

Alderney Race Tidal Power Development Areas & Preliminary Interconnector Cable Routes

Hydrographic, Geophysical & Oceanographic Surveys

VOLUME 2:

T74 Hydrographic and Geophysical Survey Results

DRAFT REPORT

C9010

August 2009

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Hydrographic, Geophysical & Oceanographic Surveys

REPORT VOLUME 2:

T74 Hydrographic and Geophysical Survey Results

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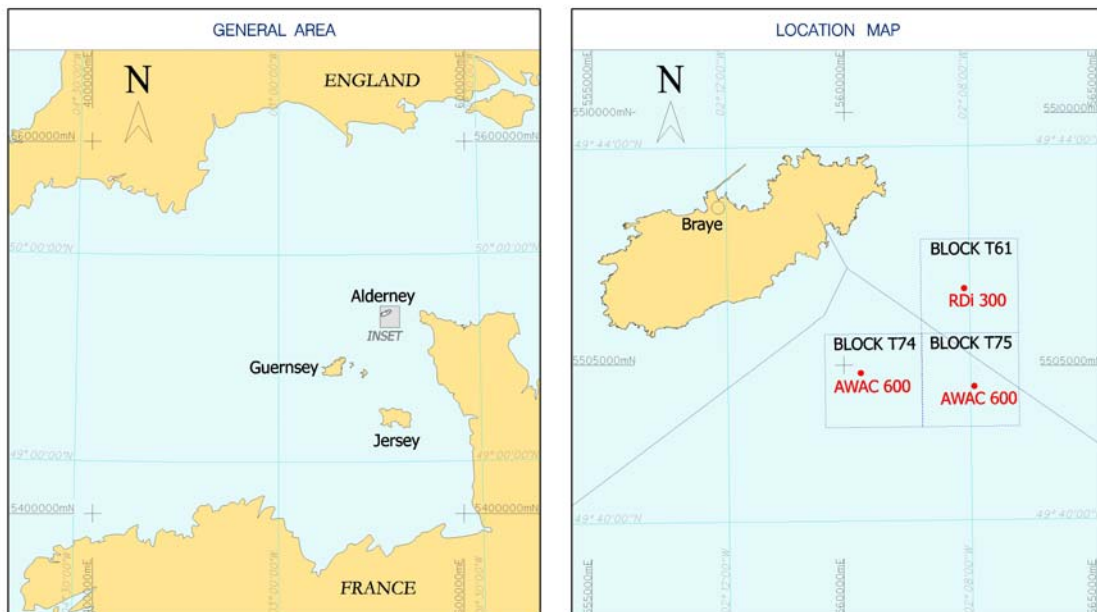
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1. INTRODUCTION

Osiris Projects were commissioned by Alderney Renewable Energy Ltd. (ARE) to undertake a combined hydrographic, geophysical and oceanographic survey of an area within Alderney Race that has been identified for tidal power development. The survey included the investigation and development of two potential interconnector cable routes, one from Alderney to mainland France (29km) and the other from Alderney to Guernsey (36km). In addition to the hydrographic and geophysical elements to the project, Osiris Projects were commissioned to acquire oceanographic information at three locations using fixed location Acoustic Doppler Current Profiler (ADCP) monitoring for a minimum 30 day period.



The objective of the development area survey was to map blocks T61, T74 and T75 so that complete coverage was achieved. The information ascertained from the acoustic survey was used to identify three suitable sites within the blocks for the installation of the bottom mounted ADCP units, which are used to record tidal flow throughout the water column, over a minimum 30 day period.

High-resolution side scan sonar, swath bathymetry, 'Boomer' sub-bottom profiler and magnetometer data were acquired simultaneously across the site development area by running parallel lines, with line centres at 75m, orientated directly in to and with the tidal flow (approximately 040° - 220°). The same equipment array was used to survey the cable routes, each comprising of 7 lines with line centres at 75m, giving total corridor widths of 500m.

A drop down camera was used to ground truth side scan sonar data and to aid the seabed classification.

