Cenos Offshore Windfarm Limited

Cenos EIA

Appendix 8 – Habitat Assessment Report - OWF

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DOCUMENT CEN001-ROV-01-CON-ENV-RPT-0020

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Environmental Habitat Assessment Report OWF

Cenos OWF Array and Export Cable Corridor Geophysical Survey

In accordance with ISO14001:2015, ISO9001:2015 and ISO45001:2018

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Habitat Assessment Report OWF

Cenos OWF Array and Export Cable Corridor Geophysical Survey

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Commercial Security

Flotation Energy

CENOS Offshore Windfarm Array

Habitat Assessment Report

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Table of Abbreviations

Abbreviations			
BDC	Biodiversity Committee	MNCR	Marine Nature Conservation Review
BSL	Benthic Solutions Limited	MOD4	BSL Camera System
CBD	Convention on Biological Diversity	MW	Megawatt
CTD	Conductivity Temperature and Depth	NB	Niskin Bottle
CNS	Central North Sea	NMBAQC	National Marine Biology Analytical Quality Control Scheme
CNSE	Central North Sea Electrification	NMCAG	National Marine Chemistry Advisory Group
CSEMP	Clean Seas Environmental Monitoring Programme	NMCAQC	National Marine Chemical Analytical Quality Control Scheme
DDV	Drop-down Video	NMEAQC	National Marine Ecotoxicological Analytical Quality Control Scheme
DVV	Dual Van Veen	NMMP	UK National Marine Monitoring Programme
EBS	Environmental Baseline Survey	OSPAR	Oslo-Paris Commission
EC	European Council	OWF	Offshore Wind Farm
ECC	Export Cable Corridor	PAM	Passive Acoustic Monitoring
EEC	European Economic Community	PEP	Project Execution Plan
EMODnet	European Marine Observation and Data Network	PMF	Priority Marine Features
EOL	End of Line	PSA	Particle Size Analysis
EU	European Union	PSD	Particle Size Distribution
EUBS	European Union Biodiversity Strategy	RDL	Redox Discontinuity Layer
EUNIS	European Nature Information System	SAC	Special Areas of Conservation
FOCI	Feature of Conservation Interest	SACFOR	Superabundant, Abundant, Common, Frequent, Occasional, Rare and Less Than Rare
GW	Gigawatt	SBF	Seabed Features
H_2S	Hydrogen Sulphide	SBL	Scottish Biodiversity List
HAS	Habitat Assessment Survey	SBP	Sub-bottom Profiler
HC	Hydrocarbons	SCI	Sites of Community Importance
HD	High Definition	SNH	Scottish Natural Heritage
HG	Hamon Grab	SOL	Start of Line
HM	Heavy Metals	SPA	Special Protection Areas
IMS	Industrial Methylated Spirit	SS.SMu.CFiMu.SpnMeg	Seapens and Burrowing Megafauna in Circalittoral Fine Mud
JNCC	Joint Nature Conservation Committee	SS.SMx.OMx	Offshore Circalittoral Mixed Sediment

Abbreviations			
LAT	Lowest Astronomical Tide	SS.SMu.OMu	Atlantic Offshore Circalittoral Mud
MAG	Magnetometry	SS.SSa.OSa	Offshore Circalittoral Sand
MBES	Multi Beam Echosounder	SSS	Side Scan Sonar
MC6216	Seapens and Burrowing Megafauna in Atlantic Circalittoral Fine Mud	THC	Total Hydrocarbon Content
MCZ	Marine Conservation Zone	UHR	Ultra-High Resolution
MD421	Faunal communities Atlantic Offshore Circalittoral Mixed Sediment	UK	United Kingdom
MD521	Faunal Communities in Atlantic Offshore Circalittoral Sand	UKBAP	UK Biodiversity Action Plan
MD521	Faunal Communities in Atlantic Offshore Circalittoral Sand	UKCS	United Kingdom Continental Shelf
MD62	Atlantic Offshore Circalittoral Mud	UTM	Universal Transverse Mercator
MMO	Marine Mammal Observer	WAS	Wilson Auto-siever

Executive Summary

As part of plans by Flotation Energy to develop a 1.4 gigawatt (GW) floating offshore wind farm (OWF) and export cable installation in the Central North Sea (CNS), approximately 200 km off the east coast of Scotland, an environmental baseline survey (EBS) and habitat assessment survey (HAS) were undertaken by ROVCO in association with Benthic Solutions Limited (BSL). This report details the habitat investigation and environmental survey operations conducted at the CENOS OWF site aboard the *Glomar Supporter* between the 20th July to 22nd September 2023; the results detailing the proposed export cable corridor (ECC) will be reported on separately.

Environmental samples were collected from 31 sites across the OWF using either a double Van Veen grab (DVV) or mini-Hamon grab (HG). Ten of these sampling locations were also selected for water sampling at bottom, middle and surface depths with corresponding CTD profiles obtained for each. Video footage was collected at 51 sites across the OWF using BSL MOD4 camera systems in order to ground truth sampling locations, facilitate the habitat assessment and ensure robust coverage of the differing habitats identified from review of the acquired geophysical data.

The seabed within the OWF site presented a predominantly flat seabed. Spanning a water depth range of 90-100 metres, the area exhibited a consistent topography devoid of significant variation. The sidescan sonar (SSS) data unveiled a spectrum of reflectivity across the OWF survey area. The majority of the region displayed a low to moderate reflectivity, primarily associated with ambient muddy sand/sand substrate characterized by a Munsell colour of dark reddish brown (5Y 3/2) Conversely, zones of higher reflectivity corresponded to patches of gravel and gravelly sand, noted with a Munsell colour of dark olive brown (2.5YR 3/3). Scattered within this expanse were smaller isolated areas presenting mixed sediment compositions. These pockets exhibited assortments of pebbles, shell debris, cobbles, and boulders, adding variance to an otherwise uniform seabed landscape.

Within this report, three JNCC/EUNIS habitat classifications were assigned based on the field observations, video footage, still images, onsite inspection of grab samples, particle size analysis, and a review of geophysical data. The most dominant habitat was ‘Offshore Circalittoral Mud’ (SS.SMu.OMu/MD62). The other less common habitat identified in the survey area was ‘Offshore Circalittoral Mixed Sediment’ (SS.SMx.OMx/MD42) which was split in two sub-categories based on further analysis of the SSS and the seabed features. Conspicuous fauna was observed to be typical of the habitats observed. The presence of level five biotopes will be reviewed within the subsequent environmental baseline survey report when the infauna data will be available.

Due to the presence of cobbles and boulders, a stony reef assessment following Irving (2009) methodology was undertaken on 540 images taken along seven camera transects. A single occurrence of ‘Low Reef’ was identified in terms of overall reefiness (structure vs epifaunal coverage vs extent) across one transect, consisting of just two still images. There were no 'Medium Reef' or 'High Reef' areas. Within the section designated as ‘Low Reef’, the abundance of key reef species was scarce, or isolated to individual still images. Therefore, these areas are considered ‘Possible Low Reef’ with no strong justification for Annex I protection. The areas identified as "Low Reef" were primarily located within OWF_51. OWF_51 was one of two transects running through the coal pit formation denoted in the SSS, with only one delineated polygon showing a texture and high reflectivity signature associated

with the identified stony reef. Following a precautionary approach, these were delineated as areas of where 'Low Reef' structures have the potential to occur, although it is expected that the majority of these areas will be 'Not a Reef'. Moreover, the quality of reef observed within these 'Low Reef' areas did not demonstrate strong justification for Annex I protection.

Sponges were evident across the survey area, primarily associated with areas of cobbles/boulders in both subcategories of the mixed sediment. The sponge assessment was based on the OSPAR (2010) definition of deep-sea sponge aggregations, whereby individual abundance is counted. The abundance of sponges did not exceed the minimum thresholds for density (>0.5 sponges per square metre) and extent (>25 m^2). In order to verify whether deep-sea sponge aggregations occurred in the OWF survey area, the results of the OSPAR (2010) assessment were evaluated against the criteria outlined by the JNCC which takes into account the density, habitat and ecological function of an area (Henry and Roberts, 2014). Given no criteria were met in the OWF survey area it can be concluded the 'deep-sea sponge aggregations' habitat is not present.

Due to the presence of burrowing megafauna (*Nephrops norvegicus*) and sea pens (*Virgularia mirabilis, Pennatula phosphorea* and *Funiculina quadrangularis*) within the survey area, the video footage and still photographs were assessed using the SACFOR abundance scale. The results revealed burrow presence across 41 of the 51 stations reviewed, with large burrows occurring at a density of at least 'Frequent' at 40 of these stations. As such, the proposed CENOS OWF site shows a degree of conformance to the OSPAR 'Seapen and Burrowing Megafauna Communities' habitat type.

No live specimens of *Arctica islandica* (ocean quahog) were observed during field operations, nor was there any evidence of their distinct siphons following review of the acquired video and photographic stills. Insights into the presence of juvenile specimens (shell diameter <5 cm) will be reviewed in the subsequent environmental baseline report once the macrofauna data becomes available. Finally in areas of 'Circalittoral Mixed Sediment' it could be considered as subtidal sands and gravel habitat.

1 Introduction

1.1 Project Information

Client:	Flotation Energy UK
Client Reference:	CEN001-ROV-01-CON-ENV-RPT-0020
Project:	CENOS Offshore Wind Farm and Export Cable Corridor EBS & HAS
Main Contractor:	ROVCO
Main Contractor Reference:	23014-SB-SU-MS-003
Sub Contractor:	Benthic Solutions Limited (BSL)
Sub Contractor Reference:	2337
Survey Areas:	UK Continental Shelf (UKCS) Quadrant 22, Central North Sea
Survey Type:	Environmental Baseline (EBS) and Habitat Survey (HAS)
Survey Period:	July 20th – September 22nd 2023
Survey Vessel:	*Glomar Supporter*
Survey Equipment:	Environmental: Mini-Hamon grab, dual Van Veen grab, *Wilson* auto-siever (WAS), Mare winch, 10 ft container lab, 5 L Niskin bottles, MOD4 underwater camera systems, Vanishing Point PAM hydrophone, Valeport CTD
Client Representatives:	[Redacted]
ROVCO Project Manager:	[Redacted]
BSL Project Manager:	[Redacted]

1.2 Project Description

At the request of Flotation Energy, an environmental baseline (EBS) and habitat assessment survey (HAS) was performed by ROVCO, supported by Benthic Solutions Limited (BSL), across the proposed CENOS OWF and ECC sites situated in the CNS. Survey operations were carried out aboard the *Glomar Supporter* between the 20th July to 22th September 2023.

A geophysical survey was conducted across both the OWF and ECC with the spread consisting of hull-mounted multibeam echosounder (MBES), towed side scan sonar (SSS), magnetometry (MAG) and hull-mounted sub-bottom profiler (SBP).

The environmental survey was required to characterise the marine habitats across the proposed area of development and to gather information on the current physico-chemical and biological condition of the site, including the identification of any protected habitats within the survey area. Seabed sediment samples were acquired using a double Van Veen grab (DVV) or mini-Hamon grab (HG); whilst seawater samples were collected using Niskin bottles (NB) in tandem with a conductivity, temperature and depth (CTD) probe to yield corresponding seawater profiles. Seabed video footage was captured using BSL MOD4 camera system fitted with a 95 mm laser scale.

This report is focussed on the habitat investigation and environmental survey operations conducted at the proposed CENOS OWF site located in UKCS Quadrant 22 of the CNS (Figure 1.1). The survey operations and habitat investigation relating to the ECC will be reported separately (Doc ref: CEN001-ROV-01-CON-ENV-RPT-0021).

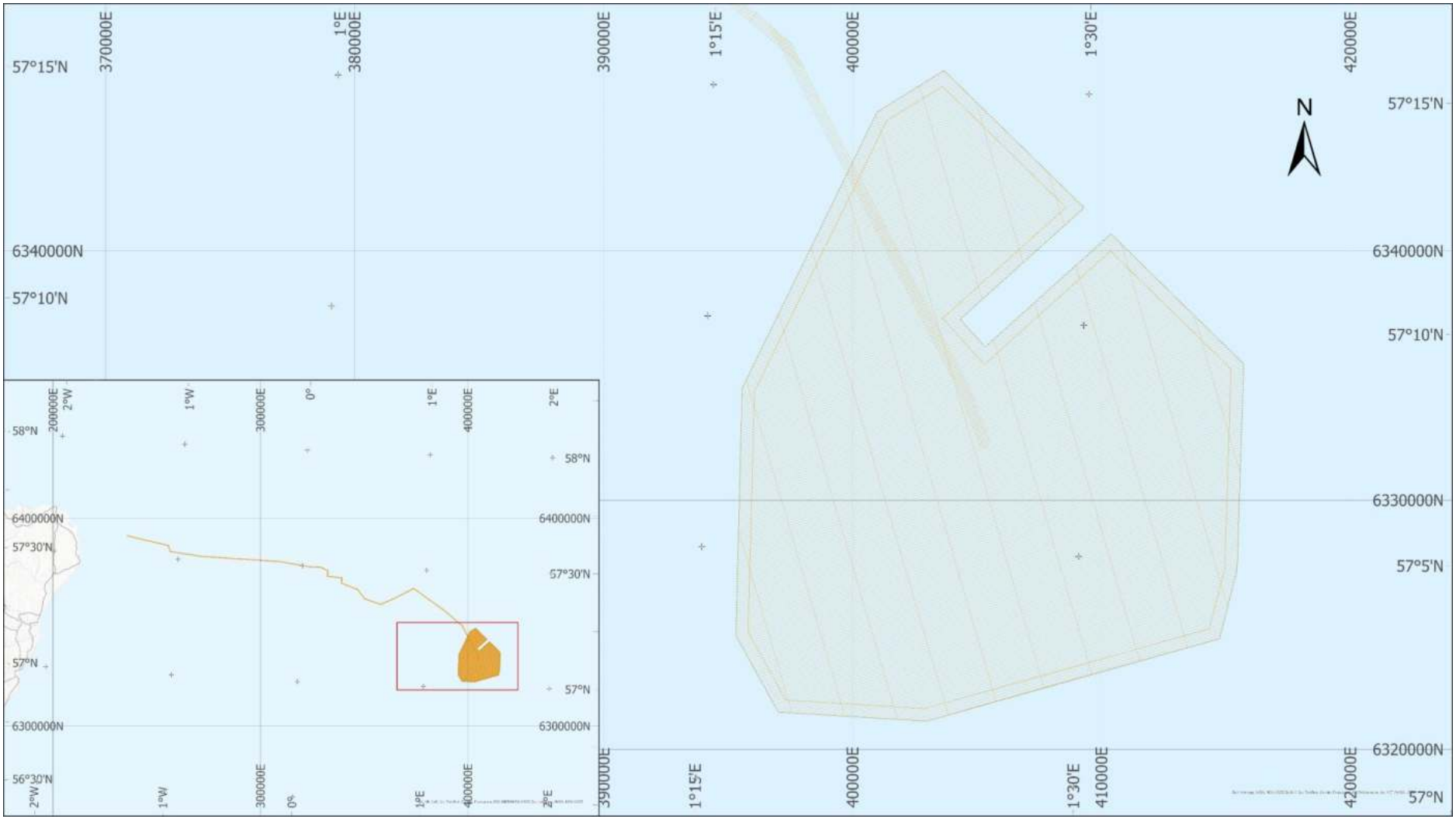


Figure 1.1 CENOS OWF and Export Cable Corridor Area Survey Overview

1.3 Scope of Work

BSL was contracted by ROVCO on behalf of Flotation Energy to conduct the environmental sampling, analysis, interpretation and reporting for the environmental baseline and habitat assessment across the CENOS OWF and ECC proposed site locations.

The survey included characterisation of the benthos and investigation of the sediment and water column physico-chemistry (PC) and sediment benthic macrofauna to provide an understanding of baseline conditions at the CENOS OWF area and along the ECC.

The specific objectives of the benthic survey were to:

- Undertake a review of the acquired geophysical data within the survey area to preliminary identify all habitats for further investigation and characterisation;
- Follow a benthic sampling plan and methodology agreed with the client; to support consenting and environmental impact assessment (EIA) requirements.
- Acquire baseline data of sediment and water PC and sediment biological characteristics across the survey area;
- Characterise the benthic environment across the sites to assign habitat types to biological level according to JNCC/EUNIS habitat classification systems;
- Identify habitats and species of potential conservation interest, defined as those listed in Annex I of the EC Habitats Directive, the OSPAR List of Threatened and/or Declining Species and Habitats, the UK Post-2010 Biodiversity Framework (formerly the UK Biodiversity Action Plan Priority Habitat descriptions).

1.4 Reporting Structure

The following reports will be provided by BSL, relating to the environmental baseline and habitat assessment survey conducted across the proposed CENOS OWF and ECC sites:

- CEN001-ROV-01-CON-ENV-RPT-0002 (23014-SB-SU-MS-002): Environmental Field Report
- **CEN001-ROV-01-CON-ENV-RPT-0020 (23014-SB-SU-MS-003): Environmental Habitat Assessment Report OWF**
- CEN001-ROV-01-CON-ENV-RPT-0021 (23014-SB-SU-MS-004): Environmental Habitat Assessment Report ECC
- CEN001-ROV-01-CON-ENV-RPT-0022 (23014-SB-SU-MS-005): Environmental Baseline Survey Report OWF3
- CEN001-ROV-01-CON-ENV-RPT-0023 (23014-SB-SU-MS-006): Environmental Baseline Survey Report ECC
- CEN001-ROV-01-CON-ENV-RPT-0035 (23014-SB-SU-MS-007): MMO/PAM Report

1.5 Background and Existing Information

1.5.1 Background Information on the CENOS OWF Survey Area

Contributing to the UK governments target of delivering 5 gigawatts (GW) of floating wind by 2030, the CENOS OWF project aims to install up to 100 floating wind turbines with a capacity up to 1400 megawatts (MW) across an area of approximately 333 km^2. The power generated will be routed to an offshore substation platform which will subsequently be exported to select oil and gas platforms as part of a drive for decarbonisation of the oil and gas sector. Any remaining surplus will then be converted and exported to the UK grid via a proposed export cable spanning ~225 km, making landfall to the south of Peterhead, Scotland. This surplus will also serve as a source of reliable power to the oil rigs when there is insufficient wind to power the turbines.

The proposed OWF site sits within UKCS Quadrant 22 which is a site of current and historical oil and gas activity. Historical and operational wells situated in proximity to the proposed OWF site (~20 km) are displayed below in Table 1.1, whilst pipelines that fall within the same radius are displayed in Table 1.2.

Table 1.1 Historical Well Information

Well Number	Well Spud Date	Completion Date	Original Well Intent	Current Status	Water Depth (m)
29/03b- 9	04/01/2015	19/06/2015	Exploration	Abandoned Phase 3	98.3
29/03a-S3	02/05/2010	14/06/2010	Development	Completed (Shut In)	96.3
29/03a-S2	21/06/2007	10/08/2007	Development	Completed (Shut In)	95.4
29/03a-S1	14/05/2007	18/06/2007	Development	Completed (Shut In)	95.4
29/03a- 7	14/10/2003	21/11/2003	Appraisal	Abandoned Phase 3	97.8
29/02b- 5	09/12/1990	03/04/1991	Exploration	Abandoned Phase 3	101.5
29/02a-BSCB	-	-	Development	Planned	89.9
29/02a-B5Z	01/09/2002	11/09/2002	Development	Abandoned Phase 1	89.9
29/02a-B5Y	11/09/2002	21/09/2002	Development	Abandoned Phase 1	89.9
29/02a-B5X	21/09/2002	17/11/2002	Development	Completed (Shut In)	89.9
29/02a-B5	01/08/2002	01/09/2002	Development	Abandoned Phase 1	89.9
29/02a-B4	09/11/1997	08/01/1998	Development	Completed (Shut In)	89.9
29/02a-B3Z	24/05/1997	18/06/1997	Development	Completed (Shut In)	89.9
29/02a-B3	27/04/1997	24/05/1997	Development	Abandoned Phase 1	89.9
29/02a-B2	04/04/1996	10/07/1996	Development	Completed (Shut In)	89.9
29/02a-B1	17/03/1996	18/07/1996	Development	Completed (Shut In)	89.9
29/02a- 7	22/10/1991	12/02/1992	Appraisal	Abandoned Phase 1	90.2
29/02a- 6	17/08/1991	15/10/1991	Exploration	Abandoned Phase 1	89.3
29/02a- 4	31/05/1988	01/09/1988	Exploration	Abandoned Phase 3	88.1
29/02a- 10	10/12/1993	19/02/1994	Appraisal	Abandoned Phase 1	90.2
29/02- 1	17/09/1975	01/01/1976	Exploration	Abandoned Phase 3	94.5
22/29c- 8Z	25/03/2014	05/08/2014	Appraisal	Abandoned Phase 3	95.4
22/29c- 8Y	05/08/2014	09/10/2015	Appraisal	Abandoned Phase 3	95.4
22/29c- 8	29/01/2014	25/03/2014	Appraisal	Abandoned Phase 3	95.4
22/29- 7	12/08/2002	10/12/2002	Exploration	Abandoned Phase 3	95.1
22/29- 4	07/08/1992	12/08/1992	Appraisal	Abandoned Phase 3	97.8

