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Holyhead Deep Disposal Site - Micro-site for rock disposal

Archaeological Assessment of Marine Geophysical Survey Data

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* I = Internal Draft; E = External Draft; F = Final

DISCLAIMER

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Summary

Wessex Archaeology was commissioned by Jacobs UK Ltd (Jacobs) on behalf of Horizon Nuclear Power Ltd (Horizon) to prepare an archaeological assessment of marine geophysical survey data of the Micro-site for rock disposal, located within the Disposal Site (Holyhead North IS043), which is situated 6.5 km off the coast of Anglesey.

The assessment interpreted geophysical survey data acquired by Partrac Ltd in June 2017. The data comprised sidescan sonar, magnetometer, multibeam bathymetry and sub-bottom profiler. Data from within the Micro-site for rock disposal and a 100 m buffer around it were assessed.

The palaeogeographic interpretation has revealed five shallow geological units within the Study Area, two of which are of possible archaeological potential (Unit 3 and Unit 4).

The seabed features assessment has identified two anomalies as being of possible archaeological interest; both of these are classified as A2 archaeological discrimination (uncertain origin of possible archaeological interest) and were identified in the magnetometer data only, indicating potential buried ferrous debris.

No Archaeological Exclusion Zones are recommended for any of these anomalies at this time, although avoidance is recommended. If the anomalies are to be directly affected by development in the future, further mitigation may be required.

Holyhead Deep Disposal Site – Micro-site for rock disposal

Archaeological Assessment of Marine Geophysical Survey Data

Acknowledgements

This project was commissioned by Jacobs UK Ltd (Jacobs) on behalf of Horizon Nuclear Power Ltd (Horizon).

Data were provided by the United Kingdom Hydrographic Office and the National Monuments Record of Wales. Wessex Archaeology is grateful to the staff of all the above organisations for their co-operation during the project.

The geophysical assessment was carried out and the report written by Abby Mynett. The figures were produced by Ken Lymer and geophysical quality control was carried out by Dr Louise Tizzard. The project was managed for Wessex Archaeology by Dr Louise Tizzard.

Holyhead Deep Disposal Site – Micro-site for rock disposal

Archaeological Assessment of Marine Geophysical Survey Data

1 INTRODUCTION

1.1 Project background

1.1.1 Wessex Archaeology was commissioned by Jacobs UK Ltd (Jacobs) on behalf of Horizon Nuclear Power Ltd (Horizon), to undertake an archaeological assessment of marine geophysical survey data over the Micro-site for rock disposal (**Figure 1**) and a 100 m buffer around it (together these are referred to as the 'the Study Area').

1.1.2 The Micro-site for rock disposal comprises a rectangular area measuring 630 m x 630 m and is located approximately 6.5 km west of the coastline of Holyhead, Anglesey in North Wales (**Figure 1**).

1.1.3 Wessex Archaeology had previously carried out a marine archaeological desk-based survey which included the Micro-site for rock disposal (see appendix D11-3c Holyhead Deep Disposal Site Marine Archaeological Baseline Report, Application Reference Number: 6.4.73).

1.1.4 This report presents the results of the archaeological review of geophysical data (sidescan sonar, magnetometer, multibeam bathymetry and sub-bottom profiler) acquired by Partrac Ltd.

1.2 Aims and objectives

1.2.1 The aim of this review was to undertake an archaeological assessment of 2017 geophysical survey data acquired over the Study Area. The objectives were as follows:

- *To assess the geophysical survey data acquired by Partrac Ltd in 2017 to identify any material of possible archaeological and cultural heritage value present within the Study Area;*
- *To compare the results of the geophysical interpretation with the results of any historic records within the Study Area.*

2 METHODOLOGY

2.1 Data sources

2.1.1 Wreck and obstruction data within the Study Area were obtained from the United Kingdom Hydrographic Office (UKHO) and the National Monuments Record of Wales (NMRW). Any records located within the Study Area were integrated with the geophysical results as outlined in **Section 2.5**.

2.1.2 The geophysical survey data comprised sidescan sonar, magnetometer, multibeam bathymetry and sub-bottom profiler acquired in June 2017.

2.1.3 Any sites found to be outside the Study Area, by any distance, are deemed beyond the scope of the current assessment and are subsequently not included in this report.

2.1.4 Full data coverage was achieved within the Micro-site for rock disposal and throughout the majority of the buffer area.

2.2 Geophysical data – technical specifications

2.2.1 The geophysical data were acquired by Partrac Ltd between the 19 and 22 June 2017 on-board survey vessel MV *SeeKat C*. Data acquired consisted of sidescan sonar, magnetometer, multibeam bathymetry and sub-bottom profiler. A line spacing of 75 m orientated north to south was executed for the survey, with a number of cross lines undertaken (Partrac Ltd 2017).

