Natural England Commissioned Report NECR311

Utopia MCZ 2016 Survey Report

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Foreword

Natural England commission a range of reports from external contractors to provide evidence and advice to assist us in delivering our duties. The views in this report are those of the authors and do not necessarily represent those of Natural England.

Background

Following designation, Natural England started a baseline monitoring programme across all marine protected areas.

This report was commissioned as part of an inshore benthic marine survey of the Utopia MCZ.

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Further information
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Utopia MCZ

2016 Survey Report

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1 Background and Introduction

1.1 Survey Project Team

The Utopia Marine Conservation Zone (MCZ) verification survey was carried out between the 6th and 9th November 2016 on the RV *Cefas Endeavour.* The survey team for the duration of the fieldwork included Cefas marine scientists, three marine scientists from the Joint Nature Conservation Committee (JNCC), two geophysicists, two hydrographers and a Passive Acoustic Monitoring (PAM) operator. This provided 24hr availability for the duration of the survey period.

Cross-shifts

Cefas Scientist in Charge

Cefas Data Manager

Day Shift

Cefas Shift Lead

Cefas Marine Instrumentation Team Technician

Cefas GIS & survey planning

Electronic Geophysical Services (EGS) Hydrographer

EGS Geophysicist

JNCC survey Scientist

Night Shift

Cefas Shift Lead

Cefas GIS

Cefas Chemist

JNCC Survey Lead

JNCC Survey Scientist

EGS Hydrographer

EGS Geophysicist

Gardline Marine Mammal Observer

1.2 Site Description

Utopia MCZ, designated in January 2016[1], is an inshore site located ~20 km east of the Isle of Wight covering an area of ~3 km^2 (Figure 1). The area is characterised by northwest-southeast trending elongate rocky reef features. The area surrounding this rocky reef is predominantly comprised of coarse sediments (gravel to boulder grade material), which are likely to exist as a relatively thin veneer on rock (Defra, 2014). Five Broadscale Habitats (BSH) and one habitat Feature of Conservation Importance (FOCI) have been listed under the MCZ designation order and are presented in Table 1 along with the associated General Management Approach (GMA).

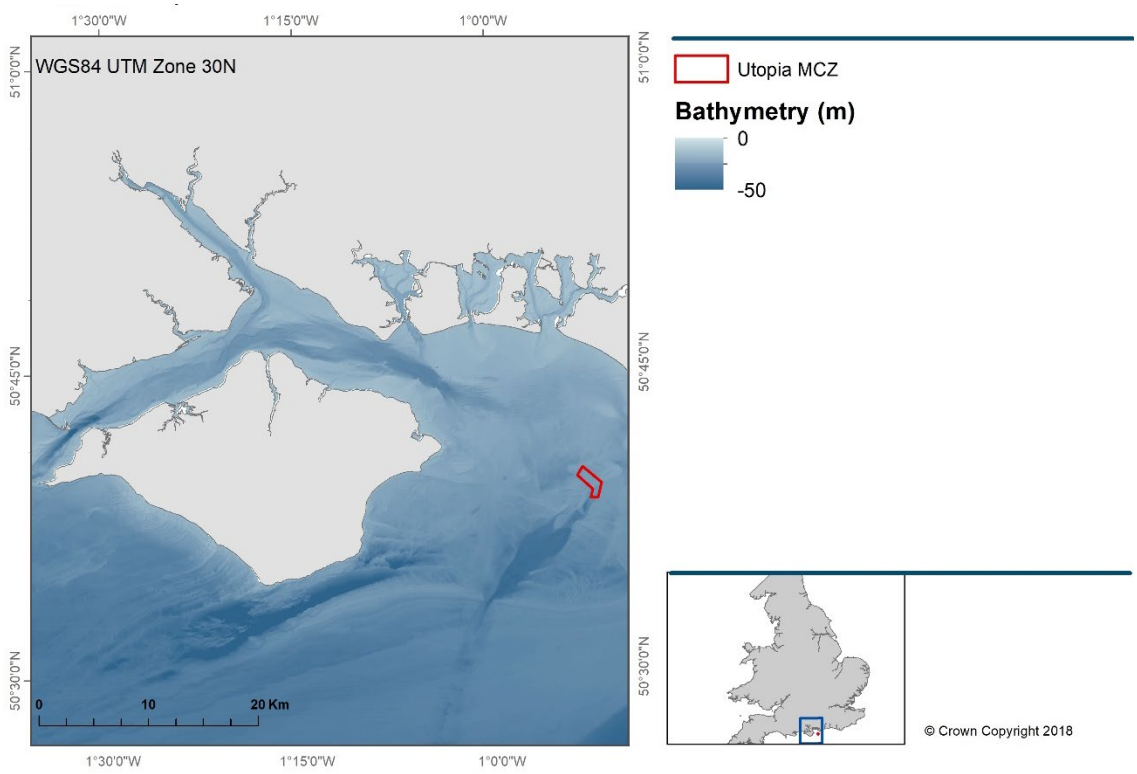

Figure 1. Location of Utopia MCZ

1.3 Geological and Biological Context

The Utopia rocky reef consists of an area of bedrock and large boulders that host rich communities of sponges, anthozoans, hydroids and bryozoans. The reef is surrounded by sediment consisting mainly of coarse gravels. The biological communities that are established within the Utopia MCZ are dominated by large, slow growing species such

[1] http://www.legislation.gov.uk/ukmo/2016/21/contents/created [Accessed 10/05/2018]

as branching sponges and Ross coral, a type of bryozoan or sea-moss that provides complex substrate for colonisation by small fish, crabs and prawns[2].

Table 1. Features proposed for designation within Utopia MCZ.

Protected features	General management approach
Moderate energy circalittoral rock	Recover to favourable condition
High energy circalittoral rock	Recover to favourable condition
Subtidal coarse sediment	Recover to favourable condition
Subtidal mixed sediments	Recover to favourable condition
Subtidal sand	Recover to favourable condition
Fragile sponge and anthozoan communities on subtidal rocky habitat	Recover to favourable condition

1.4 Existing data and information utilised to inform survey planning

1.4.1 Existing acoustic data

In 2003, 100% acoustic coverage was collected at Utopia MCZ by the Royal Navy, on behalf of the United Kingdom Hydrographic Office (UKHO) (Figure 2).

1.4.2 Existing ground truth data

In February 2012, the Environment Agency (EA) conducted a survey at Utopia MCZ. Camera tows were acquired on a 300 m diamond lattice design using a drop camera system (Figure 2). Twenty drop camera tows were conducted. These stations predominantly identified coarse sediment.

1.4.3 Habitat map

The 2003 acoustic data were used in conjunction with the EA groundtruthing data acquired in 2012 to produce a habitat map, which was utilised for survey planning purposes.

[2] https://www.gov.uk/government/publications/marine-conservation-zones-utopia [Accessed 10/05/2018]

