as such, has been retained as a precaution.

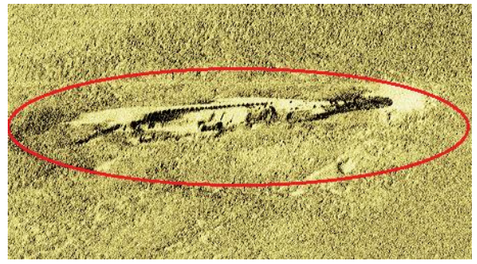
Appendix 4: Seabed features of archaeological potential

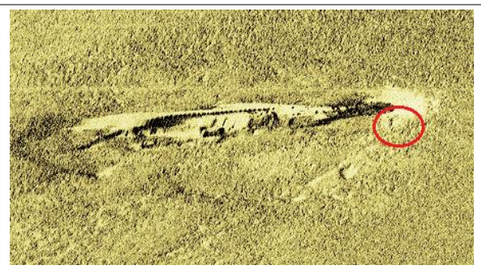
ID	Classification	Easting	Northing	Archaeological discrimination	Length (m)	Width (m)	Height (m)	Depth below seabed (m)	Magnetic amplitude (nT)	Description	Images of possible archaeological features with surface expression	Anomaly type	External references
7472	Debris	512057	5862960	A2	5.9	5.6	-	-	-	Originally identified during the 2019 assessment of priority areas as a medium sized, distinct, rectangular dark reflector with no discernible shadow that is situated in an area of sand ripples. The feature is possibly slightly broken up or partially buried. Possible item of debris.		SSS	-
7500	Magnetic	516415	5877111	A2	-	-	-	-	14	Identified in the Mag. data as a small, broad dipole with peak and trough on one survey line. No corresponding SSS or MBES contact. May represent possible ferrous debris with no surface expression.		Mag.	-
7501	Magnetic	517527	5882038	A2	-	-	-	-	36	Identified in the Mag. data as a small dipole with peak and trough on one survey line. No corresponding SSS or MBES contact. May represent possible ferrous debris with no surface expression.		Mag.	-
7502	Magnetic	517803	5882229	A2	-	-	-	-	17	Identified in the Mag. data as a small, broad dipole with peak and trough over two survey lines. No corresponding SSS or MBES contact. May represent possible ferrous debris with no surface expression.		Mag.	-
7503	Magnetic	517998	5884113	A2	-	-	-	-	17	Identified in the Mag. data as a small, broad dipole with peak and trough on one survey line. No corresponding SSS or MBES contact. May represent possible ferrous debris with no surface expression.		Mag.	-
7504	Magnetic	519195	5888047	A2	-	-	-	-	15	Identified in the Mag. data as a small positive monopole with peak and trough on one survey line. No corresponding SSS or MBES contact. May represent possible ferrous debris with no surface expression or a natural feature.		Mag.	-
7505	Magnetic	519381	5890167	A2	-	-	-	-	11	Identified in the Mag. data as a small positive monopole with peak and trough on one survey line. Possibly part of a linear trend with 7506 and 7507. No corresponding SSS or MBES contact. May represent possible ferrous debris with no surface expression or a modern anthropogenic feature. It should be noted that the feature is located approximately 150 m north-east of the UK-Germany 3 cable, and may therefore represent that. However, as this cannot be confirmed without further investigation, the feature has been retained as a precaution.		Mag.	-
7506	Magnetic	519479	5890232	A2	-	-	-	-	20	Identified in the Mag. data as a small positive monopole with peak and trough on one survey line. Possibly part of a linear trend with 7505 and 7507. No corresponding SSS or MBES contact. May represent possible ferrous debris with no surface expression or a modern anthropogenic feature. It should be noted that the feature is located approximately 150 m north-east of the UK-Germany 3 cable, and may therefore represent that.		Mag.	-

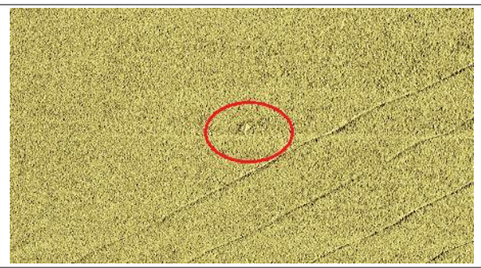
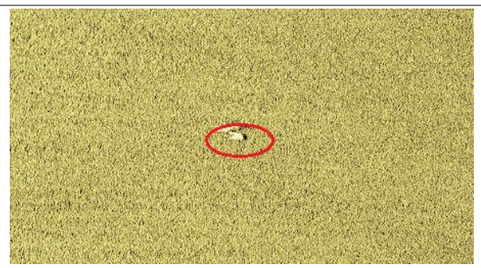
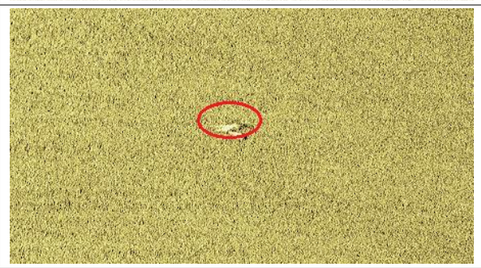
ID	Classification	Easting	Northing	Archaeological discrimination	Length (m)	Width (m)	Height (m)	Depth below seabed (m)	Magnetic amplitude (nT)	Description	Images of possible archaeological features with surface expression	Anomaly type	External references
										However, as this cannot be confirmed without further investigation, the feature has been retained as a precaution.			
7507	Magnetic	519736	5890316	A2	-	-	-	-	14	Identified in the Mag. data as a small positive monopole with peak and trough on one survey line. Possibly part of a linear trend with 7505 and 7506. No corresponding SSS or MBES contact. May represent possible ferrous debris with no surface expression or a modern anthropogenic feature. It should be noted that the feature is located approximately 150 m north-east of the UK-Germany 3 cable, and may therefore represent that. However, as this cannot be confirmed without further investigation, the feature has been retained as a precaution.		Mag.	-
7508	Dark reflector	521532	5897505	A2	4.5	0.3	-	-	-	Identified in the SSS data as a short, straight, elongate dark reflector with no clearly discernible height. No corresponding MBES or Mag. contact. Possible non-ferrous debris or a natural feature.		SSS	-
7509	Magnetic	522863	5901510	A2	-	-	-	-	7	Identified in the Mag. data as a small negative monopole with peak and trough on one survey line. Broad, but distinct. No corresponding SSS or MBES contact. May represent possible ferrous debris with no surface expression.		Mag.	-
7510	Magnetic	523555	5904479	A2	-	-	-	-	9	Identified in the Mag. data as a small, broad dipole with peak and trough on one survey line. No corresponding SSS or MBES contact. May represent possible ferrous debris with no surface expression.		Mag.	-
7511	Magnetic	524275	5906445	A2	-	-	-	-	33	Identified in the Mag. data as a small negative monopole with peak and trough on one survey line. Broad, but distinct along the line of data. No corresponding SSS or MBES contact. May represent possible ferrous debris with no surface expression.		Mag.	-
7513	Magnetic	525525	5911357	A2	-	-	-	-	15	Identified in the Mag. data as a small, broad dipole with peak and trough over two survey lines. No corresponding SSS or MBES contact. May represent possible ferrous debris with no surface expression.		Mag.	-
7514	Magnetic	525879	5912325	A2	-	-	-	-	5	Identified in the Mag. data as a small negative monopole with peak and trough on one survey line. No corresponding SSS or MBES contact. May represent possible ferrous debris with no surface expression.		Mag.	-

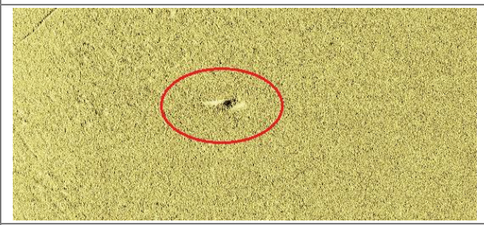
ID	Classification	Easting	Northing	Archaeological discrimination	Length (m)	Width (m)	Height (m)	Depth below seabed (m)	Magnetic amplitude (nT)	Description	Images of possible archaeological features with surface expression	Anomaly type	External references
7515	Seabed disturbance	527204	5917445	A2	24.5	18.9	-	-	-	Identified in the SSS data as an irregular area of seabed with patches of high reflectivity. No corresponding MBES or Mag. contact. Possible non-ferrous debris or a natural feature.		SSS	-
7516	Magnetic	527776	5918851	A2	-	-	-	-	11	Identified in the Mag. data as a small negative monopole with peak and trough over two survey lines. No corresponding SSS or MBES contact. May represent possible ferrous debris with no surface expression.		Mag.	-
7517	Buried object	528669	5920182	A2	-	-	-	2.0	-	A buried feature identified in the SBP data as a parabola, with a disturbance to the surrounding sediment extending approximately 100 m to the south-west. Feature is seen to cause blanking of the lower horizons. As the feature is within the interpreted modern Holocene sediments, it is unlikely to be of palaeoenvironmental interest, however it has the potential of being a buried anthropogenic feature. Feature may represent an object, and associated area of dredging, related to modern infrastructure, although there is nothing identified at this location on the admiralty charts. Possible buried debris item of natural feature.		SBP	-
7518	Magnetic	530008	5923592	A2	-	-	-	-	17	Identified in the Mag. data as a small negative monopole with peak and trough on one survey line. No corresponding SSS or MBES contact. May represent possible ferrous debris with no surface expression.		Mag.	-
7519	Magnetic	530106	5923839	A2	-	-	-	-	11	Identified in the Mag. data as a small negative monopole with peak and trough on one survey line. No corresponding SSS or MBES contact. May represent possible ferrous debris with no surface expression.		Mag.	-
7474	Recorded Wreck	530737	5925181	A3	-	-	-	-	-	Position of a recorded wreck in the UKHO record. The position is for a steel wreck and was first reported in 1971. The record has since been amended to dead. During the 2019 assessment of priority areas, a very faint and straight dark reflector measuring 4.7 x 0.8 m was identified 57.0 m east of a recorded wreck position; however, this was deemed to be natural and of no relation to the recorded wreck position. No evidence of the wreck was identified in the geophysical data.		SSS	28293 (UKHO)
7520	Magnetic	530776	5925585	A2	-	-	-	-	14	Identified in the Mag. data as a distinct, small negative monopole with peak and trough over two survey lines. No corresponding SSS or MBES contact. May represent possible ferrous debris with no surface expression.		Mag.	-

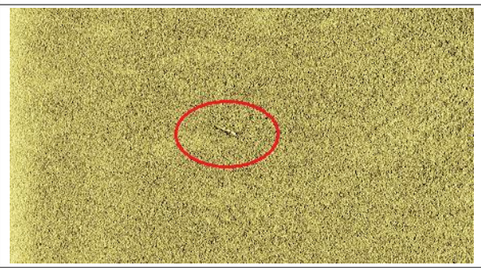
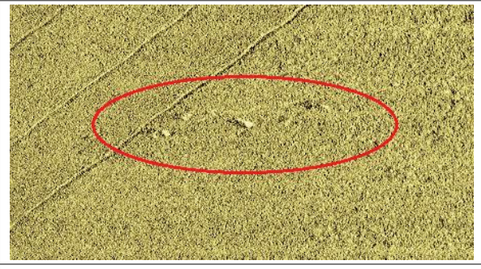
ID	Classification	Easting	Northing	Archaeological discrimination	Length (m)	Width (m)	Height (m)	Depth below seabed (m)	Magnetic amplitude (nT)	Description	Images of possible archaeological features with surface expression	Anomaly type	External references
7521	Dark reflector	531060	5925962	A2	4.0	2.9	0.5	-	-	Identified in the SSS data as a curved, elongate dark reflector, with a faint shadow. Appears isolated on the seabed. In the MBES data, this was seen as a small, distinct mound, squared in plan, with gently sloped sides. This appears anomalous for the area. No corresponding Mag. contact. Possible non-ferrous debris or a natural feature.		SSS, MBES	-
7522	Magnetic	532964	5927977	A2	-	-	-	-	7	Identified in the Mag. data as a small, broad dipole with peak and trough on one survey line. No corresponding SSS or MBES contact. May represent possible ferrous debris with no surface expression.		Mag.	-
7523	Bright reflector	536049	5928981	A2	5.7	4.9	-	-	-	Identified in the SSS data as a small, slightly elongate bright reflector, which possibly extends out on one side to form an 'L' shape. Possibly a shadow of a poorly defined dark reflector although this is not clear. No corresponding MBES or Mag. contact. Possible non-ferrous debris or a natural feature.		SSS	-
7524	Dark reflector	536662	5929287	A2	2.3	2.0	0.6	-	-	Identified in the SSS data as a small but distinct dark reflector with height. In the MBES data, this was seen as a small distinct mound, with a slightly squared plan. Appears anomalous. No corresponding Mag. contact. Possible non-ferrous debris or a natural feature.		SSS, MBES	-
7525	Magnetic	538234	5929501	A2	-	-	-	-	6	Identified in the Mag. data as a small negative monopole with peak and trough on one survey line. No corresponding SSS or MBES contact. May represent possible ferrous debris with no surface expression.		Mag.	-
7526	Dark reflector	539154	5929422	A2	3.1	1.7	-	-	-	Identified in the SSS data as a small, narrow, elongate dark reflector that appears to curve round in a 'C' shape. Identified within a small patch of disturbed sediment. Feature appears isolated on the seabed. No corresponding MBES or Mag. contact. Possible non-ferrous debris or a natural feature.		SSS	-

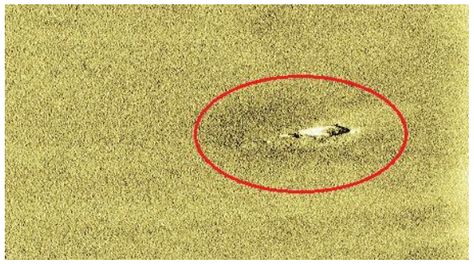
ID	Classification	Easting	Northing	Archaeological discrimination	Length (m)	Width (m)	Height (m)	Depth below seabed (m)	Magnetic amplitude (nT)	Description	Images of possible archaeological features with surface expression	Anomaly type	External references
7527	Magnetic	539724	5929553	A2	-	-	-	-	6	Identified in the Mag. data as a small, broad dipole with peak and trough over two survey lines. No corresponding SSS or MBES contact. May represent possible ferrous debris with no surface expression.		Mag.	-
7528	Magnetic	540700	5930059	A2	-	-	-	-	11	Identified in the Mag. data as a small, broad dipole with peak and trough on one survey line. Possibly part of a linear formation with **7529** and **7530**, however no features are recorded on the Admiralty Chart. No corresponding SSS or MBES contact. Features likely represent a modern anthropogenic feature however, as this cannot be proven without further investigation, they have been retained here as a precaution. Possible ferrous debris with no surface expression.		Mag.	-
7529	Magnetic	540846	5930066	A2	-	-	-	-	15	Identified in the Mag. data as a small, broad dipole with peak and trough on one survey line. Possibly part of a linear formation with **7528** and **7530**, however no features are recorded on the Admiralty Chart. No corresponding SSS or MBES contact. Features likely represent a modern anthropogenic feature however, as this cannot be proven without further investigation, they have been retained here as a precaution. Possible ferrous debris with no surface expression.		Mag.	-
7530	Magnetic	540984	5930069	A2	-	-	-	-	29	Identified in the Mag. data as a small negative monopole with peak and trough on one survey line. Possibly part of a linear formation with **7528** and **7529**, however no features are recorded on the Admiralty Chart. No corresponding SSS or MBES contact. Features likely represent a modern anthropogenic feature however, as this cannot be proven without further investigation, they have been retained here as a precaution. Possible ferrous debris with no surface expression.		Mag.	-
7477	Wreck	545026	5932601	A1	37.0	9.9	1.7	-	11	Originally identified during the 2019 assessment of priority areas as a large wreck that appears to be relatively intact and possibly upright, with some internal structure visible in the SSS data. One edge of the hull appears to be partially degraded or buried by sediment. There are some slightly slatted features visible within the vessel which could be structural. The wreck is situated on a sandy and featureless area of the seabed, within a depression, with possible associated debris in the vicinity. In the MBES data this is visible as a distinct mound, orientated on an approximate north-west to south-east alignment. Scour up to -0.5 m deep is visible around the wreck and extending approximately 22.0 m to the north-east. The wreck appears on the MBES data to be in three main segments. There is a small magnetic anomaly associated with this feature indicating the presence of some ferrous material however, as the nearest magnetometer line is situated 50.0 m from the wreck, it is likely that is the true amplitude would be larger if the wreck was directly covered by the magnetometer data. This is recorded in the UKHO database as the wreck of a Fishing vessel.		SSS, MBES, Mag.	2238 (RWS), 28296 (UKHO), NL_NCN_2238 (RCE), NCN 2238, DHY2449

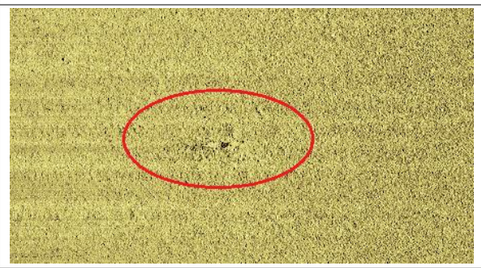
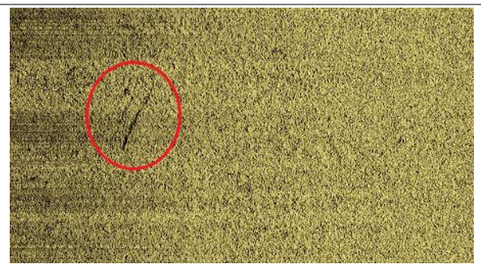
ID	Classification	Easting	Northing	Archaeological discrimination	Length (m)	Width (m)	Height (m)	Depth below seabed (m)	Magnetic amplitude (nT)	Description	Images of possible archaeological features with surface expression	Anomaly type	External references
7476	Debris	545019	5932616	A1	1.7	0.9	-	-	-	Originally identified during the 2019 assessment of priority areas as a small dark reflector with no shadow close to the stern or bow section of wreck (**7477**). This object is situated on a sandy and featureless area of the seabed and is possibly an associated item of wreck debris.		SSS	28296 (UKHO)
7475	Debris	545032	5932618	A1	4.3	0.7	-	-	-	Originally identified during the 2019 assessment of priority areas as a curved dark reflector object with no shadow situated in a slight depression on a featureless and sandy area of the seabed. This is possibly an item of debris associated with wreck **7477**.		SSS	28296 (UKHO)
7487	Recorded wreck	546919	5934236	A3	-	-	-	-	-	A recorded wreck position from the RCE database. Location was covered by the geophysical data but no remains were identified by Wessex Archaeology at this location.		-	RWS_RCE 942
7486	Recorded Wreck	546713	5934355	A3	-	-	-	-	-	A recorded wreck positioned outside of the geophysical survey data extents. This is recorded in the UKHO record as dangerous wreck. Although the feature is outside of the study area, its recommended AEZ will impact the scheme and therefore the feature has been retained here.		-	28297 (UKHO), 943 (RWS), NL_NCN_943 (RCE)
7531	Magnetic	548725	5935241	A2	-	-	-	-	8	Identified in the Mag. data as a small, broad positive monopole with peak and trough on one survey line, superimposed on an area of background noise. No corresponding SSS or MBES contact. May represent possible ferrous debris with no surface expression.		Mag.	-
7532	Magnetic	552948	5937973	A2	-	-	-	-	182	Identified in the Mag. data as a large dipole with peak and trough on one survey line. Slightly complex with a possible secondary peak to the southwest. No corresponding SSS or MBES contact. There is a UKHO position for a recorded wreck located approximately 280 m SSW of the anomaly, outside of the study area (**7607**). Due to the distance from the UKHO position, and the fact the wreck is reported as being dead in the UKHO record, this mag anomaly is not considered to be associated. However; the possibility of this representing an related feature should be noted. May represent possible ferrous debris with no surface expression.		Mag.	-
7533	Magnetic	553159	5938385	A2	-	-	-	-	51	Identified in the Mag. data as a medium dipole with peak and trough on one survey line. No corresponding SSS or MBES contact. May represent possible ferrous debris with no surface expression.		Mag.	-

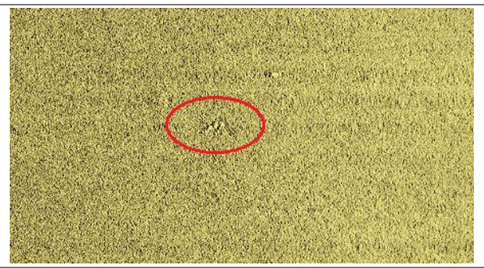
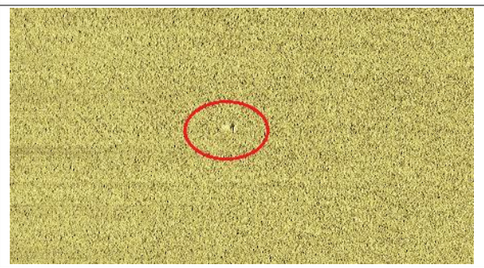
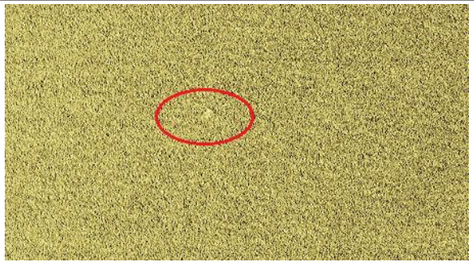
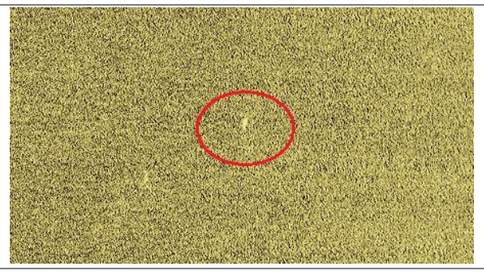
ID	Classification	Easting	Northing	Archaeological discrimination	Length (m)	Width (m)	Height (m)	Depth below seabed (m)	Magnetic amplitude (nT)	Description	Images of possible archaeological features with surface expression	Anomaly type	External references
7534	Dark reflector	557409	5941028	A2	5.0	2.2	0.1	-	-	Identified in the SSS data as a faint, slightly elongate dark reflector with height. No corresponding MBES or Mag. contact. Possible non-ferrous debris or a natural feature.		SSS	-
7535	Magnetic	557858	5941344	A2	-	-	-	-	28	Identified in the Mag. data as a small, broad dipole with peak and trough on one survey line. No corresponding SSS or MBES contact. May represent possible ferrous debris with no surface expression.		Mag.	-
7536	Magnetic	565340	5946256	A2	-	-	-	-	16	Identified in the Mag. data as a small positive monopole with peak and trough on one survey line. No corresponding SSS or MBES contact. May represent possible ferrous debris with no surface expression.		Mag.	-
7537	Magnetic	566391	5946641	A2	-	-	-	-	17	Identified in the Mag. data as a small negative monopole with peak and trough on one survey line. No corresponding SSS or MBES contact. May represent possible ferrous debris with no surface expression.		Mag.	-
7538	Dark reflector	567803	5946355	A2	3.3	0.4	0.4	-	-	Identified in the SSS data as a small, distinct dark reflector with a bright, irregular shadow. Located very close to another irregular dark reflector with height (**7539**) but otherwise in a relatively featureless area of seabed. No corresponding MBES or Mag. contact. Possible non-ferrous debris or a natural feature.		SSS	-
7539	Dark reflector	567800	5946355	A2	2.9	1.0	0.6	-	-	Identified in the SSS data as a faint, poorly defined dark reflector with a bright, irregular shadow indicating varying height. Close to a similar feature (**7538**). No corresponding MBES or Mag. contact. Possible non-ferrous debris or a natural feature.		SSS	-