2.2.2 The sidescan sonar deployed for the survey was a Klein 3000 digital dual frequency towfish, operated at high and low frequencies (100/500 kHz) with a 95 m range. These data were provided to Wessex Archaeology as *.xtf* files.

2.2.3 The magnetometer deployed for the survey was a Geometrics G882 caesium vapour towfish capable of resolving anomalies to 5 nT and above. These data were provided to Wessex Archaeology as a *.csv* file.

2.2.4 A Norbit iWBMS Turnkey 512 beam system was used to acquire the multibeam bathymetry data with integrated Internal Navigation System and sound velocity correction. The data were provided to Wessex Archaeology as a 0.5 m gridded *.xyz* file.

2.2.5 A Sonar Equipment Services miniSVP pinger with a four pot arrangement was used to acquire sub-bottom profiler data. These data were provided to Wessex Archaeology as *.sgy* files.

2.2.6 The survey data was acquired using WGS84 UTM30N.

2.3 Geophysical data – data quality

2.3.1 The geophysical data comprised sidescan sonar, magnetometer, multibeam bathymetry and sub-bottom profiler datasets. Each of these were assessed for their quality and rated using the following criteria listed in **Table 1**.

Table 1: Criteria for assessing data quality rating

Data Quality	Description
Good	Data which are clear and unaffected by weather conditions or sea state. The dataset is suitable for the interpretation of standing and partially buried metal wrecks and their character and associated debris field. These data also provide the highest chance of identifying wooden wrecks and debris.
Average	Data which are affected by weather conditions and sea state to a slight or moderate degree. The dataset is suitable for the identification and partial interpretation of standing and partially buried metal wrecks, and the larger elements of their debris fields. Wooden wrecks may be visible in the data, but their identification as such is likely to be difficult.
Variable	This category contains datasets with the quality of individual lines ranging from good to average to below average. The dataset is suitable for the identification of standing and some partially buried metal wrecks. Detailed interpretation of the wrecks and debris field is likely to be problematic. Wooden wrecks are unlikely to be identified.

2.3.2 The sidescan sonar data have been rated as 'Average' using the above criteria table. The majority of lines exhibited good quality data. However, a number of lines displayed evidence of poor weather conditions. Overall the data quality and positioning were of suitable quality for archaeological assessment.

2.3.3 The magnetometer data have been rated as 'Average' using the above criterial table. Some of the files were affected by environmental noise from the underlying geology of the Micro-site for rock disposal.

2.3.4 The multibeam bathymetry data have been rated as 'Good' using the above criteria, with seabed features clearly visible and very little environmental (e.g. weather) noise visible. The data quality and resolution of 0.5 m was found to be of a high standard and suitable for the archaeological assessment of seabed objects and debris over 0.5 m.

2.3.5 The sub-bottom profiler (pinger) data have been rated as 'Variable' using the above criteria, with shallow geological features generally visible. A degree of ringing was observed and some lines were affected by sea conditions (swell), only limited penetration appears to have been achieved across much of the Study Area. However, palaeolandscape features were observed.

2.4 Geophysical data – processing

2.4.1 The high frequency *.xtf* sidescan sonar data files were converted into *.cod* format using Coda File Utilities and processed by Wessex Archaeology using Coda Sidescan+ and Mosaic+ software. This allowed for the data to be replayed with various gain settings in order to optimise the quality of the images. The data were initially scanned to give an understanding of the geological nature of the Micro-site for rock disposal and were then 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.

2.4.2 A mosaic of the sidescan sonar data is produced during this process to assess the quality of the sonar towfish positioning. This process allows the positioning of anomalies to be checked between different survey lines and for the layback values to be further refined if necessary.

2.4.3 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 define the edge of a buried but intact feature, or it may be all that remains as a result of past impacts from, for example, dredging or fishing.

2.4.4 The magnetometer *.csv* data file was edited and converted to *.txt* file and processed in Geometrics MagPick software. The assessment was carried out in order to identify any discrete magnetic contacts which could represent buried debris or structures such as wrecks.

2.4.5 The software enables both the visualisation of individual lines of data and the gridding of data to produce a magnetic anomaly map. The data were smoothed to try and eliminate any observed noise, a trend was then fitted to the resulting data and the trend values subtracted from the smoothed values. This was carried out in an attempt to remove natural variations in the data (such as diurnal variations in magnetic field strength and changes in geology). The processed data were then gridded to produce a map of magnetic anomalies.

