



**BRIMS TIDAL ARRAY, ORKNEY
GEOPHYSICAL SURVEY
VOLUME 2c: RESULTS REPORT**

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Osiris Projects
Maritime House
4 Brunel Road
Croft Business Park
Bromborough, Wirral
CH62 3NY
Tel. 0151 328 1120. Fax 0151 343 1057
e-mail: enquiries@osirisprojects.co.uk





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Project Manager: Gareth Stevens

Geophysicists: Michael King (Party Chief),
 Theo Gausson (Party Chief),
 Joe Wheeler (Party Chief),
 Matt Regan (Party Chief),
 Pete Allanson, Aneka Hawkins,
 Cathal Clarke, George Mackintosh

Surveyors: Adam Barton, Martin Bolton,
 Marco Cesareo, Peter White,
 Katie Saverymuttu, Mathieu Kerjean,
 Adam Williamson, George Fletcher,
 Malcolm Kemp

Report Volume Author: Heike Neumann/Cherri-Ann Bones/Jim Walters

Reviewed by: *Signature..... Date.....*

Approved for Issue: *Signature..... Date.....*

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ABBREVIATIONS

AfL	Agreement for Lease
BS	British Standard
BTAL	Brims Tidal Array Ltd
CR	Cable Route
FLO	Fisheries Liaisons Officer
FLR	Fisheries Industry Representative
IMCA	International Marine Contractors Association
km	Kilometres
LAT	Lowest Astronomical Tide
m	Metres
MV	Motor Vehicle
NEC	New Engineering Contract
UKHO	UK Hydrographic Officer
VORF	Vertical Offshore Reference Frame

1. INTRODUCTION

1.1 Project Overview

Osiris Projects were commissioned in August 2012 by Brims Tidal Array Ltd (BTAL), SSE Renewables Ltd and Costa Head Wave Farm Ltd (CHWFL) to carry out geophysical surveys around Orkney, at Brims, Westray South and Costa Head sites respectively. The survey was commissioned at Brims to assess the suitability of the location for the potential installation of tidal energy converters and associated electrical infrastructure (i.e. export cables).

The surveys were initially undertaken with MV Lia between 17th August and 3rd October 2012, and with MV Chartwell between 22nd August and 18th September 2012. The project was suspended for the winter period after this date.

Osiris Projects were re-commissioned in March 2013 and survey work continued with MV Bibby Tethra between 12th April and 19th May 2013, and with MV Lia between 19th May and 28th September 2013, whereupon the three survey areas were deemed complete.

The main objectives of the surveys were as follows:

- To undertake site surveys to support the technical, environmental and economic appraisal of the development sites including their grid connection corridors.
- To provide sufficient data so that specific locations can be identified for wave and tidal generators, inter array cabling route options and delineations of the preferred export cable route to shore from each site.

The survey was completed under terms and conditions set out in NEC 3 Professional Services and in accordance with the following guidelines and standards:

- IMCA OGP (2011): Guidelines for GNSS Positioning in the Oil and Gas Industry;
- IMCA Document IMCA S 17 (2011): Guidance on vessel USBL systems for use in offshore survey and positioning operations;
- BS 5930 (1999): Code of Practice for Site Investigation; and
- BS EN ISO 9000: Quality Systems.

1.2 Site Overview

This Brims site (formerly known as Cantick Head) comprises the Agreement of Lease (AfL) and two potential export cable routes, as illustrated in Figure 1 below. Cable route 1 (CR1) is known as the Aith Hope Cable Route, with cable route 2 (CR2) known as the Melsetter cable route.

The AfL is located approximately 1.5km south of Hoy in the Pentland Firth and measures approximately 7.9km x 2.1km. The proposed CR1 corridor is approximately 2.66km long, with the CR2 corridor approximately 1.07km long.

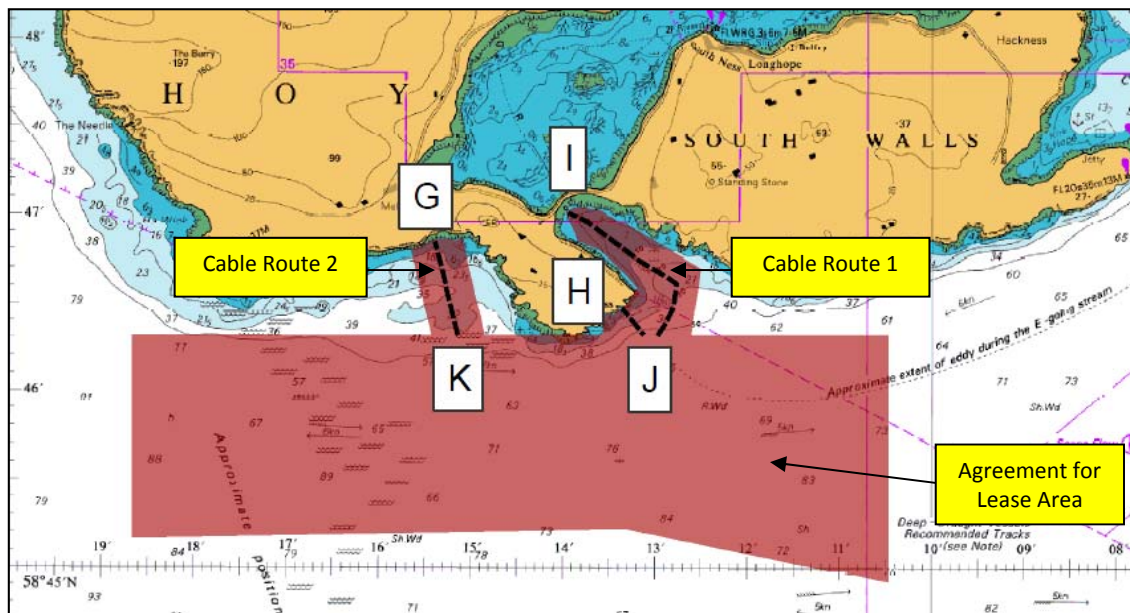


Figure 1: Overview of the Brims Tidal Array Site

Note: This figure was taken from the Scope of Works which indicates that the letters G-K are unique identifiers that have been added for the purpose of differentiating between cable corridors.

The scope of work was reduced during survey acquisition, with the AfL area reduced to the High Priority Area (HPA). These AfL and HPA areas are presented in Figure 2 below.

1.3 Operational Summary

Line spacing varied with depth across the site. A line spacing of 75m was used in water depths of greater than 30m, with cross lines collected every 1000m. For work in water shallower than 30m, the line spacing was reduced to 50m, with cross lines every 500m.

Data acquisition at Brims was undertaken from Osiris Projects' own dedicated shallow

draft vessels MV Lia (in both 2012 and 2013) and MV Bibby Tethra in 2013. Primary positioning on MV Lia was achieved using a Leica GX 1230, and primary positioning on both vessels in 2013 was achieved using CNav 3050 systems.

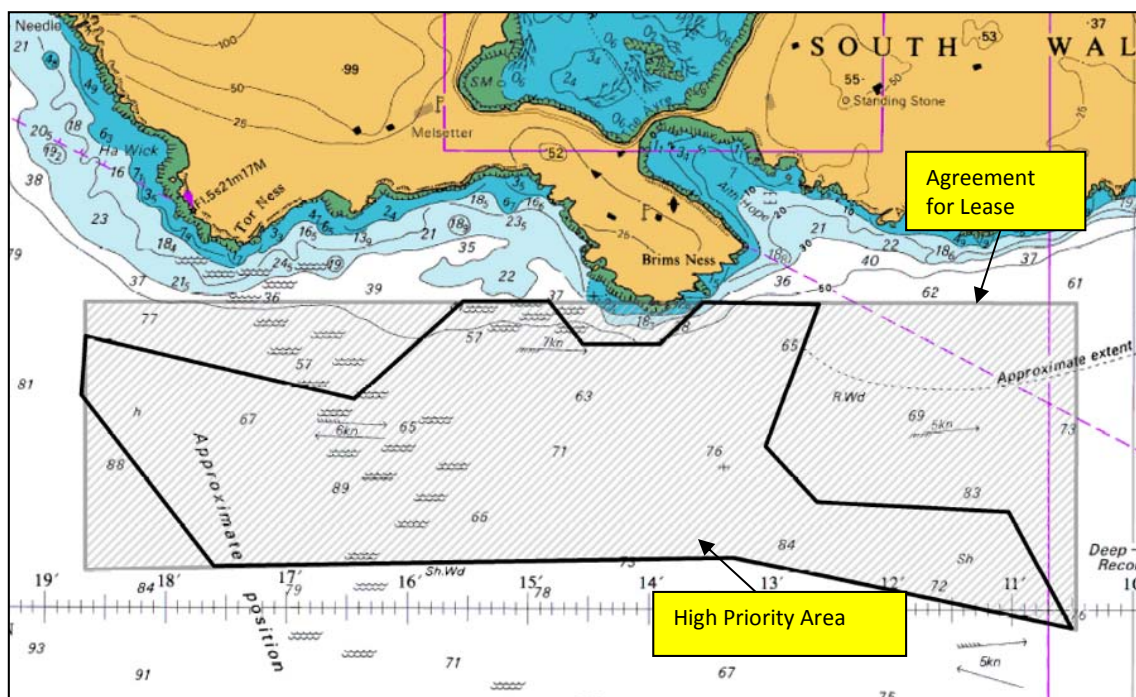


Figure 2: Overview of the Brims High Priority Area

All fieldwork and site reporting was conducted on the WGS84 ellipsoid and datum, and projected in UTM Zone 30 (Central Meridian 3°W). All water depths are quoted relative to LAT. During survey acquisition, water depths were reduced to LAT using the UKHO VORF model for the survey area.

The mobilisation and demobilisation dates for the vessels in 2012/2013 are tabulated below:

Vessel	MV Lia
Mobilisation Date	17 th August 2012
Port (Mobilisation)	Stromness
Demobilisation Date	3 rd October 2012
Port	Kirkwall

Vessel	MV Lia	MV Tethra
Mobilisation Date	19 th May 2013	12 th April 2013
Port (Mobilisation)	Stromness	Kirkwall
Demobilisation Date	28 th September 2013	19 th May 2013.
Port	Stromness	Stromness

Table 1: Survey Mobilisation and Demobilisation Dates

In order to mitigate the effects (on survey data acquisition) of fishing activity on the site, a Fisheries Liaison Officer (FLO) was present onboard the vessels. In addition, an onshore Fisheries Industry Representative (FIR) was appointed by the client and fishing gear was removed from site, based on advice from the FLO and FIR. Static fishing gear was identified at several locations during data acquisition and occasionally prevented survey operations.

This report, Volume 2c, presents the results and interpretation for the Brims site, comprising the Agreement for Lease (AfL) and two proposed cable routes. The results for Costa Head are presented in Volume 2a, with the results for Westray South presented in Volume 2b. Volume 1 is the Operations Report, which details the survey equipment, methodology and calibrations for all three of the Orkneys sites.

2. RESULTS – AGREEMENT FOR LEASE (AfL)

The SOW was reduced during the acquisition from the AfL to the HPA. Although the data interpretation includes the AfL, only data in the HPA has been accepted for all sensors. Data outside the HPA may have not passed data QC, or data may not reach the coverage requirements.

2.1 Bathymetry

The bathymetry contours and shaded relief image within the AfL are presented at a scale of 1:5000 on the Shaded Relief Bathymetry panel of the Alignment charts, drawing numbers C13007-BR-01(a-c). These are contoured at a vertical interval of 2.0m, reduced to Lowest Astronomical tide (LAT).

Water depths in the AfL range from 15.2m below LAT at the north central inshore limit of the survey area, to a maximum of 110.0m below LAT the central section of the site. The seabed is characterised by exposed, differentially weathered bedrock across the majority of the AfL. Distinctive bedding, joints and fractures of this bedrock are clearly evident within the bathymetric data. Water depths in the northern portions of the site drop steeply from an average of 17.5m LAT to approximately 62m LAT over 140m with a maximum slope gradient of 37°.

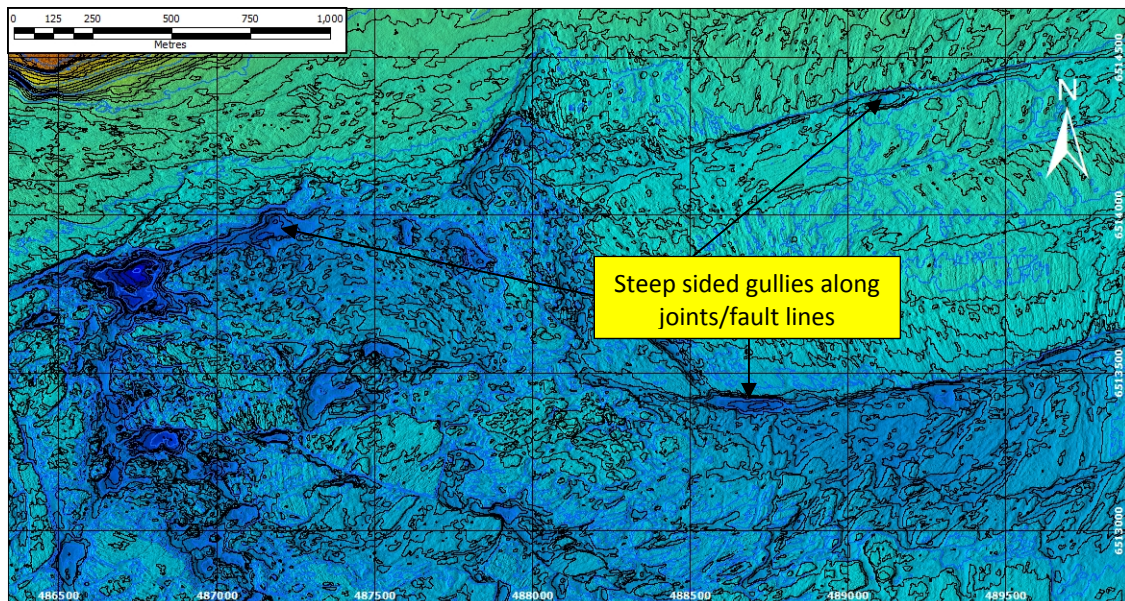


Figure 3: Channels in the Central and Western Part of the AfL

The central and western portions of the site are dominated by steep-sided gullies and troughs associated with joints or fault lines within the bedrock. The deepest gullies run

north-east to south-west, are up to 60m wide and are up to 31m deeper than the surrounding seabed. The slopes associated with these gullies are steep, with maximum slope angles of 33° in the northern slope of the gully illustrated in Figure 3 above.

Numerous faults are evident in this area also. The largest fault is evident in the central portion of the site and is orientated north-northwest to south-southeast, up to 20m wide and exhibits water depths along its axis that are up to 10m deeper than the surrounding seabed.

In the eastern part of the AfL, the seabed is less irregular, with narrow gullies traversing the bedrock in NE-SW and E-W directions.

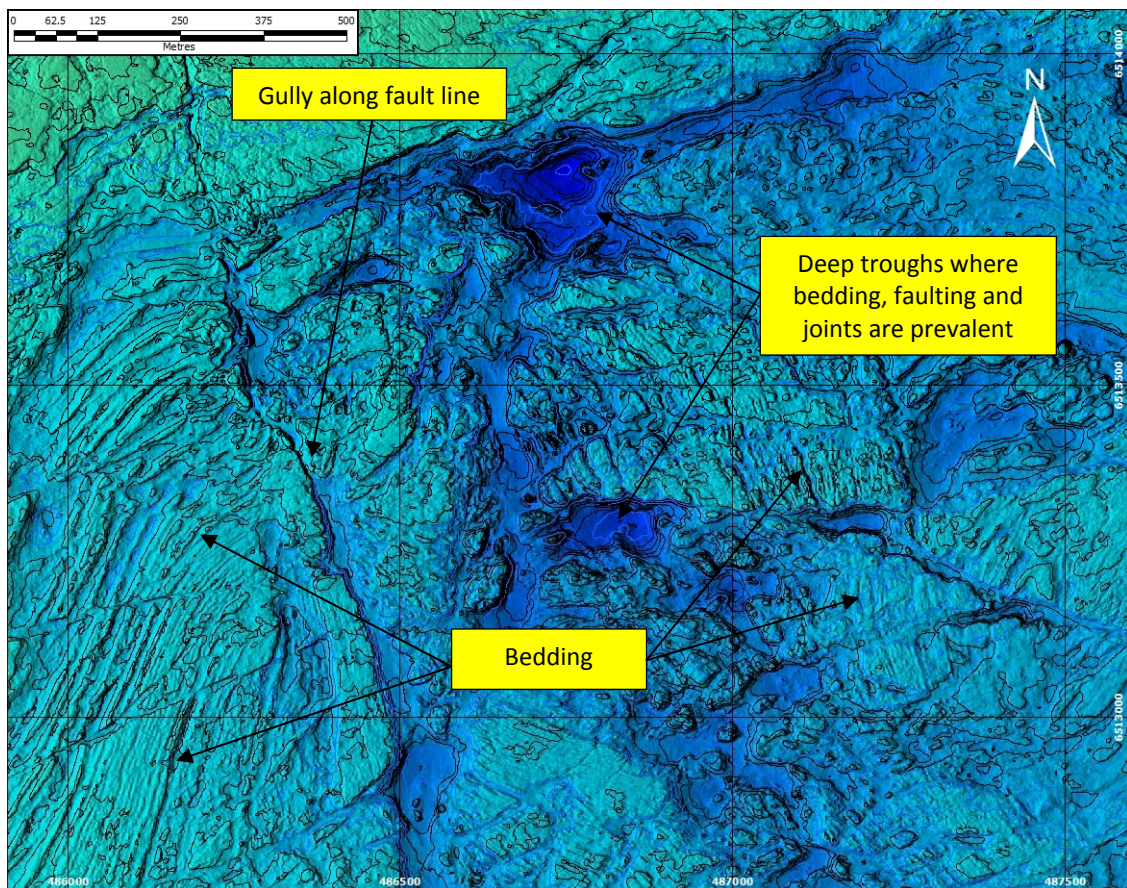


Figure 4: Bedding, Gullies and Troughs the Central and Western Part of the AfL

A north-west to south-east orientated sand wave is evident in the north-west section of the AfL (Figure 5 below). The crest of this bed form lies approximately 10m above the surrounding seabed, with depths of 58m LAT along its crest. Megaripples associated with this feature are also evident in this area.

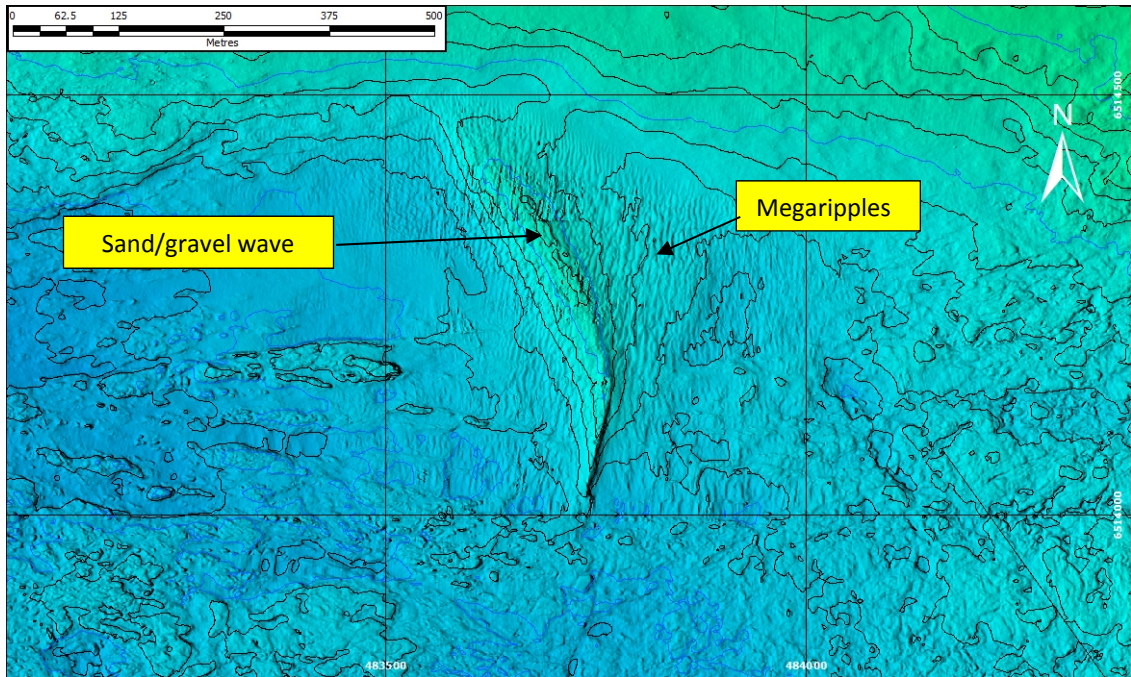


Figure 5: Sand/Gravel Wave in the Western Part of the AfL

2.2 Seabed Features

The seabed features interpretation within the AfL are presented at a scale of 1:5000 on the Seabed Features panel of the Alignment charts, drawing nos C13007-BR-02-SBF (a-c). In addition to this, a sonar mosaic is presented at a scale of 1:5000 on the Side Scan Sonar Mosaic panel of the Alignment charts, drawing nos C13007-BR-03-SSS (a-c).

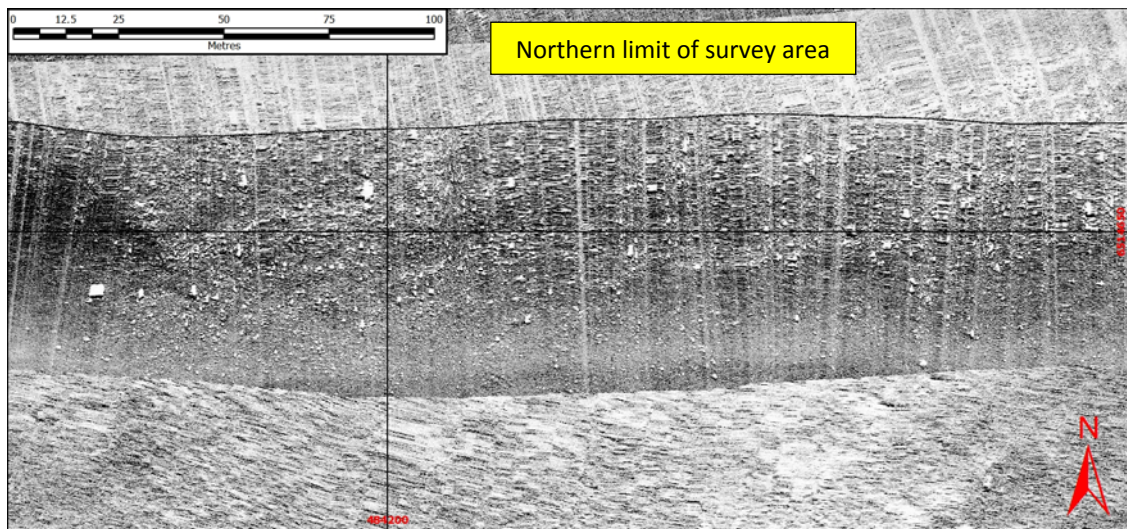


Figure 6: Boulders Close to the Northern Limit of the Survey Area

The seabed across most of the AfL comprises exposed and occasionally fragmented bedrock, with frequent isolated boulders and areas of gravelly sands/sandy gravels close to its northern boundary. Megaripples are evident across these areas of granular sediments, together with the distinct sand wave feature shown in Figure 7 below. The sand wave is orientated north-east to south-west and approximately 7.5m to 12.5m high. The associated megaripples are of similar orientation with wavelengths of 5m to 12m and heights of less than 0.5m.

Numerous sonar targets are present, and these are interpreted to comprise mainly boulders.

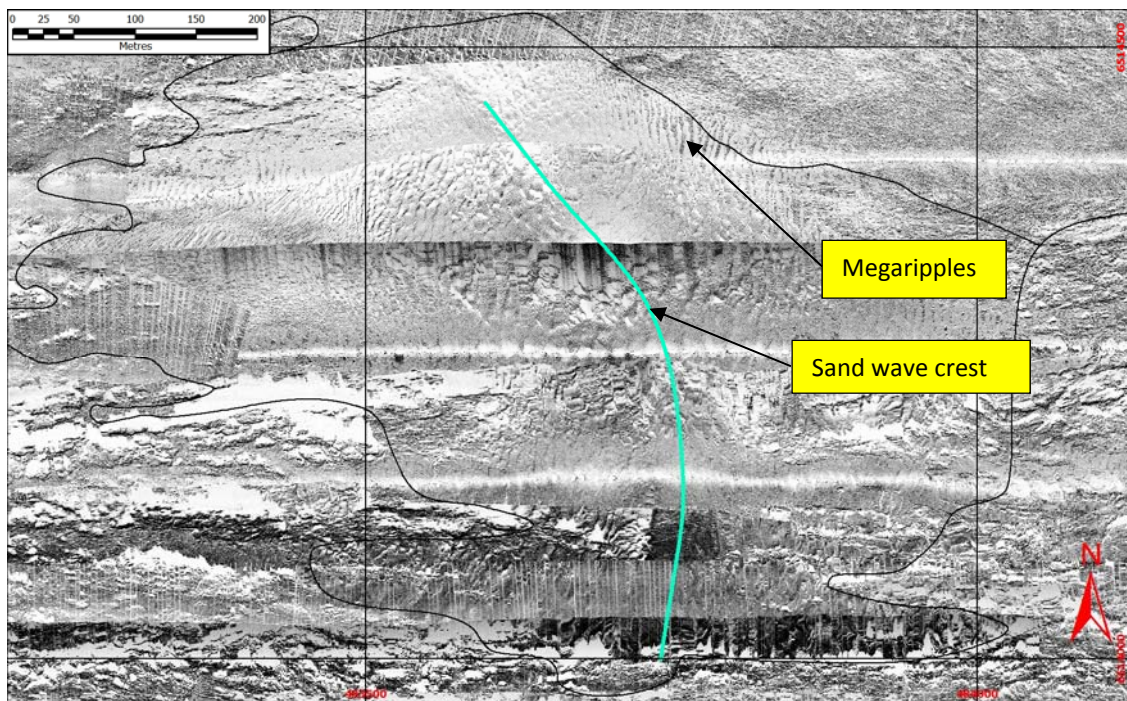


Figure 7: Sand Wave and Megaripples in the North-Western part of the AFL

An area of gravel is present in the south-west section of the survey area and this is associated with numerous sonar targets, mainly interpreted as boulders.

The deep gullies associated with faults in the bedrock are also in-filled with coarsely granular sediments, see Figure 8, below.

A total of 299 sonar targets were identified, the majority interpreted as boulders, and most with lengths of between 1m and 2m, together with some very large boulders exhibiting maximum dimensions of between 7m and 8m. Eighty two of these targets are within the high priority area.

Four items of linear debris are seen across the AfL, with lengths of between 16m and 140m. These are thought to represent items of discarded fishing gear. Two of these linear targets lie within the high priority area.

Four wrecks are listed in the general area – two of which lie within the survey area but these were not identified on the side scan sonar data.

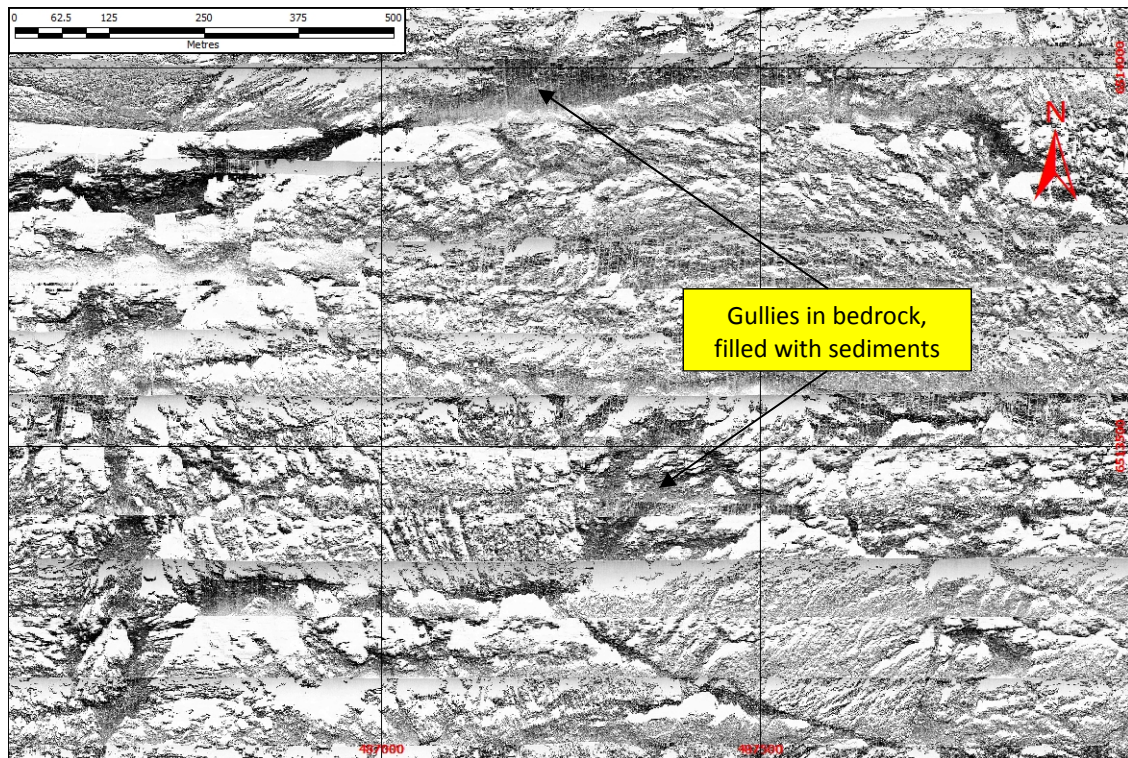


Figure 8: Sediment-filled Gullies in Bedrock

2.3 Shallow Soils

The results of the sub-bottom profiling survey within the AfL are presented as the Total Sediment Thickness to Rockhead Isopachyte, at a scale of 1:5000 on the Isopachyte panel of the Alignment charts, drawing nos C13007-BR-04(a-c).

The AfL consists predominantly of outcropping bedrock, with very little discernable sediment cover. Some areas of sediment cover are present along the northern boundary of the AfL, in particular where both the Melsetter and Aith Hope Bay cable route corridors enter the AfL, together with a localised sediment patch in the south-western corner of the AfL.

The sub-bottom profiler data indicate that sediment cover within the rock gullies that cut through the rock head is generally less than 1.0m. The thickest total sediment cover

occurs near the junction of the AfL and the Melsetter inlet, with a maximum thickness of up to 33.0m noted. To the west of the Melsetter inlet a distinct sand wave has formed, with a maximum sediment thickness of 12.0m noted along the central axis of the sand wave and with the gravelly sand surrounding this feature exhibiting a thickness of up to 8.0m.

Further to the east, where the Aith Hope Bay corridor meets the northern edge of the AfL, sediment thicknesses of up to 6.0m were noted, although these thin rapidly towards the south.

The patch of gravel in the south-western corner of the site exhibits a granular sediment cover of 1.0m – 2.0m.

2.4 Magnetometer Data

Processed magnetometer data within the AfL is presented as a series of magnetic anomalies at a scale of 1:5000 on the Seabed Features panel of the Alignment charts, drawing nos C13007-BR-02(a-c).

A total of eighty five magnetic anomalies were identified within the AfL (thirty five in the HPA), with twenty six (thirteen in the HPA) of these considered to be large or very large (over 100nT). These are tabulated below:

Anomaly ID	Easting (m)	Northing (m)	Width (m)	Amplitude (nT)	Comments
M002	481918.9	6513666.9	14.8	644.9	
M004	482120.9	6514388.2	15.4	118.1	
M006	482998.2	6514042.6	13.6	139.3	
M011	483446.5	6513795.1	35.9	206.2	
M014	483567.2	6513862.7	37.8	846.1	
M018	483885.0	6513864.9	19.3	242.5	
M022	484250.1	6513569.1	64.0	265.9	
M024	484431.9	6513868.1	26.3	375.3	
M025	484573.2	6514533.8	38.3	102.1	
M027	485148.1	6514240.4	37.3	1941.4	Geological?
M029	485677.9	6513038.7	27.5	286.5	
M033	486162.7	6514002.4	8.3	197.5	
M035	486284.6	6513181.9	54.7	294.8	
M038	486358.4	6513319.0	7.0	146.5	
M052	487850.3	6513472.1	134.6	1778.1	Geological?
M058	488034.2	6513686.7	156.9	3376.8	Geological?
M060	488045.8	6513406.8	51.5	164.5	
M061	488111.8	6513318.5	75.2	433.1	
M064	488247.5	6513406.8	54.9	232.7	
M065	488379.0	6513767.2	70.0	327.7	
M067	488407.9	6513853.6	65.8	210.8	
M068	488408.0	6513849.1	67.5	330.8	

Anomaly ID	Easting (m)	Northing (m)	Width (m)	Amplitude (nT)	Comments
M069	488419.6	6513862.0	25.1	483	
M070	488431.5	6513876.9	40.2	689.8	Geological?
M079	489102.0	6512933.0	162.9	4115.2	Geological?
M085	489307.4	6512589.5	68.7	234.2	

Table 2: Large/Very Large Magnetic Anomalies within the AfL.

Anomalies M027, M052, M058, M070 and M079 (689.8 – 4115.2nT) are extremely large features, with no obvious associated sonar targets. These are thought to be related to the underlying geology, with the British Regional Geology guide indicating that a number of volcanic vents are present within the general area encompassing the islands of Hoy, South Ronaldsay and Mainland. These vent features are connected with a large number of igneous dykes, which are also likely to be present beneath the AfL area, although any linear magnetic anomalies associated with these features are unclear.

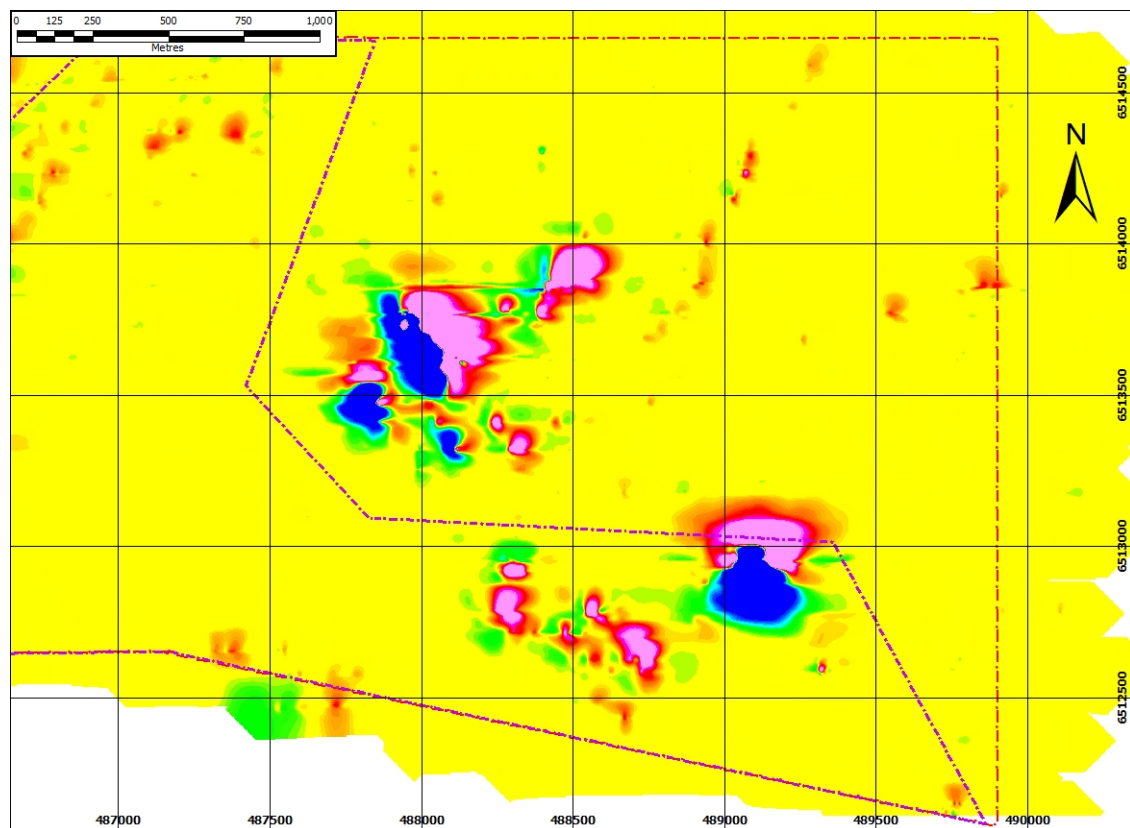


Figure 9: Magnetic Anomalies Relating to Possible Volcanic Vent Features on Eastern Side of AfL.