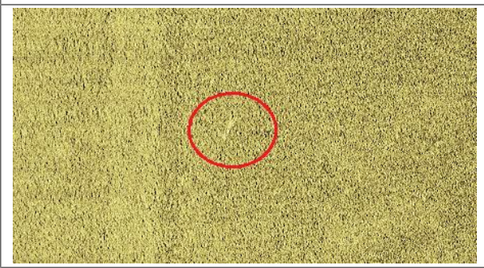
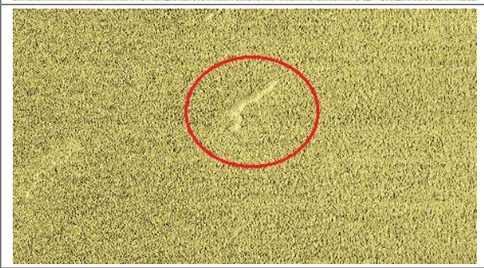
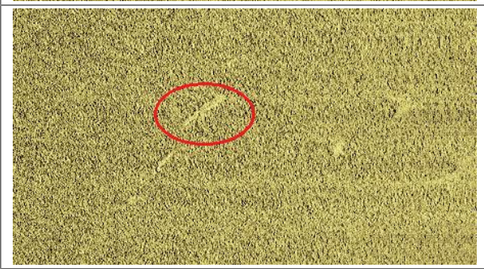
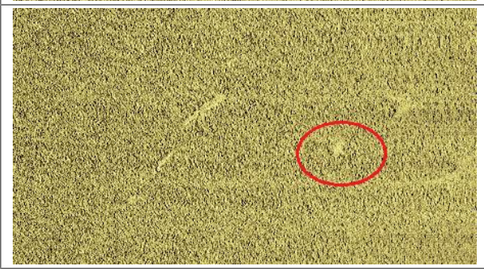
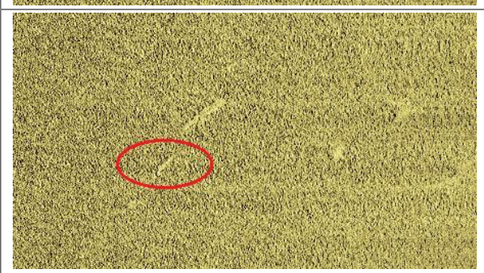
ID	Classification	Easting	Northing	Archaeological discrimination	Length (m)	Width (m)	Height (m)	Depth below seabed (m)	Magnetic amplitude (nT)	Description	Images of possible archaeological features with surface expression	Anomaly type	External references
7540	Dark reflector	571279	5946129	A2	4.8	3.5	0.5	-	-	Identified in the SSS data as a distinct, poorly defined dark reflector with height. Possibly within a slight depression, or associated scour. No corresponding MBES or Mag. contact. Possible non-ferrous debris or a natural feature.		SSS	-
7541	Mound	584239	5946750	A2	9.1	3.0	0.1	-	-	Identified in the MBES data as a distinct mound, slightly elongated and oriented north-south. The northern extent slopes more gently than the south, which has a flattened top. Profiles are steep and the feature is anomalous. No corresponding SSS or Mag. contact. Possible non-ferrous debris or a natural feature.		MBES	-
7542	Magnetic	586610	5947530	A2	-	-	-	-	34	Identified in the Mag. data as a small, broad dipole with peak and trough on one survey line. No corresponding SSS or MBES contact. May represent possible ferrous debris with no surface expression.		Mag.	-
7543	Mound	588747	5947917	A2	5.0	4.0	0.2	-	-	Identified in the MBES data as a squared mound with a flattened ridge along the top. This is distinct and anomalous for the area. A similar mound (**7544**) is located 173.0 m to the ENE. No corresponding SSS or Mag. contact. Possible non-ferrous debris or a natural feature.		MBES	-
7544	Mound	588915	5947978	A2	6.0	4.2	0.2	-	-	Identified in the MBES data as a mound, almost triangular in plan, with a flattened top. This is distinct and anomalous for the area. A similar mound (**7543**) is located 173.0 m to the WSW. No corresponding SSS or Mag. contact. Possible non-ferrous debris or a natural feature.		MBES	-

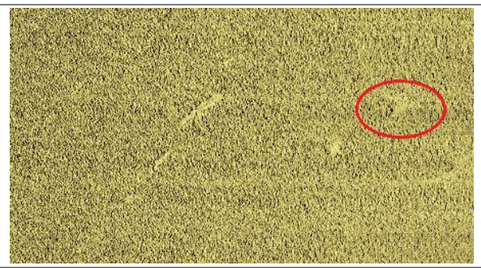
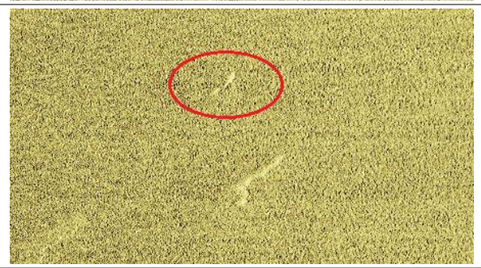
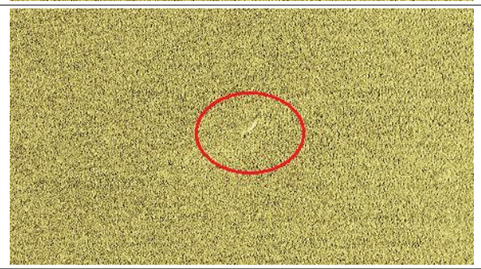
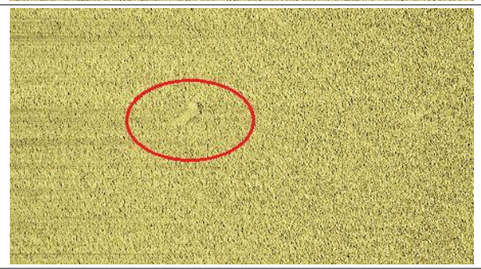
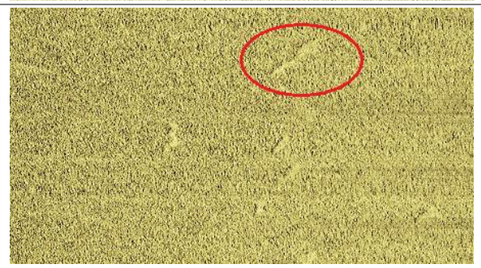
ID	Classification	Easting	Northing	Archaeological discrimination	Length (m)	Width (m)	Height (m)	Depth below seabed (m)	Magnetic amplitude (nT)	Description	Images of possible archaeological features with surface expression	Anomaly type	External references
7545	Debris	591465	5948986	A2	3.6	1.0	0.2	-	-	Identified in the SSS data as a straight, elongate dark reflector with a slight shadow. No corresponding MBES or Mag. contact. Possible item of debris.		SSS	-
7546	Seabed disturbance	591842	5949469	A2	22.0	10.2	0.2	-	-	Identified in the SSS data as a slightly elongate patch of disturbed seabed comprising several dark reflectors with height. Located close to an area of trawl scares and may therefore be disturbed by, or related to, trawling activity. No corresponding MBES or Mag. contact. Possible non-ferrous debris or a natural feature.		SSS	-
7547	Magnetic	593298	5949805	A2	-	-	-	-	48	Identified in the Mag. data as small dipoles across several lines of Mag. data. These appear to be part of a short linear WNW to ESE trend measuring 390.0 m, narrower than the study area. No corresponding SSS or MBES contact. No features are recorded on the Admiralty Chart. Feature likely represents a modern anthropogenic feature however, as this cannot be proven without further investigation, it has been retained here as a precaution. Possible ferrous debris with no surface expression.		Mag.	-
7548	Magnetic	594090	5950051	A2	-	-	-	-	23	Identified in the Mag. data as two small, broad dipoles in close proximity. No corresponding SSS or MBES contacts. This may be part of a linear trend on a north-east to south-west alignment with **7549** and **7550**. However, no features are recorded at this location on the Admiralty Chart and the anomalies are not definitively associated. Likely represents a modern anthropogenic feature however, as this cannot be proven without further investigation, it has been retained here as a precaution. Possible ferrous debris with no surface expression.		Mag.	-
7549	Magnetic	594519	5950312	A2	-	-	-	-	29	Identified in the Mag. data as two small, broad dipoles in close proximity. No corresponding SSS or MBES contacts. This may be part of a linear trend on a north-east to south-west alignment with **7548** and **7550**. However, no features are recorded at this location on the Admiralty Chart and the anomalies are not definitively associated. Likely represents a modern anthropogenic feature however, as this cannot be proven without further investigation, it has been retained here as a precaution. Possible ferrous debris with no surface expression.		Mag.	-

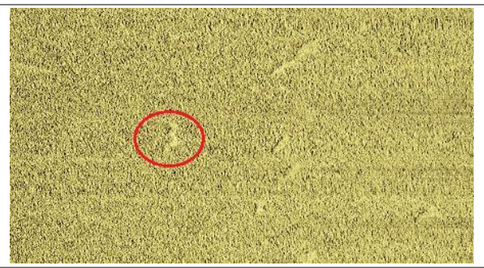
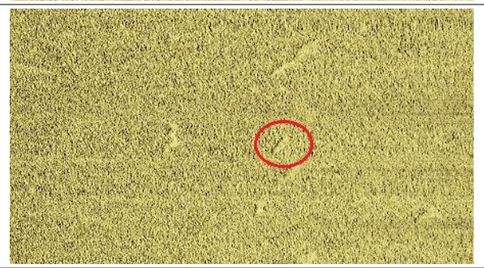
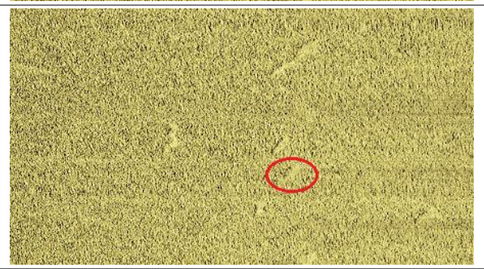
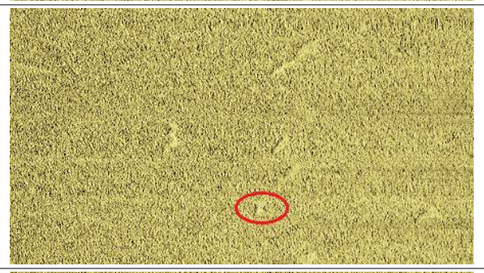
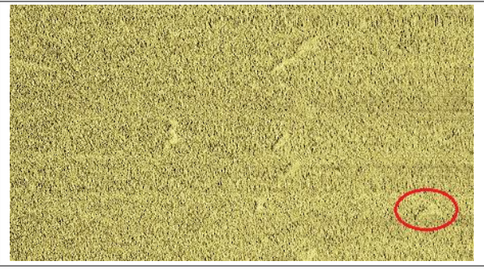
ID	Classification	Easting	Northing	Archaeological discrimination	Length (m)	Width (m)	Height (m)	Depth below seabed (m)	Magnetic amplitude (nT)	Description	Images of possible archaeological features with surface expression	Anomaly type	External references
7550	Magnetic	594791	5950508	A2	-	-	-	-	68	Identified in the Mag. data as one medium dipole and two small, broad dipoles in close proximity. No corresponding SSS or MBES contacts. This may be part of a linear trend on a north-east to south-west alignment with **7548** and **7549**. However, no features are recorded at this location on the Admiralty Chart and the anomalies are not definitively associated. Likely represents a modern anthropogenic feature however, as this cannot be proven without further investigation, it has been retained here as a precaution. Possible ferrous debris with no surface expression.		Mag.	-
7551	Magnetic	597920	5951512	A2	-	-	-	-	36	Identified in the Mag. data as small, broad dipole. No corresponding SSS or MBES contacts. May represent possible ferrous debris with no surface expression.		Mag.	-
7482	Debris field	598394	5952067	A2	10.0	10.0	1.1	-	237	Originally identified during the 2019 assessment of priority areas as a possible debris field comprising a large, distinct, slightly curved dark reflector with a bright, tapered shadow (4.2 x 2.3 x 1.1 m), in a slight depression directly next to a very small and rounded dark reflector object with a bright, small shadow (1.3 x 1.3 x 0.6 m). Some very slight dark reflectors were seen surrounding the main objects, however it is not possible to discern whether these are associated debris items or natural features. There is a large magnetic anomaly associated with this feature indicating ferrous material is present. In the MBES data this is visible as a round mound with a large depression to the north-west, there are three smaller, shallower depressions visible, one to the north-west and two to the south-west. Scour is visible extending approximately 20.0 m to the north-east of the feature. Possible ferrous item of debris		SSS, MBES, Mag	-
7552	Magnetic	602594	5953888	A2	-	-	-	-	26	Identified in the Mag. data as small, positive monopole. No corresponding SSS or MBES contacts. May represent possible ferrous debris with no surface expression.		Mag.	-
7553	Magnetic	604597	5954349	A2	-	-	-	-	12	Identified in the Mag. data as small, broad dipole. No corresponding SSS or MBES contacts. May represent possible ferrous debris with no surface expression.		Mag.	-
7554	Magnetic	614095	5957695	A2	-	-	-	-	21	Identified in the Mag. data as small, negative monopole. No corresponding SSS or MBES contacts. May represent possible ferrous debris with no surface expression.		Mag.	-
7555	Magnetic	614594	5957925	A2	-	-	-	-	9	Identified in the Mag. data as small, broad dipole. No corresponding SSS or MBES contacts. May represent possible ferrous debris with no surface expression.		Mag.	-
7556	Magnetic	615764	5957951	A2	-	-	-	-	5	Identified in the Mag. data as small, negative monopole. No corresponding SSS or MBES contacts. May represent possible ferrous debris with no surface expression.		Mag.	-
7557	Magnetic	617313	5958344	A2	-	-	-	-	15	Identified in the Mag. data as small, broad dipole. No corresponding SSS or MBES contacts. May represent possible ferrous debris with no surface expression.		Mag.	-

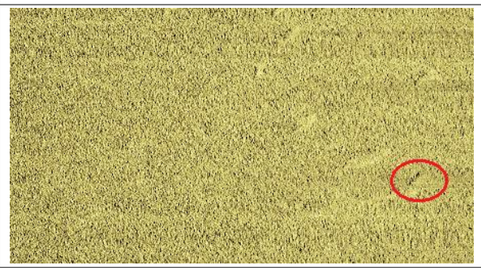
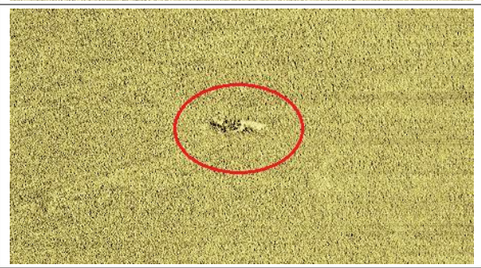
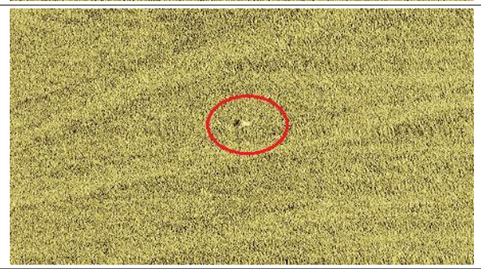
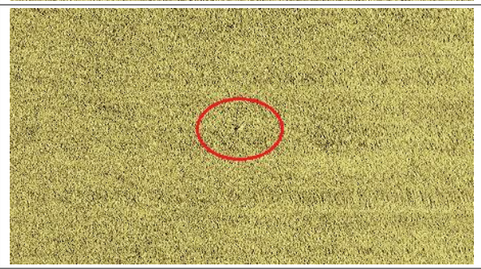
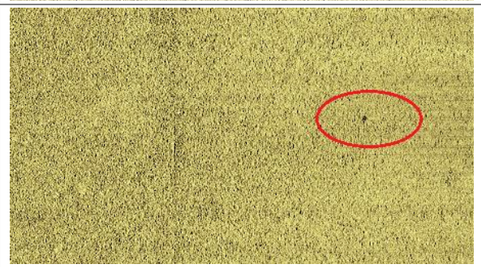
ID	Classification	Easting	Northing	Archaeological discrimination	Length (m)	Width (m)	Height (m)	Depth below seabed (m)	Magnetic amplitude (nT)	Description	Images of possible archaeological features with surface expression	Anomaly type	External references
7558	Magnetic	618710	5958408	A2	-	-	-	-	20	Identified in the Mag. data as small, broad dipole. No corresponding SSS or MBES contacts. May represent possible ferrous debris with no surface expression.		Mag.	-
7559	Magnetic	619528	5958460	A2	-	-	-	-	26	Identified in the Mag. data as small dipole. No corresponding SSS or MBES contacts. May represent possible ferrous debris with no surface expression.		Mag.	-
7560	Magnetic	619729	5958718	A2	-	-	-	-	7	Identified in the Mag. data as small, negative monopole. No corresponding SSS or MBES contacts. May represent possible ferrous debris with no surface expression.		Mag.	-
7561	Dark reflector	619805	5958800	A2	3.7	2.0	0.3	-	-	Identified in the SSS data as an angular dark reflector with a small shadow. Visible in the MBES as a small mound within an area of scour which extends for a maximum of 12.2 m and is 0.2 m deep. No corresponding Mag. contact. Possible item of debris or a natural feature.		SSS, MBES	-
7481	Dark reflector	619963	5958840	A2	27.9	0.9	-	-	-	Originally identified in the 2019 assessment of priority areas as a long dark reflector that is slightly wider at one end than the other, with no shadow. This feature is situated on a sandy and featureless area of the seabed. This feature is located 116.0 m south of a UKHO record position (**7492**) which is located outside of the study area. This feature was identified at the edge of the geophysical survey area, and is only seen in the outer ranges on one SSS line. As such, it cannot be confirmed whether this is debris or a natural feature. However, the feature was retained as a precaution based on proximity to UKHO position.		-	-
7489	Recorded Wreck	621305	5958935	A3	-	-	-	-	-	Originally identified during the 2019 assessment as a recorded wreck position. The feature was covered by the geophysical data however no remains were identified by Wessex Archaeology at this location. Based on the record information, it is possible that this wreck has been lifted, although this is not definitive. As such, the recorded location of the wreck has been retained here as a precaution. It should be noted that, even if the wreck has been lifted, there is still the possibility of associated debris items being present on the seabed.		-	67311 (UKHO)
7562	Magnetic	623434	5959289	A2	-	-	-	-	9	Identified in the Mag. data as small, broad asymmetric dipole. No corresponding SSS or MBES contacts. May represent possible ferrous debris with no surface expression.		Mag.	-

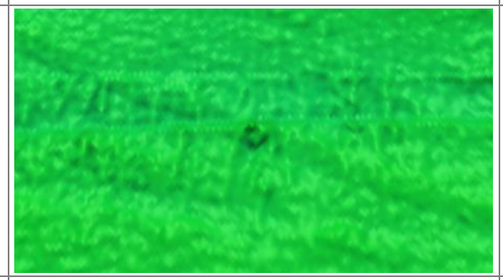
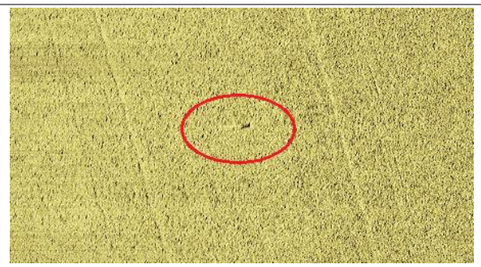
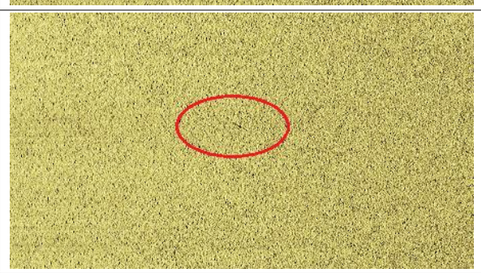
ID	Classification	Easting	Northing	Archaeological discrimination	Length (m)	Width (m)	Height (m)	Depth below seabed (m)	Magnetic amplitude (nT)	Description	Images of possible archaeological features with surface expression	Anomaly type	External references
7563	Debris	625510	5959556	A2	3.6	2.9	0.1	-	-	Identified in the SSS data as an area of seabed disturbance with three distinct dark reflectors with bright shadows. No corresponding Mag. or MBES contact. Possible item of non-ferrous partially buried debris.		SSS	-
7564	Magnetic	630674	5960569	A2	-	-	-	-	10	Identified in the Mag. data as a small, broad dipole. No corresponding SSS or MBES contacts. May represent possible ferrous debris with no surface expression.		Mag.	-
7566	Dark reflector	633548	5965294	A2	1.5	0.6	0.2	-	-	Identified in the SSS data as a slightly indistinct dark reflector with a straight sided shadow. No corresponding Mag. or MBES contact. Possible non-ferrous debris or a natural feature.		SSS	-
7567	Dark reflector	634209	5965649	A2	3.5	1.2	0.2	-	-	Identified in the SSS data as an angular dark reflector with a small shadow. Observed in MBES data as an indistinct mound. No corresponding Mag. contact. Possible non-ferrous debris or a natural feature.		SSS	-
7568	Dark reflector	634920	5966110	A2	4.2	0.5	0.1	-	-	Identified in the SSS data as an indistinct dark reflector with a bright shadow. Observed in MBES data as an indistinct mound. No corresponding Mag. contact. Possible non-ferrous debris or a natural feature.		SSS	-