Individual anomalies were tagged and images taken in a similar process to that undertaken for the sidescan sonar data.

2.4.6 The multibeam bathymetry data were analysed to identify any unusual seabed structures that could be shipwrecks or other anthropogenic debris. The data were gridded at the appropriate resolution and analysed using QPS Fledermaus software, which enables a 3D visualisation of the acquired data and geo-picking of seabed anomalies.

2.4.7 The sub-bottom profiler data (pinger) data were processed by Wessex Archaeology using Coda 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.

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

2.4.9 All of the sub-bottom profiler data lines were interpreted, this was sufficient to give a general overview of the shallow geology of the Study Area.

2.4.10 Any small reflectors which appear to be buried material such as a wreck site covered by sediment were also recorded, the position and dimensions of any such objects noted in a gazetteer, and an image of each anomaly acquired. It should be noted that anomalies of this type are rare, as the sensors must pass directly over such an object in order to produce an anomaly.

2.5 Geophysical data – anomaly grouping and discrimination

2.5.1 The previous section describes the initial interpretation of all available geophysical datasets which were conducted independently of one another. This inevitable 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 Study Area.

2.5.2 To address this fact, the anomalies were grouped together along with any features from NMRW and UKHO records of wrecks and obstructions that fall within the Study Area. This allows for one Identification (ID) number to be assigned to a single object for which there may be, for example, a UKHO record, a magnetic anomaly and multiple sidescan sonar anomalies.

2.5.3 Once all 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 as follows:

Table 2: Criteria discriminating relevance of seabed feature to proposed scheme

Non-archaeological	U1	Not of anthropogenic origin
	U2	Known non-archaeological feature
	U3	Recorded loss
Archaeological	A1	Anthropogenic origin of archaeological interest
	A2	Uncertain origin of possible archaeological interest
	A3	Historic record of possible archaeological interest with no corresponding geophysical anomaly

2.5.4 Similarly, the discrimination flags applied to shallow geological features of possible archaeological potential are ascribed as follows:

Table 3: Criteria discriminating relevance of palaeogeographic features to proposed scheme

Non-archaeological	U2	Feature of non-archaeological interest
Archaeological	P1	Feature of probable archaeological interest, either because of its palaeogeography or likelihood for producing palaeoenvironmental material
	P2	Feature of possible archaeological interest

2.5.5 The results of this assessment are presented in **Figures 2** and **3**, **Appendix I** and **Appendix II** and are discussed below.

2.5.6 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.

2.5.7 Any sites which are located outside of the defined Study Area, either previously recorded in known databases (e.g. UKHO) or identified during this geophysical assessment, are deemed beyond the scope of the current project and are subsequently not included in this report.

3 ARCHAEOLOGICAL ASSESSMENT – PREHISTORY

3.1 Geological Baseline

3.1.1 The Study Area is located within an area of seabed referred to as Holyhead Deep, a north-south trending bathymetric low within the Irish Sea located 6.5 km west of the coastline of Holyhead, Anglesey (**Figure 1**).

3.1.2 The basement geology of the Study Area comprises the Pre-Cambrian Mona Complex, made up of a sequence of quartzite and green mica schists (Jackson *et al*. 1995; Mouchel Heritage 2009). Previous magnetic anomaly data for the area indicates the presence of a northwest–southeast trending intrusive igneous dike swarm extending from Holy Island into the Irish Sea (Jackson *et al*. 1995).

3.1.3 The basement geology is generally overlain by a veneer of younger sediment and the bedrock is often exposed at the seabed within the Study Area (British Geological Survey 1990). The boundary between the basement geology and overlying sediments represents a significant hiatus, with the oldest sediments overlying the Pre-Cambrian likely to be Quaternary in age.

3.1.4 The Quaternary history of the Irish Sea is complex and dominated by repeated advance and retreat of ice sheets, and the effects of these cycles on relative sea level and sedimentary depositional environment. The Quaternary sediments from the wider Irish Sea area generally comprise sequences of till separated by pro-glacial fluvial and glaciomarine deposits, with more recent pro-deltaic and marine deposits surviving towards the top of the sequence. British Geological Survey (BGS) data indicate the survival of numerous relict glacial features on the seabed within the Irish Sea, including periglacial patterned ground and pingos (Jackson *et al*. 1995).

3.1.5 BGS information indicates that across the Irish Sea Pre-Cambrian bedrock should be present at the seabed, it is also likely that pockets of till (especially the Devensian Cardigan Bay Formation) and other sediments (such as the Late Devensian Western Irish Sea Formation) are present overlying the bedrock in areas. The exception to this sparse Quaternary sediment coverage is within Holyhead Deep, where there is a thick deposit of Western Irish Sea Formation overlaying the till and bedrock (British Geological Survey 1990). This formation is complex and contains a number of facies, though in general it records the final ice sheet retreat at the end of the Devensian glaciation, being a series of sandur plain outwash sands and gravels eventually overlain by glaciomarine and glaciolacustrine muds (Jackson *et al*. 1995).