Only one anomaly (M028, 10.3nT) has an associated sonar target (S214), which is described as a large boulder with dimensions of 5.5 x 3.6 x 2.4m.



Four wrecks are listed in the general area – two of which lie within the survey area; however, these were not identified on the magnetometer data.

3. RESULTS - AITH HOPE BAY

3.1 Bathymetry

Seabed levels along the Cable Route 1 (CR1) corridor are presented at a scale of 1:5000 on the Bathymetry panel of the Route Alignment chart, drawing no C13007-BR-05-AL. This is contoured at a vertical interval of 2.0m, reduced to Lowest Astronomical Tide (LAT).

Water depths along the CR1 corridor gradually increase from a minimum of 0.9m below LAT at the inshore limits of the data at KP0.146, to reach 40.0m below LAT at approximately KP1.91, at an average gradient of approximately 2.1°, before dipping more steeply at a maximum gradient of 8.0°, to reach 58.0m below LAT at KP2.066.

A steep-sided rock outcrop is present to the west of the corridor between KP1.5 and KP2.0, where a minimum water depth of 19.6m below LAT was noted. Very steep localised gradients of up to 40° were noted across this rocky section.

3.2 Seabed Features

Seabed features along Cable Route 1 (CR1) are presented at a scale of 1:5000 on the Seabed Features panel of the Route Alignment chart; drawing no C13007-BR-05-AL. The side scan sonar mosaic is shown on the AfL overview chart no C13007-BR-03b.

From the inshore limits of the survey at KP0.288 and moving south-eastwards, the seabed sediments within the CR1 corridor comprise mainly gravels, with numerous boulders and irregular patches of finer grained sandy sediments, out to approximately KP1.075. Outcropping bedrock is present along the south-western and north-eastern edges of this nearshore section of the corridor.

The above rock outcrops become more extensive to the south-east of KP1.00, crossing the proposed route centre line between KP1.145 and KP1.402.

To the south-east of KP1.402, the bedrock surface becomes covered by an irregular expanse of sandy gravels, with frequent boulders and patchy megaripples, with the proposed centre line turning sharply towards the south, then south-west, between KP1.475 and KP1.742.

Numerous sonar targets were noted within the CR1 route corridor, the majority of which are interpreted to be boulders, with several items of possible discarded fishing gear and associated debris. Two boulders, (targets S065 and S066), lie within 25.0m of the

proposed centre line between KP0.807 and KP0.868. Sonar target S070 lies on the proposed cable route at KP1.477 (figure 9, below). It has dimensions of 1.8m x 0.5m x 1.1m. No other sonar targets lie within 25m of the proposed cable route.

A full list of sonar targets is presented in Appendix 2.

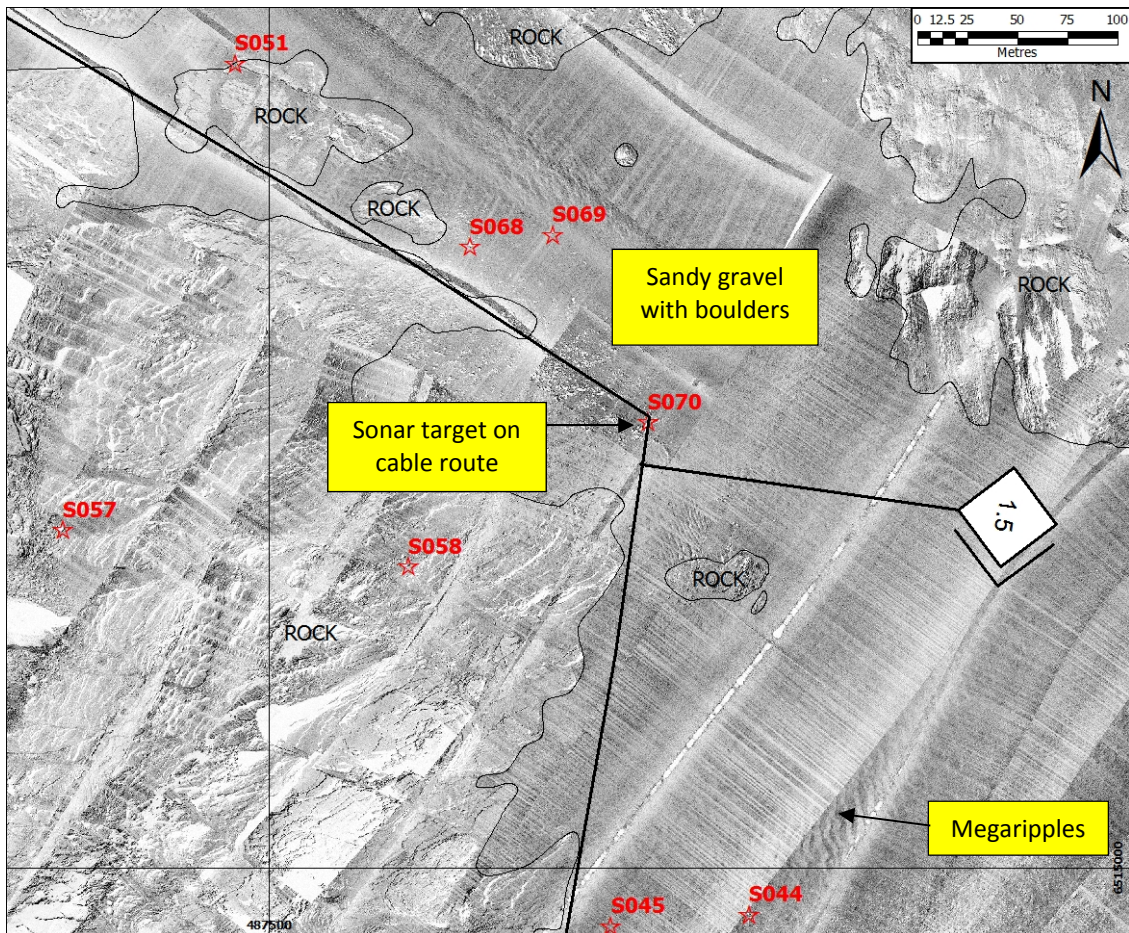


Figure 10: Sonar Target S070 on Proposed Cable Route

3.3 Shallow Soils

The results of the sub-bottom profiler survey along the CR1 corridor are presented at a scale of 1:5000 as a Total Sediment Thickness to Rockhead Isopachyte on the Isopachyte panel of the Route Alignment chart, drawing no C13007-BR-05-AL.

Interpreted sediment thicknesses along the nearshore section of the proposed cable route between KP0.288 and KP1.008 vary between 1.0m and 5.0m.

Along the central section of the proposed route, between KP1.0008 and KP1.406, and between KP1.508 and KP1.83, sediment thicknesses are generally less than 1.0m, with intermittent areas of outcropping bedrock. Offshore of KP1.83, sediment

thicknesses increase to between 2.0m and 4.0m.

3.4 Magnetometer Data

Processed magnetometer data along Cable Route 1 (CR1) is presented as a series of magnetic anomalies at a scale of 1:5000 on the Seabed Features panel of the Route Alignment chart, drawing no C13007-BR-05-AL.

A total of six magnetic anomalies were noted within the CR1 cable route corridor, none of which lie closer than 90m of the proposed route centre line. These features range in amplitude from 11.2nT to 86.6nT and do not appear to be associated with any surface features (sonar targets).

A full list of magnetic anomalies are presented in Appendix 2.

3.5 Cable Installation Constraints

The proposed cable route passes through an area of gravel with numerous boulders, between KP0.36 and KP0.92.

Rock outcrops are present within 25.0m of the proposed cable route between KP1.064 and approximately KP1.80, with the proposed route traversing areas of outcropping bedrock between KP1.145 and KP1.402.

A total of 6 sonar targets, identified as boulders, were noted within 25m of the proposed cable route centre line and these are tabulated below:

ID	Easting (m)	Northing (m)	Dimensions (m) (LxWxH)	KP	Offset (m)	Description
S039	487590.1	6514798.4	2.8 x 0.9 x 0.4	1.914	23.8 SE	Boulder
S045	487671.4	6514971.4	1.6 x 0.7 x 0.8	1.731	21.7 E	Boulder
S065	487121.9	6515577.2	1.8 x 1.2 x 2.0	0.808	25.4 SW	Boulder
S066	487192.6	6515570.0	1.7 x 0.6 x 0.3	0.869	13.0 NE	Boulder
S068	487600.6	6515311.8	2.0 x 0.9 x 0.8	1.354	23.0 NE	Boulder
S070	487690.2	6515223.9	1.8 x 1.1 x 0.5	1.477	0.0	Boulder

Table 3: Boulders within 25m of CR1 RPL

From KP1.91, up to the end of the proposed route, the seabed dips steeply at an angle of up to 8.1°.

Approximate seabed gradients along the centre line of the proposed Aith cable route are summarised in the following table:

KP	Depth (m below LAT)	Gradient
Inshore extent of survey (0.146) to 1.131	0.1 to 16.0	<0.5 – 2.2°
1.131 to 1.509	16.0 to 30.0	1.7° - 2.9°
1.509 to 1.698	30.0 to 32.0	0.6°
1.698 to 1.884	32.0 to 38.0	1.4° - 3.3°
1.884 to 2.183	38.0 to 56.8	4.3° - 8.1°

Table 4: Seabed gradients along CR1 RPL

4. RESULTS - MELSETTER BAY

4.1 Bathymetry

Seabed levels along the CR2 corridor are presented at a scale of 1:5000 on the Bathymetry panel of the Route Alignment chart, drawing no C13007-BR-05-AL. These are contoured at a vertical interval of 2.0m, reduced to Lowest Astronomical Tide (LAT).

Water depths along the CR2 corridor range from a minimum of 4.4m below LAT, near the inshore extents of the survey at KP0.095, to approximately 36.0m below LAT, close to the end of the proposed cable route at KP1.070. A shallowest depth of 0.6m below LAT was noted approximately 212m east of the proposed centre line, at the inshore limits of the data.

The seabed initially dips steeply towards the south across an area of outcropping bedrock, from 4.4m below LAT, close to the proposed centre line at KP0.095, to 18.0m below LAT at KP0.172, at an average gradient of 10.0°.

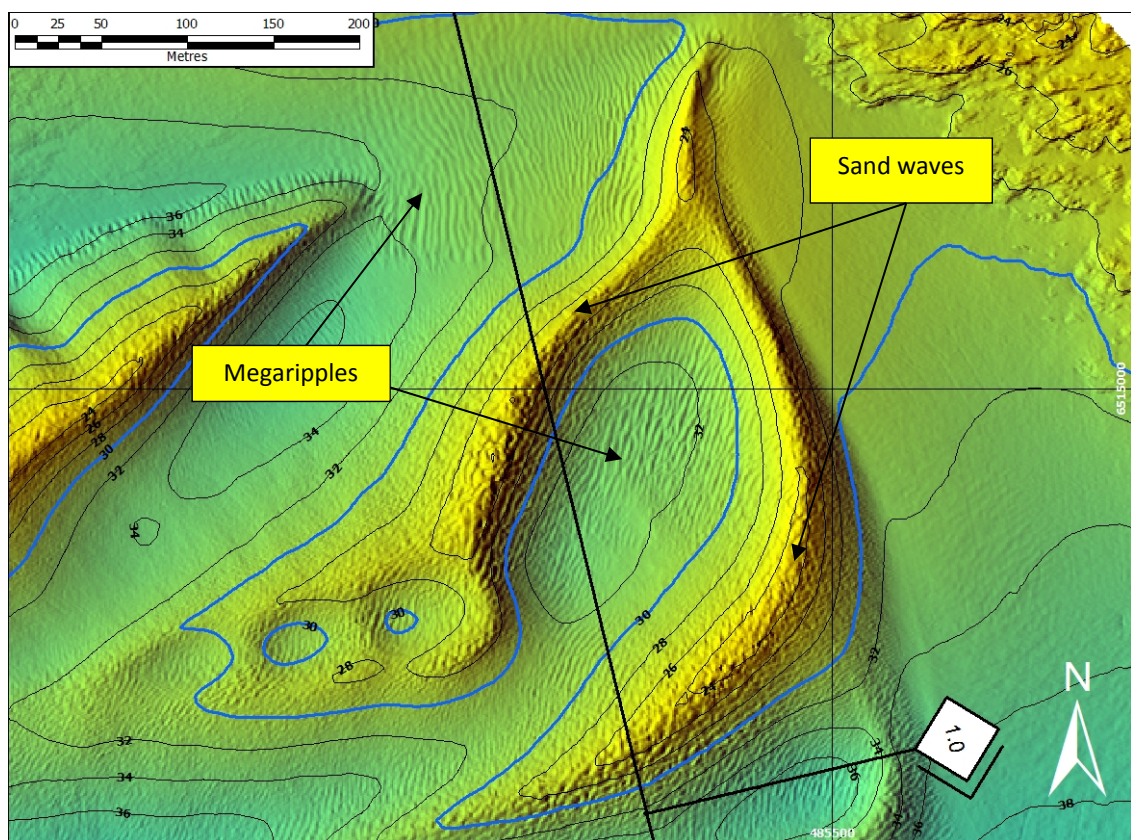


Figure 11: Sand Waves and Megaripples in the Central Melsetter Route

Between KP0.172 and KP0.425, the bedrock surface is less irregular, dipping more gently southwards at an average gradient of less than 2.0°.

To the south of KP0.425, the proposed route centre line crosses an area of sand waves and associated troughs, with the steepest gradients along the proposed centre line noted between KP0.685 and KP0.292 and again between KP0.377 and KP0.510 (figure 10, above). The sand waves stand up to 12.5m above the surrounding seabed and exhibit maximum slope gradients of 14.0°. Water depths within the associated seabed troughs deepen to approximately 32.0m below LAT.

The proposed route crosses a localised trough feature, where water depths reach a maximum of 36.0m below LAT, before crossing a smaller, 4.0m high sand wave feature near the offshore end of the route, to the south of KP1.052.

4.2 Seabed Features

Seabed features along the CR2 corridor are presented at a scale of 1:5000 on the Seabed Features panel of the Route Alignment chart, drawing no C13007-BR-05-AL.

Commencing at the inshore limits of the survey at KP0.134, the seabed comprises an irregular area of outcropping bedrock, southwards to KP0.327.

To the south of KP0.327, the bedrock surface becomes covered by a veneer of gravels, out to KP0.442, and then by a large expanse of gravelly sands to the offshore end of the proposed route at KP1.070.

A total of eight sonar targets were identified within the CR2 corridor.

Sonar target S043, with dimensions of 2.3m x 0.5m x 1.5m, lies 7.4m west of the proposed centre line at KP0.397. No other targets lie within 150m of the proposed centre line.

A full list of sonar targets are presented in Appendix 2.

4.3 Shallow Soils

The results of the sub-bottom profiler survey along the CR2 corridor are presented at a scale of 1:5000, as a Total Sediment Thickness to Rockhead Isopachyte, on the Isopachyte panel of the Route Alignment chart, drawing no C13007-BR-05-AL.

From the edge of the area of outcropping bedrock at KP0.327, sediment thicknesses beneath the proposed centre line gradually increase from a general veneer to approximately 2.0m at KP0.463, before increasing rapidly to more than 34m at the

offshore end of the proposed route.

4.4 Magnetometer

Processed magnetometer data along the CR2 corridor is presented at a scale of 1:5000 on the Seabed Features panel of the Route Alignment chart, drawing no C13007-BR-05-AL.

Only one minor magnetic anomaly was noted; M026 (3.0nT), which lies approximately 120m west of the proposed centre line at KP0.341.

A full list of magnetic anomalies are presented in Appendix 2.

4.5 Cable Installation Constraints

Outcropping bedrock is present along the nearshore section of the proposed route, between the inshore extents of the sonar data at KP0.134 and KP0.327.

Sonar target S043, with dimensions of 2.3m x 0.5m x 1.5m, lies 7.4m west of the proposed centre line at KP0.397.

To the south of KP0.425, the proposed centre line crosses two large sand waves, with the steepest gradients noted between KP0.685 and KP0.292 and again between KP0.377 and KP0.510. The sand waves stand up to 12.5m above the surrounding seabed and exhibit maximum slope gradients of almost 10.0°. The proposed route crosses a smaller, 4.0m high sand wave near the offshore end at approximately KP1.062.

The approximate seabed gradients along the centre line of the proposed Melsester cable route are summarised in the following table:

KP	Depth (m below LAT)	Gradient
Inshore extent of survey (0.095) to 0.172	4.5 to 18.0	6.7° – 13.1°
0.172 to 0.595	18.0 to 32.2	1.3° - 2.5°
0.595 to 0.686	32.2 to 30.0	1.4°
0.686 to 0.730	30.0 to 24.0	7.8°
0.730 to 0.793	24.0 to 32.0	7.2°
0.793 to 0.877	32.0	<0.5°
0.877 to 0.954	32.0 to 24.7	5.4°
0.954 to 1.010	24.7 to 34.0	9.5°
1.010 to 1.060	33.0 to 35.3	<0.5° - 4.8°

KP	Depth (m below LAT)	Gradient
1.060 to 1.070	33.0 to 34.6	8.8°

Table 5: Seabed gradients along CR2 RPL

5. REFERENCES

- Shallow geology of the seabed in the vicinity of Orkney and the Sutherland coast. Leslie, A.B., 2012, British Geological Society commissioned report CR/12/078, 15pp
- Cantick Head, Westray South and Costa Head Developments – Orkney. Invitation to Tender. Senergy Survey & GeoEngineering. Doc. No.: 1998-SSER-SOW-01-02 dated 29/05/12.
- Brims Tidal Array, Westray South & Costa Head Developments – Orkney. Volume 1 Operations Report. Osiris Projects Report No C13007, dated January 2014
- Costa Head Geophysical Survey, Orkney Volume 2a Results Report. Osiris Projects Report No C13007-2a, dated January 2014
- Brims Tidal Array Geophysical Survey, Orkney Volume 2c Results Report. Osiris Projects Report No C13007-2c, dated January 2014
- British Regional Geology '*Orkney & Shetland*', Mykura, W. HMSO, Edinburgh, 1976
- Oxford Dictionary of Earth Sciences. Allaby, A. & Allaby, M., pp599, Oxford University Press, 1999.
- An Introduction to Applied and Environmental Geophysics. J. M. Reynolds, John Wiley & Sons, 1997

APPENDIX 1

Charting

North-up Charts (1:5000)

Agreement for Lease:

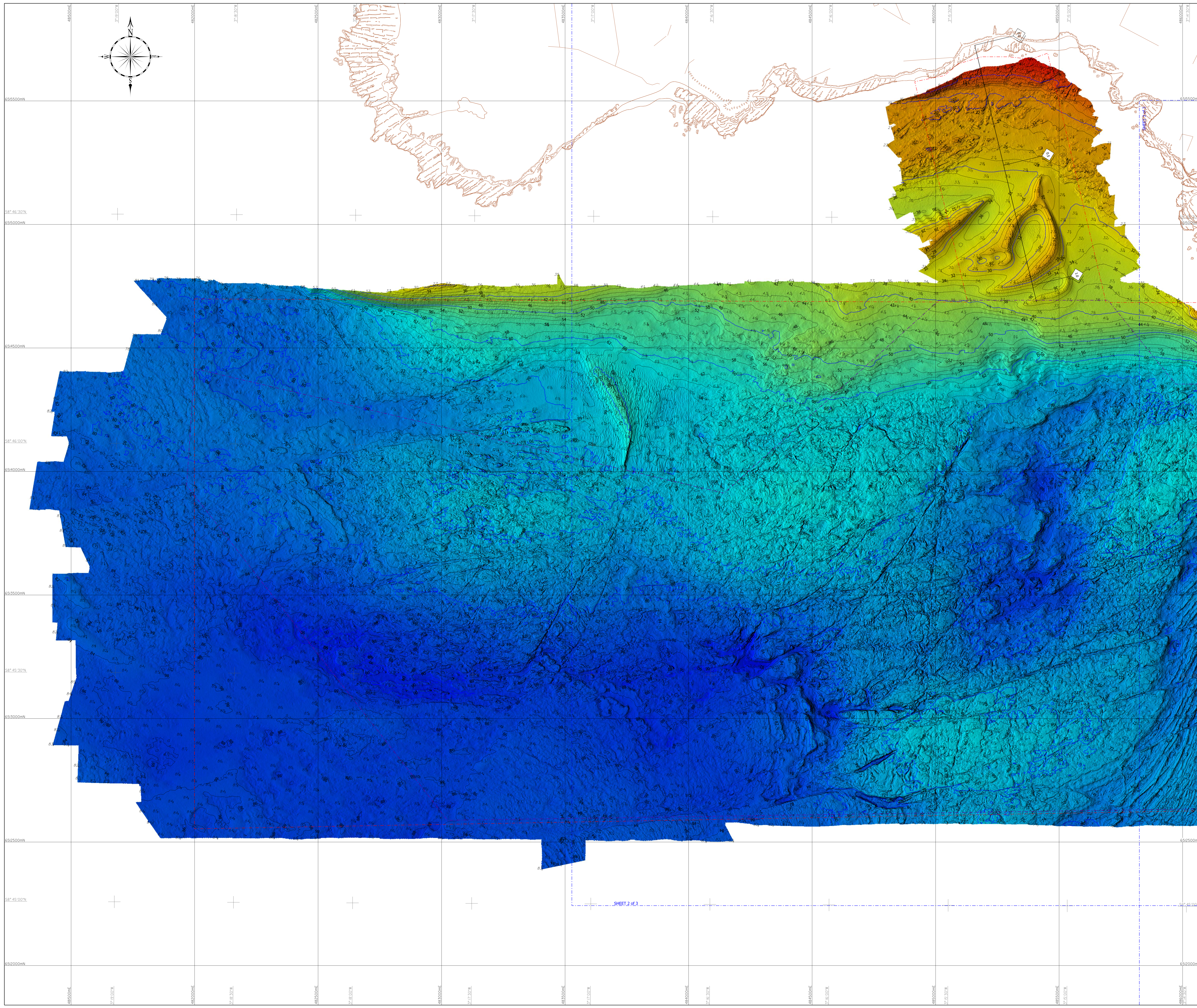
- C13007-BR-01 (a-c) Shaded Relief Bathymetry
- C13007-BR-02 (a-c) Seabed Features
- C13007-BR-03 (a-c) Side Scan Sonar Mosaic
- C13007-BR-04 (a-c) Total Isopachyte

Rotated Chart (1:5000)

Cable Routes

- C13007-BR-05-AL Aith Hope Bay and Melsetter Bay

- C13007-BR-06-AL-SSS Aith Hope Bay and Melsetter Bay



Legend:

GENERAL

- Kilometre Post
- Proposed cable route
- Survey boundary - AFL (Agreement of lease)
- High priority area
- Overlap with next and previous panel
- Location map (CS OpenData)

BATHYMETRY

- 10 Major contours at 10m intervals reduced to LAT
- 2 Minor contours at 2m intervals reduced to LAT
- 4% Representative seabed levels in metres and decimetres reduced to LAT
- Shaded relief bathymetry scale bar

Depth in metres reduced to LAT

0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95

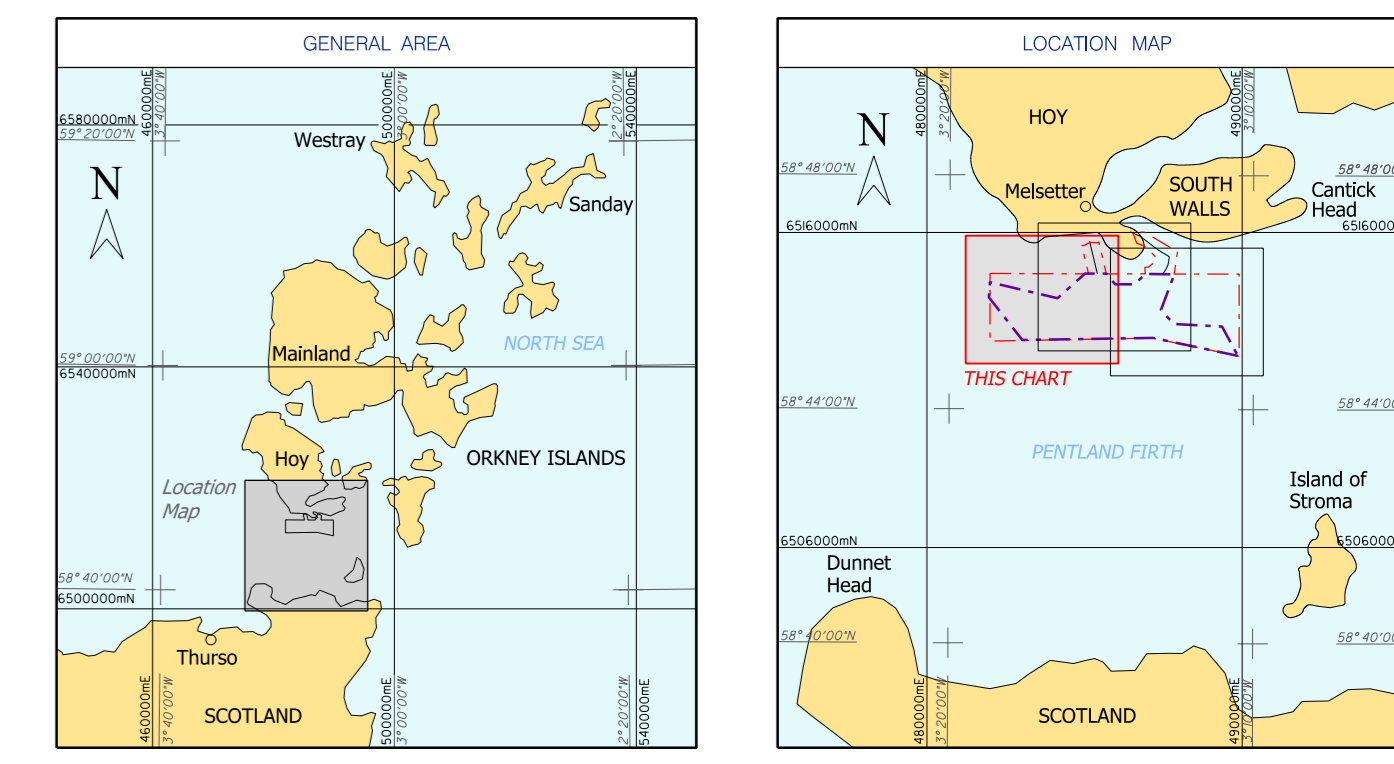
General Notes:

- Horizontal Control:**
 - In 2012 Primary surface positioning on 'MV Lia' was provided by the Leica GX 1230 Smartnet.
 - In 2013 Primary surface positioning on both vessels ('MV Lia' and 'MV Bibby Tetra') was provided by the C-Nav 3050 with RTG correction service.
 - Secondary surface position on 'MV Bibby Tetra' was provided by the Hemisphere RS20 system, and on 'MV Lia' secondary surface position was provided by the C-Nav 2000 system.
 - Further details on these systems can be found in Volume 1 - Operations report; section 2.4.1.
- Vertical Control:**
 - All water depths are relative to Lowest Astronomical Tide (LAT), using PPK heights. Ellipsoidal heights were reduced to LAT using UKHO VORP data. Further details can be found in Volume 1 - Operations report; section 2.4.2.
- Bathymetry data gridded at 1.0m x 1.0m.
- Seabed shaded relief, sun illumination: Azimuth 270°, Elevation 50°, Exaggeration x2.

Geodetic Parameters:

Geodetic datum : World Geodetic System 1984 (WGS84)
 Ellipsoid : World Geodetic System 1984 (WGS84)
 Semi major axis : 6378137.000 m
 Inverse flattening : 298.257223563

Projection : Universal Transverse Mercator (UTM) Zone 30 North
 Central Meridian : 3° West
 Latitude of Origin : 0° North
 False Easting : 500000 m
 False Northing : 0 m
 Scale Factor : 0.9996
 Vertical Datum : Lowest Astronomical Tide (LAT)



Client: Brims Tidal Array Ltd, Inverness House, 200 Dunkeld Road, Perth, PH1 3AQ

Contractor: OSIRIS PROJECTS, Maritime House, 4 Brunel Road, Cromwell Park, Bromborough, CH82 3WJ, United Kingdom. Tel: +44 151 330 1120, Fax: +44 151 343 1027, email: enquiries@osirisprojects.co.uk, website: www.osirisprojects.co.uk

Contract Title: 12.0501 - GEOPHYSICAL SURVEY 2012/13

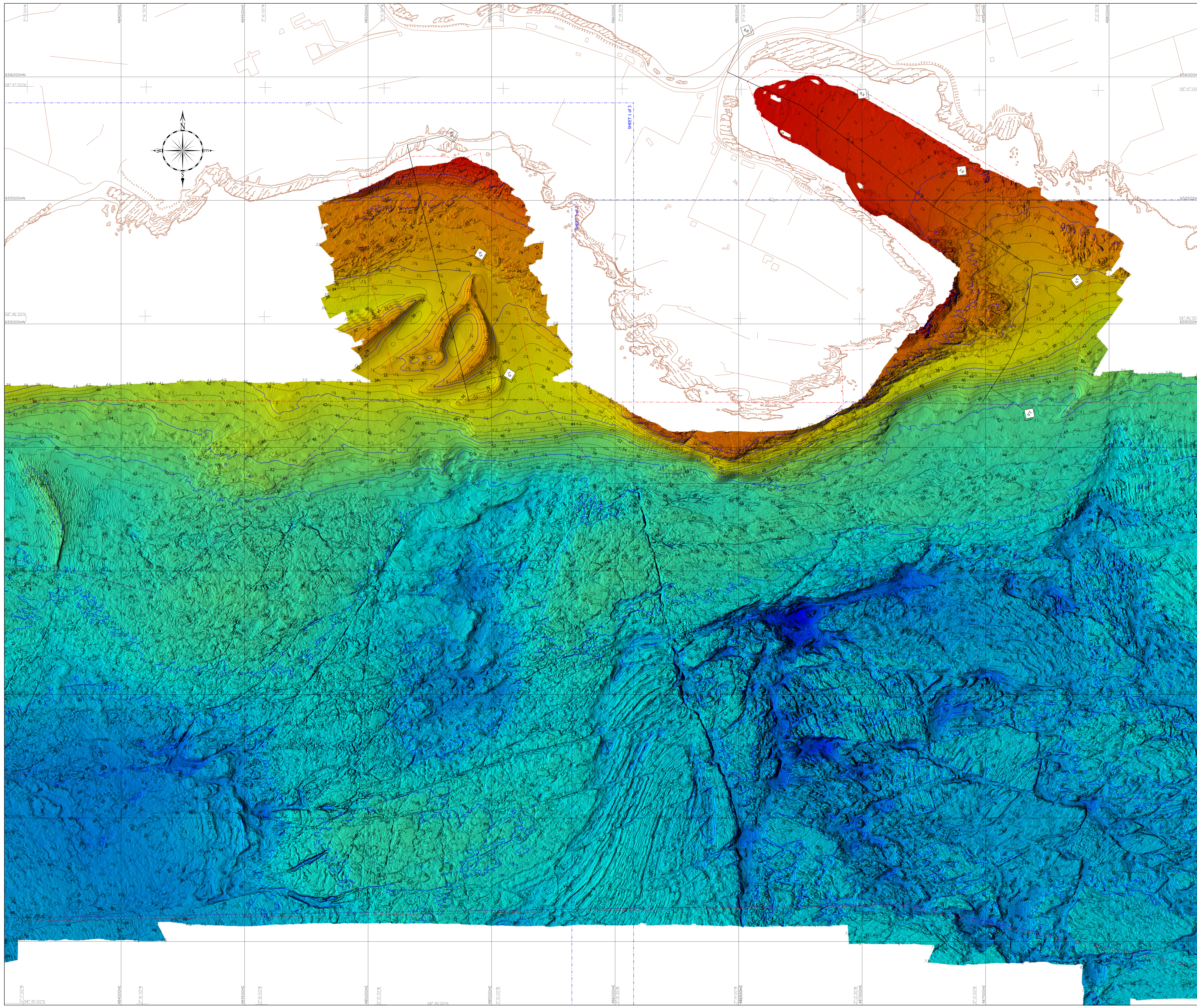
Chart Title: BRIMS TIDAL ARRAY - AGREEMENT FOR LEASE SHADED RELIEF BATHYMETRY - Sheet 1 of 3

Scale 1:5,000

100 0 100 200 300 400 500 metres

Vessel:	M.V. Bibby Tetra/M.V. Lia	Survey Date:	07/05/2013 - 26/09/2013	Client Ref.:	12.0501
3					
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1	05/02/2014	Draft		GR	<i>[Signature]</i>
0	21/11/2013	PRELIMINARY		GR	<i>[Signature]</i>

REVISION:	DATE:	REVISION / DESCRIPTION:	DRAWN:	CHECKED:	APPROVED:
Scale:	Horz.: 1:5,000	Chart Number:	C13007-BR-01a	Chart:	1 of 14
	Vert: N/A				Osiris Contract Number: C13007



GENERAL

- Kilometre Post
- Proposed cable route
- Survey boundary - AFL (Agreement of lease)
- High priority area
- Overlap with next and previous panel
- Location map (OS OpenData)

BATHYMETRY

- Major contours at 10m intervals reduced to LAT
- Minor contours at 2m intervals reduced to LAT
- Representative seabed levels in metres and decimetres reduced to LAT
- Shaded relief bathymetry scale bar

Depth in metres reduced to LAT

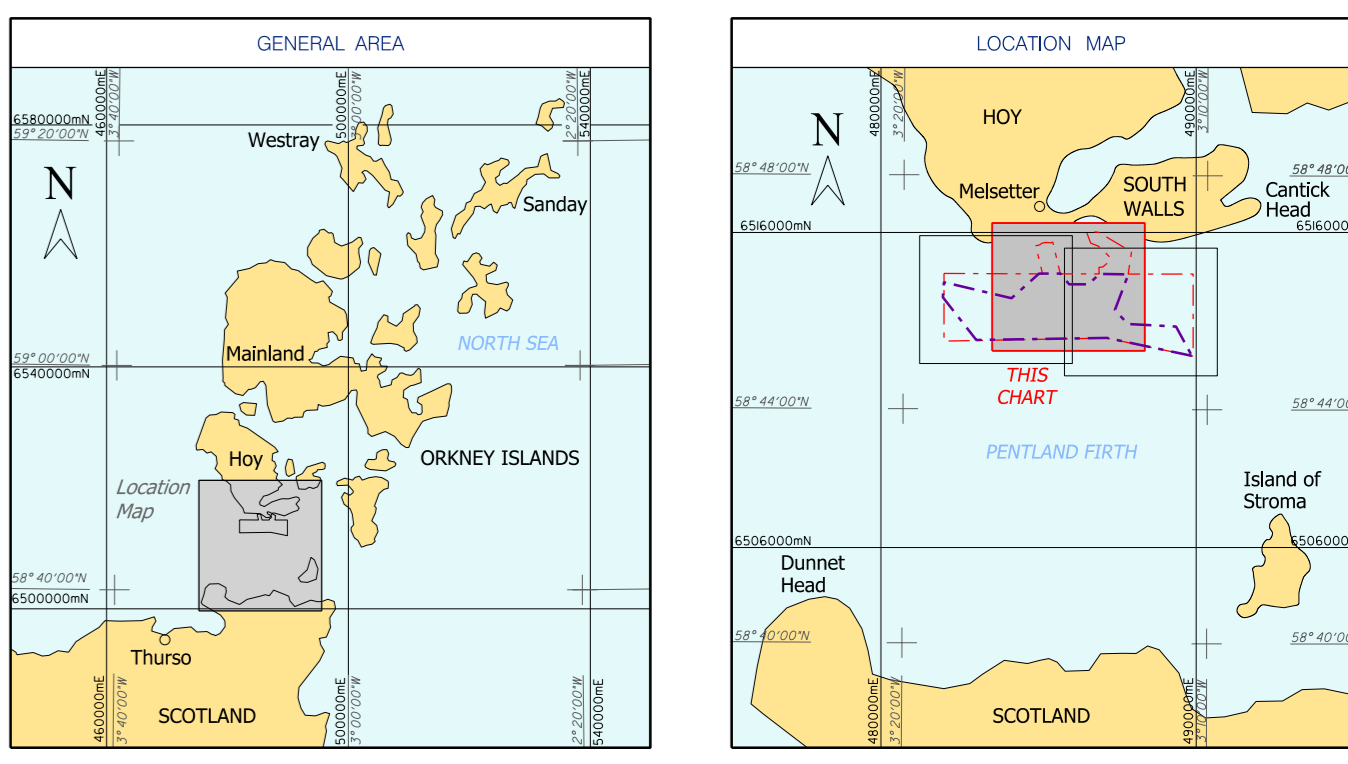
General Notes:

- Horizontal Control:**
 - In 2012 Primary surface positioning on 'MV Lia' was provided by the Leica GX 1230 Smartnet.
 - In 2013 Primary surface positioning on both vessels ('MV Lia' and 'MV Bibby Tetra') was provided by the C-Nav 3050 with RTG correction service.
 - Secondary surface position on 'MV Bibby Tetra' was provided by the Hemisphere R320 system, and on 'MV Lia' secondary surface position was provided by the C-Nav 2050 system.
 - Further details on these systems can be found in Volume 1 - Operations report; section 2.4.1.
- Vertical Control:**
 - All water depths are relative to Lowest Astronomical Tide (LAT), using PPK heights. Ellipsoidal heights were reduced to LAT using UKHO VORF data. Further details can be found in Volume 1 - Operations report; section 2.4.2.
- Bathymetry data gridded at 1.0m x 1.0m.
- Seabed shaded relief, sun illumination: Azimuth 270°, Elevation 50°, Exaggeration x2.