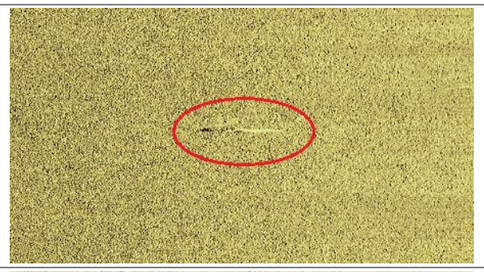
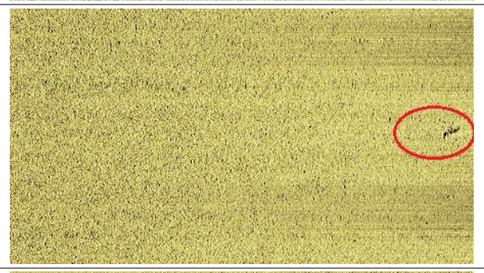
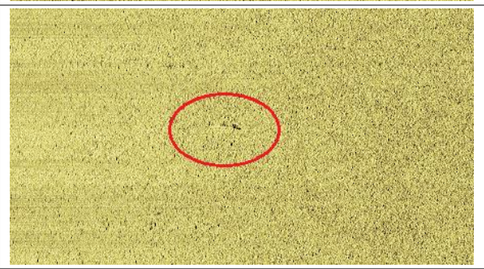
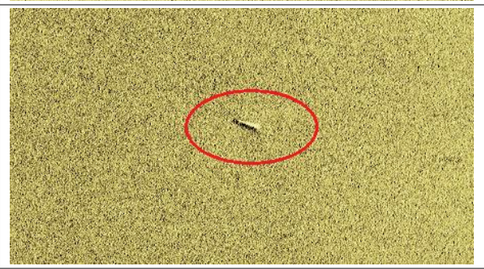
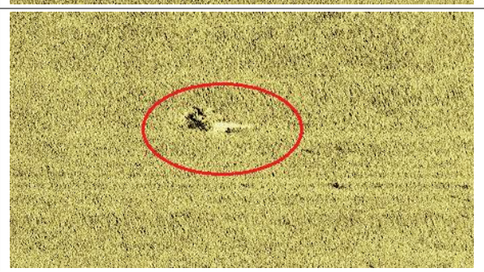
ID	Classification	Easting	Northing	Archaeological discrimination	Length (m)	Width (m)	Height (m)	Depth below seabed (m)	Magnetic amplitude (nT)	Description	Images of possible archaeological features with surface expression	Anomaly type	External references
7569	Dark reflector	635151	5966200	A2	6.0	0.8	0.1	-	-	Identified in the SSS data as a curvilinear dark reflector with a bright shadow. Observed in MBES data as an indistinct mound. No corresponding Mag. contact. Possible non-ferrous debris or a natural feature.		SSS	-
7570	Dark reflector	635061	5966432	A2	16.4	1.0	0.3	-	-	Identified in the SSS data as an irregular curvilinear dark reflector with a flared shadow. Possibly associated with **7575** and **7576**. Observed in MBES data as an elongate mound. No corresponding Mag. contact. Possible non-ferrous debris or a natural feature.		SSS	-
7571	Dark reflector	635148	5966383	A2	10.9	0.6	0.2	-	-	Identified in the SSS data as an elongate dark reflector with a long shadow. Possibly associated with **7572**, **7573**, and **7574**. Observed in MBES data as an indistinct mound. No corresponding Mag. contact. Possible non-ferrous debris or a natural feature.		SSS	-
7572	Dark reflector	635150	5966405	A2	3.3	0.7	0.2	-	-	Identified in the SSS data as an indistinct dark reflector with a flared shadow. Possible associated with **7571**, **7573**, and **7574**. Observed in MBES data as an indistinct mound. No corresponding Mag. contact. Possible non-ferrous debris or a natural feature.		SSS	-
7573	Dark reflector	635166	5966393	A2	6.8	0.5	-	-	-	Identified in the SSS data as an elongate dark reflector with a curved end a distinct shadow. Possibly associated with **7572**, **7571**, and **7574**. Observed in MBES data as an indistinct mound. No corresponding Mag. contact. Possible non-ferrous debris or a natural feature.		SSS	-

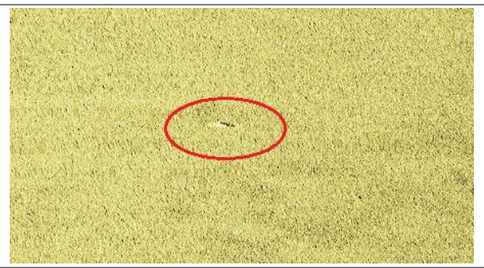
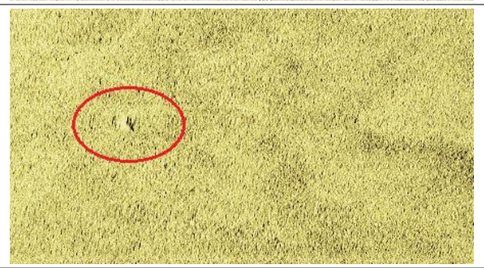
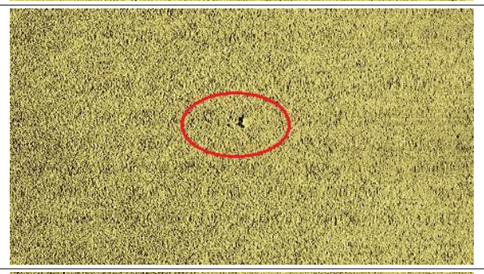
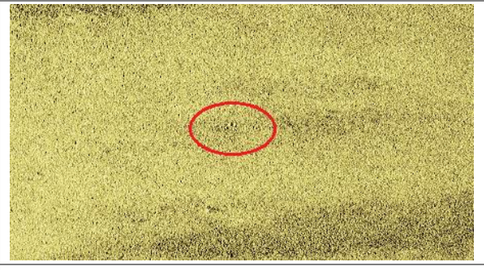
ID	Classification	Easting	Northing	Archaeological discrimination	Length (m)	Width (m)	Height (m)	Depth below seabed (m)	Magnetic amplitude (nT)	Description	Images of possible archaeological features with surface expression	Anomaly type	External references
7574	Dark reflector	635137	5966402	A2	4.2	0.5	0.2	-	-	Identified in the SSS data as an curved dark reflector with an indistinct shadow. Possibly associated with **7572**, **7571**, and **7573**. Observed in MBES data as an indistinct mound. No corresponding Mag. contact. Possible non-ferrous debris or a natural feature.		SSS	-
7575	Dark reflector	635087	5966458	A2	7.3	1.5	0.2	-	-	Identified in the SSS data as a narrow curved dark reflector with a rounded shadow. Possibly associated with **7570** and **7576**. Observed in MBES data as a rounded mound. No corresponding Mag. contact. Possible non-ferrous debris or a natural feature.		SSS	-
7576	Bright reflector	635150	5966526	A2	4.9	1.7	-	-	-	Identified in the SSS data as a distinct bright reflector, which may be the shadow of a poorly imaged dark reflector. Possibly associated with **7570** and **7575**. A rounded mound is visible in the MBES data at this location. No corresponding Mag. contact. Possible non-ferrous debris or a natural feature.		SSS	-
7484	Debris	635354	5966674	A2	8.5	3.9	0.2	-	-	Originally identified during the 2019 assessment of priority areas as a thin and angular dark reflector at a right angle with faint shadow. This is a possible linear item of debris, or a partially buried object situated on an otherwise featureless area of the seabed. In the MBES data this is visible as a rectangular mound on an approximate north-east to south-west alignment.		SSS, MBES	-
7577	Dark reflector	635525	5966726	A2	12.4	0.4	0.2	-	-	Identified in the SSS data as an indistinct curvilinear dark reflector with a shadow of varying lengths. Possibly associated with **7578**, **7579**, **7580**, **7581**, **7582** and **7583**. Observed in MBES data as an indistinct mound. No corresponding Mag. contact. Possible non-ferrous debris or a natural feature.		SSS	-

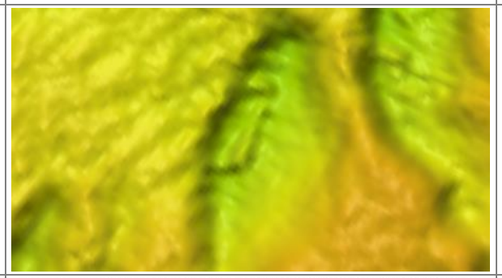
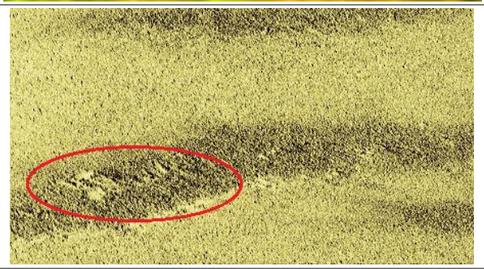
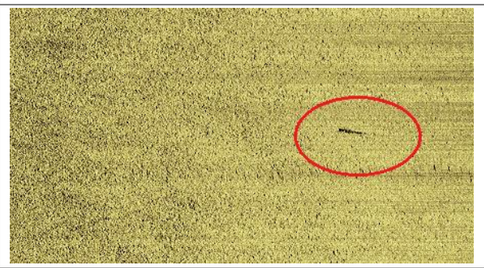
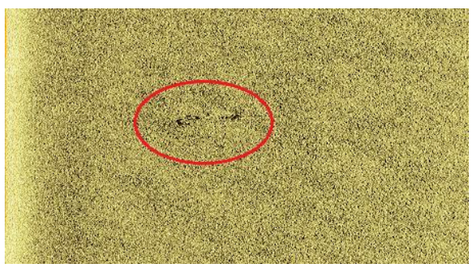
ID	Classification	Easting	Northing	Archaeological discrimination	Length (m)	Width (m)	Height (m)	Depth below seabed (m)	Magnetic amplitude (nT)	Description	Images of possible archaeological features with surface expression	Anomaly type	External references
7578	Dark reflector	635553	5966732	A2	9.4	0.7	0.1	-	-	Identified in the SSS data as an indistinct curvilinear dark reflector with a bright shadow. Possibly associated with **7577**, **7579**, **7580**, **7581**, **7582** and **7583**. Observed in MBES data as an indistinct mound. No corresponding Mag. contact. Possible non-ferrous debris or a natural feature.		SSS	-
7579	Dark reflector	635548	5966744	A2	5.0	0.3	0.1	-	-	Identified in the SSS data as an elongate dark reflector with a bright shadow. Possibly associated with **7577**, **7578**, **7580**, **7581**, **7582** and **7583**. Observed in MBES data as an indistinct mound. No corresponding Mag. contact. Possible non-ferrous debris or a natural feature.		SSS	-
7580	Dark reflector	635554	5966751	A2	4.1	1.4	0.1	-	-	Identified in the SSS data as an indistinct dark reflector with a shadow. Possibly associated with **7577**, **7578**, **7579**, **7581**, **7582** and **7583**. Observed in MBES data as an indistinct mound. No corresponding Mag. contact. Possible non-ferrous debris or a natural feature.		SSS	-
7581	Dark reflector	635566	5966756	A2	4.2	0.6	0.1	-	-	Identified in the SSS data as a curved elongate dark reflector with an indistinct shadow. Possibly associated with **7577**, **7578**, **7579**, **7580**, **7582** and **7583**. Observed in MBES data as an indistinct mound. No corresponding Mag. contact. Possible non-ferrous debris or a natural feature.		SSS	-
7582	Dark reflector	635556	5966772	A2	6.0	0.8	0.2	-	-	Identified in the SSS data as an indistinct elongate dark reflector with a shadow. Possibly associated with **7577**, **7578**, **7579**, **7580**, **7581** and **7583**. Observed in MBES data as an indistinct mound. No corresponding Mag. contact. Possible non-ferrous debris or a natural feature.		SSS	-

ID	Classification	Easting	Northing	Archaeological discrimination	Length (m)	Width (m)	Height (m)	Depth below seabed (m)	Magnetic amplitude (nT)	Description	Images of possible archaeological features with surface expression	Anomaly type	External references
7583	Dark reflector	635580	5966792	A2	4.9	0.7	0.1	-	-	Identified in the SSS data as an elongate dark reflector with an indistinct shadow. Possibly associated with **7577**, **7578**, **7579**, **7580**, **7581** and **7582**. Observed in MBES data as an elongate mound. No corresponding Mag. contact. Possible non-ferrous debris or a natural feature.		SSS	-
7584	Debris	635768	5966834	A2	5.7	5.1	0.4	-	-	Identified in the SSS data as an area of disturbed seabed with multiple dark reflectors. Visible in the MBES data as an irregularly shaped mound of varying height located within some encircling scour extending for 3.9 m and 0.1 m deep. No corresponding Mag. anomaly. Possible non-ferrous debris.		SSS, MBES	-
7585	Dark reflector	635878	5967189	A2	3.0	1.1	0.3	-	-	Identified in the SSS data as a rounded dark reflector with a bright shadow. No corresponding Mag. or MBES contact. Possible non-ferrous debris or a natural feature.		SSS	-
7586	Dark reflector	637345	5968474	A2	4.2	1.0	0.1	-	-	Identified in the SSS data as an elongated dark reflector with a bright shadow. There is some visible scour. No corresponding Mag. or MBES contact. Possible non-ferrous debris or a natural feature.		SSS	-
7587	Dark reflector	637570	5968514	A2	1.3	0.6	0.1	-	-	Identified in the SSS data as a rounded dark reflector with a bright shadow. No corresponding MBES or Mag. contact. Possible item of debris or a natural feature.		SSS	-

ID	Classification	Easting	Northing	Archaeological discrimination	Length (m)	Width (m)	Height (m)	Depth below seabed (m)	Magnetic amplitude (nT)	Description	Images of possible archaeological features with surface expression	Anomaly type	External references
7588	Magnetic	637772	5968973	A2	-	-	-	-	33	Identified in the Mag. data as a small dipole. No corresponding SSS or MBES contacts. May represent possible ferrous debris with no surface expression.		Mag.	-
7589	Magnetic	638337	5969448	A2	-	-	-	-	18	Identified in the Mag. data as a small, broad dipole. No corresponding SSS or MBES contacts. May represent possible ferrous debris with no surface expression.		Mag.	-
7590	Mound	643124	5975121	A2	9.2	8.2	0.1	-	-	Identified in the MBES data as an angular mound with a secondar pointed section at the north-west corner, possibly truncated due to trawling. No corresponding SSS or Mag. contact. Possible item of non-ferrous debris.		MBES	-
7591	Recorded Wreck	644401	5976415	A3	-	-	-	-	-	Originally identified in the 2019 assessment of priority areas as recorded wreck position. This was covered by the geophysical data, but no remains were identified by Wessex Archaeology at this location. This is described in the UKHO record as an unknown shipwreck and is recorded as dead.		-	28768 (UKHO); RWS_RCE_666
7592	Dark reflector	649590	5981292	A2	1.6	0.5	0.4	-	-	Identified in the SSS data as a distinct angular dark reflector with a bright narrow shadow. No corresponding MBES or Mag. contact. Possible item of debris or a natural feature.		SSS	-
7593	Dark reflector	664149	5990985	A2	4.0	0.8	-	-	-	Identified in the SSS data as a faint, elongate dark reflector. No corresponding MBES or Mag. contact. Possible non-ferrous debris or a natural feature.		SSS	-

ID	Classification	Easting	Northing	Archaeological discrimination	Length (m)	Width (m)	Height (m)	Depth below seabed (m)	Magnetic amplitude (nT)	Description	Images of possible archaeological features with surface expression	Anomaly type	External references
7594	Debris	672158	5992512	A2	7.3	4.3	0.8	-	-	Identified in the SSS data as an elongate dark reflector measuring 4.1 x 1.9 x 0.8 m with a bright narrow shadow. It was observed in the MBES data as a sub-rounded mound measuring 7.3 x 4.3 x 0.2 m. No corresponding Mag. contact. Possible item of debris.		SSS, MBES	-
7595	Dark reflector	675119	5993014	A2	1.9	0.2	0.3	-	-	Identified in the SSS data as a distinct elongate dark reflector with a bright shadow. Identified towards the edge of the data and therefore height should be considered a minimum. No corresponding MBES or Mag. contact. Possible non-ferrous debris or a natural feature.		SSS	-
7596	Dark reflector	681289	5994621	A2	2.4	1.8	0.4	-	-	Identified in the SSS data as a distinct elongate dark reflector with a bright narrow shadow. No corresponding MBES or Mag. contact. Possible non-ferrous debris or a natural feature.		SSS	-
7597	Debris	683718	5995479	A2	5.2	1.3	0.5	-	-	Identified in the SSS data as a short elongate dark reflector with a bright shadow. No corresponding MBES or Mag. contact. Possible item of non-ferrous debris.		SSS	-
7483	Dark reflector	684500	5995487	A2	9.9	4.0	0.7	-	-	Originally identified during the 2019 assessment of priority areas as a slightly irregular dark reflector, or possibly a collection of numerous small dark reflectors, with a faint, tapered shadow. In the MBES data this is visible as an isolated rounded mound, measuring 4.2 x 5.2 x 0.2 m, in an area of gently sloping seabed. The feature has scour that extends approximately 2.0 m to the south-west. Possible non-ferrous debris or a natural feature.		SSS, MBES	-

ID	Classification	Easting	Northing	Archaeological discrimination	Length (m)	Width (m)	Height (m)	Depth below seabed (m)	Magnetic amplitude (nT)	Description	Images of possible archaeological features with surface expression	Anomaly type	External references
7598	Dark reflector	684775	5995514	A2	3.0	1.8	0.3	-	-	Identified in the SSS data as a small, distinct elongate dark reflector with a bright shadow. No corresponding Mag. or MBES contact. Possible non-ferrous debris or a natural feature.		SSS	-
7599	Dark reflector	686620	5994762	A2	4.3	0.5	0.2	-	-	Identified in the SSS data as a distinct elongate dark reflector with a slightly indistinct shadow. No corresponding Mag. or MBES contact. Possible non-ferrous debris or a natural feature.		SSS	-
7600	Dark reflector	689389	5995498	A2	4.8	0.7	0.2	-	-	Identified in the SSS data as a distinct, irregularly shaped dark reflector with a bright shadow. No corresponding Mag. or MBES contact. Possible non-ferrous debris or a natural feature.		SSS	-
7601	Dark reflector	692925	5996240	A2	1.1	0.3	0.1	-	-	Identified in the SSS data as a distinct, small dark reflector which casts a bright shadow. Appears to be within a small area of scour. There is no corresponding Mag. contact, however it is not directly covered by magnetometer survey lines and therefore the possibility of some ferrous material being present remains. Possible item of debris or a natural feature.		SSS	-
7602	Magnetic	694252	5996434	A2	-	-	-	-	10	Identified in the Mag. data as a small, slightly broad dipole. No corresponding SSS or MBES contacts. May represent possible ferrous debris with no surface expression.		Mag.	-

ID	Classification	Easting	Northing	Archaeological discrimination	Length (m)	Width (m)	Height (m)	Depth below seabed (m)	Magnetic amplitude (nT)	Description	Images of possible archaeological features with surface expression	Anomaly type	External references
7603	Mound	695713	5996568	A2	19.0	5.1	0.1	-	-	Identified in the MBES as an elongate mound which is more prominent to the south and slopes down to the north. The sides are evenly sloped and the top is pointed. Possible secondary feature to the immediate north but unclear. In the MBES data, the feature appears similar in form to **7604**. No corresponding SSS or Mag. contact. Possible item of debris or a natural feature.		MBES	-
7604	Seabed disturbance	695711	5996626	A2	11.9	11.9	0.2	-	-	Identified in the SSS data as a series of indistinct, irregular, elongate dark reflectors with bright shadows. Visible in the MBES as a distinct irregular mound with four clear sections, with the largest at the north-east measuring 8.9 x 4.7 x 0.2 m. Feature appears to have variable height which may suggest one irregular object or multiple anomalies. No corresponding Mag. contact. Possible collection of non-ferrous debris or a natural feature.		SSS, MBES	-
7488	Recorded Wreck	696144	5996878	A3	-	-	-	-	-	This is the position of a recorded wreck, *Sparkling Wave,* which sank in a collision with *Citonia* of Grimsby, in 1895. The wreck is positioned outside of the geophysical study area and was only partially covered by MBES data. No remains were identified at the location or within the vicinity on any of the datasets; however, as it was only partially covered, the possibility of material being present remains. Although the feature is outside the study area, any associated exclusion zone would be impacted and therefore it has been retained here as a precaution.		-	29890 (UKHO)
7605	Dark reflector	696834	5996980	A2	3.7	1.7	-	-	-	Identified in the SSS data as a distinct elongate dark reflector with no clear shadow. No corresponding Mag. or MBES contact. Possible non-ferrous debris or a natural feature.		SSS	-
7606	Seabed disturbance	698140	5997156	A2	7.8	3.2	-	-	-	Identified in the SSS data as an area of seabed disturbance visible as multiple distinct dark reflectors which form a poorly defined feature with no clear shadow. Observed in the MBES as an indistinct mound. No corresponding Mag. contact. Possible partially buried debris or a natural feature.		SSS	-

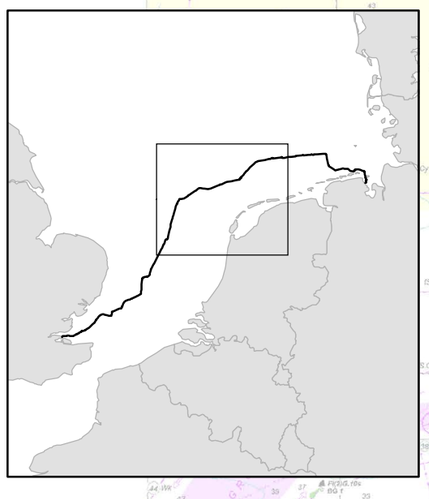
ID	Classification	Easting	Northing	Archaeological discrimination	Length (m)	Width (m)	Height (m)	Depth below seabed (m)	Magnetic amplitude (nT)	Description	Images of possible archaeological features with surface expression	Anomaly type	External references
7607	Recorded Wreck	552844	5937711	A3	-	-	-	-	-	A recorded wreck positioned outside of the geophysical survey data extents. This is recorded in the UKHO record as non-dangerous and has been marked as dead. Although the feature is outside of the study area, its recommended AEZ will impact the scheme and therefore the feature has been retained here.		-	28327 (UKHO), 869 (RWS), NL_NCN_869 (RCE)
7492	Recorded Wreck	619955	5958957	A3	-	-	-	-	-	A recorded wreck positioned outside of the geophysical survey data extents. This is recorded in the UKHO record as dangerous wreck. Although the feature is outside of the study area, its recommended AEZ will impact the scheme and therefore the feature has been retained here.		-	28397 (UKHO), 604 (RWS), NL_NCN_604 (RCE)

1. Co-ordinates are in WGS84 UTM31N
2. Positional accuracy estimated ±10 m
3. SSS images produced using the LF data, clipped with an across-track range of approximately 50 m
4. MBES images at 1X vertical exaggeration

Appendix 5: List of known receptors within the wider search area

Reference	Type	Area Name	Description	Easting	Northing
NCN_527	Unknown	L07	Shipwreck; Small wreck.	578793.06	5943612.9
NCN_602	Unknown	L06	Shipwreck	619187.56	5959407.68
NCN_603	Unknown	L06	Shipwreck	619140.18	5959124.48
NCN_648	Kirona	M01	Shipwreck	640188.34	5970712.62
NCN_688	Unknown	M01	Shipwreck	649948.46	5983787.83
NCN_696	Unknown	G17	Shipwreck	656552.62	5989061.14
NCN_697	Unknown	G17	Shipwreck	658721.3	5990224.08
NCN_703	Unknown	G17	Shipwreck	671157.23	5993283.09
NCN_914	Unknown	K09	Shipwreck	546803.83	5936034.97
NCN_980	U-97	K11	Shipwreck; DE; German, type submarine.	531514.12	5924607.24
NCN_1211	Unknown	K16	Shipwreck	518976.59	5881629.76
NCN_1527	Unknown	K06	Obstruction	564657.78	5947158.89
NCN_2229	Unknown	K08	Shipwreck	542610.31	5930238.19
NCN_2380	Unknown	K16	Shipwreck; shipwreck; iron/steel; Sank 06-08-1990.	515551.07	5880091.94
NCN_2756	Unknown	L06	Obstruction	630526.63	5963251.53
NCN_3458	Anchor with chain	K09	Obstruction; 243 m long	550231	5934649
NCN_14369	Anchor	L06	Obstruction; Anchor	631624	5963282
NCN_14611	Unknown	M01	Shipwreck	647134.41	5981028.9
NCN_18756	Unknown	P01	Shipwreck	513273	5866589
NCN_19300	Unknown	L05	Obstruction	593655	5950911
NCN_19301	Unknown	L05	Obstruction	596463	5949899
NCN_19303	Unknown	L04	Obstruction	566131	5947975
NCN_19414	Unknown	G17	Obstruction	659633	5991721
NCN_19437	Unknown	M01	Obstruction	637467	5969399
NCN_19591	Unknown	M01	Obstruction	637004	5969419
NCN_20136	Unknown	G18	Shipwreck; Location Lelystad; wood; Discovered during construction of wind farm park Gemini.	686860.04	5994518.71

Project Management Initials: AB Designer: KJF Checked: ## Approved: ##



Scale @ A3 1:700,000

Coordinate System: WGS84 UTM z31N

AECOM

PROJECT
NEUCONNECT

CLIENT
NeuConnect Britain Ltd.