3.1.6 The precise history of the Irish Sea since the Last Glacial Maximum (LGM) is currently the subject of debate, although the current evidence suggests that, as the Devensian ice front retreated northwards, relative sea level values remained low throughout the whole Irish Sea, exposing the Study Area as a terrestrial environment (Jackson *et al*. 1995; Flemming 2005).

3.1.7 It is during this time of exposure that a series of terrestrial sediments may have been deposited within the Study Area, forming part of the SL2 member of the Early Holocene Surface Sands Formation (Jackson *et al*. 1995). These are a varied series of deposits, including peaty/terrestrial layers, estuarine muds and reed swamp deposits and submerged peats, such as have previously been identified to the west of Holyhead harbour (Mouchel Heritage 2009).

3.1.8 Increased relative sea level rise as deglaciation progressed resulted in flooding of the Irish Sea, and estimates of relative sea level change indicate the entire Study Area would have been mostly, or completely, inundated by approximately 6,000 to 7,000 BP (Shennan and Horton 2002). Inundation is likely to have been relatively rapid, although the presence of submerged peat beds, such as those identified west of Holyhead, indicates at least some periods during which the coastline was potentially relatively stable.

3.1.9 At present, the Study Area is a fully marine environment. Sediment supply to the area is relatively low, and modern seabed sediment is generally reduced to thin deposits of sand and gravel with localised thicker areas containing small scale bedforms (SL1 member of the Surface Sands Formation). Any larger bedforms are generally bedrock outcrops or relict periglacial features (British Geological Survey 1990; Jackson *et al*. 1995).

3.2 Geophysical palaeographic assessment

3.2.1 A total of five shallow geological units have been interpreted from within the Study Area, which can be summarised as follows:

Table 4: Shallow geological units identified within the Study Area

Unit	BGS formation	Description	Archaeological potential
Unit 5	Surface Sands Formation (SL1 Member)	Modern seabed sediment.	Low
Unit 4	Surface Sands Formation (SL2 Member)	Early Holocene, pre-transgression terrestrial sand, silt and clay.	Moderate
Unit 3	Western Irish Sea Formation	Unknown member; could be Late Devensian periglacial outwash deposits or Late Devensian/Early Holocene glaciolacustrine/glaciomarine silts and clays.	Low/Moderate
Unit 2	Cardigan Bay Formation	Devensian glacial till.	Low
Unit 1	Mona Complex	Pre-Cambrian quartzite and green mica schist.	Low

3.2.2 Two palaeogeographic features of archaeological potential were also identified. These features are discussed below, and their distribution is illustrated in **Figure 2**. Full descriptions of individual features are provided in **Appendix I**.

3.2.3 As described in **Section 3.1**, the baseline geology of the Study Area comprises the Pre-Cambrian Mona Complex (Unit 1), which is far too old to be of archaeological potential. The overlying Quaternary sediments are generally relatively thin, although one feature of possible archaeological potential has been identified.

3.2.4 Although not always clearly defined in the sub-bottom profiler data Unit 1 and possibly Unit 2 are close to the surface or outcrop at various location across much of the Study Area. These outcropping areas can also be seen in the bathymetry data, though are not considered to be of archaeological interest.

3.2.5 Channel feature 7600 has been identified in the north-eastern extent of the Study Area and extends beyond the limits of the data. This is a coherent channel feature that has been identified on numerous survey lines. The channel is characterised by a relatively poorly defined, shallow basal reflector and a single phase of chaotic or unstructured fill. The channel has an uneven base and is cut into bedrock or till. The infill sediments thicken to the north-east and are interpreted as belonging to the Western Irish Sea Formation, Unit 3. The channel has a depth range of 0 m - 10.1 m below the seabed.

3.2.6 Although deposited post-LGM during a period of time when the Study Area was exposed as a terrestrial environment, it is likely that Unit 3 was deposited very close to the retreating ice sheet as glacial outwash. This environment is likely to have been too hostile for settlement by humans, and as such the formation is not considered to be of archaeological potential. However, there is uncertainty with this interpretation, and the unit may actually represent a later glaciolacustrine/glaciomarine deposit of possible palaeoenvironmental potential (discussed further in **Section 5**).