Geoid Parameters:

Geoid datum : World Geodetic System 1984 (WGS84)
 Ellipsoid : World Geodetic System 1984 (WGS84)
 Semi major axis : 6378137.000 m
 Inverse flattening : 299.725273363

Projection : Universal Transverse Mercator (UTM) Zone 30 North
 Central Meridian : 3° West
 Latitude of Origin : 0° North
 False Easting : 500000 m
 False Northing : 0 m
 Scale Factor : 0.9996
 Vertical Datum : Lowest Astronomical Tide (LAT)

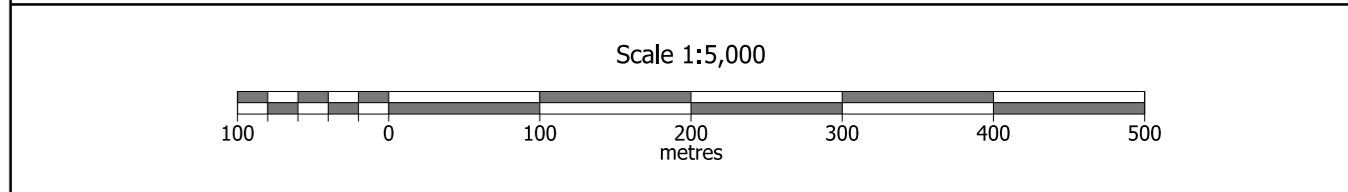


Client: Brims Tidal Array Ltd, Invermorris House, 200 Dunkeld Road, Perth, PH1 3AQ

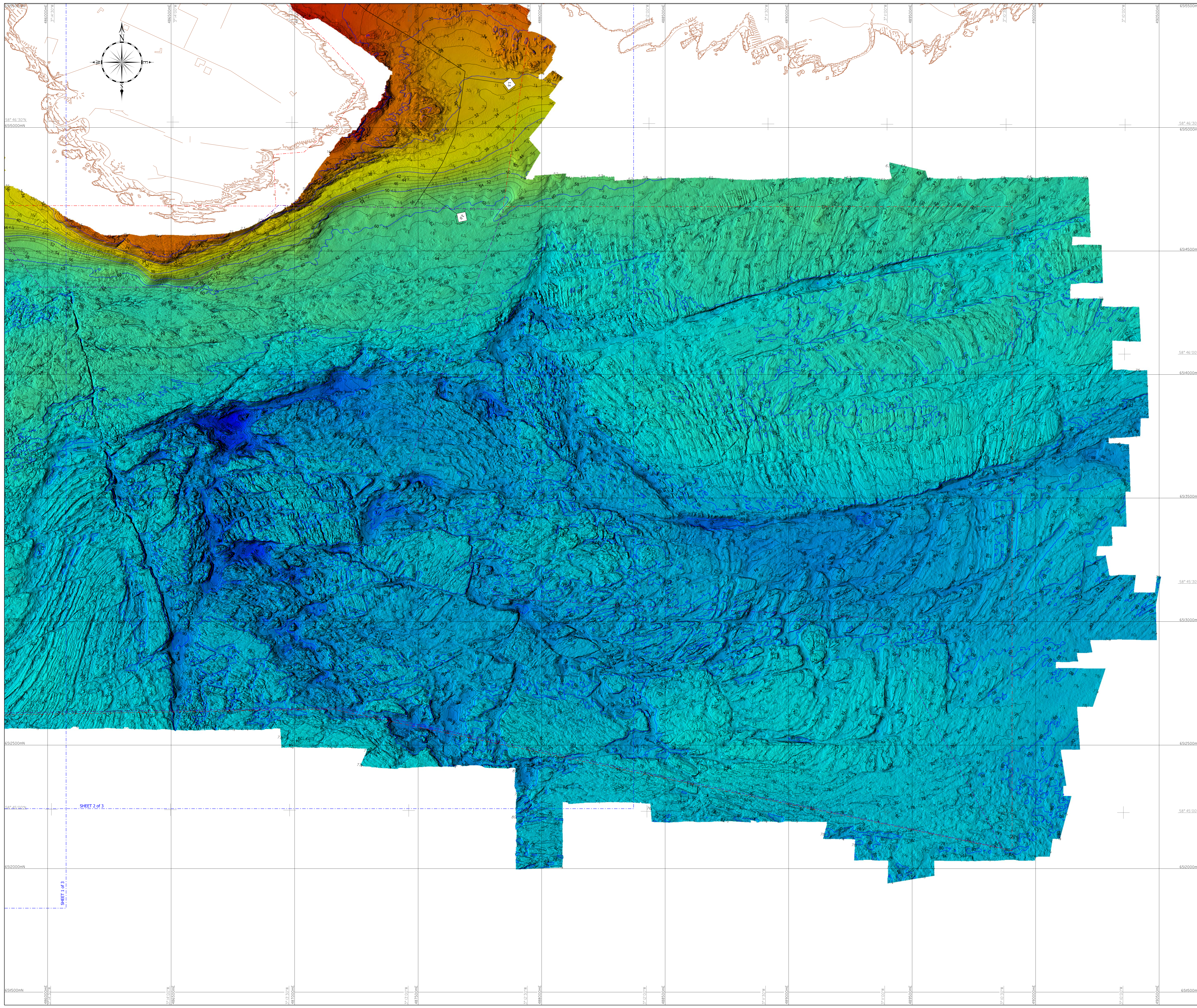
Contractor: OSIRIS PROJECTS
 Seabed Mapping & Coastal Survey
 4 Brunel Road, Cromwell Park, Birmingham, B37 7YU, United Kingdom
 Tel: +44 151 308 1100, Fax: +44 151 343 1027, email: enquiries@osirisprojects.co.uk, website: www.osirisprojects.co.uk

Contract Title: 12.0501 - GEOPHYSICAL SURVEY 2012/13

Chart Title: BRIMS TIDAL ARRAY - AGREEMENT OF LEASE
 SHADED RELIEF BATHYMETRY - Sheet 2 of 3



Vessel:	M.V. Bibby Tetra/M.V. Lia	Survey Date:	07/05/2013 - 26/09/2013	Client Ref.:	12.0501
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Scale:	Horz.: 1:5,000 Vert.: N/A	Chart Number:	C13007-BR-01b	Chart:	2 of 14
					Osiris Contract Number: C13007



GENERAL

- Kilometre Post
- Proposed cable route
- Survey boundary - AFL (Agreement of lease)
- High priority area
- Overlap with next and previous panel
- Location map (OS OpenData)

BATHYMETRY

- Major contours at 10m intervals reduced to LAT
- Minor contours at 2m intervals reduced to LAT
- Shaded relief bathymetry scale bar

Depth in metres reduced to LAT

General Notes:

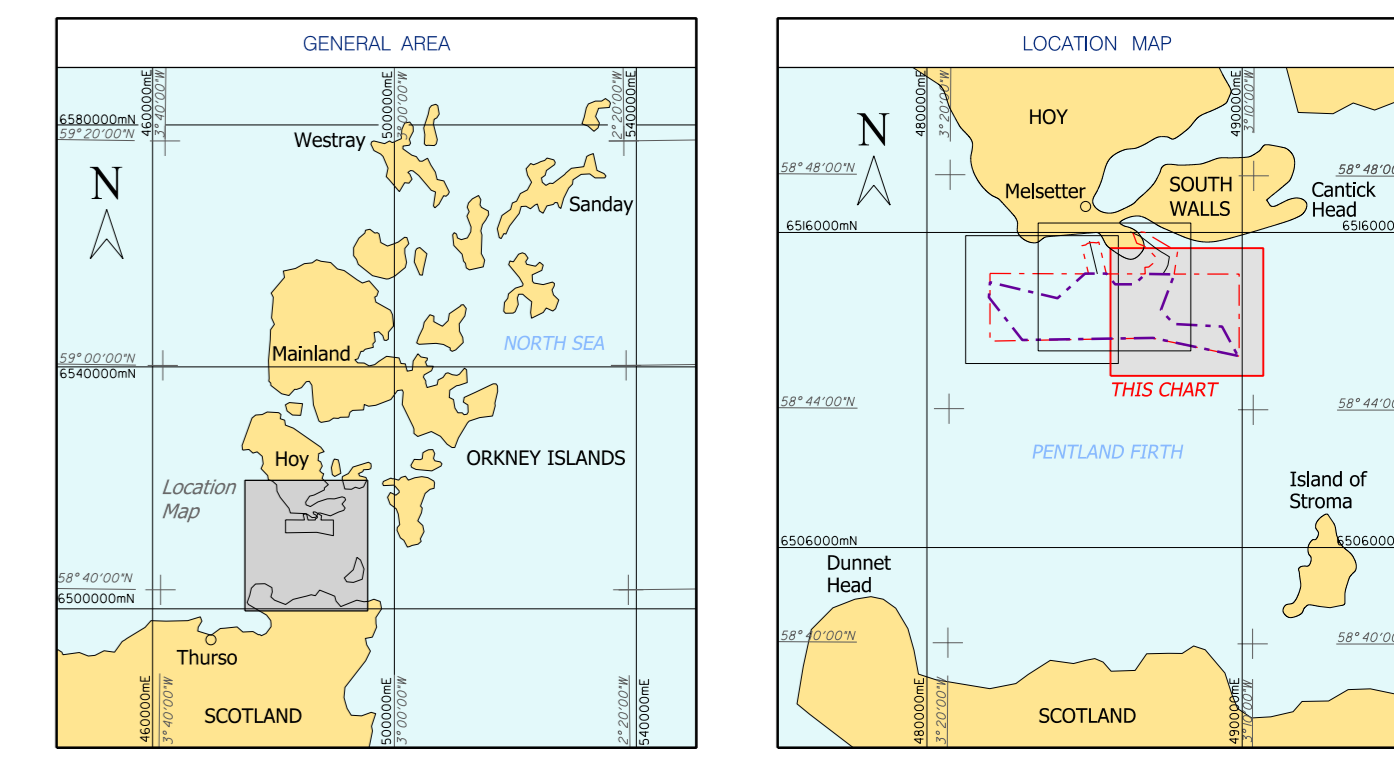
- Horizontal Control:**
 - In 2012 Primary surface positioning on 'MV Lia' was provided by the Leica GX 1230 Smartnet.
 - In 2013 Primary surface positioning on both vessels ('MV Lia' and 'MV Bibby Tetra') was provided by the C-Nav 3050 with RTG correction service.
 - Secondary surface position on 'MV Bibby Tetra' was provided by the Hemisphere R320 system, and on 'MV Lia' secondary surface position was provided by the C-Nav 2000 system.
- Vertical Control:**
 - All water depths are relative to Lowest Astronomical Tide (LAT), using PPK heights. Ellipsoidal heights were reduced to LAT using UKHO VORP data. Further details can be found in Volume 1 - Operations report; section 2.4.2.
- Bathymetry data gridded at 1.0m x 1.0m.
- Shaded relief, sun illumination: Azimuth 270°, Elevation 50°, Exaggeration x2.

Geoids Parameters:

Geoidetic datum : World Geoidetic System 1984 (WGS84)
 Ellipsoid : World Geoidetic System 1984 (WGS84)
 Semi major axis : 6378137.000 m
 Inverse flattening : 299.7223563

Projection : Universal Transverse Mercator (UTM) Zone 30 North
 Central Meridian : 3° West
 Latitude of Origin : 0° North
 False Easting : 500000 m
 False Northing : 0 m
 Scale Factor : 0.9996

Vertical Datum : Lowest Astronomical Tide (LAT)



Client: Brims Tidal Array Ltd, Inverarm House, 200 Durkell Road, Perth, PH1 3AQ

Contractor: OSIRIS PROJECTS, Seabed Mapping & Coastal Survey, Bibby, Maritime House, 4 Brunel Road, Clifton Business Park, Bromborough, CH2 2JY, United Kingdom. Tel: +44 151 338 1100, Fax: +44 151 343 1027, email: enquiries@osirisprojects.co.uk, website: www.osirisprojects.co.uk

Contract Title: 12.0501 - GEOPHYSICAL SURVEY 2012/13

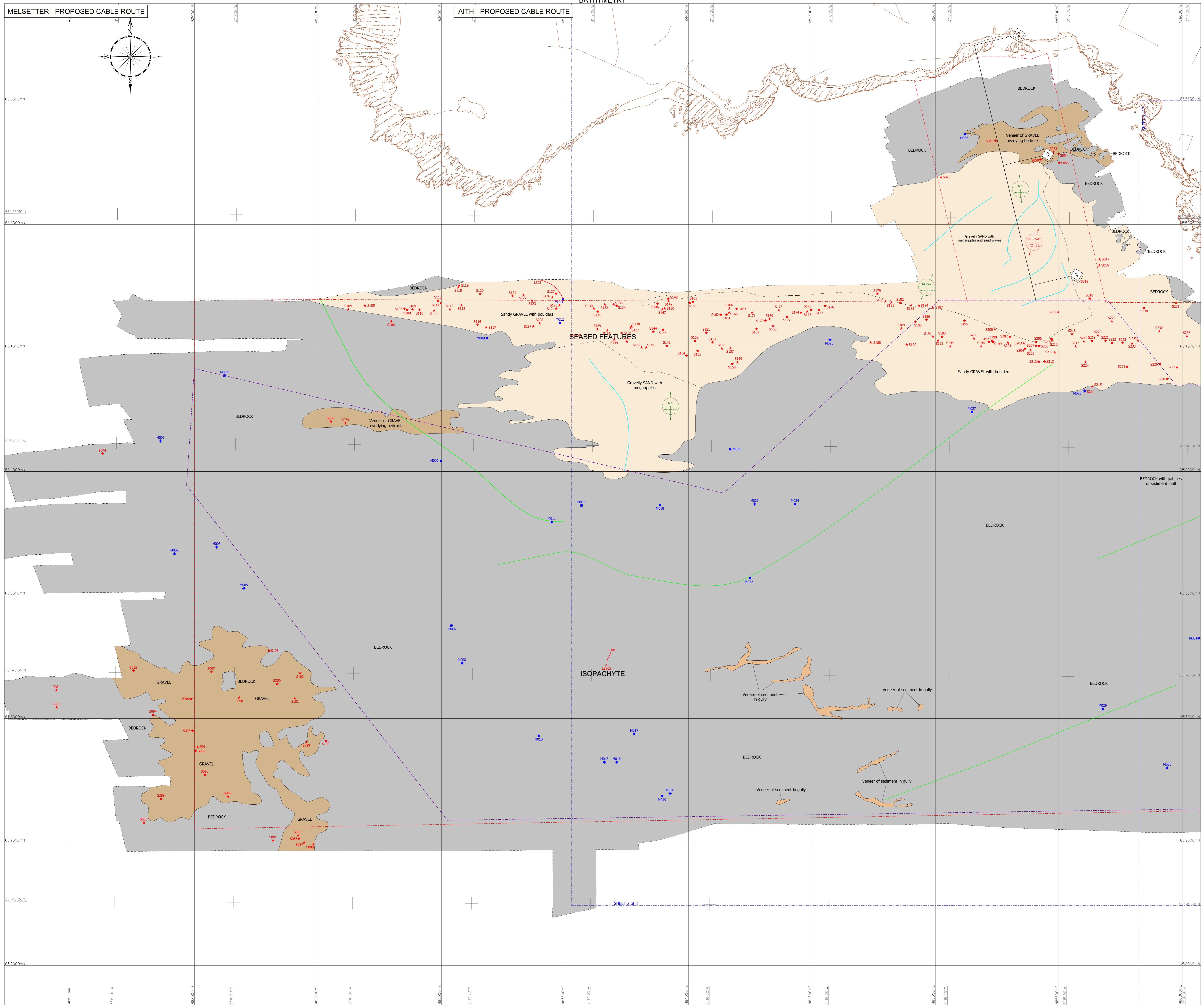
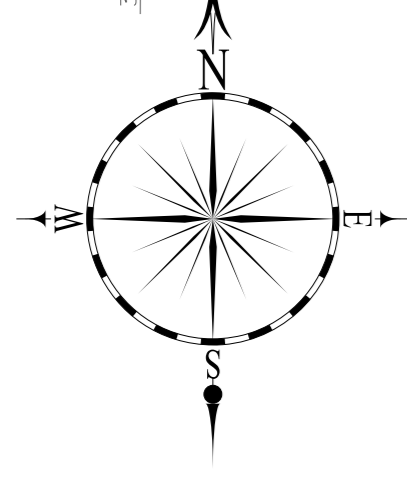
Chart Title: BRIMS TIDAL ARRAY- AGREEMENT FOR LEASE
SHADED RELIEF BATHYMETRY - Sheet 3 of 3

Scale 1:5,000

Vessel:	M.V. Bibby Tetra/M.V. Lia	Survey Date:	07/05/2013 - 26/09/2013	Client Ref.:	12.0501
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REVISION: DATE: REVISION / DESCRIPTION: DRAWN: CHECKED: APPROVED:

Scale: Horiz.: 1:5,000 Chart Number: C13007-BR-01c Chart: 3 of 14 (Brim Contract Number: C13007)



Legend

GENERAL

- Kilometre Post
- Proposed cable route
- Survey boundary - AFL (Agreement of lease)
- High priority area
- Overlap with next and previous panel
- Location map (CS Operdata)

SEABED FEATURES

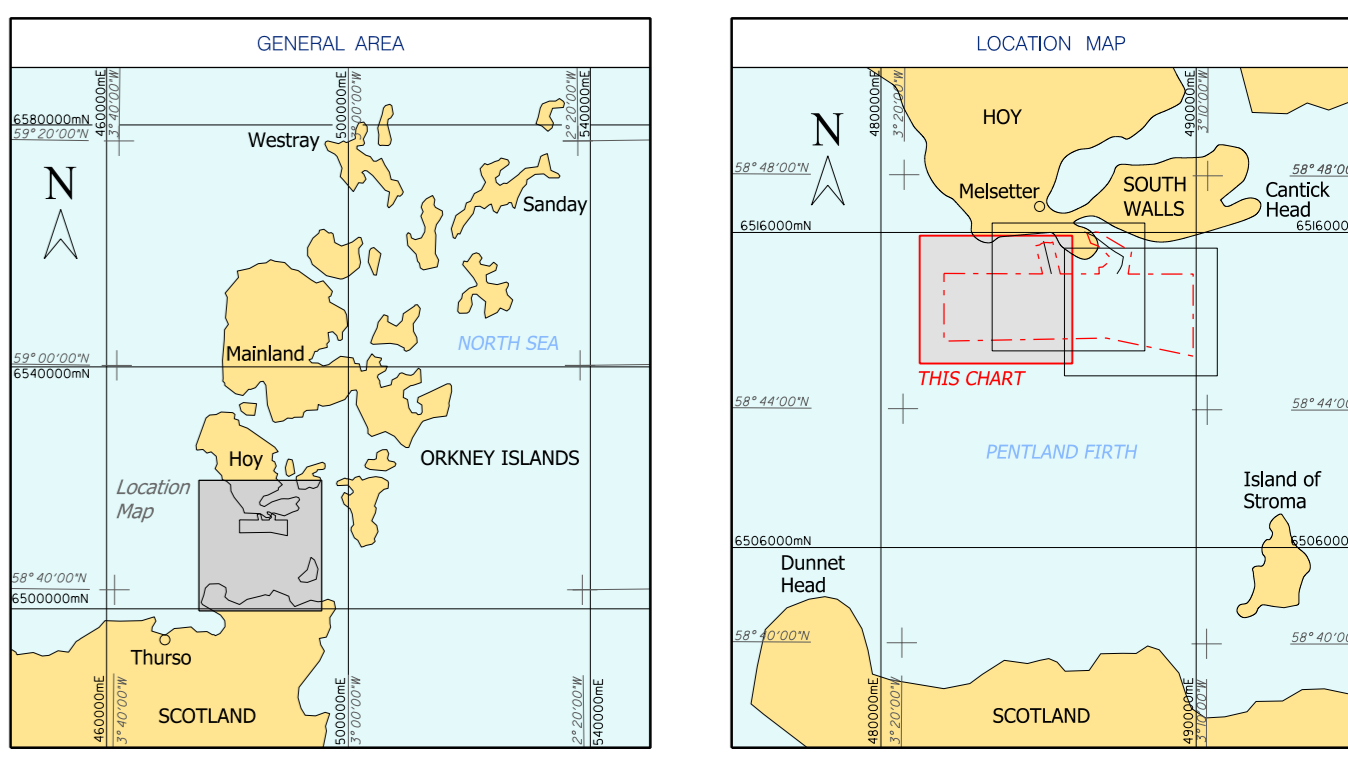
- SAND
- Gravelly SAND / Sandy GRAVEL
- GRAVEL
- Veneer of sediment in gully
- BEDROCK
- Limit of side scan sonar coverage
- Seabed feature boundary - Major
- Seabed feature boundary - Minor
- Sonar target with identifier
- Linear target with identifier
- Magnetic anomaly with identifier
- Area of high magnetic field variability
- Sand wave crest
- Possible dykes
- Wreck/possible wreck with identifier (position supplied by client)
- Megaripples
- Sand waves

General Notes:

- Horizontal Control:**
 - In 2012 Primary surface positioning on 'MV Lia' was provided by the Leica GX 1230 Smartnet.
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- Vertical Control:**
 - All water depths are relative to Lowest Astronomical Tide (LAT), using PPK heights. Ellipsoidal heights were reduced to LAT using UKHO VORP data. Further details can be found in Volume 1 - Operations report; section 2.4.2.
- Seabed interpretation based on side scan and multibeam echo sounder data.

Geodetic Parameters:

Geodetic datum : World Geodetic System 1984 (WGS84)
 Ellipsoid : World Geodetic System 1984 (WGS84)
 Semi major axis : 6378137.000 m
 Inverse flattening : 298.257223563
 Projection : Universal Transverse Mercator (UTM) Zone 30 North
 Central Meridian : 3° West
 Latitude of Origin : 0° North
 False Easting : 500000 m
 False Northing : 0 m
 Scale Factor : 0.9996
 Vertical Datum : Lowest Astronomical Tide (LAT)



Client: BRIMSTIDALARRAY
 Brims Tidal Array Ltd, Invermoriston House, 200 Dunkeld Road, Perth, PH1 3AQ

Contractor: OSIRIS PROJECTS
 Maritime House, 4 Brunel Road, Criff Business Park, Strathgordon, Aberdeen, AB9 8DQ, United Kingdom

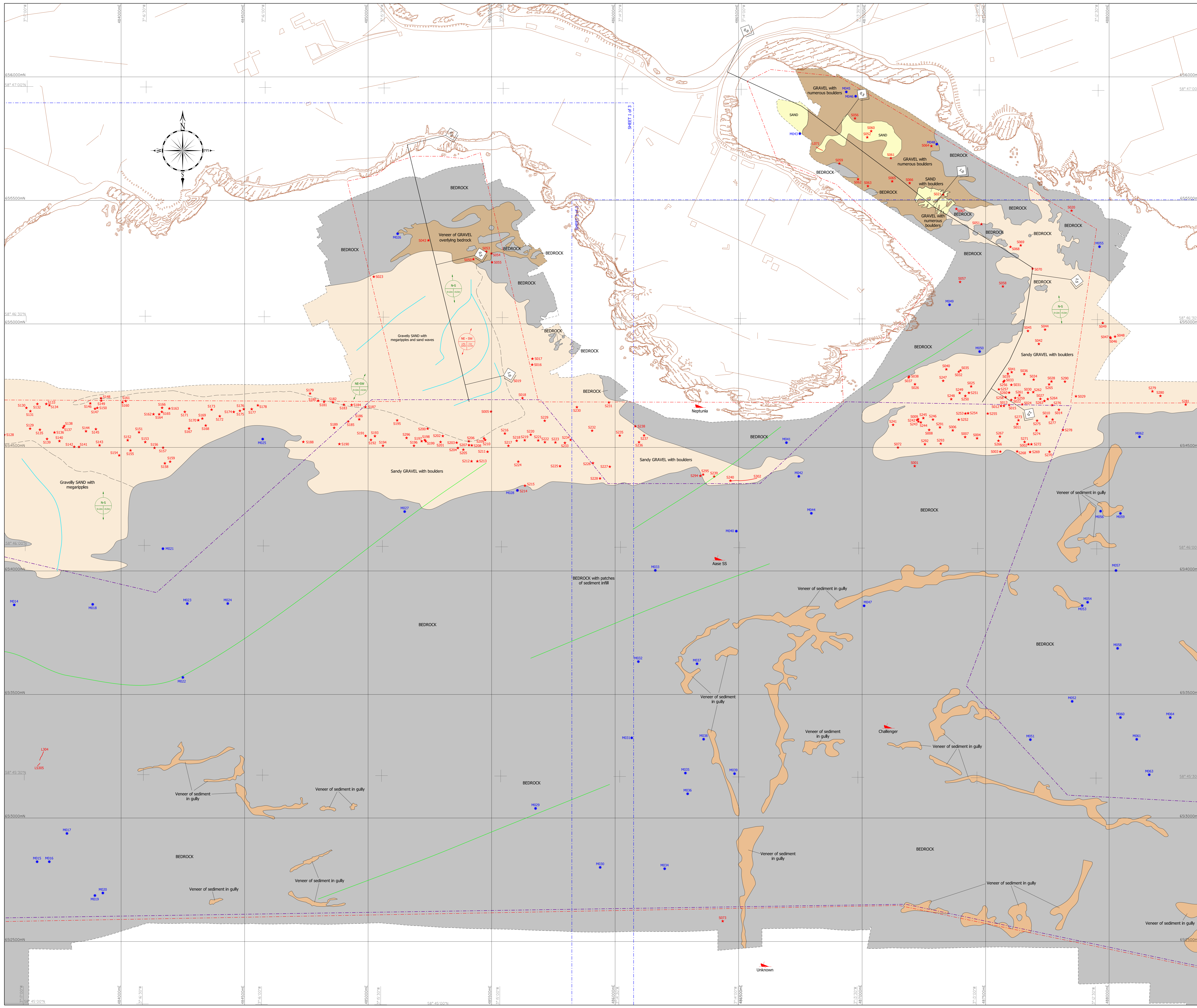
Contract Title: 12.0501 - GEOPHYSICAL SURVEY 2012/13

Chart Title: BRIMS TIDAL ARRAY - AGREEMENT FOR LEASE SEABED FEATURES - Sheet 1 of 3

Scale 1:5,000

Scale bar: 100 0 100 200 300 400 500 metres

Vessel:	M.V. Bibby Tetra/M.V. Lia	Survey Date:	07/05/2013 - 26/09/2013	Client Ref.:	12.0501
3					
2					
1	09/04/2014	Final		GR	<i>[Signature]</i>
0	05/02/2014	Draft		GR	<i>[Signature]</i>
REVISION:	DATE:	REVISION / DESCRIPTION:	DRAWN:	CHECKED:	APPROVED:
Scale:	Horz.: 1:5,000	Chart Number:	C13007-BR-02a-SBF	Chart:	4 of 14
	Vert: N/A				Osiris Contract Number: C13007



GENERAL

- Kilometre Post
- Proposed cable route
- Survey boundary - AFL (Agreement of Lease)
- High priority area
- Overlap with next and previous panel
- Location map (OS OpenData)

SEABED FEATURES

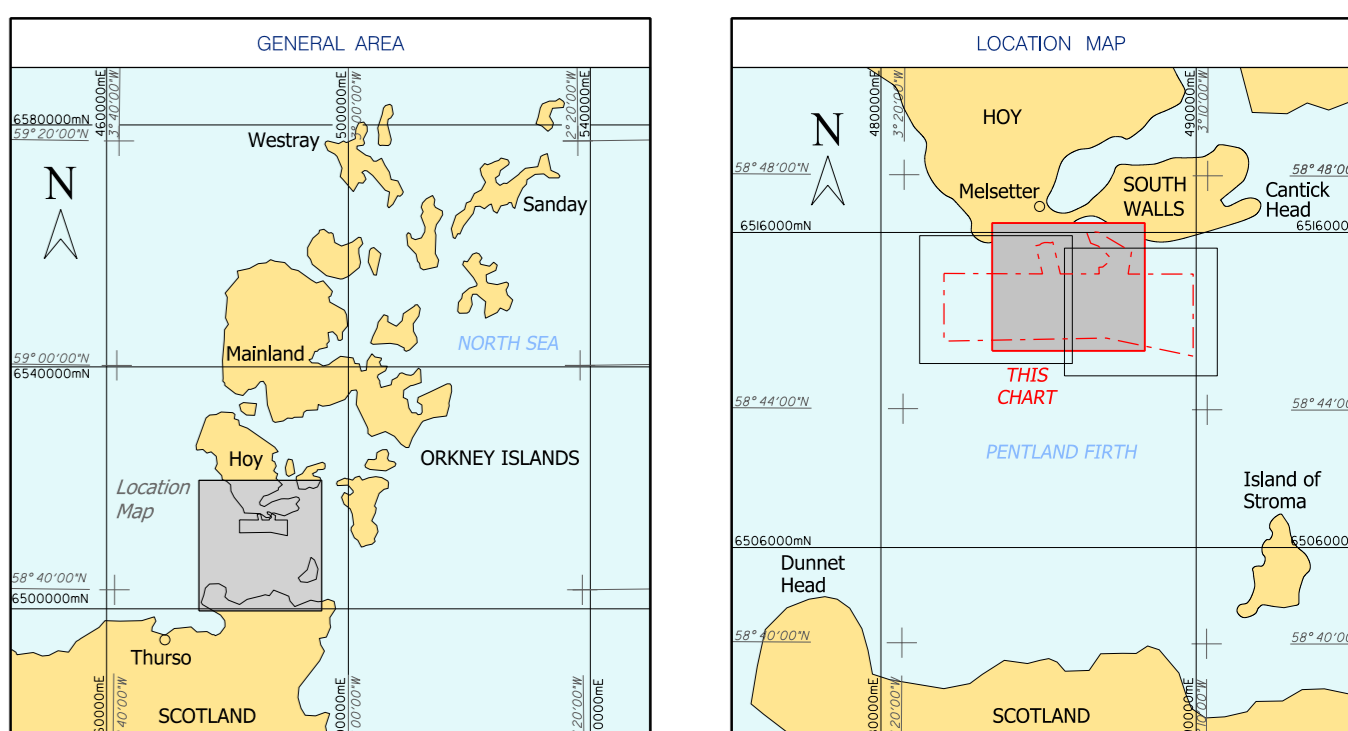
- SAND
- Gravelly SAND / Sandy GRAVEL
- GRAVEL
- Veneer of sediment in gully
- BEDROCK
- Limit of side scan sonar coverage
- Seabed feature boundary - Major
- Seabed feature boundary - Minor
- Sonar target with identifier
- Linear target with identifier
- Magnetic anomaly with identifier
- Area of high magnetic field variability
- Sand wave crest
- Possible dykes
- Wreck/possible wreck with identifier (position supplied by client)
- Neptunia
- Megaripples
- Sand waves

General Notes:

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- Seabed interpretation based on side scan and multibeam echo sounder data.