KEY
- Proposed cable route
- Geophysical study area

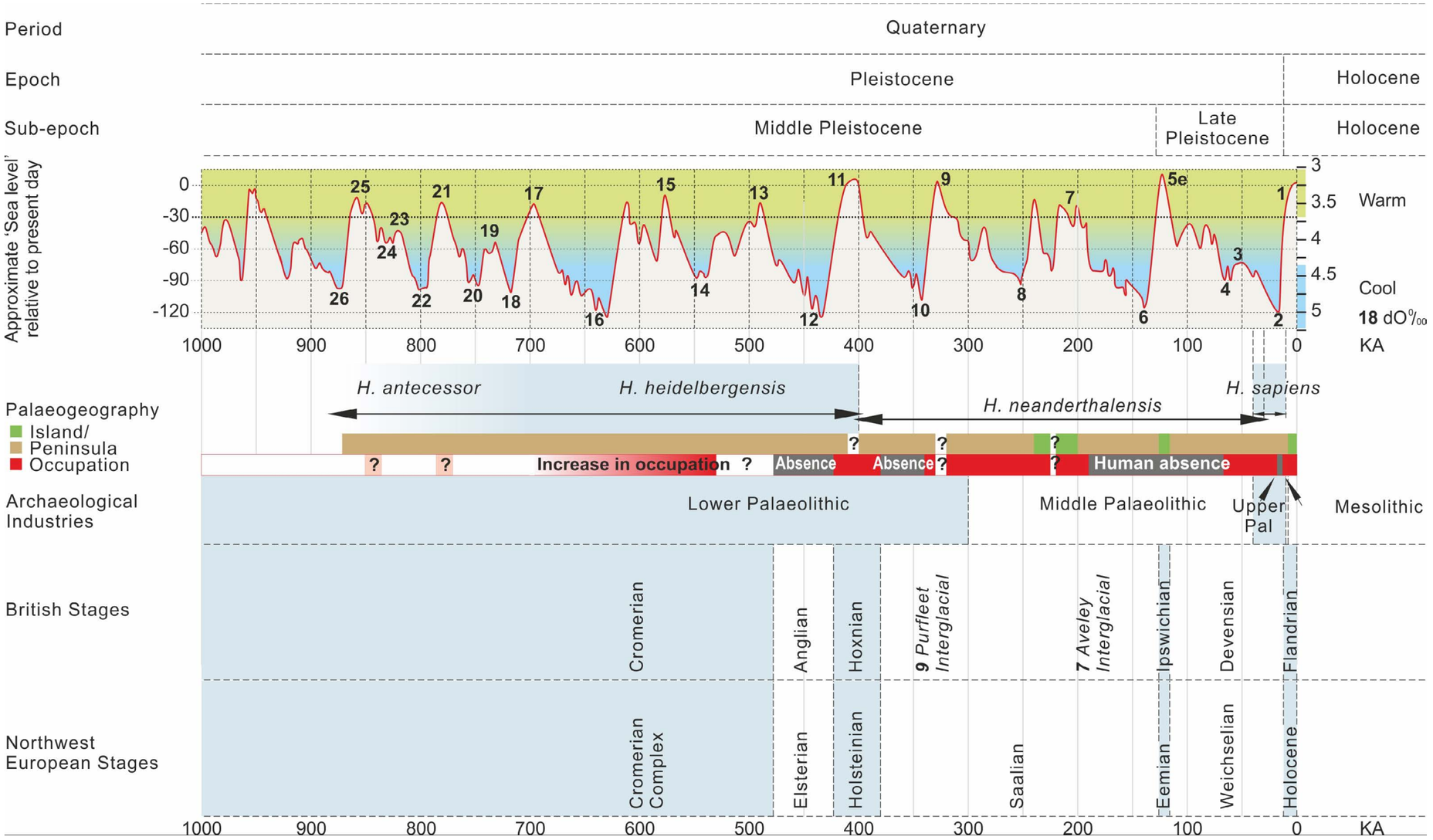
TITLE
FIGURE 1
LOCATION OF NEUCONNECT
CABLE CORRIDOR (DUTCH SECTOR)

REFERENCE
NC_210312_Tech_Dutch_Fig01

SHEET NUMBER
1 of 1

DATE
12/03/21

Project Management Initials: AB Designer: KJF Checked: ## Approved: ##



AECOM

PROJECT
NEUCONNECT

CLIENT
NeuConnect Britain Ltd.

KEY

The figure presents information derived from several references: the global sea-level curve is from Lisiecki and Raymo (2005) and Jelgersma (1979). Details on the geology and archaeology were provided by Dix and Westley (2004); Funnel (1995); Gibbard and van Kolfschoten (2004); Kukla et al. (2002); Lee et al. (2006); Lowe and Walker (1997) and Wymer (1999).

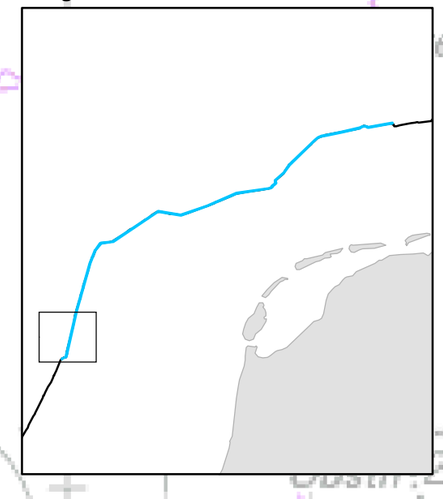
TITLE
FIGURE 2
SEA LEVEL CURVE AND CHRONOLOGY
OF THE SOUTHERN NORTH SEA LANDSCAPE

REFERENCE
NC_210312_GeophysDutch_Fig02

SHEET NUMBER
1 of 1

DATE
12/03/21

Project Management Initials: AB Designer: KJF Checked: ## Approved: ##



Scale @ A3 1:100,000

0 4 8 km

Coordinate System: WGS84 UTM z31N

AECOM

PROJECT
NEUCONNECT

CLIENT
NeuConnect Britain Ltd.

KEY

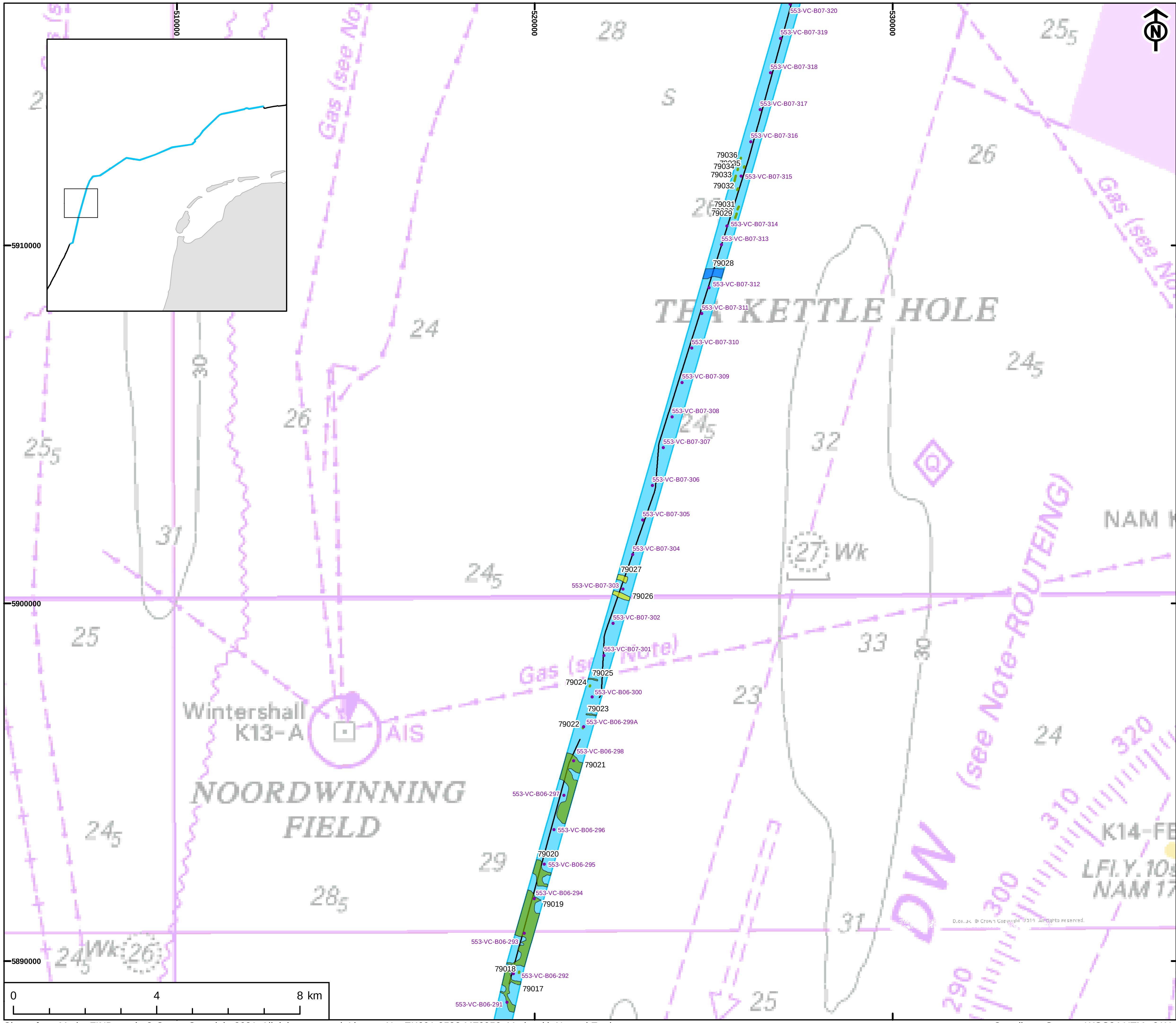
- Proposed cable route
- Geophysical study area
- Vibrocore locations
- Data example location
- Channel
- Older channel
- Coarse-grained deposit
- Cut and fill
- High amplitude reflector
- Older high amplitude reflector

TITLE
FIGURE 3A
PALAEOGEOGRAPHIC FEATURES OF ARCHAEOLOGICAL POTENTIAL

REFERENCE
NC_210312_GeophysDutch_Fig03a

SHEET NUMBER
1 of 8

DATE
12/03/21



Project Management Initials: AB Designer: KJF Checked: ## Approved: ##

Scale @ A3 1:100,000

Charts from MarineFIND.co.uk. © Crown Copyright 2021. All rights reserved. Licence No. EK001-0582-MF0050. Made with Natural Earth.

Coordinate System: WGS84 UTM z31N

AECOM

PROJECT
NEUCONNECT

CLIENT
NeuConnect Britain Ltd.

KEY
- Proposed cable route
- Geophysical study area
- Vibrocore locations
- Data example location
- Channel
- Older channel
- Coarse-grained deposit
- Cut and fill
- High amplitude reflector
- Older high amplitude reflector

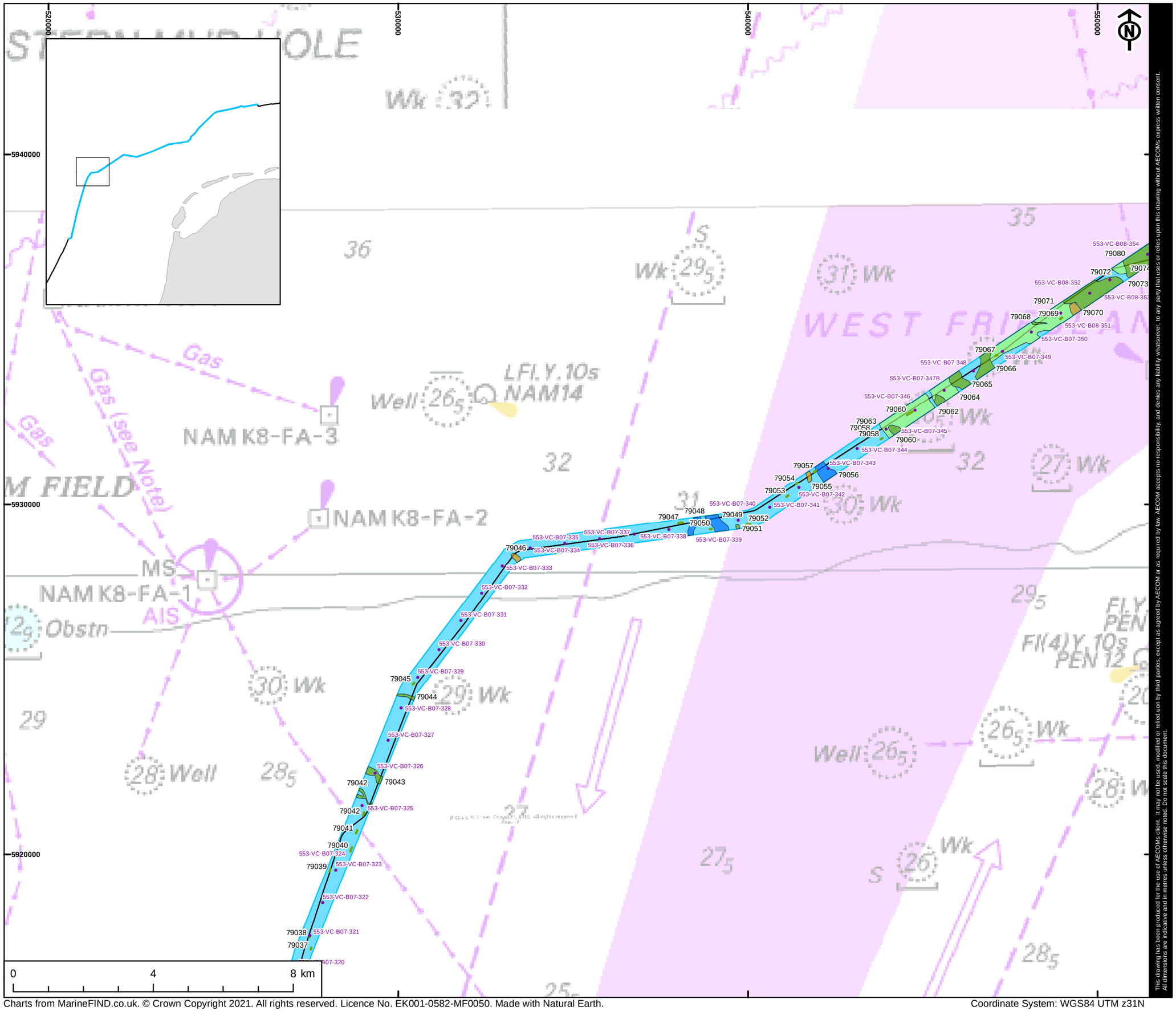
TITLE
FIGURE 3B
PALAEOGEOGRAPHIC FEATURES OF ARCHAEOLOGICAL POTENTIAL

REFERENCE
NC_210312_GeophysDutch_Fig03b

SHEET NUMBER
2 of 8

DATE
12/03/21

Project Management Initials: AB Designer: KJF Checked: ## Approved: ##



Scale @ A3 1:100,000

Charts from MarineFIND.co.uk. © Crown Copyright 2021. All rights reserved. Licence No. EK001-0582-MF0050. Made with Natural Earth.

Coordinate System: WGS84 UTM z31N

AECOM

PROJECT
NEUCONNECT

CLIENT
NeuConnect Britain Ltd.

KEY

- Proposed cable route
- Geophysical study area
- Vibrocore locations
- Data example location
- Channel
- Older channel
- Coarse-grained deposit
- Cut and fill
- High amplitude reflector
- Older high amplitude reflector

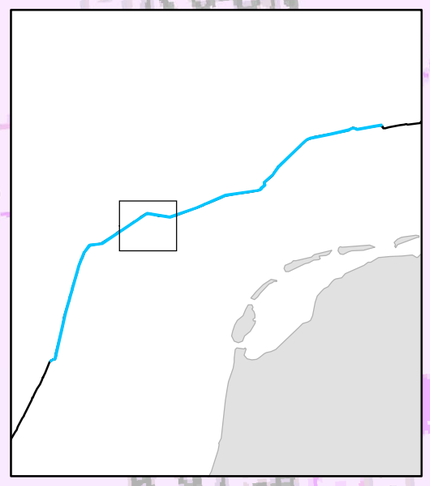
TITLE
FIGURE 3C
PALAEOGEOGRAPHIC FEATURES OF ARCHAEOLOGICAL POTENTIAL

REFERENCE
NC_210312_GeophysDutch_Fig03c

SHEET NUMBER
3 of 8

DATE
12/03/21

Project Management Initials: AB Designer: KJF Checked: ## Approved: ##



Scale @ A3 1:100,000

Charts from MarineFIND.co.uk. © Crown Copyright 2021. All rights reserved. Licence No. EK001-0582-MF0050. Made with Natural Earth.

Coordinate System: WGS84 UTM z31N

AECOM

PROJECT
NEUCONNECT

CLIENT
NeuConnect Britain Ltd.

KEY

- Proposed cable route
- Geophysical study area
- Vibrocore locations
- Data example location
- Channel
- Older channel
- Coarse-grained deposit
- Cut and fill
- High amplitude reflector
- Older high amplitude reflector

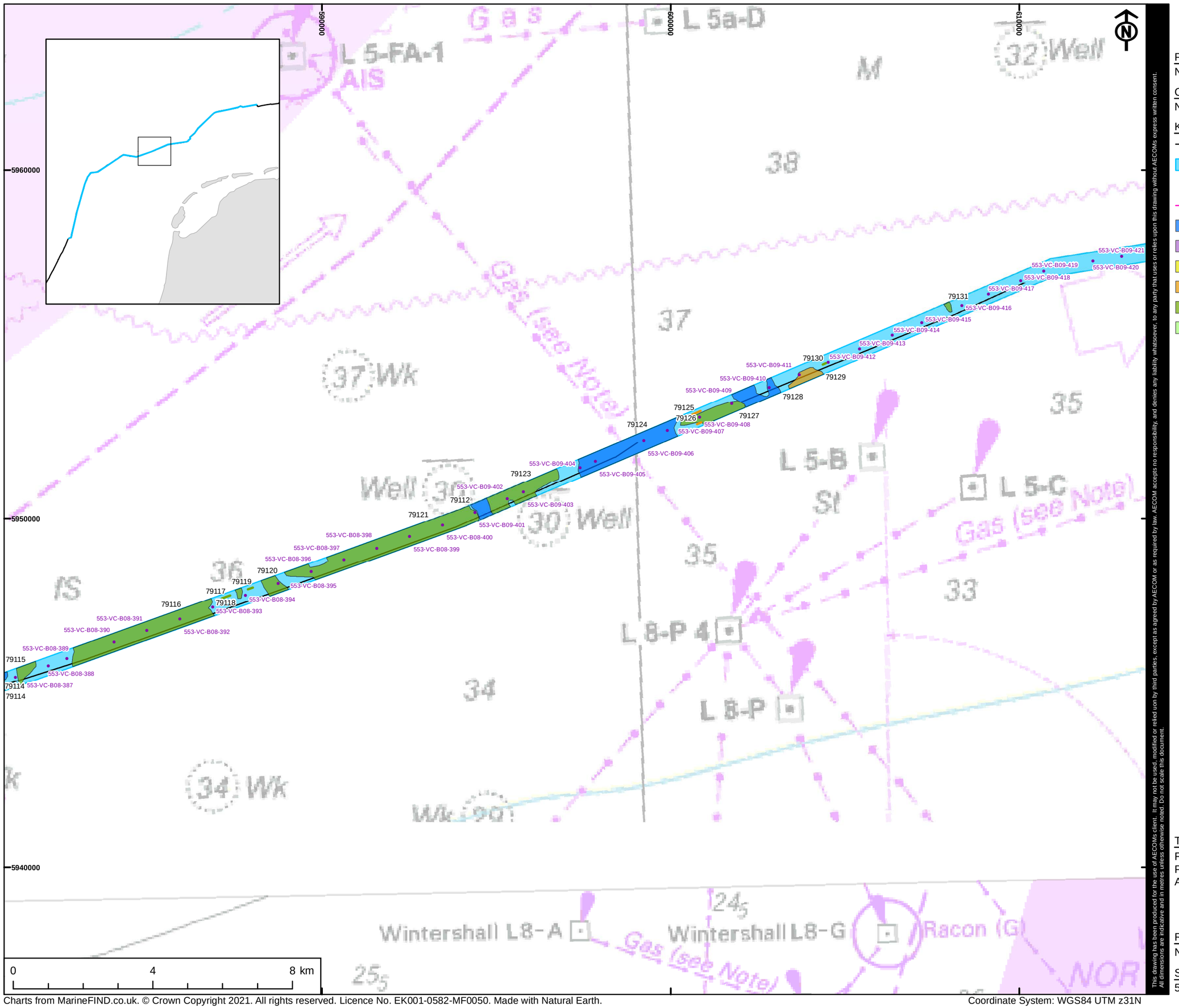
TITLE
FIGURE 3D
PALAEOGEOGRAPHIC FEATURES OF ARCHAEOLOGICAL POTENTIAL

REFERENCE
NC_210312_GeophysDutch_Fig03d

SHEET NUMBER
4 of 8

DATE
12/03/21

Project Management Initials: AB Designer: KJF Checked: ## Approved: ##



Scale @ A3 1:100,000

Coordinate System: WGS84 UTM z31N

AECOM

PROJECT
NEUCONNECT

CLIENT
NeuConnect Britain Ltd.

KEY

- Proposed cable route
- Geophysical study area
- Vibrocore locations
- Data example location
- Channel
- Older channel
- Coarse-grained deposit
- Cut and fill
- High amplitude reflector
- Older high amplitude reflector

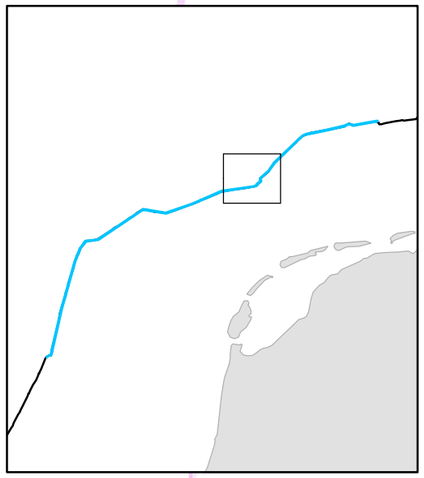
TITLE
FIGURE 3E
PALAEOGEOGRAPHIC FEATURES OF ARCHAEOLOGICAL POTENTIAL

REFERENCE
NC_210312_GeophysDutch_Fig03e

SHEET NUMBER
5 of 8

DATE
12/03/21

Project Management Initials: AB Designer: KJF Checked: ## Approved: ##



5970000
5960000
620000
630000
640000

79150 553-VC-B10-461 553-VC-B10-460 553-VC-B10-459 79149 553-VC-B10-458 553-VC-B10-457 553-VC-B10-456 553-VC-B10-455 79148 553-VC-B10-454 553-VC-B10-453 553-VC-B10-452 553-VC-B10-451 79147 553-VC-B10-450 79146 79145 553-VC-B10-449 79144 553-VC-B10-448 553-VC-B10-447 553-VC-B10-446 553-VC-B10-445 79142 79143 553-VC-B10-444 79141 553-VC-B10-442 79140 79139 553-VC-B10-441 553-VC-B10-440 553-VC-B10-439 553-VC-B09-438 553-VC-B09-437 553-VC-B09-436 79137 553-VC-B09-434 553-VC-B09-435 79138 553-VC-B09-433 553-VC-B09-432 79136 553-VC-B09-431 553-VC-B09-430 553-VC-B09-428 553-VC-B09-427 79135 553-VC-B09-429 553-VC-B09-425 79133 553-VC-B09-424 79132 553-VC-B09-426 79134 553-VC-B09-423 553-VC-B09-421 553-VC-B09-422 553-VC-B09-420

Scale @ A3 1:100,000

0 4 8 km

Coordinate System: WGS84 UTM z31N

AECOM

PROJECT
NEUCONNECT

CLIENT
NeuConnect Britain Ltd.