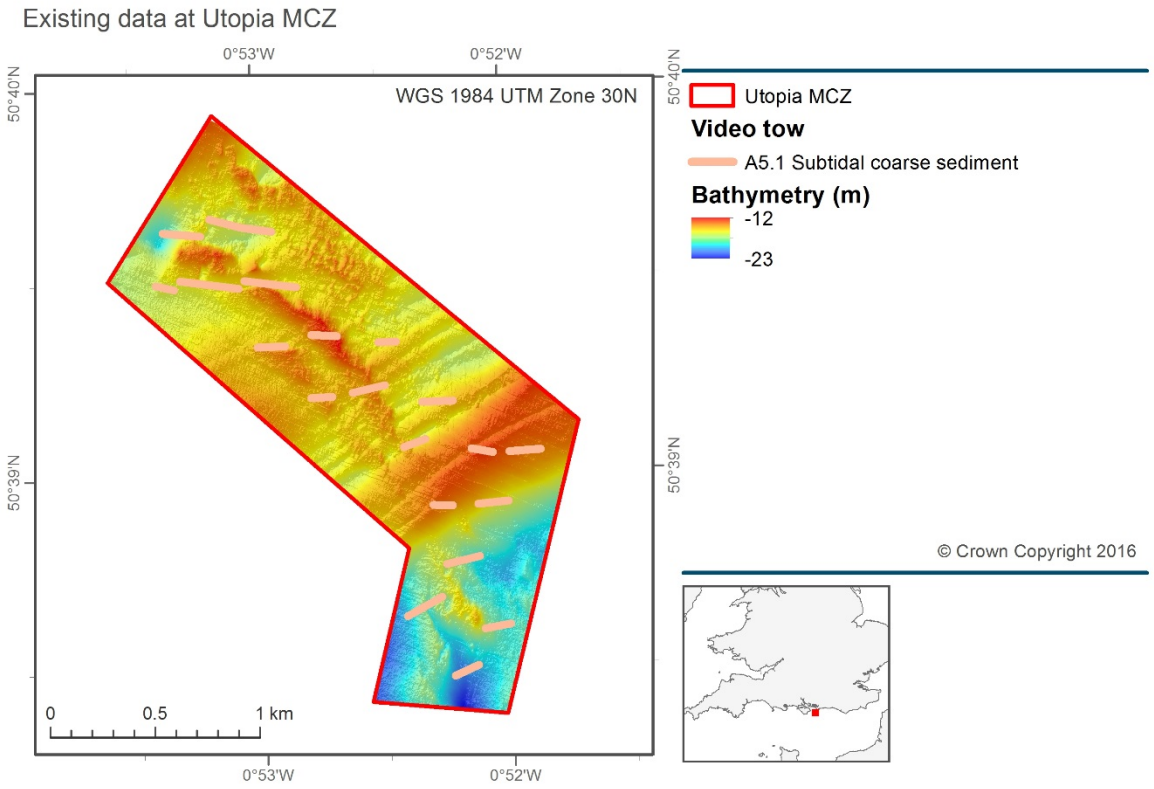

Figure 2. Location and EUNIS groups of processed video tows from an EA survey in 2012, overlaid on UKHO acquired bathymetric data

2 Aims and objectives

This survey aims to target the designated rock and sediment features of Utopia MCZ to obtain improved evidence, potentially ascribe condition and provide a baseline dataset which can then be used to detect change over time and support future monitoring.

1. Survey objectives

a) To undertake a grab and camera survey of designated features at a specified level of power to detect a change over time inside the site boundary.

b) To groundtruth subtidal sediment features 'A5.1 Subtidal coarse sediment', 'A5.2 Subtidal sand' and 'A5.4 Subtidal mixed sediments' identified only from still images during the 2012 survey and compare to sediment features outside the MCZ.

c) To undertake a detailed survey of the subtidal rock BSH 'A4.1 / A4.2 High / moderate energy circalittoral rock' and the designated habitat FOCI 'Fragile sponge and anthozoan communities on subtidal rocky habitats'.

3 Survey design and methods

3.1 Survey planning and design

3.1.1 Groundtruthing Survey

Drop camera sampling positions were planned to coincide with mapped areas of 'A4.2 Moderate energy circalittoral rock' (Figure 3). A total of 27 ground truth stations were planned at Utopia MCZ. Hamon Grab deployments for sediment sampling were also planned, to characterise the infaunal communities and particle size of the predicted coarse habitat. No nearby groundtruthing information was available outside of the MCZ. Hamon Grab stations were, therefore, also planned outside of the site to explore the future viability of a Before, After, Control, Impact (BACI) design. A total of 45 stations were planned within the site on a 250 m diamond lattice, though some stations were moved from locations considered to be coincident with hard substrate. A further 36 stations were planned outside of the site on a 350 m diamond lattice. The area identified outside the site was deemed to be likely to represent similar habitat, based on backscatter and bathymetry data, as well as not being coincident with any known ongoing human activities. Additional three minute camera locations were also targeted on failed Hamon Grab stations, that had resulted in three 'no samples', to assess the nature of the seabed at those locations.

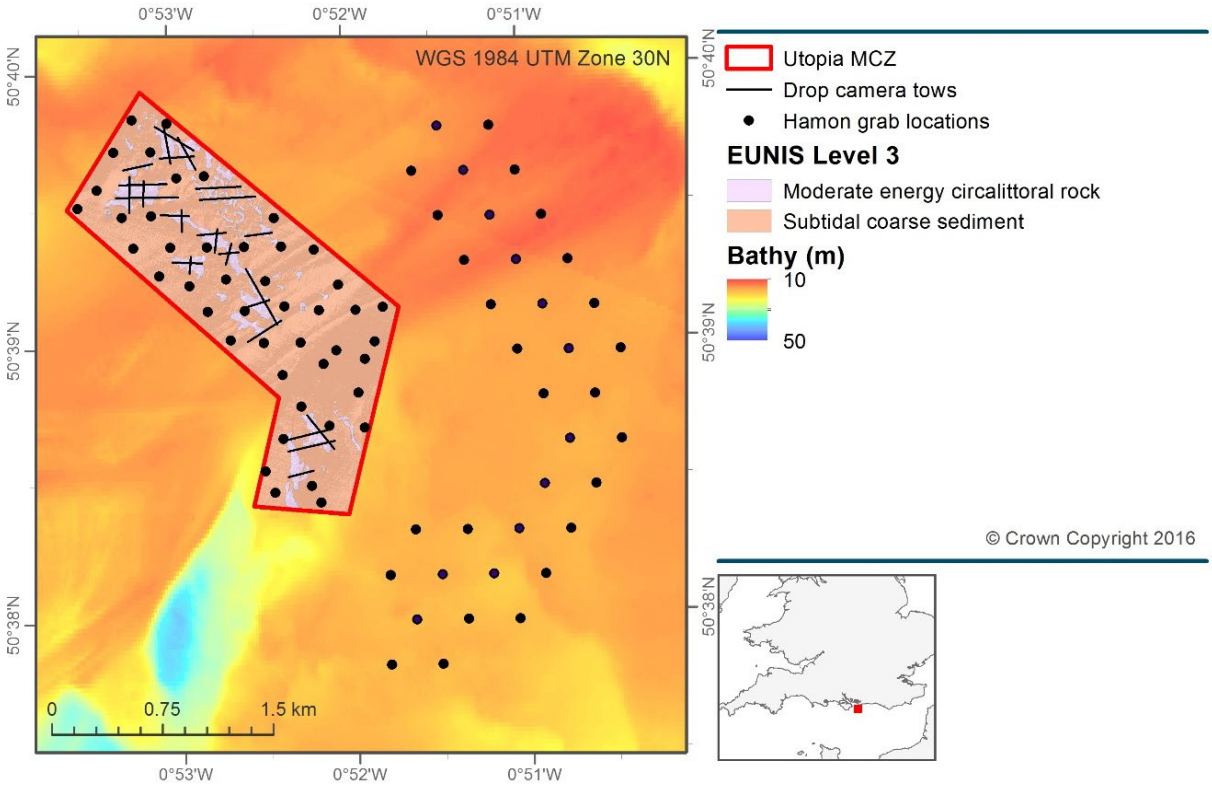

Figure 3. Planned groundtruthing locations at the Utopia MCZ.

3.2 Survey Equipment and sample processing

3.2.1 Ground truth sampling

Ground truth sampling was achieved using grabs and underwater video cameras, as described below.

3.2.1.1 Grabs

The grab system comprised a 0.1 m^2 mini Hamon Grab (Figure 4). It was not possible to collect samples from all planned stations due to hard substrate at some target locations, as well as time constraints. All planned stations within the site were attempted, whilst stations outside of the site were prioritised to maximise a wider geographical coverage. Where samples were successfully collected, they were obtained anywhere within a 50 m radius 'bullring' centred on the target location. On recovery, the grab was emptied into a large plastic bin and a representative sub-sample of sediment (approx. 0.5 litres) taken for Particle Size Analysis (PSA). The sample was stored in a labelled plastic container and frozen ready for transfer to a laboratory ashore. The remaining sample was photographed and the volume of sediment measured and recorded. Benthic fauna were collected by washing the sample with sea-water over a 1 mm sieve. The retained >1 mm fraction was transferred to a labelled container and preserved in buffered 4% formaldehyde for analysis ashore. A visual assessment was made of the sediment type sampled by the grab and noted on the field records, assigning the sample to a Folk class and its equivalent EUNIS Level 3 and BSH sediment class.

Figure 4. Mini Hamon Grab.