Well Number	Well Spud Date	Completion Date	Original Well Intent	Current Status	Water Depth (m)
22/29- 3	16/06/1992	02/11/1992	Appraisal	Abandoned Phase 3	93.6
22/29- 2Z	02/01/1992	14/04/1992	Exploration	Abandoned Phase 3	94.2
22/29- 2	21/09/1991	02/01/1992	Exploration	Abandoned Phase 3	94.2
22/29- 1	07/05/1989	30/05/1989	Appraisal	Abandoned Phase 3	95.1
22/28b- 2	05/10/1988	25/12/1988	Exploration	Abandoned Phase 3	100.0
22/28a- 4	23/06/1998	23/09/1998	Appraisal	Abandoned Phase 1	96.3
22/28a- 3	14/08/1997	28/09/1997	Exploration	Abandoned Phase 3	96.0
22/28a- 1	29/01/1988	19/04/1988	Exploration	Abandoned Phase 3	97.5
22/27a- 4Z	10/05/2009	08/07/2009	Appraisal	Abandoned Phase 3	85.6
22/27a- 4	03/01/2009	10/05/2009	Appraisal	Abandoned Phase 3	85.6
22/27a- 3Z	26/03/1992	22/04/1992	Appraisal	Abandoned Phase 3	96.9
22/27a- 3	17/02/1992	09/03/1992	Appraisal	Abandoned Phase 3	96.9
22/27a- 2	26/10/1985	07/03/1986	Exploration	Abandoned Phase 3	100.3
22/27a- 1	21/06/1984	01/10/1984	Exploration	Abandoned Phase 3	90.5
22/24e- 12	31/03/2013	02/08/2013	Exploration	Abandoned Phase 3	96.0
22/24b-S1	28/04/2001	16/07/2001	Development	Abandoned Phase 2	96.0
22/24b- 9	02/01/1987	14/04/1987	Appraisal	Abandoned Phase 3	96.9
22/24b- 7	28/01/1986	09/06/1986	Exploration	Abandoned Phase 3	97.2
22/23c- 8Z	02/06/2013	05/07/2013	Exploration	Abandoned Phase 3	95.7
22/23c- 8Y	05/07/2013	11/08/2013	Exploration	Abandoned Phase 3	95.7
22/23c- 8X	11/08/2013	11/09/2013	Exploration	Abandoned Phase 3	95.7
22/23c- 8	31/03/2013	02/06/2013	Exploration	Abandoned Phase 3	95.7
22/23b-A3Z	01/07/2002	30/08/2002	Development	Completed (Operating)	97.2
22/23b-A3	19/05/2002	01/07/2002	Development	Abandoned Phase 1	97.2
22/23b-A2	17/05/2002	04/10/2002	Development	Completed (Operating)	97.2
22/23b-A1	16/05/2002	30/11/2002	Development	Completed (Operating)	97.2
22/23b- 6	17/02/1999	06/07/1999	Appraisal	Abandoned Phase 1	96.0
22/23b- 5	17/05/1997	19/09/1997	Exploration	Abandoned Phase 3	96.9
22/23b- 4	29/06/1991	17/09/1991	Exploration	Abandoned Phase 3	95.7
22/23b- 1	31/12/1979	01/02/1980	Exploration	Abandoned Phase 3	121.0
22/22c- 6	05/08/2007	25/08/2007	Appraisal	Abandoned Phase 3	94.2
22/22c- 3Z	17/12/1996	29/12/1996	Appraisal	Abandoned Phase 3	93.6
22/22c- 3	04/11/1996	16/12/1996	Exploration	Abandoned Phase 3	93.6
22/22b- 5Z	02/10/2007	25/07/2015	Appraisal	Abandoned Phase 3	92.7
22/22b- 5	14/06/2007	02/10/2007	Appraisal	Abandoned Phase 3	92.7
22/22b- 4	14/03/1997	23/05/1997	Appraisal	Abandoned Phase 3	92.1
22/22b- 2Z	29/11/1991	03/03/1992	Appraisal	Abandoned Phase 3	93.9
22/22b- 2Y	03/03/1992	08/06/1992	Appraisal	Abandoned Phase 3	93.9
22/22b- 2	03/08/1991	28/11/1991	Exploration	Abandoned Phase 3	93.9
22/21- 7	07/04/1993	27/09/1993	Exploration	Abandoned Phase 3	86.3
22/29c-J22/29c-JA planned well	-	-	Development	Planned	94.2
22/29c-J22/29c-JB planned well	-	-	Development	Planned	94.2
22/29c-J22/29c-JC planned well	-	-	Development	Planned	94.2
22/29c-J22/29c-JD planned well	-	-	Development	Planned	94.2

Well Number	Well Spud Date	Completion Date	Original Well Intent	Current Status	Water Depth (m)
22/29c- A planned well	-	-	Development	Planned	-
22/26d- 3	03/12/2020	-	Appraisal	Drilling	82.9
22/24b-S1Z	14/07/2001	14/09/2001	Development	Abandoned Phase 2	96.0

Table 1.2 Pipelines within the proposed CENOS OWF survey area

Name	Diameter (Inch)	Fluid Transported	Status	Trenched Status	Date Laid
PL4106 Culzean 22 Inch Gas Export Flowline	22	Gas	Active	-	-

1.5.2 Existing Information Relating to the CENOS OWF Survey Area

Existing information considered as part of this assessment includes a geophysical processing report across the OWF survey area (RockWave Geophysical Processing Report UKCS BLOCKS 22/23 Project ID: 2023-0173). The report provides details of seabed elevation, seabed features and identifies potential hazards present within the survey area, utilising UHR and SBP seismic survey data.

1.5.3 Reference Sources

1.5.3.1 EMODnet Predicted Habitats Distributions

To further aid interpretation, comparison has been made with the predicted seabed habitat distribution data produced by the European marine observation and data network (EMODnet). EMODnet is a long-term marine data initiative developed through a stepwise approach to collect data and build on existing databases to provide access to European marine data across seven discipline-based themes: bathymetry, geology, seabed habitats, chemistry, biology, physics, and human activities (EMODnet, 2023). The broad-scale seabed habitat map is a predictive delineation of habitats within all European seas to the EUNIS classification system (EUNIS, 2019). Formulated through international (OSPAR) and national monitoring programmes in collaboration with European projects such as MESH or MESH Atlantic, the predicted seabed habitat map can be a useful resource to aid assignment of habitats within a given survey area (Figure 1.2).

1.5.4 Legislative Background

1.5.4.1 UK Post-2010 Biodiversity Framework

The 'UK Post-2010 Biodiversity Framework' was published in July 2012 to succeed the UKBAP and 'Conserving Biodiversity – the UK Approach' and is the result of a change in strategic thinking following the publication of the CBDs 'Strategic Plan for Biodiversity 2011-2010' and the launch of the EU Biodiversity Strategy (EUBS) in May 2011. The UKBAP (2008) lists priority species and habitats remain, with 22 principally important marine and coastal habitats included. Key habitats that may occur in an open water marine environment are as follows:

- Carbonate Mounds,
- Deep-sea Sponge Communities,

- Cold-water Coral Reefs,
- Fragile Sponge and Anthozoan Communities on Subtidal Rocky Habitats,
- Blue and Horse Mussel Beds,
- Mud Habitats in Deep Water.

1.5.4.2 OSPAR Commission

At its Biodiversity Committee (BDC) meeting in 2003, OSPAR agreed to proceed with a programme to collate existing data on the distribution of 14 key habitats, as part of a wider programme to develop measures for their protection and conservation. The UK agreed to compile the relevant data for its marine waters and submit these for collation into composite maps on the distribution of each habitat type across the whole OSPAR area. The work is being coordinated by the Joint Nature Conservation Committee (JNCC). Key OSPAR habitats that may occur in an open water marine environment are essentially the same as listed under the UKBAP, with the 'Mud Habitats in Deep Water' listed as "Seapens and Burrowing Megafauna Communities".

1.5.4.3 European Habitats Directive

The United Kingdom is a signatory of the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention, 1979). To meet their obligations under the convention, the European Community Habitats Directive was adopted in 1992. The provisions of the Directive require Member states to introduce a range of measures including the protection of species listed in the Annexes; to undertake surveillance of habitats and species and produce a report every six years on the implementation of the Directive. The 189 habitats listed in Annex I of the Directive and the 788 species listed in Annex II, are to be protected by means of a network of sites. Each Member State is required to prepare and propose a national list of sites, which will be evaluated in order to form a European network of Sites of Community Importance (SCIs). These will eventually be designated by Member States as Special Areas of Conservation (SACs) and, along with Special Protection Areas (SPAs) classified under the EC Birds Directive (2009), form a network of protected areas known as Natura 2000. The Directive was amended in 1997 by a technical adaptation Directive and latterly by the Environment Chapter of the Treaty of Accession 2003.

The implementation of the Habitats Directive (92/43/EEC) in offshore waters commenced in 2000 and highlighted a number of potential habitats for which SACs may be selected in UK offshore waters. The Annex I habitats of particular relevance to this region of UK waters are as follows:

- Subtidal reefs (e.g. biogenic reefs formed by *Sabellaria spinulosa* or *Modiolus* and rocky reefs formed from iceberg scour or moraine deposits).
- Submarine structures made by leaking gases (including, *inter alia*, carbonates formed within pockmarks).

The Habitats Directive introduced the precautionary principle to protect sensitive areas whereby projects can only be permitted where no adverse effect on the integrity of the site can be shown.

Following the UK's exit from the European Union (EU), new regulations have been put into effect that have transposed the land and marine aspects of the Habitats Directive (Council Directive 92/43/EEC)

and Wild Birds Directive (Directive 2009/147/EC). It is important to note that following the UK's exit from the EU, habitat and species protection and standards are implemented in the same or an equivalent way and there is no change in terms of policy. Amendments to parts of the 2017 regulations were applied by the 'Conservation of Habitats and Species (EU exit) Regulations 2019' which became operable from 1st January 2021 (GOV.UK, 2022). The amendments to the legislation were applied to ensure that the regulations continued to function after leaving the EU. Most of these changes involved transferring functions from the European Commission to the appropriate authorities in England and Wales. All other processes or terms in the 2017 regulations remain unchanged and existing guidance is still relevant (GOV.UK, 2022).

1.5.4.4 Priority Marine Features

In July 2014, 81 Priority Marine Features (PMFs) were identified for the seas around Scotland. The list, which covers a variety of habitats and species that are a priority for conservation in Scotland's seas, was developed by Marine Scotland, the JNCC and Scottish Natural Heritage (SNH). Key PMF habitats in Scottish deep sea environment consist of 'Carbonate Mound Communities' and 'Coral Gardens'.

1.5.4.5 The UK Marine Monitoring Programme

The UK National Marine Monitoring Programme (NMMP) was established in response to the 1986 House of Lords select committee on marine science and technology, who recommended that a common approach to marine monitoring should be established to comply with the international and national commitments (OSPAR Convention and EC Directives). The NMMP focuses on stable depositional sites and records data on sediment chemistry, biological communities, the bioaccumulation of heavy metals (cadmium, mercury and lead) and their ecological effects (Bordin *et al.*, 1992; McLeese *et al.,* 1987).

A National Marine Biology Analytical Quality Control Scheme (NMBAQC) was established in 1992 to establish quality assurance standards for the biological aspects of the NMMP. Similar schemes were set up for chemical (NMCAQC) and ecotoxicological monitoring (NMEAQC) (Davies *et al.,* 2001). The NMCAQC scheme was subsequently renamed the National Marine Chemistry Advisory Group (NMCAG) and the terms of reference for this group were updated in 2007 (MARG, 2020).

1.5.5 Habitat Investigation

1.5.5.1 Habitat Classification

A marine biotope classification system for British waters was developed by Connor *et al*. (2004) from data acquired during the JNCC Marine Nature Conservation Review (MNCR) and subsequently revised by Parry *et al*. (2015) to provide an improved classification of deep-sea habitats. The resultant combined JNCC (2014) classification system is analogous to the European Nature Information Service Habitat Classification (EUNIS, 2019), which compiled information from across Europe into a single database. The two classification systems are based on the same hierarchical analysis. Initially, abiotic habitats are defined at four levels. Biological communities are then linked to these (at two lower levels) to produce a biotope classification (Connor *et al.,* 2004; EUNIS, 2019).

Habitat descriptions have been interpretated from information on seabed sediment types and faunal communities from seabed photography and grab sampling, and the predicted seabed habitat map produced by EMODnet was utilised in the habitat investigation across the CENOS OWF survey area. As illustrated in Figure 1.2, the predicted EUNIS habitat around the OWF site is predominantly 'Atlantic Offshore Circalittoral Mud' (MD62/SS.SMu.OMu) with smaller pockets of 'Atlantic Offshore Circalittoral Sand' (MD52/SS.SSa.OSa) and 'Atlantic Circalittoral Coarse Sediment' (MD32/SS.SCS.OCS).

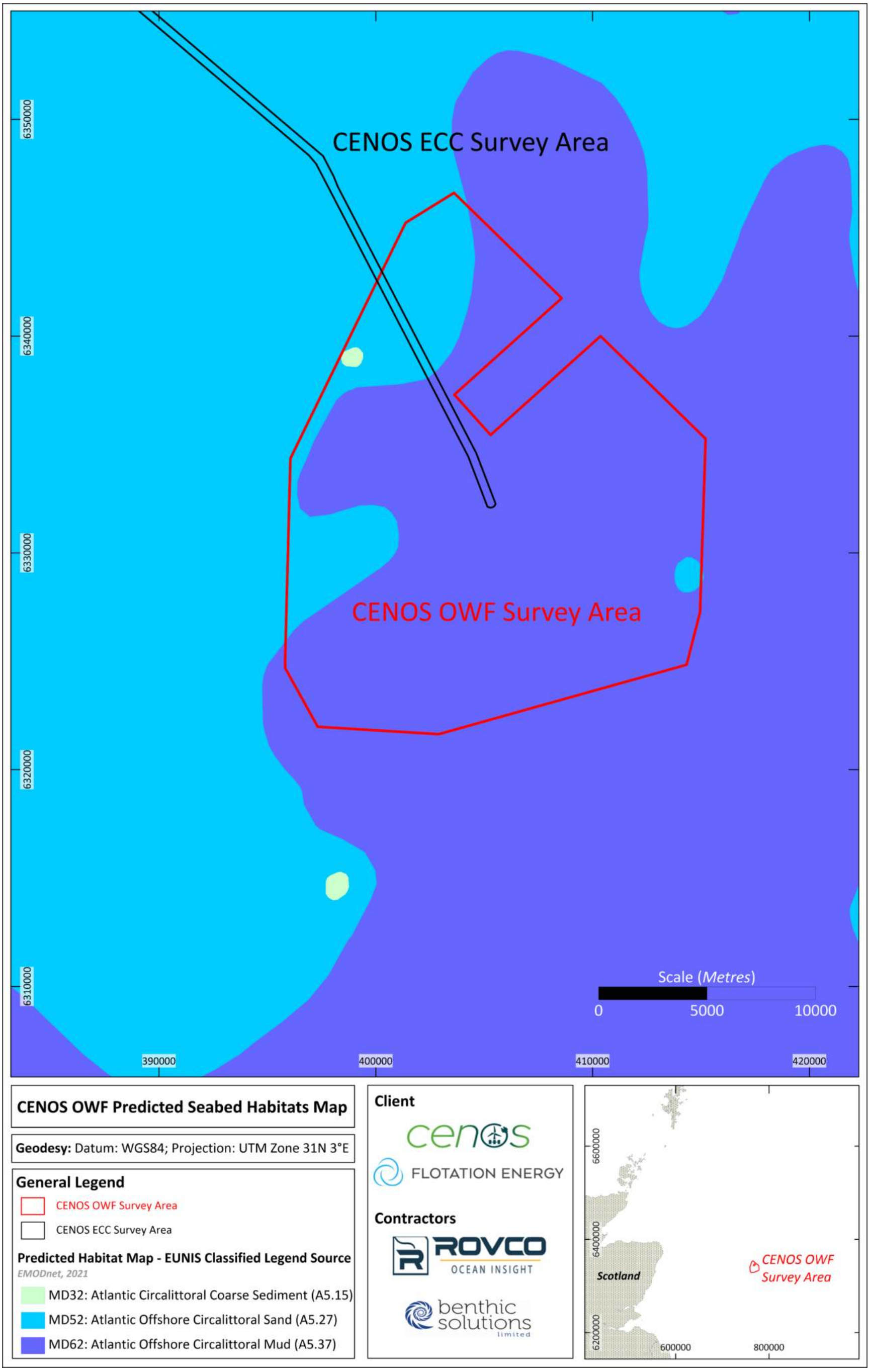


Figure 1.2 Predicted Seabed Habitats for the OWF Survey Area

1.5.5.2 Expected Habitat Sensitivities

The CENOS proposed OWF survey area lies within the East of Gannet and Montrose (EGM) Fields Marine Protected Area (MPA) designated for the occurrence of ocean quahog (*Arctica islandica*) and the presence of the UK BAP habitat 'Offshore Deep Sea Muds'. MPAs and SACs in proximity to the proposed OWF site and the primary features for which they were designated are summarised below in Table 1.3.

Table 1.3 Key Aspects of Nearby Protected Areas

SAC / MPA	Designated Site	Designation Year	Site Area (km^2)	Closest Distance to Survey Site (km)	Key Aspects
MPA	East of Gannet and Montrose Fields	2014	1,839	Within	An area with half the seabed being dominated by sand and gravels, the preferred habitat of the ocean quahog (*Arctica islandica*). The MPA also protects the full extent of an area of offshore deep-sea mud; a Priority Marine Feature (PMF).
	Norwegian Boundary Sediment Plain	2014	163	60 NE	This MPA is designated for the OSPAR Threatened and/or Declining species, the long-lived ocean quahog (*Arctica islandica*), which prefer sand and gravel habitats. Ocean quahog is an important food source for several species of fish including cod.

1.5.5.3 Protected Habitat Assessment

Based on the features that were granted in the above areas, the habitats, and species of particular relevance to this region of UK waters are:

- Subtidal Sands and Gravels (UK Post-2010 Biodiversity Framework Habitat);
- Seapen and Burrowing Megafauna Communities (Scottish PMF – as 'Burrowed Mud', Habitat FOCI, OSPAR threatened and/or declining Habitat);
- Ocean Quahog (*Arctica islandica*) (Scottish PMF, Species FOCI, OSPAR threatened and/or declining Species).

1.5.5.4 Legislative Species Protection Assessment

The epifaunal taxa recorded from review of the underwater video footage and taxonomic analysis were input into a database developed and curated by BSL staff which identifies any species that are afforded protection under several legislative conventions/directives implemented in the UK, including the UK Post-2010 Biodiversity Framework.

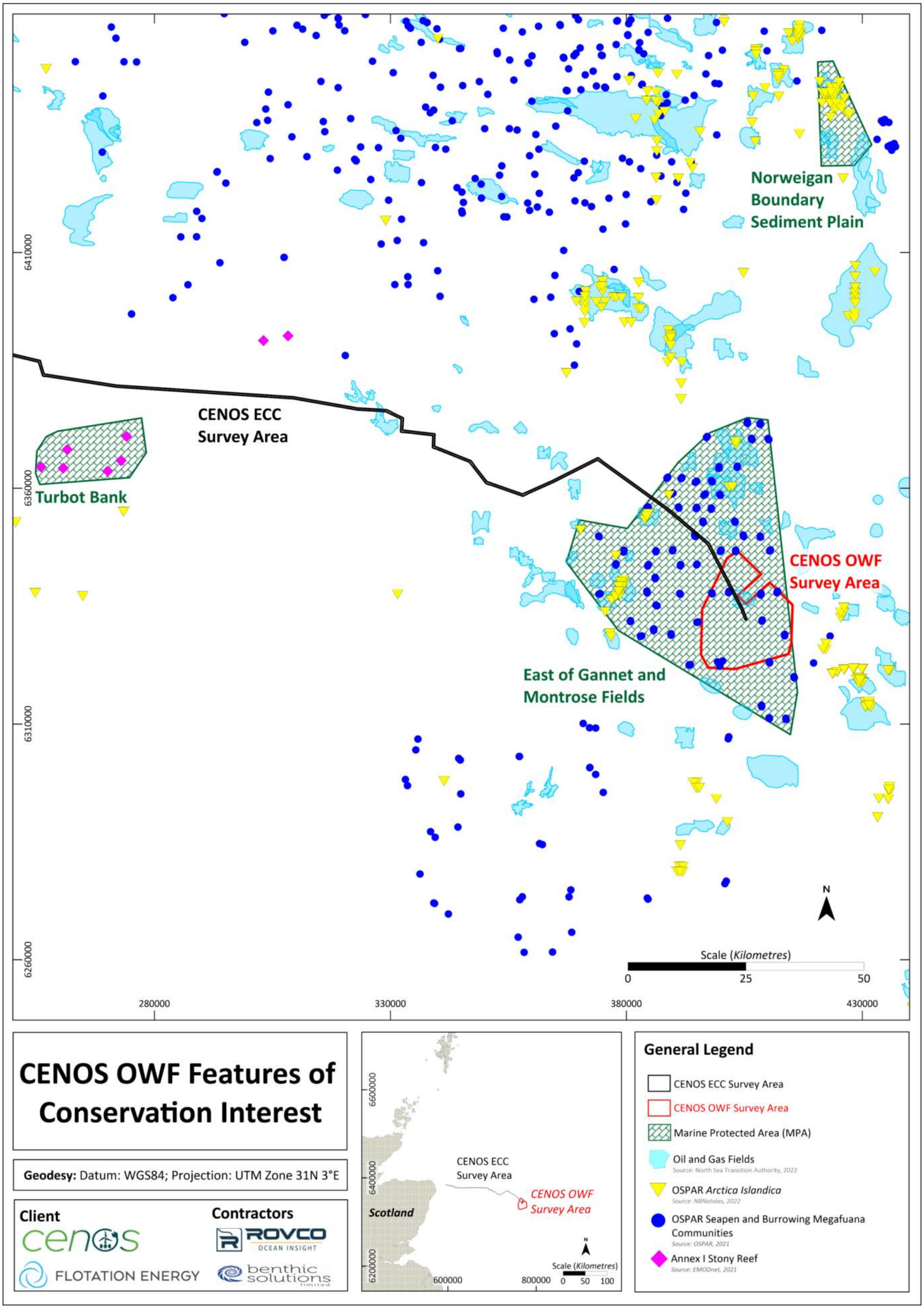


Figure 1.3 Locations of Features of Conservation Interest in Relation to the CENOS OWF Survey Area

2 Field Survey and Analytical Methods

2.1 Geodetic Parameters

The horizontal datum will be referenced to WGS84 Datum, UTM 31N projection. The geodetic parameters used are provided below in Table 2.1.