KEY
- Proposed cable route
- Geophysical study area
- Vibrocore locations
- Data example location
- Channel
- Older channel
- Coarse-grained deposit
- Cut and fill
- High amplitude reflector
- Older high amplitude reflector

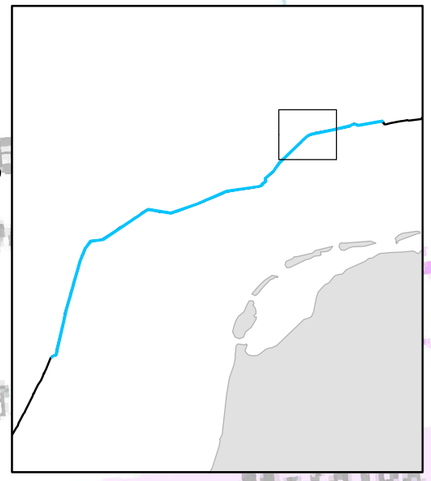
TITLE
FIGURE 3F
PALAEOGEOGRAPHIC FEATURES OF ARCHAEOLOGICAL POTENTIAL

REFERENCE
NC_210312_GeophysDutch_Fig03f

SHEET NUMBER
6 of 8

DATE
12/03/21

Project Management Initials: AB Designer: KJF Checked: ## Approved: ##



Scale @ A3 1:100,000

Charts from MarineFIND.co.uk. © Crown Copyright 2021. All rights reserved. Licence No. EK001-0582-MF0050. Made with Natural Earth.

Coordinate System: WGS84 UTM z31N

AECOM

PROJECT
NEUCONNECT

CLIENT
NeuConnect Britain Ltd.

KEY

- Proposed cable route
- Geophysical study area
- Vibrocore locations
- Data example location
- Channel
- Older channel
- Coarse-grained deposit
- Cut and fill
- High amplitude reflector
- Older high amplitude reflector

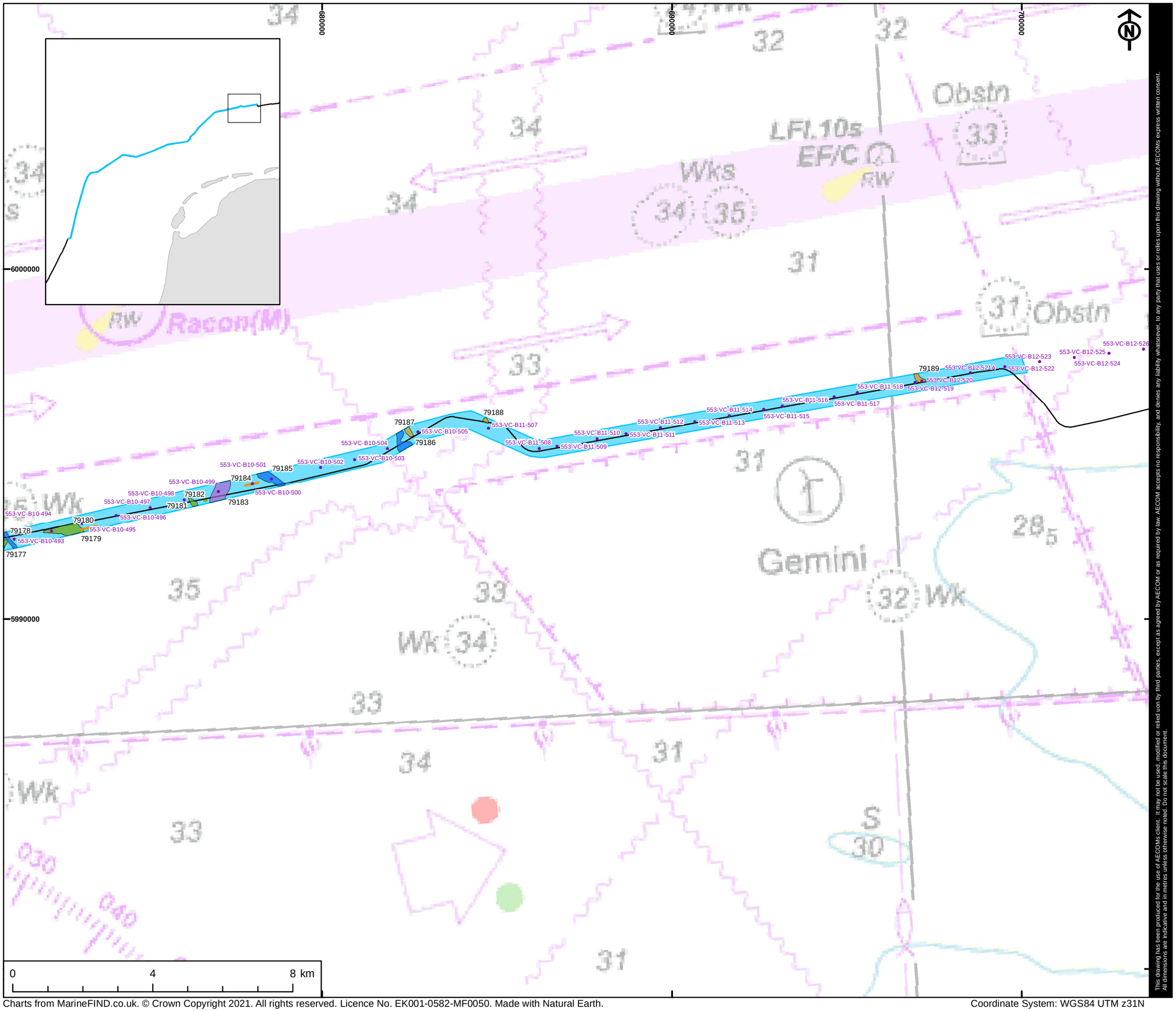
TITLE
FIGURE 3G
PALAEOGEOGRAPHIC FEATURES OF ARCHAEOLOGICAL POTENTIAL

REFERENCE
NC_210312_GeophysDutch_Fig03g

SHEET NUMBER
7 of 8

DATE
12/03/21

Project Management Initials: AB Designer: KJF Checked: ## Approved: ##



Scale @ A3 1:100,000

Coordinate System: WGS84 UTM z31N

AECOM

PROJECT
NEUCONNECT

CLIENT
NeuConnect Britain Ltd.

KEY

- Proposed cable route
- Geophysical study area
- Vibrocore locations
- Data example location
- Channel
- Older channel
- Coarse-grained deposit
- Cut and fill
- High amplitude reflector
- Older high amplitude reflector

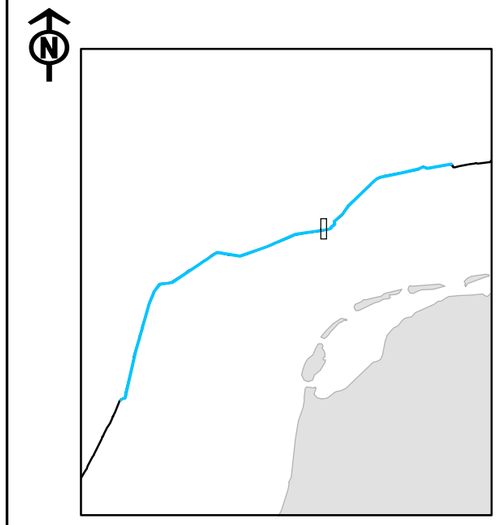
TITLE
FIGURE 3H
PALAEOGEOGRAPHIC FEATURES OF ARCHAEOLOGICAL POTENTIAL

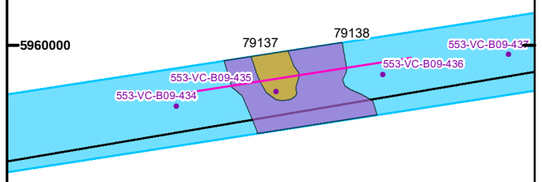
REFERENCE
NC_210312_GeophysDutch_Fig03h

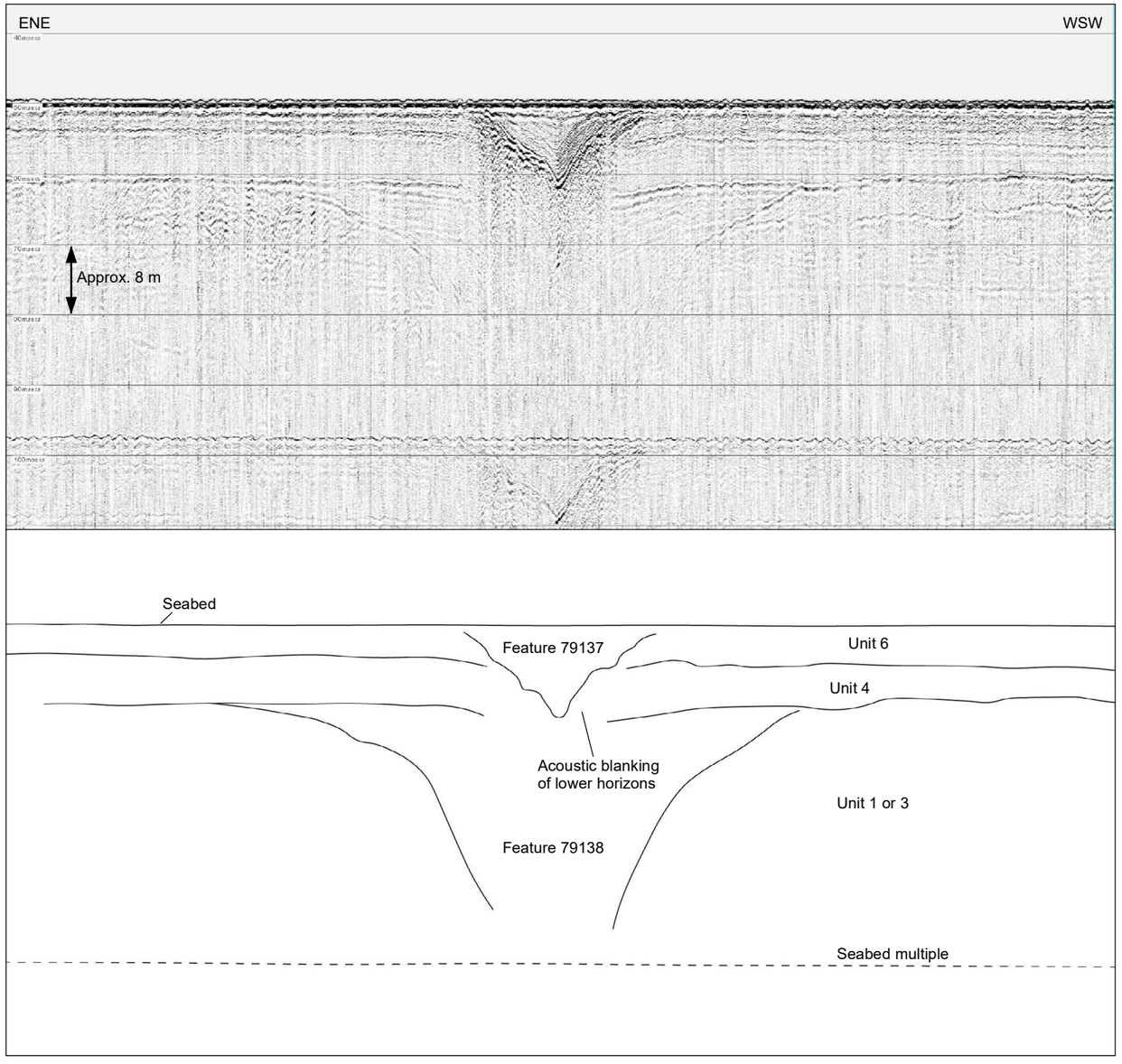
SHEET NUMBER
8 of 8

DATE
12/03/21

Project Management Initials: AB Designer: KJF Checked: ## Approved: ##







Scale @ A3 1:40,000

0 1.5 3 km

Made with Natural Earth.

Coordinate System: WGS84 UTM z31N

AECOM

PROJECT
NEUCONNECT

CLIENT
NeuConnect Britain Ltd.

KEY
- Proposed cable route
- Geophysical study area
- Vibrocore locations
- Data example location
- Older channel
- Cut and fill

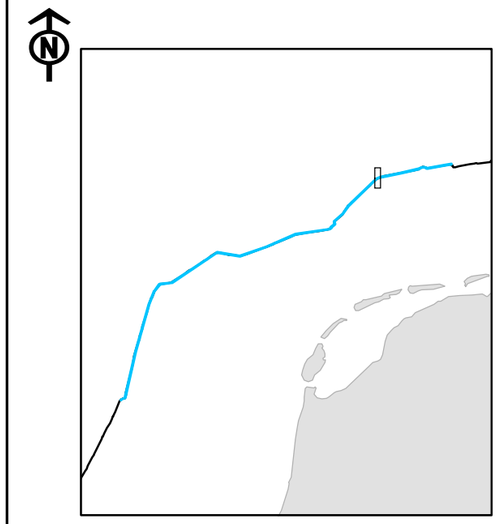
TITLE
FIGURE 4
PALAEOGEOGRAPHIC FEATURE
DATA EXAMPLE – 79138

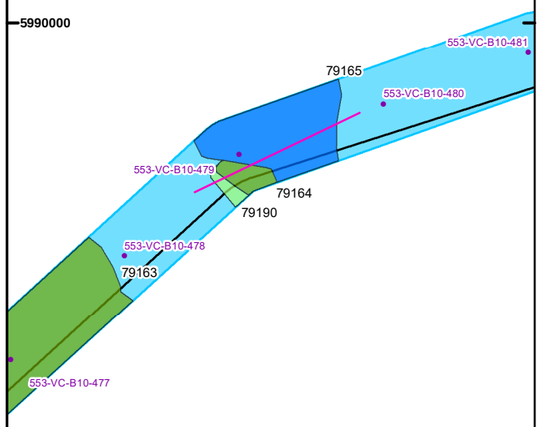
REFERENCE
NC_210312_GeophysDutch_Fig04

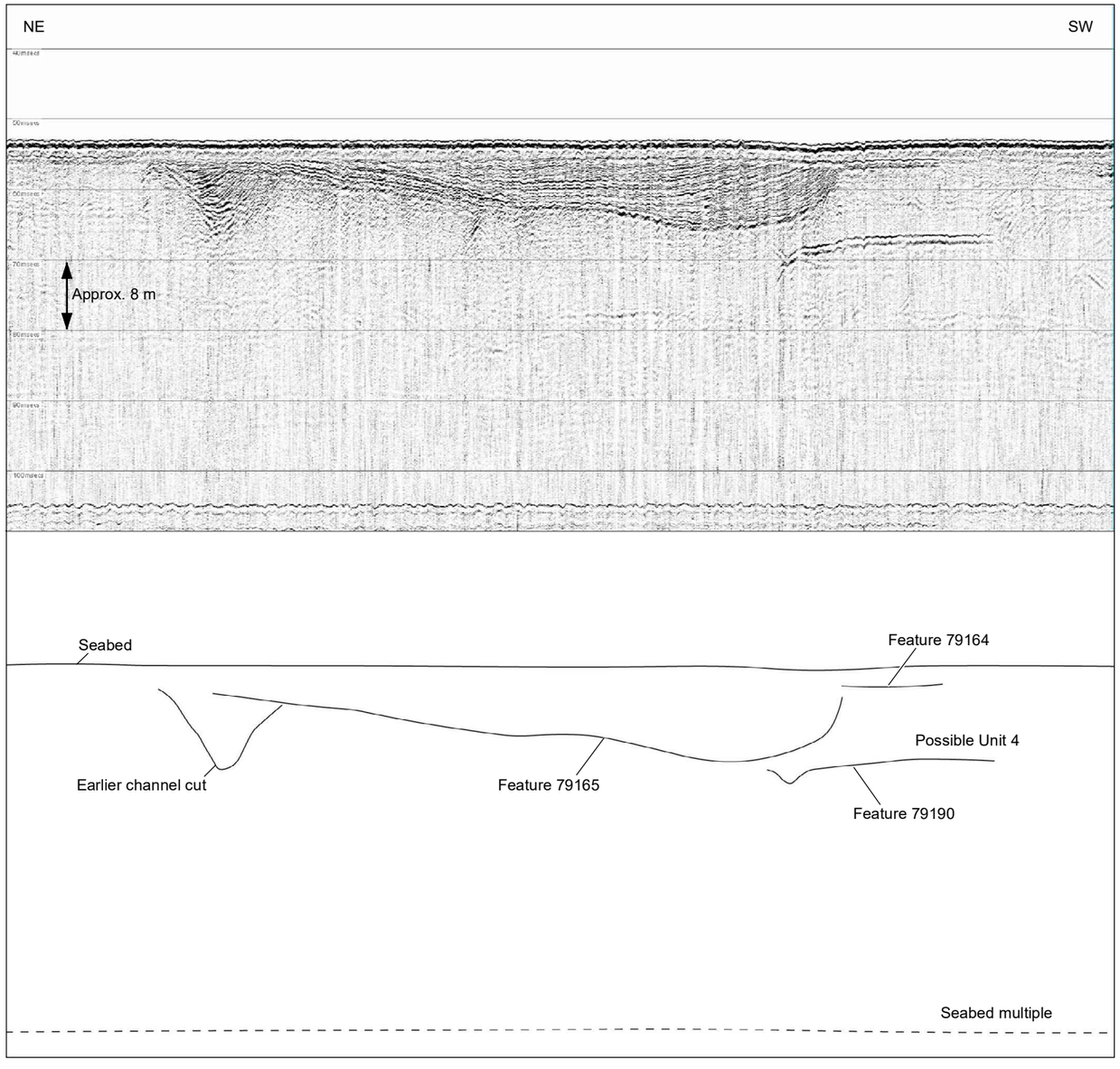
SHEET NUMBER
1 of 1

DATE
12/03/21

Project Management Initials: AB Designer: KJF Checked: ## Approved: ##







0 1.5 3 km

Scale @ A3 1:40,000

Made with Natural Earth.

Coordinate System: WGS84 UTM z31N

AECOM

PROJECT
NEUCONNECT

CLIENT
NeuConnect Britain Ltd.

KEY
- Proposed cable route
- Geophysical study area
- Vibrocore locations
- Data example location
- Channel
- High amplitude reflector
- Older high amplitude reflector

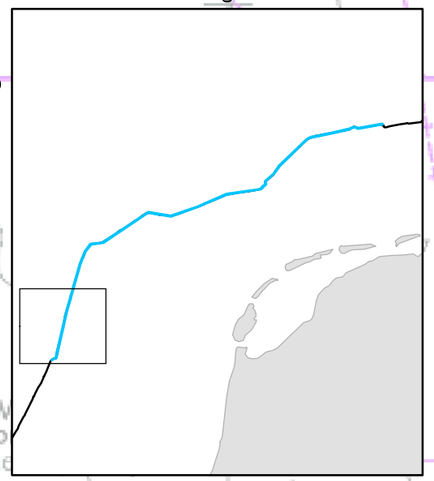
TITLE
FIGURE 5
PALAEOGEOGRAPHIC FEATURE
DATA EXAMPLE – 79165

REFERENCE
NC_210312_GeophysDutch_Fig05

SHEET NUMBER
1 of 1

DATE
12/03/21

Project Management Initials: AB Designer: KJF Checked: ## Approved: ##



Scale @ A3 1:150,000

Coordinate System: WGS84 UTM z31N

AECOM

PROJECT
NEUCONNECT

CLIENT
NeuConnect Britain Ltd.

KEY

- Proposed cable route
- Geophysical study area
- Recommended Archaeological Exclusion Zone (AEZ)
- Seabed feature extents
- Linear seabed features

Seabed features of archaeological potential

- A1 – Anthropogenic origin of archaeological interest
- A2 – Uncertain origin of possible archaeological interest
- A3 – Historic record of possible archaeological interest

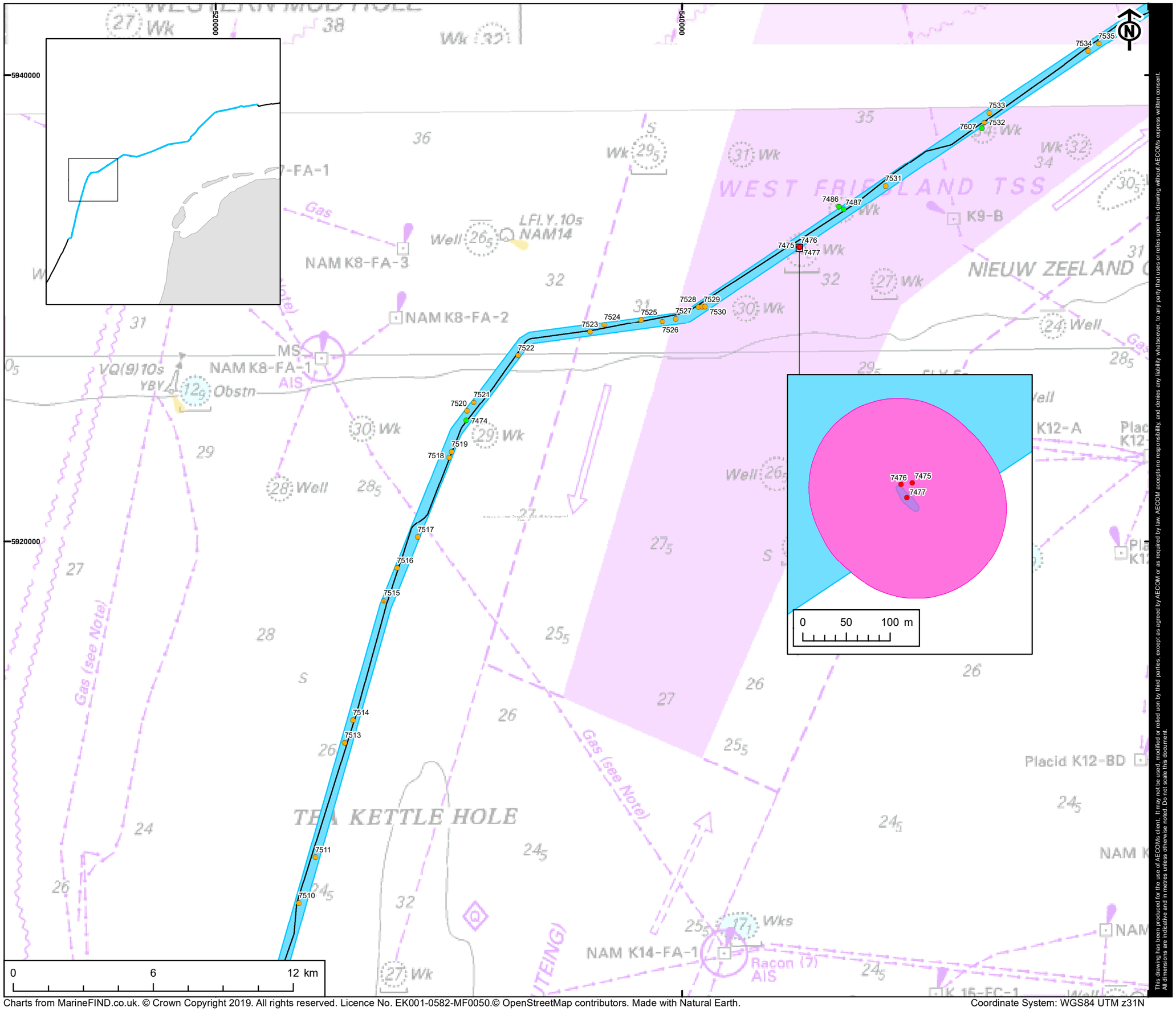
TITLE
FIGURE 6A
SEABED FEATURES OF ARCHAEOLOGICAL POTENTIAL

REFERENCE
NC_210423_GeophysDutch_Fig06a

SHEET NUMBER
1 of 5

DATE
23/04/21

Project Management Initials: AB Designer: KJF Checked: ## Approved: ##



Scale @ A3 1:4,000

Coordinate System: WGS84 UTM z31N

AECOM

PROJECT
NEUCONNECT

CLIENT
NeuConnect Britain Ltd.