Geophysical data acquisition took place using the survey vessel MV 'Lia', during the period 11th to 29th April. Within this time block T75 was completed, block T61 was partially completed and the cable route provisional reconnaissance lines were ran. During the period 30th April to 3rd May MV 'Lia' was mobilised and used to deploy the three bottom-mounted ADCP units. Geophysical data acquisition continued using the survey vessel MV 'Freja', during the period 1st to 20th May, in which blocks T61, T74 and the remaining cable route lines were completed.

The survey report structure has been defined as follows:

- C9010 – Volume 1:- T61 and T75 Hydrographic and Geophysical Survey Results Report
- C9010 – Volume 2:- T74 Hydrographic and Geophysical Survey Results Report
- C9010 – Volume 3:- Proposed Interconnector Cable Route Hydrographic and Geophysical Survey Results Report
- C9010 – Volume 4:- Hydrographic and Geophysical Operations Report
- C9010 – Volume 5:- Fixed Location ADCP Deployments Report (Operations and Results)

All positions are expressed as WGS'84; UTM Zone 30N (3^o West) grid coordinates, throughout this report.

2. RESULTS

A vessel track plot is presented at a scale of 1:2500 on drawing no C9010-T74-01 and this can be found in Appendix 1 to this report.

All seabed levels are reduced to Chart Datum, which is quoted as 3.3m below Ordnance Datum, Alderney (ODA) in the Admiralty Tide Tables (NP201). Chart Datum is the approximate level of Lowest Astronomical Tide (LAT) which is defined as a *'level so low that the tide will not frequently fall below it'*.

2.1 Bathymetry

Processed bathymetric data is presented at a scale of 1:2500 on drawing nos C9010-T74-02 and C9010-T74-03, the Bathymetry and Shaded Relief Bathymetry charts. The data has been contoured at 2.5m vertical intervals and reduced to Chart Datum.

Seabed levels across Area T74 range from 48.2m CD, towards the central eastern section of the area, to 20.2m CD in the extreme NW corner, where coarse granular sediments are present. The seabed gradient ranges between 1 in 175 (0.37°) and 1 in 260 (0.24°) in the central and south eastern sections of the area. However, in the NW corner, an average NW-SE dipping seabed gradient of approximately 1 in 32 (2.0°) is noted across an area of coarse sediments, which directly overlies the gently sloping bedrock surface. Steeper seabed gradients are seen on the slopes of the large sand/gravel wave bed forms, which are present across this area of sediments. These bed forms are NNW-SSE orientated and their individual (asymmetrical) crests stand up to 4.5m higher than the surrounding seabed. The crests are steeper on their SSE facing sides, with localised gradients of up to 1 in 3 (20.5°) present.

Occasional very steep gradients are evident within a few of the weathered joints and fissures, seen on the exposed bedrock surface. The deepest of these is located at approximately 561365mE, 5504750mN and exhibits a level of 48.2m CD.

2.2 Seabed Features

The results of the Side Scan Sonar survey are presented on drawing nos C9010-T74-04a (Side Scan Sonar Mosaic Chart) and C9010-T74-04b (Seabed Features with Greyscale Colour Shaded Relief Bathymetry Image). This is presented at a scale of 1:2500, with seabed classifications derived from a combination of an interpretation of the sonar, bathymetry and sub-bottom data sets.