Table 2.1 Geodetic Parameters

Required Datum	
GPS Datum	WGS84
Projection Parameters	
Projection	UTM 31N
Central Meridian	03° 00’ 00.0” E
Latitude of Natural Origin	00° 00’ 00.0” E
False Easting	500 000 m
False Northing	0 m
Scale Factor at Origin	0.9996 at CM

2.2 Vertical Datum

All depth measurements were reduced to the Lowest Astronomical Tide (LAT) level.

2.3 Geophysical Data

Geophysical data consisted of 86 ultra-high resolution (UHR) multi-channel seismic and 634 additional multisensor lines. These were acquired by ROVCO in 2023, covering approximately 1,088 km (UHR) and 4,049 km (SBP) respectively. Water depths within the OWF array survey area ranged between 86 m and 106 m below LAT.

The geophysical survey spread comprised hull-mounted multibeam echosounder (MBES) to acquire bathymetry data, towed side scan sonar (SSS), magnetometry (MAG) and a hull-mounted sub-bottom profiler (SBP) across a 2 x 4 km area.

At the OWF array area, the acoustic and bathymetric survey was required to cover >100% of the site with acquisition extending 500 m beyond the site boundary. However, the survey was ended before full coverage was achieved due to the prolonged adverse weather conditions experienced during the survey programme. SSS was flown at a height of approximately 10 m above the seabed, with appropriate overlap of survey lines to provide coverage of the nadirs. MBES was used to improve the positioning of contacts picked from SSS data and features such as debris, depressions and boulders were identified from the MBES data.

The following datasets were available for review during the preparation of this report:

- Bathymetric data was acquired using a dual head R2Sonic 2026 at 400 kHz which was reduced and processed offshore to provide a digital terrain model (0.5m bin size) where major bathymetric features and minor bathymetric changes could be identified and highlighted. This included the identification of debris and obstructions within the survey area (e.g., seabed scars, possible anthropogenic debris).

- Side scan sonar data was acquired using an Edgetech 4205 tri-frequency system of 230/540/850 kHz operating. The SSS data acquired was supplemented by swathe bathymetry data gridded to a 0.2 m cell size. Changes in sediment type and hardness, along with features observed through low level relief and discrete objects were delineated.

2.4 Environmental Ground-Truthing and Sampling

The environmental sampling survey strategy was outlined in the Environmental Operations Procedure/ Method Statement (23014-SB-SU-MS-001). All amendments to the environmental data acquisition were agreed prior to sampling.

A total of 30 environmental sampling stations were proposed across the OWF area prior to the commencement of sampling operations, all with collocated 300 m camera transects. An additional 20 camera transects were subsequently proposed following review of the acquired geophysical data to ensure a robust understanding of the different habitats identified across the site. Ten of the sampling stations were also selected for water sampling, at bottom, mid and surface depths with corresponding CTD profiles obtained for each. Acquired environmental and water samples are detailed in Table 2.2 whilst the camera transects are detailed in Table 2.3, with both displayed in Figure 2.1.

Benthic environmental baseline stations underwent the following sampling/sub-sampling:

- 1 x 0.1 m^2 physico-chemical replicate, subsampled for particle size distribution (PSD), heavy and trace metals (HM), and hydrocarbons (HC), at a single surface depth of 0-2 cm.
- 1 x 0.1 m^2 macro-invertebrate replicate samples processed over a 0.5 mm aperture sieve in the field.

Seabed photography/videography was used to ground-truth (provide direct visual observation/information of the seabed) each environmental sampling location and at all key seabed features identified from review of the analogue data. Survey operations were conducted using BSL MOD4 systems fitted with 10 cm laser scales.

The survey field operations are detailed in Appendix I, with grab sampling logs and deck observations in Appendix II, and camera transect logs in Appendix III.

Table 2.2 Summary of Station Sample Acquisition

Geodetics: WGS84 UTM 31N 3°E								
Station	Proposed		Acquired		Rationale	Grab Sampling		Water Sampling
	Easting (m)	Northing (m)	Easting (m)	Northing (m)		PC	Fauna	Chemistry / CTD
OWF_02	403 301	6 345 092	403 302	6 345 093	To inform benthic characteristics on the northern boundary of the array area	✓	✓	✓
OWF_03	407 691	6 322 980	407 689	6 322 982	Covering the southern area of the array and to fill gap in JNCC database	✓	✓	✓
OWF_05	406 201	6 342 816	406 201	6 342 816	Proximity to Oil Well (c. 500 m distance). To identify potential effects of the Oil Well on seabed and water characteristics	✓	✓	✓
OWF_06	400 896	6 341 259	400 896	6 341 261	To provide spatial coverage. Additionally, this is close to the area where Cable Route B enters the array area	✓	✓	-
OWF_08	406 904	6 340 417	406 905	6 340 422	To corroborate historic JNCC sampling data and collect data at array area boundary. Historic JNCC grab/DDV sampling site	✓	✓	-
OWF_09	399 154	6 339 185	399 152	6 339 187	Sampled in predicted 'deep circalittoral coarse sediment' habitat type. Proximity to Oil Well (c. 500 m distance) - to identify potential effects of the Oil Well on seabed and water characteristics	✓	✓	✓
OWF_11	402 918	6 338 958	403 049	6 338 319	To provide spatial coverage in this area and reduce sampling gaps and target high reflectivity contacts	✓	✓	-
OWF_12	407 895	6 335 986	407 896	6 335 990	Proximity to Oil Well (c. 1000 m distance). To assess changes in benthic characteristics as move away from potential areas of contamination	✓	✓	-
OWF_14	401 288	6 337 206	401 288	6 337 204	To provide spatial coverage and collect data in proximity of CNSE Cable Route	✓	✓	-
OWF_15	407 604	6 336 977	407 607	6 336 978	Proximity to Oil Well (c. 500 m distance) - to identify potential effects of the Oil Well on seabed and water characteristics	✓	✓	✓
OWF_17	399 119	6 335 527	399 200	6 335 526	Collect data in proximity of CNSE Cable Route	✓	✓	-
OWF_18	403 634	6 334 768	403 633	6 334 767	Collect data (full suite) in proximity of CNSE Cable Route. Spatial coverage for this section of the array. Historic JNCC grab/DDV sampling site	✓	✓	✓
OWF_20	414 080	6 334 707	414 079	6 334 707	To corroborate past JNCC sampling data and collect data at Eastern array area boundary. Historic JNCC grab sampling site	✓	✓	-
OWF_22	396 999	6 332 820	397 000	6 332 817	Positioned in area of previous JNCC DDV Sampling	✓	✓	✓
OWF_24	405 552	6 331 683	405 552	6 331 685	Historic JNCC grab/DDV sampling site	✓	✓	-
OWF_26	411 438	6 332 368	411 439	6 332 369	Historic JNCC DDV Site. Site selected to corroborate their data	✓	✓	-
OWF_28	400 084	6 331 641	400 082	6 331 641	Historic JNCC grab/DDV sampling site. Recorded presence of mud habitats (JNCC, 2015)	✓	✓	-

Geodetics: WGS84 UTM 31N 3°E								
Station	Proposed		Acquired		Rationale	Grab Sampling		Water Sampling
	Easting (m)	Northing (m)	Easting (m)	Northing (m)		PC	Fauna	Chemistry / CTD
OWF_30	408 393	6 331 996	409 888	6 336 102	To provide spatial coverage in the centre of the array area and cover the boundary between a large area of higher reflectivity and lower reflectivity sediment type.	✓	x	-
OWF_30_A	408 393	6 331 996	409 839	6 336 088	To provide spatial coverage in the centre of the array area and cover the boundary between a large area of higher reflectivity and lower reflectivity sediment type.	✓	✓	-
OWF_32	413 795	6 330 141	414 448	6 330 564	To provide spatial coverage at Eastern array area boundary and to cover a small and patchy area of high reflectivity sediment	✓	✓	✓
OWF_33	398 873	6 329 201	398 874	6 329 201	Historic JNCC grab/DDV sampling site. Recorded presence of mud habitats (JNCC, 2015)	✓	✓	-
OWF_34	404 517	6 328 774	404 517	6 328 773	To provide spatial coverage	✓	✓	-
OWF_36	408 691	6 327 915	408 692	6 327 915	Proximity to oil well (c. 1000 m distance). To assess changes in benthic characteristics as move away from potential areas of contamination	✓	✓	-
OWF_39	401 004	6 327 221	401 004	6 327 222	To provide spatial coverage	✓	✓	-
OWF_41	408 224	6 327 777	408 223	6 327 778	Proximity to Oil Well (c. 500 m distance) - to identify potential effects of the oil well on seabed and water	✓	✓	✓
OWF_42	413 502	6 326 154	413 768	6 324 697	To provide spatial coverage at southeast array area boundary and to cover a bathymetric elevation and round patch of higher reflectivity	✓	✓	-
OWF_43	396 593	6 324 884	396 591	6 324 883	Sampled in predicted 'deep circalittoral mud' habitat type so all known habitat types are represented	✓	✓	-
OWF_45	404 800	6 325 225	405 115	6 325 378	Collect data (full suite) in proximity of Culzean pipelines and assess any changes in benthic characteristics due to infrastructure and to cover a suspected area of coarse sediment.	✓	✓	-
OWF_46	408 781	6 324 814	408 783	6 324 814	To provide spatial coverage. Historic JNCC grab/DDV sampling site	✓	✓	-
OWF_49	397 819	6 323 160	397 820	6 323 162	Sampled in A5.37 habitat type (see figure legend) so all known habitat types are represented. Historic JNCC grab/DDV sampling site. Recorded presence of mud habitats (JNCC, 2015)	✓	✓	✓
OWF_50	404 209	6 322 951	404 208	6 322 952	Sampled in A5.37 habitat type (see figure legend). Historic JNCC grab/DDV sampling site. Recorded presence of mud habitats (JNCC, 2015)	✓	✓	-

Notes:
The suffix '_A' denotes where sampling locations had to be move from original proposed location to acquire sample.

Table 2.3 Summary of Camera Transect Acquisition

Geodetics: WGS84 UTM 31N 3°E							
Transect		Date	Time (UTC)	Easting (m)	Northing (m)	Video Footage (mm: ss)	Number of Stills
OWF_01	SOL	25/08/2023	23:34	402 079	6 345 108	25:26	67
	EOL	26/08/2023	00:00	401 745	6 345 126		
OWF_02	SOL	25/08/2023	21:16	403 322	6 344 931	23:59	55
	EOL	25/08/2023	21:40	403 282	6 345 257		
OWF_03	SOL	26/08/2023	23:35	407 846	6 323 078	30:34	72
	EOL	27/08/2023	00:05	407 569	6 322 902		
OWF_04	SOL	25/08/2023	20:08	404 929	6 343 069	23:32	68
	EOL	25/08/2023	20:31	404 663	6 342 877		
OWF_05	SOL	25/08/2023	17:31	406 141	6 342 654	27:57	52
	EOL	25/08/2023	17:59	406 256	6 342 967		
OWF_06	SOL	26/08/2023	01:01	401 057	6 341 254	25:15	78
	EOL	26/08/2023	01:26	400 733	6 341 263		
OWF_07	SOL	26/08/2023	02:31	403 783	6 340 497	23:10	54
	EOL	26/08/2023	02:55	403 453	6 340 491		
OWF_08	SOL	25/08/2023	15:50	406 946	6 340 253	25:10	33
	EOL	25/08/2023	16:17	406 865	6 340 572		
OWF_09	SOL	26/08/2023	05:22	399 312	6 339 227	23:43	36
	EOL	26/08/2023	05:46	398 990	6 339 142		
OWF_10	SOL	26/08/2023	07:11	398 470	6 337 930	22:10	38
	EOL	26/08/2023	07:34	398 151	6 337 860		
OWF_11	SOL	26/08/2023	03:29	403 178	6 338 362	27:17	62
	EOL	26/08/2023	03:56	402 872	6 338 267		
OWF_12	SOL	25/08/2023	12:24	408 045	6 336 049	24:17	35
	EOL	25/08/2023	12:49	407 748	6 335 927		
OWF_13	SOL	27/08/2023	20:06	397 151	6 334 770	32:04	47
	EOL	27/08/2023	20:40	396 992	6 335 083		
OWF_14	SOL	26/08/2023	08:20	401 128	6 337 158	25:30	31
	EOL	26/08/2023	08:45	401 442	6 337 253		
OWF_15	SOL	25/08/2023	13:54	407 662	6 336 810	23:13	38
	EOL	25/08/2023	14:17	407 551	6 337 131		
OWF_16	SOL	25/08/2023	00:38	408 237	6 331 956	22:18	43
	EOL	25/08/2023	01:01	408 547	6 332 035		
OWF_17	SOL	26/08/2023	12:46	399 195	6 335 375	24:36	35
	EOL	26/08/2023	13:10	399 047	6 335 669		
OWF_18	SOL	26/08/2023	09:48	403 479	6 334 711	21:09	30
	EOL	26/08/2023	10:11	403 787	6 334 825		
OWF_19*	SOL	25/08/2023	09:14	412 166	6 337 820	24:06	33
	EOL	25/08/2023	09:38	411 872	6 337 682		
OWF_20	SOL	25/08/2023	07:30	413 923	6 334 655	24:19	37
	EOL	25/08/2023	07:55	414 231	6 334 762		
OWF_21	SOL	27/08/2023	08:48	398 256	6 325 652	21:39	34
	EOL	27/08/2023	09:10	398 581	6 325 669		
OWF_22	SOL	26/08/2023	14:31	396 840	6 332 908	25:44	35
	EOL	26/08/2023	14:57	397 139	6 332 741		
OWF_23	SOL	26/08/2023	11:35	401 685	6 333 576	25:01	34
	EOL	26/08/2023	12:00	401 366	6 333 483		
OWF_24	SOL	24/08/2023	22:05	405 385	6 331 635	23:48	96
	EOL	24/08/2023	22:29	405 712	6 331 730		
OWF_25	SOL	25/08/2023	03:43	408 296	6 334 051	31:31	55
	EOL	25/08/2023	04:09	408 602	6 334153		
OWF_26	SOL	25/08/2023	05:19	411 278	6 332 326	23:59	68
	EOL	25/08/2023	05:48	411 592	6 332 411		

Geodetics: WGS84 UTM 31N 3°E							
Transect		Date	Time (UTC)	Easting (m)	Northing (m)	Video Footage (mm: ss)	Number of Stills
OWF_27	SOL	24/08/2023	14:31	410 272	6 329 070	26:32	38
	EOL	24/08/2023	14:58	410 400	6 328 775		
OWF_28	SOL	26/08/2023	16:37	399 906	6 331 662	26:29	33
	EOL	26/08/2023	17:03	400 251	6 331 621		
OWF_29	SOL	26/08/2023	18:10	402 592	6 329 573	24:42	52
	EOL	26/08/2023	18:35	402 668	6 329 264		
OWF_30	SOL	25/08/2023	10:13	410 047	6 336 146	23:49	68
	EOL	25/08/2023	10:39	409 737	6 336 057		
OWF_31	SOL	24/08/2023	18:37	411 237	6 330 370	19:45	75
	EOL	24/08/2023	19:02	411 395	6 330 138		
OWF_32	SOL	24/08/2023	15:53	414 340	6 330 657	24:43	47
	EOL	24/08/2023	16:18	414 588	6 330 443		
OWF_33	SOL	27/08/2023	13:20	399 043	6 329 199	22:42	35
	EOL	27/08/2023	13:43	398 700	6 329 200		
OWF_34	SOL	26/08/2023	19:20	404 344	6 328 810	23:35	62
	EOL	26/08/2023	19:43	404 679	6 328 738		
OWF_35_A	SOL	24/08/2023	20:51	406 268	6 329 812	29:28	57
	EOL	24/08/2023	21:20	406 651	6 329 918		
OWF_36	SOL	24/08/2023	13:02	408 584	6 328 146	34:45	57
	EOL	24/08/2023	13:38	408 760	6 327 762		
OWF_37	SOL	27/08/2023	12:21	400 343	6 328 494	25:16	51
	EOL	27/08/2023	13:18	399 040	6 329 199		
OWF_38	SOL	27/08/2023	14:30	396 705	6 328 754	22:33	31
	EOL	27/08/2023	14:53	396 798	6 328 437		
OWF_39	SOL	27/08/2023	11:02	401 160	6 327 167	27:45	30
	EOL	27/08/2023	11:31	400 852	6 327 275		
OWF_40	SOL	26/08/2023	20:52	404 491	6 326 861	23:12	68
	EOL	26/08/2023	21:15	404 605	6 326 551		
OWF_41	SOL	24/08/2023	10:06	408 157	6 327 936	36:36	69
	EOL	24/08/2023	10:42	408 284	6 327 638		
OWF_42	SOL	27/08/2023	07:42	396 734	6 324 963	39:15	76
	EOL	24/08/2023	01:54	413 740	6 324 792		
OWF_43	SOL	27/08/2023	07:42	396 734	6 324 963	21:29	39
	EOL	27/08/2023	08:05	396 452	6 324 802		
OWF_44	SOL	27/08/2023	09:46	401 439	6 325 807	23:06	44
	EOL	27/08/2023	10:11	401 762	6 325 861		
OWF_45	SOL	26/08/2023	21:56	404 956	6 325 343	23:25	47
	EOL	26/08/2023	22:19	405 281	6 325 417		
OWF_46	SOL	24/08/2023	08:12	408 774	6 324 978	29:04	56
	EOL	24/08/2023	08:41	408 789	6 324 658		
OWF_47	SOL	24/08/2023	05:29	412 196	6 325 390	48:47	132
	EOL	24/08/2023	06:19	412 418	6 325 644		
OWF_48_A	SOL	27/08/2023	04:47	399 340	6 323 584	25:18	42
	EOL	27/08/2023	05:13	399 636	6 323 714		
OWF_49	SOL	27/08/2023	05:51	397 966	6 323 229	23:28	32
	EOL	27/08/2023	06:16	397 670	6 323 089		
OWF_50	SOL	27/08/2023	01:49	404 353	6 323 029	22:15	52
	EOL	27/08/2023	02:12	404 065	6 322 873		
OWF_51	SOL	27/08/2023	18:54	395 291	6 334 396	25:29	46
	EOL	27/08/2023	19:26	395 291	6 334 396		

Notes:
The suffix "_A" denotes where camera transect was re-run to acquire high-definition footage.
**No HD footage available for OWF_19 due to file corruption onshore.*

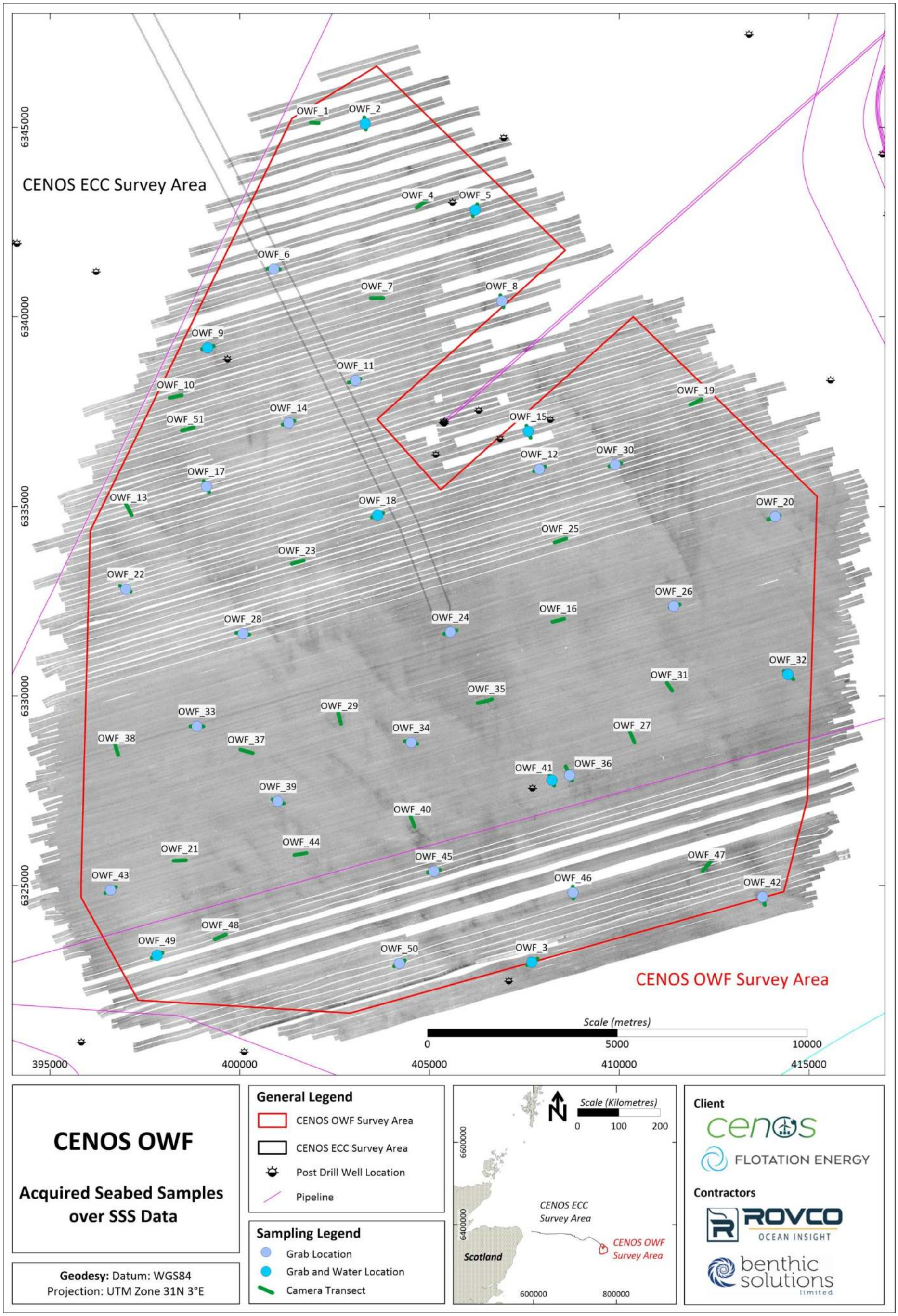


Figure 2.1 OWF Site SSS Data and Acquired Sediment Samples and Camera Transects

3 Results and Interpretation

3.1 Survey Bathymetry and Seabed Features

The following text utilises information from the environmental fieldwork report for the OWF area (Doc Ref: 23014-SB-SU-MS-002) and geophysical interpretation by ROVCO (2023) to aid in descriptions of the bathymetry and seabed features across the survey area. Environmental grab samples and regional geological information have been considered in seabed features interpretation. Figure 3.1 illustrates the seabed features over side scan sonar (SSS) data interpreted within the OWF survey area.