Geodetic Parameters:

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- Ellipsoid : World Geodetic System 1984 (WGS84)
- Semi major axis : 6378137.000 m
- Inverse flattening : -298.257223563
- Projection : Universal Transverse Mercator (UTM) Zone 30 North
- Central Meridian : 3° West
- Latitude of Origin : 0° North
- False Easting : 500000 m
- False Northing : 0 m
- Scale Factor : 0.9996
- Vertical Datum : Lowest Astronomical Tide (LAT)



Client: BRIMSTIDALARRAY

Contractor: OSIRIS PROJECTS

Contract Title: 12.0501 - GEOPHYSICAL SURVEY 2012/13

Chart Title: BRIMS TIDAL ARRAY - AGREEMENT FOR LEASE SEABED FEATURES - Sheet 2 of 3

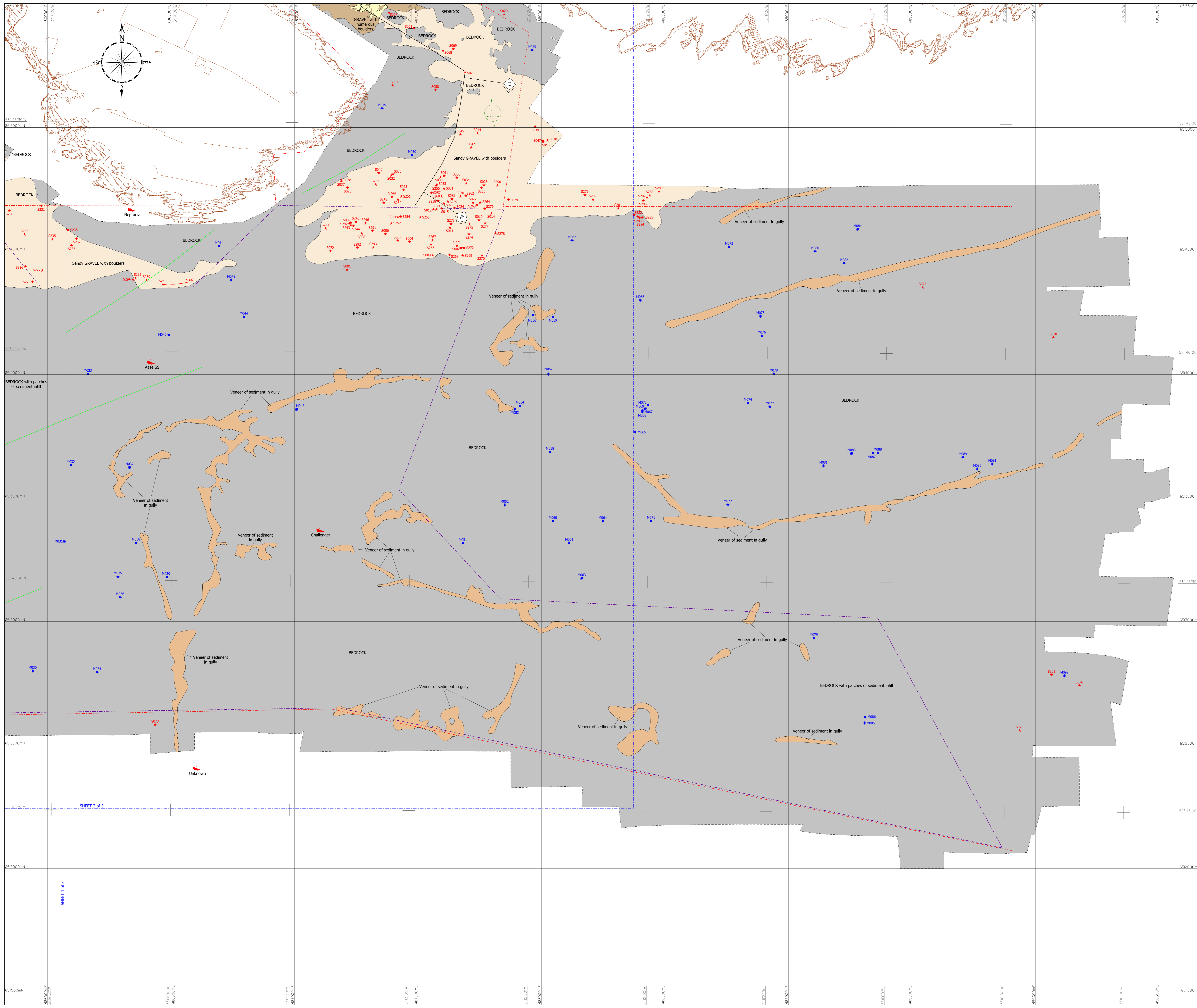
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0	05/02/2014	Draft		GR	

REVISION: DATE: REVISION / DESCRIPTION: DRAWN: CHECKED: APPROVED:

Scale: Horiz.: 1:5,000 Chart Number: C13007-BR-02b Chart: 5 of 14 Osiris Contract Number: C13007



GENERAL

- Kilometre Post
- Proposed cable route
- Survey boundary - AFL (Agreement of lease)
- High priority area
- Overlap with next and previous panel
- Location map (OS OpenData)

SEABED FEATURES

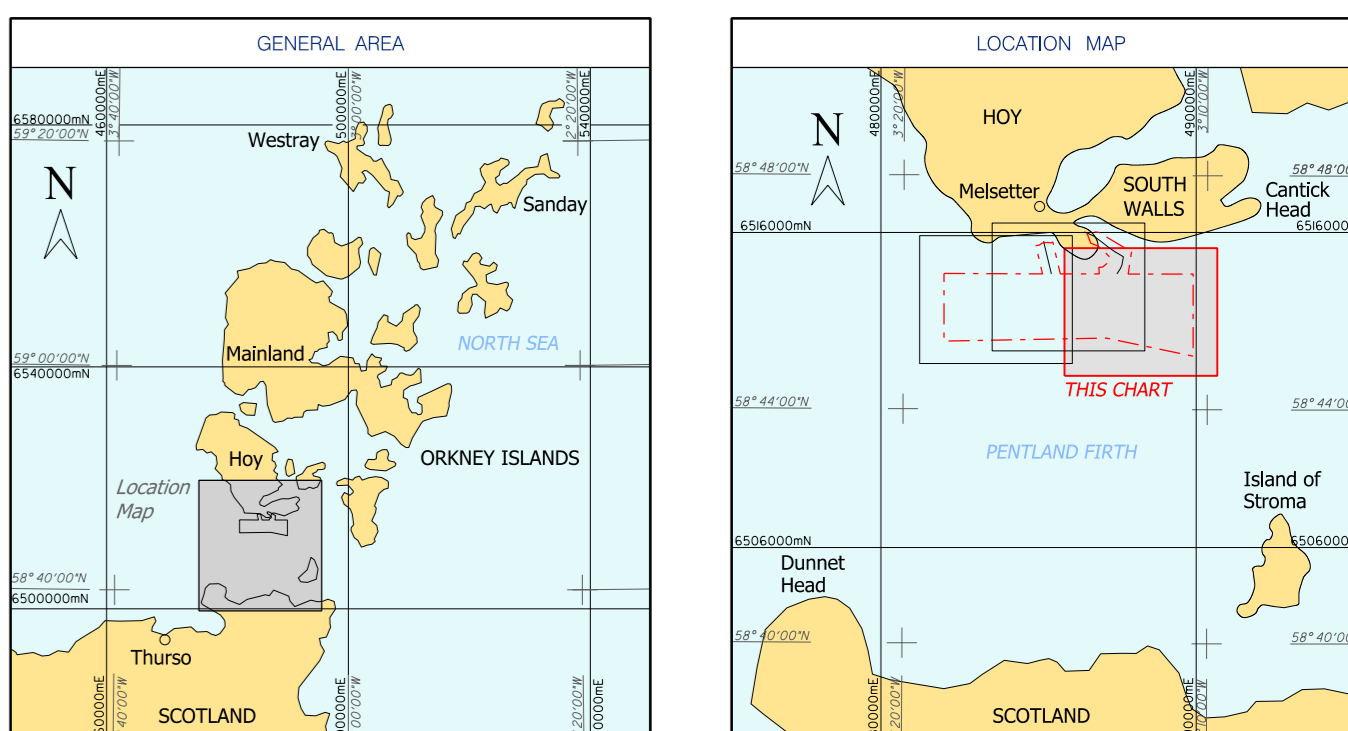
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- Gravelly SAND / Sandy GRAVEL
- GRAVEL
- Veneer of sediment in gully
- BEDROCK
- Limit of side scan sonar coverage
- Seabed feature boundary - Major
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- L123 Linear target with identifier
- M01 Magnetic anomaly with identifier
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- Possible dykes
- Neptunia Wreck/possible wreck with identifier (position supplied by client)
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- Seabed interpretation based on side scan and multibeam echo sounder data.

Geoids Parameters:

- Geoid datum : World Geoidic System 1984 (WGS84)
- Ellipsoid : World Geoidic System 1984 (WGS84)
- Semi major axis : 6378137.000 m
- Inverse flattening : 298.257223563
- Projection : Universal Transverse Mercator (UTM) Zone 30 North
- Central Meridian : 3° West
- Latitude of Origin : 0° North
- False Easting : 500000 m
- False Northing : 0 m
- Scale Factor : 0.9996
- Vertical Datum : Lowest Astronomical Tide (LAT)



Client: BRIMSTIDALARRAY

Contractor: OSIRIS PROJECTS

Contract Title: 12.0501 - GEOPHYSICAL SURVEY 2012/13

Chart Title: BRIMS TIDAL ARRAY - AGREEMENT FOR LEASE SEABED FEATURES - Sheet 3 of 3

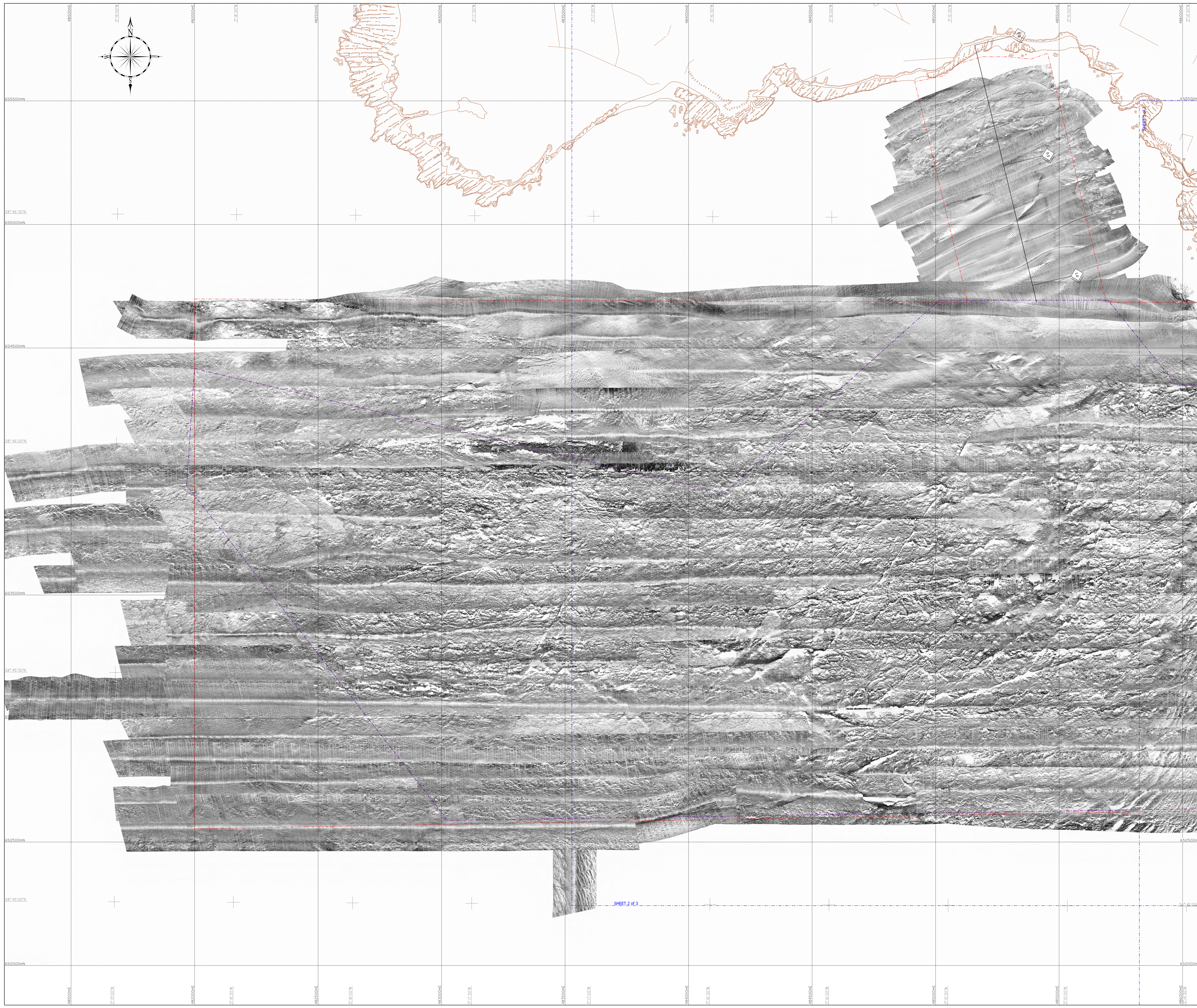
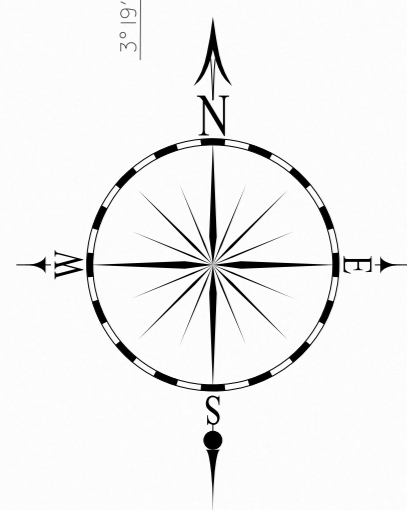
Scale 1:5,000

Vessel: M.V. Bibby Tetra/M.V. Lia | Survey Date: 07/05/2013 - 26/09/2013 | Client Ref: 12.0501

3				
2				
1	09/04/2014	Draft	GR	<i>[Signature]</i>
0	05/02/2014	Draft		<i>[Signature]</i>

REVISION: DATE: REVISION / DESCRIPTION: DRAWN: CHECKED: APPROVED:

Scale: Horiz.: 1:5,000 | Chart Number: C13007-BR-02c-SBF | Chart: 6 of 14 | Odra Contract Number: C13007



GENERAL

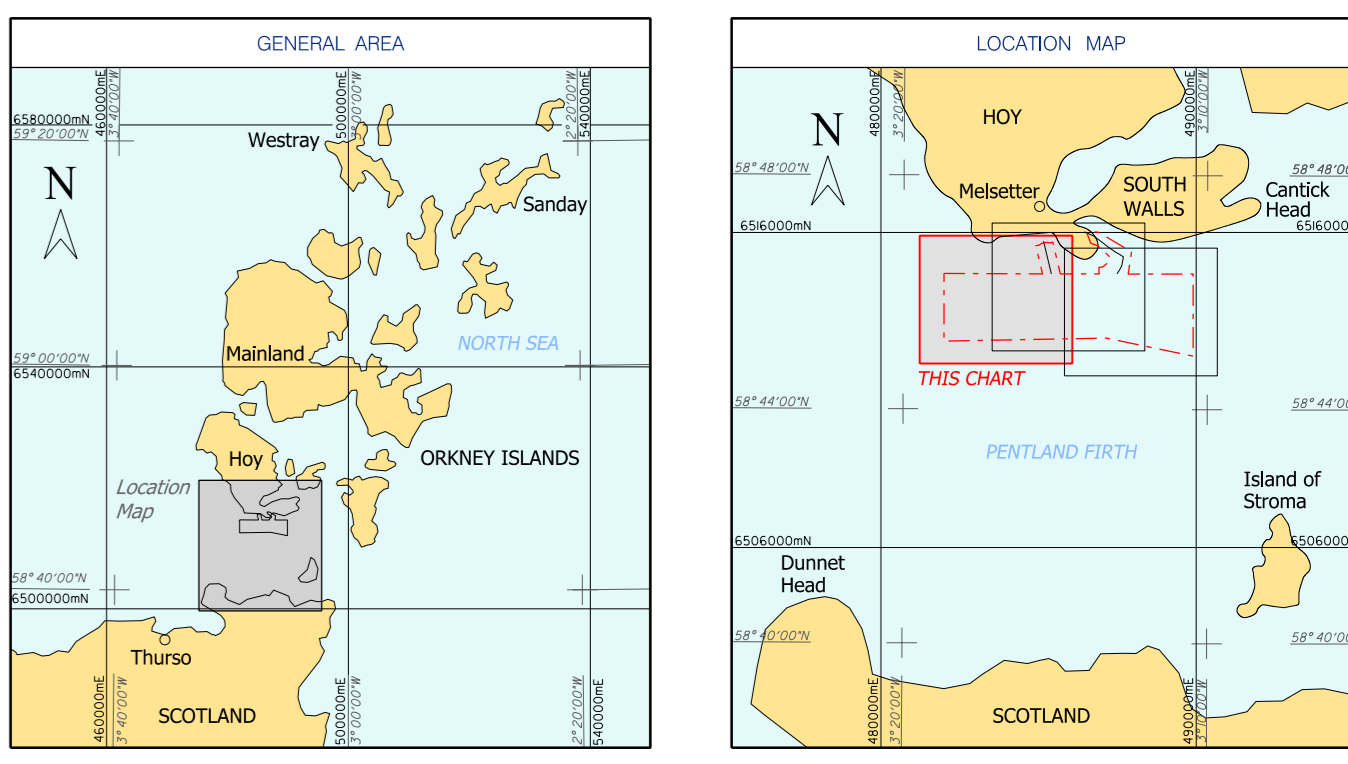
- Kilometre Post
- Proposed cable route
- Survey boundary - AFL (Agreement of lease)
- High priority area
- Overlap with next and previous panel
- Location map (OS OpenData)

General Notes:

- Horizontal Control:**
 - In 2012 Primary surface positioning on 'MV Lia' was provided by the Leica GX 1230 Smartnet.
 - In 2013 Primary surface positioning on both vessels ('MV Lia' and 'MV Bibby Tetra') was provided by the C-Nov 3050 with RTG correction service.
 - Secondary surface position on 'MV Bibby Tetra' was provided by the Hemisphere RS20 system, and on 'MV Lia' secondary surface position was provided by the C-Nov 2000 system.
- Vertical Control:**
 - All water depths are relative to Lowest Astronomical Tide (LAT), using PPK heights. Ellipsoidal heights were reduced to LAT using UKHO VORF data. Further details can be found in Volume 1 - Operations report: section 2.4.2.
- SSS mosaic created from data obtained using a Klein towfish.
- Subsea positioning provided by Sonardyne Scout USBL System.

Geodetic Parameters:

- Geodetic datum : World Geodetic System 1984 (WGS84)
- Ellipsoid : World Geodetic System 1984 (WGS84)
- Semi major axis : 6378137.000 m
- Inverse flattening : 298.257222563
- Projection : Universal Transverse Mercator (UTM) Zone 30 North
- Central Meridian : 3° West
- Latitude of Origin : 0° North
- False Easting : 500000 m
- False Northing : 0 m
- Scale Factor : 0.9996
- Vertical Datum : Lowest Astronomical Tide (LAT)

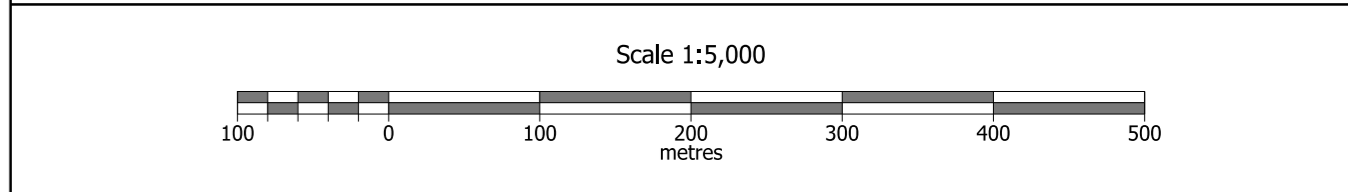


Client: Brims Tidal Array Ltd, Invermoriston House, 200 Dunkeld Road, Perth, PH1 3AQ

Contractor: OSIRIS PROJECTS, Maritime House, 4 Brunel Road, Cromwell Park, Bromborough, CH82 3JY, United Kingdom. Tel: +44 151 308 1120, Fax: +44 151 343 1027, email: enquiries@osirisprojects.co.uk, website: www.osirisprojects.co.uk

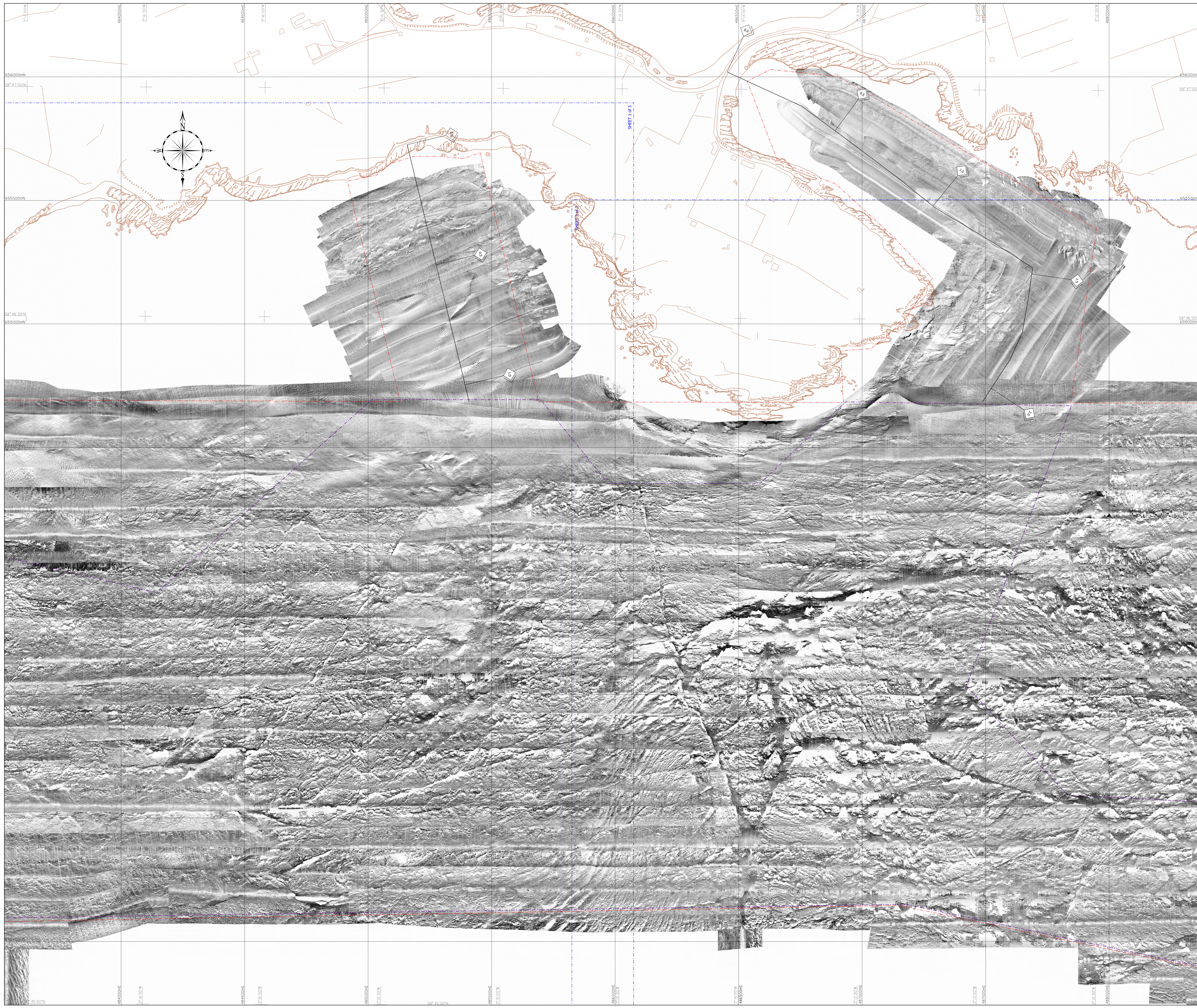
Contract Title: 12.0501 - GEOPHYSICAL SURVEY 2012/13

Chart Title: BRIMS TIDAL ARRAY - AGREEMENT FOR LEASE SIDE SCAN SONAR MOSAIC - Sheet 1 of 3



Vessel:	M.V. Bibby Tetra/M.V. Lia	Survey Date:	07/05/2013 - 26/09/2013	Client Ref.:	12.0501
3					
2	09/04/2014	Final		GR	<i>[Signature]</i>
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Scale:	Horz.: 1:5,000	Chart Number:	C13007-BR-03a	Chart:	Osiris Contract Number:
	Vert: N/A			7 of 14	C13007

SHEET 2 of 3



GENERAL

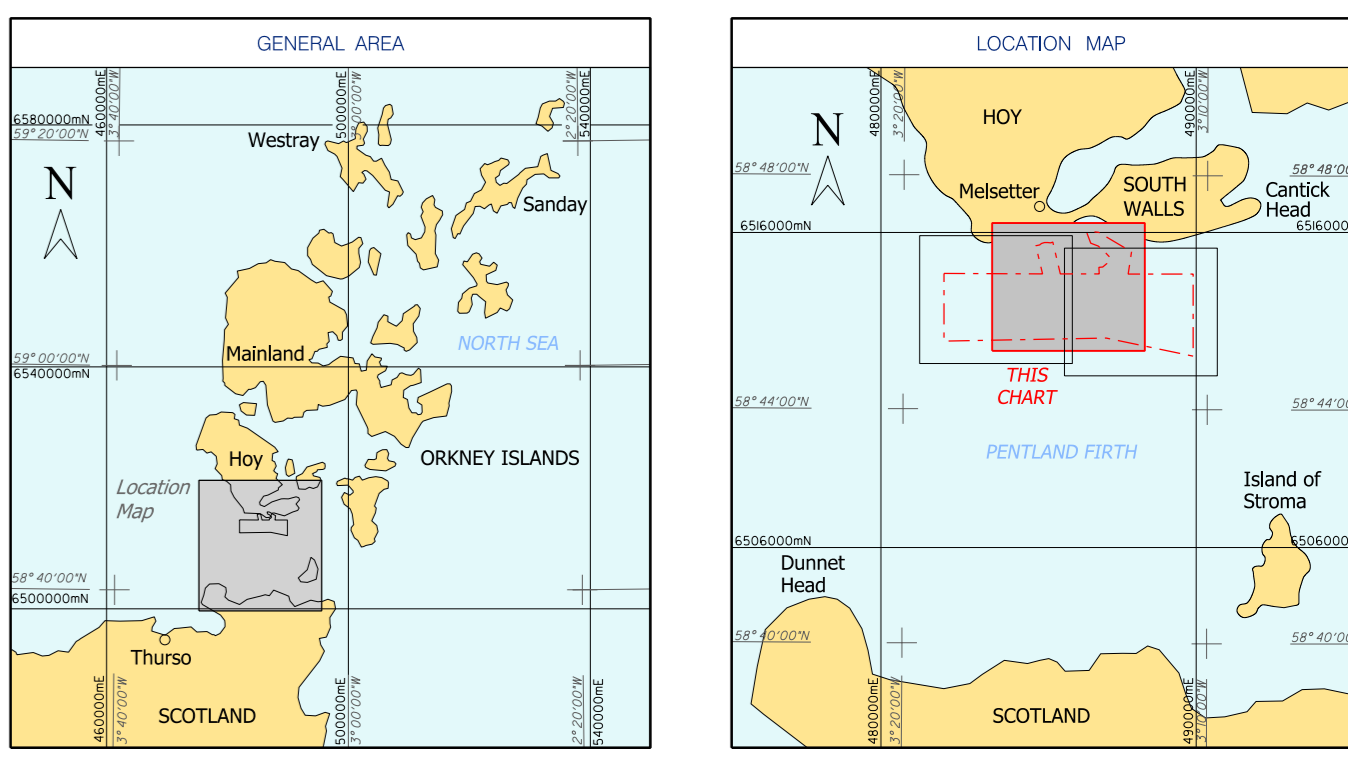
- Kilometre Post
- Proposed cable route
- Survey boundary - AFL (Agreement of lease)
- High priority area
- Overlap with next and previous panel
- Location map (OS OpenData)

General Notes:

- Horizontal Control:**
 - In 2012 Primary surface positioning on 'MV Lia' was provided by the Leica GX 1230 Smartnet.
 - In 2013 Primary surface positioning on both vessels ('MV Lia' and 'MV Bibby Tetra') was provided by the C-Nav 3050 with RTG correction service.
 - Secondary surface position on 'MV Bibby Tetra' was provided by the Hemisphere RS20 system, and on 'MV Lia' secondary surface position was provided by the C-Nav 2000 system.
 - Further details on these systems can be found in Volume 1 - Operations report: section 2.4.1.
- Vertical Control:**
 - All water depths are relative to Lowest Astronomical Tide (LAT), using PPK heights. Ellipsoidal heights were reduced to LAT using UKHO VORP data. Further details can be found in Volume 1 - Operations report: section 2.4.2.
- SSS mosaic created from data obtained using a Klein towfish.
- Subsea positioning provided by Sonardyne Scout USBL System.

Geodetic Parameters:

- Geodetic datum : World Geodetic System 1984 (WGS84)
- Ellipsoid : World Geodetic System 1984 (WGS84)
- Semi major axis : 6378137.000 m
- Inverse flattening : 298.257223563
- Projection : Universal Transverse Mercator (UTM) Zone 30 North
- Central Meridian : 3° West
- Latitude of Origin : 0° North
- False Easting : 500000 m
- False Northing : 0 m
- Scale Factor : 0.9996
- Vertical Datum : Lowest Astronomical Tide (LAT)

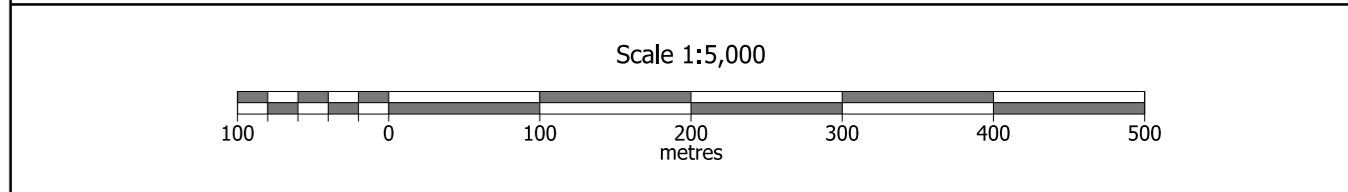


Client: BRIMS Tidal Array Ltd, Brunel House, 200 Dunkeld Road, Perth, PH1 3AQ

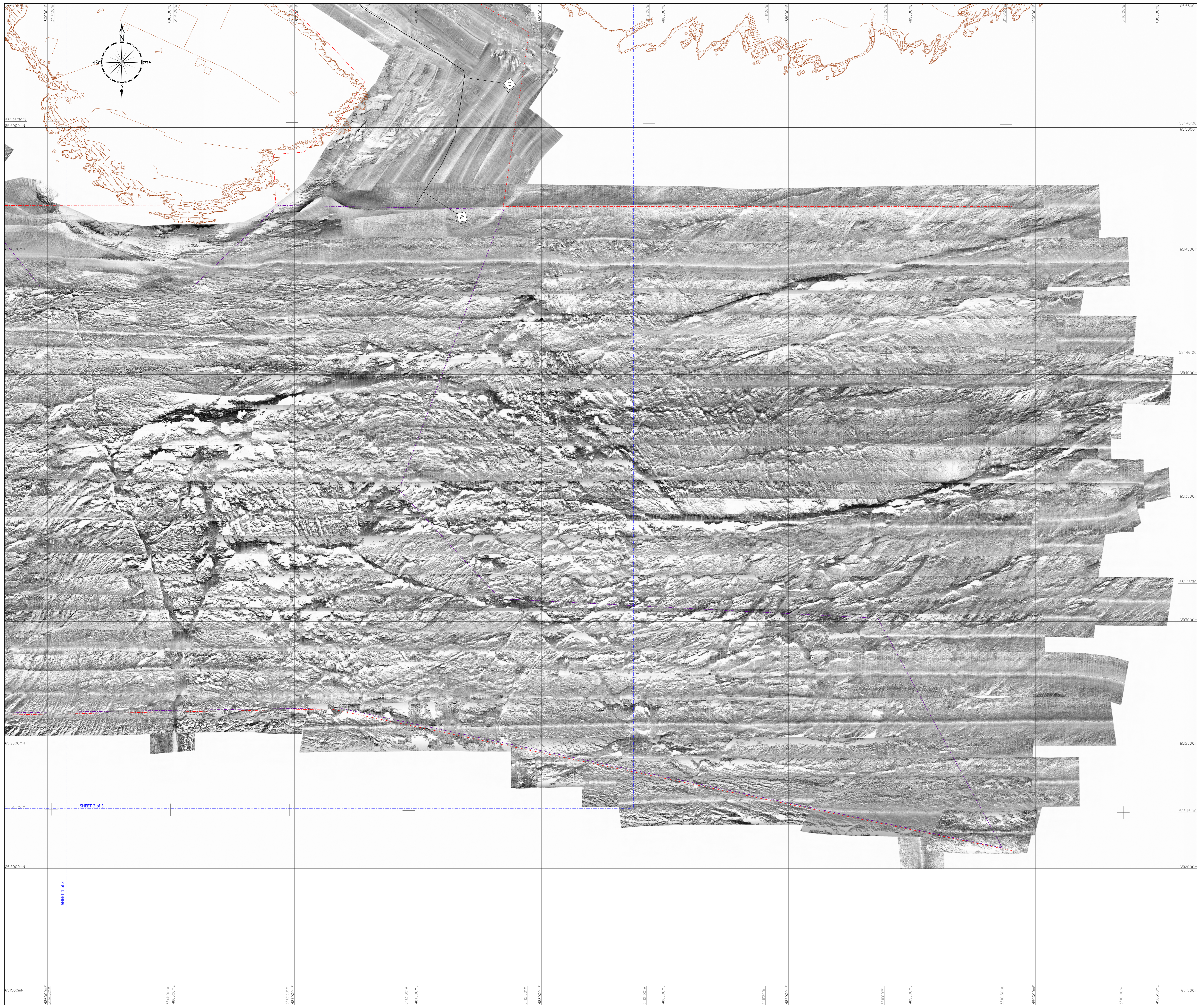
Contractor: OSIRIS PROJECTS, SEABED MAPPING & COASTAL SURVEY, BIBBY, Maritime House, 4 Brunel Road, Stronborough, CH22 3WJ, United Kingdom. Tel: +44 151 308 1100, Fax: +44 151 343 1027, email: enquiries@osirisprojects.co.uk, website: www.osirisprojects.co.uk

Contract Title: 12.0501 - GEOPHYSICAL SURVEY 2012/13

Chart Title: BRIMS TIDAL ARRAY - AGREEMENT FOR LEASE SIDE SCAN SONAR MOSAIC - Sheet 2 of 3



Vessel:	M.V. Bibby Tetra/M.V. Lia	Survey Date:	07/05/2013 - 26/09/2013	Client Ref.:	12.0501
3					
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REVISION:	DATE:	REVISION / DESCRIPTION:	DRAWN:	CHECKED:	APPROVED:
Scale:	Horz.: 1:5,000	Chart Number:	C13007-BR-03b	Chart:	OSiris Contract Number:
	Vert: N/A				C13007



Legend

GENERAL

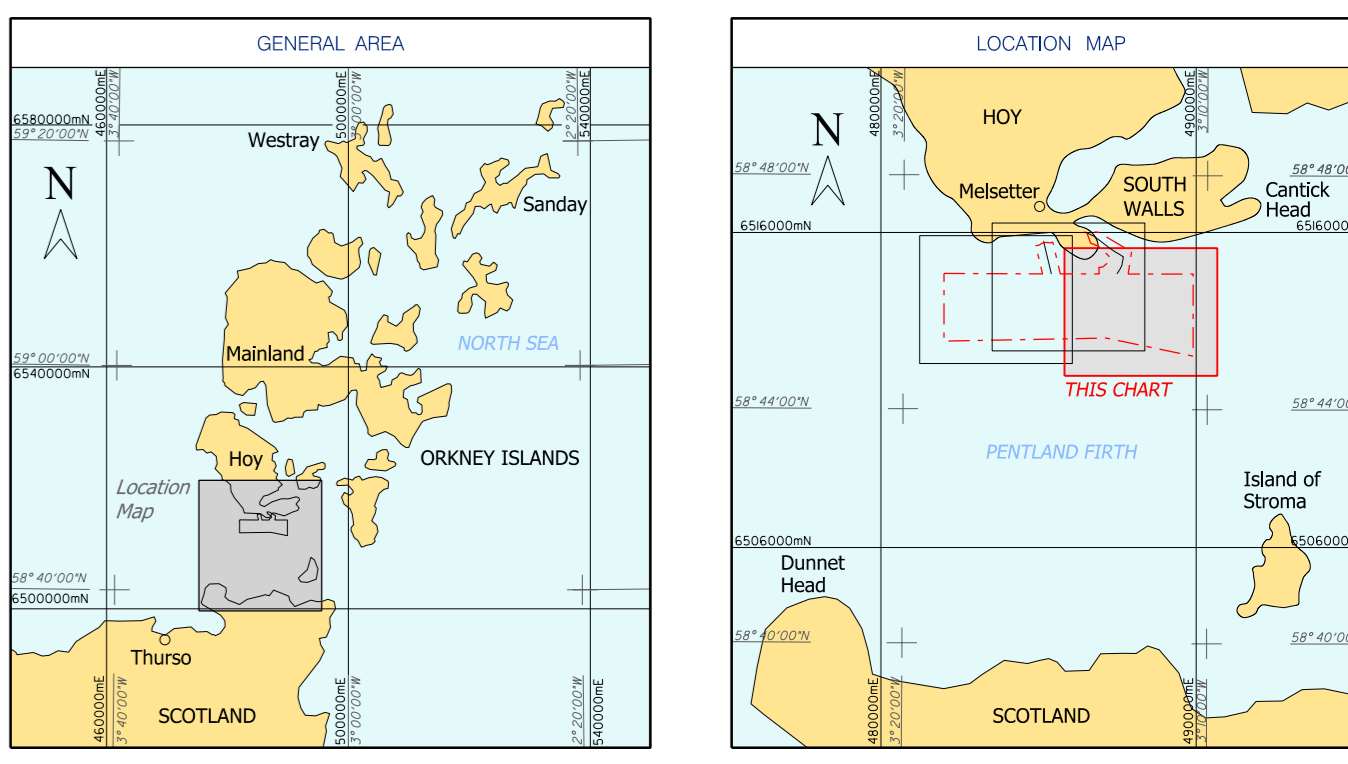
- Kilometre Post
- Proposed cable route
- Survey boundary - AFL (Agreement of lease)
- High priority area
- Overlap with next and previous panel
- Location map (OS OpenData)

General Notes:

- Horizontal Control:**
 - In 2012 Primary surface positioning on 'MV Lia' was provided by the Leica GX 1230 Smartnet.
 - In 2013 Primary surface positioning on both vessels ('MV Lia' and 'MV Bibby Tetra') was provided by the C-Nav 3050 with RTG correction service.
 - Secondary surface position on 'MV Bibby Tetra' was provided by the Hemisphere RS20 system, and on 'MV Lia' secondary surface position was provided by the C-Nav 2000 system.
 - Further details on these systems can be found in Volume 1 - Operations report; section 2.4.1.
- Vertical Control:**
 - All water depths are relative to Lowest Astronomical Tide (LAT), using PPK heights. Ellipsoidal heights were reduced to LAT using UKHO VORP data. Further details can be found in Volume 1 - Operations report; section 2.4.2.
- SSS mosaic created from data obtained using a Klein towfish.
- Subsea positioning provided by Sonardyne Scout USBL System.