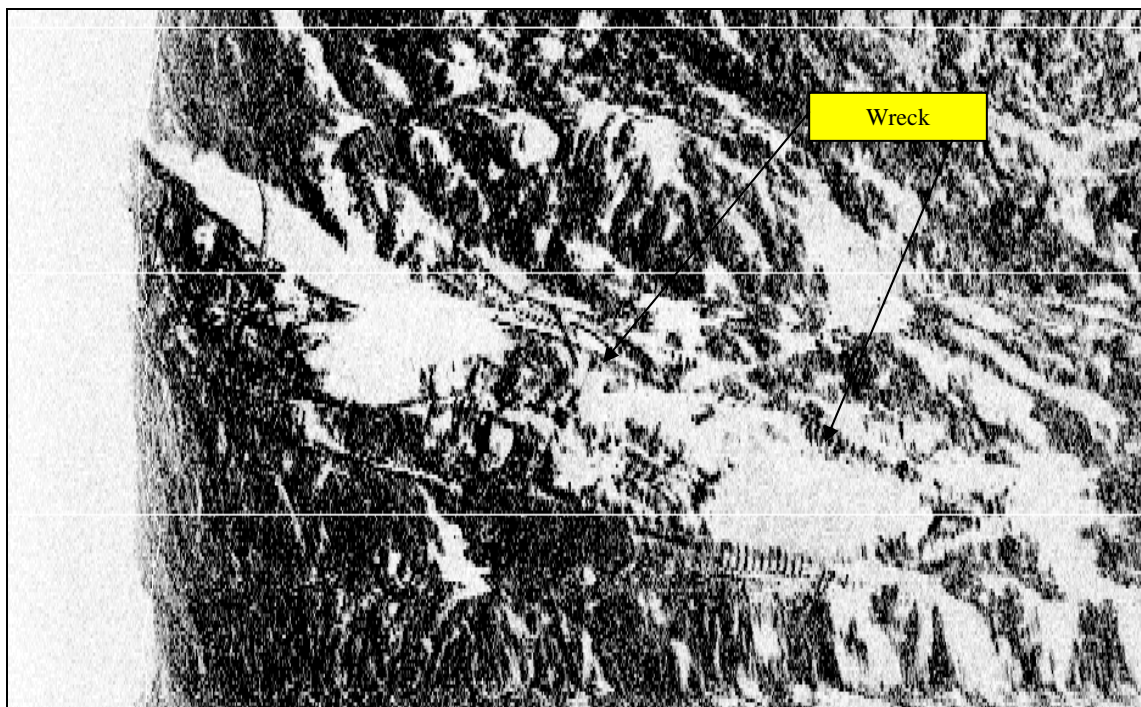
The seabed across the south eastern section of the T74 site exhibits a number of natural scars and gullies, which are weathered joints and fissures in the exposed bedrock surface. However, these features appear to become less distinct, moving from

SE to NW.

Conversely, the north western corner of Area T74 is covered by coarsely granular sediments, which are characterised by the presence of a number of distinctive large and medium order bed forms. The largest of these features are sand/gravel waves, which are orientated roughly NNW-SSE, stand up to 4.5m high and have wavelengths between 160m and 190m. Smaller, megaripple bed forms are also in evidence across this area of sand/gravel waves. These features are similarly orientated, stand less than 1.0m high and have average wavelengths between 3.0m and 7.0m.

Only 3 sonar targets were noted, with one of these (T74-S03) located some 88m to the north of the area boundary. However, a wreck was noted (sonar target T74-S02) as shown in the table and image below. This feature is approximately 55m long and 13.0m wide, with a minimum height above the surrounding seabed of over 3.5m. It also has a number of apparently associated magnetic anomalies.

ID	Eastings (m)	Northings (m)	Length (m)	Width (m)	Height (m)	Description
T74-S01	560417	5504639	4.1	4.3	2.3	Possible target with shadow
T74-S02	561442	5505172	~55.0	~13.0	~3.7	Wreck
T74-S03	561499	5505714	8.4	3.4	0	Possible target - "U" shaped hard target, no relief. Lies to north east of area boundary.



In addition to the above sonar targets, a number of joints and fissures along the rock surface have been identified and added to the Seabed Features Chart. Several of these features are thought to be fault-related.

2.3 Sub-Bottom Profiling

The results of the Sub-Bottom Profiling survey can be found on drawing no C9010-T74-05, the Total Sediment Isopachyte. This is presented at a scale of 1:2500 and is contoured at a vertical sediment thickness interval of 1.0m.

Sediment cover is only present in the NW corner of the area. These sediments gradually build up in thickness from 0.0m, to the SE of the area of sediment cover, to over 17.0m close to the extreme NW corner, across the largest of the sand/gravel wave bed forms. These materials are likely to comprise mainly coarse sands and gravels.

2.4 Magnetometer

The results of the processed magnetometer data can be found on drawing no C9010-T75-04b, the combined Seabed Features with Greyscale Shaded Relief Bathymetry Image Chart.

A total of 26 magnetic anomalies were noted on the data set. Many of these anomalies are relatively large, although most do not appear to be associated with any corresponding surface feature (sonar target).