3.2.1.2 Cameras

Video observations were made with a Drop Camera (DC) system (Figure 5), having a video camera with capability to also capture still images. Illumination was provided by two Cefas high intensity LED striplights and a dedicated flash unit. The camera was oriented to provide a forward oblique view of the seabed and was fitted with a two-spot (green) laser-scaling device which projected a line of 20 cm along the axis of the lens onto the seabed. Set-up and operation followed the Mapping European Seabed Habitats (MESH) 'Recommended Operating Guidelines (ROG) for underwater video and photographic imaging techniques'[3]. Video was recorded to a computer hard drive before copying to a backup drive. A video overlay was used to provide station metadata, time, height above seabed and position (of the Global Positioning System antenna) in the recorded video image.

The DC system was towed at ~0.3 knots along the planned transect line. Stills images were captured at regular one-minute intervals and opportunistically if specific features of interest were encountered. The DC was controlled by a winch operator with sight of the video monitor.

[3] http://www.emodnet-seabedhabitats.eu/PDF/GMHM3_Video_ROG.pdf [Accessed 10/05/2018]

Figure 5. Drop Camera video and still imaging system.

Field notes were made during each camera deployment, noting station and sample metadata, real-time observations of substrate type and taxa, and an initial assessment of the range of BSHs that had been seen.

3.2.2 Camera clock synchronisations

The internal clock of the camera used on the sledge was synchronised with GPS time. This clock creates a timestamp in the Exchangeable Image Format (EXIF) data stored in the digital image.

3.2.3 GPS positions and corrections.

GPS fixes were recorded using the Tower Navigation system on RV *Cefas Endeavour*. This records the Lat/Long position of the side gantry from which the sampling equipment is being deployed, automatically compensating for the offset between these gantries and the GPS antenna. Fixes for grab samples were taken at the instant the grab contacted the seabed. The grab system was always deployed from the side gantry and the position recorded is taken to be its true position on/above the seabed. For the Drop camera, GPS positional fixes were taken, for both the side gantry steer point and the position derived from Ultra Short Base Length (USBL). Fixes were acquired continuously at a rate of one fix every five seconds throughout the tow. The USBL position is the camera's position derived from the beacon attached to cameras

frame and transmitted to the USBL pole beneath the vessel. The side gantry position is collected simultaneously as the USBL position as a backup, should the beacon fail to transmit. This allowed the position of the camera system above the seabed to be cross referenced with the time at which the still image was captured, to accurately determine the position of each still image acquired during the drop camera transect. USBL positions were used by default, however where the USBL was not functioning accurately for more than 90 seconds of the video footage, the side gantry position was used for the entire video station.

4 Survey Narrative

4.1 Utopia MCZ

The survey at Utopia MCZ was completed between 0900 hrs on 6th November 2016 and 1700 hrs on 9th November 2016. After transiting from the Pisces Reef Complex candidate Special Area of Conservation (cSAC) and Site of Community Importance (SCI), the *RV Cefas Endeavour* survey commenced with drop camera tows on pre-planned lines. Drop camera operations were delayed due to weather at 0640 on 7th November. This decision was taken due to the vessel being unable to hold track along the planned drop camera lines. The vessel's capability allowed a swap to Hamon Grab operations, which commenced at 0800 hrs the same day. Grab operations were completed within the Utopia MCZ at 0315 on 8th November. Drop camera tows were then completed over the predicted rocky habitats, as well as at locations where no grab samples were achieved. Sampling within the site was completed at 0923 on the 8th November and swapped to Hamon Grab target stations outside of the site.

At 1500 on 8th November, the *RV Cefas Endeavour* broke from survey operations and commenced transit to the home port of Lowestoft, arriving and alongside at 1700 on 9th November.

Not all survey objectives were completed due to insufficient time before having to make way for port. Sampling outside of the site was not fully completed, although a geographical spread of sampling was prioritised, to provide evidence for habitat types for any future survey designs.

5 Sample acquisition

5.1 Grab samples

Grab samples were successfully collected at 32 stations within the Utopia MCZ site, with a further 13 stations failing to return a viable sample. Eight successful grabs were collected outside of the site, with a further five stations failing to return a viable sample (Figure 6). Cobbles were present in several sediment samples collected for PSA and infaunal community analyses.

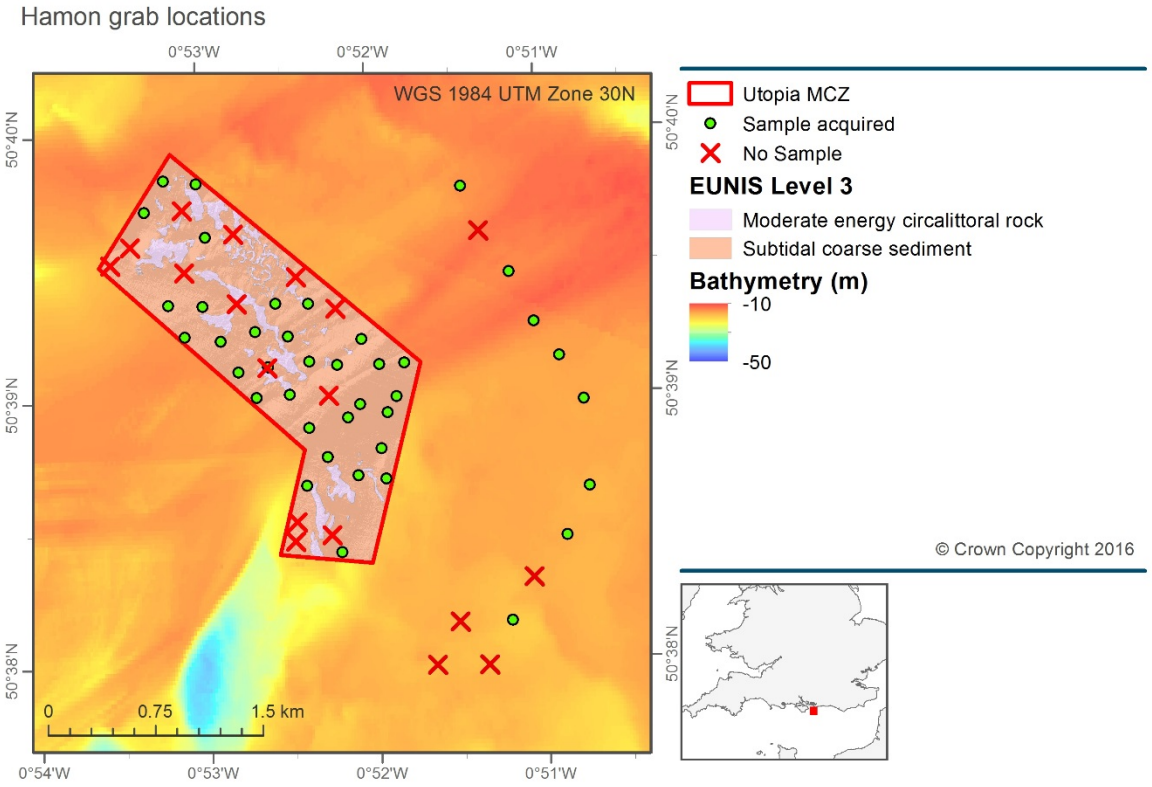

Figure 6. Location of attempted grab stations at Utopia MCZ displaying successful and failed stations.

5.2 Seabed Imagery

Underwater video and still images were successfully acquired at 27 stations (Figure 7). A further thirteen three minute tows were acquired at stations coincident with failed Hamon Grab sampling.