The water depth across the site ranged from 90 to 100 m. The SSS data indicated low to moderate reflectivity across most of the OWF survey area with areas of high reflectivity. Lower reflectivity seabed of characterised the ambient muddy sand/sand substrate and a Munsell colour of dark reddish brown (5Y 3/2). Areas of high reflectivity were typically associated with patches of gravel and gravelly sand, with a Munsell colour of dark olive brown (2.5YR 3/3). Smaller isolated areas contained mixed sediment, with varying matrices of pebbles, shell debris, cobbles and boulders.

The vast majority of the site area was interpreted to be comprised of clayey, silty sand with occasional gravel and isolated to scattered cobbles and boulders. This substrate, described as 'Holocene' was prevalent across the entire OWF survey area with smaller patches of differing substrate types , influenced by the presence of three other geological layers at or near to the seabed surface (Figure 3.1).

A series of linearly aligned patches of sand and gravelly sand with shell fragments were observed from the northern part of the OWF survey area running southeast to the mid-latitude eastern side of the survey area. These features were elevated above the surrounding Holocene sediments and were interpreted to be related to the outcropping of the 'Forth Formation Whitehorn Member'. Other isolated patches of this sediment type were observed in the south, southwest and along the northwestern edge of the survey area.

Areas interpreted to comprise soft clay and silty clay, often with scattered boulders, were prevalent across the central and southern extent of the OWF survey area. Theses features were interpreted to by related to the outcropping of the 'Forth Formation Fitzroy Member'.

An isolated area on the northwest edge of the survey area was interpreted to be related to the outcropping of the 'Coal Pit Formation' and comprised sandy silty clay and silty sand with pebbles, shell fragments and scattered boulders. These areas were ground-truthed by camera transects OWF_10 and OWF_51.

Hard contacts detected by SSS are also mapped in Figure 3.1 and represent points of higher reflectivity than their surrounding area caused by relatively large dense substrate such as boulders. These contacts were abundant across the majority survey area. Relatively low densities of contacts were evident at the northern tip and along the mid to southwestern edge of the OWF survey area. However, this apparent spatial distribution of contacts will have been influenced, to some extent, by the differing SSS coverage across the survey area.

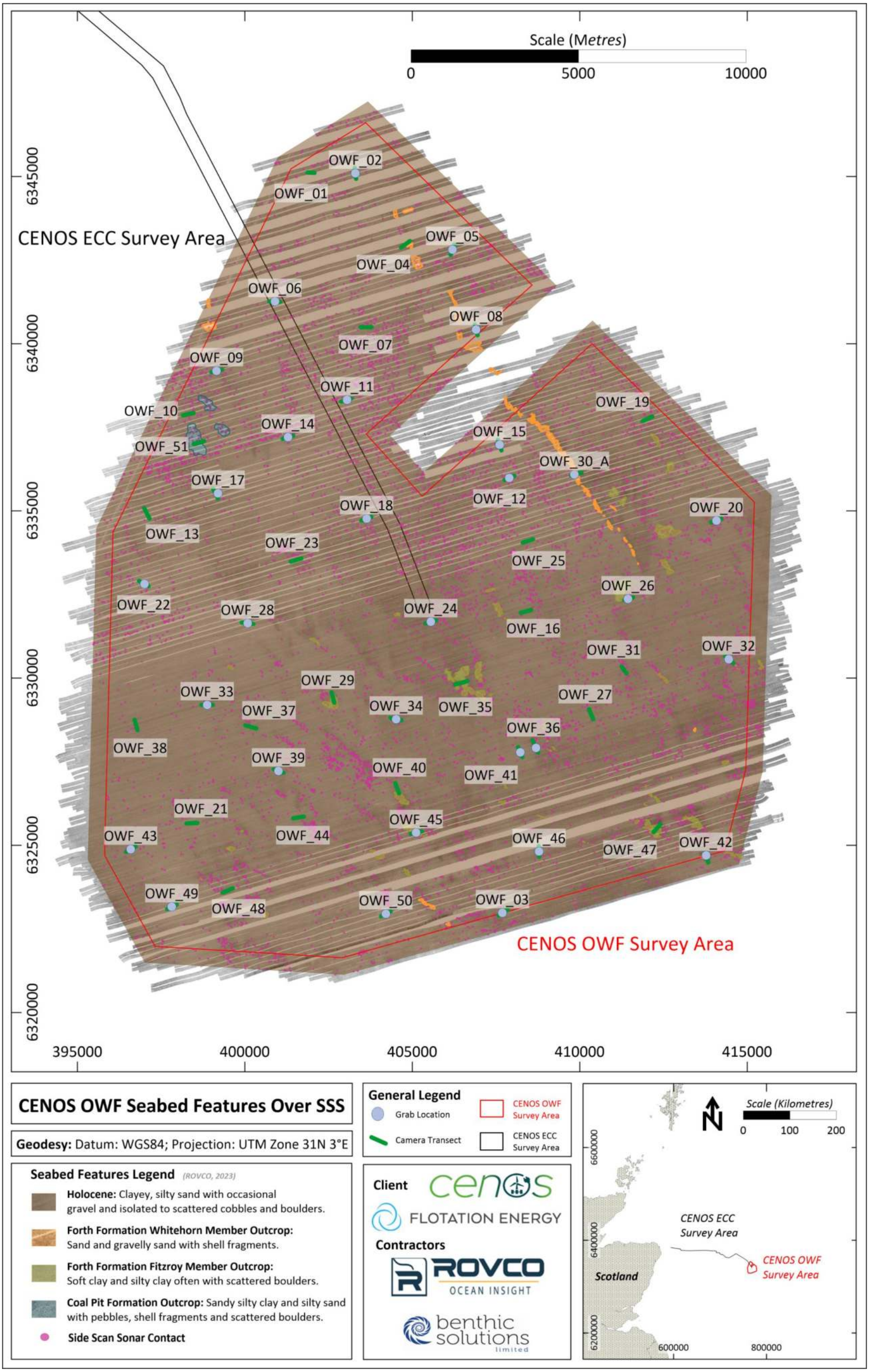


Figure 3.1 OWF Site Seabed Features over SSS

3.2 Habitat Classification

Sidescan sonar imagery, as well as video and still photographic ground-truthing from the 51 camera transects across the OWF site, and particle size analysis (PSA) were utilised in the assignment of benthic habitats.

Based on the datasets obtained, the OWF area was determined to be predominantly comprised of the JNCC/EUNIS habitat classification of SS.SMu.OMu/MD62 'Offshore Circalittoral Mud' (Table 3.1). This habitat conformed to the mapped classification predicted by EMODnet (Figure 1.2) and applied to all areas of 'Holocene' interpreted SBF. Smaller areas conforming to the JNCC/EUNIS classification of SS.SMx.OMx/MD42 'Offshore Circalittoral Mixed Sediment' were identified across several transects (OWF_11, 29. 30, 32, 35_A, 42, 45, 47 and 51) and broadly corresponded to areas of SBF interpreted to be influenced by outcropping 'Forth Formation Whitehorn Member', 'Forth Formation Fitzroy Member' and 'Coal Pit Formation'.

The outcropping underlying geological structures delineated in the SBF were utilised within the habitat assessment to delineate areas of mixed sediment following their associated geophysical sediment description. Although these areas of 'Forth Formation' and 'Coal Pit Formation' influence typically conformed to areas of mixed sediment, there was significant variation in the densities and distribution of mixed sediments within the delineated outcrop areas. Therefore, it was decided to define two different variants of the mixed sediment habitat, to be assigned to delineated SBF patches based on the observed features, seabed texture and reflectivity of the SSS data. Each SBF patch was reviewed and assigned either 'Offshore Circalittoral Mixed Sediment (SS.SMx.OMx/MD42) - Patchy distribution of cobbles and boulders intermixed with muddy sediments' or 'Offshore Circalittoral Mixed Sediment (SS.SMx.OMx/MD42) - Denser aggregation of cobbles and boulders with fringes of muddy sediment', according to visual assessment of the geophysical and environmental ground-truthing data.

Table 3.1 Summarised Habitat Classifications for the OWF Area

BGS Modified Folk Classification of Particle Size Analysis	JNCC Classification	EUNIS Classification
Muddy Sand, Sandy mud Slightly Gravelly Muddy Sand	SS.SMu.OMu Offshore Circalittoral Mud	MD62 Atlantic Offshore Circalittoral Mud
Muddy Sandy Gravel	SS.SMx.OMx Offshore Circalittoral Mixed Sediment	MD42 Atlantic Offshore Circalittoral Mixed Sediment

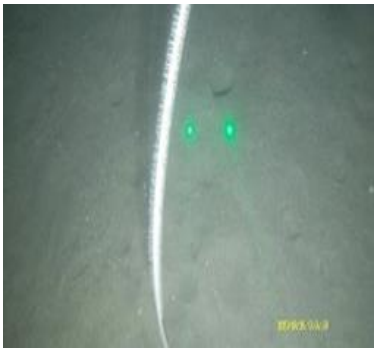
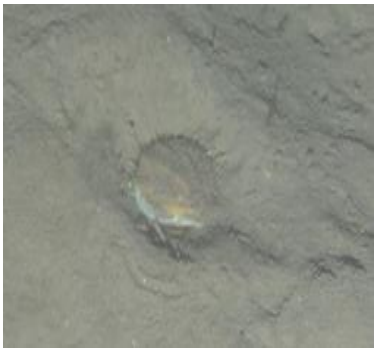
Conspicuous fauna within the OWF survey area revealed a moderate diversity and density for an overarching muddy sand dominated seabed, with comparable fauna assemblages across most stations. Sessile faunal assemblages noted across stations included several species of sea pens (*Pennatula phosphorea*, *Virgularia mirabilis* and *Funiculina quadrangularis*), several species of anemone (*Cerianthus lloydii*, *Bolocera tuediae*) and scallop (Pectinidae). Mobile fauna included hermit crabs (*Pagurus* sp.), sea stars (Asteroidea, *Asterias rubens*), brittlestars (Ophiuroidea), Urchin (Echinoidea) whelk (Buccinidae), Norway lobster (*Nephrops norvegicus*), squat lobster (Munididae), spider crab (Majidae) and sea slugs (Nudibranchia). Free-swimming megafauna mainly consisted of flatfish (Pleuronectiformes), gadoid fish (Gadidae) and the hagfish (*Myxine glutinosa*); with gurnards

(Triglidae), squid (Cephalopoda)and rays (Batoidea) also observed on occasion. A notable increase in sessile epifauna including sponges (erect and encrusting morphologies), anemones, barnacles (Cirripedia), Hydrozoa and Bryozoa were associated with areas of mixed sediments owing to the attachment opportunities provided.

Example images of conspicuous fauna within the survey area are presented below in Table 3.2, while example seabed images for each transect are provided in Appendix VIII.

Table 3.2 Examples of Epifaunal and Megafauna Species Recorded within the Survey Area

Examples of Conspicuous Fauna		
 **Slender seapen (*Virgularia mirabilis*)**	 **Flatfish (Pleuronectiformes)**	 **Hagfish *(Myxine glutinosa)***
 **Deeplet anemone (*Bolocera tuediae*)**	 **Common sea star *(Asterias rubens)***	 **Whelk (Buccinidae)**
 **Phosphorescent sea pen (*Pennatula phosphorea*)**	 **Hermit crab (*Pagurus*)**	 **Norway lobster (*Nephrops norvegicus*)**

Examples of Conspicuous Fauna		
 **Brachyura**	 **Dead man's fingers (*Alcyonium digitatum*)**	 **North Sea tube anemone (*Cerianthus lloydii)***
 **Tall sea pen (*Funiculina quadrangularis*)**	 **Gadoid fish**	 **Cephalopoda**
 **Scallop (Pectinidae)**	 **Sand star (*Astropecten irregularis*)**	 **Urchin (Echinoidea)**
 **Rajidae (possible *Raja clavata*)**	 **Bivalve siphons**	 **Sea slug (Nudibranchia)**

Examples of Conspicuous Fauna		
 **Brittlestar (Ophiuroidea)**	 **Porifera (erect morpholgy)**	 **Encrusting sponge (Porifera)**
 **Spider crab (Majidae)**	 **Lacy tubeworm (*Filograna implexa*)**	 **Quill worm (*Hyalinoecia*)**
 **Barnacles (Cirripedia)**	 **Squat lobster (Munidae)**	 **Cup coral (*Caryophyllia*)**
 **Sea slug Nudibranchia)**	 **Sea mouse (*Aphrodita*)**	 **Possible Sea beard (*Nemertesia antennina*)**

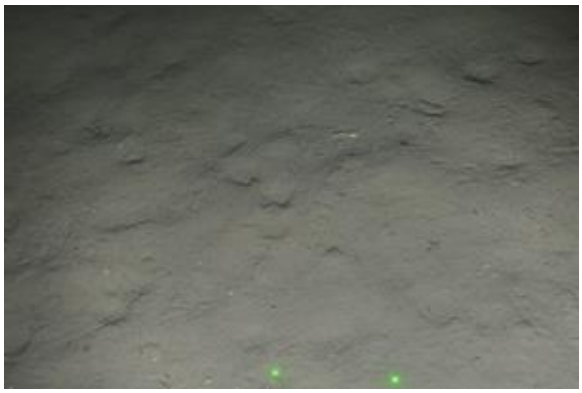
3.2.1 Offshore Circalittoral Mud (SS.SMu.OMu/MD62/A5.37)

This habitat is described by the JNCC as follows. "*In mud and cohesive sandy mud in the offshore circalittoral zone, typically below 50-70 m, a variety of faunal communities may develop, depending upon the level of silt/clay and organic matter in the sediment. Communities are typically dominated by polychaetes but often with high numbers of bivalves such as Thyasira spp., echinoderms and foraminifera.".* This habitat was widespread across most stations within the OWF site, with the sediment comprised of Muddy Sand, Sandy mud and Slightly Gravelly Muddy Sand. This biotope reflects the ambient background habitat for the CNS and equates to delineated areas of 'Holocene' interpreted SBF within the survey area.

Fauna observed on the seabed video included echinoderms, such as starfish (Asteroide*a)* and brittlestars (Ophiuroidea). Burrows of varying sizes, often associated with slender (*Virgularia mirabilis*), tall seapen (*Funiculina quadrangularis)* and phosphorescent seapens (*Pennatula phosphorea*) were observed across the majority of transects with the burrowing Norway lobster (*Nephrops norvegicus*) also seen occupying burrows in some instances. Moreover, mobile epifauna included species of flatfish (Pleuronectiformes) and ray-finned fish (Actinopterygii). Lists of the fauna observed along each transect are included within the seabed and sample photos included in Appendix.

The sediment characteristics and faunal records indicated a conformance towards the level four EUNIS habitat classification MD62 describing 'Atlantic Offshore Circalittoral Mud', corresponding with the JNCC classification SS.SMu.OMu. Eight level five biotopes exist within the 'Offshore Circalittoral Mud' habitat these are; SS.SMu.OMu.AfalPpin '*Ampharete falcata* turf with *Parvicardium pinnulatum* on cohesive muddy sediment near margins of deep stratified seas', SS.SMu.OMu.ForThy 'Foraminiferans and *Thyasira* sp. in deep circalittoral fine mud', SS.SMu.OMu.StyPse '*Styela gelatinosa*, *Pseudamussium peslutrae* and solitary ascidians on sheltered deep circalittoral muddy sediment', SS.SMu.OMu.CapThy '*Capitella capitata* and *Thyasira spp.* in organically-enriched offshore circalittoral mud and sandy mud', SS.SMu.OMu.LevHet '*Levinsenia gracilis* and *Heteromastus filiformis* in offshore circalittoral mud and sandy mud', SS.SMu.OMu.PjefThyAfil '*Paramphinome jeffreysii*, *Thyasira* spp. and *Amphiura filiformis* in offshore circalittoral sandy mud', SS.SMu.OMu.MyrPo '*Myrtea spinifera* and polychaetes in offshore circalittoral sandy mud' and SS.SMu.OMu.CalPol '*Calocaris macandreae* and polychaetes in offshore circalittoral mud and sandy mud'. The last five of the listed level five biotopes are more likely to occur within the OWF site due to the alignment towards a Mud and Sandy Mud seabed, which is more akin to OWF site seabed sediments. The other three level five biotopes move towards a seabed made of more cohesive soft muds. However, all of the above biotopes are infauna dominated, so their potential occurrence within the survey area will be reviewed within the subsequent environmental baseline survey report (Doc Ref: CEN001-ROV-01-ENV-RPT-0022) when the infauna data will be available to aid in a level five classification. However, it should be noted that not all camera transects have corresponding physico-chemical or biological data due to unsuccessful sampling at the corresponding grab location.

Example images are provided in Figure 3.2 and the spatial extent of the 'Offshore Circalittoral Mud' (MD62) habitat is mapped in Figure 3.5.



OWF_07

OWF_01

OWF_02

OWF_04

Figure 3.2 Example Images of 'Offshore Circalittoral Mud' Habitat

3.2.2 Offshore Circalittoral Mixed Sediment (SS.SMx.OMx / MD421/A5.45)

The JNCC describes this biotope as "*Mixed (heterogeneous) sediment habitats in the circalittoral zone (generally below 15-20m) including well mixed muddy gravelly sands or very poorly sorted mosaics of shell, cobbles and pebbles embedded in or lying upon mud, sand or gravel*". This biotope was present throughout the OWF survey area with large, isolated patches in the north-western edge and the central/southern extent.

The mixed sediment patches in the OWF conformed to the JNCC/EUNIS classification of SS.SMx.OMx/MD42 'Offshore Circalittoral Mixed Sediment' and were identified across several transects (OWF_11, 29. 30, 32, 35_A, 42, 45, 47 and 51). It was decided to define variants of the overall mixed sediment habitat to these areas, based on the observed features, seabed texture and reflectivity within the SSS data. Each delineated area was reviewed and assigned to either 'Offshore Circalittoral Mixed Sediment (SS.SMx.OMx/MD42) - Patchy cobbles and boulders intermixed with muddy sediments' or 'Offshore Circalittoral Mixed Sediment (SS.SMx.OMx/MD42) - Denser aggregation of cobbles and boulders with fringes of muddy sediment', depending on the visual assessment of the geophysical data. The former habitat variant was typically assigned to larger delineated areas where mixed sediment occurring in a mosaic of smaller patches amongst the muddy Holocene deposits. The latter habitat variant of mixed sediment was assigned to areas that showed more visibly dense aggregations of mixed sediments that demonstrated less intermixing with muddy Holocene sediments.

Only one level five biotope exists within the 'Offshore Circalittoral Mixed Sediments' habitat: the biotope SS.SMx.OMx.PoVen 'Polychaete-rich Deep *Venus* Community in Offshore Mixed Sediments'. The potential for this habitat to occur within the survey area will be reviewed in the subsequent environmental baseline report (Doc Ref: CEN001-ROV-01-CON-ENV-RPT-0022), when the infauna data will be available to aid in a level five classification.

The most abundant fauna observed within this habitat on the seabed photographs and video included branching sponges such as (*Axinella* sp.), Ophiuroidea (brittlestars), Dead man's fingers (*Alcyonium digitatum*), cup corals, hydrozoans and bryozoan turf. Example images of the natural accumulation of shell mixed sediment are provided in Figure ***3.3*** . The spatial extent of the 'Offshore Circalittoral Mixed Sediment' (MD42) habitat across the OWF survey area is mapped in Figure 3.5.