Geodetic Parameters:

- Geodetic datum : World Geodetic System 1984 (WGS84)
- Ellipsoid : World Geodetic System 1984 (WGS84)
- Semi major axis : 6378137.000 m
- Inverse flattening : -298.257222563
- Projection : Universal Transverse Mercator (UTM) Zone 30 North
- Central Meridian : 3° West
- Latitude of Origin : 0° North
- False Easting : 500000 m
- False Northing : 0 m
- Scale Factor : 0.9996
- Vertical Datum : Lowest Astronomical Tide (LAT)

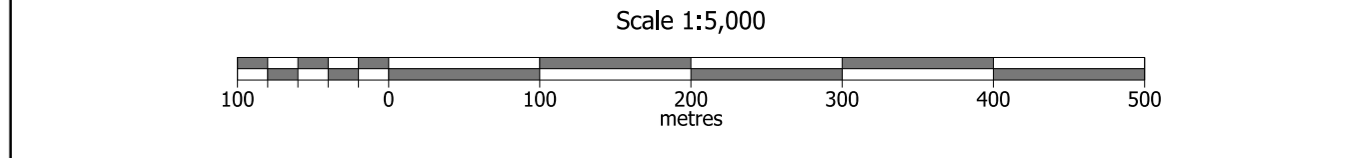


Client: BRIMS Tidal Array Ltd, Brunel House, 200 Dunkeld Road, Perth, PH1 3AQ

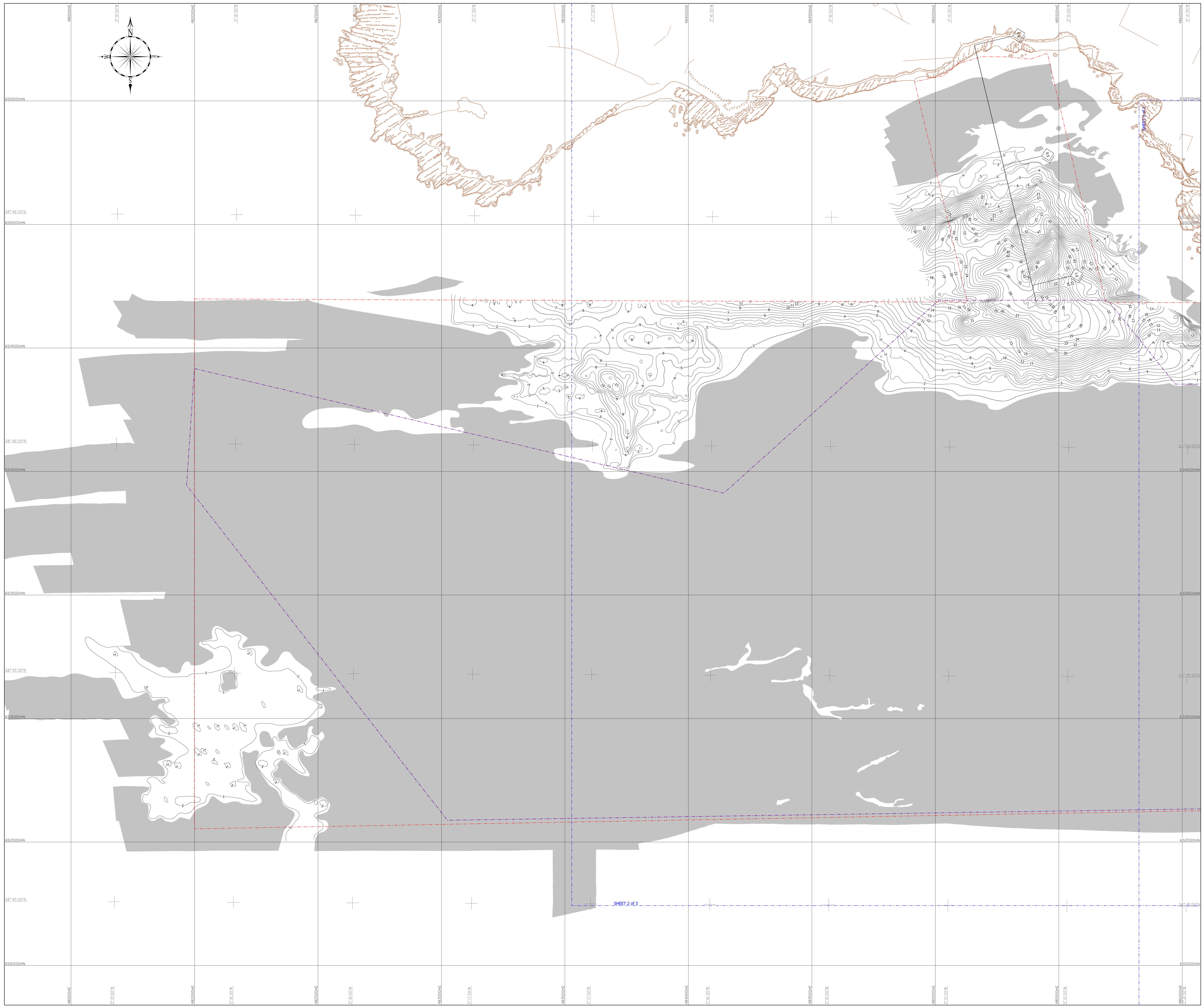
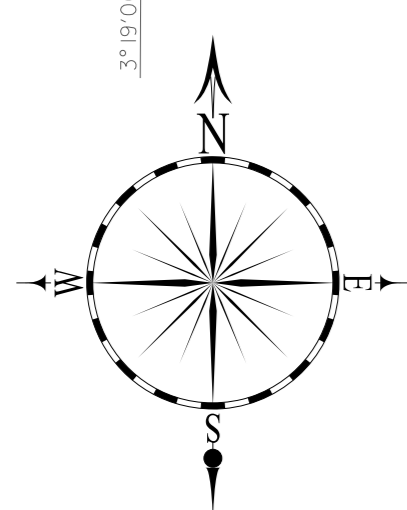
Contractor: OSIRIS PROJECTS, SEABED MAPPING & COASTAL SURVEY, BIBBY, Maritime House, 4 Brunel Road, Clifton Business Park, Bromborough, CH2 3JY, United Kingdom. Tel: +44 151 338 1120, Fax: +44 151 343 1027, email: enquiries@osirisprojects.co.uk, website: www.osirisprojects.co.uk

Contract Title: 12.0501 - GEOPHYSICAL SURVEY 2012/13

Chart Title: BRIMS TIDAL ARRAY - AGREEMENT FOR LEASE SIDE SCAN SONAR MOSAIC - Sheet 3 of 3



Vessel:	M.V. Bibby Tetra/M.V. Lia	Survey Date:	07/05/2013 - 26/09/2013	Client Ref.:	12.0501
3					
2	09/04/2014	Final		GR	<i>[Signature]</i>
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REVISION:	DATE:	REVISION / DESCRIPTION:	DRAWN:	CHECKED:	APPROVED:
Scale:	Horiz.: 1:5,000	Chart Number:	C13007-BR-03c	Chart:	9 of 14
	Vert.: N/A				C13007



Legend:

GENERAL

- Kilometre Post
- Proposed cable route
- Survey boundary - AFL (Agreement of lease)
- High priority area
- Overlap with next and previous panel
- Location map (CS Operdata)

TOTAL ISOPACHYTE

- Top of bedrock (no discernible sediment cover)
- Sediment thickness at 5m intervals
- Sediment thickness at 1m interval

General Notes:

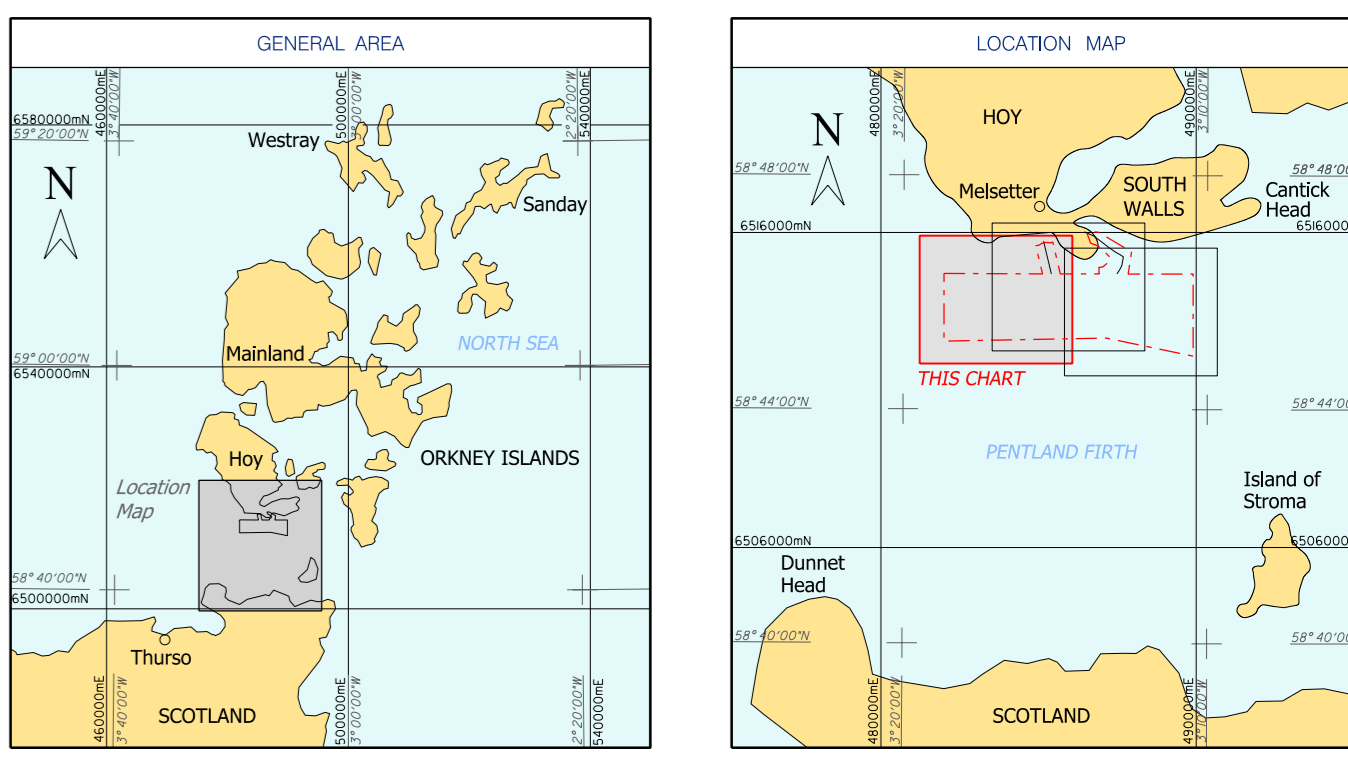
- Horizontal Control:**
 - In 2012 Primary surface positioning on 'MV Lia' was provided by the Leica GX 1230 Smartnet.
 - In 2013 Primary surface positioning on both vessels ('MV Lia' and 'MV Bibby Tetra') was provided by the C-Nav 3050 with RTG correction service.
 - Secondary surface position on 'MV Bibby Tetra' was provided by the Hemisphere RS20 system, and on 'MV Lia' secondary surface position was provided by the C-Nav 2050 system.
 - Further details on these systems can be found in Volume 1 - Operations report; section 2.4.1.
- Vertical Control:**
 - All water depths are relative to Lowest Astronomical Tide (LAT), using PPK heights. Ellipsoidal heights were reduced to LAT using UKHO VORF data. Further details can be found in Volume 1 - Operations report; section 2.4.2.
- Seabed Interpretation** based on side scan and multibeam echo sounder data.
- A seismic velocity of 1650m/s was used for all sub-bottom interpretation.
- This isopachyte chart has been interpreted from pingler and sparker data.

Geodetic Parameters:

Geodetic datum : World Geodetic System 1984 (WGS84)
 Ellipsoid : World Geodetic System 1984 (WGS84)
 Semi major axis : 6378137.000 m
 Inverse flattening : 298.257223563

Projection : Universal Transverse Mercator (UTM) Zone 30 North
 Central Meridian : 3° West
 Latitude of Origin : 0° North
 False Easting : 500000 m
 False Northing : 0 m
 Scale Factor : 0.9996

Vertical Datum : Lowest Astronomical Tide (LAT)

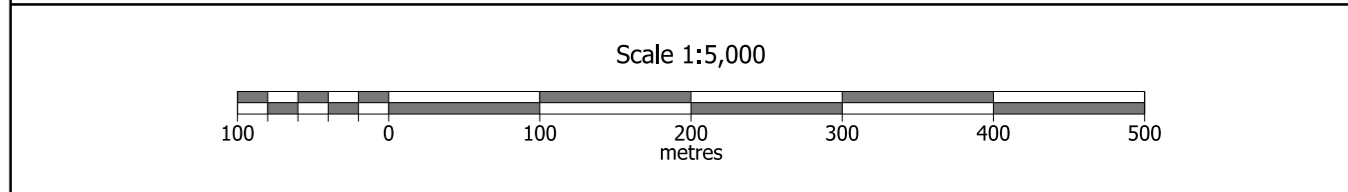


Client: Brims Tidal Array Ltd, Invermoriston House, 200 Dunkeld Road, Perth, PH1 3AQ

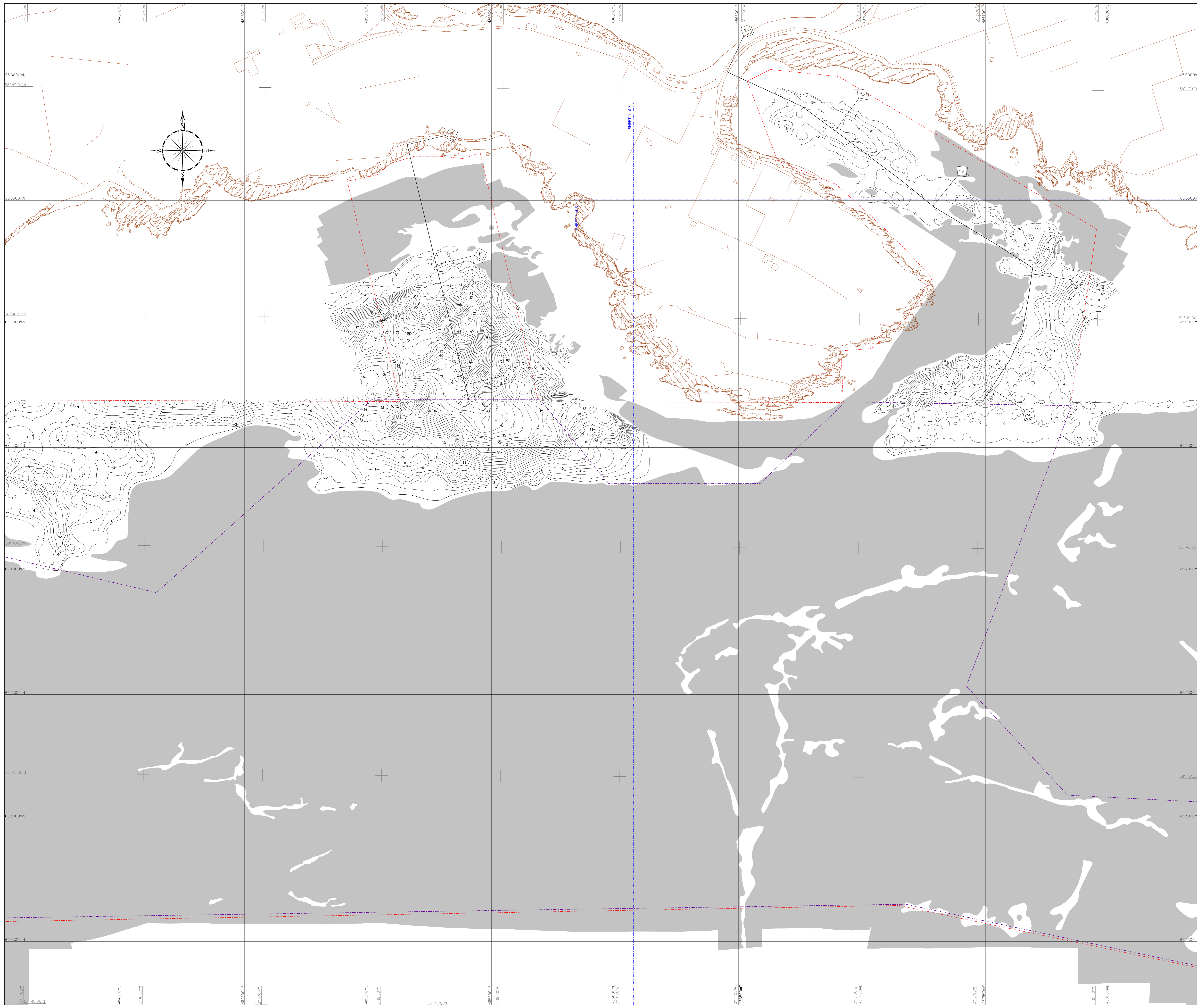
Contractor: OSIRIS PROJECTS, Seabed Mapping & Coastal Survey, Bibby, Maritime House, 4 Brunel Road, Invermoriston House, 200 Dunkeld Road, Strathmore, Perth, PH1 3AQ. Tel: +44 151 338 1120, Fax: +44 151 343 1027, email: enquiry@osirisprojects.co.uk, website: www.osirisprojects.co.uk

Contract Title: 12.0501 - GEOPHYSICAL SURVEY 2012/13

Chart Title: BRIMS TIDAL ARRAY - AGREEMENT FOR LEASE TOTAL ISOPACHYTE - Sheet 1 of 3



Vessel:	M.V. Bibby Tetra/M.V. Lia	Survey Date:	07/05/2013 - 26/09/2013	Client Ref.:	12.0501
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2					
1	09/04/2014	Final		GR	<i>[Signature]</i>
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Scale:	Horz.: 1:5,000	Chart Number:	C13007-BR-04a	Chart:	Osiris Contract Number:
	Vert: N/A				10 of 14



Legend:

GENERAL

- Kilometre Post
- Proposed cable route
- Survey boundary - AFL (Agreement of lease)
- High priority area
- Overlap with next and previous panel
- Location map (CS OpenData)

TOTAL ISOPACHYTE

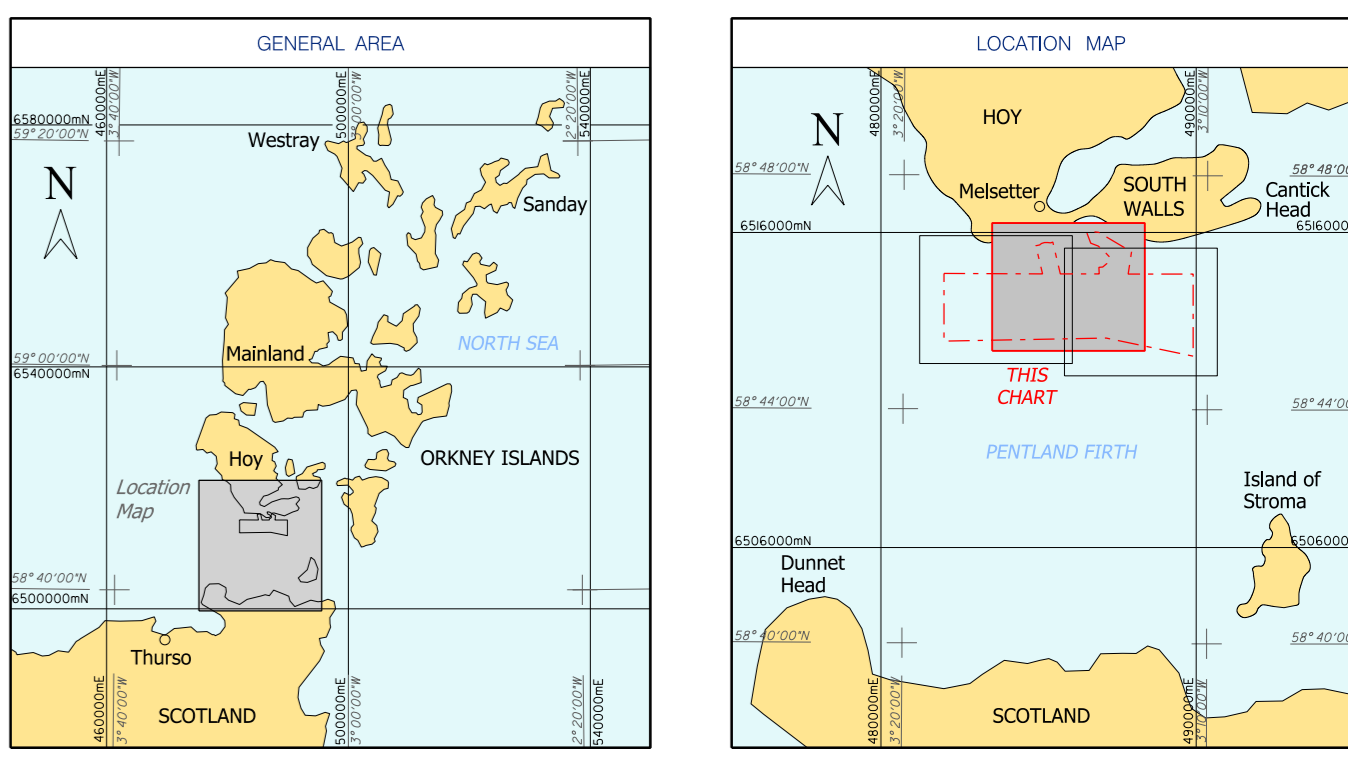
- Top of bedrock (no discernible sediment cover)
- Sediment thickness at 5m intervals
- Sediment thickness at 1m intervals

General Notes:

- Horizontal Control:**
 - In 2012 Primary surface positioning on 'MV Lia' was provided by the Leica GX 1230 Smartnet.
 - In 2013 Primary surface positioning on both vessels ('MV Lia' and 'MV Bibby Tetra') was provided by the C-Nav 3050 with RTG correction service.
 - Secondary surface position on 'MV Bibby Tetra' was provided by the Hemisphere RS20 system, and on 'MV Lia' secondary surface position was provided by the C-Nav 2050 system.
- Vertical Control:**
 - All water depths are relative to Lowest Astronomical Tide (LAT), using PPK heights. Ellipsoidal heights were reduced to LAT using UKHO VORF data. Further details can be found in Volume 1 - Operations report; section 2.4.2.
 - Seabed interpolation based on side scan and multibeam echo sounder data.
- A seismic velocity of 1650m/s was used for all sub-bottom interpretation.
- This isopachyte chart has been interpreted from pinger and sparker data.

Geodetic Parameters:

Geodetic datum : World Geodetic System 1984 (WGS84)
 Ellipsoid : World Geodetic System 1984 (WGS84)
 Semi major axis : 6378137.000 m
 Inverse flattening : 298.257223563
 Projection : Universal Transverse Mercator (UTM) Zone 30 North
 Central Meridian : 3° West
 Latitude of Origin : 0° North
 False Easting : 500000 m
 False Northing : 0 m
 Scale Factor : 0.9996
 Vertical Datum : Lowest Astronomical Tide (LAT)



Client: BRIMSTIDALARRAY

Contractor: OSIRIS PROJECTS

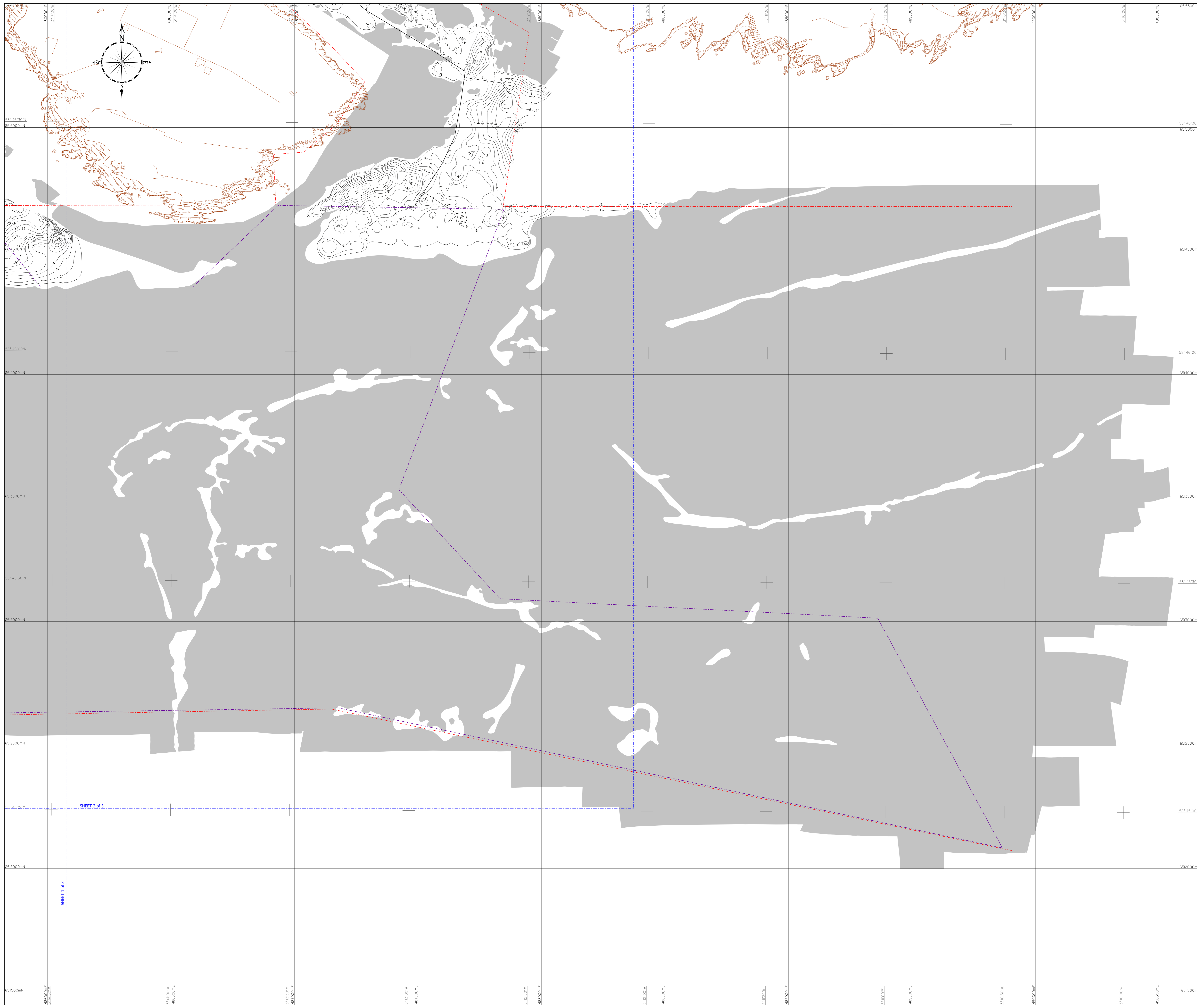
Contract Title: 12.0501 - GEOPHYSICAL SURVEY 2012/13

Chart Title: BRIMS TIDAL ARRAY - AGREEMENT FOR LEASE TOTAL ISOPACHYTE - Sheet 2 of 3

Scale 1:5,000

Scale: 100 0 100 200 300 400 500 metres

Vessel:	M.V. Bibby Tetra/M.V. Lia	Survey Date:	07/05/2013 - 26/09/2013	Client Ref.:	12.0501
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2					
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REVISION:	DATE:	REVISION / DESCRIPTION:	DRAWN:	CHECKED:	APPROVED:
Scale:	Horz.: 1:5,000	Chart Number:	C13007-BR-03b	Chart:	11 of 14
	Vert.: N/A			Osiris Contract Number:	C13007



GENERAL

- Kilometre Post
- Proposed cable route
- Survey boundary - AFL (Agreement of lease)
- High priority area
- Overlap with next and previous panel
- Location map (OS OpenData)

TOTAL ISOPACHYTE

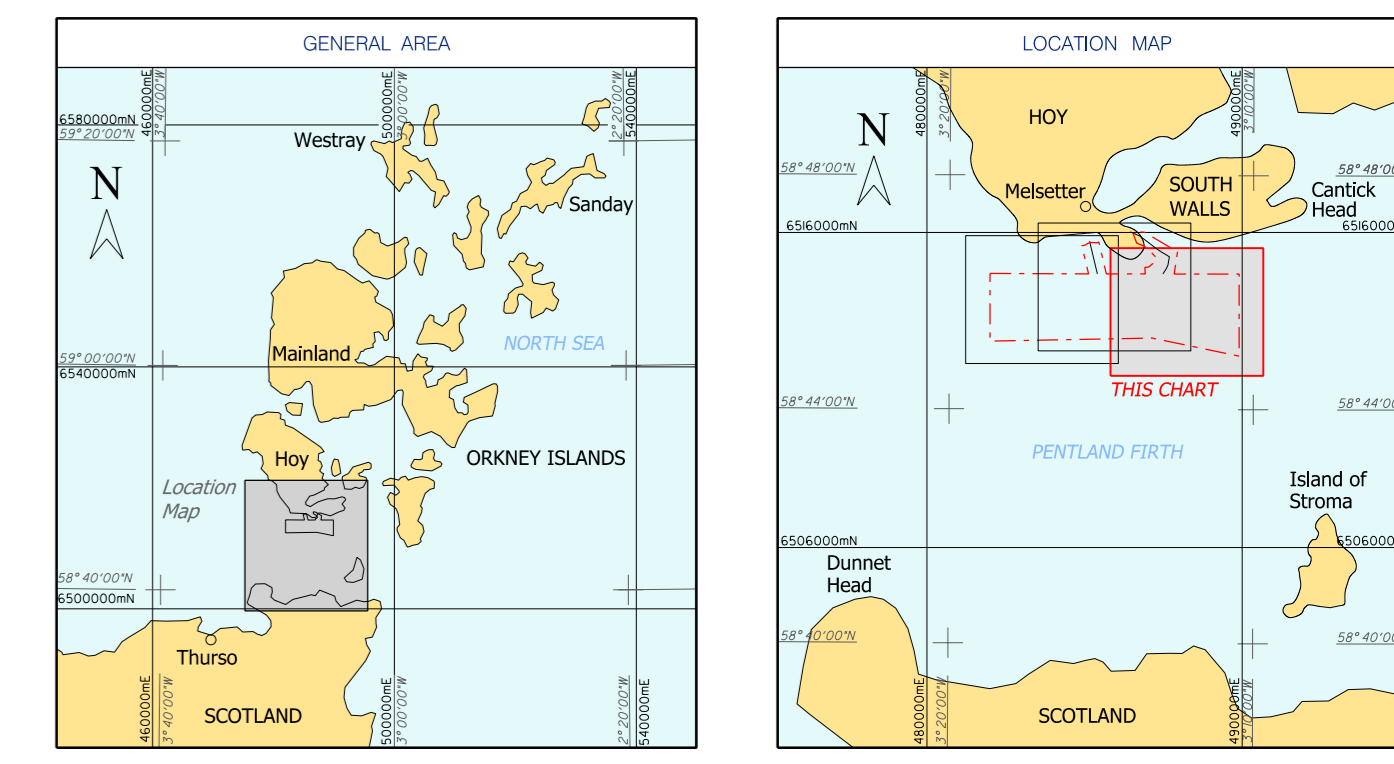
- Top of bedrock (no discernible sediment cover)
- 5 — Sediment thickness at 5m intervals
- 1 — Sediment thickness at 1m interval

General Notes:

- Horizontal Control:**
 - In 2012 Primary surface positioning on 'MV Lia' was provided by the Leica GX 1230 Smartnet.
 - In 2013 Primary surface positioning on both vessels ('MV Lia' and 'MV Bibby Tetra') was provided by the C-Nov 3050 with RTG correction service.
 - Secondary surface position on 'MV Bibby Tetra' was provided by the Hemisphere RS20 system, and on 'MV Lia' secondary surface position was provided by the C-Nov 2050 system.
 - Further details on these systems can be found in Volume 1 - Operations report; section 2.4.1.
- Vertical Control:**
 - All water depths are relative to Lowest Astronomical Tide (LAT), using PPK heights. Ellipsoidal heights were reduced to LAT using UKHO VORF data. Further details can be found in Volume 1 - Operations report; section 2.4.2.
- Seabed Interpretation** based on side scan and multibeam echo sounder data.
- A seismic velocity of 1650m/s was used for all sub-bottom interpretation.
- This isopachyte chart has been interpreted from pingler and sparker data.