KEY

- Proposed cable route
- Geophysical study area
- Recommended Archaeological Exclusion Zone (AEZ)
- Seabed feature extents
- Linear seabed features

Seabed features of archaeological potential

- A1 – Anthropogenic origin of archaeological interest
- A2 – Uncertain origin of possible archaeological interest
- A3 – Historic record of possible archaeological interest

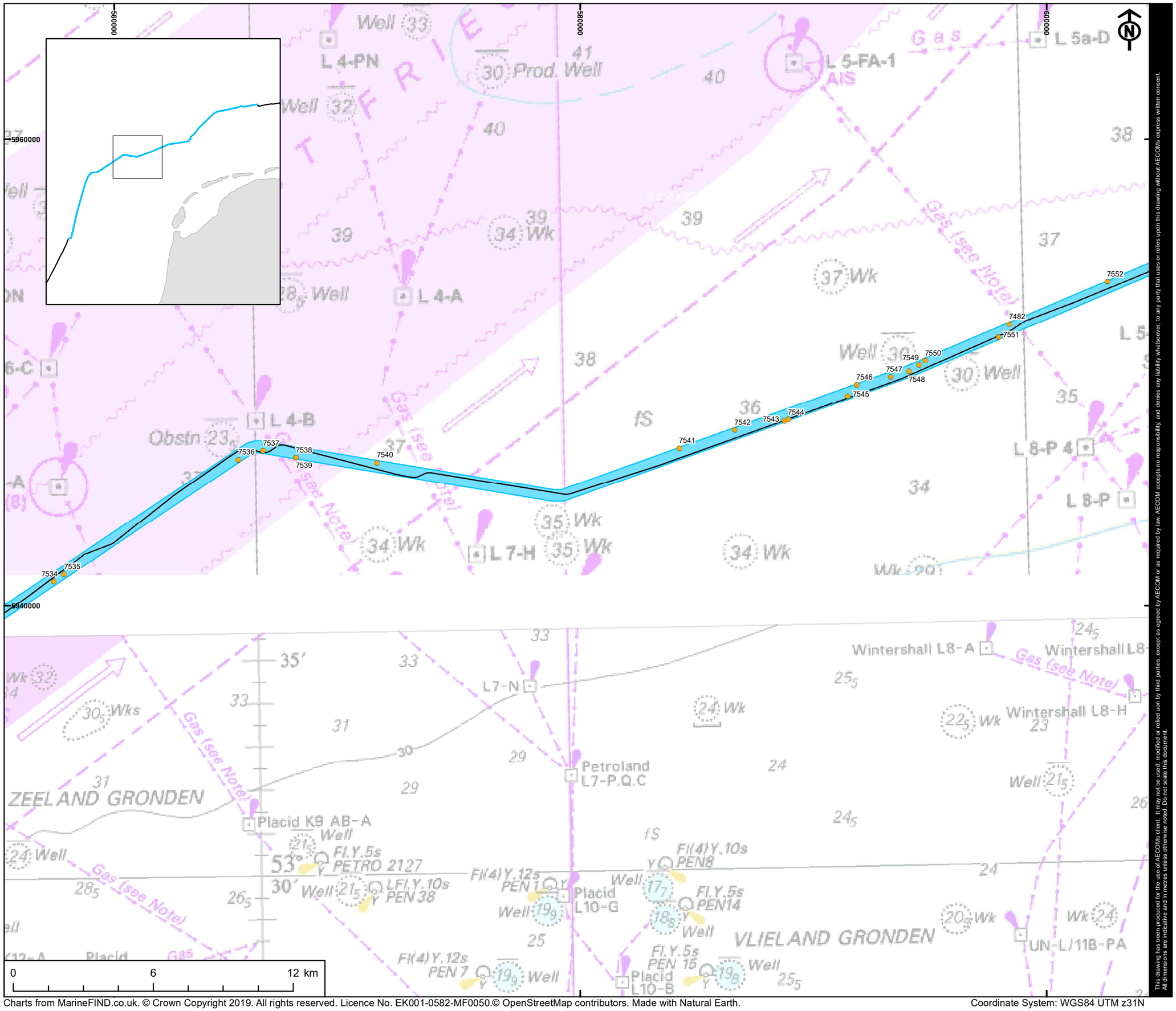
TITLE
FIGURE 6B
SEABED FEATURES OF ARCHAEOLOGICAL POTENTIAL

REFERENCE
NC_210423_GeophysDutch_Fig06b

SHEET NUMBER
2 of 5

DATE
23/04/21

Project Management Initials: AB Designer: KJF Checked: ## Approved: ##



Scale @ A3 1:150,000

0 6 12 km

Coordinate System: WGS84 UTM z31N

AECOM

PROJECT
NEUCONNECT

CLIENT
NeuConnect Britain Ltd.

KEY

- Proposed cable route
- Geophysical study area
- Recommended Archaeological Exclusion Zone (AEZ)
- Seabed feature extents
- Linear seabed features

Seabed features of archaeological potential

- A1 – Anthropogenic origin of archaeological interest
- A2 – Uncertain origin of possible archaeological interest
- A3 – Historic record of possible archaeological interest

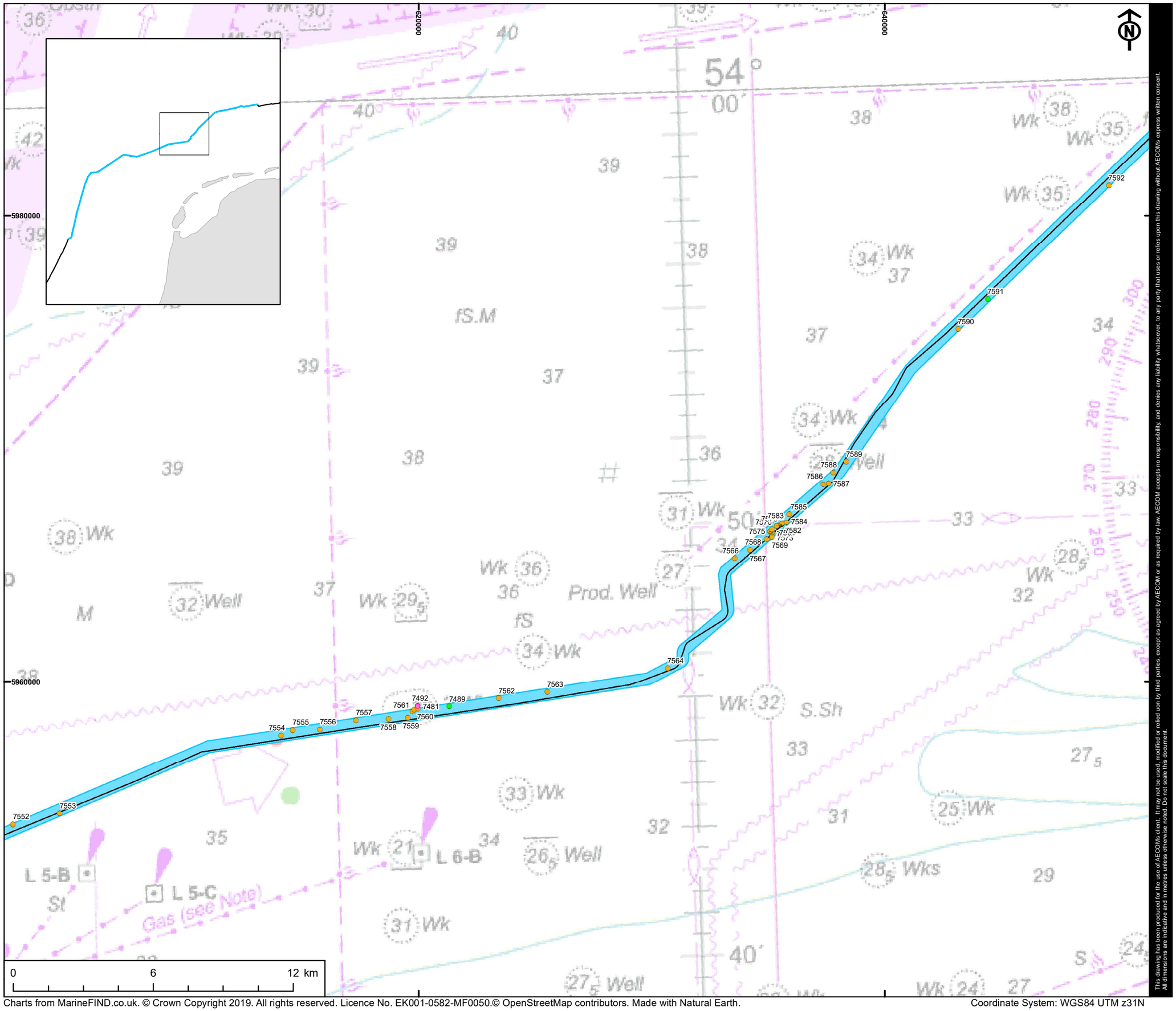
TITLE
FIGURE 6C
SEABED FEATURES OF ARCHAEOLOGICAL POTENTIAL

REFERENCE
NC_210423_GeophysDutch_Fig06c

SHEET NUMBER
3 of 5

DATE
23/04/21

Project Management Initials: AB Designer: KJF Checked: ## Approved: ##



Scale @ A3 1:150,000

Coordinate System: WGS84 UTM z31N

AECOM

PROJECT
NEUCONNECT

CLIENT
NeuConnect Britain Ltd.

KEY

- Proposed cable route
- Geophysical study area
- Recommended Archaeological Exclusion Zone (AEZ)
- Seabed feature extents
- Linear seabed features

Seabed features of archaeological potential

- A1 – Anthropogenic origin of archaeological interest
- A2 – Uncertain origin of possible archaeological interest
- A3 – Historic record of possible archaeological interest

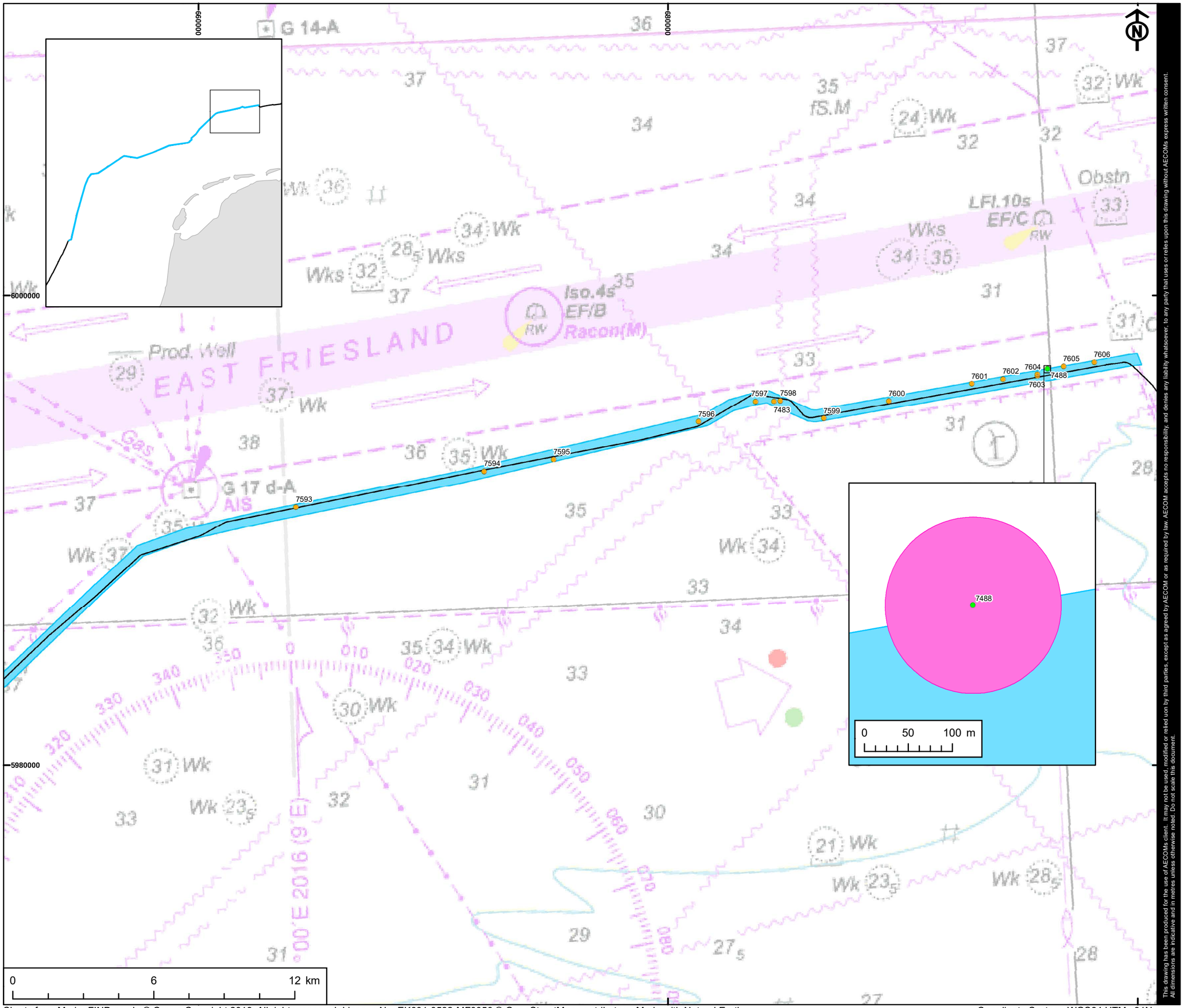
TITLE
FIGURE 6D
SEABED FEATURES OF ARCHAEOLOGICAL POTENTIAL

REFERENCE
NC_210423_GeophysDutch_Fig06d

SHEET NUMBER
4 of 5

DATE
23/04/21

Project Management Initials: AB Designer: KJF Checked: ## Approved: ##



Scale @ A3 1:4,000

Coordinate System: WGS84 UTM z31N

AECOM

PROJECT
NEUCONNECT

CLIENT
NeuConnect Britain Ltd.

KEY

- Proposed cable route
- Geophysical study area
- Recommended Archaeological Exclusion Zone (AEZ)
- Seabed feature extents
- Linear seabed features

Seabed features of archaeological potential

- A1 – Anthropogenic origin of archaeological interest
- A2 – Uncertain origin of possible archaeological interest
- A3 – Historic record of possible archaeological interest

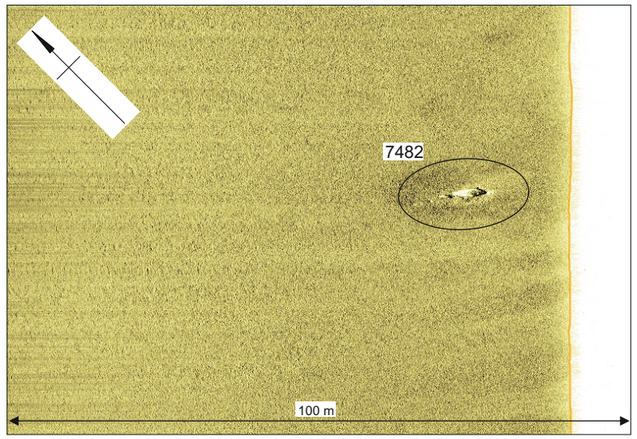
TITLE
FIGURE 6E
SEABED FEATURES OF ARCHAEOLOGICAL POTENTIAL

REFERENCE
NC_210423_GeophysDutch_Fig06e

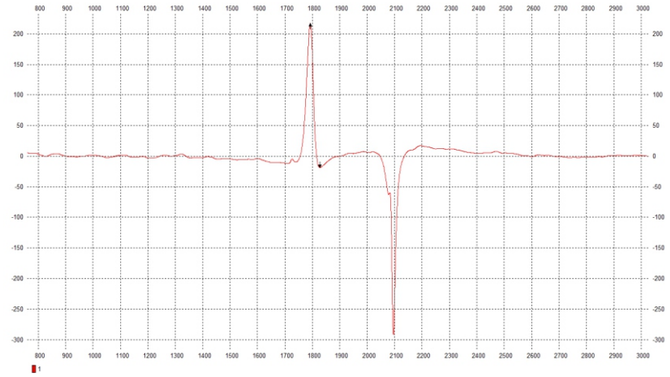
SHEET NUMBER
5 of 5

DATE
23/04/21

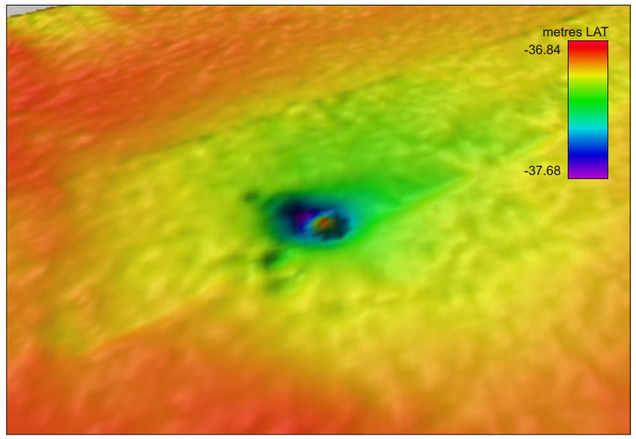
Project Management Initials: ## Designer: ## Checked: ## Approved: ##



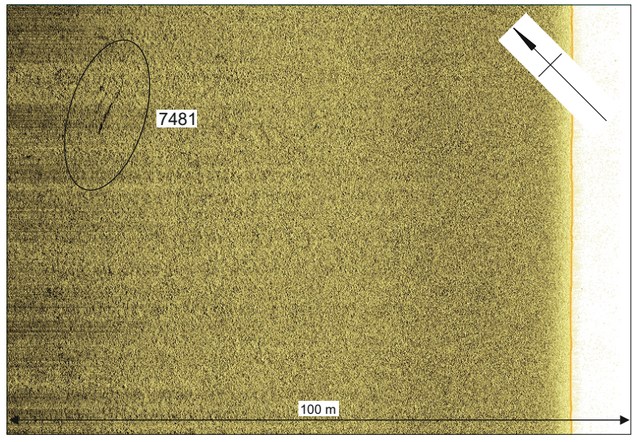
Sidescan sonar waterfall image of ferrous debris field **7482**, 10.0 x 10.0 x 1.1 m



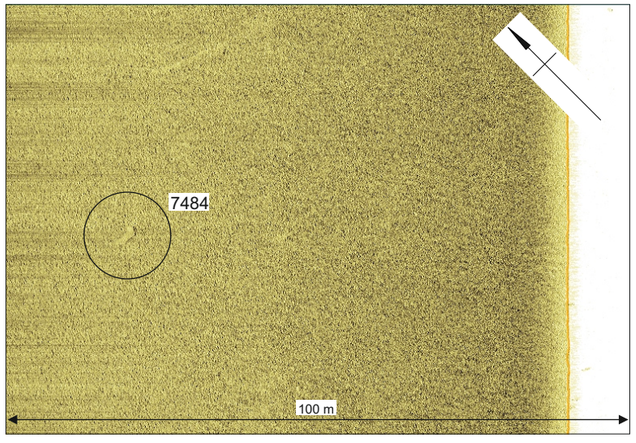
Magnetic profile of ferrous debris field **7482**, measuring 237 nT



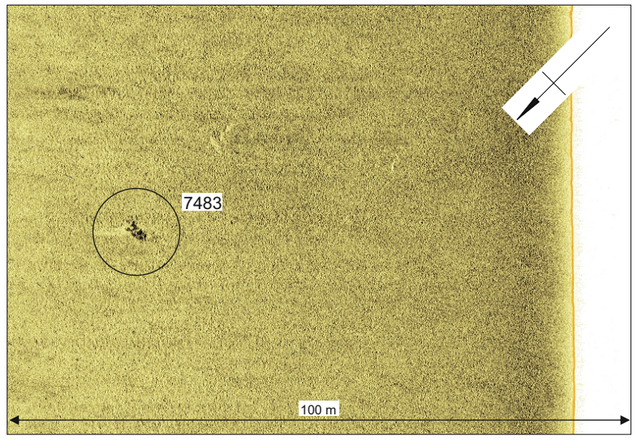
Multibeam echosounder image of ferrous debris field **7482**, looking north (x1 vertical exaggeration)



Sidescan sonar waterfall image of dark reflector **7481**, 27.9 x 0.9 m



Sidescan sonar waterfall image of debris **7484**, 13.1 x 3.9 x 0.2 m



Sidescan sonar waterfall image of dark reflector **7483**, 9.9 x 4.0 x 0.7 m

AECOM

PROJECT
NEUCONNECT

CLIENT
NeuConnect Britain Ltd.

KEY

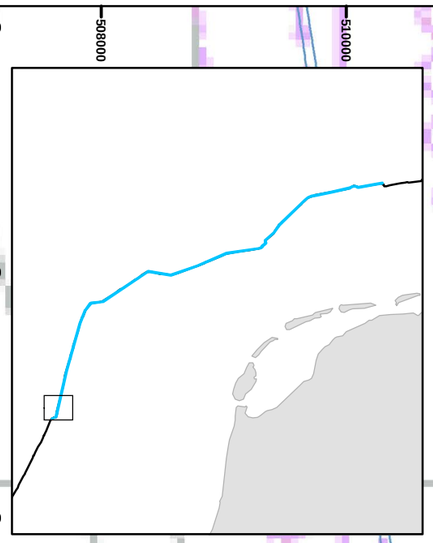
TITLE
FIGURE 7
SEABED FEATURES DATA EXAMPLES

REFERENCE
NC_190702_GeophysDutch_Fig07

SHEET NUMBER
1 of 1

DATE
28/02/19

Project Management Initials: AB Designer: KJF Checked: ## Approved: ##



Scale @ A3 1:50,000

0 2 4 km

Coordinate System: WGS84 UTM z31N

AECOM

PROJECT
NEUCONNECT

CLIENT
NeuConnect Britain Ltd.