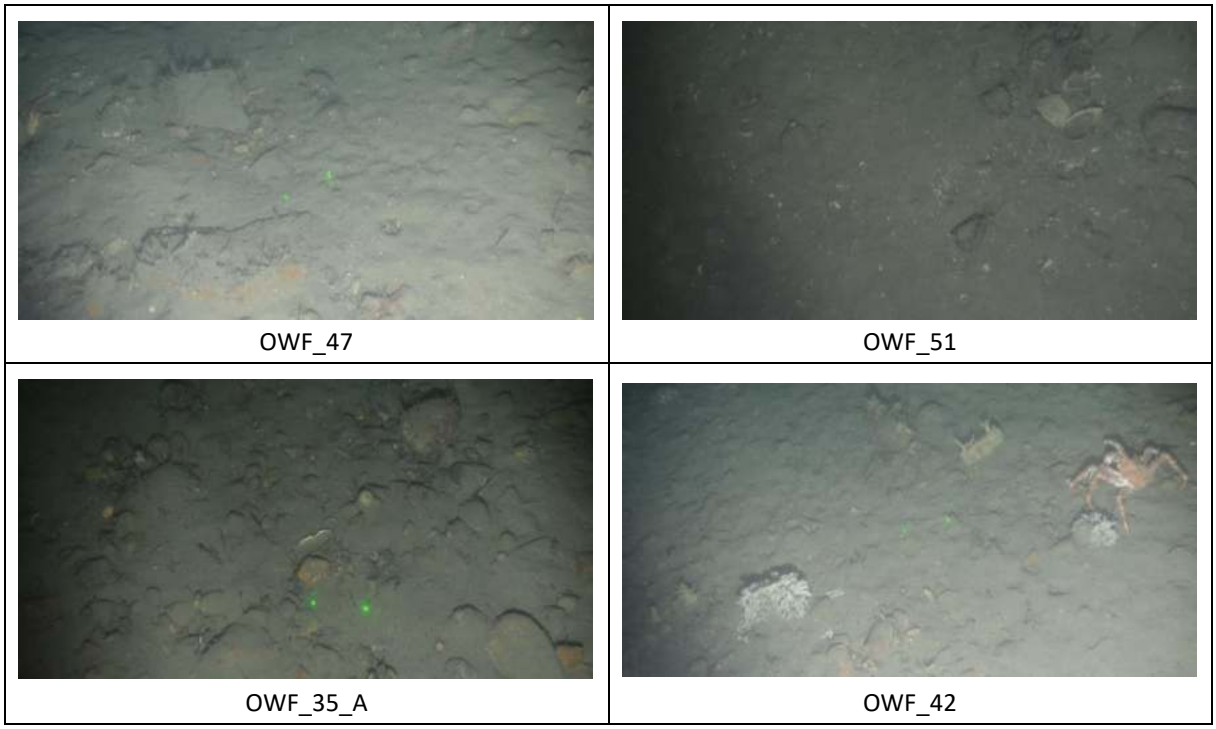


Figure 3.3 Example Images of 'Offshore Circalittoral Mixed Sediment' Habitat

3.2.3 Anthropogenic Habitats

Areas of a possible wreck, metal pipe, rope and plastic debris were colonised by epifaunal species such as bryozoan and hydrozoan turf, Cnidaria, Actinaria and Porifera species (Figure 3.4). Moreover, the wreck along transect OWF_11 was surrounded by significant numbers of ray-finned fish, including haddock and pouting. Similarly to the naturally occurring hard substrate (i.e. shell fragments, cobbles and boulders), areas of anthropogenic habitat had an observable increase in the abundance and density of mobile fauna, as sheltered structures are often used by mobile species as nursery areas and function as refuges from predators (Leewis *et al.,* 2000, Wilhelmsson *et al.* and 2006 Hiscock *et al.,* 2010).

Figure 3.4 Example Images of Anthropogenic Habitats

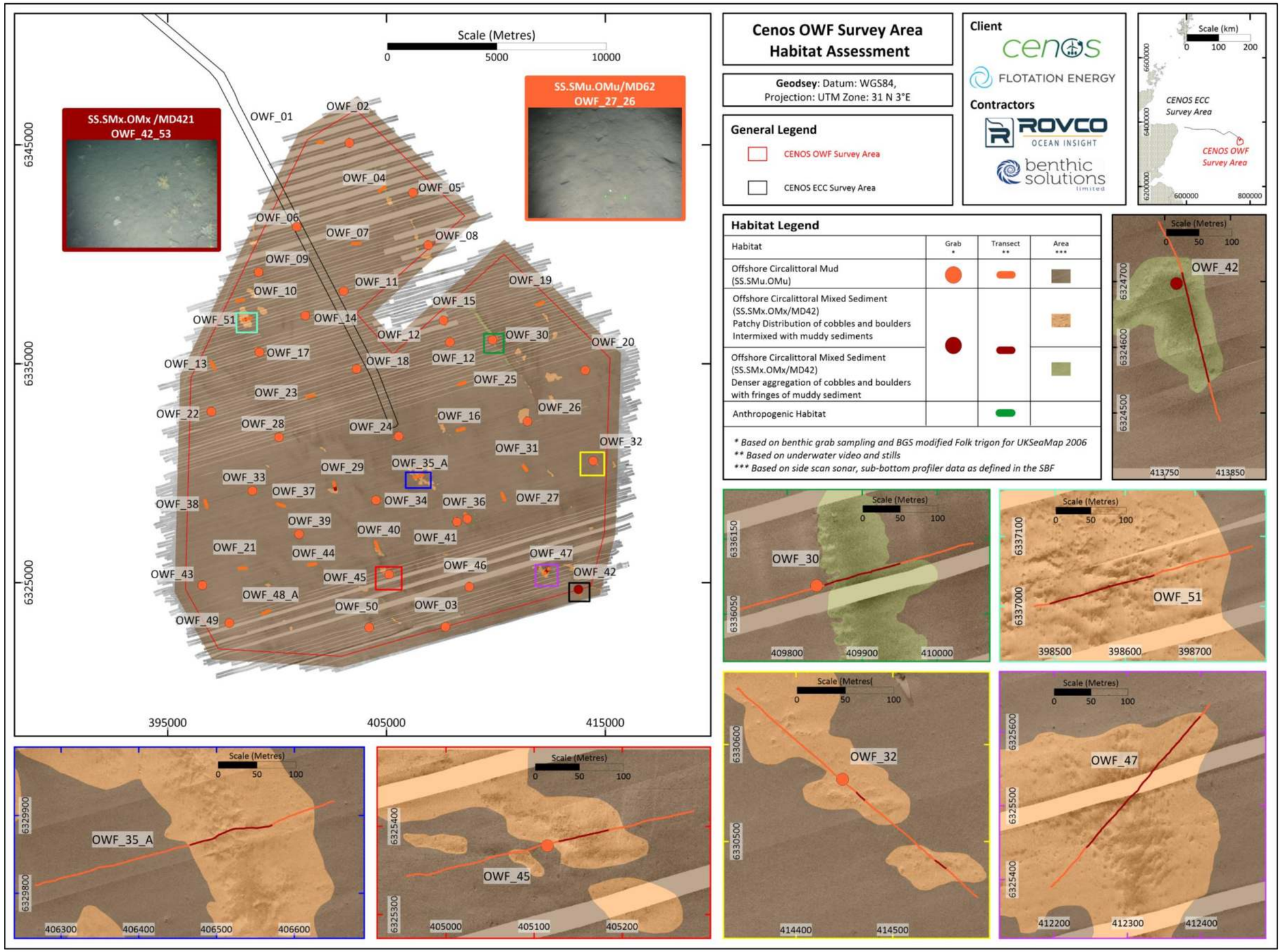


Figure 3.5 Environmental Habitats within the OWF Site

3.3 Potential Sensitive Habitats and Species

As previously discussed (Section 1.5.5.3), there are several potentially sensitive habitats and species which are known to occur in the wider region (northern North Sea), including:

- Subtidal Sands and Gravels (UK Post-2010 Biodiversity Framework Habitat)
- Seapen and Burrowing Megafauna Communities (Scottish PMF, English and Welsh Habitat FOCI, OSPAR threatened and/or declining Habitat)
- Ocean quahog, *Arctica islandica* (Scottish PMF, English and Welsh Species FOCI, OSPAR threatened and/or Declining Species)

In addition to the above habitats and species, review of the geophysical and environmental ground-truthing data from the OWF survey area indicated the presence of stony substrate and associated sponge communities, which warranted further assessment as potential:

- Stony Reef (Annex I Habitat)
- Deep-sea sponge aggregations (Scottish PMF, OSPAR threatened and/or Declining Habitat)

The aforementioned habitats and species are listed by one or more International Conventions, European Directives or UK Legislation (including devolved UK administrations). Note: while European Directives are no longer directly relevant following the UK's exit from the European Union, UK legislation implementing these directives is still applicable and there has not yet been any policy change (GOV.UK, 2022).

3.3.1 Annex I Stony Reef

Numerous boulders or clusters of cobbles and boulders were recorded along seven camera transects within the survey area. Accordingly, these transects were investigated further to assess whether any areas had the potential to be classified as EC Habitats Directive Annex I stony reef.

The seabed camera ground-truthing data were assessed for potential stony reef using the criteria proposed by Irving (2009). This breaks down the assessment criteria measures of 'quality' or 'reefiness' as outlined in Table 3.9. This is based on hard substrate being present which is elevated above the surrounding seabed, where >10% composition of the sediment matrix are cobbles or boulders, and this substrate extends across a minimum area of 25 m^2.

The stony reef assessment for the current survey was based stills of the HD video footage taken at 10 second intervals. Each image was assessed for changes in the composition (i.e., percent coverage) and elevation of cobbles and boulders. In addition, the epifauna coverage on the cobble and boulder fraction of the seabed was assessed, both including and excluding hydrozoan/bryozoan turf, which is regarded as low ecological value by Golding *et al.* (2020). Each section of the transects where cobbles or boulders were detected was then analysed and categorised according to its composition, elevation, biota cover and extent.

The assessment of the extent of hard substrate coverage from available geophysical data was challenging due to variations in data quality and uncertainties regarding textural changes associated with cobble and boulder coverage. As a result, a precautionary approach was taken to estimate the extent, assuming a circular shape for each patch and using the straight-line distance between similar

stony reef features in still images as the diameter of the circle. However, it was not possible to differentiate and map the precise seabed area covered by hard substrate.

Note: the original Irving (2009) biota criteria cannot be practically applied without acquiring high volume samples of reef matrix to identify all fauna and establish the relative richness of infaunal and epifaunal taxa, which would require non-standard sampling equipment and would damage any potential reef. As such, modified biota assessment thresholds were applied to assess the coverage of epifauna: Not a Reef = <10%; Low = 10 - 40%; Medium = 40 - 80%; and High = >80%.

Table 3.3 Summary of Resemblance to a Stony Reef as Summarised in Irving (2009)

Measure of 'Reefiness'	Not a Reef	Low[c]	Medium	High
Composition[a]	<10%	10-40%	40-95%	>95%
Elevation[b]	Flat seabed	<64 mm	64 mm-5 m	>5 m
Extent (m^2)	<25 m^2	>25 m^2	>25 m^2	>25 m^2
Biota	Dominated by infauna			>80% of species are epifauna

(a) *Diameter of cobbles / boulders being greater than 64mm. Percentage cover relates to a minimum area of 25m^2. This 'composition' characteristic also includes 'patchiness.'*
(b) *Minimum height (64 mm) relates to minimum size of constituent cobbles. This characteristic could also include 'distinctness' from the surrounding seabed.*
(c) When determining if the seabed is considered as Annex I stony reef, a 'low' scored in any category, would require a strong justification for this area to be considered as contributing to the Marine Natura site network of qualifying reefs in terms of the EC Habitats Directive.

The Irving (2009) stony reef protocol was split into separate assessments of reef 'structure' using a method developed by BSL staff. The first reef 'structure' matrix is based on the percentage coverage or composition of cobbles/boulders and assessed against the corresponding cobble/boulder elevation above the surrounding seabed (Table 3.4). The results of this assessment are presented in Table 3.5, with full details of the assessment included in Appendix IV.

Table 3.4 Stony Reef Structure Matrix: Elevation vs. Composition (After Irving, 2009)

Reef Structure Matrix			Elevation			
			Flat	<64 mm	64 mm-5 m	>5 m
			Not a Reef	Low	Medium	High
Composition	<10%	Not a reef	Not a Reef	Not a Reef	Not a Reef	Not a Reef
	10-40%	Low	Not a Reef	Low	Low	Low
	40-95%	Medium	Not a Reef	Low	Medium	Medium
	>95%	High	Not a Reef	Low	Medium	High

The stills taken during the OWF survey that were analysed for stony reef assessment indicated intermittent distribution of cobbles and boulders across the camera transects (a complete log of the assessment per still is provided in Appendix IV).

In total, 540 images were reviewed along the seven camera transects that contained areas of potential stony reef (Table 3.5). A total of 30 images were identified as unsuitable for analysis, primarily attributed to instances where the camera was in motion during capture. Of the remaining 510 images reviewed, 419 (77.6%) showed no evidence of stony reef. In terms of stony reef composition or percentage cover for all stills, 87 (16.1%) were classed as 'Not a Reef', 4.0 (0.7%) as 'Low Reef', none

as 'Medium Reef' and none as 'High Reef' (Table 3.5). In terms of elevation, 47 (8.7%) were classed as 'Not a Reef', 44 (8.2%) as 'Low Reef', none as 'Medium Reef' and none as 'High Reef'. There were also areas of pebbles and coarse shell fragments, however, they did not meet the specifications of required substratum for stony reef (>64 mm), with 419 (77.6%) classed as 'No Reef'. When both composition and elevation were considered, by examining reef 'structure', 87 (16.1%) classed as 'Not a Reef', 4.0 (0.7%) as 'Low Reef', none as 'Medium Reef' and none as 'High Reef' (Table 3.5) This equates to a total of 4 images (0.7%) showing reefiness of 'Low Reef'.

Table 3.5 Summary of Stony Reef Image Analysis

'Reefiness' of Video Screengrabs	No Stony Reef		Not a Reef		Low		Medium		High		Unclear Footage	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Composition (% cover)	419	77.6	87	16.1	4.0	0.7	0.0	0.0	0.0	0.0	30.0	5.6
Elevation			47.0	8.7	44.0	8.2	0.0	0.0	0.0	0.0	30.0	5.6
Reef Structure (Composition vs Elevation)			87.0	16.1	4.0	0.7	0.0	0.0	0.0	0.0	30.0	5.6

The average reef structure (composition vs elevation) was determined for each reef section along each transect. Reef sections were defined as continuous sections of transect showing consistent stony reef characteristics, the extent of which was delineated, on a precautionary basis, by the still photograph either side of stills showing consistent habitat/reef type. However, due to the variable sediment type and quality of geophysical for delineating sections, sections were divided into two groups: 'Low Reef' area, while areas classified as 'Not a Reef' and 'No Reef' were grouped.

There were three ground-truthed patches that were classified as 'Low Reef' structure (composition vs. elevation (Figure 3.6). Despite this, the majority of camera transects were classified as "No Reef" or "Not a Reef". No instances of 'Medium Reef' or 'High Reef' patches were present across the survey area.

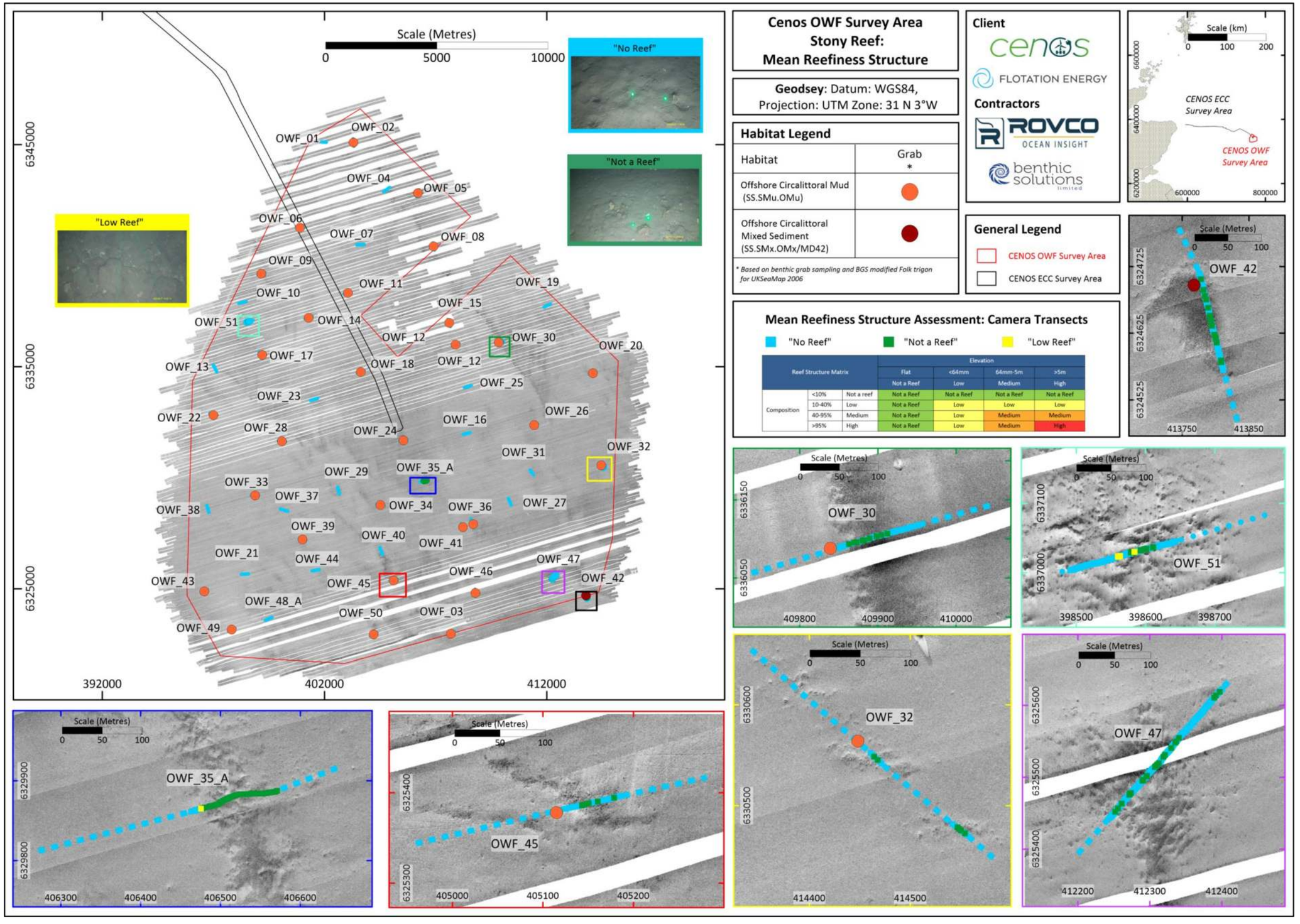


Figure 3.6 Mean Reefiness Structure (Composition vs Elevation) Assessment for the OWF Survey Area

The reef structure (composition vs. elevation) results formed part of the second 'reef structure' assessment, which considers the percentage cover of epifauna colonising the cobble and boulders. Although regarded as being of low ecological value on stony reefs by Golding *et al.* (2020), epifaunal coverage was quantified as total epifauna, including bryozoan/hydrozoan turf. The mean reefiness (structure vs. epifaunal coverage) was calculated per reef section for each camera transect showing the presence of cobbles and boulders using total epifauna coverage (including bryozoan/hydrozoan turf) as a worst-case scenario of reef habitats in the area.

One segment was classified as 'Low Reef'; however, all other habitat segments of all other camera transects were classified as 'Not a Reef' using this approach. The analysis resulted in two patches of 'Low Reef' in terms of composition vs. elevation, being downgraded to 'Not a Reef' due to their lack of epifaunal coverage (including faunal turf). The instances of 'Low Reef' related to an area of the seabed described as containing large boulders with patches of cobbles.

The highest recorded epifauna coverage, excluding turf, was 40% within a few specific patches of two still images (OWF_47_SR00110.JPG and OWF_47_SR0068.JPG), observed to be cobbles colonised with suspected branching porifera (*Axinella* sp.*).* However, these segments were not deemed to be 'Low Reef' due to the limited coverage of cobbles (<10%). The aggregations of *Axinella* sp. will be analysed further in a deep-sea sponge assessment of the area.

Table 3.6 Stony Reef Structure Matrix: Structure vs. Epifaunal Coverage (Modified Irving, 2009)

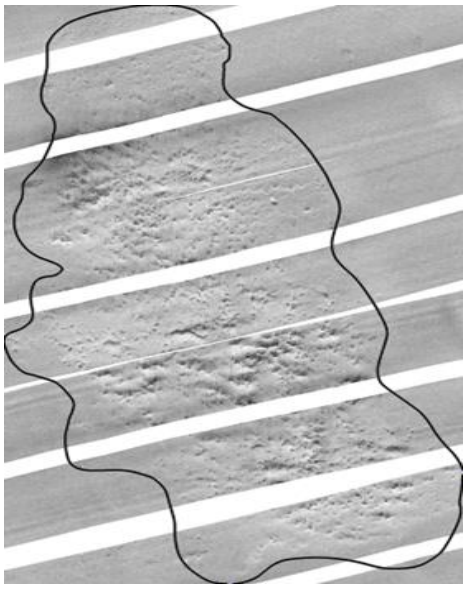
Reef Structure Matrix			Reef Structure			
			Not a Reef	Low	Medium	High
Epifaunal Coverage	<10%	Not a reef	Not a Reef	Not a Reef	Not a Reef	Not a Reef
	10-40%	Low	Not a Reef	Low	Low	Low
	40-80%	Medium	Not a Reef	Low	Medium	Medium
	>80%	High	Not a Reef	Low	Medium	High

Identified reef patches could not be reliably mapped from the geophysical data due to the lack of distinct SSS or MBES signatures associated with these areas. As such, approximations of extent were made from the measured length of continuous reef along the transect, by assuming that reefs occupied circular areas of seabed (i.e. the straight-line distance between known locations of reef stills equates to the diameter of a circle, the area of which is calculated using πr^2). As for calculation of the linear extent of habitat/reef sections, areas were calculated on a precautionary basis with the circular patch diameter equating to the distance between the still photograph either side of the stills characterised as consistent habitat/reef type.