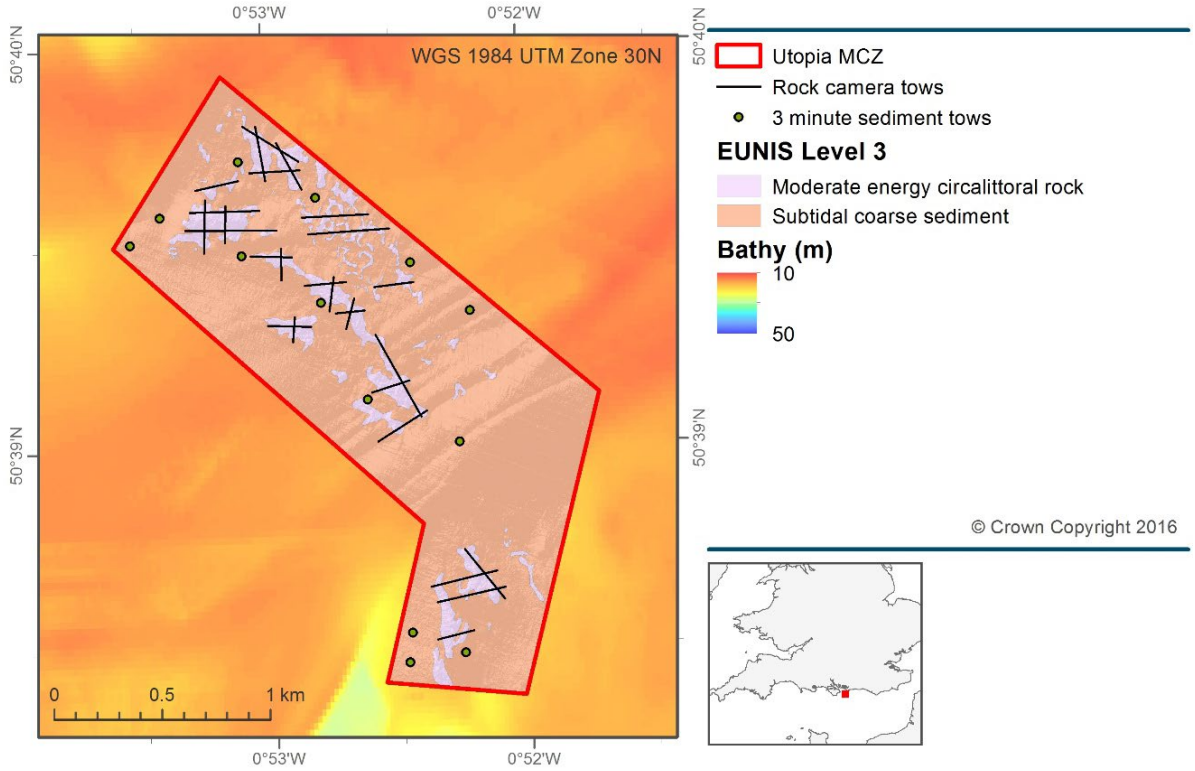

Figure 7. Location of video stations acquired at Utopia MCZ.

5.3 Evidence of anthropogenic impacts.

No anthropogenic activities were identified during the survey within the Utopia MCZ.

6 References

Defra (2014). Utopia rMCZ Post-survey Site.

7 Annexes

7.1 RV Cefas Endeavour

Port of registry	Lowestoft
Length OA	73.00 m (excluding stern roller)
Length extreme	73.916 m
Breadth (MLD)	15.80 m
Depth (MLD)	8.20 m
Design draft	5.00 m
Deep draught	5.50 m
LBP	66.50 m
Gross tonnage	2983 tonnes
Net register tonnage	894 tonnes
Net lightship	2436 tonnes
Deadweight @ 5.00 m	784 tonnes
Deadweight @ 5.50 m	1244 tonnes
Displacement @ 5.00 m	3210 tonnes
Displacement @ 5.50 m	3680 tonnes
Builder	Ferguson Shipbuilders Limited, Port Glasgow
Commissioned	2003
Communications	In port BT Tel. Cellphone Voice/Fax/Data Radio TELEX Inmarsat C Fleet 77 (Inmarsat F) and VSAT (eutelsat) internet access
Endurance	42 days
Complement	En suite accommodation for 16 crew and 19 scientists with dedicated hospital facility
Propulsion System	AC/DC Diesel Electric 3 x diesel electric AC generators, individually raft mounted 2 x tandem electric DC motors Single screw
Power generation	3240 Kw
Power propulsion	2230 Kw
Thrusters	Bow thruster (flush mounted azimuthing) Stern thruster (tunnel)
Trial speed	14.4 knots
Bollard pull	29 tonnes
Call sign	VQHF3
Official number	906938
MMSI	235005270
Lloyds/IMO number	9251107

Side Gantry	7.5 tonne articulated side A-frame
Stern Gantry	25 tonne stern A-frame
Winches	3 x cranes 35 tM, heave compensated 2 x trawl winches 2 x drum winches, (1 double) Double barrel survey winch with motion compensation and slip rings Double barrel survey winch with slip rings Double barrel towing winch with slip rings Side-scan sonar winch with slip rings 3 x Gilson winches (one fitted to stern A-frame)
Transducers/Sea tube	Drop keel to deploy transducers outside the hull boundary layer in addition to hull mounted transducers 1.2 m diameter sea tube/moon-pool
Acoustic equipment	Kongsberg Simrad: HiPAP 500 positioning sonar EK60, 38/120 kHz scientific sounder EA 600, 50/200 kHz scientific sounder Scanmar net mensuration system SH80 high frequency omni-directional sonar EM3002 swathe bathymetry sounder Hull mounted Scanmar fishing computer transducers
Boats	2 x 8m rigid work and rescue boats with suite of navigational equipment deployed on heave-compensated davits
Laboratories	8 networked laboratories designed for optimum flexibility of purpose 4 serviced deck locations for containerised laboratories
Special features	Dynamic positioning system Interring anti-roll system Local Area Network with scientific data management system Ship-wide general information system CCTV
Class	LRS 100A1+LMC UMS SCM CCS ICC IP ES(2) DP(CM) ICE class 2

7.2 Drop Camera

The drop frame was equipped with the following camera and specifications:

- HD-SDI 1080p/30fps Subsea video camera
- 18 Mega Pixels Digital Stills Camera
- Separate high-powered flash
- Up to 4 high Intensity LED Lights
- 2x Dual Scaling Lasers
- 250 kHz Precision Altimeter
- Combined Compass & Depth Sensor

7.3 Position Logging Software – Tower Navigation

Vessel offsets are defined from the pitch roll centre of the vessel – the Common Reference Point (CRP) used by the Tower CEMAP software to calculate offsets.

7.4 Station metadata

Station metadata for the Utopia MCZ survey is provided below. All stations were sampled on Cruise CEND 2316X. Station Code is used to identify the location of the sampling station. Station Number is a sequential event number for the cruise, so changes each time a new gear is used or a new location is sampled. All positions in decimal degrees, Lat/Long WGS84. Key: HG=Ham Grab, DC=Drop Camera, CTD = Conductivity, Temperature and Depth, OBS = Optical Back Scatter, SOL = Start Of Line, EOL = End Of Line.

Date	Station Number	Station Code	Gear Code	Water depth (m)	Attempt	Time	Latitude_DD	Longitude_DD	Comment
06/11/2016	95	UTPA01	DC & CTD, OBS, Flu, Optode	18	A1	09:19	50.66343	-0.88464	SOL
06/11/2016	95	UTPA01	DC & CTD, OBS, Flu, Optode	18	A1	09:52	50.66193	-0.88105	EOL
06/11/2016	96	UTPA23	DC & CTD, OBS, Flu, Optode	20	A1	10:07	50.66269	-0.88249	SOL
06/11/2016	96	UTPA23	DC & CTD, OBS, Flu, Optode	19	A1	10:32	50.66075	-0.88095	EOL
06/11/2016	97	UTPA02	DC & CTD, OBS, Flu, Optode	18	A1	10:49	50.66156	-0.88112	SOL
06/11/2016	97	UTPA02	DC & CTD, OBS, Flu, Optode	18	A2	11:11	50.66148	-0.88432	SOL
06/11/2016	97	UTPA02	DC & CTD, OBS, Flu, Optode	20	A1	10:50	50.66157	-0.88125	EOL
06/11/2016	97	UTPA02	DC & CTD, OBS, Flu, Optode	18	A2	11:36	50.66153	-0.88104	EOL
06/11/2016	98	UTPA22	DC & CTD, OBS, Flu, Optode	20	A1	11:59	50.66336	-0.88382	SOL
06/11/2016	98	UTPA22	DC & CTD, OBS, Flu, Optode	21	A1	12:27	50.66102	-0.88326	EOL
06/11/2016	99	UTPA03	DC & CTD, OBS, Flu, Optode	21	A1	12:53	50.66083	-0.88783	SOL
06/11/2016	99	UTPA03	DC & CTD, OBS, Flu, Optode	21	A1	13:17	50.66125	-0.88486	EOL
06/11/2016	100	UTPA04	DC & CTD, OBS, Flu, Optode	21	A1	13:36	50.65991	-0.88384	SOL
06/11/2016	100	UTPA04	DC & CTD, OBS, Flu, Optode	22	A1	14:07	50.65988	-0.88855	EOL
06/11/2016	101	UTPA05	DC & CTD, OBS, Flu, Optode	19	A1	14:29	50.65909	-0.88852	SOL
06/11/2016	101	UTPA05	DC & CTD, OBS, Flu, Optode	20	A1	15:19	50.65913	-0.88222	EOL
06/11/2016	102	UTPA20	DC & CTD, OBS, Flu, Optode	21	A1	16:01	50.66039	-0.88725	SOL
06/11/2016	102	UTPA20	DC & CTD, OBS, Flu, Optode	21	A1	16:28	50.65820	-0.88740	EOL
06/11/2016	103	UTPA21	DC & CTD, OBS, Flu, Optode	19	A1	16:41	50.65862	-0.88609	SOL
06/11/2016	103	UTPA21	DC & CTD, OBS, Flu, Optode	21	A1	16:59	50.66011	-0.88594	EOL