3.2.7 One feature has been interpreted as being Unit 4, possibly Early Holocene age within the Study Area (**Figure 2**). This appears as an upper channel cut and fill feature, cut into

possible Western Irish Sea Formation (Unit 3). The channel has been identified across two survey lines in the sub-bottom profiler data as a shallow and poorly defined cut and fill feature. The feature has an indistinct basal reflector and a single phase of distinct, layered fill. These have been interpreted to be possible Surface Sands Formation SL2 sediments. The feature has a depth range of 0.1 m - 2 m below the seabed and has been interpreted to be remnant terrestrial sediments deposited between the LGM and the Holocene transgression.

3.2.8 Due to the interpreted age and terrestrial nature of these sediments, they are considered to be of possible archaeological potential, and could contain both *in situ* and derived archaeological artefacts alongside preserved palaeoenvironmental material depending on the sediment type.

3.2.9 Unit 5 is the modern seabed sediment, which offshore generally comprises a thin veneer of sediment. As a modern deposit, Unit 5 is not considered to be of archaeological potential in itself, although it has the potential to cover wreck sites and other debris where the unit thickens.

3.2.10 It should be noted that no seabed sampling (e.g. borehole or vibrocore) logs have been consulted during this assessment, and the interpretation has been based on seismic character and previous (e.g. BGS) information alone. The sediment types present within the proposed stratigraphy and the identified features can only be confirmed by direct sampling.

4 ARCHAEOLOGICAL ASSESSMENT – SEABED FEATURES

4.1.1 The results of this assessment are collated in gazetteer format detailed in **Appendix II** and illustrated in **Figure 3**.

4.1.2 Two features have been identified as being of possible archaeological potential within the Study Area and are discriminated as shown in **Table 5**.

4.1.3 No recorded wrecks were identified within the Study Area.

Table 5: Features of archaeological potential within the Study Area

Archaeological discrimination	Quantity	Interpretation
A1	0	Anthropogenic origin of archaeological interest
A2	2	Uncertain origin of possible archaeological interest
A3	0	Historic record of possible archaeological interest with no corresponding geophysical anomaly
Total	**2**	

4.1.4 No features of archaeological potential were identified in the sidescan sonar or bathymetry data. Two magnetic anomalies have been identified within the Study Area and these are both located in the south-western extent of the Micro-site for rock disposal. Anomaly 7000 measures 7 nT. This is visible in the magnetic data as a small asymmetric dipole and has no surface expression in the sidescan sonar or bathymetry data. Given the size of this anomaly it may be a natural variation associated with the edge of large outcrop as seen on the bathymetry data.

4.1.5 Magnetic anomaly 7001 measures 11 nT and is visible in the data as a small and distinct dipole with no surface expression in the sidescan sonar or bathymetry data. This may be a small possibly buried ferrous object.

5 DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

5.1.1 The palaeogeographic interpretation has revealed five shallow geological units within the Study Area, two of which are of possible archaeological potential (Unit 3 and Unit 4).

5.1.2 The uncertainty with the interpretation of Unit 3 arises from the known complexity of the Western Irish Sea Formation, which comprises three separate members (or facies) representing different time periods and depositional environments (Jackson *et al*. 1995).

5.1.3 The lowest facies (Chaotic Facies) is an unsorted deposit of mud, sand, cobbles and boulders, which likely formed during the LGM as an ice proximal glaciomarine or glaciolacustrine deposit. This age and environment indicate this facies is unlikely to be of archaeological potential. The interpreted Western Irish Sea Formation deposits within the Study Area suggest that these may belong to this period.

5.1.4 The middle facies (Prograded Facies) is a series of tabular stratified sands containing prograding reflectors which are generally found infilling previous erosive features, such as the Holyhead Deep. These are expected to be glacial outwash deposits created very close to the ice front during deglaciation, and again are not interpreted to be of archaeological potential.

5.1.5 However, the upper facies (Mud Facies) of the Western Irish Sea Formation is also characterised in seismic data by sub-parallel internal reflectors. The facies generally comprises silts and clays, and is interpreted as an ice distal glaciolacustrine or glaciomarine deposit. The facies often contain gas accumulations (not identified within the Study Area), suggesting the presence of preserved organic material which may be of palaeoenvironmental importance.

5.1.6 The nature of the cut and fill channel interpreted to be Unit 4 (**Figure 2**) identified within the Study Area is similarly unconfirmed, although it is possible that it represents a terrestrial deposit.

5.1.7 The geophysical seabed features assessment has identified two features of archaeological potential within the Study Area. Both of these features have been classified as A2 archaeological discrimination, no Archaeological Exclusion Zones are recommended for these features, although avoidance of them is recommended. If they are to be directly impacted by development in the future, further mitigation may be required.