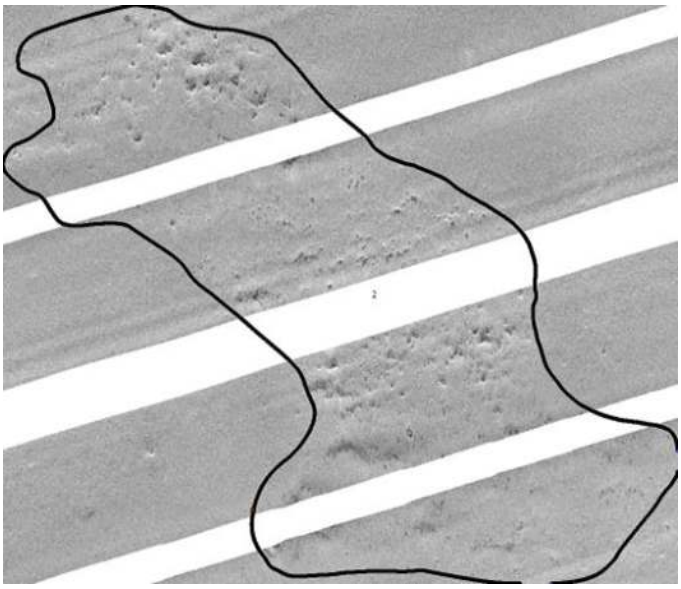
Utilising the Irving (2009) guidance, areas of seabed classified as 'Not a Reef', based on reef structure (composition vs. elevation vs. epifaunal coverage) would still be 'Not a Reef' regardless of whether the extent was <25 m^2 or >25 m^2. As such, areas were only calculated for patches of potential stony reef showing mean reefiness (structure vs. epifauna coverage) indicating 'Low Reef' structure.

The results are mapped in Figure 3.8 and indicate the single occurrences of 'Low Reef' in terms of overall reefiness (structure vs. epifaunal cover (including turf) vs. extent), characterised by two stills photographs on transect OWF_51. Transect OWF_51 was one of two camera transects that ran through areas of outcropping Coal Pit Formation noted from the SSS, with only one delineated polygon shows a texture and high reflectivity signature associated with the identified stony reef.

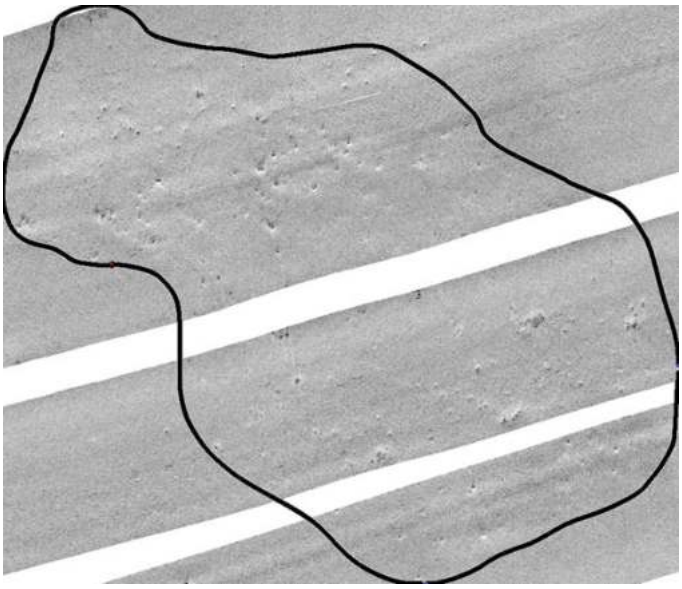
Three polygon areas were delineated as potential outcropping Coal Pit Formation. However, since their texture and reflectivity did not conform to that associated with possible stony reef seen along transect OWF_51, only one polygon has been assigned as a potential area of occurrence for 'Low Reef' as a precaution. It is important to note that the polygon delineated over transect OWF_51 does not indicate an area of 'Low Reef' per se but, rather, this delineates an area where it is reasonable to assume that additional small areas of 'Low Reef' could occur. Furthermore, transect OWF_51 crossed through the area of highest sonar reflectivity associated with this patch and only two stills were seen that could be classified as low stony reef, so it is unlikely that any notable additional reef would be seen in this area. Finally, it is worth noting that Irving (2009) advises that strong justification would be required for 'Low Reef' to be considered as contributing to the Marine Natura site network of qualifying reefs in terms of the EU Habitats Directive.



OWF_51 Coal Pit Formation '*a*'



Coal Pit Formation '*b*'



Coal Pit Formation '*c*'

Figure 3.7 Coal Pit Formation Polygons; 'a', 'b' and 'c'

Table 3.7 Overall Stony Reefiness Matrix (Structure vs. Epifaunal coverage vs. Extent)

Overall Reefiness Matrix			Reef Structure (incl. Composition, Elevation and Epifaunal Coverage)			
			Not a Reef	Low	Medium	High
Extent (m^2)	<25	Not a Reef	Not a Reef	Not a Reef	Not a Reef	Not a Reef
	>25	Low - High	Not a Reef	Low	Medium	High

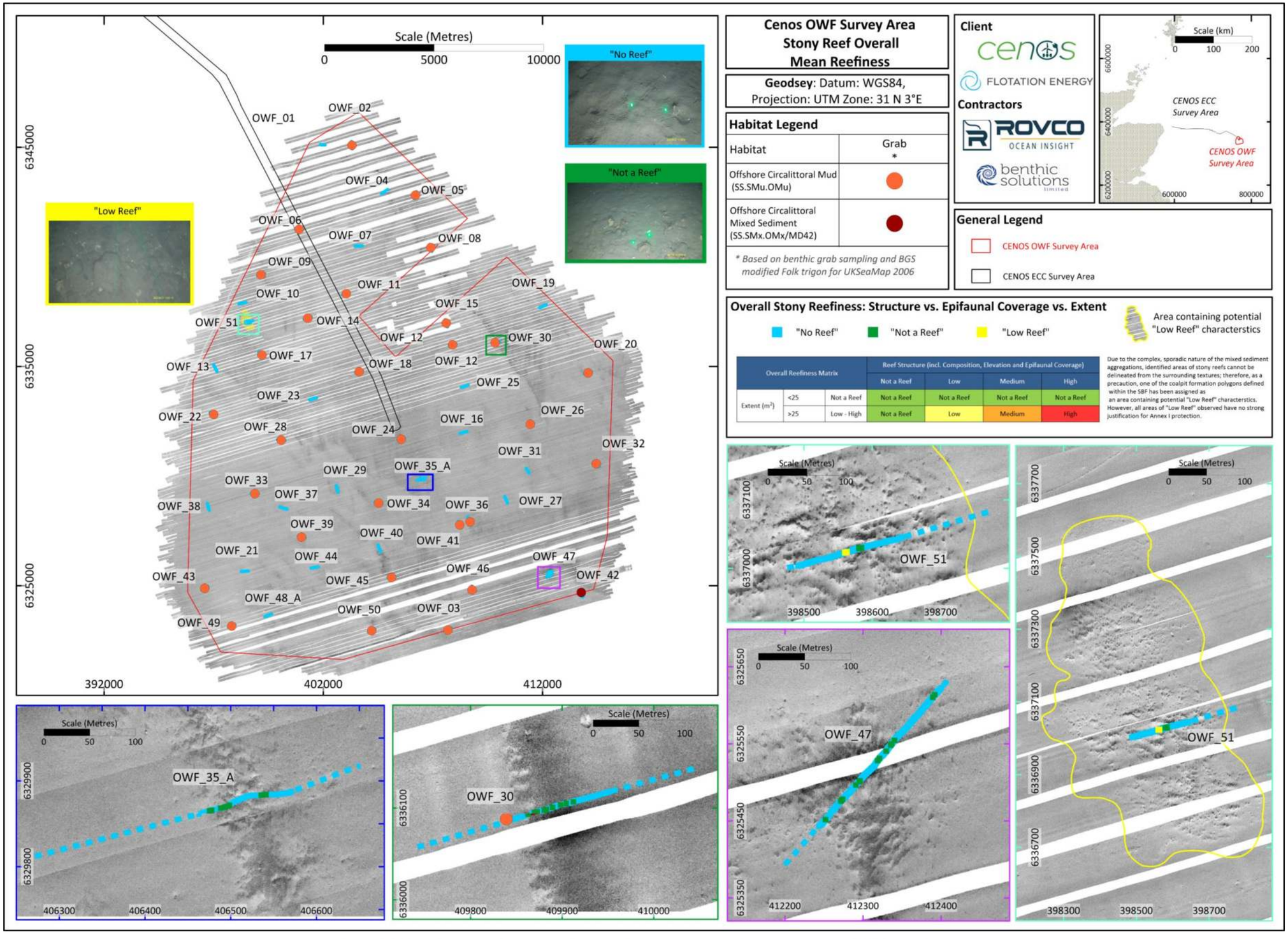


Figure 3.8 Mean Reefiness (Structure vs Extent vs Epifauna coverage) Assessment for the OWF Survey Area

One of the key principles to be considered for an area when assessing its 'resemblance' to Annex I stony reef is stability; areas of consolidated and patchy hard substrate may not fulfil the composition requirements of the Annex I stony reef criteria by Irving (i.e. not having the required percentage of cobbles and boulders, but stability allows a diverse and 'reef-like' epifaunal community to develop (Golding *et al.*, 2020).

The transects where initial Annex I stony reef assessment were conducted and exhibited overall 'Low Reef' (structure vs epifaunal coverage vs. extent) were further investigated to establish whether hard substrate areas still corresponded to reef-like structures based on the epifauna present. This involved the assignment of 'reef biotopes', the identification of key species and the richness of 'reef species' according to the criteria outlined in Golding *et al.* (2020).

Table 3.8 Biota Criteria for Defining 'Low Resemblance' Stony Reef (Golding et al., 2020)

Reef	Stage 1	Stage 2	Stage 3
	Reef Biotopes	Key Reef Species Count	Reef Species Count
Reef	Reef biotope	≥3	>20
Possible reef	Possible reef biotope	>1 and <3	>5 and <20
Not reef	Non-reef biotope	0	<5

The 'Low Reef' transect (OWF_51) examined exhibited predominantly 'Possible Reef' characteristics, as the identification of 'Circalittoral Mixed Sediment' (SS.SMx.CMx/MC421) matched one of the key reef biotopes listed in Golding *et al.* (2020). To evaluate the presence of reef species, epifauna from the still photographs were reviewed from the one occurrence of overall 'Low Reef' (structure vs. epifaunal coverage vs. extent).

Two taxa observed in the stills classified as 'Key-Reef' species; the Cnidaria *Alcyonium digitatum* and bryozoan turf. The presence/abundance of desirable reef species included cup corals (*Caryophyllia*). No more than three 'Key Reef' species were recorded for the section of 'Low Reef', resulting in the classification of "Possible Low Reef" with no strong justification to warrant Annex I protection.

3.3.2 Deep-sea sponge aggregations

The habitat "Deep-sea sponge aggregations" is listed in the OSPAR "List of Threatened and/or Declining Species and Habitats" and is currently considered under threat and/or decline in all OSPAR areas where it occurs (OSPAR, 2008). The habitat corresponds with the EUNIS classification of 'Sponge communities on Atlantic upper bathyal rock' (ME122; EUNIS, 2019). The OSPAR (2010) methodology, which is in line with the JNCC (Henry and Roberts, 2014) was utilised in this report to assess whether the 'deep-sea sponge aggregations' Priority Marine Feature (PMF) habitat was present within the OWF survey area.

OSPAR (2010) defines that any sponge aggregations with "*more than 0.5 sponges per m²*" extending over an area of 25 m^2 should be defined as a potential deep-sea sponge habitat. The assessment was applied to the 539 stills images acquired along the camera transects previously assessed for stony reef habitat. The density of sponges within each photograph was recorded and if sponges covered an area of 25 m^2, a sponge assessment category was applied (Table 3.9). If the area was less than 25 m^2, the density of the sponges would be classified as 'no category', but a note was made that sponges were present. The categories were colour coded for ease of review, with the results of the assessment for all images taken across the survey area presented in Appendix V.

Assessed still images were primarily grouped into the same habitat sections as used for the stony reef assessment, due to these areas displaying similar characteristics for attachment and colonisation of sponges. However, where geophysical data displayed discernible differences, the extent was assessed using the area coverage of higher reflectivity patches, determined by delineating the area within Global Mapper. In the absence of any discernible habitat boundaries on the geophysical data, extent was assessed on a precautionary basis, assuming a circular shape to each patch and taking the straight-line distance between stills within the sections to be the diameter of the circle.

Sponges were not observed across most of the survey area, hence the 'No category' description was used. Sponges with a density of less than 0.5 per m^2 were recorded in small patches (<25 m^2). In total, six delineated sections were categorised 'Category 1' due to the presence of sponges at densities of less than 0.5 m^2. A large proportion of these sponges were located at transect OWF_42 which was situated in a subcategory of (SS.SMu.OMx/MD42) 'Offshore Circalittoral Mixed Sediment'. However, no areas with sponge densities of greater than 0.5 m^2 (i.e. Category 2 or higher) were observed.

Table 3.9 Sponge Density Categories

Sponge Density Category	Number of Sponges per m^2	Number of Sections Within Category	Number of Image Within Categories	Number of Sponges Observed Within Categories
No Category	None*	7	101	0
Category 1	<0.5 m^2	6	403	186
Category 2	≥0.5 m^2 – 1 m^2	0	0	0
Category 3	>1 m^2 – 2 m^2	0	0	0
Category 4	>2 m^2 – 4 m^2	0	0	0
Category 5	>4 m^2 – 5 m^2	0	0	0

**Note: 'No Category' represents an area less than 25 m^2 and sections assigned a category exceeded 25m^2 as per the OSPAR 2010 definition of a potential deep-sea sponge habitat*

In order to verify whether deep-sea sponge aggregations occurred in the OWF survey area, the results of the OSPAR (2010) assessment were evaluated against the criteria outlined by the JNCC which takes into account the density, habitat and ecological function of an area (Figure 3.9) (Henry and Roberts, 2014). For a 'High' confidence level to be assigned, an area must be complaint with all three criteria elements, while a 'Medium' confidence level requires two criteria to have been met. A 'Low' confidence level is assigned when only one criteria category can be met.

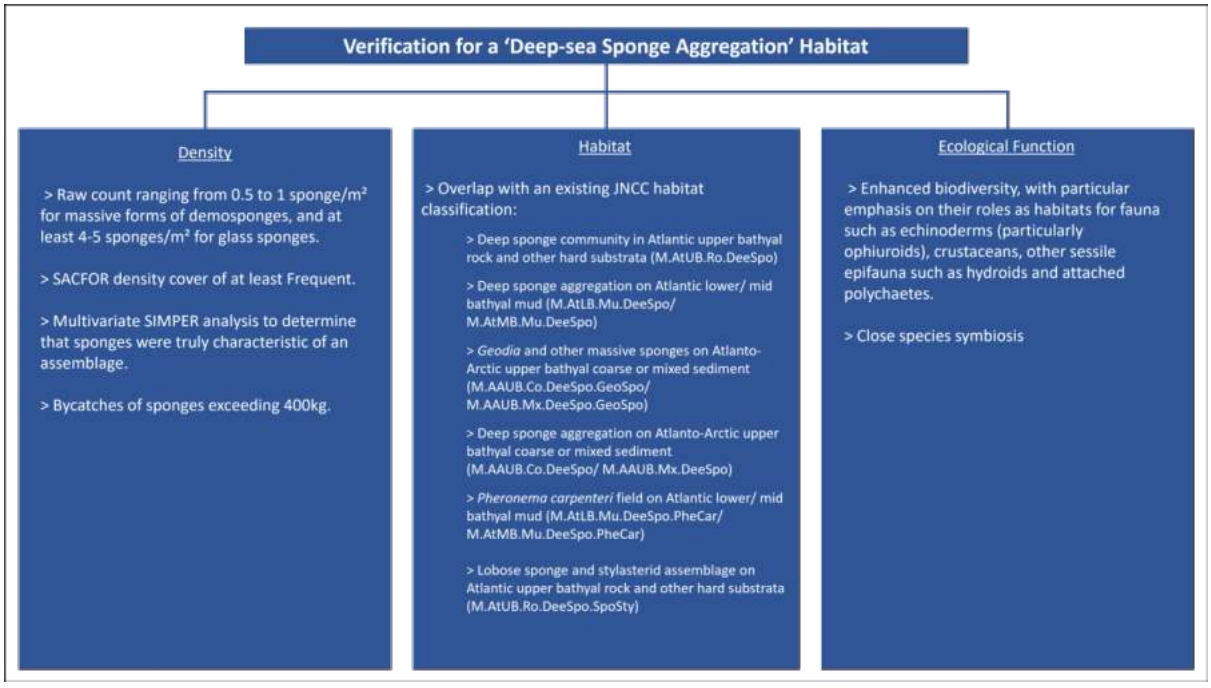


Figure 3.9 Criteria Used to Verify Deep-sea Sponge Aggregations (Adapted from JNCC, 2014)

In terms of density, the OWF site had an OSPAR sponge density of <0.5 m^2, so the site did not pass the minimum density criteria. None of the habitats (SS.SMu.OMu, SS.SMx.OMx) assigned in the OWF survey area corresponded to the sponge associated habitat classifications (Figure 3.9). The majority of erect epifauna associated with these habitats included branching porifera (*Axinella* sp.*),* encrusting porifera, occasional dead man's fingers (*Alcyonium digitatum*) and cup corals (*Caryophyllia* sp.). Other taxa such as sea anemones (Actiniaria sp.), tube worms (Serpulidae), sea stars (*Asterias sp.*), hermit crabs (*Pagurus* sp.), and bryozoan/hydrozoan turf were present but only infrequently. Given no criteria were met in the OWF survey area, it can be concluded the OSPAR and PMF 'deep-sea sponge aggregations' habitat was not present.

3.3.3 Legislative Species Protection

To assess if any species afforded legislative protection in the UK were present within the survey area, the epifauna data recorded from the underwater video assessment were run through a listed species database developed by BSL staff. The tall sea pen (*Funiculina quadrangularis*), recorded across the majority of stations, is listed on the Scottish Biodiversity List (SBL), as an English and Welsh Feature of Conservation Interest (FOCI) and a UK Biodiversity Action Plan (UKBAP) priority species. In addition, although slender and phosphorescent sea pens (*Virgularia mirabilis* and *Pennatula phosphorea* respectively) do not have specific legislative protection in UK waters they are associated to the OSPAR 'Seapen and burrowing megafauna communities' habitat.

3.3.4 Subtidal Sands and Gravels

The subtidal sands and gravel habitat is a priority habitat under the UK BAP and occurs in a wide variety of marine environments where sediments like sand, gravel and cobblestone accumulate. The habitat is home to a variety of species including polychaetes, crustaceans and fish which rely on the habitat for breeding, feeding and shelter. Offshore examples of these habitats are considered more diverse due to the reduction in natural disturbance and are characterised by a range of anemones, polychaetes, bivalves, amphipods as well as mobile and sessile epifauna. These areas support internationally important fish and shellfish fisheries and provides important ecosystem services by improving water quality and acting as a carbon sink. This habitat is at risk from pollutants in riverine discharge, trawling and dredging activities and aggregate extraction.

Upon review of the high-definition video data, areas of 'Circalittoral Mixed Sediment' could be considered as 'Subtidal Sands and Gravel' UKBAP priority habitat.

3.3.5 Burrowing Megafauna Communities

To determine whether the 'Offshore Circalittoral Mud' (SS.SSa.OSa/ MD52) habitat should be classified as OSPAR 'Seapen and burrowing megafauna communities', a combination of environmental factors and faunal information are considered, as outlined in JNCC (2014). The OSPAR definition of 'Seapen and burrowing megafauna communities' is as follows:

"*Plains of fine mud, at water depths ranging from 15–200 m or more, which are heavily bioturbated by burrowing megafauna; burrows and mounds may form a prominent feature of the sediment surface with conspicuous populations of sea-pens, typically Virgularia mirabilis and Pennatula phosphorea. The burrowing crustaceans present may include Nephrops norvegicus, Calocaris macandreae or Callianassa subterranea. In the deeper fjordic lochs which are protected by an entrance sill, the tall sea-pen Funiculina quadrangularis may also be present. The burrowing activity of megafauna creates a complex habitat, providing deep oxygen penetration. This habitat occurs extensively in sheltered basins of fjords, sea lochs, voes and in deeper offshore waters such as the North Sea and Irish Sea basins and the Bay of Biscay*." (OSPAR, 2010).

For a habitat to be classified as 'Seapen and burrowing megafauna communities' the presence of burrowing macrofauna is an essential element, while sea pens (e.g. *V. mirabilis*, *P. phosphorea* and *Funiculina quadrangularis*) may, and by extension may not, be present (JNCC, 2014). Phosphorescent seapens (*P. phosphorea*) were commonly observed at stations characterised by "lebensspuren" and burrows. Slender (*Virgularia mirabilis*) and tall (*Funiculina quadrangularis)* sea pens were also observed across several transects but occurred less frequently within the video footage obtained, particularly the latter. In addition, the burrowing crustacean *Nephrops norvegicus* was observed utilising and interacting with burrows across several stations within the survey area.

According to JNCC (2014) guidance, the key determinant for classification of 'Seapen and burrowing megafauna communities' is the presence of burrowing species or burrows at a SACFOR density of at least 'Frequent'. However, application of the SACFOR scale is dependent on the size of the fauna being assessed (Table 3.10).The burrowing fauna, *Nephrops norvegicus* was observed across the majority of stations and was sighted occupying burrows at stations OWF_04, _07, _11, _14,_34, _44 (Figure 3.10). Review of the infauna data in the subsequent environmental baseline reports will allow a review into whether the community contains populations of burrowing polychaete, bivalve or echinoderm species.

The density of the burrows was quantified using the video footage and still images to provide further information on the potential abundance of burrowing fauna. The visible seabed area was estimated with a laser scale to calculate the number of burrows per m^2. Still images were assessed at 60 second intervals to provide a high-resolution assessment of the burrows present.

In order to apply the SACFOR scale (Table 3.10), the burrows were divided into two size groups and assessed independently, with smaller burrows likely to be inhabited by burrowing fauna of 1 to 3 cm length and larger burrows likely inhabited by fauna of 3 to 15 cm in diameter burrows length. Due to the typically small size of non-*Nephrops* burrowing fauna (1 to 3 cm) present within the survey area, it was not possible to differentiate the burrows of different species. As such, it was necessary to count

all visible burrow holes, which is likely to overestimate the total number of burrowing megafauna by including other small body-sized burrowing fauna, such as polychaetes. Burrow count data for each still image assessed across all relevant transects are detailed in Table 3.11 and Appendix VI.