Geodetic Parameters:

- Geodetic datum : World Geodetic System 1984 (WGS84)
- Ellipsoid : World Geodetic System 1984 (WGS84)
- Semi major axis : 6378137.000 m
- Inverse flattening : 298.257223563
- Projection : Universal Transverse Mercator (UTM) Zone 30 North
- Central Meridian : 3° West
- Latitude of Origin : 0° North
- False Easting : 500000 m
- False Northing : 0 m
- Scale Factor : 0.9996
- Vertical Datum : Lowest Astronomical Tide (LAT)

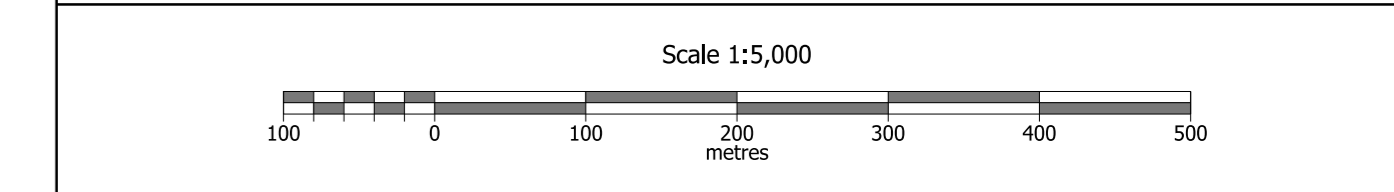


Client: BRIMS Tidal Array Ltd, Invermoriston House, 200 Dunkeld Road, Perth, PH1 3AQ

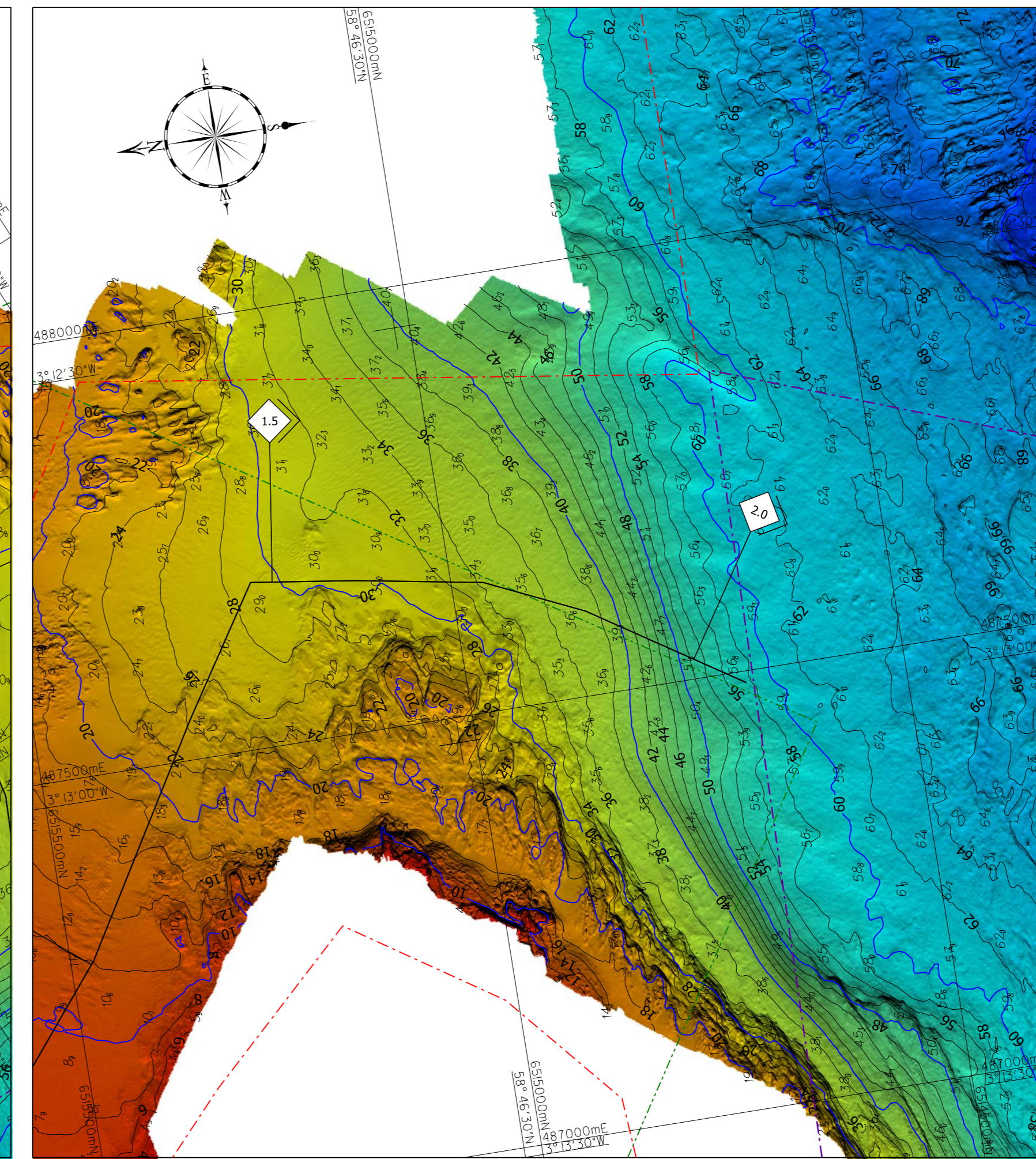
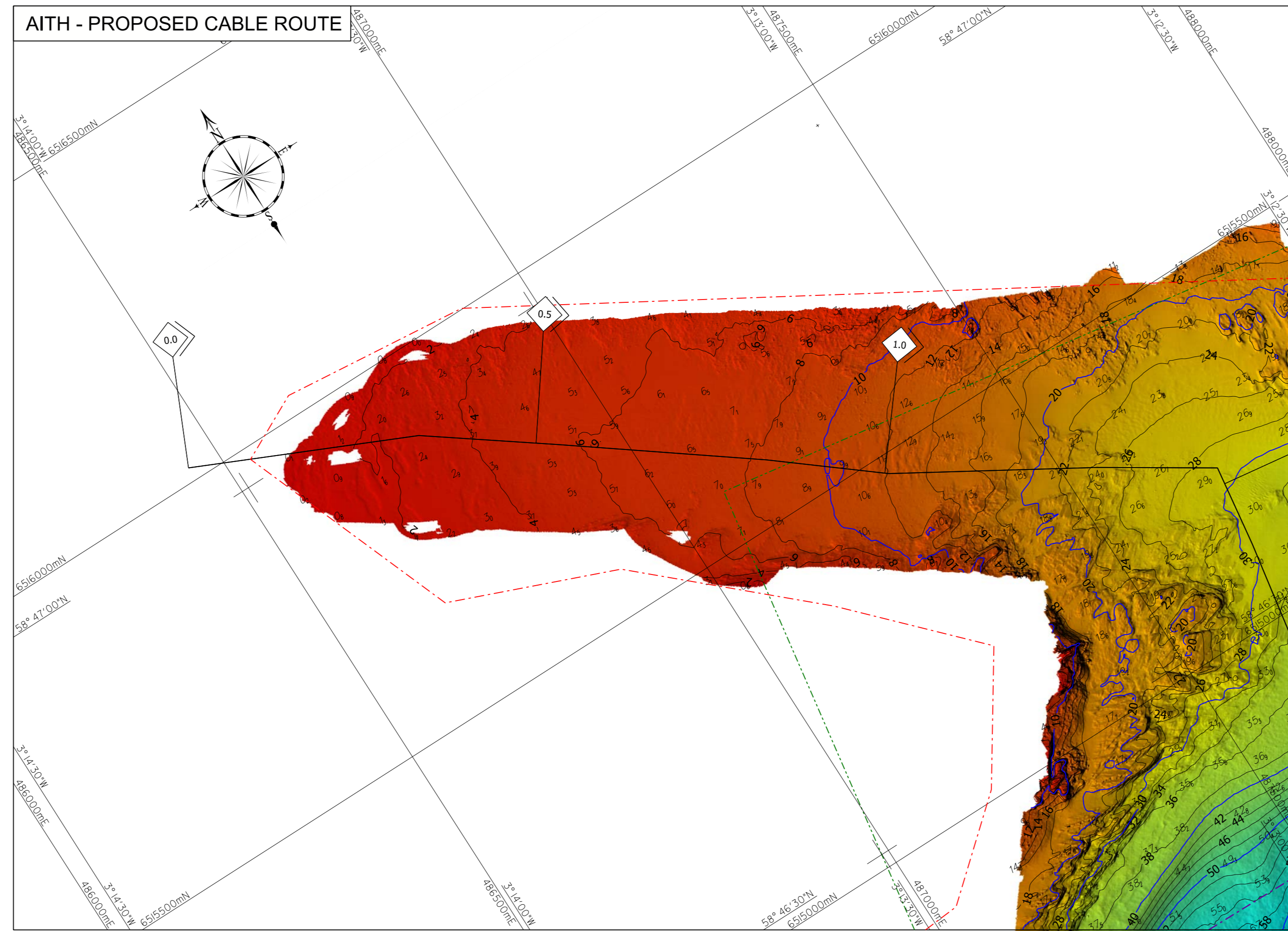
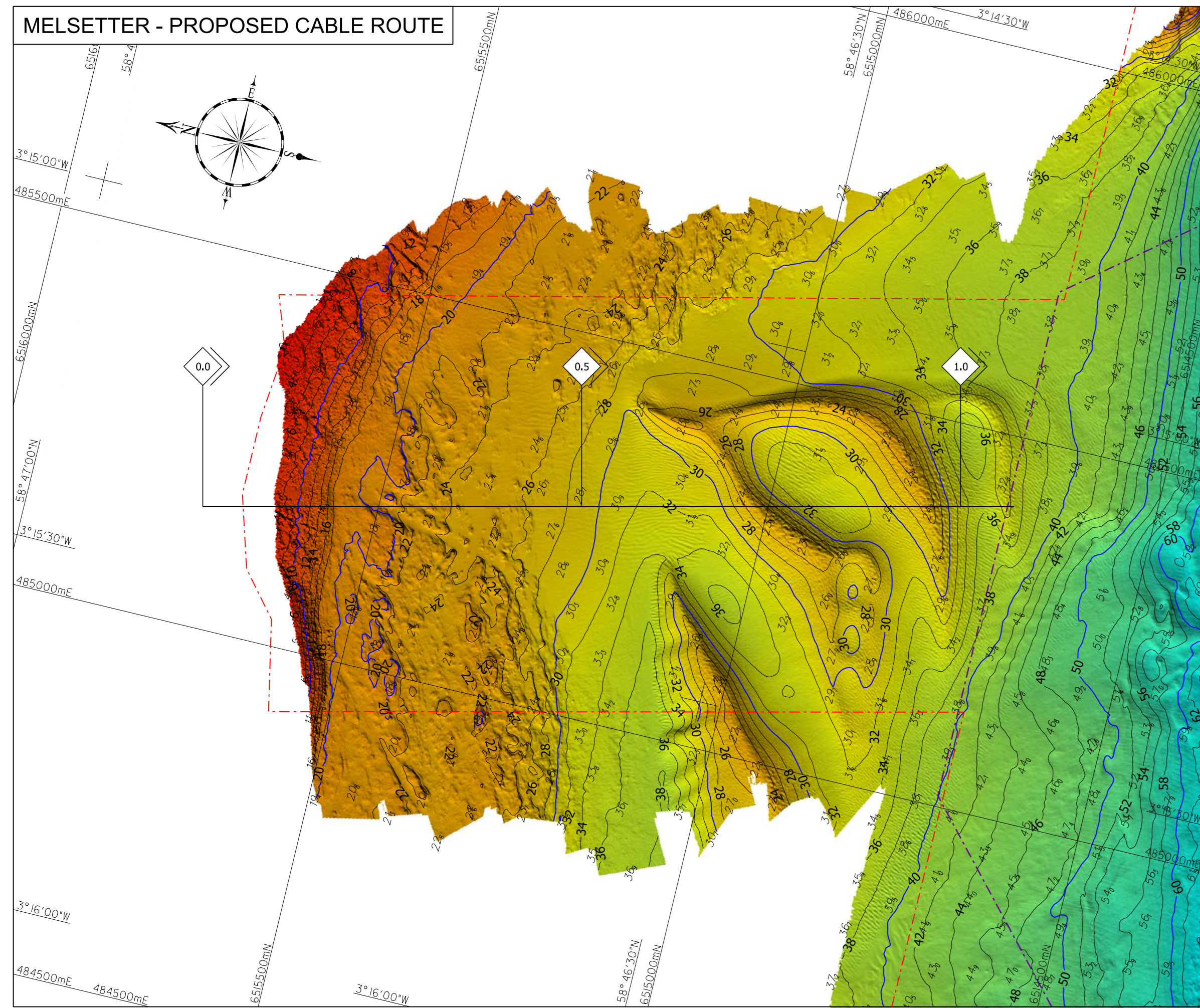
Contractor: OSIRIS PROJECTS, SEABED MAPPING & COASTAL SURVEY, BIBBY, Maritime House, 4 Brunel Road, Cliff Business Park, Stronborough, CH2 3JY, United Kingdom. Tel: +44 151 330 1120, Fax: +44 151 343 1027, email: enquiry@osirisprojects.co.uk, website: www.osirisprojects.co.uk

Contract Title: 12.0501 - GEOPHYSICAL SURVEY 2012/13

Chart Title: BRIMS TIDAL ARRAY - AGREEMENT FOR LEASE ISOPACHYTE - Sheet 3 of 3



Vessel:	M.V. Bibby Tetra/M.V. Lia	Survey Date:	07/05/2013 - 26/09/2013	Client Ref.:	12.0501
3					
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1	09/04/2014	Final		GR	<i>[Signature]</i>
0	05/02/2014	Draft		GR	<i>[Signature]</i>
REVISION:	DATE:	REVISION / DESCRIPTION:	DRAWN:	CHECKED:	APPROVED:
Scale:	Horiz.: 1:5,000	Chart Number:	C13007-BR-03c	Chart:	12 of 14
	Vert.: N/A				



GENERAL

- Kilometre Post
- Proposed cable route
- Survey boundary - AFL (Agreement of Issues)
- Overlap with next and previous panel

BATHYMETRY

- 10 Major contours at 10m intervals reduced to LAT
- 2 Minor contours at 2m intervals reduced to LAT
- 4% Representative seabed levels in metres and decimetres reduced to LAT

Shaded relief bathymetry scale bar - Melsetter Depth in metres reduced to LAT

Shaded relief bathymetry scale bar - Aith Depth in metres reduced to LAT

SEABED FEATURES

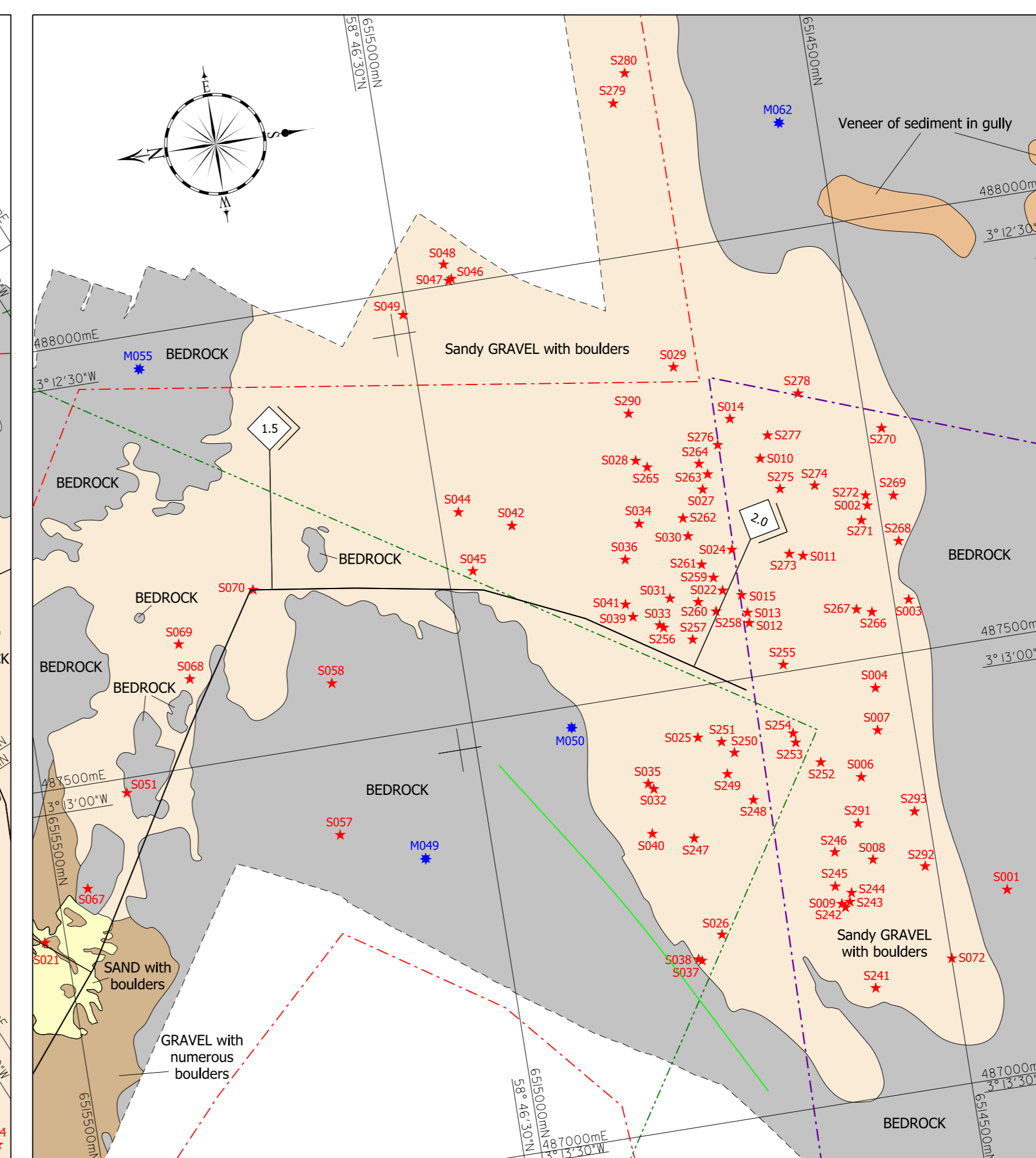
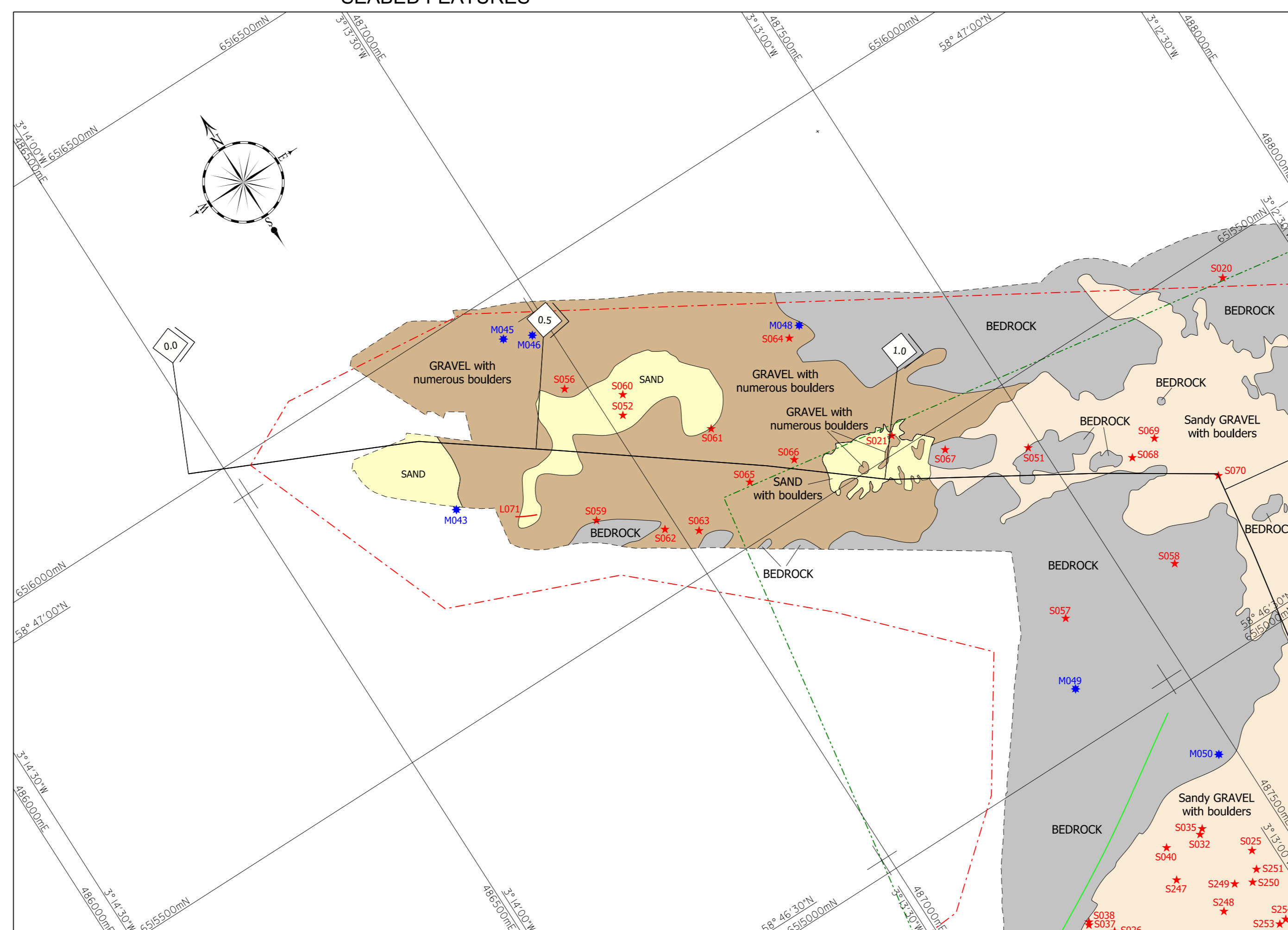
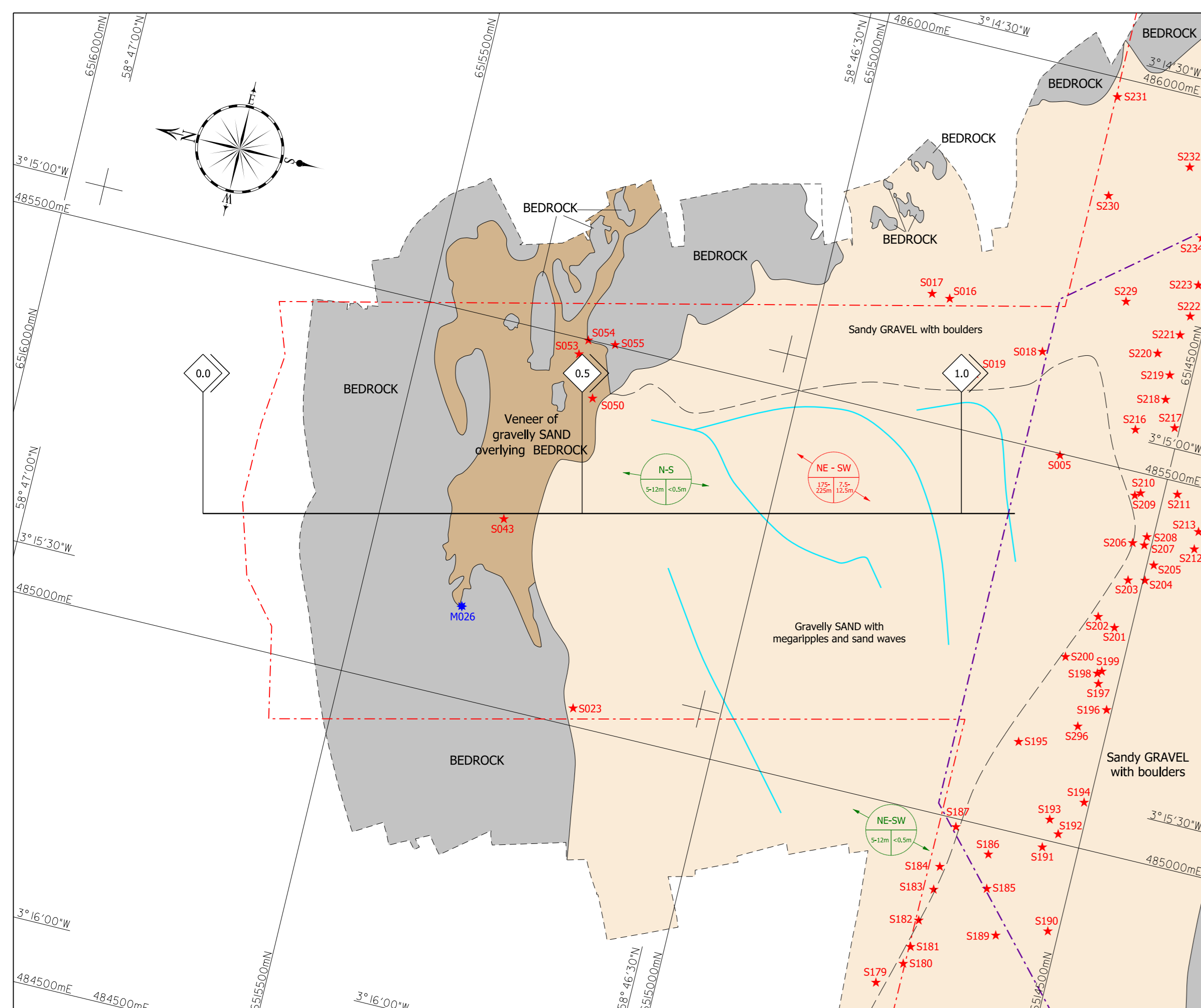
- SAND
- GRAVELLY SAND / Sandy GRAVEL
- GRAVEL
- Venier of GRAVEL overlying BEDROCK
- BEDROCK
- Limit of side scan sonar coverage
- Seabed feature boundary - Major
- Seabed feature boundary - Minor
- S321 Sonar target with identifier
- L123 Linear target with identifier
- M21 Magnetic anomaly with identifier
- Area of high magnetic field variability
- Sand wave crest

Megaripples

Sand waves

ISOPACHYTE

- Top of bedrock (no discernible sediment cover)
- 5 Major contours at 5m intervals of sediment thickness
- 1 Minor contours at 1m intervals of sediment thickness

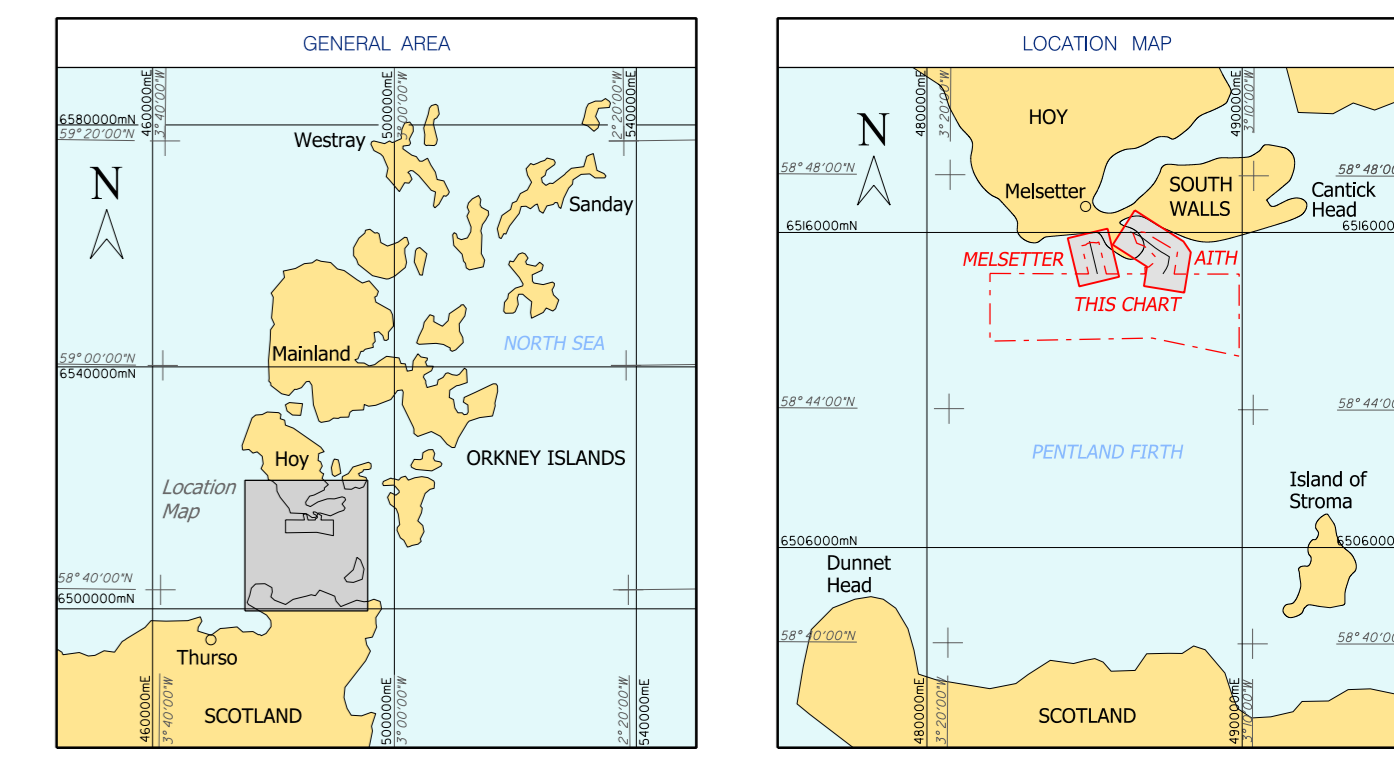
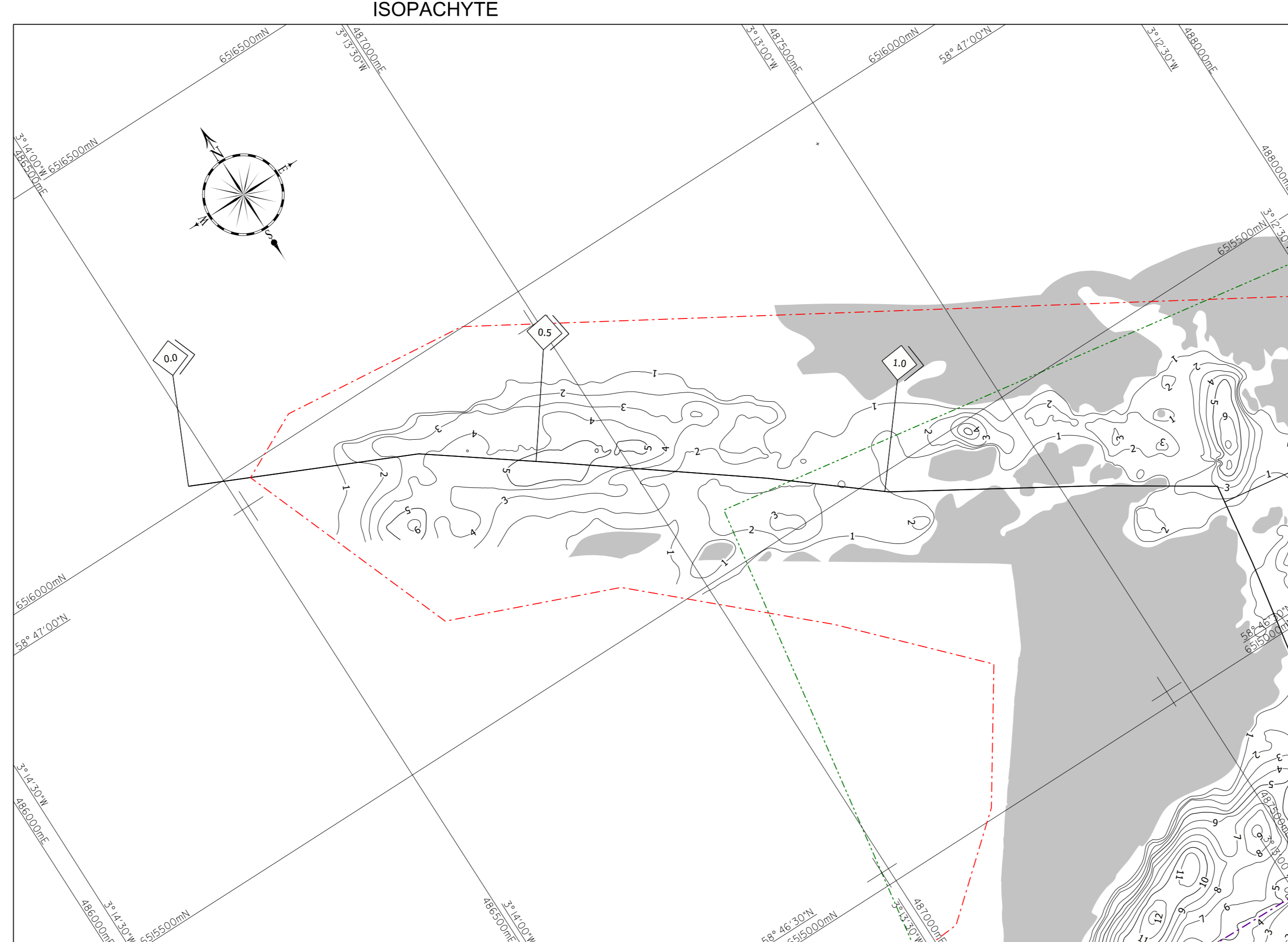
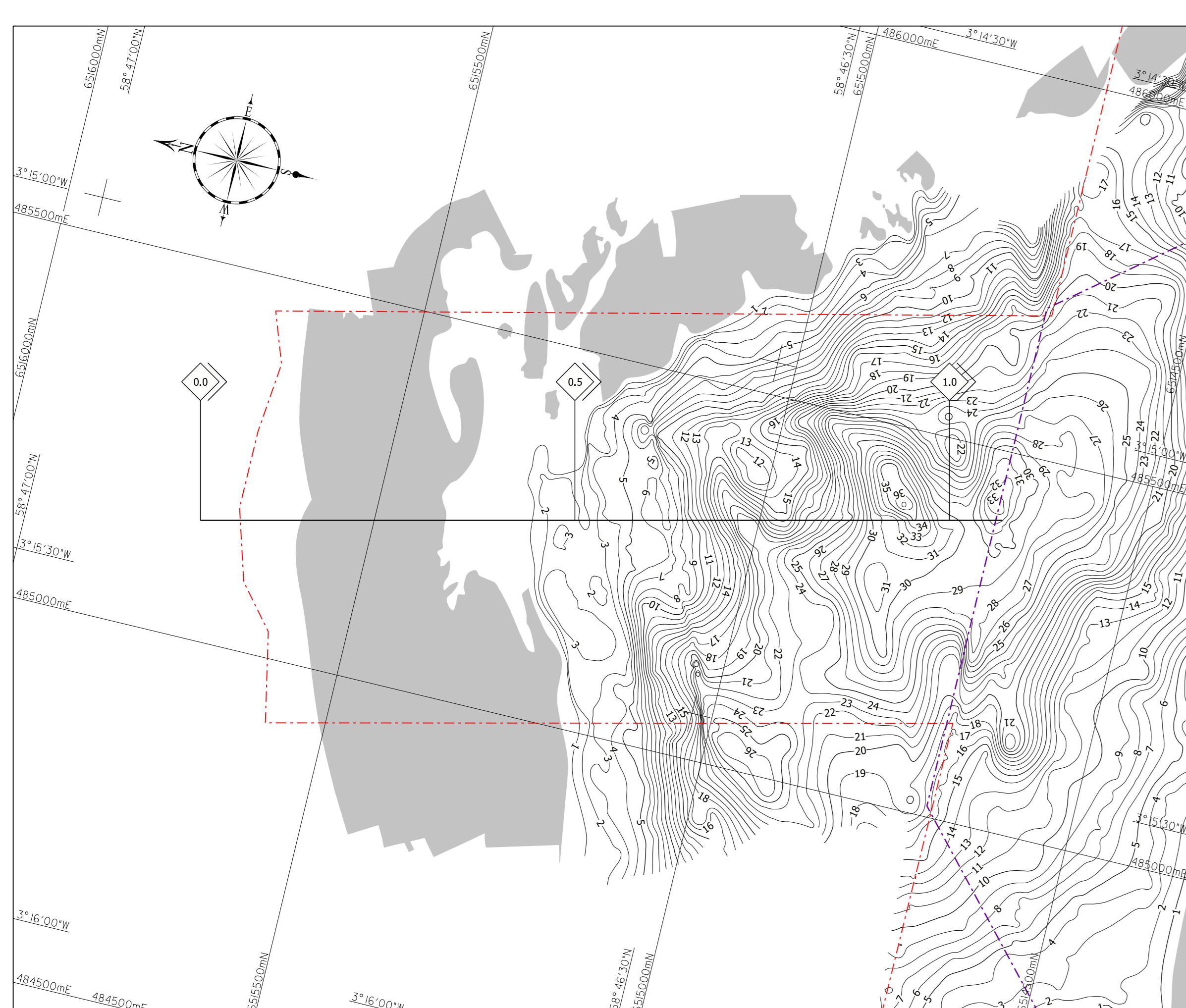


General Notes:

- Horizontal Control:**
 - Primary surface positioning on both vessels was provided by the C-Nav 3550 with RTG correction service.
 - Secondary surface position on MV Bibby Tetra was provided by the Hemisphere R200 system, and on MV Lar secondary surface position was provided by the C-Nav 2050 system.
 - Further details on these systems can be found in Volume 1 - Operations report: section 2.4.1.
- Vertical Control:**
 - All water depths are relative to Lowest Astronomical Tide (LAT), using PPK heights. Ellipsoidal heights were reduced to LAT using UKHO VORF data. Further details can be found in Volume 1 - Operations report: section 2.4.2.
- Bathymetry data gridded at 1.0m x 1.0m.
- Seabed shaded relief: sun illumination: Azimuth 270°, Elevation 50°, Exaggeration x2.
- Seabed interpretation based on side scan and multibeam echo sounder data.
- A seismic velocity of 1650m/s was used for all sub-bottom interpretation.
- The isopachyte charts have been interpreted from plinger and sparker data.