06/11/2016	104	UTPA06	DC & CTD, OBS, Flu, Optode	18	A1	17:39	50.65963	-0.88091	SOL
06/11/2016	104	UTPA06	DC & CTD, OBS, Flu, Optode	19	A1	18:13	50.65967	-0.87644	EOL
06/11/2016	105	UTPA08	DC & CTD, OBS, Flu, Optode	19	A1	18:25	50.65900	-0.87539	SOL
06/11/2016	105	UTPA08	DC & CTD, OBS, Flu, Optode	18	A1	19:05	50.65889	-0.88062	EOL
06/11/2016	106	UTPA07	DC & CTD, OBS, Flu, Optode	18	A1	19:18	50.65796	-0.88179	SOL
06/11/2016	106	UTPA07	DC & CTD, OBS, Flu, Optode	18	A1	19:39	50.65804	-0.88442	EOL
06/11/2016	107	UTPA24	DC & CTD, OBS, Flu, Optode	17	A1	19:56	50.65821	-0.88235	SOL
06/11/2016	107	UTPA24	DC & CTD, OBS, Flu, Optode	17	A1	20:11	50.65698	-0.88238	EOL
06/11/2016	108	UTPA10	DC & CTD, OBS, Flu, Optode	15	A1	20:23	50.65678	-0.88072	SOL
06/11/2016	108	UTPA10	DC & CTD, OBS, Flu, Optode	17	A1	20:43	50.65687	-0.87808	EOL
06/11/2016	109	UTPA25	DC & CTD, OBS, Flu, Optode	17	A1	20:54	50.65703	-0.87906	SOL
06/11/2016	109	UTPA25	DC & CTD, OBS, Flu, Optode	16	A1	21:12	50.65558	-0.87934	EOL
06/11/2016	110	UTPA11	DC & CTD, OBS, Flu, Optode	16	A1	21:32	50.65557	-0.87883	SOL
06/11/2016	110	UTPA11	DC & CTD, OBS, Flu, Optode	18	A1	21:46	50.65566	-0.87696	EOL
06/11/2016	111	UTPA26	DC & CTD, OBS, Flu, Optode	17	A1	22:07	50.65606	-0.87776	SOL
06/11/2016	111	UTPA26	DC & CTD, OBS, Flu, Optode	17	A1	22:25	50.65487	-0.87831	EOL
06/11/2016	112	UTPA09	DC & CTD, OBS, Flu, Optode	19	A1	23:05	50.65663	-0.87603	SOL
06/11/2016	112	UTPA09	DC & CTD, OBS, Flu, Optode	19	A1	23:26	50.65677	-0.87374	EOL
06/11/2016	113	UTPA12	DC & CTD, OBS, Flu, Optode	18	A1	23:48	50.65510	-0.88316	SOL
06/11/2016	113	UTPA12	DC & CTD, OBS, Flu, Optode	18	A1	00:13	50.65500	-0.88046	EOL
07/11/2016	114	UTPA27	DC & CTD, OBS, Flu, Optode	18	A1	00:28	50.65539	-0.88164	SOL
07/11/2016	114	UTPA27	DC & CTD, OBS, Flu, Optode	18	A1	00:39	50.65443	-0.88180	EOL
07/11/2016	115	UTPA15	DC & CTD, OBS, Flu, Optode	18	A1	01:09	50.65462	-0.87631	SOL
07/11/2016	115	UTPA15	DC & CTD, OBS, Flu, Optode	19	A1	01:54	50.65117	-0.87353	EOL
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07/11/2016	117	UTPA13	DC & CTD, OBS, Flu, Optode	21	A1	03:03	50.65265	-0.87443	SOL
07/11/2016	117	UTPA13	DC & CTD, OBS, Flu, Optode	20	A1	03:21	50.65225	-0.87670	EOL
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07/11/2016	119	UTPA17	DC & CTD, OBS, Flu, Optode	23	A1	05:13	50.64353	-0.87285	EOL
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07/11/2016	120	UTPA16	DC & CTD, OBS, Flu, Optode	23	A1	06:03	50.64470	-0.86878	EOL
07/11/2016	121	UTPA032	HG	25	A1	08:32	50.64027	-0.87010	SAMPLE
07/11/2016	122	UTPA036	HG	23	A1	08:54	50.64111	-0.87031	NO SAMPLE
07/11/2016	122	UTPA036	HG	23	A2	08:55	50.64108	-0.86995	NO SAMPLE
07/11/2016	122	UTPA036	HG	23	A3	09:07	50.64169	-0.87059	NO SAMPLE
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07/11/2016	122	UTPA036	HG	23	A5	09:27	50.64144	-0.87091	NO SAMPLE
07/11/2016	123	UTPA025	HG	23	A1	09:51	50.64118	-0.87456	NO SAMPLE
07/11/2016	123	UTPA025	HG	23	A2	09:54	50.64117	-0.87458	NO SAMPLE
07/11/2016	123	UTPA025	HG	23	A3	10:02	50.64116	-0.87441	NO SAMPLE
07/11/2016	124	UTPA026	HG	22	A1	10:18	50.64451	-0.87327	NO SAMPLE
07/11/2016	124	UTPA026	HG	22	A2	10:26	50.64451	-0.87341	SAMPLE
07/11/2016	125	UTPA030	HG	19	A1	10:39	50.64644	-0.87125	NO SAMPLE
07/11/2016	125	UTPA030	HG	19	A2	10:44	50.64636	-0.87126	NO SAMPLE
07/11/2016	125	UTPA030	HG	19	A3	10:49	50.64627	-0.87127	SAMPLE
07/11/2016	126	UTPA037	HG	22	A1	11:08	50.64512	-0.86830	NO SAMPLE
07/11/2016	126	UTPA037	HG	22	A2	11:12	50.64512	-0.86831	NO SAMPLE
07/11/2016	126	UTPA037	HG	22	A3	11:19	50.64505	-0.86830	SAMPLE
07/11/2016	127	UTPA040	HG	23	A1	11:41	50.64481	-0.86557	NO SAMPLE
07/11/2016	127	UTPA040	HG	23	A2	11:43	50.64481	-0.86558	SAMPLE
07/11/2016	128	UTPA043	HG	24	A1	12:17	50.64673	-0.86596	SAMPLE
07/11/2016	129	UTPA041	HG	20	A1	13:03	50.64897	-0.86525	SAMPLE
07/11/2016	130	UTPA044	HG	19	A1	13:27	50.64997	-0.86431	SAMPLE
07/11/2016	131	UTPA045	HG	17	A1	13:58	50.65206	-0.86348	SAMPLE
07/11/2016	132	UTPA042	HG	17	A1	14:15	50.65199	-0.86594	SAMPLE