Table 3.10 SACFOR Abundance Scale

Cover (%)	Crust/ Meadow	Massive/ Turf	<1cm	1-3 cm	3-15 cm	>15 cm	Density	
>80%	S		S				>1/0.001m² (1x1 cm)	>10,000/m²
40-79%	A	S	A	S			1-9/0.001m²	1000-9999/m²
20-39%	C	A	C	A	S		1-9 / 0.01m² (10 x 10 cm)	100-999/m²
10-19%	F	C	F	C	A	S	1-9 / 0.1m²	10-99/m²
5-9%	O	F	O	F	C	A	1-9/m²	
1-5% or density	R	O	R	O	F	C	1-9 / 10m² (3.16 x 3.16m)	0.1 to 0.9/m²
<1% or density		R		R	O	F	1-9 / 100m² (10 x 10m)	0.01 to 0.09/m²
					R	O	1-9 / 1000m² (31.6 x 31.6m)	>0.01/m²
						R	<1 / 1000m² (100 x 100m)	-
							<1 / 10000m² (1km²)	

Key					
Superabundant	**A**bundant	**C**ommon	**F**requent	**O**ccasional	**R**are

The results of the burrows assessment indicate that 44 out of the 51 transects reviewed revealed the presence of burrows predominantly in the 'Offshore Circalittoral Mud' biotope. Large burrows were observed across 42 stations and were categorised as 'Occasional' to 'Common' on the SACFOR scale, whereas small burrows were observed at just 21 stations varying in average density from 'Rare' to 'Frequent' (Table 3.11, Figure 3.11 and Figure 3.12). The presence of 'Frequent' or above burrow densities, particularly in the case of large burrows, coupled with the presence of burrowing fauna (*N. norvegicus*) indicates a degree of conformity to the OSPAR 'Seapen and Burrowing Megafauna Communities' and/or the 'Burrowed Mud' Scottish PMF. Further analysis of the macrofauna data within the subsequent EBS report will give an insight to the burrowing infauna formulating the smaller burrows within the survey area.

Example images of burrows and their respective burrowing fauna found within the CENOS OWF survey area are presented in (Figure 3.10).

Table 3.11 CENOS OWF Burrow Density Estimations

Transect	Sediment variation (Camera and Grab data)	Number of small burrows present (1 to 3 cm) per m²	Number of large burrows present (3 to 15 cm) per m²
OWF_01*	Offshore Circalittoral Mud	1.34	0.73
OWF_02	Offshore Circalittoral Mud	1.99	1.11
OWF_03	Offshore Circalittoral Mud	0.31	1.27
OWF_04*	Offshore Circalittoral Mud/Offshore Circalittoral Mixed Sediment	0.11	0.62
OWF_05	Offshore Circalittoral Mud	0.50	0.31
OWF_06	Offshore Circalittoral Mud	0.00	0.72
OWF_07*	Offshore Circalittoral Mud	0.15	0.46
OWF_08	Offshore Circalittoral Mud	0.20	0.55
OWF_09	Offshore Circalittoral Mud	0.00	0.41
OWF_10*	Offshore Circalittoral Mud	0.00	0.00
OWF_11	Offshore Circalittoral Mud/Offshore Circalittoral Mixed Sediment	0.06	0.15
OWF_12	Offshore Circalittoral Mud	0.00	0.50
OWF_13*	Offshore Circalittoral Mud	0.58	0.00
OWF_14	Offshore Circalittoral Mud	0.56	0.22
OWF_15	Offshore Circalittoral Mud	0.00	0.45
OWF_16*	Offshore Circalittoral Mud	0.18	0.86
OWF_17	Offshore Circalittoral Mud	0.00	0.30
OWF_18	Offshore Circalittoral Mud	0.45	0.40
OWF_19*	Offshore Circalittoral Mud	-	-
OWF_20	Offshore Circalittoral Mud	0.53	0.84
OWF_21*	Offshore Circalittoral Mud	0.15	0.44
OWF_22	Offshore Circalittoral Mud	0.00	0.07
OWF_23*	Offshore Circalittoral Mud	0.00	0.00
OWF_24	Offshore Circalittoral Mud/Offshore Circalittoral Mixed Sediment	0.00	0.25
OWF_25*	Offshore Circalittoral Mud	0.00	0.22
OWF_26	Offshore Circalittoral Mud/Offshore Circalittoral Mixed Sediment	0.00	0.00
OWF_27*	Offshore Circalittoral Mud	0.00	0.94
OWF_28	Offshore Circalittoral Mud	0.00	0.23
OWF_29*	Offshore Circalittoral Mud/Offshore Circalittoral Mixed Sediment	0.00	0.00
OWF_30_A	Offshore Circalittoral Mud/Offshore Circalittoral Mixed Sediment	0.00	0.00
OWF_31*	Offshore Circalittoral Mud	0.00	0.63
OWF_32	Offshore Circalittoral Mud/Offshore Circalittoral Mixed Sediment	0.00	0.13
OWF_33	Offshore Circalittoral Mud	0.17	0.47
OWF_34	Offshore Circalittoral Mud	0.17	0.20

Transect	Sediment variation (Camera and Grab data)	Number of small burrows present (1 to 3 cm) per m²	Number of large burrows present (3 to 15 cm) per m²
OWF_35_A *	Offshore Circalittoral Mud/Offshore Circalittoral Mixed Sediment	0.12	0.00
OWF_36	Offshore Circalittoral Mud	0.00	0.34
OWF_37*	Offshore Circalittoral Mud	0.00	0.58
OWF_38*	Offshore Circalittoral Mud	0.00	0.30
OWF_39	Offshore Circalittoral Mud	0.00	0.49
OWF_40*	Offshore Circalittoral Mud/Offshore Circalittoral Mixed Sediment	0.00	0.33
OWF_41	Offshore Circalittoral Mud	0.00	0.21
OWF_42	Offshore Circalittoral Mixed Sediment	0.00	0.31
OWF_43	Offshore Circalittoral Mud	0.00	0.76
OWF_44	Offshore Circalittoral Mud	1.57	0.31
OWF_45	Offshore Circalittoral Mud/Offshore Circalittoral Mixed Sediment	0.00	0.18
OWF_46	Offshore Circalittoral Mud	0.00	0.30
OWF_47*	Offshore Circalittoral Mud/Offshore Circalittoral Mixed Sediment	0.00	0.00
OWF_48_A *	Offshore Circalittoral Mud	0.44	0.17
OWF_49	Offshore Circalittoral Mud	0.00	1.05
OWF_50	Offshore Circalittoral Mud	1.09	1.06
OWF_51*	Offshore Circalittoral Mud/Offshore Circalittoral Mixed Sediment	0.00	0.00

Colour code for SACFOR abundance classification

Superabundant	Abundant	Common	Frequent	Occasional	Rare

Notes
**Stations without grab samples and only camera data available for sediment classification*

Figure 3.10 Nephrops norvegicus Interacting with Burrows

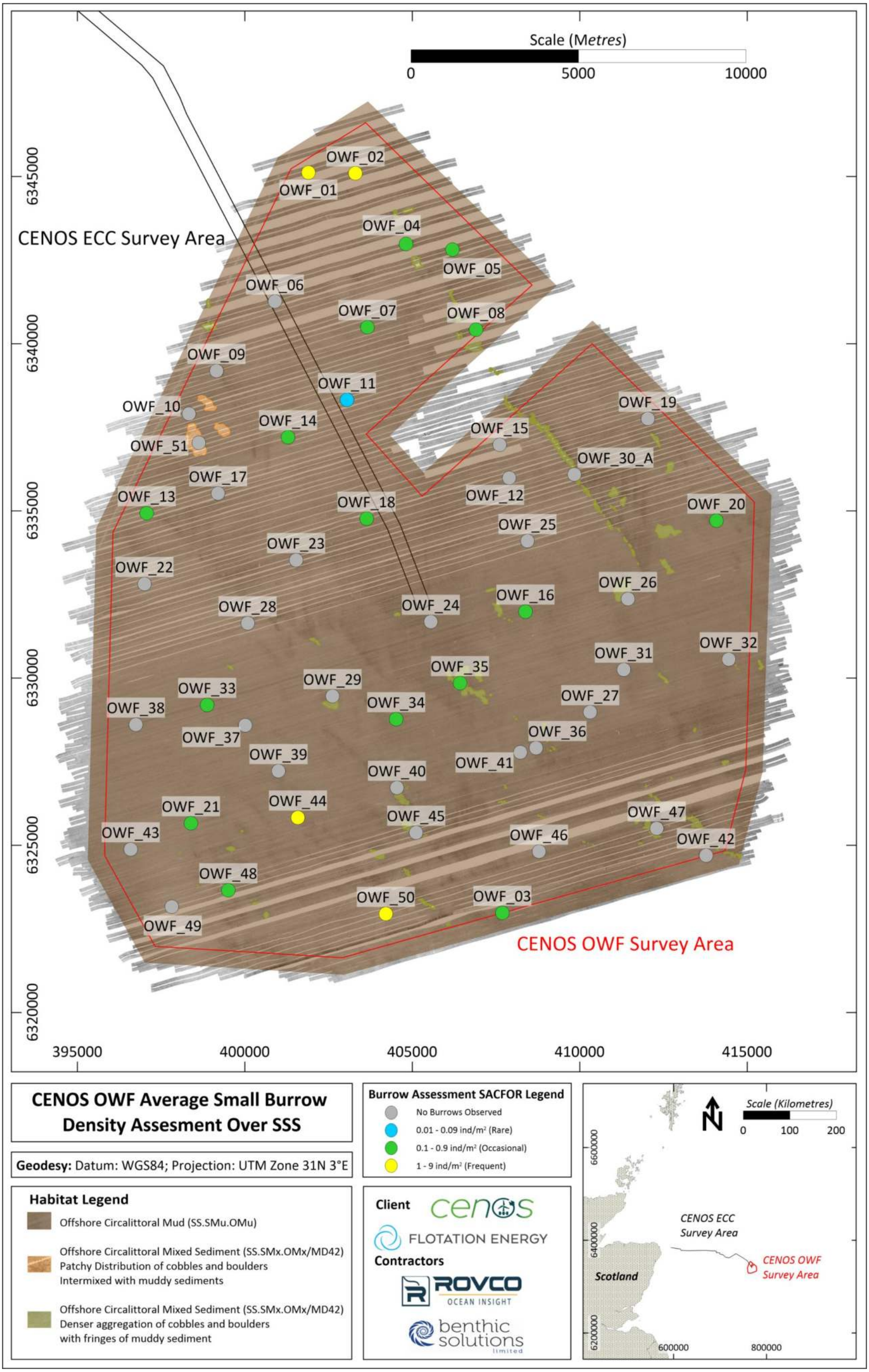


Figure 3.11 ***Average Small Burrow Density within the OWF Survey Area***

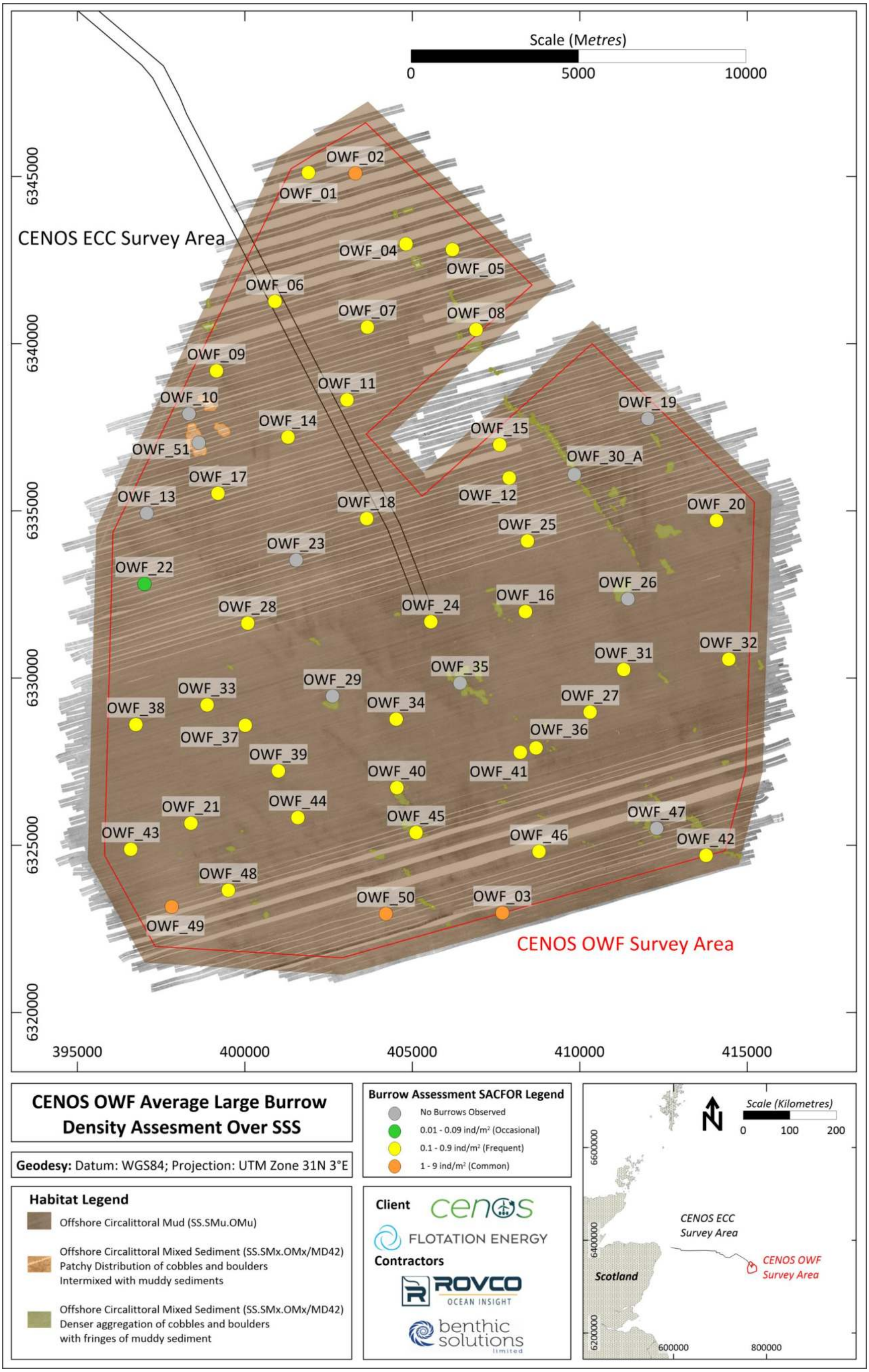


Figure 3.12 ***Average Large Burrow Density within the OWF Survey Area***

3.3.6 Ocean Quahog (Arctica islandica)

The ocean quahog (*A. islandica*) bivalve species is afforded status under the OSPAR Commission due to its inclusion on the OSPAR List of Threatened and/or Declining Species in the Greater North Sea area as a priority (OSPAR, 2009). This species is also listed as a marine conservation zone (MCZ) feature of conservation importance (FOCI) for both inshore and offshore protection (JNCC and Natural England, 2016). Ocean quahogs grow very slowly and are at particular risk from bottom fishing gear, and like other slow-growing animals, once their numbers have reduced the populations can take a long time to recover. The species prefers sand and muddy sands ranging from fine to coarse grains and live buried vertically within the top few centimetres of the sediment, with retractable inhalant and exhalant siphons occasionally visible at the surface.

No live adult specimens of ocean quahogs were identified during field operations, nor was there any sighting of their distinctive siphons observed following review of the acquired video footage and photographic stills. The potential occurrence of juvenile specimens (<5 cm), which are difficult to distinguish from other bivalves in the field, will be explored in the upcoming EBS report following taxonomic review of the faunal samples.

4 Conclusion

The seabed within the OWF area was relatively flat, with water depths across the site ranging from 90-100 m. The SSS data indicated low to moderate reflectivity across most of the OWF survey area with lower reflectivity areas relating to ambient muddy sand/sand substrate, with a Munsell colour of dark reddish brown (5Y 3/2). Areas of higher reflectivity were typically associated with patches of gravel and gravelly sand, with a Munsell colour of dark olive brown (2.5YR 3/3), within smaller isolated areas of mixed sediment, with varying compositions of pebbles, shell debris, cobbles and boulders.

The seabed across the proposed CENOS OWF site was predominantly comprised of the JNCC/EUNIS habitat classification of SS.SSa.OSa/MD521/A5.27 'Offshore Circalittoral Mud' with smaller sporadic areas conforming to SS.SMx.OMx/MD42 'Offshore Circalittoral Mixed Sediment'. This mixed sediment was split into two variants relating to the density of cobbles and boulders within this habitat; the northwestern edge of the survey area was delineated by a 'Patchy distribution of cobbles and boulders intermixed with muddy sediment', while other areas of mixed sediment were delineated as 'Denser aggregation of cobbles and boulders with fringes of muddy sediment'. Sessile conspicuous fauna observed across the survey area included several species of sea pens (*Virgularia mirabilis*, *Pennatula phosphorea* and *Funiculina quadrangularis*), anemones (*Cerianthus lloydii*, *Bolocera tuediae*) and scallop (Pectinidae). Frequently observed mobile fauna included hermit crabs (*Pagurus* sp.), sea stars (Asteroidea, *Asterias rubens*), whelk (Buccinidae) and Norway lobster (*Nephrops norvegicus*). Several species of fish including flatfish (Pleuronectiformes), gadoid fish (Gadidae) and hagfish (*Myxine glutinosa*) were often observed throughout the survey area.

Due to the presence of cobbles and boulders, a stony reef assessment was undertaken to establish whether any Annex I stony reef occurred within the survey area. The analysis of 540 images taken along seven camera transects indicated that the majority of the survey area did not show any evidence of a stony reef. Only 0.7% of the images showed a low level of reefiness, while no medium or high reef structures were identified. Due to the lack of distinct signatures within geophysical data, associated with these areas, approximations of their full spatial extent were made by assuming that reefs occupied circular areas of seabed. Areas of mostly low stony reef (structure vs epifauna coverage) identified from the camera transects were of variable size and, as a result, the majority of camera ground-truthed areas were ultimately classified as' Not a Reef' as stony substrate did not exceed the minimum threshold of 25 m^2. A single occurrence of 'Low Reef' was identified in terms of overall reefiness (structure vs. epifaunal coverage vs. extent) on a single transect (OWF_51), comprising one habitat segment represented by just two still images. This transect was one of two running through areas of outcropping Coal Pit Formation denoted in the SSS, with only one delineated polygon showing a texture and high reflectivity signature associated with the identified stony reef. There were no 'Medium Reef' or 'High Reef' areas identified from the ground-truthing data. In line with the Irving (2009) stony reef guidance, all such areas of 'Low Reef' are unlikely to be classified as Annex I stony reef without strong justification. Accordingly, the aforementioned area of 'Low Reef' was further evaluated to determine whether any such justification was warranted by assessing whether they met the reef biotope/species characteristics outlined by Golding *et al*. (2020). However, the abundance of key reef species was scarce or isolated to individual still images and, as a consequence, this area was

classified as a 'Possible Low Reef' with no strong justification for Annex I protection. Due to the lack of the precise extent of the reef patches, the extent could not be reliably mapped.

Sponges were evident across the survey area, primarily associated with areas of cobbles/boulders in both subcategories of the mixed sediment. In order to assess the potential occurrence of the 'deep-sea sponge aggregations' Priority Marine Feature (PMF) and OSPAR habitat, an assessment was undertaken using the OSPAR (2010) definition of deep-sea sponge aggregations, whereby individual abundance is counted. The abundance of sponges did not exceed the minimum thresholds for density (>0.5 sponges per square metre) and extent (>25 m^2). In order to verify whether deep-sea sponge aggregations occurred in the OWF survey area, the results of the OSPAR (2010) assessment were evaluated against the criteria outlined by the JNCC which takes into account the density, habitat and ecological function of an area (Henry and Roberts, 2014). Given no criteria were met in the OWF survey area it can be concluded the 'deep-sea sponge aggregations' habitat is not present.

Due to the presence of burrowing megafauna (*Nephrops norvegicus*) and sea pens (*V. mirabilis, P. phosphorea* and *F. quadrangularis*) within the survey area, the video footage and still photographs were assessed using the SACFOR abundance scale. The results revealed burrow presence across 41 of the 51 stations reviewed, with large burrows occurring at a density of at least 'Frequent' at 40 of these stations. As such, the proposed CENOS OWF site shows a degree of conformance to the OSPAR 'Seapen and Burrowing Megafauna Communities' habitat type.

No live specimens of *A. islandica* were observed during field operations, nor was there any evidence of their distinct siphons following review of the acquired video and photographic stills. Insights into the presence of juvenile specimens (shell diameter <5 cm) will be reviewed in the subsequent environmental baseline report once the macrofauna data becomes available.

Areas of 'Circalittoral Mixed Sediment' identified within the survey area could be considered to represent the subtidal sands and gravel broad scale habitat.

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Appendix I – Field Operations

Appendix I presents a summary of the different methods employed during the field. For additional information, please refer to the Environmental Field Report (Doc Ref: PRJ000836-SUB-REP-002).

Seabed Photography and Video

Seabed video footage was acquired using the BSL MOD4 camera system fitted with laser scaling of 9.5 cm, to ground-truth all grab locations, and additional transects were performed to increase coverage of the site and target features observed within the geophysical data. All transects were selected with the aim to facilitate a robust benthic ecology and habitat assessment. Once at the seabed, the camera was moved along the length of the transect at a speed of 0.3-0.5 knots, at an elevation of between 0.3 - 1.0 m above the seafloor. Best efforts were made to minimise the contact with the seabed throughout the transects. Live video footage, overlaid with the date, time, position and site details were viewed in real-time, and were recorded by BSL personnel. High-definition stills images were taken at regular intervals (>1 per 10 m) along the transects. Upon recovery of the camera, data was backed onto a second storage medium to prevent inadvertent loss of information.