KEY

- Proposed cable route
- RWS pipelines and cables
- MMT produced magnetometer trackplot

Seabed features of archaeological potential

- A1 – Anthropogenic origin of archaeological interest
- A2 – Uncertain origin of possible archaeological interest
- A3 – Historic record of possible archaeological interest

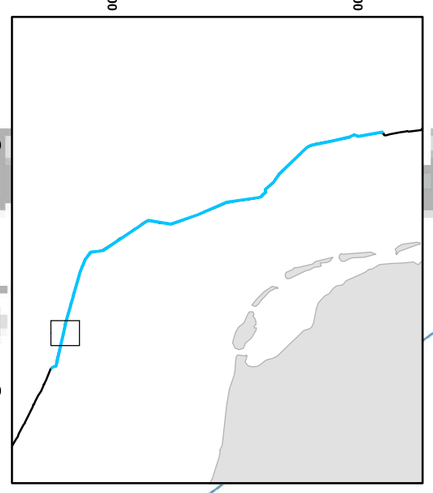
TITLE
FIGURE 8A
SEABED FEATURES OF ARCHAEOLOGICAL POTENTIAL IN RELATION TO THE MAGNETOMETER DATA

REFERENCE
NC_210423_GeophysDutch_Fig08

SHEET NUMBER
1 of 16

DATE
23/04/21

Project Management Initials: AB Designer: KJF Checked: ## Approved: ##



512000 514000 516000 518800 520000 522000 524000 526000

5888000 5886000 5884000 5882000 5880000 5878000 5876000

7504 7503 7502 7501 7500

0 2 4 km

Scale @ A3 1:50,000

Coordinate System: WGS84 UTM z31N

AECOM

PROJECT
NEUCONNECT

CLIENT
NeuConnect Britain Ltd.

KEY

- Proposed cable route
- RWS pipelines and cables
- MMT produced magnetometer trackplot

Seabed features of archaeological potential

- A1 – Anthropogenic origin of archaeological interest
- A2 – Uncertain origin of possible archaeological interest
- A3 – Historic record of possible archaeological interest

TITLE

FIGURE 8B
SEABED FEATURES OF ARCHAEOLOGICAL POTENTIAL IN RELATION TO THE MAGNETOMETER DATA

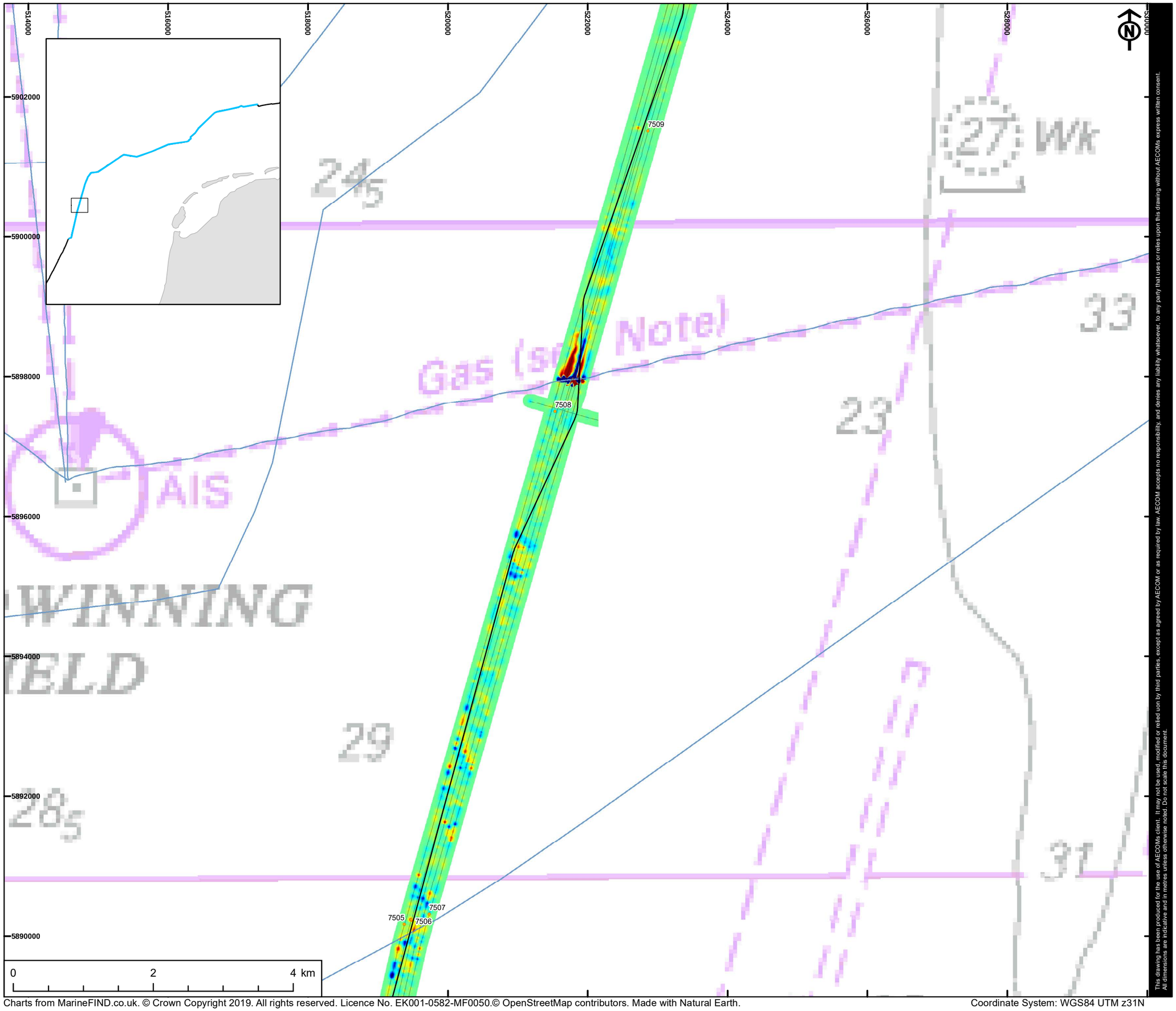
REFERENCE

NC_210423_GeophysDutch_Fig08

SHEET NUMBER
2 of 16

DATE
23/04/21

Project Management Initials: AB Designer: KJF Checked: ## Approved: ##



Scale @ A3 1:50,000

Coordinate System: WGS84 UTM z31N

AECOM

PROJECT
NEUCONNECT

CLIENT
NeuConnect Britain Ltd.

KEY

- Proposed cable route
- RWS pipelines and cables
- MMT produced magnetometer trackplot

Seabed features of archaeological potential

- A1 – Anthropogenic origin of archaeological interest
- A2 – Uncertain origin of possible archaeological interest
- A3 – Historic record of possible archaeological interest

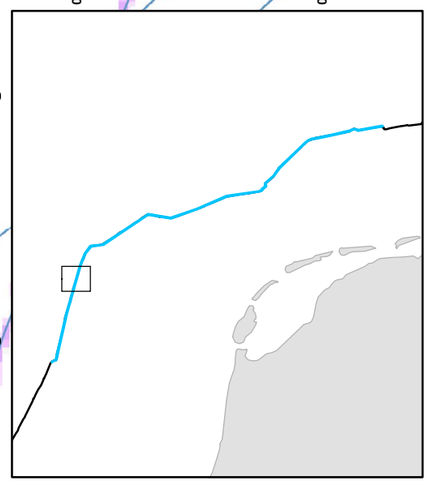
TITLE
FIGURE 8C
SEABED FEATURES OF ARCHAEOLOGICAL POTENTIAL IN RELATION TO THE MAGNETOMETER DATA

REFERENCE
NC_210423_GeophysDutch_Fig08

SHEET NUMBER
3 of 16

DATE
23/04/21

Project Management Initials: AB Designer: KJF Checked: ## Approved: ##



518000 520000 522000 524000 526000 528000 530000 532000

5916000 5914000 5912000 5910000 5908000 5906000 5904000

28 S 26 26 24 5 32 4

7514 7513 7511 7510

TBA KETTLE HOLE

0 2 4 km

Scale @ A3 1:50,000

Coordinate System: WGS84 UTM z31N

AECOM

PROJECT
NEUCONNECT

CLIENT
NeuConnect Britain Ltd.

KEY

- Proposed cable route
- RWS pipelines and cables
- MMT produced magnetometer trackplot

Seabed features of archaeological potential

- A1 – Anthropogenic origin of archaeological interest
- A2 – Uncertain origin of possible archaeological interest
- A3 – Historic record of possible archaeological interest

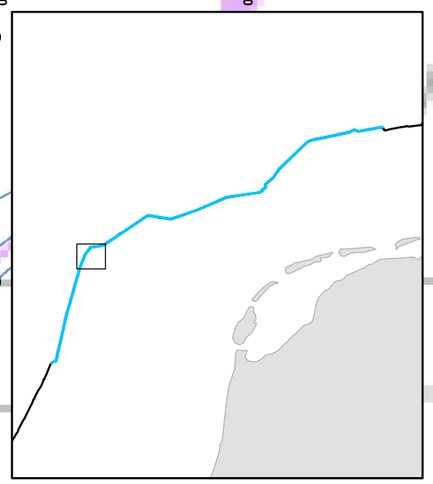
TITLE
FIGURE 8D
SEABED FEATURES OF ARCHAEOLOGICAL POTENTIAL IN RELATION TO THE MAGNETOMETER DATA

REFERENCE
NC_210423_GeophysDutch_Fig08

SHEET NUMBER
4 of 16

DATE
23/04/21

Project Management Initials: AB Designer: KJF Checked: ## Approved: ##



526000 528000 530000 532000 534000 536000 538000 540000

5930000 5928000 5926000 5924000 5922000 5920000 5918000

7528 7530 7529 7527 7525 7526 7524 7523 7522 7521 7520 7474 7519 7518 7517 7516 7515

31 30 wk 29 wk 28s 27 27s

0 2 4 km

Scale @ A3 1:50,000

Charts from MarineFIND.co.uk. © Crown Copyright 2019. All rights reserved. Licence No. EK001-0582-MF0050.© OpenStreetMap contributors. Made with Natural Earth.

Coordinate System: WGS84 UTM z31N

AECOM

PROJECT
NEUCONNECT

CLIENT
NeuConnect Britain Ltd.

KEY

- Proposed cable route
- RWS pipelines and cables
- MMT produced magnetometer trackplot

Seabed features of archaeological potential

- A1 – Anthropogenic origin of archaeological interest
- A2 – Uncertain origin of possible archaeological interest
- A3 – Historic record of possible archaeological interest

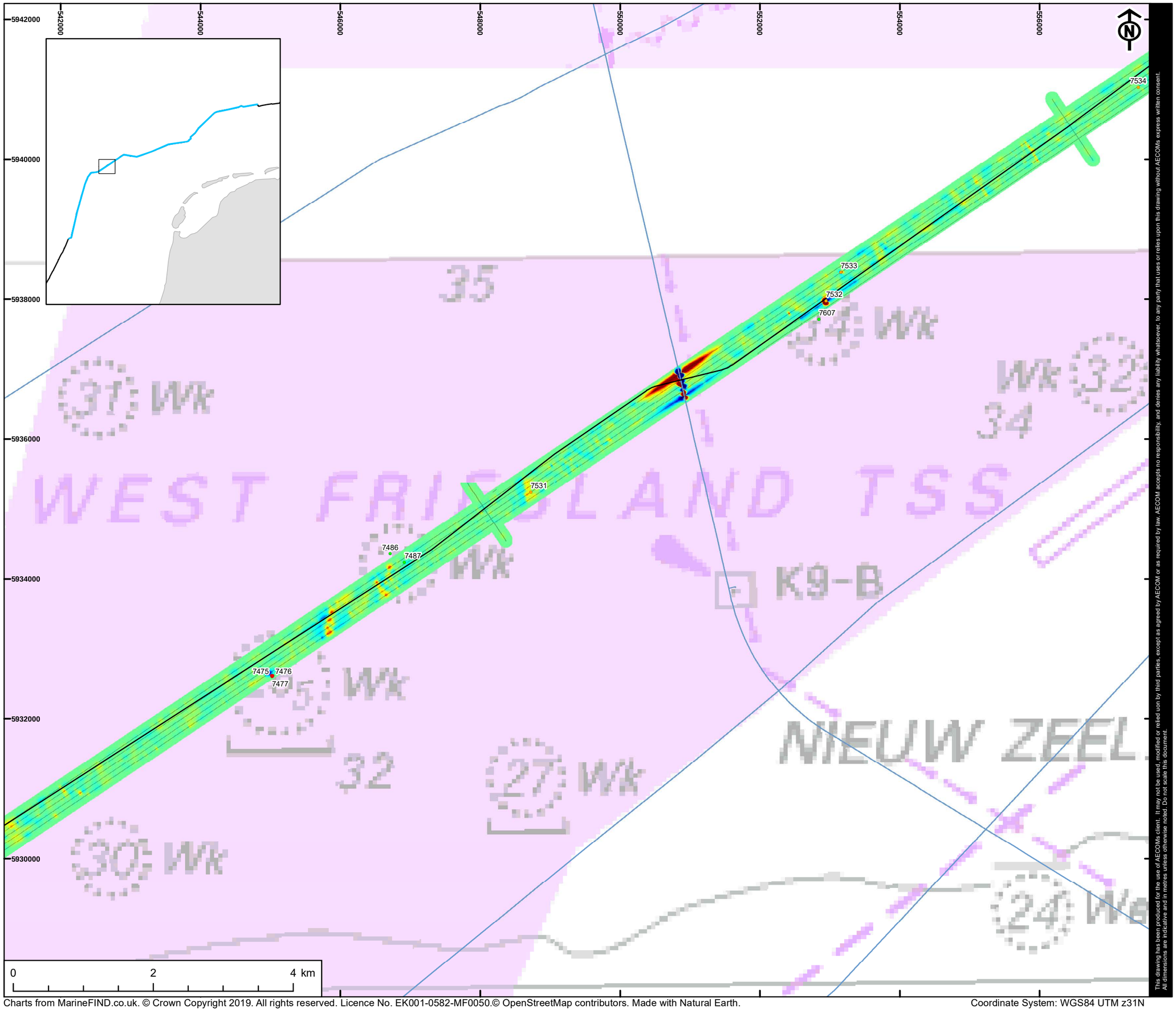
TITLE
FIGURE 8E
SEABED FEATURES OF ARCHAEOLOGICAL POTENTIAL IN RELATION TO THE MAGNETOMETER DATA

REFERENCE
NC_210423_GeophysDutch_Fig08

SHEET NUMBER
5 of 16

DATE
23/04/21

Project Management Initials: AB Designer: KJF Checked: ## Approved: ##



Scale @ A3 1:50,000

Coordinate System: WGS84 UTM z31N

AECOM

PROJECT
NEUCONNECT

CLIENT
NeuConnect Britain Ltd.

KEY

- Proposed cable route
- RWS pipelines and cables
- MMT produced magnetometer trackplot

Seabed features of archaeological potential

- A1 – Anthropogenic origin of archaeological interest
- A2 – Uncertain origin of possible archaeological interest
- A3 – Historic record of possible archaeological interest

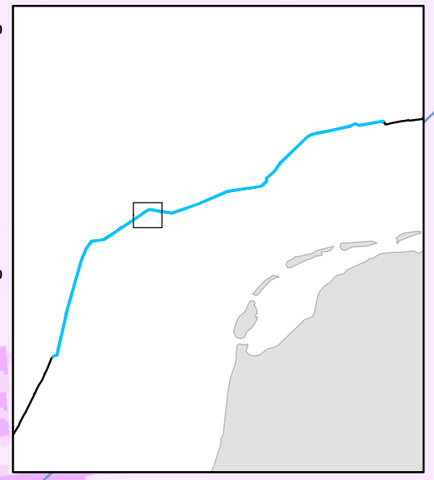
TITLE
FIGURE 8F
SEABED FEATURES OF ARCHAEOLOGICAL POTENTIAL IN RELATION TO THE MAGNETOMETER DATA

REFERENCE
NC_210423_GeophysDutch_Fig08

SHEET NUMBER
6 of 16

DATE
23/04/21

Project Management Initials: AB Designer: KJF Checked: ## Approved: ##



558000 560000 562000 564000 566000 568000 570000 572000

5950000 5948000 5946000 5944000 5942000 5940000 5938000

7534 7535 7536 7537 7538 7539 7540

Obstn 23 L 4-B 37 34 WK 35 33

0 2 4 km

Scale @ A3 1:50,000

Coordinate System: WGS84 UTM z31N

AECOM

PROJECT
NEUCONNECT

CLIENT
NeuConnect Britain Ltd.

KEY

- Proposed cable route
- RWS pipelines and cables
- MMT produced magnetometer trackplot

Seabed features of archaeological potential

- A1 – Anthropogenic origin of archaeological interest
- A2 – Uncertain origin of possible archaeological interest
- A3 – Historic record of possible archaeological interest

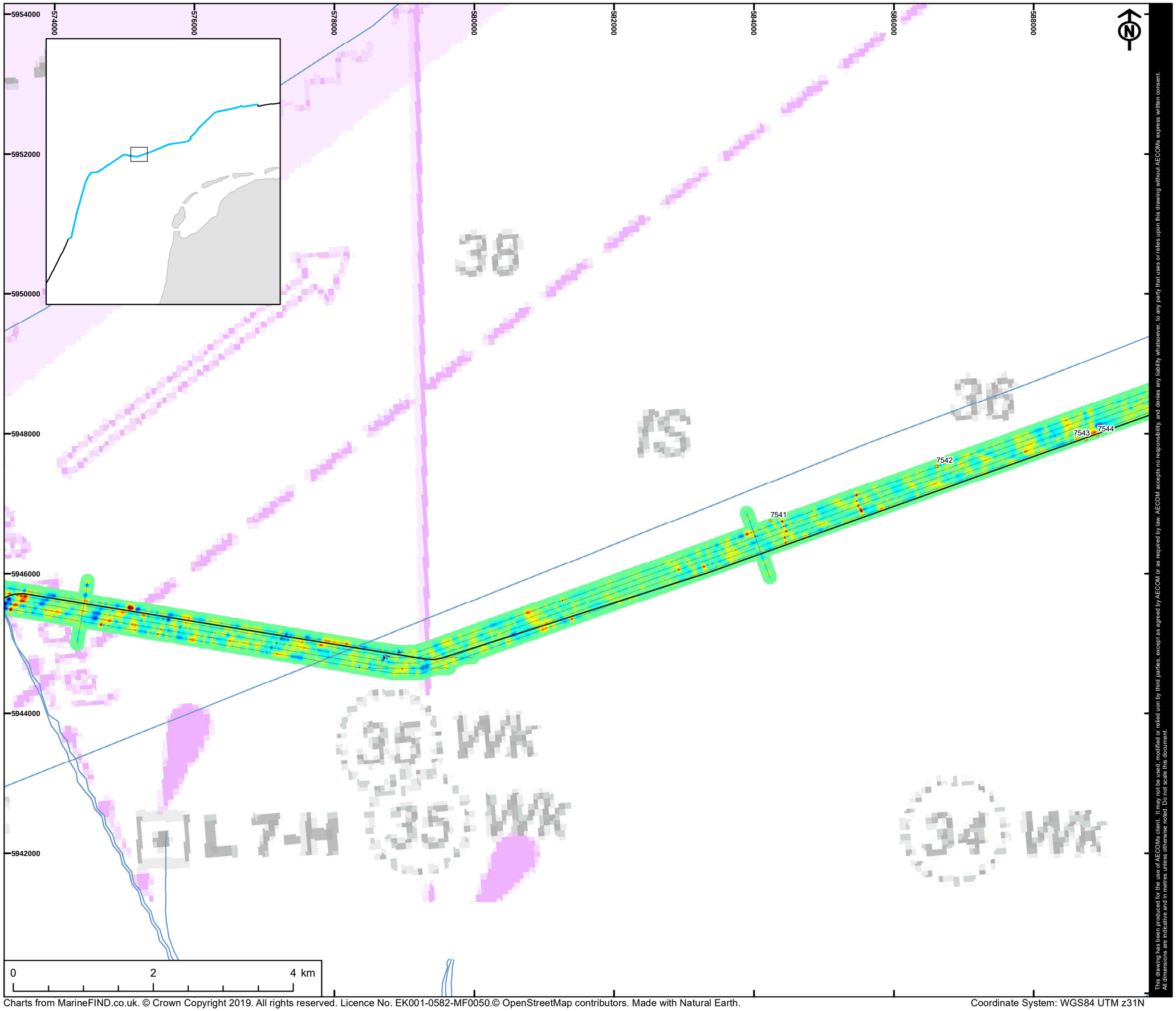
TITLE
FIGURE 8G
SEABED FEATURES OF ARCHAEOLOGICAL POTENTIAL IN RELATION TO THE MAGNETOMETER DATA

REFERENCE
NC_210423_GeophysDutch_Fig08

SHEET NUMBER
7 of 16

DATE
23/04/21

Project Management Initials: AB Designer: KJF Checked: ## Approved: ##



Scale @ A3 1:50,000

Coordinate System: WGS84 UTM z31N

AECOM

PROJECT
NEUCONNECT

CLIENT
NeuConnect Britain Ltd.

KEY

- Proposed cable route
- RWS pipelines and cables
- MMT produced magnetometer trackplot

Seabed features of archaeological potential

- A1 – Anthropogenic origin of archaeological interest
- A2 – Uncertain origin of possible archaeological interest
- A3 – Historic record of possible archaeological interest

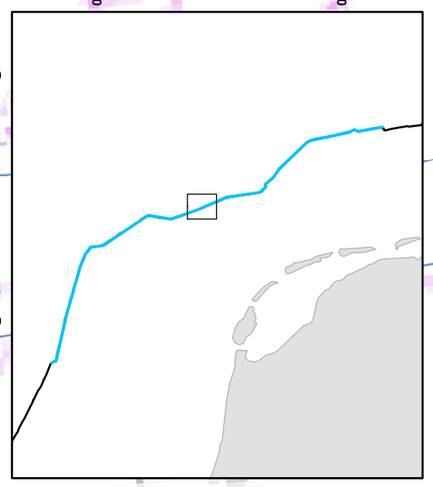
TITLE
FIGURE 8H
SEABED FEATURES OF ARCHAEOLOGICAL POTENTIAL IN RELATION TO THE MAGNETOMETER DATA

REFERENCE
NC_210423_GeophysDutch_Fig08

SHEET NUMBER
8 of 16

DATE
23/04/21

Project Management Initials: AB Designer: KJF Checked: ## Approved: ##



Scale @ A3 1:50,000

0 2 4 km

Coordinate System: WGS84 UTM z31N

AECOM

PROJECT
NEUCONNECT

CLIENT
NeuConnect Britain Ltd.