07/11/2016	133	UTPA038	HG	18	A1	14:39	50.64953	-0.86796	NO SAMPLE
07/11/2016	133	UTPA038	HG	18	A2	14:42	50.64953	-0.86794	SAMPLE
07/11/2016	134	UTPA033	HG	18	A1	15:01	50.64871	-0.86917	SAMPLE
07/11/2016	135	UTPA027	HG	19	A1	15:20	50.64812	-0.87302	SAMPLE
07/11/2016	135	UTPA027	HG	19	A2	15:24	50.64811	-0.87305	NO SAMPLE
07/11/2016	135	UTPA027	HG	19	A3	15:28	50.64815	-0.87303	NO SAMPLE
07/11/2016	136	UTPA031	HG	18	A1	15:48	50.65004	-0.87136	NO SAMPLE
07/11/2016	136	UTPA031	HG	18	A2	15:51	50.65004	-0.87136	NO SAMPLE
07/11/2016	136	UTPA031	HG	18	A3	15:55	50.65008	-0.87133	NO SAMPLE
07/11/2016	137	UTPA034	HG	19	A1	16:09	50.65204	-0.86967	NO SAMPLE
07/11/2016	137	UTPA034	HG	19	A2	16:12	50.65204	-0.86966	NO SAMPLE
07/11/2016	138	UTPA039	HG	19	A1	16:24	50.65360	-0.86771	NO SAMPLE
07/11/2016	138	UTPA039	HG	19	A2	16:28	50.65363	-0.86770	NO SAMPLE
07/11/2016	138	UTPA039	HG	19	A3	16:34	50.65361	-0.86766	SAMPLE
07/11/2016	139	UTPA035	HG	19	A1	17:31	50.65559	-0.86969	NO SAMPLE
07/11/2016	139	UTPA035	HG	19	A2	17:35	50.65560	-0.86969	NO SAMPLE
07/11/2016	139	UTPA035	HG	19	A3	17:40	50.65561	-0.86969	NO SAMPLE
07/11/2016	140	UTPA034	HG	17	A1	18:05	50.65203	-0.87009	SAMPLE
07/11/2016	141	UTPA023	HG	19	A1	18:47	50.65193	-0.87278	NO SAMPLE
07/11/2016	141	UTPA023	HG	19	A2	18:50	50.65197	-0.87279	NO SAMPLE
07/11/2016	141	UTPA023	HG	19	A3	18:51	50.65228	-0.87286	SAMPLE
07/11/2016	142	UTPA028	HG	18	A1	18:24	50.65039	-0.87505	NO SAMPLE
07/11/2016	142	UTPA028	HG	18	A2	18:27	50.65029	-0.87494	NO SAMPLE
07/11/2016	142	UTPA028	HG	18	A3	18:30	50.65023	-0.87487	SAMPLE
07/11/2016	143	UTPA017	HG	18	A1	19:03	50.65009	-0.87816	SAMPLE
07/11/2016	144	UTPA019	HG	18	A1	19:18	50.65205	-0.87696	NO SAMPLE
07/11/2016	144	UTPA019	HG	18	A2	19:20	50.65201	-0.87693	NO SAMPLE
07/11/2016	144	UTPA019	HG	18	A3	19:21	50.65201	-0.87692	SAMPLE
07/11/2016	145	UTPA024	HG	17	A1	19:31	50.65405	-0.87504	NO SAMPLE

07/11/2016	145	UTPA024	HG	17	A2	19:33	50.65401	-0.87499	NO SAMPLE
07/11/2016	145	UTPA024	HG	17	A3	19:36	50.65388	-0.87488	SAMPLE
07/11/2016	146	UTPA029	HG	18	A1	19:46	50.65592	-0.87281	SAMPLE
07/11/2016	147	UTPA021	HG	18	A1	20:00	50.65751	-0.87350	NO SAMPLE
07/11/2016	147	UTPA021	HG	18	A2	20:03	50.65754	-0.87353	NO SAMPLE
07/11/2016	147	UTPA021	HG	18	A3	20:05	50.65754	-0.87357	NO SAMPLE
07/11/2016	148	UTPA020	HG	18	A1	20:15	50.65605	-0.87614	NO SAMPLE
07/11/2016	148	UTPA020	HG	18	A2	20:17	50.65597	-0.87603	SAMPLE
07/11/2016	149	UTPA018	HG	16	A1	20:32	50.65424	-0.87812	SAMPLE
07/11/2016	150	UTPA014	HG	17	A1	20:51	50.65173	-0.87986	SAMPLE
07/11/2016	151	UTPA013	HG	17	A1	21:03	50.65376	-0.88186	NO SAMPLE
07/11/2016	151	UTPA013	HG	17	A2	21:06	50.65367	-0.88154	SAMPLE
07/11/2016	152	UTPA015	HG	16	A1	21:22	50.65590	-0.88033	NO SAMPLE
07/11/2016	152	UTPA015	HG	16	A2	21:24	50.65591	-0.88015	NO SAMPLE
07/11/2016	152	UTPA015	HG	16	A3	21:29	50.65600	-0.88018	NO SAMPLE
07/11/2016	153	UTPA010	HG	17	A1	21:40	50.65599	-0.88329	NO SAMPLE
07/11/2016	153	UTPA010	HG	17	A2	21:41	50.65599	-0.88328	NO SAMPLE
07/11/2016	153	UTPA010	HG	17	A3	21:44	50.65598	-0.88327	NO SAMPLE
07/11/2016	153	UTPA010	HG	17	A4	21:51	50.65590	-0.88323	SAMPLE
07/11/2016	154	UTPA007	HG	16	A1	22:14	50.65399	-0.88509	NO SAMPLE
07/11/2016	154	UTPA007	HG	16	A2	22:17	50.65399	-0.88507	SAMPLE
07/11/2016	154	UTPA007	HG	16	A3	22:23	50.65403	-0.88503	NO SAMPLE
07/11/2016	155	UTPA005	HG	18	A1	22:35	50.65607	-0.88676	NO SAMPLE
07/11/2016	155	UTPA005	HG	18	A2	22:41	50.65605	-0.88669	NO SAMPLE
07/11/2016	155	UTPA005	HG	18	A3	22:45	50.65602	-0.88663	SAMPLE
07/11/2016	156	UTPA008	HG	18	A1	23:01	50.65815	-0.88549	NO SAMPLE
07/11/2016	156	UTPA008	HG	18	A2	23:05	50.65813	-0.88543	NO SAMPLE
07/11/2016	156	UTPA008	HG	18	A3	23:09	50.65811	-0.88536	NO SAMPLE
07/11/2016	157	UTPA003	HG	18	A1	23:18	50.65796	-0.88771	NO SAMPLE

07/11/2016	157	UTPA003	HG	18	A2	23:22	50.65795	-0.88765	NO SAMPLE
07/11/2016	157	UTPA003	HG	18	A3	23:26	50.65793	-0.88758	NO SAMPLE
07/11/2016	158	UTPA001	HG	20	A1	22:38	50.65865	-0.89250	NO SAMPLE
07/11/2016	158	UTPA001	HG	20	A2	23:42	50.65863	-0.89242	NO SAMPLE
07/11/2016	158	UTPA001	HG	20	A3	23:46	50.65861	-0.89236	NO SAMPLE
08/11/2016	159	UTPA002	HG	19	A1	00:05	50.65968	-0.89054	NO SAMPLE
08/11/2016	159	UTPA002	HG	19	A2	00:14	50.65963	-0.89042	NO SAMPLE
08/11/2016	159	UTPA002	HG	19	A3	00:17	50.65959	-0.89029	NO SAMPLE
08/11/2016	160	UTPA004	HG	19	A1	00:36	50.66189	-0.88876	SAMPLE
08/11/2016	161	UTPA006	HG	17	A1	00:53	50.66386	-0.88692	NO SAMPLE
08/11/2016	161	UTPA006	HG	17	A2	00:59	50.66383	-0.88681	SAMPLE
08/11/2016	162	UTPA012	HG	18	A1	01:14	50.66360	-0.88357	SAMPLE
08/11/2016	163	UTPA009	HG	19	A1	01:30	50.66189	-0.88513	NO SAMPLE
08/11/2016	163	UTPA009	HG	19	A2	01:35	50.66189	-0.88499	NO SAMPLE
08/11/2016	163	UTPA009	HG	19	A3	01:40	50.66187	-0.88486	NO SAMPLE
08/11/2016	164	UTPA011	HG	19	A1	01:56	50.66022	-0.88278	SAMPLE
08/11/2016	165	UTPA016	HG	19	A1	02:10	50.66031	-0.88016	NO SAMPLE
08/11/2016	165	UTPA016	HG	19	A2	02:15	50.66027	-0.88002	NO SAMPLE
08/11/2016	165	UTPA016	HG	19	A3	02:22	50.66023	-0.87989	NO SAMPLE
08/11/2016	166	UTPA016	HG	26	A1	03:03	50.64233	-0.87534	NO SAMPLE
08/11/2016	166	UTPA016	HG	26	A2	03:10	50.64238	-0.87520	NO SAMPLE
08/11/2016	166	UTPA022	HG	26	A3	03:15	50.64229	-0.87515	NO SAMPLE
08/11/2016	167	DCUTPA18	DC & CTD, OBS, Flu, Optode	24	A1	03:39	50.64192	-0.87272	SOL
08/11/2016	167	DCUTPA18	DC & CTD, OBS, Flu, Optode	25	A1	03:57	50.64227	-0.87045	EOL
08/11/2016	168	UTPA036	DC	25	A1	04:47	50.64136	-0.87066	SOL
08/11/2016	168	UTPA036	DC	25	A1	04:50	50.64136	-0.87105	EOL
08/11/2016	169	UTPA025	DC	25	A1	05:04	50.64100	-0.87425	SOL
08/11/2016	169	UTPA025	DC	25	A1	05:06	50.64101	-0.87469	EOL
08/11/2016	170	UTPA022	DC	26	A1	05:21	50.64223	-0.87507	SOL