6 REFERENCES

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APPENDIX I - PALAEOGEOGRAPHIC FEATURES OF ARCHAEOLOGICAL POTENTIAL

WA ID	Classification	Archaeological Discrimination	Description
7600	Channel	P2	A poorly defined cut of channel filled with a single phase of poorly defined unstructured fill, the channel has an uneven base and is cut into bedrock/till. The infill sediments are likely to belong to the Western Irish Sea Formation. Depth range; 0 - 10.1 m below the seabed
7601	Upper channel	P2	A shallow and poorly defined cut and fill feature cut into possible Western Irish Sea Formation/till. Basal reflector is poorly defined, with a single phase of distinct layered fill. Possible SL2 sediments. Depth range; 0.1 - 2 m below the seabed.

APPENDIX II - SEABED ANOMALIES OF ARCHAEOLOGICAL POTENTIAL

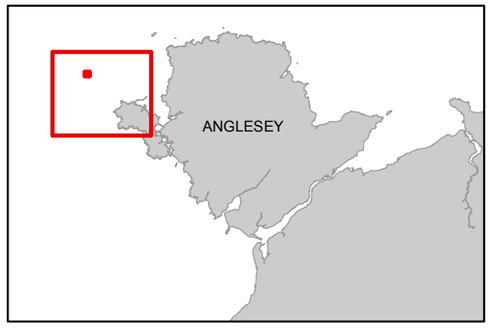
WA ID	Asset Name	Easting	Northing	Type	Archaeological Discrimination	L (m)	W (m)	H (m)	Mag (nT)	Designation	HER Ref	RCAHMW Ref	UKHO/ Seazone Number	Value	Period	Description
7000	Magnetic anomaly	382302	5913795	Magnetic	A2	-	-	-	7	-	-	-	-	Unknown	Unknown	Small asymmetric dipole with no surface expression, possibly natural
7001	Magnetic anomaly	382222	5913747	Magnetic	A2	-	-	-	11	-	-	-	-	Unknown	Unknown	Small distinct dipole with no surface expression indicating possible buried ferrous material with archaeological potential.

Notes:
Co-ordinates provided in WGS84 UTM30N
Positional accuracy +/- 10m

FIGURE 1

Legend

- Potential Disposal site
- 100 m buffer



Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
0	07/2017	First Draft	KJ			

Client: HORIZON NUCLEAR POWER

Project: WYLFA NEWYDD PROPOSED NUCLEAR POWER STATION

Drawing Title: STUDY AREA LOCATION

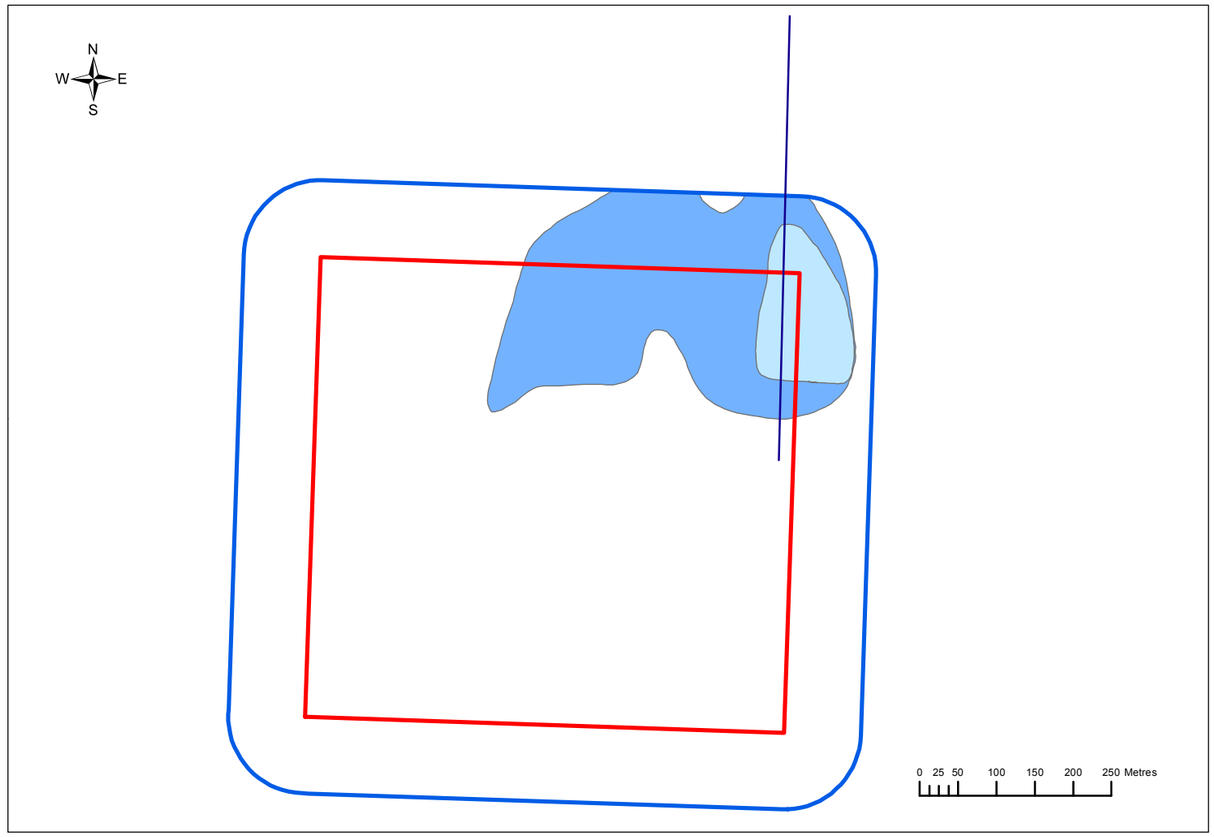
Drawing Status:

Scale @ A3	1:50,000	DO NOT SCALE
Jacobs No.		
Client No.		

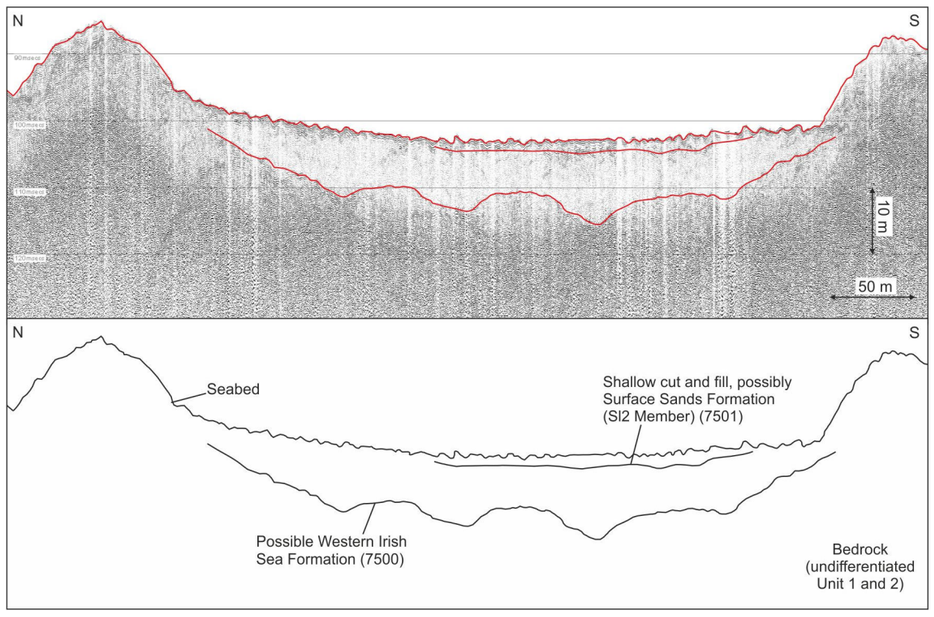
Drawing No.: 110104_Fig01

0 250 500 1,000 1,500 2,000 2,500 Metres

FIGURE 2



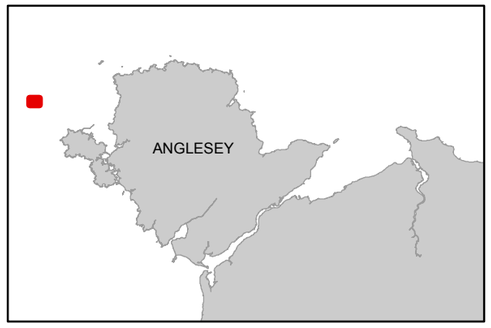
Palaeogeographic features of archaeological potential