I.D.	Eastings (m)	Northings (m)	Anomaly Magnetic Signature Width (m)	Anomaly Magnetic Signature Amplitude (nT)	Description
T74-M01	559616	5505308	224.7	18.0	Broad Positive Monopole
T74-M02	559657	5505620	172.0	7.0	Positive Monopole
T74-M03	559690	5505534	128.6	5.7	Positive Monopole
T74-M04	559717	5505382	235.7	43.7	Complex Dipole
T74-M05	559788	5505402	334.5	19.3	Broad Positive Monopole
T74-M06	559875	5504690	315.8	33.0	Negative Monopole
T74-M07	560047	5505003	88.0	2.8	Positive Monopole
T74-M08	560405	5504100	40.2	3.8	Positive Monopole
T74-M09	560685	5503842	217.6	16.8	Dipole

T74-M10	560692	5504492	30.3	5.2	Positive Monopole
T74-M11	560724	5504640	121.0	50.8	Complex Positive Monopole
T74-M12	560773	5504613	31.0	6.3	Positive Monopole
T74-M13	560774	5503958	94.1	6.4	Positive Monopole
T74-M14	560894	5503998	295.2	30.1	Positive Monopole
T74-M15	560948	5505633	59.7	2.5	Positive Monopole
T74-M16	560980	5503987	266.6	11.1	Positive Monopole
T74-M17	561225	5504202	228.5	12.4	Dipole
T74-M18	561319	5505236	281.9	11.8	Broad Positive Monopole
T74-M19	561393	5504222	257.5	23.5	Complex Dipole
T74-M20	561456	5505165	342.2	647.7	Dipole
T74-M21	561459	5505052	211.3	97.2	Positive Monopole
T74-M22	561471	5505191	158.9	290.9	Negative Monopole
T74-M23	561495	5504328	76.0	5.2	Positive Monopole
T74-M24	561501	5505131	522.1	210.5	Dipole
T74-M25	561527	5504252	234.7	27.1	Dipole
T74-M26	561535	5505028	254.8	14.4	Positive Monopole

The wreck (sonar target T74-S02) has several associated, very large magnetic anomalies (T74-M20, -M21, -M22 & -M24). These anomalies may be related to the wreck itself, or to any associated debris close to its position.

Anomalies T74-M01, -M04 & -M05 are three, relatively large anomalies, which all lie within the north western corner of Area T74, where coarse granular sediments reach up to 17.0m in thickness. It is possible that these three anomalies relate to buried debris or wreckage, as no surface feature (sonar target) is present. However, the three features also appear to exhibit a linear relationship and it is therefore possible that the individual anomalies are caused by an underlying geological feature, such as a dyke.

It is possible that many of the remaining anomalies are also related to the underlying geology – faults, mineralized veins/joints, etc.

2.5 Video Camera

Four camera runs were undertaken and the images recorded have been used to ground truth the side scan sonar data. The recorded video files are presented with the digital data deliverables to this report. Vessel tracks during the video camera acquisition are presented at a scale of 1:2500 on drawing nos C9010-T74-01 and these can be found in Appendix 1 to this report.

The camera data acquired within these two areas indicate a rocky irregular seabed with moderate amounts of marine fauna and flora.

Summary table of video camera acquisition:

Video Run	Start Position mE	Start Position mN	End Position mE	End Position mN	Video Duration	Area
1	561376.9	5505139.3	561583.3	5505385.0	00:11:52	T74/T75 (Wreck)
2	559753.1	5505462.6	559643.9	5505368.4	00:11:22	T74
3	561738.8	5505280.2	561571.1	5505084.9	00:12:44	T74/T75
4	562793.0	5506171.6	562532.1	5505788.5	00:11:20	T61

APPENDICES

APPENDIX 1

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CHARTING

APPENDIX 1

CHARTING

AREA CHARTS

Area T74

C9010-T74-01	-	Vessel Track Plot
C9010-T74-02	-	Bathymetry
C9010-T74-03	-	Shaded Relief Bathymetry
C9010-T74-04a	-	Seabed Features
C9010-T74-04b	-	Side Scan Sonar Mosaic
C9010-T74-05	-	Total Sediment Isopachyte