

A14.1 Summary of Marine Geophysics Assessment

1 Introduction

1.1.1 Wessex Archaeology was commissioned by Jacobs Arup to undertake an archaeological assessment of previously acquired geophysical data for the route of the proposed Forth Replacement Crossing. The results of this work have informed the assessment reported in Chapter 14 (Cultural Heritage).

2 Approach and Methods

2.1.1 The objectives of geophysical assessment are as follows:

- to confirm the presence of known or previously located marine sites and to comment on their apparent character;
- to identify, locate and characterise previously unrecorded marine sites and to comment on their apparent character;
- to review available data in respect of sediments likely to be of archaeological interest; and
- to provide data for integration with the results of the desk-based assessment.

2.1.2 The geophysical dataset comprised of sidescan sonar, sub-bottom profiler and multibeam bathymetry data acquired by Osiris Projects Ltd in August 2007 from the survey vessel MV Freja. This geophysical survey was conducted to an engineering specification with the aim of mapping the bathymetry and seabed features. The data were supplied as:

- multibeam bathymetry data, in the form of cleaned, de-spiked and tidally-corrected text (x,y,z) files per line, including layback; and as a digital terrain model, acquired using a GeoSwath interferometric system;
- sidescan Sonar data in the form of raw, unmosaiced .xtf files acquired with a Geoacoustics 159D towfish interfaced to a Geoacoustics dual frequency transceiver and CODA DA200 recording system; and
- single Beam Shallow Seismic (1000 Joule Sparker) data as cod files.

2.1.3 The data coverage extended westward beyond the Chapter 14 study area, but were interpreted as appropriate. The data were subject to archaeological assessment and interpretation, and were also reviewed to identify anomalies, with particular reference made to:

- the correlation of anomalies with previously recorded sites identified on UKHO Admiralty Chart 736;
- anomalies indicative of hitherto unrecorded sites; and
- the absence of anomalies in the vicinity of previously recorded sites identified on UKHO Admiralty Chart 736.

2.1.4 The sidescan sonar data were processed and interpreted by Wessex Archaeology using Coda Geosurvey software. This allows 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 and the position and dimensions of any such objects was recorded in a gazetteer.

2.1.5 The sidescan sonar data were also mosaiced to provide a georeferenced sidescan sonar image for the entire study area.

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- 2.1.6 The raw shallow seismic (sparker) data were processed and interpreted by WA using Coda Geosurvey software. The data is interpreted by delineating any strong boundaries between different geological layers or features such as peat horizons or the base of palaeo-channels. Deposits and surfaces that may be of archaeological interest were highlighted.

3 Conclusion

- 3.1.1 On the basis of the geophysical data, the marine archaeological potential of the survey area can be summarised as follows:

- One wreck site lying within 200m of the proposed scheme. The wreck appears to lie at coordinates 311948, 680044 (NGR) approximately 70m east of the United Kingdom Hydrographic Office (UKHO) charted position. It does not appear to exhibit any significant height, but has a length of 79m and width of 6m. Debris possibly associated with the wreck site lies further west of the main site.
- A further 67 sites of low archaeological potential were identified throughout the study area. These sites include debris which may prove to be of modern origin such as tyres, rope etc., and also a number of sites which were indistinct. However, some of these sites may represent the edges of buried but intact features, or all that remains as a result of past impacts.

- 3.1.2 The geology of the area is characterised by Quaternary (Pleistocene – Late Devensian) glacial till overlying bedrock. This is in turn characterised by glaciomarine clays formed after glacial retreat of the St. Abbs Formation. These are in turn overlain by the Forth Formation. The Forth Formation consists of two members, a lower, late Devensian Largo Bay member consisting of marine clays, silty clays and rare gravels and a Holocene St. Andrews Bay member formed of clayey to gravelly estuarine sands and some fluvio-marine sands and silts. The St. Andrews Bay member represents a reduction in sea-level and a change to more coastal and estuarine conditions due to eustatic rebound and the raising of the land as a result of reduced glacial loading. Archaeologically the St. Andrews Bay member has the highest potential as the ameliorating climate and coastal/estuarine environment would have made the area attractive to our ancestors. It is possible also given the fluvial input to the environment that artefacts may be found in a secondary context but these will not be identifiable by geophysics. The sub-bottom profiler data were reviewed for the presence of localised palaeo-channels within the estuarine system and peat-horizons where organic material and palaeo-environmental evidence may be preserved but no specific areas of increased potential were identified within the study area.

4 References

Admiralty Navigational Chart. Sheet 736: Firth of Forth - Granton and Burntisland to Rosyth. Scale 1:15,000.