08/11/2016	170	UTPA022	DC	25	A1	05:25	50.64224	-0.87448	EOL
08/11/2016	171	UTPA031	DC	18	A1	05:44	50.65007	-0.87138	SOL
08/11/2016	171	UTPA031	DC	18	A1	05:47	50.65012	-0.87105	EOL
08/11/2016	172	UTPA035	DC	21	A1	06:02	50.65560	-0.86975	SOL
08/11/2016	172	UTPA035	DC	21	A1	06:05	50.65555	-0.87016	EOL
08/11/2016	173	UTPA021	DC	20	A1	06:20	50.65773	-0.87365	SOL
08/11/2016	173	UTPA021	DC	20	A1	06:23	50.65760	-0.87397	EOL
08/11/2016	174	UTPA019	DC	20	A1	06:39	50.65206	-0.87668	SOL
08/11/2016	174	UTPA019	DC	20	A1	06:42	50.65196	-0.87700	EOL
08/11/2016	175	UTPA015	DC	18	A1	06:57	50.65596	-0.88014	SOL
08/11/2016	175	UTPA015	DC	17	A1	07:00	50.65602	-0.87986	EOL
08/11/2016	176	UTPA016	DC	19	A1	07:14	50.66027	-0.88034	SOL
08/11/2016	176	UTPA016	DC	19	A1	07:16	50.66039	-0.88005	EOL
08/11/2016	177	UTPA008	DC	19	A1	08:07	50.65796	-0.88528	SOL
08/11/2016	177	UTPA008	DC	19	A1	08:09	50.65804	-0.88497	EOL
08/11/2016	178	UTPA009	DC	19	A1	08:21	50.66183	-0.88558	SOL
08/11/2016	178	UTPA009	DC	19	A1	08:25	50.66195	-0.88505	EOL
08/11/2016	179	UTPA002	DC	20	A1	08:37	50.65953	-0.89051	SOL
08/11/2016	179	UTPA002	DC	20	A1	08:40	50.65971	-0.89026	EOL
08/11/2016	180	UTPA001	DC	20	A1	08:50	50.65848	-0.89247	SOL
08/11/2016	180	UTPA001	DC	20	A1	08:52	50.65860	-0.89225	EOL
08/11/2016	181	UTPA054	HG	17	A1	09:23	50.66305	-0.85746	SAMPLE
08/11/2016	182	UTPA058	HG	15	A1	09:39	50.66034	-0.85559	NO SAMPLE
08/11/2016	182	UTPA058	HG	15	A2	09:45	50.66028	-0.85571	NO SAMPLE
08/11/2016	182	UTPA058	HG	15	A3	09:50	50.66023	-0.85583	NO SAMPLE
08/11/2016	183	UTPA061	HG	16	A1	10:04	50.65760	-0.85292	SAMPLE
08/11/2016	184	UTPA066	HG	14	A1	10:24	50.65446	-0.85060	SAMPLE
08/11/2016	185	UTPA071	HG	18	A1	10:42	50.65228	-0.84817	SAMPLE
08/11/2016	186	UTPA075	HG	18	A1	11:06	50.64952	-0.84601	NO SAMPLE

08/11/2016	186	UTPA075	HG	18	A2	11:11	50.64952	-0.84586	SAMPLE
08/11/2016	187	UTPA074	HG	19	A1	11:31	50.64406	-0.84551	SAMPLE
08/11/2016	188	UTPA069	HG	19	A1	11:48	50.64109	-0.84776	NO SAMPLE
08/11/2016	188	UTPA069	HG	19	A2	11:56	50.64100	-0.84776	NO SAMPLE
08/11/2016	188	UTPA069	HG	19	A3	12:00	50.64100	-0.84784	SAMPLE
08/11/2016	189	UTPA064	HG	20	A1	12:22	50.63841	-0.85096	NO SAMPLE
08/11/2016	189	UTPA064	HG	20	A2	12:27	50.63843	-0.85111	NO SAMPLE
08/11/2016	189	UTPA064	HG	20	A3	12:32	50.63844	-0.85125	NO SAMPLE
08/11/2016	190	UTPA059	HG	22	A1	12:59	50.63572	-0.85346	SAMPLE
08/11/2016	191	UTPA052	HG	20	A1	13:20	50.63570	-0.85838	NO SAMPLE
08/11/2016	191	UTPA052	HG	20	A2	13:28	50.63571	-0.85853	NO SAMPLE
08/11/2016	191	UTPA052	HG	20	A3	13:34	50.63571	-0.85868	SAMPLE
08/11/2016	192	UTPA048	HG	20	A1	13:55	50.63306	-0.86088	NO SAMPLE
08/11/2016	192	UTPA048	HG	20	A2	13:56	50.63306	-0.86087	NO SAMPLE
08/11/2016	192	UTPA048	HG	20	A3	14:01	50.63305	-0.86103	SAMPLE
08/11/2016	192	UTPA048	HG	20	A4	14:06	50.63305	-0.86118	NO SAMPLE
08/11/2016	193	UTPA055	HG	21	A1	14:25	50.63297	-0.85600	NO SAMPLE
08/11/2016	193	UTPA055	HG	21	A2	14:29	50.63299	-0.85591	NO SAMPLE
08/11/2016	193	UTPA055	HG	21	A3	14:33	50.63299	-0.85585	NO SAMPLE
08/11/2016	193	UTPA055	HG	21	A4	14:34	50.63299	-0.85586	SAMPLE

7.5 Daily Progress Reports

The Natural England Daily Progress Reports (DPRs) covering the days which had activities relating to the Utopia MCZ survey are reproduced in the two documents below. Double click to open.

-

Vessel: RV Cefas Endeavour GSM : 07799 773456	Project: Pisces Reef Complex cSAC/SCI Monitoring CEND2316x Satellite Voice Bridge: 00 870 (or 00871) 763998027
Daily Progress Report No. 08 Date: 06/11/2016	Location at 24:00 (GMT): 50° 16.6' N 02° 53.8' E

Cefas	Chris Jenkins	chris.jenkins@cefas.co.uk
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Cefas	Kelly Baker	kelly.baker@cefas.co.uk
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Cefas	Sonia Kirby	sonia.kirby@cefas.co.uk
Cefas	Sue Ware	suzanne.ware@cefas.co.uk
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EGS	Paul Clement	pclement@egssurvey.co.uk
EGS	Stephen Hayes	shayes@egssurvey.co.uk
EGS	Debbie Jenkins	djenkins@egssurvey.co.uk
Gardline	N/A	3rdpartyDPRs@gardline.com
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JNCC	Tammy Noble-James	tammy.noble-james@jncc.gov.uk
NE	Mike Young	michael.young@naturalengland.org.uk
NE	Ben Green	benjamin.green@naturalengland.org.uk

Accidents/Incidents	-	-
Near Misses	-	1
Safety Drills/Induction	-	2
Additional comments:	-	

00:00	Transit	Continue transit to Utopia MCZ
09:00	TOSa	Arrive at Utopia MCZ and begin camera sampling. Note had to hold fire for approx 20 mins while shipping container passed on one of the stations.

Weather/sea state conditions	0000-0600	0600-1200	1200-1800	1800-2400	Remarks

Page 1 of 3

DPR 08.