KEY

- Proposed cable route
- RWS pipelines and cables
- MMT produced magnetometer trackplot

Seabed features of archaeological potential

- A1 – Anthropogenic origin of archaeological interest
- A2 – Uncertain origin of possible archaeological interest
- A3 – Historic record of possible archaeological interest

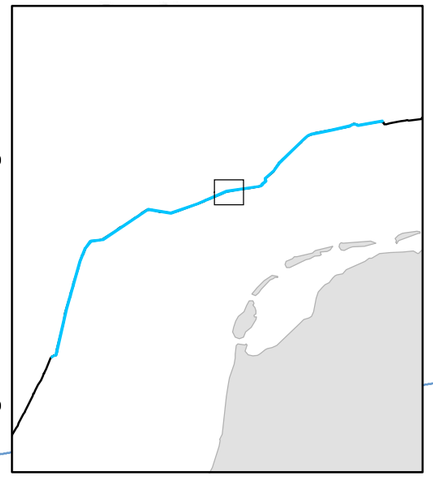
TITLE
FIGURE 8I
SEABED FEATURES OF ARCHAEOLOGICAL POTENTIAL IN RELATION TO THE MAGNETOMETER DATA

REFERENCE
NC_210423_GeophysDutch_Fig08

SHEET NUMBER
9 of 16

DATE
23/04/21

Project Management Initials: AB Designer: KJF Checked: ## Approved: ##



Scale @ A3 1:50,000

Coordinate System: WGS84 UTM z31N

AECOM

PROJECT
NEUCONNECT

CLIENT
NeuConnect Britain Ltd.

KEY

- Proposed cable route
- RWS pipelines and cables
- MMT produced magnetometer trackplot

Seabed features of archaeological potential

- A1 – Anthropogenic origin of archaeological interest
- A2 – Uncertain origin of possible archaeological interest
- A3 – Historic record of possible archaeological interest

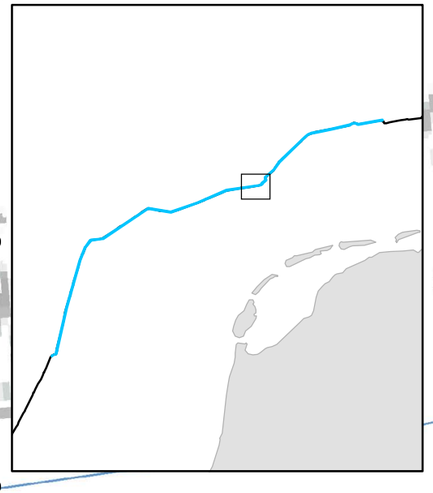
TITLE
FIGURE 8J
SEABED FEATURES OF ARCHAEOLOGICAL POTENTIAL IN RELATION TO THE MAGNETOMETER DATA

REFERENCE
NC_210423_GeophysDutch_Fig08

SHEET NUMBER
10 of 16

DATE
23/04/21

Project Management Initials: AB Designer: KJF Checked: ## Approved: ##



620000 622000 624000 626000 628000 630000 632000 634000

5966000 5964000 5962000 5960000 5958000 5956000 5954000

7574 7573 7568 7567 7566 7564 7563 7562 7492 7489 7481 7560 7561 7559

Prod Well 27

Wk 36

36

34 Wk

34

Wk 32

33 Wk

32

34

26 Well

0 2 4 km

Scale @ A3 1:50,000

Coordinate System: WGS84 UTM z31N

AECOM

PROJECT
NEUCONNECT

CLIENT
NeuConnect Britain Ltd.

KEY

- Proposed cable route
- RWS pipelines and cables
- MMT produced magnetometer trackplot

Seabed features of archaeological potential

- A1 – Anthropogenic origin of archaeological interest
- A2 – Uncertain origin of possible archaeological interest
- A3 – Historic record of possible archaeological interest

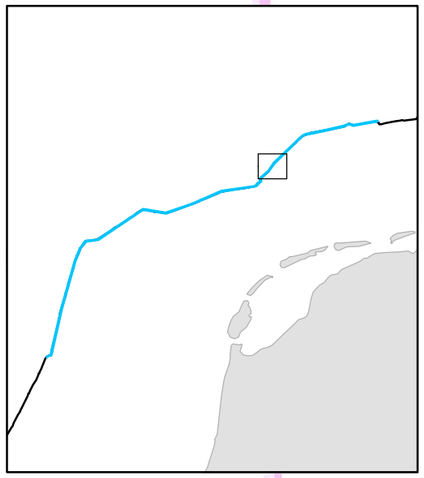
TITLE
FIGURE 8K
SEABED FEATURES OF ARCHAEOLOGICAL POTENTIAL IN RELATION TO THE MAGNETOMETER DATA

REFERENCE
NC_210423_GeophysDutch_Fig08

SHEET NUMBER
11 of 16

DATE
23/04/21

Project Management Initials: AB Designer: KJF Checked: ## Approved: ##



632000 634000 636000 638000 640000 642000 644000 646000

5978000 5976000 5974000 5972000 5970000 5968000 5966000

7591 7590 7589 7588 7587 7586 7585 7584 7583 7580 7572 7571 7569 7568 7567 7566

34 Wk 37 37 34 Wk 36 29 Well Wk 50 34 33 28 Wk

0 2 4 km

Scale @ A3 1:50,000

Coordinate System: WGS84 UTM z31N

AECOM

PROJECT
NEUCONNECT

CLIENT
NeuConnect Britain Ltd.

KEY

- Proposed cable route
- RWS pipelines and cables
- MMT produced magnetometer trackplot

Seabed features of archaeological potential

- A1 – Anthropogenic origin of archaeological interest
- A2 – Uncertain origin of possible archaeological interest
- A3 – Historic record of possible archaeological interest

TITLE
FIGURE 8L
SEABED FEATURES OF ARCHAEOLOGICAL POTENTIAL IN RELATION TO THE MAGNETOMETER DATA

REFERENCE
NC_210423_GeophysDutch_Fig08

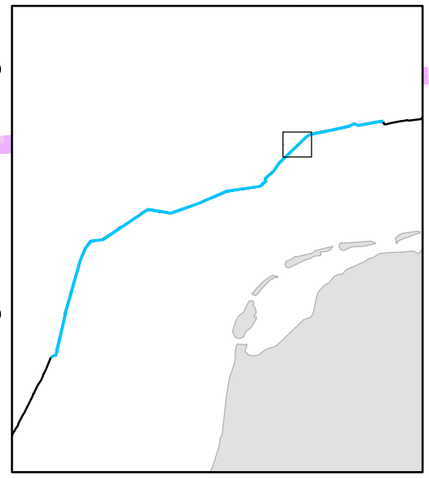
SHEET NUMBER
12 of 16

DATE
23/04/21

Project Management Initials: AB Designer: KJF Checked: ## Approved: ##

644000 646000 648000 650000 652000 654000 656000 658000

5990000 5988000 5986000 5984000 5982000 5980000 5978000



7592

0 2 4 km

Scale @ A3 1:50,000

Coordinate System: WGS84 UTM z31N

AECOM

PROJECT
NEUCONNECT

CLIENT
NeuConnect Britain Ltd.

KEY

- Proposed cable route
- RWS pipelines and cables
- MMT produced magnetometer trackplot

Seabed features of archaeological potential

- A1 – Anthropogenic origin of archaeological interest
- A2 – Uncertain origin of possible archaeological interest
- A3 – Historic record of possible archaeological interest

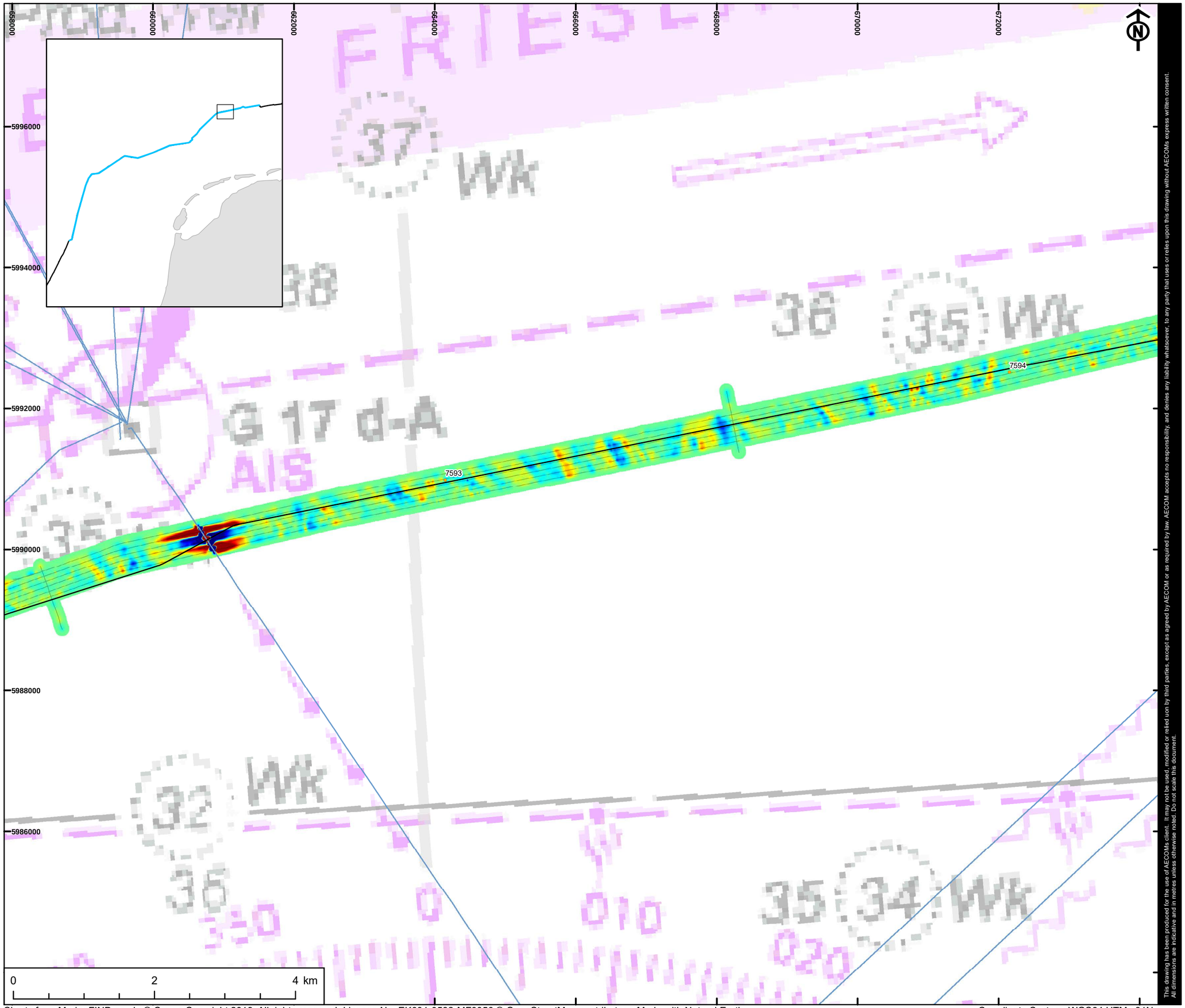
TITLE
FIGURE 8M
SEABED FEATURES OF ARCHAEOLOGICAL POTENTIAL IN RELATION TO THE MAGNETOMETER DATA

REFERENCE
NC_210423_GeophysDutch_Fig08

SHEET NUMBER
13 of 16

DATE
23/04/21

Project Management Initials: AB Designer: KJF Checked: ## Approved: ##



Scale @ A3 1:50,000

Charts from MarineFIND.co.uk. © Crown Copyright 2019. All rights reserved. Licence No. EK001-0582-MF0050.© OpenStreetMap contributors. Made with Natural Earth.

Coordinate System: WGS84 UTM z31N

AECOM

PROJECT
NEUCONNECT

CLIENT
NeuConnect Britain Ltd.

KEY

- Proposed cable route
- RWS pipelines and cables
- MMT produced magnetometer trackplot

Seabed features of archaeological potential

- A1 – Anthropogenic origin of archaeological interest
- A2 – Uncertain origin of possible archaeological interest
- A3 – Historic record of possible archaeological interest

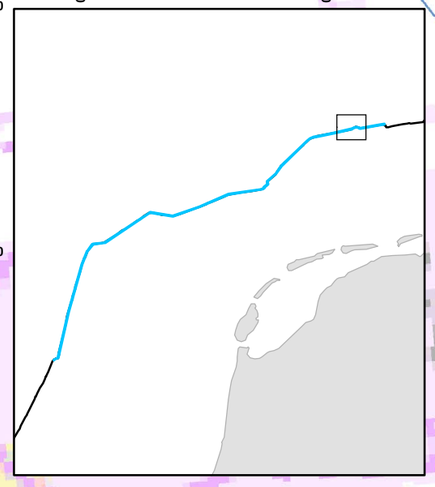
TITLE
FIGURE 8N
SEABED FEATURES OF ARCHAEOLOGICAL POTENTIAL IN RELATION TO THE MAGNETOMETER DATA

REFERENCE
NC_210423_GeophysDutch_Fig08

SHEET NUMBER
14 of 16

DATE
23/04/21

Project Management Initials: AB Designer: KJF Checked: ## Approved: ##



674000 676000 678000 680000 682000 684000 686000 688000

6002000 6000000 5998000 5996000 5994000 5992000 5990000

7595 7596 7597 7483 7598 7599

34 35 33 35 33 WK 34

0 2 4 km

Scale @ A3 1:50,000

Coordinate System: WGS84 UTM z31N

AECOM

PROJECT
NEUCONNECT

CLIENT
NeuConnect Britain Ltd.

KEY

- Proposed cable route
- RWS pipelines and cables
- MMT produced magnetometer trackplot

Seabed features of archaeological potential

- A1 – Anthropogenic origin of archaeological interest
- A2 – Uncertain origin of possible archaeological interest
- A3 – Historic record of possible archaeological interest

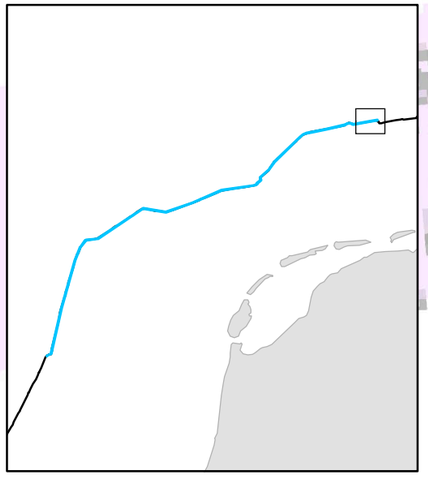
TITLE
FIGURE 8O
SEABED FEATURES OF ARCHAEOLOGICAL POTENTIAL IN RELATION TO THE MAGNETOMETER DATA

REFERENCE
NC_210423_GeophysDutch_Fig08

SHEET NUMBER
15 of 16

DATE
23/04/21

Project Management Initials: AB Designer: KJF Checked: ## Approved: ##



Scale @ A3 1:50,000

Coordinate System: WGS84 UTM z31N

AECOM

PROJECT
NEUCONNECT

CLIENT
NeuConnect Britain Ltd.

KEY

- Proposed cable route
- RWS pipelines and cables
- MMT produced magnetometer trackplot

Seabed features of archaeological potential

- A1 – Anthropogenic origin of archaeological interest
- A2 – Uncertain origin of possible archaeological interest
- A3 – Historic record of possible archaeological interest

TITLE
FIGURE 8P
SEABED FEATURES OF ARCHAEOLOGICAL POTENTIAL IN RELATION TO THE MAGNETOMETER DATA

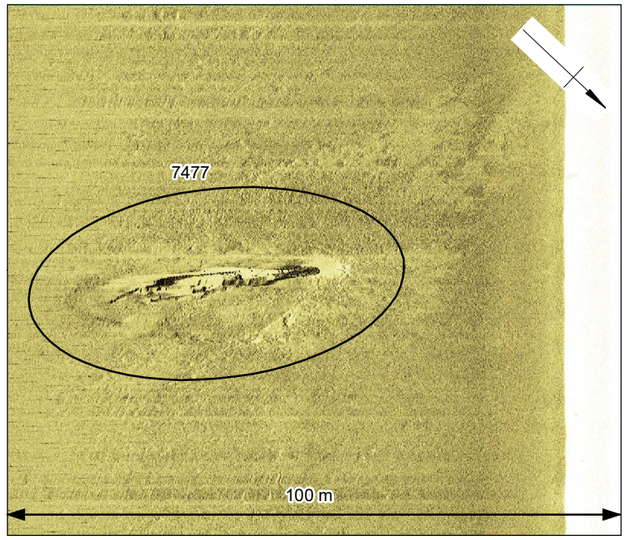
REFERENCE
NC_210423_GeophysDutch_Fig08

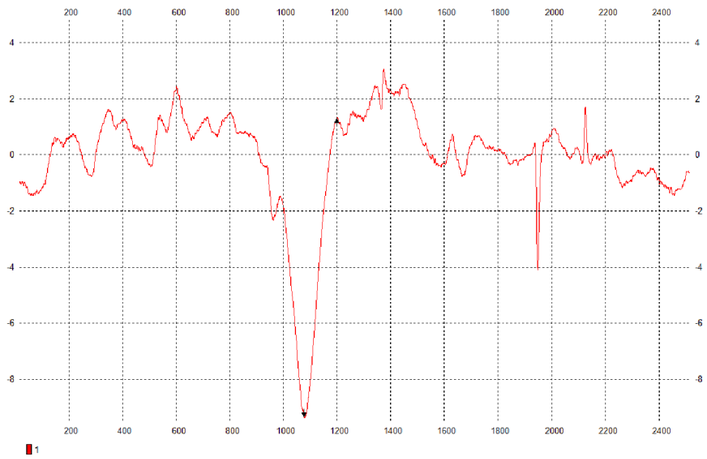
SHEET NUMBER
16 of 16

DATE
23/04/21

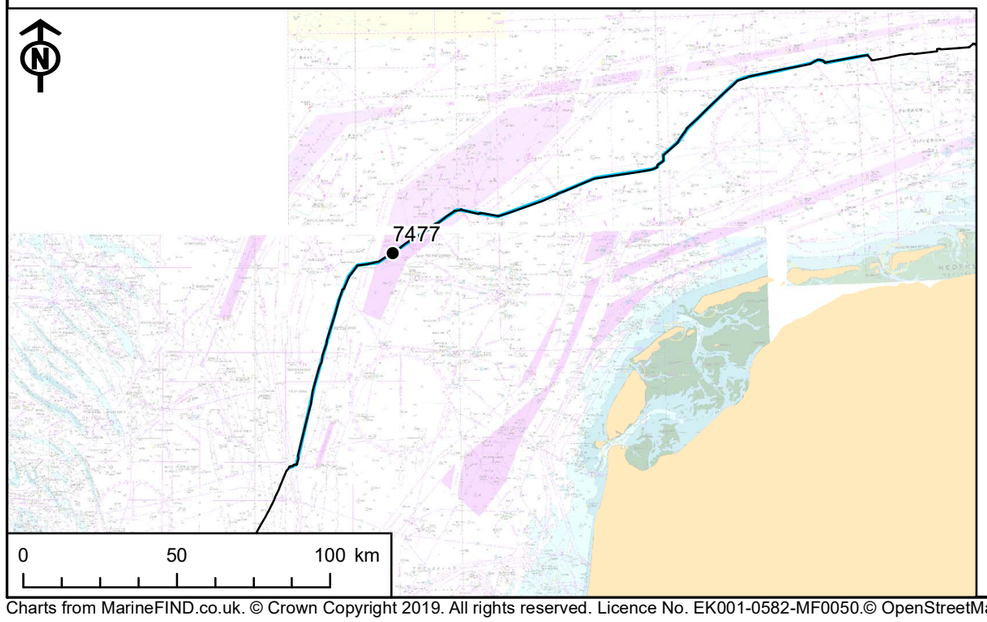
ID 7477 – Unknown

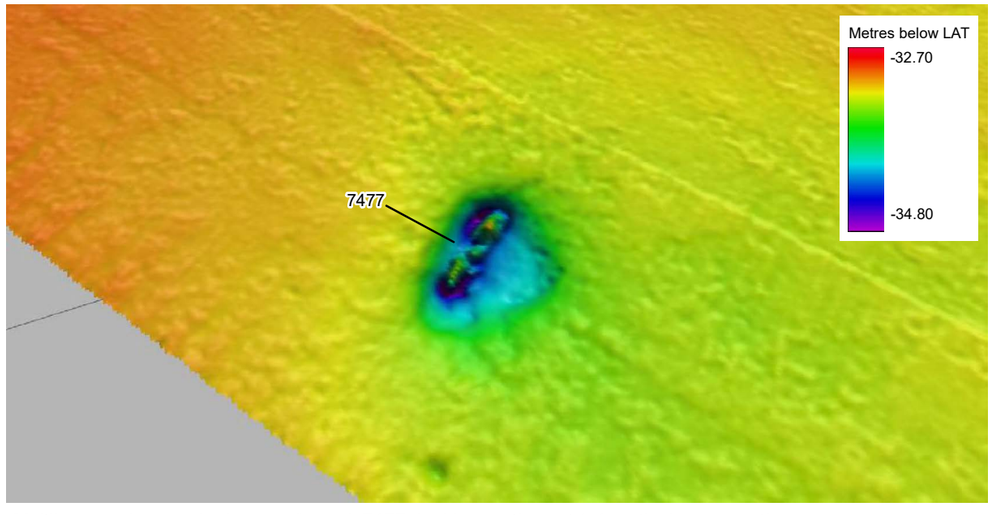
Location		545026 E 5932601 N	**Area**	Dutch Sector
Archaeological Importance		High		
Geophysical survey dimensions and notes		**7477** is a wreck situated in the Dutch Sector of the NeuConnect study area, orientated north west to south east on the seabed. The wreck is recorded in the UKHO database (UKHO 28296). In the SSS data this is a large wreck that appears to be relatively intact and possibly lying upright on the seabed with dimensions of 37 x 9.9 x 0.9 m. One edge of the hull appears to be partially degraded or buried by sediment, while the other edge seems complete. There are some slightly slatted features visible within the vessel which could be surviving structural remains. The wreck is situated on a sandy and featureless area of the seabed, within a depression, with possible associated debris items in the vicinity. There is a small magnetic anomaly measuring 11 nT associated with this wreck indicating the presence of some ferrous material however, as the nearest magnetometer line is situated 40 m from the wreck, it is likely that the true amplitude would be larger if the wreck was directly covered by the magnetometer data. In the MBES data this is visible as a distinct mound 1.7 m high, orientated on an approximate north-west to south-east alignment. Scour up to -0.5 m deep is visible around the wreck and extending approximately 22 m to the north east. The wreck appears in the MBES data to be in three main segments which suggests there is some deterioration in its centre.		
Build	**Type**	Unknown		
	Construction	Unknown		
	Dimensions (m)	Unknown		
	Shipyard	Unknown		
Loss	**Cause**	Unknown		
Extent of Survival		This is recorded in the UKHO database as the remains of an unknown fishing vessel. In the geophysical data the wreck appears to be mostly intact, with some internal possible structural objects still standing and discernible. There is possibly some deterioration to the central area of the wreck visible in the MBES data.		





Magnetic profile of wreck **7477**, measuring 11 nT





Multibeam echosounder image of wreck 7477, looking north west (x1 vertical exaggeration

Scale @ A3 1:2,000,000

Coordinate System: WGS84 UTM z31N

Project Management Initials: AB Designer: KJF Checked: ## Approved: ##

AECOM

PROJECT
NEUCONNECT

CLIENT
NeuConnect Britain Ltd.

KEY
- Proposed cable route
- Geophysical study area

TITLE
SHEET 1
ID 7477 – UNKNOWN

REFERENCE
NC_210312_WreckSheet01

SHEET NUMBER
1 of 1

DATE
12/03/21

Wessex Archaeology Ltd registered office Portway House, Old Sarum Park, Salisbury, Wiltshire SP4 6EB
Tel: 01722 326867 Fax: 01722 337562 info@wessexarch.co.uk www. wessexarch.co.uk

FS 606559