Section: Seismic data example – WA 7500 & 7501

Legend

- Potential Disposal site
- 100 m buffer
- Upper channel
- Channel
- Section



Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
0	07/2017	First issue	KL			

Client: HORIZON NUCLEAR POWER

Project: WYLFA NEWYDD PROPOSED NUCLEAR POWER STATION

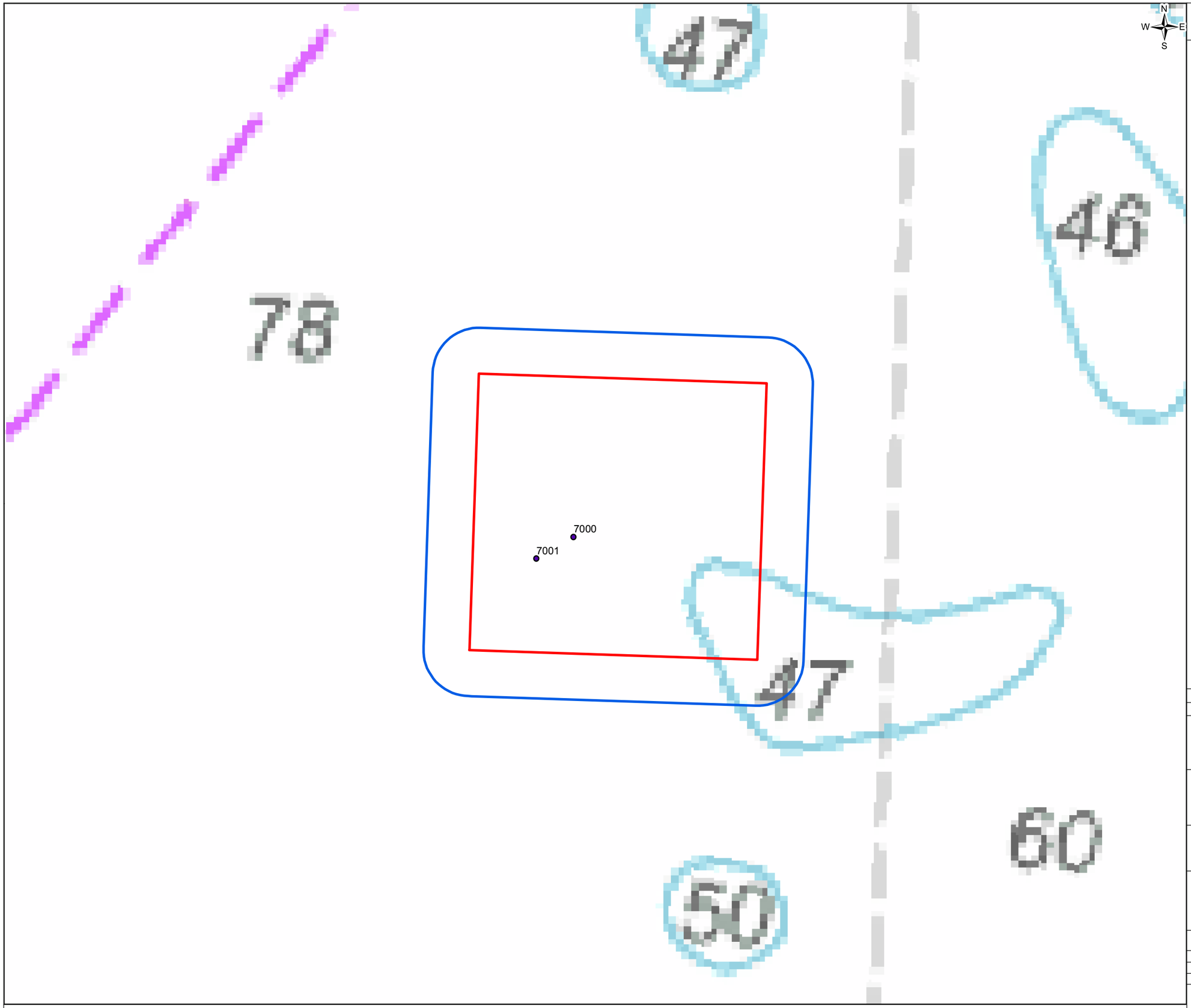
Drawing Title: PALAEOGEOGRAPHIC FEATURES OF ARCHAEOLOGICAL POTENTIAL AND SEISMIC DATA EXAMPLE

Drawing Status

Scale @ A3	1:8,000	DO NOT SCALE
Jacobs No.		
Client No.		

Drawing No.: 110104_Fig02

FIGURE 3



Legend

- Potential Disposal site
- 100 m buffer
- A2 - Uncertain origin of possible archaeological interest

Rev.	Date	Purpose of revision	Drawn	Check'd	Rev'd	Appr'd
0	07/2017	First Draft	KJ			

Client: HORIZON NUCLEAR POWER

Project: WYLFA NEWYDD PROPOSED NUCLEAR POWER STATION

Drawing Title: SEABED FEATURES OF ARCHAEOLOGICAL POTENTIAL

Drawing Status:

Scale @ A3	1:8,000	DO NOT SCALE
Jacobs No.		
Client No.		

Drawing No.: 110104_Fig03

0 50 100 200 300 400 500 Metres