DAILY LOG
STATUS REPORT
CEND2316x – Pisces Reef Complex cSAC/SCI Monitoring Survey

Vessel: RV Cefas Endeavour GSM : 07799 773456	Project: Pisces Reef Complex cSAC/SCI Monitoring CEND2316x Satellite Voice Bridge: 00 870 (or 00871) 763998027
Daily Progress Report No. 09	Location at 24:00 (GMT): 50° 16.6" N 02° 53.8" E
Date: 07/11/2016	

To Company:	Person:	E-mail:
Cefas	Chris Jenkins	chris.jenkins@cefas.co.uk
Cefas	Dave Limpenny	david.limpenny@cefas.co.uk
Cefas	Kelly Baker	kelly.baker@cefas.co.uk
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Cefas	Sonia Kirby	sonia.kirby@cefas.co.uk
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NE	Mike Young	michael.young@naturalengland.org.uk
NE	Ben Green	benjamin.green@naturalengland.org.uk

Safety

	Today	To Date
Accidents/Incidents	-	-
Near Misses	-	1
Safety Drills/Induction	-	2
Additional comments:	-	

Summary of operations 0000-2400

Time UTC	Type	Comments
00:00	TOSa	Continue camera sampling within Utopia MCZ
06:20	Ship/Plant Downtime	Engine issues
06:40	Waiting On Weather	Conditions make it difficult to maintain position along camera tow lines so decision made to switch to Hamon grab operations
08:00	TOSa	Hamon grab sampling at stations within Utopia MCZ

Weather

Weather/sea state conditions	0000-0600	0600-1200	1200-1800	1800-2400	Remarks

DPRs 09 –11.

7.6 Cobble analysis

Standard Operating Procedure for the analysis of the cobble fraction from a grab sample onboard a research vessel

After the grab is retrieved and the bucket is emptied in the crate, the following procedure should be followed for the analysis of the cobble fraction. The standard SOP's for grab analysis should be used in conjunction with this SOP.

1. Empty the contents of the grab into a large container (e.g. fish box). Add a suitable label (Cruise ID, Station No., Station Code) and photograph the entire sample, using a digital camera.
2. Empty the sample into a graduated bucket and record the sample volume to the nearest 0.5 litre.
3. Take a 500 ml (if only a smaller volume could be collected this should be recorded on the log sheet) sub-sample for PSA analysis and store in a labelled, plastic container. The sub-sample should be representative for the < 64 mm fraction and should NOT include cobbles (>64mm).
4. Set up the benthos sorting table with two grids inside the table, a 5 mm mesh first and a 64 mm mesh on top. Place a 1 mm sieve at the outlet.
5. Empty the sample from the graduated bucket into the benthos sorting table as usual, and was with seawater hoses. The cobbles will be retained on the 64 mm mesh.
6. Remove the 64 mm mesh (complete with cobble fraction) from the benthos sorting table, place it on the deck, add a suitably large label (Cruise ID, Station No., Station Code) and take a photograph of the entire cobble sample using a digital camera.
7. Prepare and label a suitable sized bucket. The cobbles are to be preserved in formalin for later biological analysis. Use appropriate internal and external labels.
8. Collect a Cobble log sheet and fill in the header data: Cruise Name, Station Number, Station Code, Date, Gear Type and Number of cobbles. Tick the photo box to show you have photographed the entire sample.
9. For each individual cobble, do the following
    a. Place the cobble on a suitable background (not shiny), next to a scale object (e.g. ruler) and a label showing Cruise Code, Station Number, Station Code and COBBLE NUMBER. Photograph the arrangement with a digital camera.
    b. Using vernier callipers, measure the 3 perpendicular dimensions of the cobble (length, width and height = x, y and z) to the nearest millimetre and note these on the record sheet.
    c. Record the weight of the cobble (grams).

d. Record the volume of the cobble (cm^3). Determine this by displacement of water in a graduated measuring vessel.

e. Record the hardness of the rock on a 3-point scale, judging the hardness from a fingernail scratch test. See the attached sheet on rock types & hardness for guidance.

Hard	No scratch left by fingernail scratch test (e.g. granite, flint)
Medium	Feint scratch is left (e.g. sandstone)
Soft	Deep scratch is left (e.g. chalk or mud-stone). Soft rocks can often be broken by hand.

f. Record the texture of the rock on a 3-point scale from smooth to rough.

1	Smooth rock surfaces
2	Intermediate roughness
3	Rough or pitted rock surfaces

g. Record the type of rock using the attached sheet on rock types & hardness as guidance. Do not guess. If you don't know (or can't tell), record 'unknown'.

h. Record the shape of the rock on a 4-point scale. Angular, Sub-angular, Sub-rounded, Rounded. See attached sheet on particle shapes for guidance.

A	Angular
SA	Sub-angular
SR	Sub-rounded
R	Rounded

i. Record the extent of faunal coverage on the cobble using the categories given in the table below.

0	No attached fauna/flora
1	Individuals on ONE surface only
2	Individuals on more than one surface
3	Individuals on all surfaces but coverage incomplete
4	100% coverage on all rock surfaces

j. Record the main type of faunal coverage, in a brief statement. E.g. barnacles, hydroid turf.

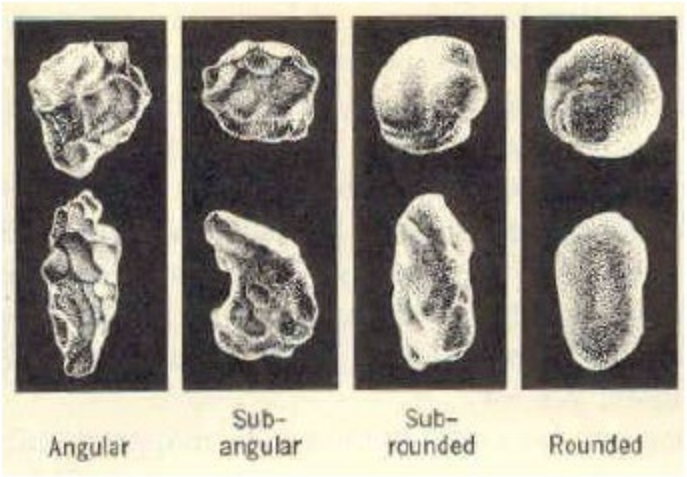
k. Place the cobble in bucket of preservative.

HARD	
Flint   - highly variable in color but easily recognized by its high hardness, very fine grain size and conchoidal fracture - Grain size: microscopic	**Quartz**  - composed predominantly of quartz - coarser grained than sandstone **Coal**  Characteristics: black color, low density

MEDIUM	
Sandstone  Grainy texture	**Limestone**  Fossil fragments visible, porous
Slate  is similar in appearance to mudstone and shale due to the low grade of metamorphism but can be distinguished by its slaty cleavage and more dense, compact nature	

SOFT	
Chalk  fine-grained nature and white colour	**Mudstone**  Grain size: silt and clay (mud)
Shale  fine-grained mudstone which breaks into thin parallel sheets and is softer and less dense than slate	

GUIDE TO PARTICLE SHAPES



About us

Cefas is a multi-disciplinary scientific research and consultancy centre providing a comprehensive range of services in fisheries management, environmental monitoring and assessment, and aquaculture to a large number of clients worldwide.

We have more than 500 staff based in 2 laboratories, our own ocean-going research vessel, and over 100 years of fisheries experience.

We have a long and successful track record in delivering high-quality services to clients in a confidential and impartial manner.
(www.cefas.defra.gov.uk)

Cefas Technology Limited (CTL) is a wholly owned subsidiary of Cefas specialising in the application of Cefas technology to specific customer needs in a cost-effective and focussed manner.

CTL systems and services are developed by teams that are experienced in fisheries, environmental management and aquaculture, and in working closely with clients to ensure that their needs are fully met.
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Customer focus

With our unique facilities and our breadth of expertise in environmental and fisheries management, we can rapidly put together a multi-disciplinary team of experienced specialists, fully supported by our comprehensive in-house resources.

Our existing customers are drawn from a broad spectrum with wide ranging interests. Clients include:

- international and UK government departments
- the European Commission
- the World Bank
- Food and Agriculture Organisation of the United Nations (FAO)
- oil, water, chemical, pharmaceutical, agro-chemical, aggregate and marine industries
- non-governmental and environmental organisations
- regulators and enforcement agencies
- local authorities and other public bodies

We also work successfully in partnership with other organisations, operate in international consortia and have several joint ventures commercialising our intellectual property