Geodetic Parameters:

- World Geodetic System 1984 (WGS84)
- Semi major axis: 6378137.000 m
- Inverse flattening: 298.257223563
- Projection: Universal Transverse Mercator (UTM) Zone 30 North
- Central Meridian: 3° West
- Latitude of Origin: 0° North
- Falses Easting: 500000 m
- Falses Northing: 0 m
- Scale Factor: 0.9996
- Vertical Datum: Lowest Astronomical Tide (LAT)



Client: BRIMSTIDALARRAY

Contractor: OSIRIS PROJECTS

Contract Title: 12.0501 - GEOPHYSICAL SURVEY 2012/13

Chart Title: BRIMS - MELSETTER CABLE ROUTE - KP 0.00 to KP 1.070 AND BRIMS - AITH CABLE ROUTE - KP 0.00 to KP 2.066

Scale 1:15,000

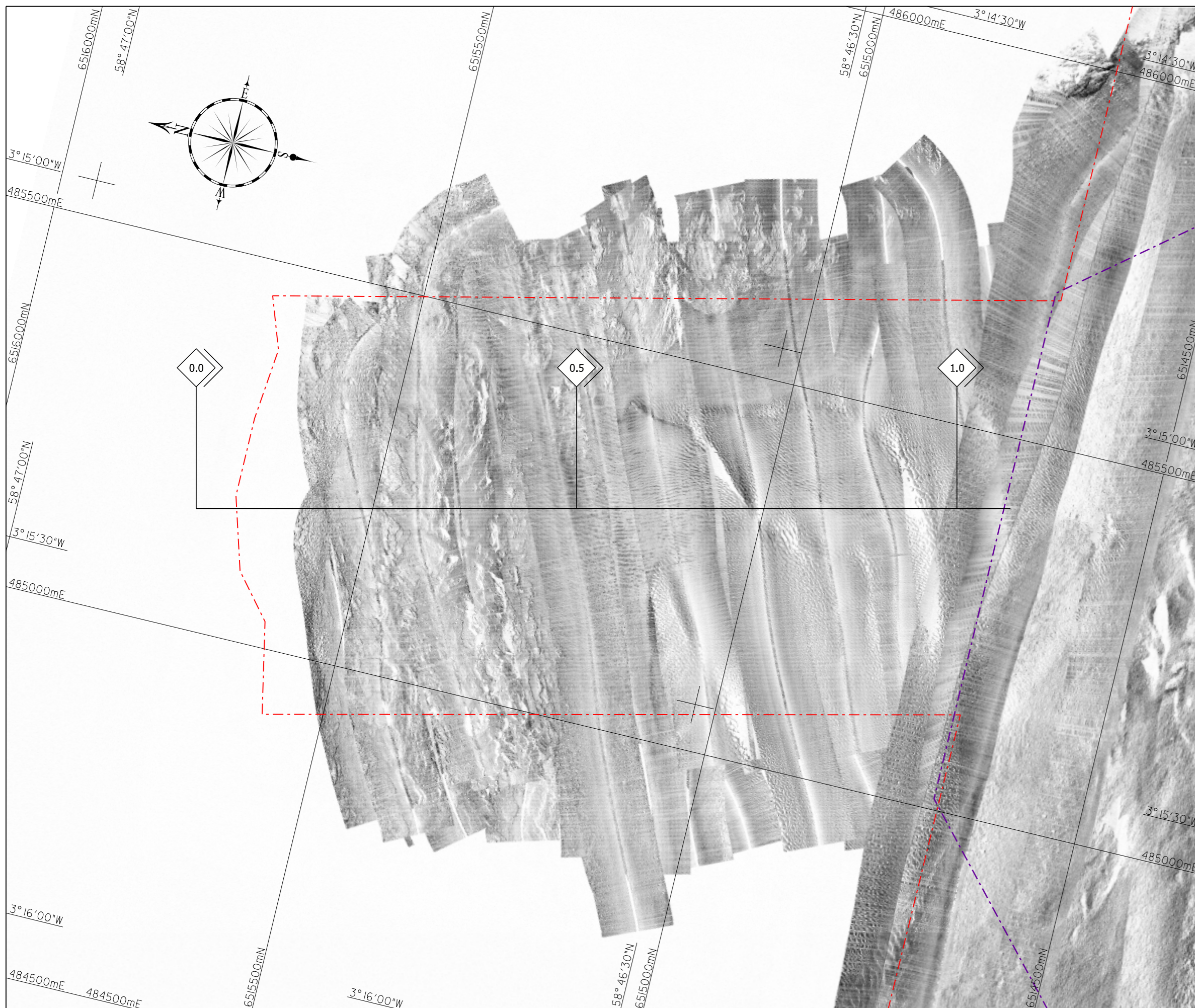
Vessel: M.V. Bibby Tetra/M.V. Lia | Survey Date: 07/05/2013 - 26/09/2013 | Client Ref: 12.0501

3			
2			
1	09/04/2014	Final	GR
0	05/02/2014	Draft	GR

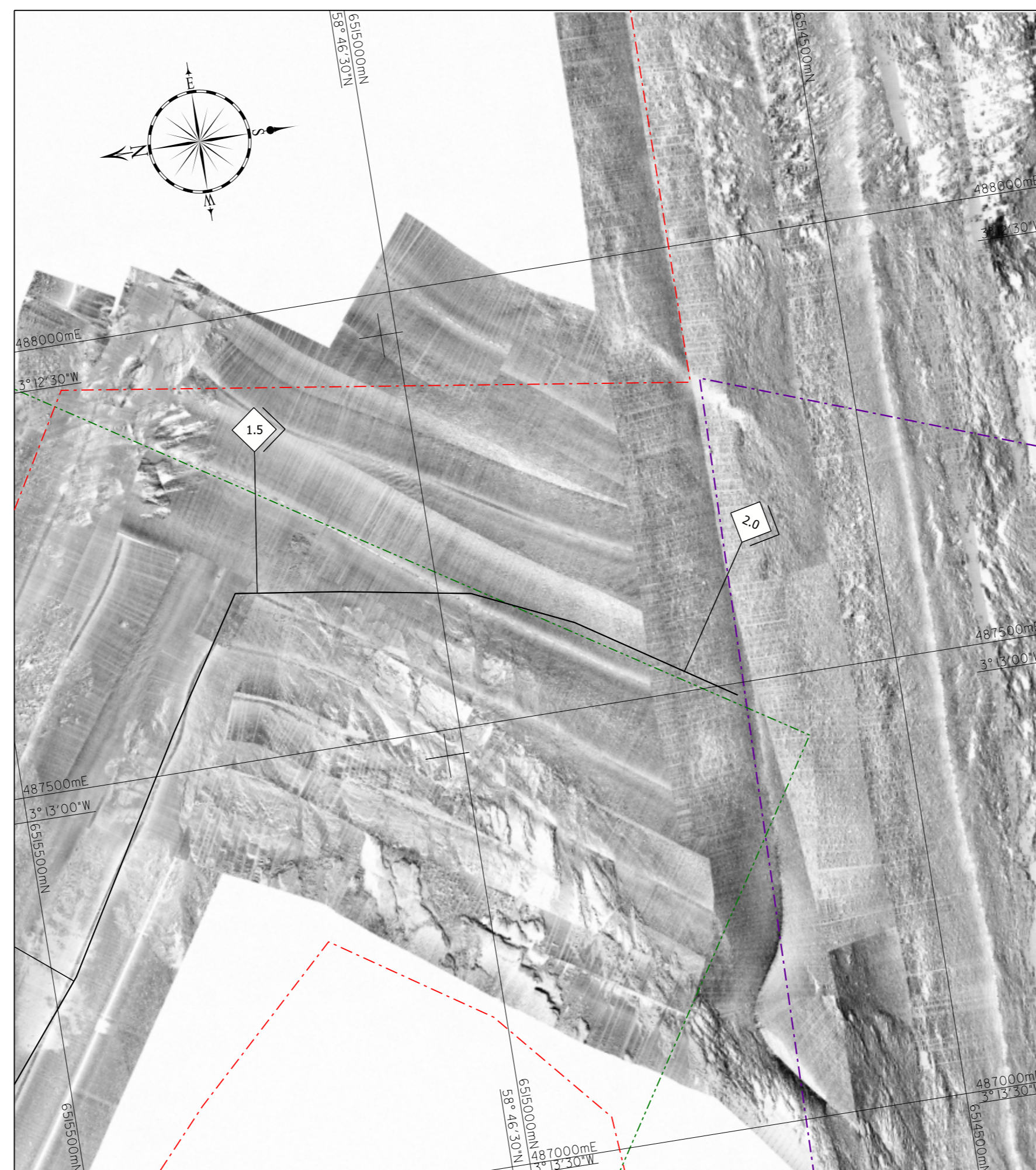
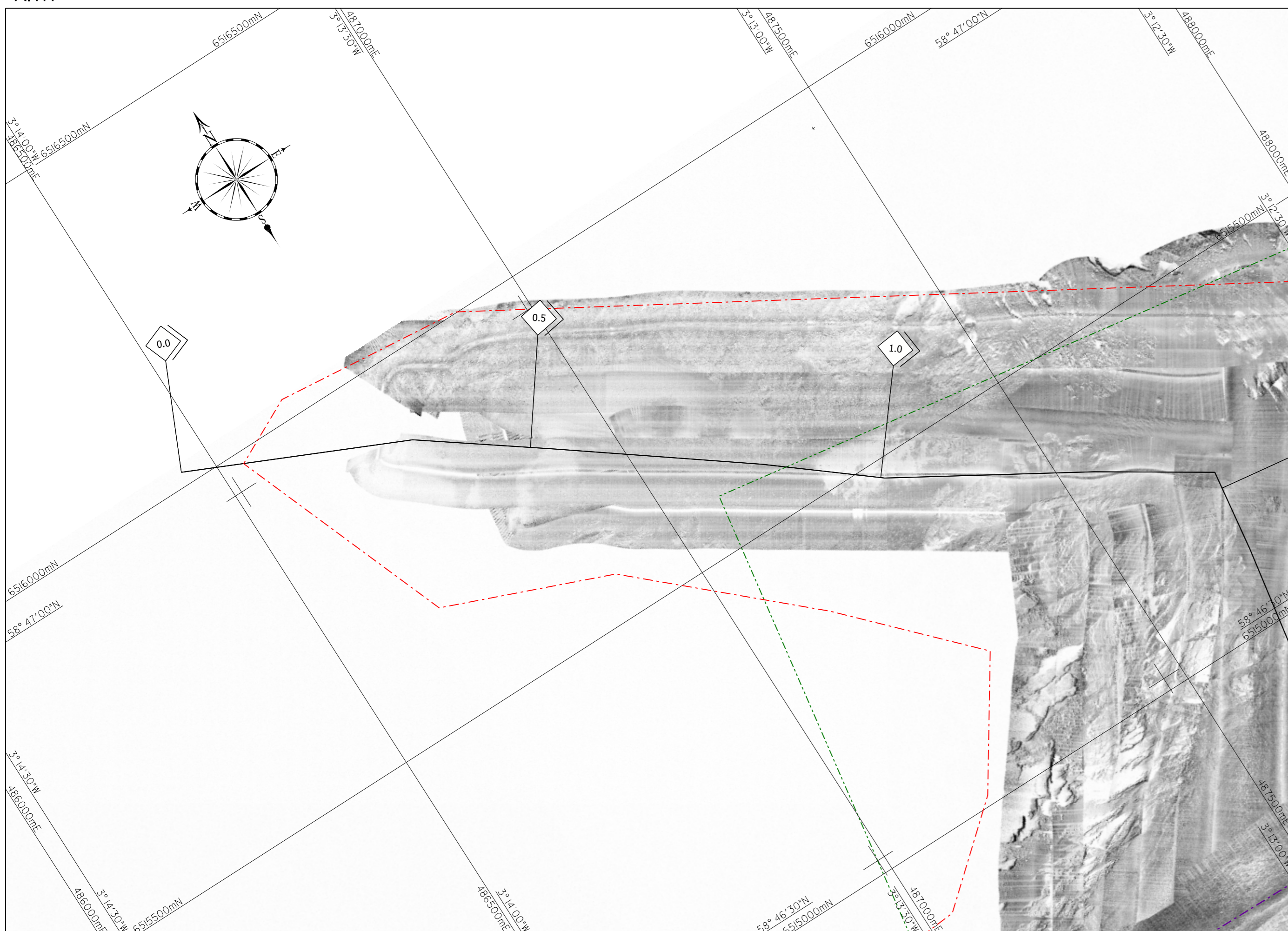
REVISION: DATE: REVISION / DESCRIPTION: DRAWN: CHECKED: APPROVED:

Scale: Horiz.: 1:5,000 | Chart Number: C13007-BR-05-AL | Chart: 13 of 14 | Osis Contract Number: C13007

MELSETTER



AITH



GENERAL

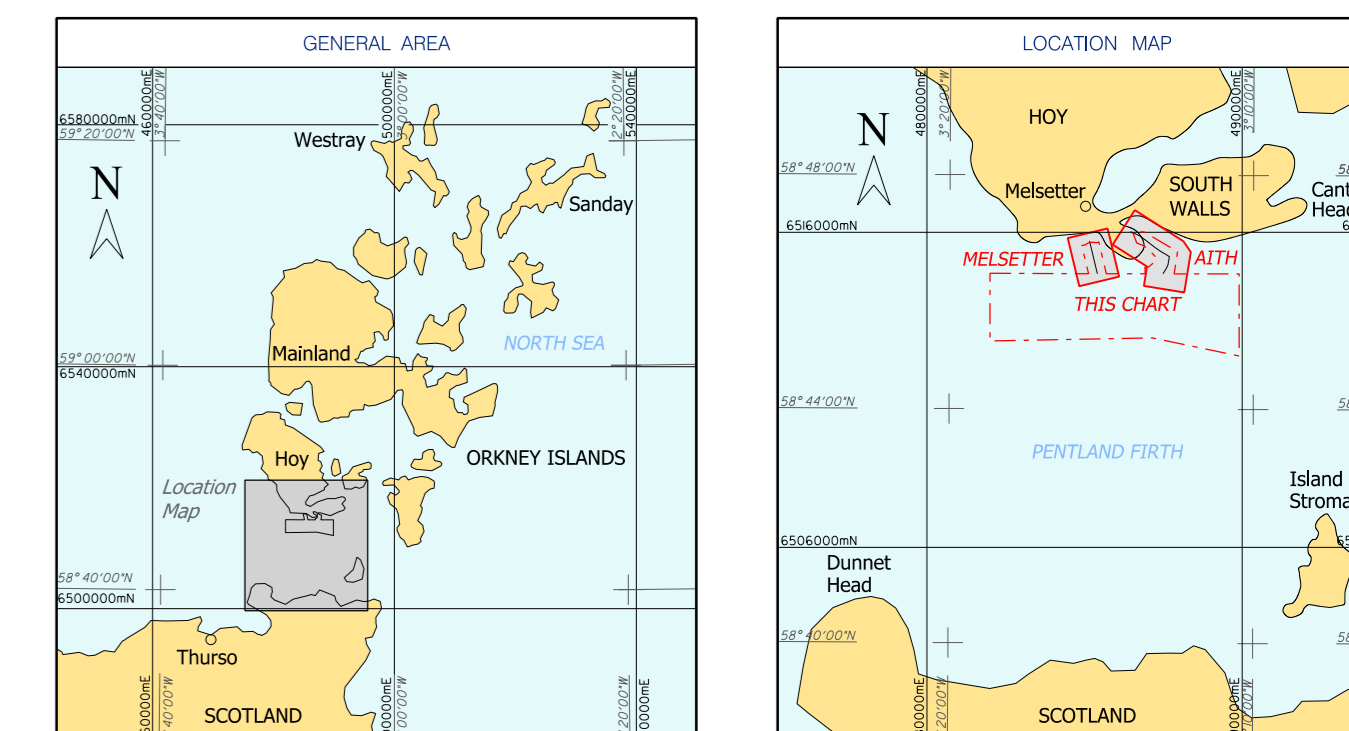
- Kilometre Point
- Proposed cable route
- Survey boundary - AFL (Agreement of lease)
- High priority area
- Overlap with next and previous panel
- Location map (OS OpenData)

General Notes:

- Horizontal Control:**
 - In 2012 Primary surface positioning on 'MV Lia' was provided by the Leica GX 1230 Smartnet.
 - In 2013 Primary surface positioning on both vessels ('MV Lia' and 'MV Bibby Tetra') was provided by the C-Nov 3050 with RTG correction service.
 - Secondary surface position on 'MV Bibby Tetra' was provided by the Hemisphere RS20 system, and on 'MV Lia' secondary surface position was provided by the C-Nov 2000 system.
- Vertical Control:**
 - All water depths are relative to Lowest Astronomical Tide (LAT), using PPK heights. Ellipsoidal heights were reduced to LAT using UKHO VORF data. Further details can be found in Volume 1 - Operations report: section 2.4.2.
- SSS mosaic created from Klein towfish.
- Subsea positioning provided by Sonardyne Scout USBL System.

Geodetic Parameters:

- Geodetic datum : World Geodetic System 1984 (WGS84)
- Ellipsoid : World Geodetic System 1984 (WGS84)
- Semi major axis : 6378137.000 m
- Inverse flattening : 298.257222563
- Projection : Universal Transverse Mercator (UTM) Zone 30 North
- Central Meridian : 3° West
- Latitude of Origin : 0° North
- False Easting : 500000 m
- False Northing : 0 m
- Scale Factor : 0.9996
- Vertical Datum : Lowest Astronomical Tide (LAT)

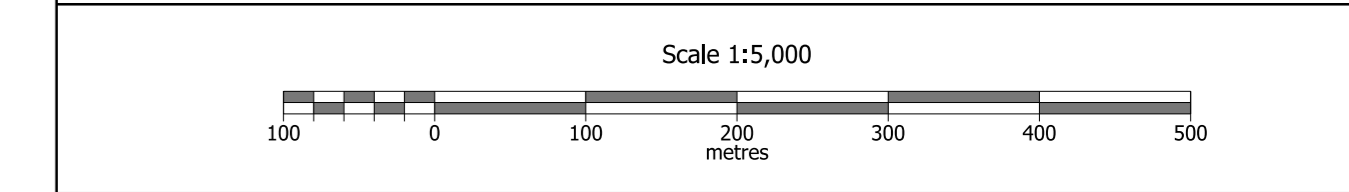


Client: BRIMS Tidal Array Ltd, Invercrown House, 200 Dunkeld Road, Perth, PH1 3AQ

Contractor: OSIRIS PROJECTS SEABED MAPPING & COASTAL SURVEY, BIBBY, Maritime House, 4 Brunel Road, Cliff Business Park, Bromborough, CH82 3JY, United Kingdom. Tel: +44 151 338 1120, Fax: +44 151 343 1027, email: enquiries@osirisprojects.co.uk, website: www.osirisprojects.co.uk

Contract Title: 12.0501 - GEOPHYSICAL SURVEY 2012/13

Chart Title: SIDE SCAN SONAR MOSAIC
BRIMS - MELSETTER CABLE ROUTE - KP 0.00 to KP 1.070
BRIMS - AITH CABLE ROUTE - KP 0.00 to KP 2.066



Vessel:	M.V. Bibby Tetra/M.V. Lia	Survey Date:	07/05/2013 - 26/09/2013	Client Ref.:	12.0501
3					
2					
1					
0	09/04/2014	Final for approval		GR	
REVISION:	DATE:	REVISION / DESCRIPTION:	DRAWN:	CHECKED:	APPROVED:
Scale:	Horz.: 1:5,000	Chart Number:	C13007-BR-06-AL-SSS	Chart:	14 of 14
	Vert.: N/A			Osiris Contract Number:	C13007

APPENDIX 2

Survey Geodetics

Listings

Cable Routes

Sonar Targets

Magnetic Anomalies

Agreement for Lease

Point Sonar Targets

Linear Sonar Targets

Magnetic Anomalies

The point target listings contain objects seen on the side scan sonar data, with one measurable dimension greater than 1m.

GEODETIC PARAMETERS

The GPS is referenced to the World Geodetic System, 1984 (WGS84).

All survey area coordinates are in terms of:

Datum:	WGS84
Spheroid:	WGS 1984
Semi-Major Axis:	6378137.0000m
Semi-Minor Axis:	6356752.3142
Inverse Flattening (I/F):	298.2572236
Projection	Universal Transverse Mercator
False Easting:	500000.0000
False Northing:	0.0000
Latitude of Origin:	00;00;00.0000N
Central Meridian:	3° West
UTM Zone:	30N
Scale Factor on CM:	0.9996
Units:	metres

Listings
Cable Route 1 – Aith Hope
Sonar Targets

ID	Easting (m)	Northing (m)	Dimensions (m) (LxWxH)	Description
S020	487848.0	6515458.4	10.0 x 3.2 x 2.1	Possible linear debris or boulder with significant height
S021	487328.4	6515524.0	19.4 x 0.1 x 0.1	Possible linear debris
S022	487603.7	6514692.1	1.6 x 1.7 x 0.3	
S025	487441.5	6514747.0	1.6 x 0.9 x 0.6	
S026	487213.9	6514755.7	2.0 x 0.7 x 0.7	
S027	487721.8	6514696.4	1.3 x 0.9 x 0.2	Possible debris
S028	487766.6	6514767.0	1.3 x 0.9 x 0.8	
S030	487671.5	6514721.5	1.4 x 0.7 x 0.9	
S031	487604.2	6514753.3	1.5 x 0.8 x 0.4	
S032	487391.4	6514806.3	1.7 x 1.1 x 0.8	
S033	487575.9	6514769.8	1.9 x 1.4 x 0.8	
S034	487694.6	6514774.5	1.8 x 1.2 x 0.6	
S035	487398.4	6514811.6	2.2 x 0.6 x 0.1	
S036	487656.3	6514796.9	1.1 x 1.0 x 1.2	
S037	487188.0	6514783.1	3.1 x 1.2 x 0.9	Possible contact
S038	487190.3	6514786.8	1.9 x 1.0 x 1.0	Possible contact
S039	487590.1	6514798.4	2.8 x 0.9 x 0.4	
S040	487340.9	6514816.2	2.2 x 1.0 x 0.6	
S041	487605.6	6514804.7	1.8 x 1.3 x 1.1	
S042	487715.5	6514919.0	2.4 x 0.5 x 0.7	
S044	487740.6	6514977.1	1.4 x 0.7 x 0.5	
S045	487671.4	6514971.4	1.6 x 0.7 x 0.8	
S046	488006.3	6514942.5	1.1 x 0.7 x 0.3	
S047	488004.7	6514946.0	0.9 x 0.8 x 0.7	
S048	488024.0	6514948.7	0.9 x 0.7 x 1.0	
S049	487974.2	6515003.8	2.1 x 0.5 x 0.3	
S051	487483.1	6515403.9	5.2 x 4.0 x 0.2	Possible debris
S052	487020.8	6515755.5	4.9 x 1.5 x 0.7	
S056	486971.1	6515832.0	1.5 x 2.0 x 0.9	
S057	487396.6	6515170.0	3.9 x 1.5 x 1.3	
S058	487569.8	6515151.7	2.2 x 2.1 x 1.0	
S059	486908.0	6515649.3	10.7 x 0.1 x 0.0	Debris - cable or rope
S060	487036.7	6515780.4	1.7 x 1.0 x 0.5	
S061	487116.6	6515671.2	2.4 x 1.1 x 0.4	
S062	486983.5	6515585.8	1.3 x 1.4 x 0.5	
S063	487023.4	6515558.0	23.6 x 0.1 x 0.0	Debris - cable or rope

ID	Easting (m)	Northing (m)	Dimensions (m) (LxWxH)	Description
S064	487280.4	6515719.9	2.6 x 0.6 x 0.7	
S065	487121.9	6515577.2	1.8 x 1.2 x 2.0	
S066	487192.6	6515570.0	1.7 x 0.6 x 0.3	
S067	487381.7	6515465.6	19.2 x 0.1 x 0.0	Debris - cable or rope
S068	487600.6	6515311.8	2.0 x 0.9 x 0.8	
S069	487642.1	6515318.0	0.6 x 0.5 x 0.3	
S070	487690.2	6515223.9	1.8 x 1.1 x 0.5	
S247	487328.1	6514769.7	2.2 x 1.4 x 0.5	On gravel/cobbles
S248	487360.8	6514695.5	1.4 x 1.2 x 0.6	On gravel/cobbles
S249	487394.9	6514720.2	1.2 x 1.0 x 0.7	On gravel/cobbles
S250	487417.8	6514708.4	4.0 x 3.0 x 0.6	Cluster on gravel/cobbles
S251	487432.4	6514721.0	1.3 x 1.2 x 0.6	On gravel/cobbles
S257	487553.6	6514735.1	1.8 x 1.2 x 0.7	On gravel/cobbles
S258	487581.2	6514703.4	2.2 x 1.2 x 0.9	On gravel/cobbles
S259	487619.9	6514700.2	3.5 x 1.4 x 0.8	On gravel/cobbles
S260	487595.1	6514721.9	1.4 x 1.0 x 0.5	On gravel/cobbles
S261	487636.9	6514711.2	1.6 x 1.2 x 0.6	On gravel/cobbles
S262	487692.8	6514723.9	5.4 x 1.8 x 0.5	On gravel/cobbles
S263	487738.1	6514687.9	2.2 x 1.4 x 0.5	On gravel/cobbles
S264	487751.6	6514695.8	1.8 x 1.4 x 0.7	On gravel/cobbles
S265	487757.0	6514755.1	5.5 x 2.5 x 1.0	On gravel/cobbles
S276	487769.4	6514671.1	4.5 x 3.0 x 0.8	On flat rock/gravel/cobbles
S290	487821.1	6514766.4	1.6 x 1.6 x 0.7	On gravel/cobbles

Cable Route 1 – Aith Hope

Linear Sonar Targets

I.D	Start Easting (m)	Start Northing (m)	End Easting (m)	End Northing (m)	Description
S071	486813.3	6515716.5	486841.2	6515701.9	Debris - Cable or rope

Cable Route 1 – Aith Hope

Magnetic Anomalies

Anomaly ID	Easting (m)	Northing (m)	Width (m)	Amplitude (nT)
M043	486748.0	6515770.3	16.2	11.2
M045	486936.0	6515939.2	14.2	78.8
M046	486973.8	6515921.5	12.9	41.5
M048	487302.1	6515727.8	14.5	15.4
M049	487354.0	6515077.5	48.2	86.6
M050	487475.8	6514888.2	28.8	17.7

Cable Route 2 – Melsetter

Sonar Targets

ID	Easting (m)	Northing (m)	Dimensions (m) (LxWxH)	Description
S016	485664.3	6514834.9	10.0 x 0.5 x 0.0	Linear Debris
S017	485665.3	6514858.9	18.8 x 1.0 x 0.9	Linear Debris
S018	485625.0	6514699.6	10.9 x 0.9 x 0.2	Small linear debris
S019	485575.8	6514778.7	10.9 x 0.8 x 0.5	Linear Debris
S023	485023.1	6515191.1	3.6 x 1.5 x 0.7	
S043	485244.2	6515338.3	2.3 x 1.5 x 0.5	Possible debris
S050	485426.2	6515261.8	1.6 x 1.2 x 0.4	
S053	485478.7	6515292.8	10.0 x 0.5 x 0.4	Debris
S054	485499.4	6515285.2	3.1 x 1.0 x 0.7	
S055	485501.8	6515249.5	13.0 x 0.6 x 0.2	Debris

Cable Route 2 – Melsetter

Magnetic Anomalies

Anomaly ID	Easting (m)	Northing (m)	Width (m)	Amplitude (nT)
M026	485119.5	6515365.2	14.0	3.0

Agreement for Lease Sonar Targets

ID	Easting (m)	Northing (m)	Dimensions (m) (LxWxH)	Description
S001	487212.9	6514424.6	1.9 x 1.4 x 0.9	
S002	487673.6	6514512.8	2.1 x 0.8 x 0.1	
S003	487559.5	6514483.0	1.6 x 1.4 x 0.2	
S004	487465.4	6514537.0	2.7 x 1.5 x 0.8	
S006	487367.0	6514569.2	1.0 x 1.0 x 0.4	
S007	487417.0	6514542.1	1.5 x 1.1 x 0.8	
S008	487271.4	6514571.0	3.0 x 1.2 x 0.7	
S009	487227.0	6514614.4	2.2 x 1.8 x 0.8	
S010	487746.4	6514625.5	2.9 x 2.3 x 1.1	
S011	487628.4	6514594.9	2.1 x 1.2 x 0.3	
S012	487562.1	6514668.0	1.6 x 1.2 x 0.6	
S013	487574.0	6514668.2	3.2 x 1.1 x 0.7	
S014	487796.8	6514652.6	1.7 x 1.1 x 0.8	
S015	487595.2	6514671.6	0.8 x 1.1 x 0.6	
S072	487145.0	6514499.7	7.0 x 3.5 x 2.5	Large boulder(s)
S073	486435.6	6512582.5	3.5 x 3.0 x 2.5	Large, on rock
S074	481627.2	6514071.4	2.0 x 1.5 x 0.9	On rock
S075	489935.6	6512559.8	4.0 x 1.8 x 0.9	On gravel
S076	490177.6	6512740.7	3.0 x 1.5 x 0.7	On gravel
S077	489542.9	6514353.2	2.8 x 2.0 x 2.6	On rock
S078	490072.1	6514149.7	2.0 x 2.0 x 0.9	On gravel/cobbles
S079	482610.9	6514195.5	3.0 x 1.5 x 1.0	On gravel/cobbles
S080	482551.4	6514201.9	3.0 x 1.8 x 0.9	On gravel/cobbles
S081	481440.3	6513114.8	1.8 x 1.8 x 1.2	On gravel/cobbles
S082	481441.4	6513044.7	1.2 x 1.2 x 0.8	On gravel/cobbles
S083	481794.5	6512578.4	1.5 x 1.5 x 0.9	On flat rock/gravel/cobbles
S084	482318.4	6512506.9	1.5 x 1.5 x 0.7	On gravel/cobbles
S085	482419.5	6512527.1	1.5 x 1.5 x 0.7	On gravel/cobbles
S086	482423.7	6512514.4	2.0 x 1.5 x 0.8	On gravel/cobbles
S087	482444.5	6512497.7	1.4 x 1.4 x 1.0	On gravel/cobbles
S088	482480.7	6512491.0	2.5 x 1.5 x 0.6	On gravel/cobbles
S089	482135.1	6512684.5	7.5 x 2.5 x 1.0	On flat rock/gravel/cobbles
S090	482041.8	6512772.4	2.5 x 2.0 x 0.8	On gravel/cobbles
S091	482012.3	6512884.3	3.0 x 2.0 x 1.0	On gravel
S092	482004.7	6512868.8	2.0 x 1.8 x 0.7	On gravel
S093	481991.2	6512950.0	1.2 x 1.2 x 0.8	On gravel
S094	481832.3	6513015.1	2.0 x 1.6 x 1.0	On flat rock/gravel/cobbles
S095	481753.0	6513193.0	1.5 x 1.2 x 0.8	On gravel/cobbles