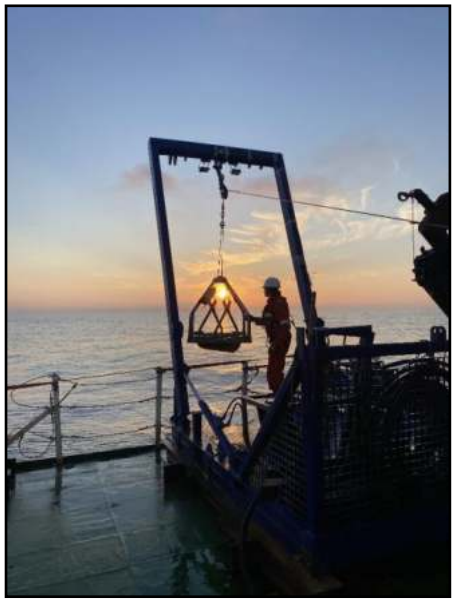
Figure I.1 MOD4 Camera Deployment

Water Sampling

Water Sampling was performed at ten locations in the OWF survey area. Water profiles were obtained using a Valeport MIDAS CTD and water samples were obtained at three depths (surface, middle and bottom) using five litre Niskin bottles triggered using a messenger weight. The preservation of water was undertaken using standard techniques. All physico-chemical samples were stored in appropriate containers (i.e., glass for hydrocarbons, and plastics for metals and chlorophyl) and appropriately stored (frozen at < -18°C for metals and chlorophyl and chilled at 5°C for hydrocarbons) for later transportation to the laboratory upon demobilisation.

Environmental Baseline Seabed Sampling

BSL Double Grab



A BSL double grab was used for sampling the seabed at along all pipeline and cruciform sample locations. The BSL double grab was designed and built by BSL for operations in soft sediments, compacted sands, and shallow stiff clays. This device consists of two 0.1 m^2 samplers set into a ballasted frame, reducing the time required to obtain multiple replicates at a single station.

Pre-deployment procedures included the cleaning of the inner stainless grab buckets, cable and shackles so that they were generally grease free. Samples were subject to quality control on retrieval and were retained in the following circumstances:

- Water above sample was undisturbed;
- Bucket closure complete allowing no sediment washout;
- Sampler access doors had closed properly enclosing the sample;
- No disruption of the sample through striking the side of the vessel;
- Sample was taken within the acceptable target range <10m;
- Sample represented greater than 5L capacity;
- No hagfish or other mucus coagulants were found in the sample;
- There was no obvious contamination from equipment or the vessel, etc.;
- The sample was acceptable to the principal scientist.

Upon recovery, each sample was inspected, described, and photographed prior to processing. Key observations from samples included colour, sediment classification, layering (including RDLs), smell (including the presence of H_2S), obvious fauna, evidence of bioturbation and evidence of anthropogenic debris. Two successful deployments of the DVV (four successful 0.1 m^2 replicates) were required per station to acquire enough material for three macrofauna replicates and sub-sampling of physico-chemistry from the remaining sample. The macrofaunal replicates were processed on-board over a 500 µm aperture mesh by BSL scientists using a *Wilson* Auto-siever.

Sample Processing

Field processing was conducted on board by BSL scientists. Sub-sampling of physico-chemical parameters was undertaken from the grab samples with the following material retrieved from the surface sediments (0-2 cm) for later analysis:

- Hydrocarbons (stored in a pre-washed foil capped glass jar);
- Heavy & trace metals and Total Organic Carbon & Matter (stored in doubled lined ziplock plastic bag);
- Particle size distribution (PSA; stored in doubled lined ziplock plastic bag);

The preservation of materials was undertaken using standard techniques. All physico-chemical samples were stored in appropriate containers (i.e., glass for hydrocarbons and plastics for metals and PSA) and immediately frozen and stored (< -18°C) for later transportation (frozen) to the laboratory upon demobilisation. Macrofaunal samples were fixed and stained in 5-10% buffered formalin and a vital stain (Rose Bengal) for storage and transportation. This material will be later transferred to Industrial Methylated Spirit (IMS). All biological samples were double-labelled with internal tags.

Appendix II – Sampling Log Sheets

Cast #	Station	Sampler Used	Water Depth (m)	Time	Date	Volume Recovered	Sample Name	Container Type/Quantity	Sediment Characteristic			Conspicuous fauna/comments
									Stratification (cm)	Munsell Colour	Sediment Description	
1	OWF_42	DVV	96	03:11	24/08/2023	20% 20%	NS	-	0-2	2.5YR 3/3	Sandy Gravelly Mud	Cobble in jaws, sample washout.
									2-5	2.5YR 3/3	Sandy Gravelly Mud	
									5-10	2.5YR 3/3	Sandy Gravelly Mud	
2	OWF_42	DVV	96	03:40	24/08/2023	30% 10%	PC NS	3 Bags, 2 Jars, 1 FT	0-2	2.5YR 3/3	Muddy Gravel	-
									2-5	2.5YR 3/3	Gravel (Coarse)	
									5-10	-	-	
3	OWF_42	DVV	96	04:06	24/08/2023	50% 30%	F NS	1 × 1L 1 × 3L	0-2	2.5YR 3/3	Muddy Gravel	Ophiuroidea Hydrozoan, Limpet, Polychaetes
									2-5	2.5YR 3/3	Coarse Muddy Gravel	
									5-10	2.5YR 3/3	Coarse Muddy Gravel	
4	OWF_46	DVV	99	09:11	24/08/2023	99% 99%	F PC	3 Bags, 2 Jars, 1 FT 1 × 1L	0-2	2.5YR 3/3	Slightly Sandy Mud	Polychaetes, Tusk shells, Sea mouse
									2-5	2.5YR 3/3	Slightly Sandy Mud	
									5-10	2.5YR 3/3	Slightly Sandy Mud	
5	OWF_41	NB CTD	100	11:44 12:06 12:09	24/08/2023	-	BOT MID SUR	6 × glass bottles 9 × plastic bottles	0-2	-	-	-
									2-5	-	-	
									5-10	-	-	
7	OWF_41	DVV	100	12:30	24/08/2023	99% 99%	PC F	3 Bags, 2 Jars, 1 FT 1 × 1L	0-2	2.5YR 3/3	Slightly Sandy Mud	Polychaetes, Ophiuroidea, Caridea
									2-5	2.5YR 3/3	Slightly Sandy Mud	
									5-10	2.5YR 3/3	Slightly Sandy Mud	
8	OWF_36	DVV	98	14:00	24/08/2023	99% 99%	PC F	3 Bags, 2 Jars, 1 FT 1 × 1L	0-2	2.5YR 3/3	Slightly Sandy Mud	Polychaetes
									2-5	2.5YR 3/3	Slightly Sandy Mud	
									5-10	2.5YR 3/3	Slightly Sandy Mud	
9	OWF_32	NB CTD	90 45 3	16:57 17:15 17:19	24/08/2023	-	BOT MID SUR	6 × glass bottles 9 × plastic bottles	0-2	-	-	
									2-5	-	-	
									5-10	-	-	
11	OWF_32	DVV	94	17:34	24/08/2023	70% 70%	PC F	3 Bags, 2 Jars, 1 FT 1 × 1L	0-2	2.5Y 3/2	Sandy Mud	Bivalvia
									2-5	2.5Y 3/2	Sandy Mud	
									5-10	2.5Y 3/2	Sandy Mud	
12	OWF_24	DVV	97	23:27	24/08/2023	88% 85%	F PC	3 Bags, 2 Jars, 1 FT 1 × 1L	0-2	2.5Y 2.5/1	Sandy Mud	Ophiuroidea, Bivalvia
									2-5	2.5Y 2.5/1	Sandy Mud	
									5-10	2.5Y 2.5/1	Sandy Mud	

Cast #	Station	Sampler Used	Water Depth (m)	Time	Date	Volume Recovered	Sample Name	Container Type/Quantity	Sediment Characteristic			Conspicuous fauna/comments
									Stratification (cm)	Munsell Colour	Sediment Description	
13	OWF_26	DVV	98	06:23	25/08/2023	90% NS	F	1 × 1L	0-2	2.5Y 3/2	Sandy Mud	Ophiuroidea, Polychaetes
									2-5	2.5Y 3/2	Sandy Mud	
									5-10	2.5Y 3/2	Sandy Mud	
14	OWF_26	DVV	98	06:41	25/08/2023	65% 30%	PC NS	3 Bags, 2 Jars, 1 FT	0-2	2.5Y 3/2	Sandy Mud	-
									2-5	2.5Y 3/2	Sandy Mud	
									5-10	2.5Y 3/2	Sandy Mud	
15	OWF_20	DVV	99	08:14	25/08/2023	90% 30%	F NS	1 × 1L	0-2	2.5Y 3/2	Sandy Mud	Urchin, *A. Islandica* shell, Amphipod No grab pictures for this sample
									2-5	2.5Y 3/2	Sandy Mud	
									5-10	2.5Y 3/2	Sandy Mud	
16	OWF_20	DVV	99	08:26	25/08/2023	95% 80%	PC NS	3 Bags, 2 Jars, 1 FT	0-2	2.5Y 3/2	Sandy Mud	-
									2-5	2.5Y 3/2	Sandy Mud	
									5-10	2.5Y 3/2	Sandy Mud	
17	OWF_30	DVV	100	10:55	25/08/2023	40% 20%	PC NS	3 Bags, 2 Jars, 1 FT	0-2	2.5Y 3/2	Slightly Gravelly Sand	-
									2-5	2.5Y 3/2	Slightly Gravelly Sand	
									5-10	2.5Y 3/2	Slightly Gravelly Sand	
18	OWF_30	DVV	100	11:10	25/08/2023	20% 25%	NS NS	-	0-2	-	-	-
									2-5	-	-	
									5-10	-	-	
19	OWF_30	DVV	100	11:38	25/08/2023	0% 20%	NS NS	-	0-2	-	-	-
									2-5	-	-	
									5-10	-	-	
20	OWF_30_A	DVV	100	11:51	25/08/2023	80% 80%	F1 PC	3 Bags, 2 Jars, 1 FT 1 × 1L	0-2	5Y 3/2.5	Sandy Mud	Relocated 50m along the transect for this attempt.
									2-5	5Y 3/2.5	Sandy Mud	
									5-10	5Y 3/2.5	Sandy Mud	
21	OWF_12	DVV	99	13:04	25/08/2023	0% 0%	NS NS	-	0-2	-	-	-
									2-5	-	-	
									5-10	-	-	
22	OWF_12	DVV	99	13:11	25/08/2023	80% 50%	F PC	3 Bags, 2 Jars, 1 FT 1 × 1L	0-2	2.5YR 3/3	Slightly Sandy Mud	Polychaetes
									2-5	2.5YR 3/3	Slightly Sandy Mud	
									5-10	2.5YR 3/3	Slightly Sandy Mud	
23	OWF_15	NB CTD	99	14:47 14:48 14:45	25/08/2023	5L 5L 5L	SUR MID BOT	6 × glass bottles 9 × plastic bottles	0-2	-	-	-
									2-5	-	-	
									5-10	-	-	

Cast #	Station	Sampler Used	Water Depth (m)	Time	Date	Volume Recovered	Sample Name	Container Type/Quantity	Sediment Characteristic			Conspicuous fauna/comments
									Stratification (cm)	Munsell Colour	Sediment Description	
24	OWF_15	DVV	99	15:05	25/08/2023	90% 90%	F PC	3 Bags, 2 Jars, 1 FT 1 × 1L	0-2	2.5YR 4/3	Slightly Sandy Mud	Sea potato, Polychaetes, Ophiuroid
									2-5	2.5YR 4/3	Slightly Sandy Mud	
									5-10	2.5YR 4/3	Slightly Sandy Mud	
25	OWF_08	DVV	99	16:34	25/08/2023	90% 90%	F PC	3 Bags, 2 Jars, 1 FT 1 × 1L	0-2	2.5YR 4/3	Slightly Sandy Mud	Sea potato, Polychaetes, Ophiuroid
									2-5	2.5YR 4/3	Slightly Sandy Mud	
									5-10	2.5YR 4/3	Slightly Sandy Mud	
26	OWF_05	NB CTD	96 50 2	19:10 19:03 18:53	25/08/2023	-	SUR MID BOT	6 × glass bottles 9 × plastic bottles	0-2	-	-	-
									2-5	-	-	
									5-10	-	-	
27	OWF_05	DVV	96	19:23	25/08/2023	75% 80%	PC F	3 Bags, 2 Jars, 1 FT 1 × 1L	0-2	5Y 3/2	Sandy Mud	Brittlestar, Polychaetes Slight H_2S smell
									2-5	5Y 3/2	Sandy Mud	
									5-10	5Y 3/2	Sandy Mud	
28	OWF_02	NB CTD	96 50 2	22:22 22:19 22:10	25/08/2023	5L 5L 5L	SUR MID BOT	6 × glass bottles 9 × plastic bottles	0-2	-	-	-
									2-5	-	-	
									5-10	-	-	
29	OWF_02	DVV	100	22:29	25/08/2023	60% 80%	PC F	3 Bags, 2 Jars, 1 FT 1 × 1L	0-2	5Y 3/2	Sandy Mud	Polychaetes, Ophiuroid
									2-5	5Y 3/2	Sandy Mud	
									5-10	5Y 3/2	Sandy Mud	
30	OWF_06	DVV	98	01:48	26/08/2023	85% 85%	PC F	3 Bags, 2 Jars, 1 FT 1 × 1L	0-2	5Y 3/2	Sandy Mud	Ophiuroid, Urchin, Polychaetes, Bivalvia
									2-5	5Y 3/2	Sandy Mud	
									5-10	5Y 3/2	Sandy Mud	
31	OWF_11	DVV	100	04:18	26/08/2023	70% 85%	PC F	3 Bags, 2 Jars, 1 FT 1 × 1L	0-2	5Y 3/2	Muddy Sand	-
									2-5	5Y 3/2	Muddy Sand	
									5-10	5Y 3/2	Muddy Sand	
32	OWF_09	NB CTD	100	06:1606:29 06:35	26/08/2023	5L 5L 5L	BOT SUR MID	6 × glass bottles 9 × plastic bottles -	0-2	-	-	-
									2-5	-	-	
									5-10	-	-	
34	OWF_09	DVV	100	06:36	26/08/2023	60% 60%	F PC	3 Bags, 2 Jars, 1 FT 1 × 1L	0-2	5Y 3/2	Sandy Mud	Crab, Polychaetes, Ophiuroid No grab photos for this station
									2-5	5Y 3/2	Sandy Mud	
									5-10	5Y 3/2	Sandy Mud	

Cast #	Station	Sampler Used	Water Depth (m)	Time	Date	Volume Recovered	Sample Name	Container Type/Quantity	Sediment Characteristic			Conspicuous fauna/comments
									Stratification (cm)	Munsell Colour	Sediment Description	
35	OWF_14	DVV	100	09:03	26/08/2023	90% 90%	F PC	3 Bags, 2 Jars, 1 FT 1 × 1L	0-2	5Y 3/2	Sandy Mud	Polychaetes, *Pennatula phosphorea,* Ophiuroid
									2-5	5Y 3/2	Sandy Mud	
									5-10	5Y 3/2	Sandy Mud	
36	OWF_18	NB CTD	100 50 2	10:35 10:47 10:46	26/08/2023	5L 5L 5L	BOT MID SUR	6 × glass bottles 9 × plastic bottles	0-2	-	-	-
									2-5	-	-	
									5-10	-	-	
38	OWF_18	DVV	100	10:53	26/08/2023	70% 70%	F PC	3 Bags, 2 Jars, 1 FT 1 × 1L	0-2	5Y 3/2	Sandy Mud	Polychaetes
									2-5	5Y 3/2	Sandy Mud	
									5-10	5Y 3/2	Sandy Mud	
39	OWF_17	DVV	96	13:27	26/08/2023	60% 60%	NS	-	0-2	-	-	Hagfish in the grab -> sample rejection
									2-5	-	-	
									5-10	-	-	
40	OWF_17	DVV	96	13:37	26/08/2023	85% 85%	F PC	3 Bags, 2 Jars, 1 FT 1 × 1L	0-2	5Y 3/2	Sandy Mud	Polychaetes
									2-5	5Y 3/2	Sandy Mud	
									5-10	5Y 3/2	Sandy Mud	
41	OWF_22	NB	100	15:22 15:28	26/08/2023	-	NS	-	0-2	-	-	NB failed to trigger
									2-5	-	-	
									5-10	-	-	
43	OWF_22	NB CTD	99	15:32 15:40 15:45	26/08/2023	-	BOT MID SUR	6 × glass bottles 9 × plastic bottles -	0-2	-	-	-
									2-5	-	-	
									5-10	-	-	
46	OWF_22	DVV	99	15:51	26/08/2023	80% 80%	F PC	3 Bags, 2 Jars, 1 FT 1 × 1L	0-2	5Y 4/3	Sandy Mud	Polychaetes
									2-5	5Y 4/3	Sandy Mud	
									5-10	5Y 4/3	Sandy Mud	
47	OWF_28	DVV	100	17:25	26/08/2023	80% 70%	F PC	3 Bags, 2 Jars, 1 FT 1 × 1L	0-2	5Y 4/3	Sandy Mud	Polychaetes, Bivalves
									2-5	5Y 4/3	Sandy Mud	
									5-10	5Y 4/3	Sandy Mud	
48	OWF_34	DVV	100	20:03	26/08/2023	80% 70%	F PC	3 Bags, 2 Jars, 1 FT 1 × 1L	0-2	5Y 4/3	Sandy Mud	Polychaetes, Bivalves
									2-5	5Y 4/3	Sandy Mud	
									5-10	5Y 4/3	Sandy Mud	

Cast #	Station	Sampler Used	Water Depth (m)	Time	Date	Volume Recovered	Sample Name	Container Type/Quantity	Sediment Characteristic			Conspicuous fauna/comments
									Stratification (cm)	Munsell Colour	Sediment Description	
49	OWF_45	DVV	101	22:37	26/08/2023	70% 50%	F PC	3 Bags, 2 Jars, 1 FT 1 × 1L	0-2	5Y 4/2	Sandy Mud	-
									2-5	5Y 4/2	Sandy Mud	
									5-10	5Y 4/2	Sandy Mud	
50	OWF_03	NB CTD	100	00:30 00:41 00:43	27/08/2023	5L 5L 5L	BOT MID SUR	6 × glass bottles 9 × plastic bottles	0-2	-	-	-
									2-5	-	-	
									5-10	-	-	
51	OWF_03	DVV	100	00:49	27/08/2023	80% 70%	F PC	3 Bags, 2 Jars, 1 FT 1 × 1L	0-2	5Y 3/2	Sandy Mud	Bivalves, Ophiuroid, Polychaetes
									2-5	5Y 3/2	Sandy Mud	
									5-10	5Y 3/2	Sandy Mud	
52	OWF_50	DVV	100	02:55	27/08/2023	85% 85%	F PC	3 Bags, 2 Jars, 1 FT 1 × 1L	0-2	5Y 3/2	Sandy Mud	-
									2-5	5Y 3/2	Sandy Mud	
									5-10	5Y 3/2	Sandy Mud	
53	OWF_49	NB CTD	100	06:42 06:52	27/08/2023	-	BOT MID SUR	6 × glass bottles 9 × plastic bottles	0-2	-	-	-
									2-5	-	-	
									5-10	-	-	
55	OWF_49	DVV	100	06:55	27/08/2023	90% 90%	F PC	3 Bags, 2 Jars, 1 FT 1 × 1L	0-2	5Y 3/2	Sandy Mud	-
									2-5	5Y 3/2	Sandy Mud	
									5-10	5Y 3/2	Sandy Mud	
56	OWF_43	DVV	100	08:17	27/08/2023	85% 85%	F PC	3 Bags, 2 Jars, 1 FT 1 × 1L	0-2	5Y 3/2	Sandy Mud	Ophiuroid
									2-5	5Y 3/2	Sandy Mud	
									5-10	5Y 3/2	Sandy Mud	
57	OWF_39	DVV	100	11:53	27/08/2023	80% 80%	F PC	3 Bags, 2 Jars, 1 FT 1 × 1L	0-2	5Y 3/2	Sandy Mud	Ophiuroid, Polychaetes
									2-5	5Y 3/2	Sandy Mud	
									5-10	5Y 3/2	Sandy Mud	
58	OWF_35	DVV	100	13:36	27/08/2023	80% 80%	F PC	3 Bags, 2 Jars, 1 FT 1 × 1L	0-2	5Y 3/2	Sandy Mud	Polychaetes
									2-5	5Y 3/2	Sandy Mud	
									5-10	5Y 3/2	Sandy Mud	

Appendix III – Camera Transect Log Sheets

For electronic copies of this report, the Appendix below has been made available separately within the https://marine.gov.scot supporting documentation for Cenos Offshore Windfarm, as well as on our website at www.cenosoffshorewind.com.

For hard copies of this report please see information included below.

Appendix IV – Stony Reef Assessment

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Appendix V - Deep-sea sponge Assessment

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Appendix VI – Burrow Assessment

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Appendix VII – Sample and Seabed Photographs

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Appendix VIII – Service Warranty

This report, with its associated works and services, has been designed solely to meet the requirements of the contract agreed with you, our client. If used in other circumstances, some or all of the results may not be valid, and we can accept no liability for such use. Such circumstances include different or changed objectives, use by third parties, or changes to, for example, site conditions or legislation occurring after completion of the work. In case of doubt, please consult Benthic Solutions Limited. Please note that all charts, where applicable should not be used for navigational purposes.