ID	Easting (m)	Northing (m)	Dimensions (m) (LxWxH)	Description
S096	481985.6	6513079.4	1.4 x 1.0 x 0.8	On flat rock/gravel/cobbles
S097	482068.1	6513188.3	3.7 x 1.5 x 0.8	On gravel/cobbles
S098	482181.1	6513085.5	1.8 x 1.8 x 0.9	On gravel/cobbles
S099	482453.2	6512904.8	3.0 x 1.5 x 1.0	On flat rock/gravel/cobbles
S100	482532.3	6512909.8	3.0 x 1.5 x 0.8	On flat rock/gravel/cobbles
S101	482406.7	6513082.3	2.7 x 1.8 x 0.7	On gravel/cobbles
S102	482427.2	6513184.1	2.5 x 1.5 x 0.9	On flat rock/gravel/cobbles
S103	482302.1	6513274.1	3.5 x 2.8 x 1.7	On flat rock/gravel/cobbles
S104	482622.9	6514656.7	2.0 x 1.8 x 0.9	On flat rock/gravel/cobbles
S105	482689.4	6514671.5	5.5 x 1.5 x 0.9	On gravel/cobbles
S106	482797.4	6514607.3	3.5 x 2.0 x 1.0	On flat rock/gravel/cobbles
S107	482850.2	6514657.6	2.4 x 2.0 x 0.8	On flat rock/gravel/cobbles
S108	482861.0	6514654.6	1.8 x 1.5 x 0.9	On flat rock/gravel/cobbles
S109	482882.6	6514655.4	4.0 x 2.0 x 0.9	On flat rock/gravel/cobbles
S110	482911.2	6514653.4	2.0 x 1.8 x 0.9	On flat rock/gravel/cobbles
S111	482970.4	6514652.2	2.8 x 1.8 x 1.0	On flat rock/gravel/cobbles
S112	483081.2	6514673.0	3.5 x 2.0 x 1.0	On flat rock/gravel/cobbles
S113	482986.2	6514691.6	2.0 x 1.5 x 0.8	On flat rock/gravel/cobbles
S114	482997.0	6514681.5	2.0 x 1.5 x 0.8	On flat rock/gravel/cobbles
S115	483033.9	6514656.5	2.0 x 1.5 x 0.9	On flat rock/gravel/cobbles
S116	483146.4	6514592.9	5.0 x 2.0 x 0.8	On flat rock/gravel/cobbles
S117	483180.9	6514583.7	2.5 x 1.5 x 1.2	On flat rock/gravel/cobbles
S118	483068.0	6514745.9	1.6 x 1.5 x 1.2	On flat rock/gravel/cobbles
S119	483071.1	6514753.3	1.8 x 1.6 x 1.2	On flat rock/gravel/cobbles
S120	483156.3	6514718.7	4.0 x 3.5 x 2.0	Cluster on flat rock/gravel/cobbles
S121	483288.0	6514710.0	1.8 x 1.6 x 0.8	On gravel/cobbles
S122	483332.3	6514713.6	2.6 x 1.8 x 0.7	On gravel/cobbles
S123	483366.1	6514692.1	1.4 x 1.0 x 0.7	On gravel/cobbles
S124	483465.1	6514659.2	1.5 x 1.2 x 0.7	On gravel/cobbles
S125	483477.8	6514672.8	1.5 x 1.2 x 0.7	On gravel/cobbles
S126	483448.9	6514705.3	2.6 x 1.8 x 0.7	On gravel/cobbles
S127	483463.6	6514720.7	1.5 x 1.5 x 0.7	On gravel/cobbles
S128	483527.1	6514551.6	2.7 x 1.7 x 1.1	On gravel/cobbles
S129	483631.6	6514576.1	3.0 x 1.8 x 0.9	On gravel/cobbles
S130	483616.6	6514660.2	1.8 x 1.2 x 1.0	On gravel/cobbles
S131	483632.7	6514646.8	1.8 x 1.2 x 0.7	On gravel/cobbles
S132	483661.0	6514676.1	1.5 x 1.2 x 1.0	On gravel/cobbles
S133	483697.0	6514676.1	1.8 x 1.2 x 0.7	On gravel/cobbles
S134	483709.8	6514670.9	1.8 x 1.8 x 0.7	On gravel/cobbles
S135	483671.4	6514571.7	1.4 x 1.4 x 0.7	On gravel/cobbles

ID	Easting (m)	Northing (m)	Dimensions (m) (LxWxH)	Description
S136	483730.4	6514560.5	1.4 x 1.4 x 0.8	On gravel/cobbles
S137	483765.5	6514580.2	3.4 x 1.4 x 1.0	On gravel/cobbles
S138	483769.7	6514586.9	3.2 x 1.4 x 0.8	On gravel/cobbles
S139	483700.2	6514534.4	2.0 x 1.8 x 0.7	On gravel/cobbles
S140	483750.3	6514525.8	1.4 x 1.2 x 1.0	On gravel/cobbles
S141	483829.6	6514502.0	3.5 x 1.8 x 0.9	On gravel/cobbles
S142	483810.3	6514502.5	2.8 x 1.8 x 0.7	On gravel/cobbles
S143	483913.0	6514508.5	3.0 x 1.5 x 0.7	On gravel/cobbles
S144	483857.9	6514565.6	1.5 x 1.5 x 0.7	On gravel/cobbles
S145	483897.9	6514574.1	1.8 x 1.2 x 0.7	On gravel/cobbles
S146	483875.2	6514678.3	4.0 x 1.2 x 0.5	On flat rock/gravel/cobbles
S147	483894.3	6514656.6	2.0 x 1.2 x 0.5	On flat rock/gravel/cobbles
S148	483918.6	6514699.4	5.5 x 2.4 x 0.5	On flat rock/gravel/cobbles
S149	483919.6	6514689.5	3.2 x 2.1 x 0.5	On flat rock/gravel/cobbles
S150	483903.7	6514660.0	1.2 x 1.2 x 0.6	On flat rock/gravel/cobbles
S151	484072.5	6514561.3	5.0 x 1.5 x 0.8	On gravel/cobbles
S152	484026.7	6514529.2	2.2 x 1.5 x 1.1	On gravel/cobbles
S153	484097.7	6514521.8	2.2 x 1.5 x 0.9	On gravel/cobbles
S154	483992.4	6514467.9	3.0 x 1.5 x 0.8	On gravel/cobbles
S155	484038.1	6514487.9	1.5 x 1.5 x 1.0	On gravel/cobbles
S156	484135.3	6514498.2	1.4 x 1.4 x 0.7	On gravel/cobbles
S157	484170.0	6514499.1	2.8 x 1.6 x 0.9	On gravel/cobbles
S158	484177.2	6514435.6	1.4 x 1.4 x 1.0	On gravel/cobbles
S159	484198.5	6514442.4	1.4 x 1.4 x 0.7	On gravel/cobbles
S160	484005.8	6514682.7	2.6 x 1.5 x 0.5	On gravel/cobbles
S161	484018.7	6514687.7	2.0 x 1.4 x 0.9	On gravel/cobbles
S162	484131.0	6514634.6	3.0 x 2.0 x 1.0	On gravel/cobbles
S163	484195.4	6514657.6	1.8 x 1.4 x 0.8	On gravel/cobbles
S164	484154.0	6514634.2	1.2 x 1.2 x 0.9	On gravel/cobbles
S165	484164.9	6514644.0	1.5 x 1.2 x 0.8	On gravel/cobbles
S166	484166.0	6514660.5	2.0 x 1.2 x 0.8	On gravel/cobbles
S167	484275.3	6514576.7	1.9 x 1.7 x 0.6	On gravel/cobbles
S168	484342.6	6514588.8	1.8 x 1.2 x 0.8	On gravel/cobbles
S169	484328.8	6514616.9	1.4 x 1.2 x 0.5	On gravel/cobbles
S170	484312.3	6514610.3	2.0 x 1.6 x 0.5	On gravel/cobbles
S171	484257.9	6514644.2	1.6 x 1.2 x 0.5	On gravel/cobbles
S172	484399.5	6514626.5	1.2 x 1.2 x 0.6	On gravel/cobbles
S173	484366.3	6514652.9	1.0 x 1.0 x 0.8	On gravel/cobbles
S174	484456.1	6514643.8	1.4 x 1.2 x 0.6	On gravel/cobbles
S175	484481.0	6514648.2	1.2 x 1.2 x 0.5	On gravel/cobbles

ID	Easting (m)	Northing (m)	Dimensions (m) (LxWxH)	Description
S176	484496.5	6514654.9	2.5 x 1.8 x 0.9	On gravel/cobbles
S177	484528.7	6514655.0	1.2 x 1.2 x 0.5	On gravel/cobbles
S178	484553.6	6514670.4	2.0 x 1.2 x 0.5	On gravel/cobbles
S179	484765.1	6514718.3	1.7 x 1.7 x 0.7	In Sand
S180	484797.7	6514689.1	2.2 x 1.2 x 0.5	On gravel/cobbles
S181	484821.6	6514684.8	3.0 x 1.4 x 0.5	On gravel/cobbles
S182	484857.9	6514682.6	2.4 x 2.0 x 0.7	In Sand
S183	484902.1	6514673.0	1.6 x 1.4 x 0.5	In Sand
S184	484933.3	6514672.1	2.6 x 1.4 x 0.5	In Sand
S185	484919.5	6514605.2	1.8 x 1.4 x 0.5	On gravel
S186	484964.0	6514613.7	3.2 x 1.6 x 0.6	On gravel
S187	484989.2	6514663.8	2.2 x 1.4 x 0.9	On gravel
S188	484737.7	6514522.5	1.2 x 1.2 x 0.6	On gravel
S189	484862.5	6514579.3	2.0 x 1.4 x 0.8	On gravel
S190	484883.9	6514513.8	1.2 x 1.2 x 0.8	On gravel/cobbles
S191	484989.9	6514546.8	2.6 x 1.2 x 0.7	On gravel/cobbles
S192	485011.5	6514530.5	3.0 x 1.2 x 0.8	On gravel/cobbles
S193	485027.6	6514545.8	3.5 x 1.5 x 0.8	On gravel/cobbles
S194	485060.1	6514507.0	2.0 x 2.0 x 0.5	On gravel/cobbles
S195	485117.7	6514609.7	1.8 x 1.2 x 0.7	On gravel
S196	485185.6	6514506.8	1.8 x 1.2 x 0.5	On gravel/cobbles
S197	485216.7	6514525.4	1.4 x 1.2 x 0.5	On gravel/cobbles
S198	485229.6	6514529.9	2.5 x 1.4 x 0.4	On gravel/cobbles
S199	485233.6	6514524.8	2.0 x 1.2 x 0.5	On gravel/cobbles
S200	485241.1	6514575.9	2.9 x 1.4 x 0.7	On gravel/cobbles
S201	485293.4	6514522.1	2.6 x 1.2 x 0.5	On gravel/cobbles
S202	485302.5	6514546.3	1.8 x 1.0 x 0.5	On gravel/cobbles
S203	485358.5	6514519.3	1.2 x 1.2 x 0.6	On gravel/cobbles
S204	485363.4	6514497.6	1.2 x 1.2 x 0.7	On gravel/cobbles
S205	485385.6	6514491.0	1.2 x 1.2 x 0.7	On gravel/cobbles
S206	485407.7	6514524.9	1.5 x 1.2 x 0.6	On gravel/cobbles
S207	485408.3	6514509.3	1.2 x 1.2 x 0.6	On gravel/cobbles
S208	485419.8	6514508.4	1.2 x 1.2 x 0.7	On gravel/cobbles
S209	485469.2	6514536.8	2.2 x 1.4 x 0.5	On gravel/cobbles
S210	485474.0	6514530.1	3.0 x 1.4 x 0.5	On gravel/cobbles
S211	485483.6	6514482.5	1.2 x 1.2 x 1.0	On gravel/cobbles
S212	485418.7	6514444.0	2.5 x 1.4 x 1.1	On gravel/cobbles
S213	485442.3	6514444.0	2.0 x 1.0 x 1.1	On gravel/cobbles
S214	485605.8	6514326.1	5.5 x 3.6 x 2.4	Large, on flat rock
S215	485634.9	6514345.3	3.5 x 2.5 x 1.8	On flat rock/gravel/cobbles

ID	Easting (m)	Northing (m)	Dimensions (m) (LxWxH)	Description
S216	485553.7	6514556.4	4.0 x 1.6 x 0.6	In Sand
S217	485568.0	6514506.6	1.4 x 1.2 x 0.6	On sand/gravel
S218	485601.6	6514527.0	1.4 x 1.2 x 0.6	On sand/gravel
S219	485634.2	6514529.1	1.4 x 1.2 x 0.5	On sand/gravel
S220	485658.4	6514551.4	1.4 x 1.2 x 0.6	In Sand
S221	485688.8	6514528.3	1.4 x 1.2 x 0.5	On sand/gravel
S222	485715.8	6514521.2	2.8 x 1.2 x 0.5	On sand/gravel
S223	485758.3	6514520.3	1.0 x 1.0 x 0.5	On sand/gravel
S224	485607.9	6514442.5	2.8 x 1.2 x 0.8	On gravel/cobbles
S225	485776.8	6514424.2	1.6 x 1.2 x 1.2	On gravel/cobbles
S226	485910.3	6514436.7	3.2 x 2.6 x 1.2	On flat rock/gravel/cobbles
S227	485978.5	6514422.0	2.8 x 1.2 x 0.8	On flat rock/gravel/cobbles
S228	485939.0	6514374.6	3.5 x 3.5 x 3.2	Large, on flat rock
S229	485715.0	6514608.0	4.8 x 2.7 x 0.4	On sand/gravel
S230	485845.2	6514663.0	1.8 x 1.2 x 0.5	On sand/gravel
S231	485974.7	6514682.1	4.0 x 3.0 x 0.8	Cluster on flat rock/gravel/cobbles
S232	485906.9	6514567.8	2.6 x 2.0 x 1.0	On sand/gravel
S233	485796.7	6514518.5	1.2 x 1.2 x 0.7	On sand/gravel
S234	485819.9	6514530.5	1.8 x 1.6 x 0.6	On sand/gravel
S235	486018.8	6514547.9	1.8 x 1.2 x 0.7	On gravel/cobbles
S236	486096.7	6514521.4	1.8 x 1.6 x 1.0	On gravel/cobbles
S237	486117.2	6514548.7	3.0 x 1.5 x 0.9	On flat rock/gravel/cobbles
S238	486081.8	6514585.7	3.4 x 1.6 x 0.9	On flat rock/gravel/cobbles
S239	486401.0	6514382.3	1.2 x 1.2 x 1.3	On flat rock/gravel/cobbles
S240	486466.7	6514365.3	1.9 x 1.4 x 1.0	On flat rock/gravel/cobbles
S241	487125.4	6514591.4	2.0 x 1.3 x 1.1	On flat rock/gravel
S242	487222.2	6514610.9	5.0 x 2.0 x 0.7	Cluster on gravel/cobbles
S243	487227.8	6514604.8	2.2 x 1.4 x 0.6	On gravel/cobbles
S244	487237.7	6514601.3	2.2 x 1.5 x 0.6	On gravel/cobbles
S245	487247.9	6514618.7	3.0 x 1.6 x 1.0	On gravel/cobbles
S246	487286.8	6514612.9	2.0 x 1.4 x 0.6	On gravel/cobbles
S252	487391.2	6514612.4	1.5 x 1.5 x 1.2	On gravel/cobbles
S253	487418.1	6514637.2	2.5 x 1.5 x 0.6	On gravel/cobbles
S254	487429.0	6514638.4	2.5 x 1.5 x 0.6	On gravel/cobbles
S255	487508.5	6514637.0	2.5 x 1.5 x 0.7	On gravel/cobbles
S256	487572.4	6514765.7	1.8 x 1.2 x 0.5	On gravel/cobbles
S266	487552.0	6514527.0	7.5 x 4.0 x 1.2	Cluster on flat rock/gravel/cobbles
S267	487557.9	6514544.0	8.0 x 4.5 x 1.0	On flat rock/gravel/cobbles
S268	487627.6	6514483.8	1.6 x 1.3 x 0.9	On flat rock/gravel/cobbles

ID	Easting (m)	Northing (m)	Dimensions (m) (LxWxH)	Description
S269	487680.1	6514481.4	1.4 x 1.2 x 0.9	On flat rock/gravel/cobbles
S270	487758.6	6514482.5	1.4 x 1.2 x 0.8	On flat rock/gravel/cobbles
S271	487657.9	6514522.2	3.5 x 2.0 x 0.9	On flat rock/gravel/cobbles
S272	487685.4	6514512.9	3.2 x 2.0 x 0.8	On flat rock/gravel/cobbles
S273	487633.0	6514609.9	1.6 x 1.4 x 0.7	On flat rock/gravel/cobbles
S274	487705.9	6514568.8	1.6 x 1.4 x 0.9	On flat rock/gravel/cobbles
S275	487708.3	6514608.6	1.2 x 0.8 x 0.6	On flat rock/gravel/cobbles
S277	487771.2	6514612.9	1.6 x 1.2 x 0.7	On flat rock/gravel/cobbles
S278	487813.2	6514570.8	2.5 x 2.0 x 0.6	On gravel/cobbles
S279	488175.4	6514727.1	1.4 x 1.2 x 0.6	On gravel/cobbles
S280	488207.6	6514708.7	1.4 x 1.2 x 0.9	On gravel/cobbles
S281	488310.0	6514673.4	1.8 x 1.4 x 1.1	On gravel/cobbles
S282	488374.2	6514646.6	2.0 x 1.4 x 0.9	On gravel/cobbles
S283	488388.8	6514639.1	1.8 x 1.6 x 0.6	On gravel/cobbles
S284	488396.7	6514633.8	4.5 x 3.0 x 0.7	Cluster on gravel/cobbles
S285	488407.9	6514634.9	1.6 x 1.2 x 0.6	On gravel/cobbles
S286	488412.1	6514703.6	2.8 x 2.6 x 0.8	On gravel/cobbles
S287	488426.6	6514717.4	1.4 x 1.2 x 0.8	On gravel/cobbles
S288	488438.0	6514725.7	1.6 x 1.2 x 0.6	On gravel/cobbles
S289	488475.2	6514741.7	1.8 x 1.4 x 0.6	On gravel/cobbles
S291	487315.1	6514581.2	1.4 x 1.2 x 0.8	On flat rock/gravel/cobbles
S292	487254.3	6514513.1	1.8 x 1.2 x 0.6	On flat rock/gravel/cobbles
S293	487318.3	6514515.2	1.4 x 1.2 x 0.6	On flat rock/gravel/cobbles
S294	486345.1	6514385.0	6.0 x 4.0 x 1.8	On flat rock
S295	486356.4	6514390.3	1.8 x 1.8 x 1.2	On flat rock
S296	485155.7	6514538.6	1.8 x 1.2 x 0.7	On flat rock/gravel/cobbles
S297	483372.3	6514586.7	1.8 x 1.2 x 0.5	On flat rock/gravel/cobbles
S298	483397.8	6514600.2	1.8 x 1.2 x 0.5	On flat rock/gravel/cobbles
S299	481864.5	6512675.1	1.2 x 1.2 x 0.6	On gravel/cobbles
S300	482334.5	6513139.9	3.8 x 3.0 x 0.5	On gravel/cobbles
S301	490064.7	6512784.3	4.0 x 4.0 x 1.5	On gravel/cobbles
S301	490064.7	6512784.3	4.0 x 4.0 x 1.5	On gravel/cobbles

Agreement for Lease

Sonar Targets

I.D	Start Easting (m)	Start Northing (m)	End Easting (m)	End Northing (m)	Length (m)	Description
S302	486467.9	6514364.1	486574.64	6514375.2	108.0	Possible chain or cable
S303	483385.3	6514773.9	483491.1	6514697.1	140.0	Possible chain or cable
S304	483686.4	6513269.5	483670.06	6513233.0	40.1	Possible chain or cable

I.D	Start Easting (m)	Start Northing (m)	End Easting (m)	End Northing (m)	Length (m)	Description
S305	483672.0	6513222.3	483660.71	6513211.3	15.7	Possible chain or cable

**Agreement for Lease
Magnetic Anomalies**

Anomaly ID	Easting (m)	Northing (m)	Width (m)	Amplitude (nT)
M001	481862.2	6514123.3	12.1	18.1
M002	481918.9	6513666.9	14.8	644.9
M003	482089.1	6513693.7	8.7	1.3
M004	482120.9	6514388.2	15.4	118.1
M005	482199.6	6513526.7	6.3	23.3
M006	482998.2	6514042.6	13.6	139.3
M007	483040.0	6513376.2	17.5	80.5
M008	483084.3	6513224.1	36.1	49.4
M009	483184.5	6514539.2	7.0	25.0
M010	483393.9	6512930.0	29.6	58.5
M011	483446.5	6513795.1	35.9	206.2
M012	483479.3	6514601.5	17.3	31.2
M013	483491.1	6514697.9	13.3	23.1
M014	483567.2	6513862.7	37.8	846.1
M015	483660.0	6512823.0	46.0	28.3
M016	483709.3	6512823.1	20.5	18.6
M017	483780.8	6512937.5	19.5	39.0
M018	483885.0	6513864.9	19.3	242.5
M019	483894.0	6512686.2	6.2	18.0
M020	483926.1	6512696.5	6.3	14.6
M021	484169.4	6514090.2	82.6	84.3
M022	484250.1	6513569.1	64.0	265.9
M023	484268.1	6513868.0	5.3	78.4
M024	484431.9	6513868.1	26.3	375.3
M025	484573.2	6514533.8	38.3	102.1
M027	485148.1	6514240.4	37.3	1941.4
M028	485604.3	6514326.1	14.8	10.3
M029	485677.9	6513038.7	27.5	286.5
M030	485939.5	6512800.1	18.9	31.4
M031	486067.3	6513324.4	38.3	13.3
M032	486094.1	6513633.1	26.6	22.1
M033	486162.7	6514002.4	8.3	197.5
M034	486200.6	6512794.7	20.7	26.9
M035	486284.6	6513181.9	54.7	294.8
M036	486293.7	6513098.1	130.2	39.7
M037	486331.7	6513624.4	22.5	24.0
M038	486358.4	6513319.0	7.0	146.5
M039	486483.5	6513179.6	8.2	3.1
M040	486490.7	6514161.2	30.2	15.8
M041	486693.6	6514519.4	16.4	12.0

Anomaly ID	Easting (m)	Northing (m)	Width (m)	Amplitude (nT)
M042	486743.6	6514383.0	19.4	22.5
M044	486794.5	6514233.4	33.9	60.6
M047	487008.0	6513859.0	21.0	6.3
M051	487681.2	6513317.3	17.1	5.7
M052	487850.3	6513472.1	134.6	1778.1
M053	487890.9	6513859.8	8.7	12.4
M054	487912.9	6513873.4	15.7	6.6
M055	487961.0	6515312.6	24.4	10.9
M056	487965.5	6514241.9	50.7	20.3
M057	488027.7	6514001.8	13.5	12.9
M058	488034.2	6513686.7	156.9	3376.8
M059	488045.8	6514232.9	28.1	21.1
M060	488045.8	6513406.8	51.5	164.5
M061	488111.8	6513318.5	75.2	433.1
M062	488123.2	6514543.0	14.2	3.2
M063	488162.4	6513175.2	10.6	4.4
M064	488247.5	6513406.8	54.9	232.7
M065	488379.0	6513767.2	70.0	327.7
M066	488399.7	6514300.7	25.6	57.8
M067	488407.9	6513853.6	65.8	210.8
M068	488408.0	6513849.1	67.5	330.8
M069	488419.6	6513862.0	25.1	483.0
M070	488431.5	6513876.9	40.2	689.8
M071	488443.0	6513407.1	41.7	43.9
M072	488754.0	6513473.6	35.7	24.6
M073	488759.1	6514516.5	41.9	9.4
M074	488835.6	6513884.8	8.2	2.5
M075	488886.1	6514236.1	14.1	11.5
M076	488891.4	6514156.7	9.3	10.2
M077	488923.7	6513869.9	33.5	62.5
M078	488939.7	6514003.0	32.1	79.2
M079	489102.0	6512933.0	162.9	4115.2
M080	489107.1	6514498.5	14.5	4.1
M081	489141.1	6513630.4	19.7	2.7
M082	489224.4	6514450.2	59.1	11.7
M083	489254.9	6513680.8	3.8	47.3
M084	489279.6	6514587.9	15.2	19.8
M085	489307.4	6512589.5	68.7	234.2
M086	489309.9	6512612.9	57.7	45.3
M087	489341.9	6513681.7	2.5	2.3
M088	489361.0	6513682.9	5.0	3.0
M089	489705.4	6513665.0	6.7	6.1
M090	489764.1	6513617.8	21.8	27.0
M091	489824.7	6513638.0	21.2	2.5
M092	490116.7	6512780.5	45.9	19.5

High Priority Area Sonar Targets

ID	Easting (m)	Northing (m)	Dimensions (m) (LxWxH)	Description
S001	487212.9	6514424.6	1.9 x 1.4 x 0.9	
S002	487673.6	6514512.8	2.1 x 0.8 x 0.1	
S003	487559.5	6514483.0	1.6 x 1.4 x 0.2	
S004	487465.4	6514537.0	2.7 x 1.5 x 0.8	
S006	487367.0	6514569.2	1.0 x 1.0 x 0.4	
S007	487417.0	6514542.1	1.5 x 1.1 x 0.8	
S008	487271.4	6514571.0	3.0 x 1.2 x 0.7	
S009	487227.0	6514614.4	2.2 x 1.8 x 0.8	
S010	487746.4	6514625.5	2.9 x 2.3 x 1.1	
S011	487628.4	6514594.9	2.1 x 1.2 x 0.3	
S012	487562.1	6514668.0	1.6 x 1.2 x 0.6	
S013	487574.0	6514668.2	3.2 x 1.1 x 0.7	
S014	487796.8	6514652.6	1.7 x 1.1 x 0.8	
S015	487595.2	6514671.6	0.8 x 1.1 x 0.6	
S072	487145.0	6514499.7	7.0 x 3.5 x 2.5	Large boulder(s)
S079	482610.9	6514195.5	3.0 x 1.5 x 1.0	On gravel/cobbles
S080	482551.4	6514201.9	3.0 x 1.8 x 0.9	On gravel/cobbles
S185	484919.5	6514605.2	1.8 x 1.4 x 0.5	On gravel
S186	484964.0	6514613.7	3.2 x 1.6 x 0.6	On gravel
S187	484989.2	6514663.8	2.2 x 1.4 x 0.9	On gravel
S190	484883.9	6514513.8	1.2 x 1.2 x 0.8	On gravel/cobbles
S191	484989.9	6514546.8	2.6 x 1.2 x 0.7	On gravel/cobbles
S192	485011.5	6514530.5	3.0 x 1.2 x 0.8	On gravel/cobbles
S193	485027.6	6514545.8	3.5 x 1.5 x 0.8	On gravel/cobbles
S194	485060.1	6514507.0	2.0 x 2.0 x 0.5	On gravel/cobbles
S195	485117.7	6514609.7	1.8 x 1.2 x 0.7	On gravel
S196	485185.6	6514506.8	1.8 x 1.2 x 0.5	On gravel/cobbles
S197	485216.7	6514525.4	1.4 x 1.2 x 0.5	On gravel/cobbles
S198	485229.6	6514529.9	2.5 x 1.4 x 0.4	On gravel/cobbles
S199	485233.6	6514524.8	2.0 x 1.2 x 0.5	On gravel/cobbles
S200	485241.1	6514575.9	2.9 x 1.4 x 0.7	On gravel/cobbles
S201	485293.4	6514522.1	2.6 x 1.2 x 0.5	On gravel/cobbles
S202	485302.5	6514546.3	1.8 x 1.0 x 0.5	On gravel/cobbles
S203	485358.5	6514519.3	1.2 x 1.2 x 0.6	On gravel/cobbles
S204	485363.4	6514497.6	1.2 x 1.2 x 0.7	On gravel/cobbles
S205	485385.6	6514491.0	1.2 x 1.2 x 0.7	On gravel/cobbles
S206	485407.7	6514524.9	1.5 x 1.2 x 0.6	On gravel/cobbles
S207	485408.3	6514509.3	1.2 x 1.2 x 0.6	On gravel/cobbles

ID	Easting (m)	Northing (m)	Dimensions (m) (LxWxH)	Description
S208	485419.8	6514508.4	1.2 x 1.2 x 0.7	On gravel/cobbles
S209	485469.2	6514536.8	2.2 x 1.4 x 0.5	On gravel/cobbles
S210	485474.0	6514530.1	3.0 x 1.4 x 0.5	On gravel/cobbles
S211	485483.6	6514482.5	1.2 x 1.2 x 1.0	On gravel/cobbles
S212	485418.7	6514444.0	2.5 x 1.4 x 1.1	On gravel/cobbles
S213	485442.3	6514444.0	2.0 x 1.0 x 1.1	On gravel/cobbles
S215	485634.9	6514345.3	3.5 x 2.5 x 1.8	On flat rock/gravel/cobbles
S216	485553.7	6514556.4	4.0 x 1.6 x 0.6	In Sand
S217	485568.0	6514506.6	1.4 x 1.2 x 0.6	On sand/gravel
S218	485601.6	6514527.0	1.4 x 1.2 x 0.6	On sand/gravel
S219	485634.2	6514529.1	1.4 x 1.2 x 0.5	On sand/gravel
S220	485658.4	6514551.4	1.4 x 1.2 x 0.6	In Sand
S221	485688.8	6514528.3	1.4 x 1.2 x 0.5	On sand/gravel
S222	485715.8	6514521.2	2.8 x 1.2 x 0.5	On sand/gravel
S223	485758.3	6514520.3	1.0 x 1.0 x 0.5	On sand/gravel
S224	485607.9	6514442.5	2.8 x 1.2 x 0.8	On gravel/cobbles
S225	485776.8	6514424.2	1.6 x 1.2 x 1.2	On gravel/cobbles
S228	485939.0	6514374.6	3.5 x 3.5 x 3.2	Large, on flat rock
S229	485715.0	6514608.0	4.8 x 2.7 x 0.4	On sand/gravel
S233	485796.7	6514518.5	1.2 x 1.2 x 0.7	On sand/gravel
S234	485819.9	6514530.5	1.8 x 1.6 x 0.6	On sand/gravel
S241	487125.4	6514591.4	2.0 x 1.3 x 1.1	On flat rock/gravel
S242	487222.2	6514610.9	5.0 x 2.0 x 0.7	Cluster on gravel/cobbles
S244	487237.7	6514601.3	2.2 x 1.5 x 0.6	On gravel/cobbles
S245	487247.9	6514618.7	3.0 x 1.6 x 1.0	On gravel/cobbles
S246	487286.8	6514612.9	2.0 x 1.4 x 0.6	On gravel/cobbles
S252	487391.2	6514612.4	1.5 x 1.5 x 1.2	On gravel/cobbles
S253	487418.1	6514637.2	2.5 x 1.5 x 0.6	On gravel/cobbles
S254	487429.0	6514638.4	2.5 x 1.5 x 0.6	On gravel/cobbles
S255	487508.5	6514637.0	2.5 x 1.5 x 0.7	On gravel/cobbles
S266	487552.0	6514527.0	7.5 x 4.0 x 1.2	Cluster on flat rock/gravel/cobbles
S267	487557.9	6514544.0	8.0 x 4.5 x 1.0	On flat rock/gravel/cobbles
S268	487627.6	6514483.8	1.6 x 1.3 x 0.9	On flat rock/gravel/cobbles
S269	487680.1	6514481.4	1.4 x 1.2 x 0.9	On flat rock/gravel/cobbles
S270	487758.6	6514482.5	1.4 x 1.2 x 0.8	On flat rock/gravel/cobbles
S271	487657.9	6514522.2	3.5 x 2.0 x 0.9	On flat rock/gravel/cobbles

ID	Easting (m)	Northing (m)	Dimensions (m) (LxWxH)	Description
S272	487685.4	6514512.9	3.2 x 2.0 x 0.8	On flat rock/gravel/cobbles
S273	487633.0	6514609.9	1.6 x 1.4 x 0.7	On flat rock/gravel/cobbles
S274	487705.9	6514568.8	1.6 x 1.4 x 0.9	On flat rock/gravel/cobbles
S275	487708.3	6514608.6	1.2 x 0.8 x 0.6	On flat rock/gravel/cobbles
S277	487771.2	6514612.9	1.6 x 1.2 x 0.7	On flat rock/gravel/cobbles
S291	487315.1	6514581.2	1.4 x 1.2 x 0.8	On flat rock/gravel/cobbles
S292	487254.3	6514513.1	1.8 x 1.2 x 0.6	On flat rock/gravel/cobbles
S293	487318.3	6514515.2	1.4 x 1.2 x 0.6	On flat rock/gravel/cobbles

High Priority Area

Sonar Targets

I.D	Start Easting (m)	Start Northing (m)	End Easting (m)	End Northing (m)	Length (m)	Description
S304	483686.4	6513269.5	483670.06	6513233.0	40.1	Possible chain or cable
S305	483672.0	6513222.3	483660.71	6513211.3	15.7	Possible chain or cable

High Priority Area

Magnetic Anomalies

Anomaly ID	Easting (m)	Northing (m)	Width (m)	Amplitude (nT)
M006	482998.2	6514042.6	13.6	139.3
M007	483040.0	6513376.2	17.5	80.5
M008	483084.3	6513224.1	36.1	49.4
M010	483393.9	6512930.0	29.6	58.5
M011	483446.5	6513795.1	35.9	206.2
M014	483567.2	6513862.7	37.8	846.1
M015	483660.0	6512823.0	46.0	28.3
M016	483709.3	6512823.1	20.5	18.6
M017	483780.8	6512937.5	19.5	39.0
M018	483885.0	6513864.9	19.3	242.5
M019	483894.0	6512686.2	6.2	18.0
M020	483926.1	6512696.5	6.3	14.6
M022	484250.1	6513569.1	64.0	265.9
M023	484268.1	6513868.0	5.3	78.4
M024	484431.9	6513868.1	26.3	375.3
M027	485148.1	6514240.4	37.3	1941.4

Anomaly ID	Easting (m)	Northing (m)	Width (m)	Amplitude (nT)
M028	485604.3	6514326.1	14.8	10.3
M029	485677.9	6513038.7	27.5	286.5
M030	485939.5	6512800.1	18.9	31.4
M031	486067.3	6513324.4	38.3	13.3
M032	486094.1	6513633.1	26.6	22.1
M033	486162.7	6514002.4	8.3	197.5
M034	486200.6	6512794.7	20.7	26.9
M035	486284.6	6513181.9	54.7	294.8
M036	486293.7	6513098.1	130.2	39.7
M037	486331.7	6513624.4	22.5	24.0
M038	486358.4	6513319.0	7.0	146.5
M039	486483.5	6513179.6	8.2	3.1
M040	486490.7	6514161.2	30.2	15.8
M042	486743.6	6514383.0	19.4	22.5
M044	486794.5	6514233.4	33.9	60.6
M047	487008.0	6513859.0	21.0	6.3
M079	489102.0	6512933.0	162.9	4115.2
M085	489307.4	6512589.5	68.7	234.2
M086	489309.9	6512612.9	57.7	45.3